

Facility: <b><u>Columbia Generating Station</u></b>		Date of Examination: <b><u>April 2015</u></b>
Examination Level: RO <b>X</b> SRO		Operating Test Number: <b><u>1</u></b>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	M, R	Main Turbine change of load rate determination
Conduct of Operations	P, R	Alternate determination of drywell identified leak rate
Equipment Control	D, R	Determine FPC-P-1A clearance order requirements
Radiation Control	N, R	Determine Radiological posting requirements
Emergency Procedures/Plan		
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria:    (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		

Facility: <b><u>Columbia Generating Station</u></b>		Date of Examination: <b><u>April 2015</u></b>
Examination Level: RO	SRO <b>X</b>	Operating Test Number: <b>1</b>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations	P, D, R	Based on plant conditions and pull sheets supplied, determine early criticality will occur and then determine required procedural actions.
Conduct of Operations	M, R	Based on plant conditions, determine if 'Voluntary Entry into AIA' is allowable.
Equipment Control	M, R	Determination of Operating Point and required action following feedwater heater trip.
Radiation Control	D, R	Estimate Main Condenser air ejector gross gamma activity and determine required actions.
Emergency Procedures/Plan	M, R	Given a QEDPS, determine that a General Emergency should be declared and complete a Classification Notification Form for the declaration.
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank ( $\leq 3$ for ROs; $\leq 4$ for SROs & RO retakes) (N)ew or (M)odified from bank ( $\geq 1$ ) (P)revious 2 exams ( $\leq 1$ ; randomly selected)		



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	<u>OPERATIONS TRAINING</u>		
COURSE TITLE	<u>JOB PERFORMANCE MEASURE</u>		
LESSON TITLE	<u>MAIN TURBINE CHANGE OF LOAD RATE DETERMINATION (ADMIN)</u>		
LESSON LENGTH	<u>.5 HRS</u>	MAXIMUM STUDENTS	<u>1</u>
<b>INSTRUCTIONAL MATERIALS INCLUDED</b>			
Lesson Plan PQD Code	<u></u>	Rev. No.	<u></u>
Simulator Guide PQD Code	<u></u>	Rev. No.	<u></u>
JPM PQD Code	<u>LO001783</u>	Rev. No.	<u>0</u>
Exam PQD Code	<u></u>	Rev. No.	<u></u>
DIVISION TITLE	<u>Nuclear Training</u>		
DEPARTMENT	<u>Operations Training</u>		
PREPARED BY	<u>Ron Hayden</u>	DATE	<u>10/21/14</u>
REVISED BY	<u></u>	DATE	<u></u>
TECHNICAL REVIEW BY	<u></u>	DATE	<u></u>
INSTRUCTIONAL REVIEW BY	<u></u>	DATE	<u></u>
	SAT Coordinator		
APPROVED BY	<u></u>	DATE	<u></u>
	Operations Training Manager		

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

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### Simulator ICs; Malfunctions; Triggers; Overrides:

None

### Special Setup Instructions:

Ensure student has access to a calculator.

Previous revisions used 10% current load going to 70% load with a 20,000 cycles fatigue index.

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** SOP-MT-START

**Safety Items:** None

**Task Number:** RO-0325

**Validation Time:** 8 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** SOP-MT-START Rev. 25

**Location:** Any

**NUREG 1123 Ref:** 245000 K5.07 (2.6 / 2.9)

**Performance Method:** Perform

**Task Standard:** The Time to Change Load has been calculated and written in the space provided on the Student JPM Information Card and is within the range allowed.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Columbia is in the process of starting up. The Main Turbine is on the line and is currently 10% loaded.
<b>INITIATING CUE:</b>	You have been directed to determine the time required to change load from Columbia's current load to a load of 95%. Assume a fatigue index of 20,000 cycles. Inform the CRS of your determination when complete by writing it in the space provided below and handing the card back to the examiner.

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Obtains procedure.	Recognizes SOP-MT-START as being correct procedure and refers to Attachment 6.1.		S / U *
	2	SOP-MT-START Attachment 6.1	Refers to example at bottom of Attachment 6.1 to determine use of graphs: <ul style="list-style-type: none"> <li>• Percent Rated Load vs. First Stage Temp</li> <li>• Time to change Load vs. First Stage Temp</li> </ul>		S / U
	3		Correlates 10% load to a First Stage Steam Temperature of 90°F (accept 90°F to 80°F).		
	4		Correlates 95% load to a First Stage Steam Temperature of 285°F (accept 275° to 290°).		S / U *
	5		Calculates difference (285° - 90°) to be 195°F (accept 205° to 195°).		S / U *
	6		Plots First Stage Steam Temperature Change to Time to Change Load-Hours using the 20,000 cycles curve and determines time to change load is 2.5 hours.	Accept a range of 2.4 hours to 3.0 hours	S / U *
<b>Termination Criteria: Student hands completed JPM Information Card to the examiner.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

Columbia is in the process of starting up.

The Main Turbine is on the line and is currently 10% loaded.

### Cue:

**You have been directed to determine the time required to change load from Columbia's current load to a load of 95%.**

**Assume a fatigue index of 20,000 cycles.**

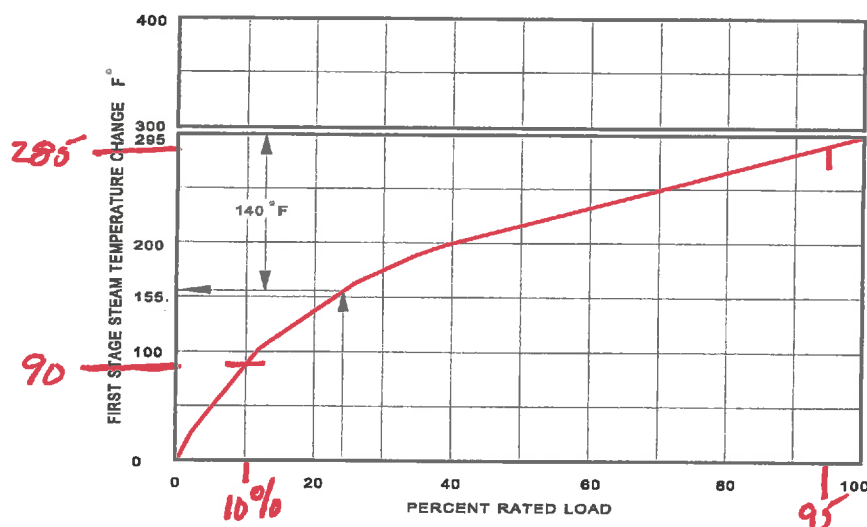
**Inform the CRS of your determination when complete by writing it in the space provided below and handing this JPM Information card back to the examiner.**

The time required to change load from 10% to 95% is: \_\_\_\_\_

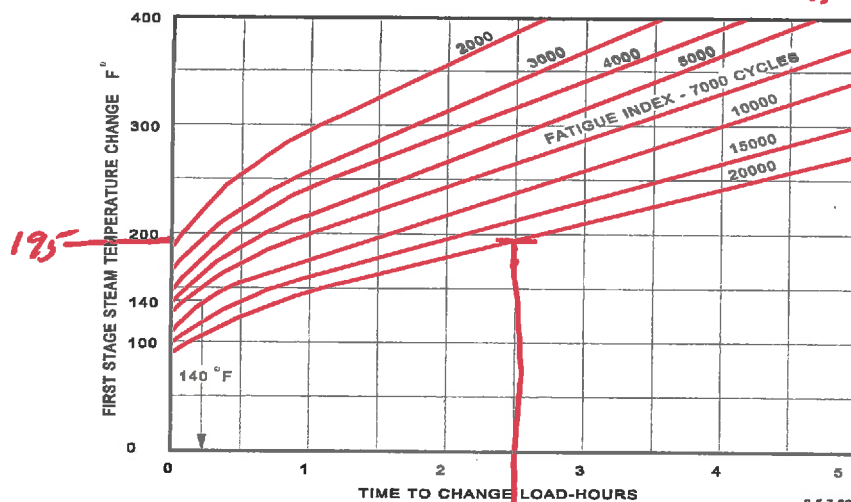
KEY RO AI

Number: SOP-MT-START	Use Category: CONTINUOUS	Major Rev: 026
Title: Main Turbine Start		Minor Rev: N/A
		Page: 64 of 73

# LOAD CHANGING RECOMMENDATIONS (HPT FIRST STAGE TEMP CHANGE)



$$285 - 90 = 195$$



## EXAMPLE (Shown on Charts)

Determine the time required and load change rate to raise load from 25% to 100%. Use a 10,000 cycle fatigue index for this example.

## PROCEDURE

Enter Figure 1 at 25% load and 100% load and determine from curve the first stage temperature change from 0 to 25% load to be 155° F and from 0 to 100% load to be 295° F. By subtracting the 0-25% temperature change from the 0-100% change, the first stage temperature change that occurs in raising load from 25% to 100% is  $295^{\circ} - 155^{\circ} = 140^{\circ} \text{ F}$ .

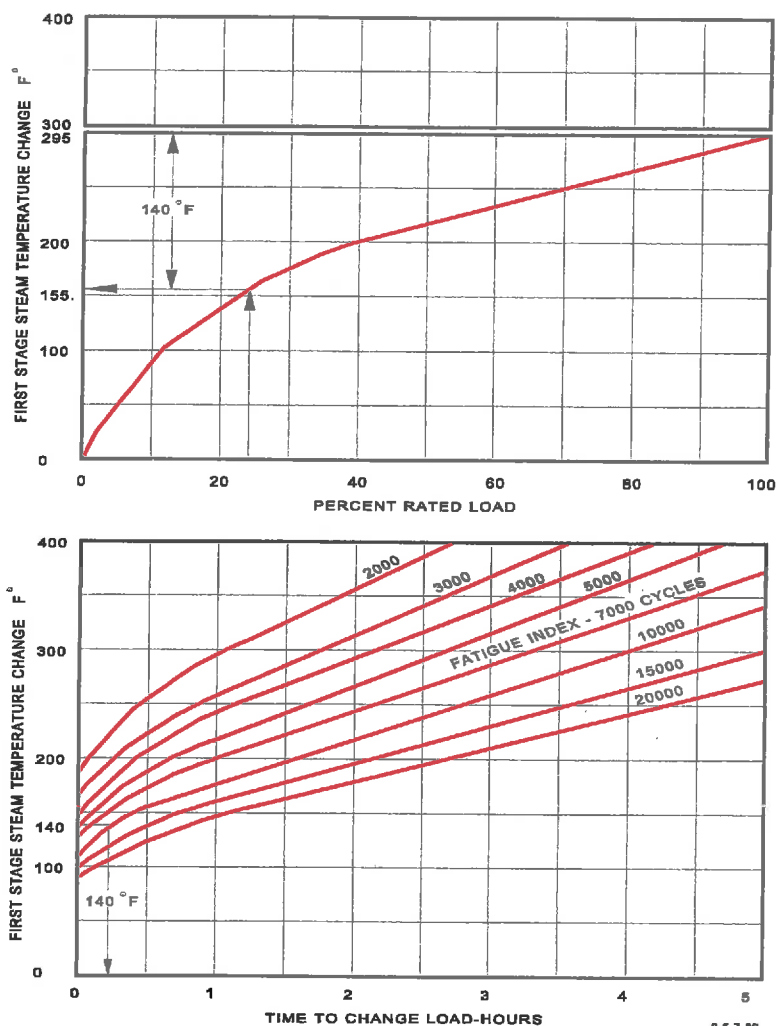
Enter Figure 2 with the 140° F first stage steam temperature change and project to the selected 10,000 cycle fatigue index curve. It is determined that load should be raised from 25% to 100% load at a uniform rate over 0.2 hours (12 minutes). The load change rate is  $75\% / 12 \text{ min.} = 6\% / \text{min.}$

END



Number: SOP-MT-START	Use Category: CONTINUOUS	Major Rev: 026
Title: Main Turbine Start		Minor Rev: N/A
		Page: 64 of 73

LOAD CHANGING RECOMMENDATIONS (HPT FIRST STAGE TEMP CHANGE)



EXAMPLE (Shown on Charts)

Determine the time required and load change rate to raise load from 25% to 100%. Use a 10,000 cycle fatigue index for this example.

PROCEDURE

Enter Figure 1 at 25% load and 100% load and determine from curve the first stage temperature change from 0 to 25% load to be 155° F and from 0 to 100% load to be 295° F. By subtracting the 0-25% temperature change from the 0-100% change, the first stage temperature change that occurs in raising load from 25% to 100% is  $295^{\circ} - 155^{\circ} = 140^{\circ} \text{ F}$ .

Enter Figure 2 with the 140° F first stage steam temperature change and project to the selected 10,000 cycle fatigue index curve. It is determined that load should be raised from 25% to 100% load at a uniform rate over 0.2 hours (12 minutes). The load change rate is  $75\% / 12 \text{ min.} = 6\% / \text{min.}$

END



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR INITIAL TRAINING		
COURSE TITLE	ADMIN JOB PERFORMANCE MEASURE		
LESSON TITLE	ALTERNATE DETERMINATION OF DRYWELL IDENTIFIED LEAK RATE		
LESSON LENGTH	.5 HRS	MAXIMUM STUDENTS	1
INSTRUCTIONAL MATERIALS INCLUDED			
Lesson Plan PQD Code	_____	Rev. No.	_____
Simulator Guide PQD Code	_____	Rev. No.	_____
JPM PQD Code	LO001726	Rev. No.	2
Exam PQD Code	_____	Rev. No.	_____
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	07/15/10
REVISED BY	Ron Hayden	DATE	12/29/14
TECHNICAL REVIEW BY	_____	DATE	_____
INSTRUCTIONAL REVIEW BY	_____	DATE	_____
APPROVED BY	SAT Coordinator		DATE
	Operations Training Manager		_____

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

# ALTERNATE DETERMINATION OF DRYWELL IDENTIFIED LEAK RATE

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

### Simulator ICs; Malfunctions; Triggers; Overrides:

N / A

### Setup Instructions:

The student should have access to a calculator.

Copy Section 5.7 of SOP-EDR-OPS for the Student to complete. Fill in Steps 5.7.1 through step 5.7.6 with the information from the initial conditions.

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** N/A

**Safety Items:** N/A

**Task Number:** RO-0892

**Validation Time:** 15 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** SOP-EDR-OPS Section 5.7 Rev. 4

**Location:** Simulator / Classroom

**NUREG 1123 Ref:** 2.1.20 (4.6 / 4.6)

**Performance Method:** Perform

**Task Standard:** Student determines the Calculated Drywell Identified Leak Rate within required acceptance range.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	At 0415 EDR-SUMP-R5 sump pump was manually started and EDR-TQ-5 reading was 0551.0. At 0430, the EDR-SUMP-R5 sump pump automatically stopped and EDR-TQ-5 reading was 0551.2. At 1630, EDR-SUMP-R5 sump pump was again manually started and had not auto started since 0430. At 1715, the EDR-SUMP-R5 sump pump automatically stopped and EDR-TQ-5 reading was 0552.0. SOP-EDR-OPS section 5.7 steps 5.7.1 through 5.7.6 have been completed.
<b>INITIATING CUE:</b>	The CRS directs you to determine the Calculated Identified Drywell Leak Rate per SOP-EDR-OPS section 5.7. Complete the remainder of section 5.7 (Step 5.7.11 is not required to be done) and when finished, hand the completed procedure section to the examiner.

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Step 5.7.7 Calculate the duration of the monitoring period of this section: a. Completion Time from step 5.7.5 or 5.7.6	Enters 1715.		S / U *
	2	Step 5.7.7b Start Time from step 5.7.2	Enters 0430.		S / U *
	3	Step 5.7.7c Total Time (a. – b.)	Enters 12 hours 45 minutes.		S / U *
	4	Step 5.7.8 Calculate EDR-P-5A/B Elapsed Run Time: a. EDR-TQ-5 Final Reading from Step 5.7.5 or 5.7.6	Enters 0552.0.		S / U *
	5	Step 5.7.8b EDR-TQ-5 Initial Reading from Step 5.7.2	Enters 0551.2.		S / U *

**\* Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	6	Step 5.7.8c Elapsed Run Time (a. – b.)	Calculates 0.8 as elapsed run time.		S / U *
	7	Step 5.7.9  Calculate the total volume of water pumped out of EDR-SUMP-R5 during the monitoring period of this section using the Elapsed Run Time calculated in step 5.7.8, and the following formula: Pumped Volume = ERT x 60 min/hr x 66.1 gallons/min Pumped Volume = ERT x 3966 gallons/hr Pumped Volume = _____ gallons	Calculates pumped volume as 3172.8.		S / U * (Accept 3172 to 3173)
	8	Step 5.7.10  Determine the Calculated Identified Drywell Leak Rate using the Pumped Volume calculated in step 5.7.9, and the Total Time calculated in step 5.7.7, as follows: Calculated Identified Drywell Leak Rate = Pumped Volume /Total Time Calculated Identified Drywell Leak Rate = _____ gpm	Enters 3172.8 as pumped volume and 765 minutes as Total time (12 hours plus .75 hours = 12.75 hours x 60 min/hr = 765 min).  Calculates Calculated Identified Drywell Leak Rate as 4.147 gpm.		S / U * (accept 4.1 to 4.2 gpm)

**RESULTS OF JPM:**  
**Calculation of Identified Drywell Leak Rate**

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** Student determines the Calculated Drywell Identified Leak Rate within required acceptance range.

Overall Evaluation	JPM Completion Time
SAT / UNSAT (Circle One)	Minutes

**COMMENTS:**

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**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

At 0415 EDR-SUMP-R5 sump pump was manually started and EDR-TQ-5 reading was 0551.0.

At 0430, the EDR-SUMP-R5 sump pump automatically stopped and EDR-TQ-5 reading was 0551.2.

At 1630, EDR-SUMP-R5 sump pump was again manually started and had not auto started since 0430.

At 1715, the EDR-SUMP-R5 sump pump automatically stopped and EDR-TQ-5 reading was 0552.0.

### Cue:

**The CRS directs you to determine the Calculated Identified Drywell Leak Rate per SOP-EDR-OPS section 5.7.**

**Complete section 5.7 (Step 5.7.11 is not required to be done) and when finished, hand the completed procedure section to the examiner.**

Number: SOP-EDR-OPS	Use Category: CONTINUOUS	Major Rev: 004 Minor Rev: 002 Page: 18 of 19
Title: Equipment Drain System Operation		

- 5.7.5 IF EDR-P-5A/5B does NOT start,  
THEN **END** the Drywell identified leakage monitoring period  
AND **RECORD** the completion time and final R5 sump pump run time.

Completion Date/Time: N/A / N/A

EDR-TQ-5 Final Reading: N/A hours

- 5.7.6 IF EDR-P-5A/5B starts,  
THEN **PERFORM** the following:

a. **PUMP** EDR-SUMP-R5.

- b. WHEN EDR-P-5A/B automatically stop,  
THEN **END** the drywell identified leakage monitoring period  
AND **RECORD** the completion time and final R5 sump pump run time:

Completion Date/Time: Today / 1715

EDR-TQ-5 Final Reading: 552.0 hours

- 5.7.7 **CALCULATE** the duration of the monitoring period of this section:

- a. Completion Time from step 5.7.5 or 5.7.6 1715
- b. Start Time from step 5.7.2 0430
- c. Total Time (Between a. and b.) Min 12 hr 45 min

- 5.7.8 **CALCULATE** EDR-P-5A/B Elapsed Run Time:

- a. EDR-TQ-5 Final Reading from Step 5.7.5 or 5.7.6 552.0 hours
- b. EDR-TQ-5 Initial Reading from Step 5.7.2 551.2 hours
- c. Elapsed Run Time (a. – b.) 0.8 hours



Number: SOP-EDR-OPS	Use Category: CONTINUOUS	Major Rev: 004
Title: Equipment Drain System Operation		Minor Rev: 002
		Page: 19 of 19

**NOTE:** The following step uses a nominal pumping capacity of 66.1 gpm for either of the Reactor Building equipment drain sump pumps EDR-P-5A/5B in accordance with calculation NE-02-90-08 (Sump Pump-Out Timer Setpoint Calculation).

**NOTE:** Given the initial and final readings of EDR-TQ-5 are each within 0.1 hr of the actual sump pump run time, the pumped volume of leakage calculated in the following step could vary by approximately 793 gallons over a 12 hour monitoring period. This equates to an inherent uncertainty of approximately 1.1 gpm in the calculated identified drywell leak rate if averaged over a 12 hour monitoring period.

**NOTE:** Sump pump EDR-P-5A/B recirculates sump water through EDR-HX-2 and back into the sump on high sump temperatures (GE 140°F). If P602-A13 annunciator 4-1 (REACTOR BLDG EQUIP SUMP TEMP HIGH) alarms during the 12 hour monitoring period, the Pumped Volume calculated in the following step will be artificially high with respect to the actual volume of water pumped out of the sump.

5.7.9 **CALCULATE** the total volume of water pumped out of EDR-SUMP-R5 during the monitoring period of this section using the Elapsed Run Time calculated in step 5.7.8, and the following formula:

**NOTE:** ERT = Elapsed Run Time from step 5.7.8.

$$\text{Pumped Volume} = \text{ERT} \times 60 \text{ min/hr} \times 66.1 \text{ gallons/min}$$

$$\text{Pumped Volume} = \text{ERT} \times 3966 \text{ gallons/hr}$$

$$\text{Pumped Volume} = \underline{3172.8} \text{ gallons}$$

5.7.10 **DETERMINE** the Calculated Identified Drywell Leak Rate using the Pumped Volume calculated in step 5.7.9, **AND** the Total Time calculated in step 5.7.7, as follows:

$$\text{Calculated Identified Drywell Leak Rate} = \frac{\text{Pumped Volume}}{\text{Total Time}} = \frac{3172.8 \text{ gal}}{765 \text{ min}}$$

$$\text{Calculated Identified Drywell Leak Rate} = \underline{4.147} \text{ gpm}$$

5.7.11 **LOG** the leakrate in the Control Room Log as Drywell leakage trend only.

## 6.0 ATTACHMENTS

None

Number: SOP-EDR-OPS	Use Category: CONTINUOUS	Major Rev: 004
Title: Equipment Drain System Operation		Minor Rev: 002
		Page: 17 of 19

### 5.7 Alternate Determination of Drywell Identified Leakrate

- NOTE: This procedure may be used for trending Drywell leakage only. This method is not accurate enough to be used to satisfy Technical specifications.
- NOTE: This procedure uses the EDR sump pump run time meter (EDR-TQ-5) to determine a calculated identified drywell leak rate.
- NOTE: Because sump EDR-SUMP-R5 receives equipment drain leakage from both the Drywell and the Reactor Building equipment drains, the results of this section determine a conservative maximum identified drywell leak rate.
- NOTE: Given a nominal pumping capacity of 66.1 gpm for either of the Reactor Building equipment drain sump pumps EDR-P-5A/5B, a 1 hour rise in the sump pump run time indicator (EDR-TQ-5) over a 12 hour period is equivalent to an average total equipment drain leak rate of 5.5 gpm.
- NOTE: The following step is performed in order to ensure that only equipment drain system leakage entering EDR-SUMP-R5 during the 12 hour monitoring period is included in the leakage estimate calculated by this section.

5.7.1 **START** EDR-P-5A/B (Reactor Building Equipment Drain Pump) **AND ALLOW** it to pump down EDR-SUMP-R5 until it automatically stops (H13-P602).

5.7.2 **WHEN** EDR-P-5A/B stops, **THEN BEGIN** the drywell identified leakage monitoring period by recording the start time and the initial R5 sump pump run time:

Start Date/Time: Today / 0430

EDR-TQ-5 Initial Reading: 551.2 hours

5.7.3 **IF** H13-P601.A3.5-8, LEAK DET REACTOR BLDG EQUIP SUMP LEAKAGE HIGH alarms, **OR** H13-P602.A13.4-1 REACTOR BLDG EQUIP SUMP TEMP HIGH alarms during the 12-hour monitoring period of this section, **THEN RECORD** the time and date of the annunciator alarm, **AND PERFORM** Section 5.6.

Date/Time: N/A / N/A

5.7.4 **WHEN** approximately 12 hours have elapsed, **THEN PLACE** the control switch for EDR-P-5A/B to **START**.

Number: SOP-EDR-OPS	Use Category: CONTINUOUS	Major Rev: 004 Minor Rev: 002 Page: 18 of 19
Title: Equipment Drain System Operation		

- 5.7.5 IF EDR-P-5A/5B does NOT start,  
THEN **END** the Drywell identified leakage monitoring period  
AND **RECORD** the completion time and final R5 sump pump run time.

Completion Date/Time: N/A / N/A

EDR-TQ-5 Final Reading: N/A hours

*N/A*

- 5.7.6 IF EDR-P-5A/5B starts,  
THEN **PERFORM** the following:

a. **PUMP** EDR-SUMP-R5.

*N/A*

- b. WHEN EDR-P-5A/B automatically stop,  
THEN **END** the drywell identified leakage monitoring period  
AND **RECORD** the completion time and final R5 sump pump run time:

Completion Date/Time: Today / 1715

EDR-TQ-5 Final Reading: 552.0 hours

*N/A*

- 5.7.7 **CALCULATE** the duration of the monitoring period of this section:

- a. Completion Time from step 5.7.5 or 5.7.6 \_\_\_\_\_
- b. Start Time from step 5.7.2 \_\_\_\_\_
- c. Total Time (Between a. and b.) Min \_\_\_\_\_

- 5.7.8 **CALCULATE** EDR-P-5A/B Elapsed Run Time:

- a. EDR-TQ-5 Final Reading from Step 5.7.5 or 5.7.6 \_\_\_\_\_ hours
- b. EDR-TQ-5 Initial Reading from Step 5.7.2 \_\_\_\_\_ hours
- c. Elapsed Run Time (a. – b.) \_\_\_\_\_ hours

Number: SOP-EDR-OPS	Use Category: CONTINUOUS	Major Rev: 004
Title: Equipment Drain System Operation		Minor Rev: 002
		Page: 19 of 19

**NOTE:** The following step uses a nominal pumping capacity of 66.1 gpm for either of the Reactor Building equipment drain sump pumps EDR-P-5A/5B in accordance with calculation NE-02-90-08 (Sump Pump-Out Timer Setpoint Calculation).

**NOTE:** Given the initial and final readings of EDR-TQ-5 are each within 0.1 hr of the actual sump pump run time, the pumped volume of leakage calculated in the following step could vary by approximately 793 gallons over a 12 hour monitoring period. This equates to an inherent uncertainty of approximately 1.1 gpm in the calculated identified drywell leak rate if averaged over a 12 hour monitoring period.

**NOTE:** Sump pump EDR-P-5A/B recirculates sump water through EDR-HX-2 and back into the sump on high sump temperatures (GE 140°F). If P602-A13 annunciator 4-1 (REACTOR BLDG EQUIP SUMP TEMP HIGH) alarms during the 12 hour monitoring period, the Pumped Volume calculated in the following step will be artificially high with respect to the actual volume of water pumped out of the sump.

5.7.9 **CALCULATE** the total volume of water pumped out of EDR-SUMP-R5 during the monitoring period of this section using the Elapsed Run Time calculated in step 5.7.8, and the following formula:

**NOTE:** ERT = Elapsed Run Time from step 5.7.8.

Pumped Volume = ERT x 60 min/hr x 66.1 gallons/min

Pumped Volume = ERT x 3966 gallons/hr

Pumped Volume = \_\_\_\_\_ gallons

5.7.10 **DETERMINE** the Calculated Identified Drywell Leak Rate using the Pumped Volume calculated in step 5.7.9, **AND** the Total Time calculated in step 5.7.7, as follows:

Calculated Identified Drywell Leak Rate =  $\frac{\text{Pumped Volume}}{\text{Total Time}}$

Calculated Identified Drywell Leak Rate = \_\_\_\_\_ gpm

5.7.11 **LOG** the leakrate in the Control Room Log as Drywell leakage trend only.

## 6.0 ATTACHMENTS

None



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR INITIAL TRAINING		
COURSE TITLE	ADMIN JOB PERFORMANCE MEASURE		
LESSON TITLE	DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A (ADMIN)		
LESSON LENGTH	.5 HRS	MAXIMUM STUDENTS	1
INSTRUCTIONAL MATERIALS INCLUDED			
Lesson Plan PQD Code	_____	Rev. No.	_____
Simulator Guide PQD Code	_____	Rev. No.	_____
JPM PQD Code	LO001644	Rev. No.	2
Exam PQD Code	_____	Rev. No.	_____
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	10/6/08
REVISED BY	Ron Hayden	DATE	12/29/14
TECHNICAL REVIEW BY	_____	DATE	_____
INSTRUCTIONAL REVIEW BY	_____	DATE	_____
APPROVED BY	_____	DATE	_____
Operations Training Manager			

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

# DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

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### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

### Setup Instructions:

Have the following drawings ready for candidate to reference:

M-526 Sheet 1

E-503 Sheet 7 and Sheet 12

EWD-38E-001

EWD-38E-021

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** N/A

**Safety Items:** N/A

**Task Number:** RO-1181

**Validation Time:** 20 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** PPM 1.3.64; SWP-OPS-3; M-526-1r100;

**Location:** Simulator / Classroom

E-503-7r88; E-503-12r83; EWD-38E-001r8;

EWD-38E-021r6

**NUREG 1123 Ref:** 2.2.13 (4.1 / 4.3)

**Performance Method:** Perform

**Task Standard:** Student correctly identifies the components, component position, and tagging requirements to mechanically and electrically isolate FPC-P-1A per answer sheet.

## DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

### JPM CHECKLIST

<b>INITIAL CONDITION:</b>	Columbia is operating at full power. It is a Division 1 work week. Maintenance wants to replace the pipe coupling (3 inch to 6 inch) located at the discharge of FPC-P-1A.
<b>INITIATING CUE:</b>	You have been directed to determine the clearance order boundary component, required component position, and component tagging requirement necessary to perform work on the coupling downstream of FPC-P-1A.

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Identifies boundary and valve position required to isolate coupling downstream of FPC-P-1A.	References M-526-1 and determines the following valves should be closed to isolate FPC-P-1A: <ul style="list-style-type: none"> <li>• FPC-V-114</li> <li>• FPC-V-115A</li> <li>• FPC-V-116A</li> <li>• FPC-V-181A</li> </ul>		S / U
	2	Determines tagging requirements.	Determines the following valves should be danger tagged: <ul style="list-style-type: none"> <li>• FPC-V-114</li> <li>• FPC-V-115A</li> <li>• FPC-V-116A</li> <li>• FPC-V-181A</li> </ul>		S / U *

## DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	3	Identifies FPC-P-1A Vent and Drain valves.	Refers to M-526-1 Detail 3 and determines vent and drain valves for FPC-P-1A: <ul style="list-style-type: none"> <li>• FPC-V-187A (Vent)</li> <li>• FPC-V-150A (Drain)</li> </ul>		S / U
	4	Determines tagging requirements.	Determines that FPC-V-187A AND/OR FPC-V-150A should be danger tagged opened or No Tagged (due to valves possible removal to perform work on pump).		S / U *
	5	Identifies breaker and position required to isolate FPC-P-1A electrically.	References E-503 sheet 12 and determines FPC-42-7BB 9B (disconnect 9B on MC-7B-B) should be open/off.		S / U
	6	Determines tagging requirements.	Determines that FPC-42-7BB 9B (disconnect 9B on MC-7B-B) should be danger tagged open/off.		S / U *
	7	Identifies breaker and position required to isolate FPC-V-181A electrically.	References E-503 sheet 7 and determines FPC-42-7BA 1C (disconnect 1C on MC-7B-A) should be open/off.		S / U
	8	Determines tagging requirements.	Determines that FPC-42-7BA 1C (disconnect 1C on MC-7B-A) should be danger tagged.		S / U *



## DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	9	Identifies Control Switch requirements for FPC-P-1A.	References EWD-38E-001 for FPC-P-1A and determines the pump control switch, FPC-RMS-P1A/1, should be danger or blue tagged in AUTO, or AUTO after STOP or the PTL IR-71 position.		S / U *
	10	Identifies Control Switch requirements for FPC-V-181A.	References EWD-38E-021 for FPC-V-181A and determines switch should be danger or blue tagged in the NORM or NORM after CLOSE position.		S / U *
<b>Termination Criteria: Student hands completed JPM Answer Sheet to the examiner.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

ANSWER KEY:

<b>COMPONENT</b>	<b>REQUIRED POSITION</b>	<b>TYPE OF TAG (Blue/ Danger/ Caution)</b>
Control Switch for FPC-P-1A	Auto or Auto after Stop or PTL IR-71	Danger or Blue
Control Switch for FPC-V-181A	Norm or Norm after Close	Danger or Blue
FPC-42-7BB 9B (Disconnect 9B for FPC-P-1A on MC-7B-B)	Open/Off	Danger
FPC-42-7BA 1C (Disconnect for FPC-V-181A)	Open/Off	Danger
FPC-V-114	Closed	Danger
FPC-V-115A	Closed	Danger
FPC-V-116A	Closed	Danger
FCP-V-181A	Closed	Danger
FPC-V-150A and / or FPC-V-187A	Open	Danger or No Tag

## DETERMINE CLEARANCE REQUIREMENTS FOR FPC-P-1A

## RESULTS OF JPM:

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** Student correctly identifies the components, components position, and tagging requirements to mechanically and electrically isolate FPC-P-1A per answer sheet.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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**Initial Conditions:**

Columbia is operating at full power.

It is a Division 1 work week.

Maintenance wants to replace the pipe coupling (3 inch to 6 inch) located at the discharge of FPC-P-1A.

**Cue:**

**You have been directed to determine the clearance order boundary component, required component position, and component tagging requirement, necessary to perform work on the coupling downstream of FPC-P-1A.**

# **JPM ANSWER SHEET**

The following is required to perform work on the coupling downstream of FPC-P-1A:

<b>COMPONENT</b>	<b>REQUIRED POSITION</b>	<b>TYPE OF TAG (BLUE/DANGER/CAUTION)</b>

When completed, hand this sheet to the examiner.



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE LICENSED OPERATOR INITIAL TRAINING

COURSE TITLE ADMIN JOB PERFORMANCE MEASURE

LESSON TITLE RADIOLOGICAL POSTINGS DETERMINATION

LESSON LENGTH .5 HRS MAXIMUM STUDENTS 1

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	_____	Rev. No.	_____
Simulator Guide PQD Code	_____	Rev. No.	_____
JPM PQD Code	<u>LO001786</u>	Rev. No.	<u>0</u>
Exam PQD Code	_____	Rev. No.	_____

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

REVISED BY \_\_\_\_\_ DATE \_\_\_\_\_

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY SAT Coordinator DATE \_\_\_\_\_  
Operations Training Manager

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

## RADIOLOGICAL POSTINGS DETERMINATION

### MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### Simulator ICs; Malfunctions; Triggers; Overrides:

N / A

#### Setup Instructions:

The student should have access to PPM 11.2.7.1 Area Posting, and PPM 11.2.13.1 Radiation and Contamination Surveys.

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** N/A

**Safety Items:** N/A

**Task Number:** RO-0557, SRO-0026

**Validation Time:** 15 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** 11.2.7.1 Rev. 39

**Location:** Simulator / Classroom

**NUREG 1123 Ref:** 2.3.4 (3.2 / 3.7)

**Performance Method:** Perform

**Task Standard:** The Radiation Areas, High Radiation Areas, Contaminated Areas, and areas requiring no postings have been correctly identified based on the survey maps given.

# RADIOLOGICAL POSTINGS DETERMINATION

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Radiological Surveys have just been completed to update the baseline data in preparation for scheduled work. HP is short on personnel and has requested Operations assistance in preparing for the work by reviewing the surveys and determining the required postings in the areas designated.
<b>INITIATING CUE:</b>	The CRS directs you to review the survey forms and make recommendations with regards to posting of the identified areas by filling in the posting requirement on the JPM Answer Sheet provided. When completed, hand the completed form to the examiner.

**\* Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Radiation Survey Map Area 1	Identifies as a Radiation Area (RA)		S / U *
	2	Radiation Survey Map Area 2	Identifies as a Radiation Area (RA)		S / U *
	3	Radiation Survey Map Area 3	Identifies as a High Radiation Area (HRA)		S / U *
	4	Radiation Survey Map Area 4	Identifies as a Radiation Area (RA)		S / U *
	5	Radiation Survey Map Area 5	Identifies no radiological posting required (May list as RCA)		S / U *
	6	Contamination Survey Map Area 1	Identifies as a High Contamination Area (HCA)		S / U *
	7	Contamination Survey Map Area 2	Identifies as a Contaminated Area (CA)		S / U *
	8	Contamination Survey Map Area 3	Identifies as a Contaminated Area (CA)		S / U *
	9	Contamination Survey Map Area 4	Identifies no contamination postings required (May List as a RCA)		S / U *
	10	Contamination Survey Map Area 5	Identifies as a Contaminated Area (CA)		S / U *
<b>Termination Criteria: Student hands completed section to the examiner.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					



# RADIOLOGICAL POSTINGS DETERMINATION

## **JPM ANSWER SHEET**

### Radiation Area Survey Map 1

Survey Area <input type="checkbox"/>	Radiation Posting Requirement
1	RADIATION AREA (RA)
2	RADIATION AREA (RA)
3	HIGH RADIATION AREA (HRA)
4	RADIATION AREA (RA)
5	NONE OR RCA

### Contamination Survey Map 2

Survey Area <input type="checkbox"/>	Contamination Posting Requirement
1	HIGH CONTAMINATED AREA (HCA)
2	CONTAMINATED AREA (CA)
3	NONE OR RCA
4	CONTAMINATED AREA (CA)
5	CONTAMINATED AREA (CA)

## RESULTS OF JPM: Radiological Posting Determination

**Evaluator (Please Print):** \_\_\_\_\_

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

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Page 5 of 9

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

Radiological Surveys have just been completed to update the baseline data in preparation for scheduled work.

HP is short on personnel and has requested Operations assistance in preparing for the work by reviewing the surveys and determining the required postings in the areas designated.

### CUE:

**The CRS directs you to review the survey maps and make recommendations with regards to posting of the identified areas by filling in the posting requirement on the JPM Answer Sheet provided.**

**When completed, hand the completed form to the examiner.**

RWP map pages (for RO admin JPM A4) removed from Operating test due to potential SUNSI concerns

## **JPM ANSWER SHEET**

### Radiation Area Survey Map 1

Survey Area <input type="checkbox"/>	Radiation Posting Requirement
1	
2	
3	
4	
5	

### Contamination Survey Map 2

Survey Area <input type="checkbox"/>	Contamination Posting Requirement
1	
2	
3	
4	
5	



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	<u>LICENSED OPERATOR INITIAL TRAINING</u>		
COURSE TITLE	<u>ADMIN JOB PERFORMANCE MEASURE</u>		
LESSON TITLE	<u>DETERMINE ACTIONS FOR CRITICALITY OUTSIDE OF ECP (EARLY)</u>		
LESSON LENGTH	<u>.5 HRS</u>	MAXIMUM STUDENTS	<u>1</u>
<b>INSTRUCTIONAL MATERIALS INCLUDED</b>			
Lesson Plan PQD Code	<u></u>	Rev. No.	<u></u>
Simulator Guide PQD Code	<u></u>	Rev. No.	<u></u>
JPM PQD Code	<u>LO001587</u>	Rev. No.	<u>6</u>
Exam PQD Code	<u></u>	Rev. No.	<u></u>
DIVISION TITLE	<u>Nuclear Training</u>		
DEPARTMENT	<u>Operations Training</u>		
PREPARED BY	<u>Ron Hayden</u>	DATE	<u>5/11/06</u>
REVISED BY	<u>Ron Hayden</u>	DATE	<u>12/30/14</u>
TECHNICAL REVIEW BY	<u></u>	DATE	<u></u>
INSTRUCTIONAL REVIEW BY	<u></u>	DATE	<u></u>
	SAT Coordinator		
APPROVED BY	<u></u>	DATE	<u></u>
	Operations Training Manager		

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

## DETERMINE ACTIONS FOR CRITICALITY OUTSIDE OF ECP (EARLY)

### MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

---

#### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

#### Setup Instructions:

Make a copy of the current pull sheet from the simulator. Determine where Minimum ECP is and indicate it on copy of pull sheet by placing a '\*1' next to the step and at the bottom of the column indicate that a \*1 is 'Minimum ECP'. Ensure it is AFTER step indicated in initial conditions by about four control rods. Place a \*2 ten rods later and make that the maximum ECP.

Fill out the pull sheet pages. The performed by column is initialed up to control rod 10-47. The verified column, the coupling check column and the full out light columns are initialed to control rod 10-47 by the verifier. Fill in response noted column with a few N's but mostly Y's.

**Have a copy of PPM 3.1.2 Page 1 of 4 and page 2 of 4, startup flowchart, available for reference.**

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** N/A

**Safety Items:** N/A

**Task Number:** RO-0156; SRO-0118

**Validation Time:** 15 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** PPM 3.1.2 Rev. 78

**Location:** Simulator/Classroom

**NUREG 1123 Ref:** 2.1.37 (4.3 / 4.6)

**Performance Method:** Perform

**Task Standard:** It is determined that criticality will occur prior to reaching the minimum ECP and correctly identified the appropriate (RO or SRO) next action to be taken due to being critical outside of the ECP.

## DETERMINE ACTIONS FOR CRITICALITY OUTSIDE OF ECP (EARLY)

### JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	<p>A plant startup is in progress. PPM 3.1.2 has been completed as follows: Step L11 has been completed, waiting at step L12; Step P1 has not yet been completed; Step S11 is in progress; Step B5 is in progress; Step A19 has been completed; Step Q12 has been completed and Step Q13 is in progress.</p> <p>CRO1 is pulling control rods and notes the following indications:</p> <ul style="list-style-type: none"><li>• Time 0953</li><li>• Coolant Temp 205°F</li><li>• Control rod 18-47</li><li>• Control rod position 18</li><li>• Neutron level 8,000 CPS and rising</li><li>• Period 145 seconds and stable</li></ul> <p>Control rods have been pulled steadily since starting Group 1 of the Pull Sheet. Control rod motion stopped approximately 1 minute ago.</p>
<b>INITIATING CUE:</b>	<p>Using the given information, PPM 3.1.2, and the supplied pull sheets, determine your next action. When you have determined your next action, write it on the JPM Answer Sheet, along with the basis for the decision and hand it to the examiner.</p>



## DETERMINE ACTIONS FOR CRITICALITY OUTSIDE OF ECP (EARLY)

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
Criticality will be determined using the criteria on Startup Flow Chart 3.1.2 page 1 Note N6: Criticality usually occurs in the source range between $1 \times 10^3$ and $1 \times 10^4$ cps. For purposes of this procedure, criticality shall be identified by increasing neutron level, a constant steady period and no simultaneous control rod motion.					
<b>If the SRO Position being evaluated:</b>					
	1	Determine status of Reactor based on information given.	<p>The information given identifies 8000 cps and rising (which is between the <math>1 \times 10^3</math> and <math>1 \times 10^4</math> cps) and a constant steady period with no rod motion – these are indications of a critical reactor.</p> <p>Using given information, determines that the reactor is critical or will be critical before the minimum ECP has been reached.</p>		S / U *
	2	Determines actions based on early criticality.	Indicates that the Reactor Operator would be directed to stop control rod withdrawal direct the CRO to drive control rods in the reverse order until all control rods are fully inserted.		S / U *
	3	Determines basis for actions.	Indicates that basis for the above action is due to reactor being critical prior to the indicated minimum ECP (early criticality).		S / U *

## DETERMINE ACTIONS FOR CRITICALITY OUTSIDE OF ECP (EARLY)

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>If the RO Position being evaluated:</b>					
	4	Determine status of Reactor based on information given.	<p>The information given identifies 8000 cps and rising (which is between the <math>1 \times 10^3</math> and <math>1 \times 10^4</math> cps) and a constant steady period with no rod motion – these are indications of a critical reactor.</p> <p>Using given information, determines that the reactor is critical or will be critical before the minimum ECP has been reached.</p>		S / U *
	5	Determines actions based on early criticality.	Indicates that control rod withdrawal would be stopped the CRS would be notified.		S / U *
	6	Determines basis for actions.	Indicates that basis for the above action is due to reactor being critical prior to the indicated minimum ECP (early criticality).		S / U *
<b>Termination Criteria: Student hands the JPM Answer Sheet to the examiner.</b>					
<b>Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM:

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** It is determined that criticality will occur prior to reaching the minimum ECP and correctly identified the appropriate (RO or SRO) next action to be taken due to being critical outside of the ECP.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface. There is no handwriting or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

A plant startup is in progress.

PPM 3.1.2 has been completed as follows: Step L11 has been completed, waiting at step L12; Step P1 has not yet been completed; Step S11 is in progress; Step B5 is in progress; Step A19 has been completed; Step Q12 has been completed and Step Q13 is in progress.

The following indications are observed:

- Time 0953
- Coolant Temp 205° F
- Control rod 18-47
- Control rod position 18
- Neutron level 8,000 CPS and rising
- Period 145 seconds and stable

Control rods have been steadily pulled since starting Group 1 of the Pull Sheet. Control rod motion stopped approximately 1 minute ago.

### Initiating Cue:

**Using the given information, PPM 3.1.2, and the supplied pull sheets, determine your next action.**

**When you have determined your next action, write it on the JPM Answer Sheet along with the basis for the decision and hand it to the examiner.**

## JPM ANSWER SHEET

NEXT ACTION TO BE TAKEN: \_\_\_\_\_

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BASIS FOR ACTION: \_\_\_\_\_

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SRO AI Handout

CGS PULL SHEET COVER PAGE

SEQUENCE FILE NAMED A2C21SU1.SEQ 0024453492  
SEQUENCE TYPE A2  
TOTAL NUMBER OF GROUPS 60  
TOTAL NUMBER OF STEPS 582  
PULL SHEET CHECK SUM 0024453492

SNE review: SNE Reviewer DATE: Last Week  
SECOND review: Second Reviewer DATE: Also Last Week  
OPS review: Ops Reviewer DATE: Earlier This Week

Date / Time of startup Today / Earlier

Critical Data:

Recirc Suction Temperature - \_\_\_\_\_  
Date / Time - \_\_\_\_\_  
RWM Sequence Step - \_\_\_\_\_  
Control Rod Position - \_\_\_\_\_  
Period at Critical Data - \_\_\_\_\_  
Rod Pattern at Critical attached - \_\_\_\_\_  
(Screen dump or Printout )

Completed Pullsheets to be filed under PPM 9.3.9, DIC 1814.2

NOTICE: IF YOUR INITIALS APPEAR ON ANY PAGE OF THIS PULL SHEET,  
PLEASE SIGN AND INITIAL ON THE FOLLOWING PAGE

Pull Sheet Check Sum - 0024453492

COLUMBIA Pull Sheet Print Menu

CGS PULL SHEET COVER PAGE

SEQUENCE FILE NAMED

A2C21SU1.SEO 0024453492

Name (Print)

Signature

Initials

Rad Worker

Rad Worker

dw

Joe Helper

Joe Helper

HT

# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2 A2C21SU1.SEQ 0024453492

Page 1 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Star Here ↓ ↓
1 - 1	1	26 - 31	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 2	1	42 - 39	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 3	1	42 - 23	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 4	1	34 - 31	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 5	1	18 - 39	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 6	1	18 - 23	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 7	1	34 - 47	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 8	1	50 - 31	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 9	1	26 - 15	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 10	1	10 - 31	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 11	1	26 - 47	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	
1 - 12	1	34 - 15	00	48	<i>HW</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>N</i>	

(1) Continuous Withdraw Couple Check required when pulled to 48

T.S. S.R 3.1.3.4

(2) Neutron Flux Response (Y or N) only required prior to criticality

{P-104550}

Pull Sheet Check Sum = 0024453492

COLUMBIA Pull Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_



# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2

A2C21SU1.SEQ 0024453492

Page 2 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Star Here ↑ ↓
2 - 1	1	42 - 55	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 2	1	58 - 23	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 3	1	18 - 07	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 4	1	02 - 39	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 5	1	58 - 39	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 6	1	42 - 07	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 7	1	02 - 23	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 8	1	18 - 55	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 9	1	50 - 47	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 10	1	50 - 15	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 11	1	10 - 15	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
2 - 12	1	10 - 47	00	48	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	

(1) Continuous Withdraw Couple Check required when pulled to 48

(2) Neutron Flux Response (Y or N) only required prior to criticality

T.S. S.R 3.1.3.4  
{P-104550}

Pull Sheet Check Sum - 0024453492

COLUMBIA Pull Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_

# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2 A2C21SU1.SEQ 0024453492

Page 3 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Star Here ↓ ↓
3 - 1	2	02 - 31	00	48	<i>Plu</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>Y</i>	
3 - 2	2	58 - 31	00	48	<i>Plu</i>	<i>H</i>	<i>H</i>	<i>H</i>	<i>Y</i>	

(1) Continuous Withdraw Couple Check required when pulled to 48

(2) Neutron Flux Response (Y or N) only required prior to criticality

T.S. S.R 3.1.3.4  
(P-104550)

Pull Sheet Check Sum = 0024453492

COLUMBIA Pull Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_

# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2 A2C21SU1.SEQ 0024453492

Page 4 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Star Here ↓ ↓
4 - 1	2	18 - 47	00	24						
4 - 2	2	42 - 47	00	24						
4 - 3	2	18 - 15	00	24						
4 - 4	2	42 - 15	00	24						

(1) Continuous Withdraw Couple Check required when pulled to 48

T.S. S.R 3.1.3.4

(2) Neutron Flux Response (Y or N) only required prior to criticality

{P-104550}

\*1 - "MINIMUM ECP"

Pull Sheet Check Sum = 0024453492

COLUMBIA Pull Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_

# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2 A2C21SU1.SEQ 0024453492

Page 5 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Start Here ↓ ↓
#2 5 - 1	2	18 - 47	24	28						
5 - 2	2	42 - 47	24	28						
5 - 3	2	18 - 15	24	28						
5 - 4	2	42 - 15	24	28						

- (1) Continuous Withdraw Couple Check required when pulled to 48 T.S. S.R 3.1.3.4  
(2) Neutron Flux Response (Y or N) only required prior to criticality (P-104550)

#2 - "MAXIMUM ECP"

Full Sheet Check Sum = 0024453492

COLUMBIA Full Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_

# CONTROL ROD WITHDRAWAL ORDER SHEET

Sequence : A2 A2C21SU1.SEQ 0024453492

Page 6 of 60

WITHDRAWAL CONTROL RODS FROM THE TOP TO THE BOTTOM OF THE PAGE

RWM Group-Step	BPWS Group	Rod No.	From	To	Performed by (Initial)	Verified by (Initial)	# Cont. Withdraw Couple Check (1)	Full Out Light	Neutron Flux Response (2)	Star Here ↑ ↓
6 - 1	2	18 - 47	28	48						
6 - 2	2	42 - 47	28	48						
6 - 3	2	18 - 15	28	48						
6 - 4	2	42 - 15	28	48						

- (1) Continuous Withdraw Couple Check required when pulled to 48  
 (2) Neutron Flux Response (Y or N) only required prior to criticality

T.S. S.R 3.1.3.4  
{P-104550}

Pull Sheet Check Sum = 0024453492

COLUMBIA Pull Sheet Print Menu

Reactivity Manager Review \_\_\_\_\_



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE DETERMINE IF VOLUNTARY ENTRY INTO AIA IS ALLOWABLE

LESSON LENGTH .5 HRS MAXIMUM STUDENTS 1

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Simulator Guide PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

JPM PQD Code LO001784 Rev. No. 0

Exam PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

REVISED BY \_\_\_\_\_ DATE \_\_\_\_\_

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

---

### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

### Special Setup Instructions:

Student should have access to SOPs and Volume 3 procedures.

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** SRO-0122

**Validation Time:** 10 Minutes

**Alternate Path:** No

**Time Critical:** N/A

**PPM Reference:** PPM 3.2.1 Rev. 78

**Location:** Classroom

**NUREG 1123 Ref:** 2.1.25 (3.9 / 4.2)

**Performance Method:** Perform

**Task Standard:** The JPM Answer Sheet is initialed for 'would direct entry into AIA'.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Columbia Generating Station is shutting down per PPM 3.2.1. Reactor Power is 30%. Per the Reactivity Control Plan and CRS direction, Rod Line is 50%. RFW-TI-5 on H13-P840 is reading 326°F. Core Flow is 42 Mlbm/Hr. A planned entry into the Area Of Increased Awareness is scheduled for your shift.
<b>INITIATING CUE:</b>	On the page provided indicate if you would or would not direct the planned AIA entry. Fill in all required information based on your answer on the JPM Answer Sheet and hand the completed sheet to the examiner.

**\* Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	PPM 3.2.1 Step 5.1.28 Prior to a planned entry into the AIA (i.e. Single Loop Operation), then verify Reactor Feedwater temperature, as indicated on RFW-TI-5 (H13-P840), is within the Normal Operating Region Attachment 7.3.	Refers to PPM 3.2.1 Attachment 7.3, plots the parameters given, and recognizes that the plant is currently in the 'Normal Operating' region.		S / U *
	2	Determines if would or would not direct entry into AIA.	Initials block for would direct planned entry into AIA.		S / U *
<b>Termination Criteria: Student hands the JPM Answer Sheet to the examiner.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					



## RESULTS OF JPM: PLANNED ENTRY INTO AIA

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** The JPM Answer Sheet is initialed for ‘would direct entry into AIA’.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

[illegible]

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

Columbia Generating Station is shutting down per PPM 3.2.1.

Reactor Power is 30%.

Per the Reactivity Control Plan and CRS direction, Rod Line is 50%.

RFW-TI-5 on H13-P840 is reading 326°F.

Core Flow is 42 Mlbm/Hr.

A planned entry into the Area Of Increased Awareness is scheduled for your shift.

### Cue:

**On the page provided indicate if you would or would not direct the planned AIA entry.**

**Fill in all required information based on your answer on the JPM Answer Sheet and hand the completed sheet to the examiner.**

## JPM ANSWER SHEET

YES - I would direct the planned entry into the Area of Increased Awareness for the following reason:

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Initials

NO – I would not direct the planned entry into the Area Of Increased Awareness for the following reason:

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Initials

KEY SRO A2

Number: 3.2.1

Use Category: CONTINUOUS

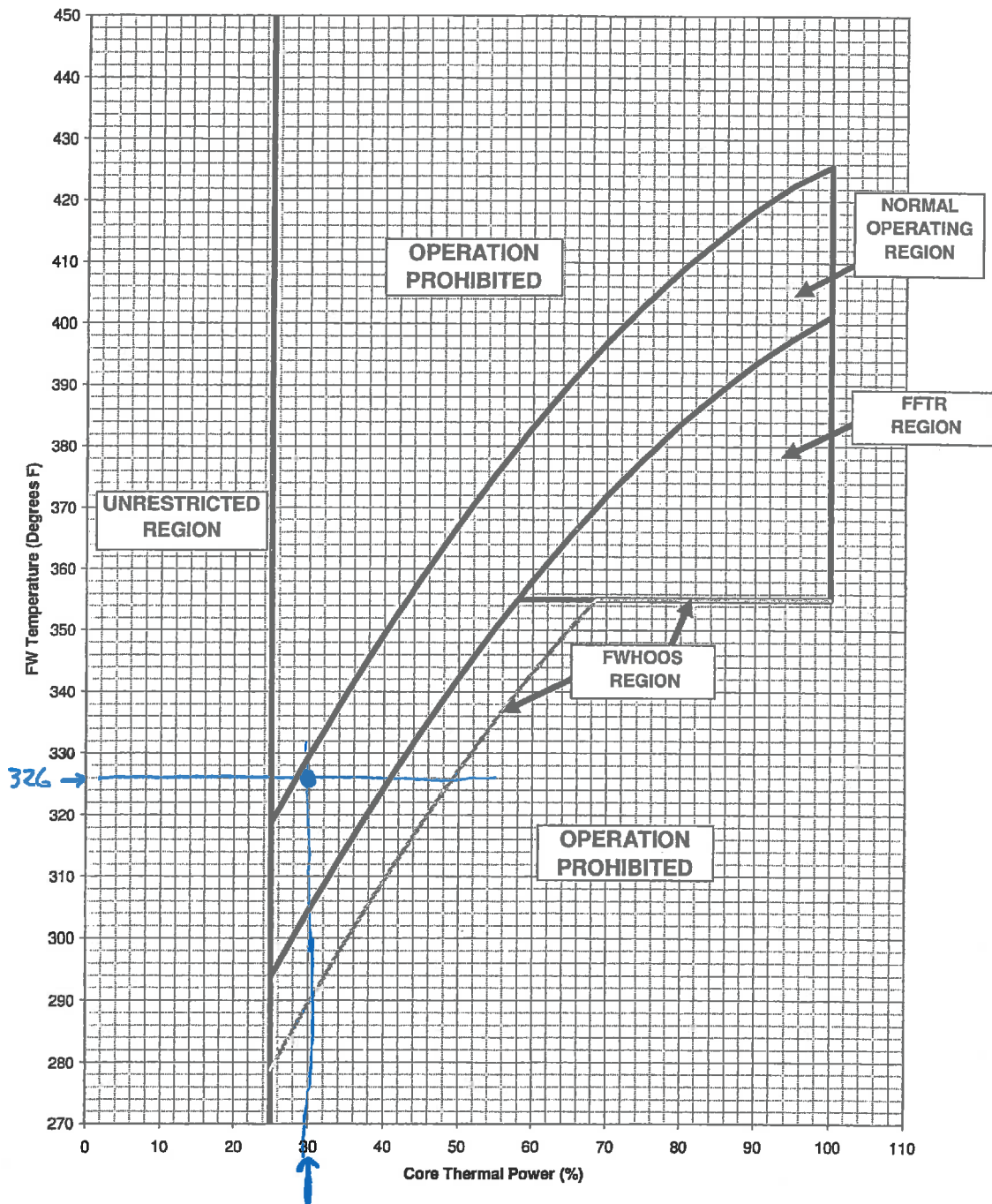
Major Rev: 078

Minor Rev: 001

Title: Normal Plant Shutdown

Page: 51 of 51

### FEEDWATER TEMPERATURE VERSUS REACTOR POWER



END



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	<u>LICENSED OPERATOR TRAINING</u>		
COURSE TITLE	<u>JOB PERFORMANCE MEASURE</u>		
LESSON TITLE	<u>DETERMINATION OF OPERATING POINT AND REQUIRED ACTIONS FOLLOWING FW HEATER TRIP PER ABN-POWER (Admin)</u>		
LESSON LENGTH	<u>.5 HRS</u>		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE	<u></u>	Rev. No.	<u></u>
SIMULATOR GUIDE PQD CODE	<u></u>	Rev. No.	<u></u>
JPM PQD CODE	<u>LO001650</u>	Rev. No.	<u>2</u>
EXAM PQD CODE	<u></u>	Rev. No.	<u></u>
DIVISION TITLE	<u>Nuclear Training</u>		
DEPARTMENT	<u>Operations Training</u>		
PREPARED BY	<u>Ron Hayden</u>	DATE	<u>11/18/08</u>
REVISED BY	<u>Ron Hayden</u>	DATE	<u>12/30/14</u>
TECHNICAL REVIEW BY	<u></u>	DATE	<u></u>
INSTRUCTIONAL REVIEW BY	<u></u>	DATE	<u></u>
	SAT Coordinator		
APPROVED BY	<u></u>	DATE	<u></u>
	Operations Training Manager		

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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**Simulator ICs; Malfunctions; Triggers; Overrides:**

N/A

**Special Setup Instructions:**

A copy of ABN-POWER must be available.

**JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0557; SRO-0318

**Validation Time:** 10 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** ABN-POWER Rev. 13

**Location:** Any

**NUREG 1123 Ref:** 2.1.7 (4.4 / 4.7)

**Performance Method:** Perform

**Task Standard:** Determination is made and entered: Operation in the FWH OOS or the FFWT region and Continued Operation action is: Insertion of control rods to below the 100% rod line.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	The plant was operating at 92% power when Feedwater Heater 6A tripped. Reactor power is currently 94% and trending up slow. Feedwater temperature is currently 394°F and trending down slow.
<b>INITIATING CUE:</b>	Based on the above information answer the following questions concerning current plant status. When you have answered the two question hand the Student JPM Information Card to the examiner.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Determines procedure to be referenced.	Determines entry into ABN-POWER is required and refers to section 4.3 and Attachment 7.1.		S / U *
	2	Plots Core Thermal Power versus FW Temperature (°F).	Plots point for 94% Core Thermal Power and 394°F.		S / U *
	3	Determines operating region.	Determines the plant is operating in the FWH OOS or FFTR Region and fills in blank for question 1.		S / U *
	4	ABN-POWER step 4.3.1a	Determines lowering core flow is not required.		S / U
	5	ABN-POWER step 4.3.1b	Determines that insertion of control rods to maintain below the 100% rod line is required and fills in blank for question 2.		S / U *
	6	ABN-POWER step 4.3.1c	Determines power reduction per PPM 3.2.4 is not required.		S / U
	7	ABN-POWER step 4.3.1d	Determines the plant is not operating in the Operation Prohibited Region and does not take action associated with being in that region.		S / U
<b>Termination Criteria: Hands the Student JPM Information Card to examiner.</b>					
<b>Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## DETERMINATION OF OPERATING POINT AND REQUIRED ACTIONS FOLLOWING FW HEATER TRIP PER ABN-POWER

**Evaluator (Print):** \_\_\_\_\_

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

[illegible]

Page 4 of 5



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

The plant was operating at 92% power when Feedwater Heater 6A tripped.

Reactor power is currently 94% and trending up slow.

Feedwater temperature is currently 394°F and trending down slow.

### Cue:

**Based on the above information answer the following two questions concerning current plant status by filling in your answer.**

**When you have answered the questions, hand this Student JPM Information Card to the examiner.**

1. The plant is operating in the \_\_\_\_\_ Region

2. The next action is: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

KEY SRO A3

Number: ABN-POWER

Use Category: CONTINUOUS

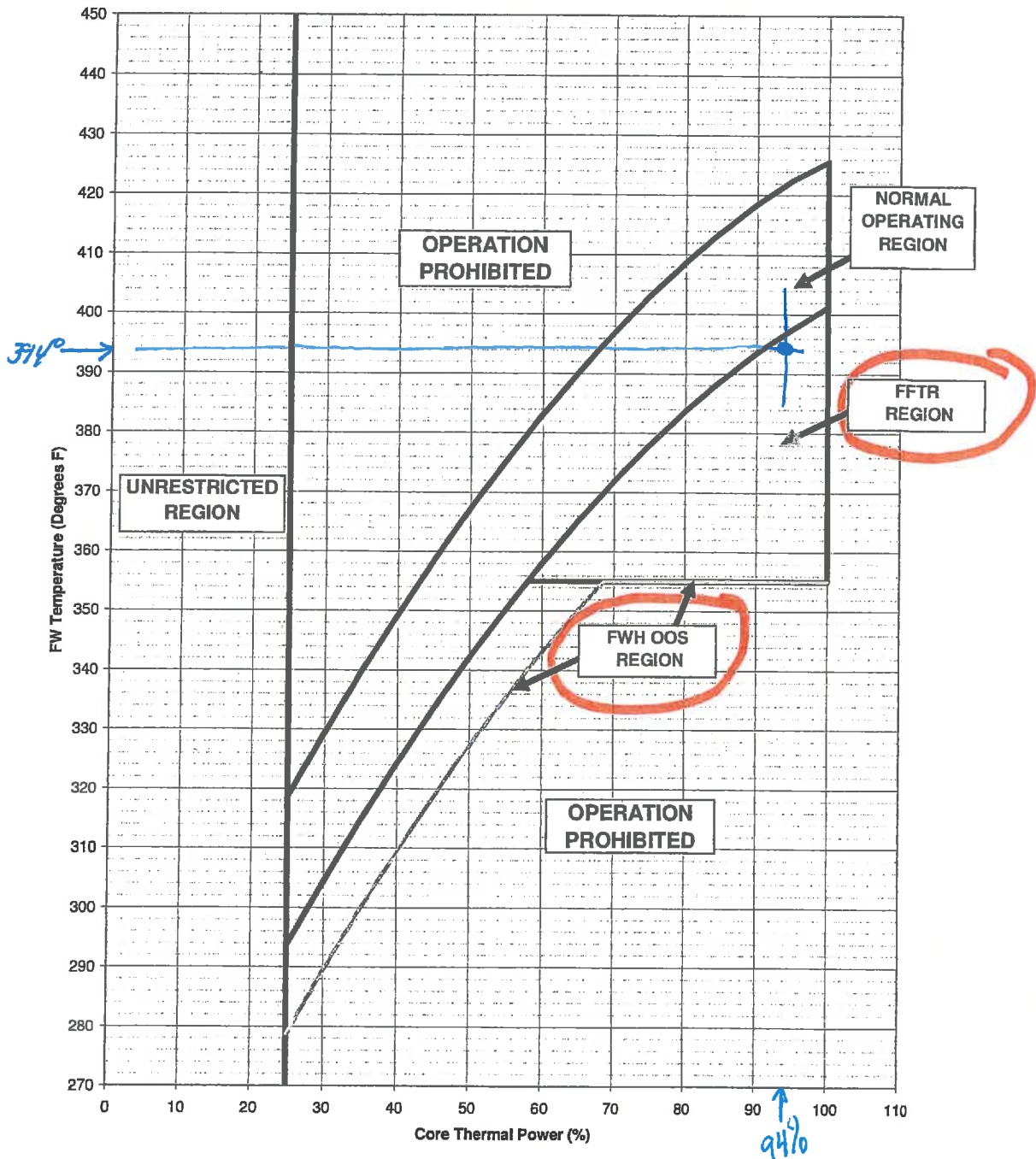
Major Rev: 013

Title: Unplanned Reactor Power Change

Minor Rev: 005

Page: 14 of 15

FEEDWATER TEMPERATURE VERSUS REACTOR POWER



END



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE ADMIN JOB PERFORMANCE MEASURE

LESSON TITLE ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA ACTIVITY  
RATE AND DETERMINE ACTIONS (ADMIN)

LESSON LENGTH .5 HRS MAXIMUM STUDENTS 1

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Simulator Guide PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

JPM PQD Code LO001590 Rev. No. 4

Exam PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/06

REVISED BY Ron Hayden DATE 12/30/14

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

Operations Training Manager

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

ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA ACTIVITY RATE  
AND DETERMINE ACTIONS

**MINOR REVISION RECORD**

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

**JPM SETUP**

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**Simulator ICs; Malfunctions; Triggers; Overrides:**

N/A

**Setup Instructions:**

Candidate needs a calculator and access to ABN-OG.

**JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** N/A

**Safety Items:** N/A

**Task Number:** SRO-0658

**Validation Time:** 10 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** ABN-OG Rev. 3

**Location:** Classroom

**NUREG 1123 Ref:** 271000A2.04 (3.7 / 4.1)

**Performance Method:** Perform

**Task Standard:** Candidate fills out the JPM Answer Sheet and has determined that a power reduction per PPM 3.2.4 is required to maintain Main Condenser Gross gamma activity LT 332 mCi/sec.

ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA ACTIVITY RATE  
AND DETERMINE ACTIONS

### JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Columbia is operating at full power. Various alarms are locked in due to suspected fuel pin damage. Offgas system parameters are as follows: OFFGAS POST TREATMENT RADIATION MONITOR, OG-RIS-601A, is in alarm. OFFGAS SYSTEM EXHAUST FLOW, OG-FR-620, is reading 43 SCFM. SJAE CONDENSER OUTLET RADIATION MONITOR, OG-RR-604, is reading 7721 mr/hr.
<b>INITIATING CUE:</b>	Based on the above information, determine what action, if any, should be taken. Fill in the result of your conclusion on the attachment provided.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Determine procedure.	Refers to Alarm Response Procedures for given alarms to determine procedural requirement.		S / U
	2		Recognizes entry condition into ABN-OG and refers to procedure.		S / U
	3	ABN-OG Step 4.1.4 Estimate Main Condenser air ejector gross gamma activity rate using the following formula: [OG Pretreatment (mRem/hr) (OG-RR-604)] X [OG System flow (scfm) (OG-FR-620)] divided by 1000 = Main Condenser Gross gamma activity (mCi/sec).	Main Condenser Gross gamma activity = 7721 mr/hr times 43 SCFM divided by 1000 OR Main Condenser Gross gamma activity = 332.03 mCi/sec (GT 332mCi/sec).		S / U *

ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA ACTIVITY RATE  
AND DETERMINE ACTIONS

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	ABN-OG Step 4.1.5  Determines required action.	Based on a Main Condenser Gross gamma activity reading of 332.03 mCi/sec, candidate determines that a power reduction per PPM 3.2.4 to maintain Main Condenser Gross gamma activity LT 332 mCi/sec is required.		S / U *
<b>Termination Criteria: Hands the JPM Answer Sheet to the examiner.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

**RESULTS OF JPM:**  
**ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA**  
**ACTIVITY RATE AND DETERMINE ACTIONS**

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** Candidate fills out the JPM Answer Sheet and has determined that a power reduction per PPM 3.2.4 is required to maintain Main Condenser Gross gamma activity LT 332 mCi/sec.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### **Initial Conditions:**

Columbia is operating at full power.

Various alarms are locked in due to suspected fuel pin damage.

Offgas system parameters are as follows:

OFFGAS POST TREATMENT RADIATION MONITOR, OG-RIS-601A, is in alarm.

OFFGAS SYSTEM EXHAUST FLOW, OG-FR-620, is reading 43 SCFM.

SJAE CONDENSER OUTLET RADIATION MONITOR, OG-RR-604, is reading 7721 mr/hr.

### **Cue:**

**Based on the above, determine what action, if any, should be taken.**

**Fill in the result of your conclusion on the JPM Answer Sheet. Hand the JPM Answer Sheet to your examiner when complete.**



## **JPM ANSWER SHEET**

INITIAL HERE IF NO ACTIONS ARE REQUIRED: \_\_\_\_\_

REASON NO ACTIONS ARE REQUIRED: \_\_\_\_\_

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INITIAL HERE IF ACTIONS ARE REQUIRED: \_\_\_\_\_

ACTION(S) IF REQUIRED AND REASON FOR ACTION: \_\_\_\_\_

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Number: ABN-OG	Use Category: CONTINUOUS	Major Rev: 003
Title: Off-Gas System Trouble		Minor Rev: 001
		Page: 4 of 10

#### 4.0 SUBSEQUENT OPERATOR ACTIONS

**NOTE:** Section 4.1 contains actions for rising OG pre or post treatment radiation levels. Section 4.2 contains actions for rising ARM or Exhaust Ventilation Monitor readings in areas adjacent to the OG system.

#### 4.1 Rising OG Pre or Post Treatment Radiation Levels

4.1.1 **MONITOR** OG pre and post treatment radiation levels.

4.1.2 IF OG-V-60 has closed,  
THEN REFER to ABN-BACKPRESSURE.

**NOTE:** CRD suction from the CSTs could cause high OG post treatment activity due to dissolved gas.

4.1.3 IF radiation or airborne contamination levels are rising in the Turbine Building or Radwaste Building,  
THEN REFER to the following procedures:

- ABN-RAD-RELEASE
- ABN-RAD-HIGH

4.1.4 **ESTIMATE** Main Condenser air ejector gross gamma activity rate using the following formula:

$$\frac{[OG \text{ Pretreatment (mRem/hr) (OG-RR-604)}] \times [OG \text{ System flow (scfm) (OG-FR-620)}]}{1,000}$$

Main Condenser gross gamma activity (mCi/sec) = 332.003

#### CAUTION

Reducing core flow below 50% of rated (54.3 MLbm/HR on MS-FR-613) will cause entry into the Area of Increased Awareness. {P-62137}

4.1.5 IF estimated Main Condenser gross gamma activity approaches 332 mCi/sec,  
THEN REDUCE reactor power per PPM 3.2.4 to maintain Main Condenser gross gamma activity LT 332 mCi/sec.



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	CLASSIFY AN EVENT AND COMPLETE A CNF (GE) (SRO) (TC)		
LESSON LENGTH	.5 HRS		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE	_____	Rev. No.	_____
SIMULATOR GUIDE PQD CODE	_____	Rev. No.	_____
JPM PQD CODE	LO001811	Rev. No.	0
EXAM PQD CODE	_____	Rev. No.	_____
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	2/10/15
REVISED BY	_____	DATE	_____
TECHNICAL REVIEW BY	_____	DATE	_____
INSTRUCTIONAL REVIEW BY	_____	DATE	_____
APPROVED BY	SAT Coordinator	DATE	_____
	Operations Training Manager		

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

---

#### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

#### Special Setup Instructions:

Run a QEDPS based upon initial conditions. Print (screen print) the QEDPS form and print out the corresponding map showing the release. Give these to the student after reading the initial conditions and cue to him/her. Ensure CDE Thyroid is GT 5000 mrem and all other readings are LT GE levels.

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** SRO- 0315, 0529, 0638

**Validation Time:** 18 Minutes

**Alternate Path:** No

**Time Critical:** Yes 30 Minutes (15 to declare and 15 to initiate CNF)

**PPM Reference:** PPM 13.8.1 Rev. 34

**Location:** Simulator

**NUREG 1123 Ref:** 2.4.41 (2.9/4.6)

**Performance Method:** Perform

**Task Standard:** Completes Classification Notification Form with required information within the time constraints.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	The plant has experienced an event that has resulted in the following conditions: The plant scrammed 55 minutes ago. Wind Speed is 4 mph. Wind Direction is from 290°. A release from the Turbine Building started thirty minutes ago. TB HVAC flow rate of 360,000 cfm. The Turbine Building Composite Signal (TEA) is reading 2.50E-02 uCi/cc. The release is expected to last 3 hours. Stability class is E. It is not raining outside. A QEDPS has been performed.
<b>INITIATING CUE:</b>	The Shift Manager directs you to complete a Classification Notification Form based only on the results of the completed QEDPS. This is the initial classification. Present the completed form to the Shift Manager for signature. This is a time critical JPM and your time starts now.

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>RECORD START TIME: _____</b>					
	1	Classifies the Event	Refers to PPM 13.1.1 Attachment 7.2 and classifies event as an General Emergency based upon Table 4 Thyroid CDE at 1.2 miles of GT 5000 mrem.		S / U *
<b>NOTE: THIS STOPS THE FIRST 15 MINUTE CLOCK AND STARTS THE NEXT 15 MINUTE CLOCK</b>					
	2	Completes Classification Notification Form.	Fills in following information on the CNF:		S / U
	3	Block 1	Checks b. (Drill)		S / U
	4	Block 2	Enters a '1'		S / U
	5	Block 3	Enters a name		S / U
	6	Block 4	Checks a. (Initial Classification) and enters today's date and time		S / U *

**\* Items are Critical Steps**

<b>Time</b>	<b>Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	7	Block 5	Checks d. (General Emergency)		S / U *
	8	Block 6	Checks "Evacuate" 0-2 miles		S / U *
	9	Block 6a	Checks "Evacuate" 2-10 miles Section 2		S / U *
	10	Block 6a	Checks "Shelter" 2-10 miles Sections 1, 3, and 4		S / U *
	11	Block 6a	Checks Radiological for Basis for Pars		S / U
	12	Block 6b	Checks No for Security Event		S / U
	13	Block 7	Enters 4 for Wind Speed		S / U *
	14	Block 7	Enters 290 for degrees		S / U *
	15	Block 7	Checks No for Precipitation		S / U
	16	Block 7	Enters 'E' as Stability Classification		S / U
	17	Block 8	Checks Release		S / U *
	18	Block 9	Checks Airborne		S / U
	19	Block 10	Enters a time for Estimated Start of Release		S / U
	20	Block 11	Checks Yes		S / U
	21	Block 12	Enters 5.1.G.2 for EAL#		S / U *

**\* Items are Critical Steps**

<b>Time</b>	<b>Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	22	Block 12	Enters a brief description for Description of Incident such as CDE Thyroid at GT 5000 mrem		S / U *
	23	Block 13	Checks a., b., or c.		S / U
<b>RECORD STOP TIME: _____</b>					
<b>Termination Criteria: Student hands in the completed CNF.</b>					
<b>Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

**Examinee (Print):** \_\_\_\_\_

**Task Standard:** Completes Classification Notification Form with required information within the time constraints.

**COMMENTS:**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Page 6 of 7



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

The plant has experienced an event that has resulted in the following conditions:

- The plant scrammed 55 minutes ago.
- Wind Speed is 4 mph.
- Wind Direction is from 290°.
- A release from the Turbine Building started thirty minutes ago.
- TB HVAC flow rate of 360,000 cfm.
- The Turbine Building Composite Signal (TEA) is reading 2.50E-02 uCi/cc.
- The release is expected to last 3 hours.
- Stability class is E.
- It is not raining outside.
- A QEDPS has been performed.

### Initiating Cue:

**The Shift Manager directs you to complete a Classification Notification Form based only on the results of the completed QEDPS. This is the initial classification.**

**Present the completed form to the Shift Manager for signature.**

**THIS IS A TIME CRITICAL JPM  
and your time starts now.**

The Key portion of this JPM (SRO A5) has been redacted due to internal sensitivity markings by the licensee.

Facility: <u>Columbia</u>		Date of Examination: <u>April, 2015</u>	
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>		Operating Test No.: <u>1</u>	
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)			
System / JPM Title	Type Code*	Safety Function	
<p>S1. Reduce RPV pressure with DEH; BPV fail in Auto – take manual control. (241000A4.02) The task is to lower RPV pressure to 550 psig at 50 psig per minute with DEH in automatic. DEH does not open the bypass valves in auto. The operator then takes manual control of bypass valves to lower RPV pressure.</p> <p>(LO001780) – Performed by the RO, SRO-I and SRO-U</p>	N, A, L, S	3	
<p>S2. Restore power to RPS-B. (212000A4.14) The task is to restore power and reset RPS-B. The B MG set is found not to be operable and power is then supplied from alternate power source.</p> <p>(LO001779) Performed by the RO, SRO-I and SRO-U</p>	M, A, L, S	7	
<p>S3. Start HPCS and return RPV level to bend. (209002A2.13) Given a LOCA, a loss of Condensate/Feed has occurred and RPV level is trending down. The task is to start HPCS-P-1 and return RPV level to given band. As level is rising, the HPCS SUCTION SWITCHOVER CST LOW LEVEL annunciator alarms. Investigation reveals the systems suction valves have not swapped. Manual action is taken to align HPCS to the Suppression Pool.</p> <p>(LO001814) Performed by the RO, SRO-I and SRO-U</p>	N, L, EN, S	4	
<p>S4. Transfer SL-31 to SL-21 from SM-3 (262001A4.01) Perform procedure and when the transfer is made the supply breaker does not auto trip but can be tripped manually.</p> <p>(LO001781) Performed by the RO and SRO-I</p>	M, S	6	

<p>S5. Start RRC-P-1B at power (202001A4.01) Performs procedure and when RRC-P-1B is started, its speed does not stop increasing. The operator will trip RRC-P-1B per the immediate operator action of ABN-POWER.</p> <p>(LO001642) Performed by the RO and SRO-I</p>	D, A, S	1
<p>S6. Align SSW to the FPC HX (233000A2.08) The task is to align service water to both Fuel Pool Cooling heat exchangers following a complete loss of RCC.</p> <p>(LO001756) Performed by the RO and SRO-I</p>	D, P, S	9
<p>S7. Swap RCC pumps (Partial loss of RCC) (400000A2.01) The task is start RCC-P-1B and stop RCC-P-1C. RCC-P-1B starts normally but when RCC-P-1C is stopped, RCC-P-1B trips leaving only one operating RCC pump. Actions per ABN-RCC are then performed to secure and isolate RWCU.</p> <p>(LO001806) Performed by the RO</p>	N, A, S	8
<p>C1. Emergency Drywell Venting per PPM 5.5.15. (223001A4.07) The task is to vent the Drywell with Standby Gas Treatment train B.</p> <p>(LR000161) Performed by RO and SRO-I</p>	D, C, R, E, EN	5

In-Plant Systems <sup>@</sup> (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1. Prevent a RCIC High Exhaust Pressure trip. (217000 A2.02) During a station blackout, performs the actions of PPM 5.6.2 required to prevent a high exhaust pressure trip and a high area temperature isolation of the RCIC system. (LR000218) Performed by the RO, SRO-I and SRO-U	D, E, EN, L, P, R	2
P2. Reset the HPCS DG mechanical overspeed trip. (264000A4.04) The task is to reset the mechanical overspeed trip on the HPCS diesel generator. (LR001563) Performed by the RO and SRO-I	D, R	6
P3. Respond to CR HVAC High Radiation. (288000A2.02) During isolation of the Northwest Remote Air Intake, one of the valves cannot be closed which then requires removal of a fuse to complete isolation the intake path. (LO001595) Performed by the RO, SRO-I and SRO-U	D, E, A, R	9
All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	4-6 / 4-6 / 2-3	Actual - 5 / 4 / 3
(C)ontrol room		Actual - 1 / 1 / 0
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4	Actual - 6 / 6 / 2
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1	Actual - 2 / 2 / 2
(EN)gineered safety feature	- / - / ≥ 1 (control room system)	Actual - 3 / 3 / 2
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1	Actual - 4 / 4 / 4
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1	Actual - 5 / 4 / 3
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)	Actual - 2 / 2 / 1
(R)CA	≥ 1 / ≥ 1 / ≥ 1	Actual - 3 / 3 / 3
(S)imulator		Actual - 7 / 6 / 3



# INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
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[illegible]

LESSON TITLE	LOWER RPV PRESSURE USING DEH (CR/SIM) (Alt Path) – S1
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LESSON LENGTH	.5 HRS
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## INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE \_\_\_\_\_ Rev. No. \_\_\_\_\_

SIMULATOR GUIDE PQD CODE Rev. No.

JPM PQD CODE	LO001780	Rev. No.	0
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EXAM PQD CODE	Rev. No.
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DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

REVISED BY	DATE
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TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

## Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

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### JPM SETUP

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#### **Simulator ICs; Malfunctions; Triggers; Overrides:**

Reset to IC with reactor shutdown and pressure being controlled by bypass valves.

#### **Special Setup Instructions:**

Insert MAL-DEH017.

Set Pressure Rate to any value other than 50 psig.

#### **JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0348

**Validation Time:** 7 Minutes

**Alternate Path:** Yes

**Time Critical:** No

**PPM Reference:** SOP-DEH-QC Rev. 5

**Location:** Simulator

**NUREG 1123 Ref:** 241000 A4.02 (4.1 / 4.1)

**Performance Method:** Perform

**Task Standard:** Recognize that auto control of bypass valves to lower RPV pressure to a target of 550psig does not work and RPV pressure has been lowered at a rate LE 50 psig per minute and in a controlled manner by taking manual control of the Bypass Valves.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Columbia was operating at full power when RFW-P-1A tripped followed by RFW-P-1B tripping five minutes later. CRO1 has lined up on the startup flow control valves.
<b>INITIATING CUE:</b>	The CRS directs you to lower RPV pressure to 550 psig at the rate of 50 psig per minute to facilitate feeding the RPV with the Condensate Booster pumps per SOP-DEH-QC. Inform the CRS when RPV pressure is 550 psig.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
NOTE: If the plant is operating in Mode 1 and is GT 25% power, then the DEH set point should be 960 psi. If a reactor pressure change is desired refer to ABN-PRESSURE.					
	1	Step 2.1.1 Initiate Pressure setpoint change as follows (Turbine Start Up; Reactor Startup Display) or (Main Display):	Selects a display screen.		S / U
	2	a. Select Pressure Target.	Selects Pressure Target.		S / U *
	3	b. Enter desired pressure.	Enters "5,5,0" psig.		S / U *
	4	c. Select OK.	Selects OK.		S / U *
	5	d. If a change in pressure rate is desired, then perform the following:	Observes Pressure Rate is not 50 psig and performs step.		S / U
	6	1) Select Pressure Rate.	Selects Pressure Rate.		S / U *
	7	2) Enter desired Pressure rate.	Enters "5,0".		S / U *
	8	3) Select OK.	Selects OK.		S / U *
	9	e. Select GO.	Selects GO.		S / U *
	10	f. Select YES.	Selects YES.		S / U *



\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
ALTERNATE PATH STEP	11	g. Verify Press Demand and Throttle Press change at the Pressure Rate.	Observes no change in Pressure Demand or Bypass Valve position.  Observes green Hold light is still illuminated.  Informs the CRS.	CRS – What actions would you recommend to lower RPV pressure to 550 psig at 50 psig per minute?	S / U *
<b>EVALUATOR: If SOP-DEH-OPS is referenced, when section for manual bypass valve operation is found, cue to use the DEH Quick Card.</b>					
	12	SOP-DEH-QC Step 2.2  Manual Bypass Valve Operation.	Performs this section.		S / U
NOTE: In Manual, raising BPV demand will open the BPVs and cause Reactor pressure to lower. The BPVs will not respond to pressure changes in Manual.					
	13	Step 2.2.1  Operate the Bypass Valves Manually as follows (Turbine Start-up, Reactor Start screen):	Performs this step.		S / U
NOTE: In manual, raising BPV demand will open the BPVs and cause Reactor pressure to lower. The BPVs will not respond to pressure changes in Manual.					
	14	a. Select BPV MANUAL.	Selects BPV Manual.		S / U *
	15	b. Select YES.	Selects Yes.		S / U *
	16	c. If rapid Bypass Valve movement is desired, then select FAST ACTION.	Verbalizes step (it is anticipated that this step will not be performed but it is OK if it is performed).		S / U
	17	d. If opening Bypass Valves, then select BPV Raise.	Selects BPV Raise.		S / U *
	18	e. If closing Bypass Valves, then select BPV Lower.	Does not perform this step.		S / U

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
NOTE: The JOG button illuminates green when the command is accepted, and extinguishes when the command is complete.					
<b>EVALUATOR: Either step f or steps g, h, and i are performed to lower RPV pressure. Whichever is performed makes the other steps not critical steps. It is anticipated that step f will be used to reduce RPV pressure.</b>					
	19	f. If incremental Bypass Valve movement is desired, then depress JOG button once for each 1% of valve demand change desired.	Depresses the JOG button to achieve approximately a 50 psig pressure drop per minute.		S / U *
<b>If JPM step 19 was performed, skip JPM steps 20, 21, and 22 (which are now NOT critical step).</b>					
	20	g. Select GO for full range motion to 100% demand or 0% demand.	Selects Go.		S / U *
	21	h. Select YES.	Selects Yes and observes bypass valves starting to open.		S / U *
	22	i. If desired to stop BPV motion, then depress hold.	Selects Hold to stop bypass valve motion.		S / U *
<b>EVALUATOR: No matter which steps were performed to lower pressure - When you determine that RPV pressure is being lowered in a controlled manner at less than or equal to 50 psig per minute, inform the operator that at the next RPV pressure 50 psig increment to close the Bypass Valves and stop the pressure reduction.</b>					
	23	Stops RPV pressure reduction and closes Bypass Valves.	Selects BPV Lower.		S / U *
<b>EVALUATOR: Student may perform JPM step 24 or steps 25, 26, and 27 to close the Bypass Valves. Whichever is performed makes the other NOT critical.</b>					
	24		Selects the JOG button until the BPVs are closed.		S / U *

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>Step 24 or 25-27 will be performed.</b>					
	25		Selects Fast Action.		S / U *
	26		Selects Go.		S / U *
	27		Selects Yes.		S / U *
<b>IF SOP-DEH-OPS is utilized, these steps will be performed.</b>					
	28	SOP-DEH-OPS Step 5.5.1: Operate the Bypass Valves Manually as follows:	Performs this step.		S / U
	29	a. Select BPV Manual.	Selects BPV Manual		S / U *
	30	b. Select YES.	Selects Yes		S / U *
	31	c. Verify BPV Manual illuminates.	Observes BPV Manual illuminates.		S / U
NOTE: In BPV Manual mode the ramp rate is 1 %/sec (valve position) if the BPV RAISE or LOWER and GO buttons are used. The ramp rate is 5 %/sec if the FAST ACTION button is used with BPV RAISE or LOWER and GO. BPV position changes in 1% increments if the JOG button is used with BPV RAISE or LOWER.					
	32	d. If incremental Bypass Valve movement is desired, then depress JOG button once for each 1% of valve demand change desired.	Depresses the JOG button to achieve approximately a 50 psig pressure drop per minute.		S / U *
Candidate may decide to do rapid valve movement and perform the following steps instead of step 'd' above. If the below steps are performed then above step is not critical. If d is performed then e, f, g, and h are not critical.					
	33	e. If rapid Bypass valve movement is desired, then select fast action.	Selects Fast Action.		S / U *
	34	f. If lowering pressure, then select BPV raise.	Selects BPV raise.		S / U *
	35	g. If raising pressure, then select BPV lower.	Does not perform this step.		S / U *
	36	h. Select GO for full range motion to 100% demand or 0% demand.	Selects Go.		S / U *

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	37	i. Select yes.	Select yes.		S / U *
	38	j. Verifies Go illuminates	Observes Go illuminates.		S / U *
	39	k. Monitor BPV position and RPV pressure during BPV motion.	Monitors BPV position.		S / U
	40	1. If desired to stop BPV motion, then perform the following: 1. Select Hold 2. Verify Hold illuminates.	Selects Hold Observes Hold illuminates.		S / U *
<b>EVALUATOR: No matter which steps were performed to lower pressure - When you determine that RPV pressure is being lowered in a controlled manner at less than or equal to 50 psig per minute, inform the operator that at the next RPV pressure 50 psig increment to close the Bypass Valves and stop the pressure reduction.</b>					
	41	Stops RPV pressure reduction and closes Bypass Valves.	Selects BPV Lower.		S / U *
<b>EVALUATOR: Student may perform JPM step 42 or steps 43, 44, and 45 to close the Bypass Valves. Whichever is performed makes the other NOT critical.</b>					
	42		Selects the JOG button until the BPVs are closed.		S / U *
<b>Step 42 or 43-45 will be performed.</b>					
	43		Selects Fast Action.		S / U *
	44		Selects Go.		S / U *
	45		Selects Yes.		S / U *
<b>Termination Criteria: When the BPVs are closed, inform the Student that the termination point of the JPM has been reached.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

Columbia was operating at full power when RFW-P-1A tripped followed by RFW-P-1B tripping five minutes later.

CRO1 has lined up on the startup flow control valves.

### Initiating Cue:

**The CRS directs you to lower RPV pressure to 550 psig at the rate of 50 psig per minute to facilitate feeding the RPV with the Condensate Booster pumps per SOP-DEH-QC.**

**Inform the CRS when RPV pressure is 550 psig.**



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	<u>LICENSED OPERATOR TRAINING</u>		
COURSE TITLE	<u>JOB PERFORMANCE MEASURE</u>		
LESSON TITLE	<u>RESTORE POWER TO RPS B (ALT. POWER) (CR/SIM) (Alt Path) – S2</u>		
LESSON LENGTH	<u>.5 HRS</u>		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE	<u></u>	Rev. No.	<u></u>
SIMULATOR GUIDE PQD CODE	<u></u>	Rev. No.	<u></u>
JPM PQD CODE	<u>LO001779</u>	Rev. No.	<u>0</u>
EXAM PQD CODE	<u></u>	Rev. No.	<u></u>
DIVISION TITLE	<u>Nuclear Training</u>		
DEPARTMENT	<u>Operations Training</u>		
PREPARED BY	<u>Ron Hayden</u>	DATE	<u>10/21/14</u>
REVISED BY	<u></u>	DATE	<u></u>
TECHNICAL REVIEW BY	<u></u>	DATE	<u></u>
INSTRUCTIONAL REVIEW BY	<u></u>	DATE	<u></u>
APPROVED BY	<u></u>	DATE	<u></u>
	Operations Training Manager		

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

## RESTORE RPS B FROM ALTERNATE POWER SOURCE

### MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### Simulator ICs; Malfunctions; Triggers; Overrides:

Any IC with a normal electrical lineup – all load centers energized.  
Ensure AR-EX-1B is in service.

#### Special Setup Instructions:

Open RPS EPA BKR 3B, acknowledge all annunciators, and allow plant to stabilize.

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0248

**Validation Time:** 10 minutes

**Alternate Path:** Yes

**Time Critical:** No

**PPM Reference:** ABN-RPS Rev. 10

**Location:** Simulator

**NUREG 1123 Ref:** 212000 A4.14 (3.8 / 3.8)

**Performance Method:** Perform

**Task Standard:** RWCU-V-104 is throttled open, RPS 'B' is powered from the alternate power supply and the half-scam has been reset.



# RESTORE POWER TO RPS B FROM ALTERNATE SOURCE

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	A loss of RPS 'B' has just occurred. All maintenance and surveillance testing has been stopped. All automatic actions have been verified to have occurred.
<b>INITIATING CUE:</b>	The CRS directs you to perform the subsequent actions of ABN-RPS. Inform the CRS when the scram has been reset.

**\* Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
The candidate is given a copy of ABN-RPS.					
	1	Step 4.1 If power is available to RWCU-V-104 (Cleanup System Bypass), then throttle open RWCU-V-104.	Observes the Green light and Red light for RWCU-V-104 are both on.  Turns the control switch clockwise to open until the Red light comes on, then releases the control switch (both lights should be on to satisfy the critical step).		S / U *
	2	Step 4.2 If the alternate Gland Exhauster (AR-EX-1A(B)) is required, then start the alternate Gland Exhauster, and place the tripped Gland Exhauster in off.	Observes AR-EX-1A running and does not perform this step.		S / U
	3	Step 4.3 If the alternate Mechanical Vacuum Pump (AR-P-1A(B)) is required, then start the alternate Mechanical Vacuum Pump.	Recognizes current plant configuration does not require Mechanical Vacuum Pump operation and does not perform this step.		S / U

## RESTORE POWER TO RPS B FROM ALTERNATE SOURCE

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	Step 4.4 Ensure automatic actions have occurred.	Recognizes this step has been completed per the Initial Conditions and does not perform.		S / U
ALTERNATE PATH STEP	5	Step 4.5 Perform the following to reenergize RPS:	Recognizes that RPS MG set condition is not known and contacts an Equipment Operator and requests status of RPS B MG set.	<b>The B RPS MG set is not running and the motor is hot to the touch.</b>	S / U *
	6	Step 4.5.1 If the condition of the RPS MG set is known to be operable, then restart the RPS MG set, and repower the bus per SOP-RPS-START and SOP-RPS-START.	Determines that the condition of RPS MG Set B is not operable and does not perform this step.		S / U
	7	Step 4.5.2 If the condition of the RPS MG set is uncertain then repower RPS A or B from H13-P610 as follows:  a. Verify power available from the Reactor Protection System Alternate Power Supply, MC-6B, by observing the Alternate Feed white light illuminated.	Determines this step is to be performed.  Observes the white light is on for Alternate RPS Feed at H13-P610.		S / U
<b>CAUTION : The MG Set Transfer switch is break before make and positioning it to the wrong supply will result in a full REACTOR SCRAM.</b>					
	8	Step 4.5.2b If repowering RPS A, then place the RPS power source selector switch in ALT A position.	Recognizes RPS A is powered and does not perform this step.		S / U

## RESTORE POWER TO RPS B FROM ALTERNATE SOURCE

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	9	Step 4.5.2c If repowering RPS B, then place the RPS power source selector switch in ALT B position.	Rotates the RPS Power Source Select switch on H13-P610 clockwise to the ALT B position.		S / U *
	10	Step 4.6 When RPS power has been restored and stabilized, then perform the following: Step 4.6.1 If restoring RPS A then perform the following:	Recognizes RPS A is powered and does not perform this step.		S / U
	11	Step 4.6.2 If restoring RPS B, then perform the following:	Performs this step.		S / U
	12	Step 4.6.2a Reset the Half Scram at H13-P603.	Depresses the two Reactor Scram Logic A1/B1 and the A2/B2 reset P/B's on H13-P603.  (Observes white RPS Scram group solenoid lights on and amber Backup Scram System lights off).		S / U *
<b>Termination Criteria: Candidate informs CRS that ABN-RPS has been completed up to resetting the Half Scram.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

**RESULTS OF JPM**

**RESTORE RPS B FROM ALTERNATE POWER SOURCE**

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** RWCU-V-104 is throttled open, RPS ‘B’ is powered from the alternate power supply and the half-scam has been reset.

Overall Evaluation	JPM Completion Time
SAT / UNSAT (Circle One)	Minutes

**COMMENTS:**

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\_\_\_\_\_

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## **STUDENT JPM INFORMATION CARD**

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### **Initial Conditions:**

A loss of RPS 'B' just occurred.

All maintenance and surveillance testing has been stopped.

All automatic actions have been verified to have occurred.

### **Initiating Cue:**

The CRS directs you to perform the subsequent actions of ABN-RPS.

Inform the CRS when RPS B has been repowered and the scram is reset.



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	RESPOND TO LOCA – RHR PUMP CAVITATES (CR/SIM) (Alt Path) – S3		
LESSON LENGTH	.5 HRS		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE	_____	Rev. No.	_____
SIMULATOR GUIDE PQD CODE	_____	Rev. No.	_____
JPM PQD CODE	LO001815	Rev. No.	0
EXAM PQD CODE	_____	Rev. No.	_____
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	4/13/15
REVISED BY	_____	DATE	_____
TECHNICAL REVIEW BY	_____	DATE	_____
INSTRUCTIONAL REVIEW BY	_____	DATE	_____
APPROVED BY	_____	DATE	_____
	Operations Training Manager		

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

## RESPOND TO LOCA – RHR PUMP CAVITATES - RETURN RPV LEVEL

### MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### Simulator ICs; Malfunctions; Triggers; Overrides:

Run this schedule file to indicate cavitation on RHR-P-2A when RHR-V-42A's red light comes on:

```
<SCHEDULE>
  <ITEM row = 1>
    <TIME>1</TIME>
    <EVENT>1</EVENT>
    <ACTION>Insert malfunction MAL-RHR010 on event 1</ACTION>
    <DESCRIPTION>RHR-P-2A's Current Meter oscillates</DESCRIPTION>
  </ITEM>
  <ITEM row = 2>
    <TIME>1</TIME>
    <ACTION>Insert malfunction XMT-RHR012N to 60 on event 1</ACTION>
    <DESCRIPTION>RHR-P-2A Discharge Pressure gage oscillates</DESCRIPTION>
  </ITEM>
  <ITEM row = 3>
    <TIME>1</TIME>
    <ACTION>Insert malfunction XMT-RHR005N to 60 on event trigger 1</ACTION>
    <DESCRIPTION>RHR-P-2A Flow meter oscillates</DESCRIPTION>
  </ITEM>
```

#### Event file

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

```
<EVENT>
```

```
  <TRIGGER id="1" description="Insert RHR-P-2A cavitation when RHR-V-42A's red light comes on">X01O208R &gt; 0</TRIGGER>
```

```
</EVENT>
```

#### Special Setup Instructions:

From a 100% IC insert a DBA LOCA. Take mode switch to SHUTDOWN. Stop all Condensate pumps and CRD pumps. Turn off all panel annunciators except for P601's. Put in a failure of the injection valves to open on RHR-B, RHR-C and LPCS systems.

## RESPOND TO LOCA – RHR PUMP CAVITATES - RETURN RPV LEVEL

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0645

**Validation Time:** 5 minutes

**Alternate Path:** Yes

**Time Critical:** No

**PPM Reference:** SOP-RHR-INJECTION-QC

**Location:** Simulator

**NUREG 1123 Ref:** 203000 A2.01 (3.2 / 3.4)

**Performance Method:** Perform

**Task Standard:** RHR-V-42A was opened and it was noted that RHR-P-2A showed signs of pump cavitation and in response, RHR-P-2A was secured. When the next injection system use was attempted, it was recognized that the injection valve failed to open. In response, a third injection system was used to raise RPV level by opening the system's RPV injection valve.



## START HPCS DUE TO LOCA AND RETURN RPV LEVEL

### JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	A LOCA in the Recirc system caused a high Drywell pressure scram. Operators took actions and recovered RPV level. RPV level is currently -130" and is trending down slow. HPCS is the only system currently injecting.
<b>INITIATING CUE:</b>	The CRS directs you use SOP-RHRA-INJECTION-QC and raise RPV level back to a -50" to +54" level band. Inform the CRS when RPV level has been returned to the level band and RHR-V-42A is closed.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
The candidate refers to SOP-RHRA-INJECTION-QC.					
	1	Step 2.1.1 Verify RHR-P-2A running.	Observes Red light on and Green light off for RHR-P-2A.  May also verify discharge pressure and pump amps.		S / U
	2	Step 2.1.2  When RPV pressure is LT 470 psig, then verify RHR-V-42A open (LPCI Isolation).	Observes RPV pressure LT 470 psig (not critical).  Turns the control switch for RHR-V-42A clockwise to open and observes the Red light comes on and Green light eventually goes off (when valve is full open).		S / U *
Alternate Path Step	3		Observes pump flow rising, motor current rising and pump discharge pressure rising.  Observes all three of these indications oscillating.  May inform the CRS.	If CRS is informed without a recommendation: What actions would you recommend?  When/if recommendation is given - concur with recommendation.	S / U *
	4	Stop pump cavitation.	May close RHR-V-42A by turning control switch counterclockwise.  Secures RHR-P-2A by turning control switch counterclockwise to stop.		S / U *

## START HPCS DUE TO LOCA AND RETURN RPV LEVEL

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	5		Informs the CRS of actions taken.	<b>If CRS is informed repeat back communication only.</b>	S / U
	6	Chooses a different injection system.	Observes other ECCS injection systems that are not injecting and refers to the injection quick card.  If RHR-B is used refers to SOP-RHRB-INJECTION-QC; if RHR-C is used refers to SOP-RHRC-INJECTION-QC; If LPCS is used refers to SOP-LPCS-INJECTIN-QC.		S / U
	7	Step 2.1.1 Verify RHR-P-2B running or Verify RHR-P-2C running or Verify LPCS-P-1 running.	Observes Red light on and Green light off for operating pump.  May also verify discharge pressure and pump amps.		S / U
Alternate Path Step	8	Step 2.1.2  When RPV pressure is LT 470 psig, then verify RHR-V-42B open (LPCI Isolation) or RHR-V-42C open (LPCI Isolation) or LPCS-V-5 open (LPCS Isolation).	Turns the control switch for RHR-V-42B or RHR-V-42C or LPCS-V-5 clockwise to open and observes the Red light remains off and the valve does not open.  May inform the CRS.	<b>If CRS is informed repeat back communication only.</b>	S / U *
	9	Chooses a different injection system.	Observes other ECCS injection systems that are not injecting and refers to the injection quick card.  If RHR-B is used refers to SOP-RHRB-INJECTION-QC; if RHR-C is used refers to SOP-RHRC-INJECTION-QC; If LPCS is used refers to SOP-LPCS-INJECTIN-QC.		S / U

## START HPCS DUE TO LOCA AND RETURN RPV LEVEL

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	10	Step 2.1.1 Verify RHR-P-2B running or Verify RHR-P-2C running or Verify LPCS-P-1 running.	Observes Red light on and Green light off for operating pump.  May also verify discharge pressure and pump amps.		S / U
	11	Step 2.1.2 When RPV pressure is LT 470 psig, then verify RHR-V-42B open (LPCI Isolation) or RHR-V-42C open (LPCI Isolation) or LPCS-V-5 open (LPCS Isolation).	Turns the control switch for RHR-V-42B or RHR-V-42C or LPCS-V-5 clockwise to open and observes the Red light comes on and Green light eventually goes off (when valve is full open).		S / U *
	12		Observes pump parameters normal and injection flow increasing.  Observes RPV level rising.  May inform the CRS.		S / U
<b>Termination Criteria: When injection flow has started and RPV level is rising, inform the candidate that the termination point of the JPM has been reached.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM

## RESPOND TO LOCA – RHR PUMP CAVITATES - RETURN RPV LEVEL

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** RHR-V-42A was opened and it was noted that RHR-P-2A showed signs of pump cavitation and in response, RHR-P-2A was secured. When the next injection system use was attempted, it was recognized that the injection valve failed to open. In response, a third injection system was used to raise RPV level by opening the system's RPV injection valve.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

[illegible]

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### **Initial Conditions:**

A LOCA in the Recirc system caused a high Drywell pressure scram.

Operators took actions and recovered RPV level.

HPCS is the only system currently injecting.

RPV level is currently -130" and is trending down slow.

### **Initiating Cue:**

The CRS directs you use SOP-RHRA-INJECTION-QC and raise RPV level to a -50" to +54" level band.

Inform the CRS when RPV level has been returned to the level band and RHR-V-42A is closed.



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	TRANSFER SL-31 TO SL-21 FROM SM-3 (CR/SIM) – S4		
LESSON LENGTH	.5 HRS		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE	_____	Rev. No.	_____
SIMULATOR GUIDE PQD CODE	_____	Rev. No.	_____
JPM PQD CODE	LO001781	Rev. No.	0
EXAM PQD CODE	_____	Rev. No.	_____
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	10/21/14
REVISED BY	_____	DATE	_____
TECHNICAL REVIEW BY	_____	DATE	_____
INSTRUCTIONAL REVIEW BY	_____	DATE	_____
	SAT Coordinator		
APPROVED BY	_____	DATE	_____
	Operations Training Manager		

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### **Simulator ICs; Malfunctions; Triggers; Overrides:**

Any IC where SL-31 is being powered from SM-3.

#### **Special Setup Instructions:**

Fail CB-31/3 to auto open.

#### **JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** R0-0398

**Validation Time:** 5 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** SOP-ELEC-480V-OPS Section 5.4 Rev. 4

**Location:** Simulator

**NUREG 1123 Ref:** 262001A4.01 (3.4 / 3.7) / A4.05 (3.3 / 3.3)

**Performance Method:** Perform

**Task Standard:** SL-31 is powered from SL-21 and the control switch for CB-31/3 was opened by turning the C/S to the trip position.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	SL-31 is currently powered from SM-3. Work on the transformer requires SL-31 power be transferred to SL-21. All conditions, limitations, and prerequisites for this evolution are completed.
<b>INITIATING CUE:</b>	The CRS directs you to transfer SL-31 to SL-21 from SM-3. Inform the CRS when SL-31 is being powered from SL-21.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>When the student identifies section 5.4 of SOP-ELEC-480V-OPS as procedure give student a copy.</b>					
<b>CAUTION: DO NOT exceed 277 supply amps on any one transformer.</b> NOTE: The controls and indications necessary to perform this section are located at H13-P800 (Bd C). NOTE: CB-31/3 will trip when CB-31/21 is closed.					
	1	Step 5.4.1 Verify the sum of ammeters E-AM-3/31 and E-AM-2/21 is LE 277 amps.	Observes amp readings on ammeters E-AM-3/31 and E-AM-2/21 and recognizes total is LT 277 amps.		S / U
	2	Step 5.4.2 Verify CB-31/21 green light illuminated and flag displayed.	Observes the Green light on and the Red light off and Green flag displayed for CB-31/21.		S / U
	3	Step 5.4.3 Place Bus 11, 21, and 31 Trip Permissive Selector switch in Trip CB-31/3.	Turns the Bus 11, 21, and 31 Trip Permissive Selector switch to the Trip CB-31/3 position.		S / U *
NOTE: 4.800.C3.5-4, BKR 31/3 TRIP will alarm when the following step is performed.					
	4	Step 5.4.4 Close CB-31/21.	Turns the control switch for CB-31/21 to the close position.		S / U *
	5	Step 5.4.5 Verify CB-31/21 green light extinguishes.	Observes the Green light off for CB-31/21.		S / U



**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	6	Step 5.4.6 Verify CB-31/21 red light illuminates.	Observes the Red light on for CB-31/21.		S / U
	7	Step 5.4.7 Verify CB-31/3 auto trips.	Observes Red light lit and Green light off for CB-31/3.		S / U
	8	Step 5.4.8 Place CB-31/3 control switch in Trip.	Turns the control switch for CB-31/3 to the Trip position.  Observes CB-31/3 Green light on and Red light off (Not part of the critical step).		S / U *
	9	Step 5.4.9 Verify CB-31/3 green light illuminated and green flag displayed.	Observes the Green light lit and the Green flag displayed for CB-31/3.		S / U
	10	Step 5.4.10 Place Bus 11, 21, and 31 Trip Permissive Selector switch in Off.	Turns the Bus 11, 21, and 31 Trip Permissive Selector switch to an Off position.		S / U
	11	Step 5.4.11 Verify E-AM-2/21 is LE 277 amps.	Observes amp readings on ammeters E-AM-3/31 and E-AM-2/21 and recognizes total is LT 277 amps.		S / U
<b>Termination Criteria: Student informs CRS that SL-31 has been transferred from SM-3 and is being powered from SL-21.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM TRANSFER SM-3 FROM TR-S TO TR-N

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** SL-31 is powered from SL-21 and the control switch for CB-31/3 was opened by turning the C/S to the trip position.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## **STUDENT JPM INFORMATION CARD**

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### **Initial Conditions:**

SL-31 is currently powered from SM-3.

Work on the transformer requires SL-31 power be transferred to SL-21.

All conditions, limitations, and prerequisites for this evolution are completed.

### **Initiating Cue:**

**The CRS directs you to transfer SL-31 to SL-21 from SM-3.**

**Inform the CRS when SL-31 is being powered from SL-21.**



# INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
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COURSE TITLE	JOB PERFORMANCE MEASURE

LESSON TITLE	Start RRC-P-1B; Inadvertent RRC Flow Increase (Sim) (Alt Path) – S5
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LESSON LENGTH	.5 HRS
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## INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE \_\_\_\_\_ Rev. No. \_\_\_\_\_

SIMULATOR GUIDE PQD CODE Rev. No.

JPM PQD CODE                      LO001642                      Rev. No.                      3

EXAM PQD CODE

Rev. No.

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY      Ron Hayden      DATE      10/02/08

REVISED BY Ron Hayden DATE 12/31/14

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

SAT Coordinator

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

## Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

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### Simulator ICs; Malfunctions; Triggers; Overrides:

An IC set where only the ‘A’ RRC Pump is running and you are ready to start RRC-P-1B.

Ensure RRC-P-1A flow is about 22,000 gpm (GT 20,800 gpm). Ensure CB-RPT-3B, 4B and CB-RRB are open.

**Insert malfunction MAL-RFC016E which overrides off the ASD 15 second P/B Stuck limit.**

### This is the event file for the schedule file:

```
<!-- This file contains a Thunder Simulations Event -->
<EVENT>
  <TRIGGER id="1" description="ASD 1B1 Light on">X02I137T &gt; 0</TRIGGER>
</EVENT>
```

### Run the following schedule files:

```
!-- This file contains a Thunder Simulations Schedule -->
<SCHEDULE>
  <ITEM row = 1>
    <TIME>1</TIME>
    <EVENT>1</EVENT>
    <ACTION>Insert override OVR-RFC030P after 15 to ON on event 1</ACTION>
    <DESCRIPTION>Depress RRC-P-1B raise P/B</DESCRIPTION>
  </ITEM>
  <ITEM row = 2>
    <TIME>1</TIME>
    <EVENT>1</EVENT>
    <ACTION>Insert override OVR-RFC030N to OFF on event 1</ACTION>
    <DESCRIPTION>RRC-M/A-676B LOWER P/B OFF</DESCRIPTION>
  </ITEM>
  <ITEM row = 3>
    <TIME>1</TIME>
```

<ACTION>Event Events/LO001642.evt</ACTION>  
<DESCRIPTION>LO001642 event file</DESCRIPTION>  
</ITEM>  
</SCHEDULE>

**Special Setup Instructions:**

See above.

**JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-1162; RO-0083

**Validation Time:** 20 Minutes

**Alternate Path:** Yes

**Time Critical:** No

**PPM Reference:** SOP-RRC-START Rev. 16; ABN-POWER Rev. 13

**Location:** Simulator

**NUREG 1123 Ref:** 202001 A2.05 (3.8 / 4.0)

**Performance Method:** Perform

**Task Standard:** RRC-P-1B was started. It was recognized that RRC-P-1B's speed was increasing uncontrolled. RRC-P-1B was stopped by depressing the stop pushbutton.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	The plant was operating at 99% power when RRC-P-1B tripped. The cause has been corrected and RRC-P-1B is ready to be started. The SNE is in the control room and has evaluated Core conditions and RPV inlet temperature as satisfactory per SOP-RRC-C103. A Reactivity Plan / Startup Plan is in place. The reactor is below the 54% rod line. RRC seal purge has been in service for 3 hours per SOP-RRC-SEAL. OSP-RRC-C103 has been completed for steps 5.2.15 and 5.2.16. Both Channel Selector Switches are in the ON positions at panels: RRC-IMD-ASD1B/1 and RRC-IMD-ASD1B/2 (Local Control and Diagnostics Panels). OPS 4 is standing by in the ASD Building. CRO1 is monitoring and controlling RPV level.
<b>INITIATING CUE:</b>	The CRS has directed you to start RRC-P-1B per SOP-RRC-START section 5.2. Notify the CRS when RRC-P-1B is operating at 15 Hz.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
NOTE: An RRC pump start in this condition requires the presence of an SNE in the Control Room and an approved PPM 9.3.12 S/U plan in place. CAUTION Entry into the Area of Increased Awareness may result in core oscillations. CAUTION Do not enter the Area Of Increased Awareness when reducing core flow. CAUTION Due to a crack near Jet Pump 17/18 riser, RRC loop B flow should not exceed 55.9 Mlbm/hr, averaged over a one hour period.					
	1	<p>Step 5.2.1</p> <p>Verify the SNE has evaluated the following parameters per PPM 9.3.12:</p> <ul style="list-style-type: none"> <li>Core conditions are consistent with the requirements specified in the Reactivity Control Plan</li> <li>RPV Inlet temperature, as indicated on RFW-TI-5 (H13-P840) (or the average of computer points F018 and F019), is to the left of the curve on the Minimum Feedwater Temperature Verses Power Prior to Recirc Pump Start curve in Att. 6.3</li> </ul>	Recognizes initial conditions stated SNE review of Core Conditions and RPV Inlet Temperature was complete.		S / U

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	2	Step 5.2.2 Lower the operating recirculation pump speed to LT 30 Hz (~20,800 GPM drive flow or less).	Observes pump speed is 33 Hz and depresses the lower P/B to reduce RRC-P-1A speed to LE 30 Hz.  Observes flow to be approximately 20,800 gpm.		S / U *
Caution RRC Pump start in the AIA is prohibited. The lower boundary of the AIA is the 54% rod line as specified in Attachment 6.1.					
	3	Step 5.2.3 Verify the Reactor is below the 54% rod line.	Recognizes initial conditions stated rod line LT 54% (May also refer to computer screen).	Rod Line on Computer screen may not be displayed or be below 54%. If simulator is checked refer student to initial conditions or cue that rod line is LT 54%.	S / U
	4	Step 5.2.4 Verify reactor water level is GT level 4.	Observes RPV level indication and determines RPV/L is GT +31.5 inches.		S / U
	5	Step 5.2.5 Verify recirculation pump seal purge injection has been in service for at least 2 hours prior to starting an idle pump per SOP-RRC-SEAL.	Recognizes initial conditions stated RRC seal purge has been in service for GT 2 hours.		S / U



\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	6	Step 5.2.6 Verify the following: <ul style="list-style-type: none"> <li>• RWCU-V-106 OPEN</li> <li>• RRC-V-23B OPEN</li> <li>• RRC-V-67B OPEN</li> <li>• RCC-V-17B OPEN</li> <li>• RRC-M/A-R676B in MANUAL</li> <li>• RRC-M/A-R676B is set at 15 Hz demand</li> <li>• RRC-M/A-R676B status lights extinguished:               <ul style="list-style-type: none"> <li>• Feed Pump Trip</li> <li>• dT Cavitation</li> <li>• Reactor Low Level</li> </ul> </li> </ul>	Observes the Red light on and the Green light off for: RWCU-V-106, RRC-V-23B RRC-V-67B, RCC-V-17B.  Observes manual light on for RRC-M/A-R676B.  Observes RRC-M/A-R676B is set at 15 Hz demand.  Observes lights for Feed pump trip, Delta T Cavitation and Low RPV Level are off.		S / U
Note: It is acceptable for the thrust monitor to be in alarm when the RRC pump is shutdown					
	7	Step 5.2.6 (continued) <ul style="list-style-type: none"> <li>• H13-P602.A6-2.8, RECIRC B SYSTEM VIB HIGH is clear.</li> <li>• H13-P602.A6.2-5, RECIRC B PUMP SEAL COOLING WATER FLOW LOW is clear.</li> <li>• H13-P602.A6.3-6, RECIRC B MOTOR WINDING COOLANT FLOW LOW is clear.</li> </ul>	Observes H13-P602. A6-2.8, RECIRC B SYSTEM VIB HIGH not alarmed. Observes H13-P602. A6.2-5, RECIRC B PUMP SEAL COOLING WATER FLOW LOW not alarmed. Observes H13-P602.A6.3-6, RECIRC B MOTOR WINDING COOLANT FLOW LOW not alarmed.		S / U

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	8	Step 5.2.7 Close CB-RRB (RRC-P-1B Bus Tie breaker) (H13-P602).	Places control switch for CB-RRB to the Close position. Observes the Red light on and the Green light off.		S / U *
	9	Step 5.2.8 Close CB-RPT-4B (RRC-P-1B Motor Interlock Breaker) (H13-P602).	Places control switch for CB-RPT-4B to the Close position. Observes the Red light on and the Green light off.		S / U *
	10	Step 5.2.9 Close CB-RPT-3B (RRC-P-1B Motor Interlock Breaker) (H13-P602).	Places control switch for CB-RPT-3B to the Close position. Observes the Red light on and the Green light off.		S / U *
NOTE: White lights DS-6C and 6D may be pulsing at the rate of approximately once per second.					
	11	Step 5.2.10 Verify following white lights Dimly lit (RPT trip system B): • DS 6C (H13-P609) • DS 6D (H13-P611)	Observes lights lit for DS-6C on H13-P609 and DS-6D on H13-P611.		S / U
	12	Step 5.2.11 Depress the reset pushbutton at the control and diagnostic panel for each drive	Contacts OPS4 and directs depressing the reset pushbutton at the control and diagnostic panel for each drive.	The reset pushbutton for each drive has been depressed.	S / U

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	13	<p>Step 5.2.12</p> <p>If starting an RRC pump on the master channel 1B1, then verify the following:</p> <ul style="list-style-type: none"> <li>• Channel Selector Switch for Channel 1B1 is on</li> <li>• Channel Selector Switch for Channel 1B2 is off</li> </ul>	Recognizes that both drive channels will be used – does not perform.	If students performs this step, direct a start using both drive channels	S / U
	14	<p>Step 5.2.13</p> <p>If starting an RRC pump on the master channel 1B2, then verify the following:</p> <ul style="list-style-type: none"> <li>• Channel Selector Switch for Channel 1B1 is off</li> <li>• Channel Selector Switch for Channel 1B2 is on</li> </ul>	Recognizes that both drive channels will be used – does not perform.	If students performs this step, direct a start using both drive channels	S / U
	15	<p>Step 5.2.14</p> <p>If starting an RRC pump on both drive channels, then verify both Channel Selector Switches for that drive are on.</p> <ul style="list-style-type: none"> <li>• RRC-IMD-ASD1B/1 (Local Control and Diagnostics Panel)</li> <li>• RRC-IMD-ASD1B/2 (Local Control and Diagnostics Panel)</li> </ul>	Contacts OPS4 and directs verification that both Channel Selector Switches are in the ON positions at panels: RRC-IMD-ASD1B/1 (Local Control and Diagnostics Panel) and RRC-IMD-ASD1B/2 (Local Control and Diagnostics Panel).	Both channel selector switches are in the on position for ASD-1B/1 and ASD-1B/2.	S / U
CAUTION Operation within the prohibited region of the Two Loop Recirculation Pump Speed Mismatch Operating Limits Curve, Attachment 6.4, will result in high vibration levels in the idle Jet Pumps.					

**\* Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	16	Step 5.2.15 Verify temperature limitations within 15 minutes prior to starting an idle recirculation pump per OSP-RRC-C103.	Recognizes information given in turnover (OSP-RRC-C103 has been completed for steps 5.1.15 and 5.1.16).	NOTE: Even if GT 15 minutes has passed since starting the JPM, cue student the requirements of step 5.1.15 and 5.1.16 have been completed per OSP-RRC-C103.	S / U
	17	Step 5.2.16 If starting an idle pump with the other pump in operation, then verify the operating loop flow is LT 50% of rated loop flow (30 Hz) within 15 minutes prior to pump start per OSP-RRC-C103.	Recognizes information given in turnover (OSP-RRC-C103 has been completed for steps 5.1.15 and 5.1.16).	NOTE: Even if GT 15 minutes has passed since starting the JPM, cue student the requirements of step 5.1.15 and 5.1.16 have been completed per OSP-RRC-C103.	S / U
	18	Step 5.2.17 If applicable, then remove the B18 computer substitute value for Single Loop Operation.	Verbalizes step.	The STA has removed the B18 computer substitute value for Single Loop Operation.	S / U
	19	Step 5.2.18 Verify the ASD "READY" light for the drive channels to be started are illuminated.	Observes ASD ready lights are on for each drive channel.		S / U
NOTE: A momentary "GTO FREEZE" alarm may be expected upon channel start. This alarm may be cleared by depressing the local reset pushbutton. An actual "GTO FREEZE" alarm will cause the channel to fault and trip. NOTE: Frequency indication may be momentarily erratic during pump start. NOTE: If the pump has been idle for an extended period of time, the expected start time of 30-50 seconds may be longer due to no oil film present under the thrust bearing					
	20	Step 5.2.19 Start RRC-P-1B by momentarily depressing the ASD START pushbutton.	Momentarily depresses the ASD start pushbutton for RRC-P-1B.		S / U *

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	21	Step 5.2.20 Verify the RRC-P-1B starts and continues to operate at approximately 450 RPM (15 Hz).	Observes the Red lights on and the White lights off for drives No.1 and No.2.  Observes RPMs for RRC-P-1B rise to 450 rpm within 50 seconds.		S / U
ALT PATH STEP	22		Recognizes that the speed for RRC-P-1B continues to go up past 15 Hz / 450 rpm without operator demand.  May attempt to stop the rising pump speed by depressing the lower button for RRC-P-1B but notes that this does not stop pump speed increase.  May inform CRS that RRC-P-1B speed is rising without demand.	<b>If CRS is informed of the rise in RRC-P-1B speed, ONLY repeat back the communication – do not give any direction.</b>  <b>The critical part of this step is to recognize that RRC-P-1B's speed is increasing and is uncontrolled.</b>	S / U *
	23	ABN-POWER Step 3.2.1  If RRC pump speed is rising for one pump and cannot be controlled, then stop the affected pump.	Depresses the STOP pushbutton for RRC-P-1B and verifies it stops.  Informs the CRS that RRC-P-1B was stopped as pump speed continued to rise GT 15 Hz.		S / U *
<b>Termination Criteria: When the student informs the CRS that RRC-P-1B was stopped due to speed rising without operator action, inform the student that the termination point of the JPM has been reached.</b>					
<b>Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM

### START RRC-P-1B; INADVERTENT RRC FLOW INCREASE

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** RRC-P-1B was started. It was recognized that RRC-P-1B's speed was increasing uncontrolled. RRC-P-1B was stopped by depressing the stop pushbutton.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

The plant was operating at 99% power when RRC-P-1B tripped.

The cause has been corrected and RRC-P-1B is ready to be started.

The SNE is in the control room and has evaluated Core conditions and RPV inlet temperature as satisfactory per SOP-RRC-C103.

A Reactivity Plan / Startup Plan is in place.

The reactor is below the 54% rod line.

RRC seal purge has been in service for 3 hours per SOP-RRC-SEAL.

OSP-RRC-C103 has been completed for steps 5.2.15 and 5.2.16.

No computer substitute value for Single Loop Operation has been entered.

Both Channel Selector Switches are in the ON positions at panels: RRC-IMD-ASD1B/1 and RRC-IMD-ASD1B/2 (Local Control and Diagnostics Panels).

OPS 4 is standing by in the ASD Building.

CRO1 is monitoring and controlling RPV level.

### Initiating Cue:

The CRS directs you to start RRC-P-1B per SOP-RRC-START section 5.2.

Notify the CRS when RRC-P-1B is operating at 15 Hz.



# INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	ALIGN SERV. WATER TO BOTH FUEL POOL HX's (CR/SIM) – S6		
LESSON LENGTH	.5 HRS		
	INSTRUCTIONAL MATERIALS INCLUDED		
LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	LO001756	Rev. No.	1
EXAM PQD CODE		Rev. No.	
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	12/12/12
REVISED BY	Ron Hayden	DATE	10/31/14
TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY		DATE	
	Operations Training Manager		

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



## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

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### Simulator ICs; Malfunctions; Triggers; Overrides:

Any IC where FPC is running.

Run this schedule file that closes RCC valves and add an event that initiates trigger 2 when the green light for RCC-V-131 illuminates (X26O031G > 0).

<SCHEDULE>

```

<ITEM row = 1>
  <TIME>0</TIME>
    <EVENT>2</EVENT>
    <ACTION>Insert remote LOA-RCC011 to 0 on event 2</ACTION>
    <DESCRIPTION>RCC-V-9A FPC-HX-1A INLET ISOL</DESCRIPTION>
  </ITEM>
<ITEM row = 2>
  <TIME>0</TIME>
    <EVENT>2</EVENT>
    <ACTION>Insert remote LOA-RCC013 to 0 on event 2</ACTION>
    <DESCRIPTION>RCC-V-10A FPC-HX-1A OUTLET</DESCRIPTION>
  </ITEM>
<ITEM row = 3>
  <TIME>0</TIME>
    <EVENT>2</EVENT>
    <ACTION>Insert remote LOA-RCC012 to 0.02000 on event 2</ACTION>
    <DESCRIPTION>RCC-V-9B FPC-HX-1B INLET ISOL</DESCRIPTION>
  </ITEM>
<ITEM row = 4>
  <TIME>0</TIME>
    <EVENT>2</EVENT>
    <ACTION>Insert remote LOA-RCC014 to 0 on event 2</ACTION>
    <DESCRIPTION>RCC-V-10B FPC-HX-1B OUTLET</DESCRIPTION>
  </ITEM>

```

</SCHEDULE>

**Special Setup Instructions:**

The candidate is given a copy of SOP-FPC-OPS Section 5.6 at the beginning of the JPM.

**JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0304

**Validation Time:** 8 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** SOP-FPC-OPS Section 5.6 Rev. 7

**Location:** Simulator

**NUREG 1123 Ref:** 233000 A2.08 (2.9 / 3.1)

**Performance Method:** Simulate

**Task Standard:** Service Water has been aligned to BOTH FPC-HX-1A and to FPC-HX-1B.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Columbia was operating in Mode 1 when a complete loss of RCC occurred. A reactor scram was inserted and efforts are underway to restore RCC cooling. SW-P-1A and SW-P-1B are running. Fuel Pool temperatures are rising. Free release of RCC heat exchanger water to the Service Water spray ponds has been approved. OSP-SW-M101 and OSP-SW-M102 have been referenced for component flow requirements. OPS2 has been briefed and is on station.
<b>INITIATING CUE:</b>	The CRS directs you to align Service Water to both Fuel Pool Cooling Heat Exchangers per SOP-FPC-OPS Section 5.6. Inform the CRS when Service Water has been aligned to both Fuel Pool Cooling heat exchangers.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<p>NOTE: Standby Service Water to FPC-HX-1A(B) is normally used if RCC flow is lost and restoration is not anticipated prior to 125° F in the Fuel Pool, as indicated on FPC-TI-7/8 at H13-P626 (FPC-1), or for evolutions that require the Fuel Pool to be cooled below the capabilities of the RCC system. Examples: Loading spent fuel into an ISFSI MPC or to raise stay time for divers.</p> <p>NOTE: If Standby Service Water is aligned to the FPC heat exchanger, it is acceptable to operate below the minimum flow specified in OSP-SW-M101(M102) as long as the minimum operability value specified in PPM 8.4.81 is maintained.</p> <p>NOTE: If RCC is lined up to SSW for GE 48 hours, then it is recommended RCC-RV-34A(B) (FPC-HX-1A(B) Shell Side Relief Valve) be scheduled for replacement and test as soon as possible after swapping back to RCC. This is due to the potential for loose debris in SSW causing RCC-RV-34A(B) to lift and leak.</p>					
	1	Step 5.6.1 Verify free release of RCC Heat Exchanger water to the Service Water Spray Ponds.	Recognizes that discharge of RCC heat exchanger water into the Service Water spray ponds has been approved.		S / U
	2	Step 5.6.2 If desired, then lineup Standby Service Water Cooling to FPC-HX-1A as follows:	Performs this step.		S / U
	3	Step 5.6.2a Refer to OSP-SW-M101 for Standby Service Water Loop A for component flow requirements.	Given as complete in the Initial Conditions – does not perform.	If OSP-SW-M101 is referenced, refer candidate to Initial Conditions.	S / U
	4	Step 5.6.2b Verify SW-P-1A is running.	Recognizes that SW-P-1A is given in Initial Conditions as running.		S / U

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>EVALUATORS NOTE: The candidate must perform at least one of the following two steps (Either 5.6.2c or 5.6.2d but may perform both).</b>					
	5	Step 5.6.2c If RCC cooling to FPC-HX-1B is not required, then close the following: <ul style="list-style-type: none"> <li>• RCC-V-129 (Fuel Pool HX-A/B RCC Cooling Inlet)</li> <li>• RCC-V-130 (Fuel Pool HX-A/B RCC Cooling Outlet)</li> <li>• RCC-V-131 (Fuel Pool HX-A/B RCC Cooling Outlet)</li> </ul>	Turns the control switch for the following valves to close and verifies Green light on and Red light off for: <ul style="list-style-type: none"> <li>• RCC-V-129</li> <li>• RCC-V-130</li> <li>• RCC-V-131</li> </ul>		S / U *  (Note: Either this step or the next step is critical. At least one of these steps must be performed)
	6	Step 5.6.2d If RCC cooling to FPC-HX-1B is required, or SW is to be aligned to both FPC-HX-1A and FPC-HX-1B, then close the following: <ul style="list-style-type: none"> <li>• RCC-V-9A (FPC-HX-1A RCC Cooling Inlet) (FPC HX Room)</li> <li>• RCC-V-10A (FPC-HX-1A RCC Cooling Outlet) (FPC HX Room)</li> </ul>	Direct OPS2 to perform Step 5.6.2d of SOP-FPC-OPS to close RCC-V-9A and RCC-V-10A.	If candidate approaches front panel to use the radio, direct candidate to simulate communications.  RCC-V-9A and RCC-V-10A are closed (Note: No simulator actions are required).	S / U *  (Note: If RCC-V-129, V-130 and V-131 were previously closed, this is not a critical step – refer to above step).
NOTE: SW-V-187A and SW-V-188A keylock switch spring returns to NORMAL from OPEN, and maintains in CLOSE.					

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	7	Step 5.6.2e Open SW-V-187A (FPC-HX-1A Backup Cooling SW-A Inlet) (H13-P626).	Obtains key 219 from key locker and places key in the control switch and turns the control switch for SW-V-187A clockwise to open and allows switch to spring return to Norm.  Verifies Red light on and Green light off.		S / U *
	8	Step 5.6.2f Open SW-V-188A (FPC-HX-1A Backup Cooling SW-A Outlet) (H13-P626).	Obtains key 221 and places key in the control switch and turns the control switch for SW-V-188A clockwise to open and allows switch to spring return to Norm.  Verifies Red light on and Green light off.		S / U *
	9	Step 5.6.3 If desired, then lineup Standby Service Water Cooling to FPC-HX-1B as follows:	Performs this step.		S / U
	10	Step 5.6.3a Refer to OSP-SW-M102 for Standby Service Water Loop B for component flow requirements.	Given as complete in the Initial Conditions – does not perform.	If OSP-SW-M102 is referenced, refer candidate to Initial Conditions.	S / U
	11	Step 5.6.3b Verify SW-P-1B is running.	Recognizes that SW-P-1A is given in Initial Conditions as running.		S / U

**\* Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	12	<p>Step 5.6.3c</p> <p>If RCC cooling to FPC-HX-1A is not required, then close the following:</p> <ul style="list-style-type: none"> <li>• RCC-V-129 (Fuel Pool HX-A/B RCC Cooling Inlet)</li> <li>• RCC-V-130 (Fuel Pool HX-A/B RCC Cooling Outlet)</li> <li>• RCC-V-131 (Fuel Pool HX-A/B RCC Cooling Outlet)</li> </ul>	<p>Recognizes that these valves were closed in a previous step – does not perform.</p> <p>If this step was not previously performed it may be performed at this point.</p> <p>Turns the control switch for the following valves to close and verifies Green light on and Red light off for:</p> <ul style="list-style-type: none"> <li>• RCC-V-129</li> <li>• RCC-V-130</li> <li>• RCC-V-131</li> </ul>		<p>S / U *</p> <p>(Note: Either this step or the next step is critical. At least one of these steps must be performed)</p>
	13	<p>Step 5.6.3d</p> <p>If RCC cooling to FPC-HX-1A is required, or SW is to be aligned to both FPC-HX-1A and FPC-HX-1B, then close the following:</p> <ul style="list-style-type: none"> <li>• RCC-V-9B (FPC-HX-1B RCC Cooling Inlet) (FPC HX Room)</li> <li>• RCC-V-10B (FPC-HX-1B RCC Cooling Outlet) (FPC HX Room)</li> </ul>	<p>Directs OPS2 to perform Step 5.6.3d of SOP-FPC-OPS to close RCC-V-9B and RCC-V-10B.</p>	<p>If candidate approaches front panel to use the radio, direct candidate to simulate communications.</p> <p>RCC-V-9B and RCC-V-10B are closed (Note: No simulator actions are required).</p>	<p>S / U *</p> <p>(Note: If RCC-V-129, V-130 and V-131 were not previously closed this is a critical step).</p>
NOTE: SW-V-187B and SW-V-188B keylock switch spring returns to NORMAL from OPEN, and maintains in CLOSE.					

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
	14	Step 5.6.3e Open SW-V-187B (FPC-HX-1B Backup Cooling SW-B Inlet) (H13-P626).	Obtains key 220 and places key in the control switch and turns the control switch for SW-V-187B clockwise to open and allows switch to spring return to Norm.  Verifies Red light on and Green light off.	Note: during validation it was recognized that this valve is on P627 and not P626. If recognized, authorize an editorial change to allow the JPM to continue.	S / U *
	15	Step 5.6.3f Open SW-V-188B (FPC-HX-1A Backup Cooling SW-B Outlet) (H13-P626).  Note: during validation it was recognized that this valve is on P627.	Obtains key 222 and places key in the control switch and turns the control switch for SW-V-188B clockwise to open and allows switch to spring return to Norm.  Verifies Red light on and Green light off.	Note: during validation it was recognized that this valve is on P627 and not P626. If recognized, authorize an editorial change to allow the JPM to continue.	S / U *
<b>Termination Criteria: Student informs CRS that Service Water has been aligned to both Fuel Pool Cooling Heat Exchangers.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM ALIGN SERVICE WATER TO THE FUEL POOL COOLING HEAT EXCHANGERS

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** Service Water has been aligned to BOTH FPC-HX-1A and to FPC-HX-1B.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

Columbia was operating in Mode 1 when a complete loss of RCC occurred.

A reactor scram was inserted and efforts are underway to restore RCC cooling.

SW-P-1A and SW-P-1B are running.

Fuel Pool temperatures are raising.

Free release of RCC heat exchanger water to the Service Water spray ponds has been approved.

OSP-SW-M101 and OSP-SW-M102 have been referenced for component flow requirements.

OPS2 has been briefed and is on station.

### Initiating Cue:

**The CRS directs you to align Service Water to both Fuel Pool Cooling Heat Exchangers per SOP-FPC-OPS Section 5.6.**

**Inform the CRS when Service Water has been aligned to both Fuel Pool Cooling heat exchangers.**



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	SWAP RCC PUMPS (PARTIAL LOSS OF RCC FLOW) (CR/SIM) (ALT PATH) – S7		
LESSON LENGTH	.5 HRS		
	<b>INSTRUCTIONAL MATERIALS INCLUDED</b>		
LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	LO001806	Rev. No.	0
EXAM PQD CODE		Rev. No.	
DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	10/21/14
REVISED BY		DATE	
TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY	SAT Coordinator	DATE	
	Operations Training Manager		

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

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### JPM SETUP

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#### Simulator ICs; Malfunctions; Triggers; Overrides:

Run the following CAEP file:

RCC-P-1A trip on event 1.

RCC-P-1C trip on event 1.

RWCU-P-1A does not auto trip.

RWCU-V-4 does not auto close.

Event 1 should trigger when RCC-P-1B's red light goes out with a 3 second time delay.

#### Special Setup Instructions:

None

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0221; RO-0048

**Validation Time:** 8 minutes

**Alternate Path:** Yes

**Time Critical:** NO

**PPM Reference:** SOP-RCC-OPS Section 5.1 Rev. 4

**Location:** SIMULATOR

ABN-RCC Rev. 6

**NUREG 1123 Ref:** 400000 A2.01 (3.3/3.4)

**Performance Method:** PERFORM

**Task Standard:** RCC-P-1B was started, it was recognized that a partial loss of RCC occurred, RWCU-P-1A was stopped, RWCU-V-104 was throttled open and then RWCU-V-4 was closed.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	Pump maintenance on RCC-P-1C is schedule to be performed next shift. No maintenance has been performed on RCC-P-1B. OPS2 has been briefed and is standing by to swap RCC pumps.
<b>INITIATING CUE:</b>	The CRS directs you to swap RCC pumps to RCC-P-1B running and RCC-P-1C in standby per SOP-RCC-OPS section 5.1. Inform the CRS when the RCC pump swap has been completed.

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Step 5.1.1 If Standby RCC pump is to be started, then START Standby RCC Pump as follows:	Performs this step.		S / U
	2	Step 5.1.1a If starting RCC-P-1A....	Recognizes RCC-P-1A is already running and does not perform this step.		S / U
	3	Step 5.1.1b If starting RCC-P-1B then perform the following:	Performs this step.		S / U
	4	Step 5.1.1b 1) Verify RCC-V-1B open (Pump Suction) (RB 548 J9/4.1).	Contacts OPS2 and requests status of RCC-V-1B (verify valve open).	RCC-V-1B is open.	S / U
	5	Step 5.1.1b 2) Verify RCC-V-2B open (Pump Discharge) (RB 548 J9/4.1).	Contacts OPS2 and requests status of RCC-V-2B (verify valve open).	RCC-V-2B is open.	S / U
	6	Step 5.1.1b 3) If maintenance was performed.....	Recognizes initial conditions state maintenance was not performed and does not perform this step.		S / U

**\* Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	7	Step 5.1.1b 4) Place RCC-RMS-P-1B in Auto after Start (H13-P820).	Turns RCC-P-1B's control switch, RCC-RMS-P-1B, clockwise to start.  Observes Red light on and Green light off.  Releases RCC-RMS-P-1B in the Auto after Start position.		S / U *
	8	Step 5.1.2 Stop one RCC pump as follows:	Performs this step.		S / U
WARNING: Check valve RCC-V-23A(B)(C) may require manual manipulation to fully close. Exercise caution to ensure all personnel stay clear of the movement of the valve handle which will move quickly as valve is closing.					
	9	Step 5.1.2a If stopping RCC-P-1A....	Does not perform this step.		S / U
	10	Step 5.1.2b If stopping RCC-P-1B....	Does not perform this step.		S / U
	11	Step 5.1.2c If stopping RCC-P-1C then perform the following:	Performs this step.		S / U
	12	Step 5.1.2c 1) Place RCC-RMS-1C in Auto after Stop (H13-P820).	Turns RCC-P-1C's control switch, RCC-RMS-1C, to stop.  Observes Green light on and Red light off.  Releases RCC-RMS-1C in the auto after stop position.		S / U *

\* Items are Critical Steps

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	13		Recognizes RCC-P-1B tripped.  Inform the CRS that RCC-P-1B has tripped (and only RCC-P-1A is running).	Perform required actions.	S / U *
	14	ABN-RCC. Step 4.0 Subsequent Actions Step 4.1 If a complete loss of RCC flow occurs or a loss of RCC flow to the Drywell occurs, then perform the following...	Refers to ABN-RCC and recognizes no immediate operator actions.  Recognizes neither condition exists and does not perform this step.		S / U
	15	Step 4.2 If a partial loss of RCC flow occurs then perform the following:	Performs this step.		S / U
NOTE: If RCC flow is lost to the Radwaste Building, OG-RF-20A(B)(C) may trip.					
	16	Step 4.2.1 If an RCC pump has tripped then verify the standby RCC pump has started.	Recognizes RCC-P-1B has not restarted.  Turns RCC-P-1B's control switch, RCC-RMS-1B, clockwise to start and recognizes the pump does not start.		S / U
	17	Step 4.2.2 If two RCC pumps are running, then verify RCC-V-6 is open.	Recognizes only one RCC pump is running and does not perform this step.		S / U
NOTE: Closing RWCU-V-4 without throttling open RWCU-V-104 will result in RWCU-RV-3 lifting, if CRD seal purge is not isolated.					

**\* Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	18	Step 4.2.3 If RCC-V-6 (RW/RB Supply) is closed, then perform the following:	May go to backpanel to verify RCC-V-6 is closed or may make the determination RCC-V-6 is closed based on only one RCC pump running.		S / U
	19	Step 4.2.3a Stop RWCU-P-1A(B).	Turns the control switch for RWCU-P-1A counterclockwise to stop.  Observes Green light on and Red light off.		S / U *
	20	Step 4.2.3b Throttle open RWCU-V-104.	Turns the control switch for RWCU-V-104 clockwise to open until both the Red and Green light are on.		S / U *
	21	Step 4.2.3c Close RWCU-V-4 (RWCU Suction Outboard Isolation).	Turns the control switch for RWCU-V-4 counterclockwise to close.  Observes Green light on and Red light off.		S / U *
<b>Termination Criteria: When RWCU-V-4 has been closed, inform the Student that the termination point of the JPM has been reached.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					





## **STUDENT JPM INFORMATION CARD**

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### **Initial Conditions:**

Pump maintenance on RCC-P-1C is schedule to be performed next shift.

No maintenance has been performed on RCC-P-1B. OPS2 has been briefed and is standing by to swap RCC pumps.

### **Initiating Cue:**

The CRS directs you to swap RCC pumps to RCC-P-1B running and RCC-P-1C in standby per SOP-RCC-OPS section 5.1.

Inform the CRS when the RCC pump swap has been completed.



**ENERGY  
NORTHWEST**

## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE Emergency Drywell Venting (PPM 5.5.15) (CR/SIM) – C1

LENGTH OF LESSON 1 Hour

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Simulator Guide PQD Code LR000161 Rev. No. 11

JPM PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Exam PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/99

REVISED BY Ron Hayden DATE 10/31/14

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY SAT Coordinator DATE \_\_\_\_\_

Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

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### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

### Special Setup Instructions:

None

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** flashlight/laser pointer, if required;  
PPE

**Safety Items:** High Voltage inside panels

**Task Number:** RO-0687

**Validation Time:** 10 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** PPM 5.5.15 Rev. 5

**Location:** Control Room

**NUREG 1123 Ref:** 223001 A4.07 (4.2/4.1)

**Performance Method:** Simulate

**Task Standard:** All personnel have been evacuated from the Reactor Building and Emergency Drywell Venting has been initiated.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	A LOCA has occurred. PPM 5.2.1 has been entered and plant conditions require containment venting. Neither Standby Gas train is currently operating.
<b>INITIATING CUE:</b>	The CRS directs you to vent the drywell in accordance with PPM 5.5.15 using SGT train B. Inform the CRS when venting of the Drywell has been initiated. The performance of this JPM is simulated. Control manipulations will not be performed.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>DO NOT ALLOW STUDENT TO OPEN THE EOP DRAWER IN THE CONTROL ROOM</b>					
	1	Obtains procedure/tools/ equipment for PPM 5.5.15.	Student indicates the EOP drawer is where the procedure, tools, equipment and safety equipment would be obtained to perform procedure.	You have obtained procedure and equipment bag from the drawer.  Hand student working copy of procedure.	S / U *
	2	Step 4.1 Select the SGT Train to be used for venting.	Recognizes direction to use SGT-B is given in Initiating Cue.		S / U
	3	Step 4.2 If the SGT A will be used...	Recognizes direction to use SGT-B is given in Initiating Cue - does not perform this step.		S / U

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	<p>Step 4.3</p> <p>If the SGT B train will be used for venting, then override SGT-V-1B (inlet from containment) isolation logic by lifting and taping the grey (top) lead on terminal 16 of TM-K2-1-09, at H13-P891, Bay 1.</p>	<p>Opens H13-P891 Bay 1 door and identifies terminal 16 on TM-K2-1-09.</p> <p>Simulates/verbalizes that the terminal 16 screw would be removed and the grey (top) lead would be lifted and taped.</p>	The indicated lead has been lifted and taped.	S / U *
	5	<p>Step 4.4</p> <p>Override CEP-V-1A (Drywell Exhaust Outboard) isolation logic by installing a jumper between terminal 14 and terminal 15 of TM-K1-4-05, at H13-P892 Bay 4.</p>	<p>Opens H13-P892 Bay 4 door and identifies terminal 14 and 15 on TM-K1-4-05.</p> <p>Simulates/verbalizes that the screws from terminals 14 and 15 would be removed and a jumper would be installed between them.</p>	A jumper has been installed between the terminal points indicated.	S / U *
	6	<p>Step 4.5</p> <p>Override CEP-V-2A (Drywell Exhaust Inboard) isolation logic by installing a jumper between 14 and 15 of TM-K2-4-07 at P891 Bay 4.</p>	<p>Opens H13-P891 Bay 4 door and identifies terminals 14 and 15 on TM-K2-4-07.</p> <p>Simulates/verbalizes that the screws from terminals 14 and 15 would be removed and a jumper would be installed between them.</p>	A jumper has been installed between the terminal points indicated	S / U *
	7	<p>Step 4.6</p> <p>Verify CEP-V-11, (Exhaust to Rx Bldg Plenum) is closed.</p>	<p>Observes Green light on and Red light is off for CEP-V-11.</p>	<p>The evaluator will indicate:</p> <ol style="list-style-type: none"> <li>1. Green light is on.</li> <li>2. Red light is off</li> </ol>	S / U

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	8	Step 4.7 If not operating, then start SGT Train A(B) as follows:	Performs this step.		S / U
	9	Step 4.7.1 Verify SGT-V-2A (2B), (Inlet from Reactor Building) is open.	Observes Red light on and Green light off for SGT-V-2B.	The evaluator will indicate: 1. Red light is on. 2. Green light is off. 3. Red flag displayed.	S / U
	10	Step 4.7.2 Verify SGT-V-3A2, Fan A-1 Inlet (3B1, Fan B2 Inlet) is open.	Observes Red light on and Green light off for SGT-V-3B1.	The evaluator will indicate: 1. Red light is on. 2. Green light is off. 3. Red flag displayed.	S / U
	11	Step 4.7.3 Open SGT-V-5A1 (5B2) (Exhaust to Stack).	Simulates opening SGT-V-5B2 by taking control switch clockwise to open.	The evaluator will indicate: 1. The control switch is pointing to open. 2. The Red light is on. 3. The Green light is off. 4. The red flag is displayed. 5. The control switch returns to center.	S / U *
	12	Step 4.7.4 Place SGT-EHC-1A1 (1B2), (Main Heater control switch), to on.	Simulates placing the control switch for SGT-EHC-1B2 clockwise to on.	The evaluator will indicate: 1. The control switch is in ON. 2. The three blue heater lights are illuminated.	S / U *

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
	13	Step 4.7.5 Verify SGT-FN-1A1 (1B2) automatically starts approximately 10 seconds after heater energization.	Observes Red light on and Green light out for SGT-FN-1B2.	The evaluator will indicate: 1. 10 seconds after the heater control switch was manipulated for SGT-FN-1B-2: a. The Red light is on. b. The Green light is off.	S / U
	14	Step 4.7.6 Verify the following: <ul style="list-style-type: none"> <li>• SGT-DPIC-1A-1 (1B-2), Fan Controller, controlling in Automatic.</li> <li>• SGT-DPIC-1A-1 (1B-2) maintaining a negative pressure in Reactor Building .</li> <li>• SGT-DPIC-1A-1 (1B2) controller set at -1.7 in.</li> </ul>	Observes SGT-DPIC-1B2 and verbalizes it should be in Automatic.  Observes SGT-DPIC-1B- controller set at -1.7 in.	The evaluator will indicate: 1. The black knob is under the A on SGT-DPIC-1B2. 2. The red arrow lowers and is in the green shaded area and is pointing to the thin red line. 3. SGT-DPIC-1B2 is set as you see it.	S / U
	15	Step 4.7.7 Verify SGT-DPIC-1A2 (1B1), Fan controller (Lag fan) in automatic set at -1.7 in.	Observes SGT-DPIC-1B1 and verbalizes that it should be set to control at -1.7 in.	The evaluator will indicate: 1. SGT-DPIC-1B1 is set as you see it.	S / U
	16	Step 4.8 Evacuate all personnel from the reactor building before continuing in this procedure.	Simulates making a plant announcement to evacuate the Reactor Building.	If student starts towards the front panels ask what actions would be taken. If announcement would be made then cue the student that the announcement has been made and all personnel have been evacuated from the Reactor Building.	S / U *

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>CAUTION:</b> Venting the Drywell through the SGT system at high Drywell pressures may rupture SGT system ducting and release the radioactivity directly into the Secondary Containment.					
	17	Step 4.9 Open SGT-V- 1A (1B), (Inlet from containment).	Simulates taking the control switch for SGT-V-1B clockwise to open.	The evaluator will indicate: 1. The control switch is pointing to open. 2. The Red light is on, the Green light is off. 3. The red flag is displayed. 4. The control switch returns to center when released.	S / U *
	18	Step 4.10 Open CEP-V-1A (Drywell Exhaust Outboard Isolation).	Simulates taking the control switch for CEP-V-1A clockwise to open.	The evaluator will indicate: 1. The control switch turns to open. 2. The Red light is on. 3. The Green light is off. 4. The control switch returns to Norm when released.	S / U *
	19	Step 4.11 Open CEP-V-2A (Drywell Exhaust Inboard Isolation).	Simulates opening CEP-V-2A by taking control switch clockwise to open.	The evaluator will indicate: 1. The control switch turns to open. 2. The Red light is on. 3. The Green light is off. 4. The control switch returns to Norm when released.	S / U *
<b>Termination Criteria:</b> The student informs the CRS that Drywell venting has been started.					
<b>Transfer the following to the "Results of JPM" page:</b> Any Unsat step - indicate if step was a Critical Step; JPM completion time.					



## RESULTS OF JPM: EMERGENCY DRYWELL VENTING

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** All personnel have been evacuated from the Reactor Building and Emergency Drywell Venting has been initiated.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

[illegible]

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

A LOCA has occurred.

PPM 5.2.1 has been entered and plant conditions require containment venting.

Neither Standby Gas train is currently operating.

### Initiating Cue:

**The CRS directs you to vent the Drywell in accordance with PPM 5.5.15 using SGT train B.**

**Inform the CRS when venting of the drywell has been initiated.**

**THE PERFORMANCE OF THIS JPM  
IS SIMULATED.**

**CONTROL MANIPULATIONS WILL  
NOT BE PERFORMED.**



# INSTRUCTIONAL COVER SHEET

PROGRAM TITLE LICENSED OPERATOR TRAINING

COURSE TITLE	JOB PERFORMANCE MEASURE
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LESSON TITLE	BYPASS RCIC TRIPS AND ISOLATIONS (Control Room & Plant) – P1
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LESSON LENGTH	.5 HRS
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## INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE \_\_\_\_\_ Rev. No. \_\_\_\_\_

SIMULATOR GUIDE PQD CODE Rev. No.

JPM PQD CODE                      LR000218                      Rev. No.                      13

EXAM PQD CODE

Rev. No.

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY      Ron Hayden      DATE      10/21/94

REVISED BY Ron Hayden DATE 2/17/15

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

SAT Coordinator

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

## Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### **Simulator ICs; Malfunctions; Triggers; Overrides:**

N/A

#### **Special Setup Instructions:**

This JPM starts in the Control Room and then proceeds to RCIC pump room stairwell.

#### **JPM Instructions:**

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** NONE

**Safety Items:** Hard Hat Safety Glasses

**Task Number:** RO-0545

**Validation Time:** 9 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** 5.6.2 Rev. 2; PPM 5.5.5 Rev. 7

**Location:** Plant

**NUREG 1123 Ref:** 295003 AA1.03 (4.4 / 4.4)

**Performance Method:** Simulate

**Task Standard:** The RCIC high area temperature isolation and the 25 psig high exhaust pressure trip have been prevented.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	A station blackout has occurred. RCIC is operating normally and is restoring RPV level.
<b>INITIATING CUE:</b>	The CRS directs you to prevent the RCIC high area temperature isolation and the 25 psig high exhaust pressure trip per PPM 5.6.2 steps 8.2.5 and 8.2.6. Inform the CRS when RCIC high area temperature isolation and the 25 psig high exhaust pressure trip have been prevented. Control manipulations will not be performed. All actions and steps will be simulated.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>THE FOLLOWING DISCUSSION SHOULD BE DONE TO OBTAIN BOTH PPM 5.6.2 AND PPM 5.5.5:</b> <b>THE EOP DRAWER IN THE CONTROL ROOM SHOULD NOT BE OPENED. A discussion of where the procedures and tools are found is sufficient – procedures and tools are located in the EOP drawer located next to the steps to the CRS platform. After the discussion – Hand student a copy of each procedure discussed and cue student that student also has plastic bag containing: For PPM 5.6.2 - two keys – Key 117, LD-RMS-S2A “RCIC-V-8 ISOL PIPE AREA TEMP” AND Key 127, LD-RMS-S2B “RCIC-V-63/76 ISOL PIPE AREA TEMP”;</b> <b>For PPM 5.5.5 – Two contact boots.</b>					
	1	Simulates obtaining PPM 5.6.2 and EOP tool bag from EOP drawer.	Verbalizes where PPM 5.6.2 would be obtained from.	Hand student PPM 5.6.2 and cue applicant that <b>“You have the plastic bag containing:</b> <b>For PPM 5.6.2 - two keys</b> <b>Key 117, LD-RMS-S2A “RCIC-V-8 ISOL PIPE AREA TEMP” AND</b> <b>Key 127, LD-RMS-S2B “RCIC-V-63/76 ISOL PIPE AREA TEMP”;</b> <b>For PPM 5.5.5 – Two contact boots.”</b>	S / U *

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	2	Step 8.2.5 Prevent a RCIC high area temperature isolation (160°F) and RCIC pump room area high differential temperature (50°dT) by performing the following:	Performs this step.		S / U
	3	• Place test switch LD-RMS-S2A to TEST (RCIC-V-8 Isol Pipe Area Temp) (H13-P632) (Key 117/2-632).	Simulates inserting key (which was in EOP tool bag) and turning the test switch, LD-RMS-S2A, clockwise to Test.	The evaluator will indicate: The switch is pointing to Test.	S / U *
	4	• Place test switch LD-RMS-S2B to TEST (RCIC-V-63/76 Isol Pump Area Temp) (H13-P642) (Key 127/2-642).	Simulates inserting key (which was in EOP tool bag) and turning the test switch, LD-RMS-S2B, clockwise to Test.	The evaluator will indicate: The switch is pointing to Test.	S / U *
	5	Step 8.2.6 Prevent a RCIC high exhaust pressure trip (25 psig) by ensuring the trip is bypassed in accordance with PPM 5.5.5 Overriding RCIC Low RPV Pressure Isolation and High Exhaust Pressure Trip.	Verbalizes this step.		S / U
	6	Obtains PPM 5.5.5 and EOP tool bag.	If not discussed previously, states that procedure would be obtained from EOP drawer (none of the tools in the drawer are required for this task).	Refer to discussion at the beginning of JPM.  Hand student PPM 5.5.5 and cue that student also has plastic bag with two contact boots.	S / U *
EVALUATOR NOTE: PPM 5.5.5 Step 4.1 should not be performed as this overrides the low RPV pressure isolation interlocks. This step puts contact boots on relays in H13-P621 and H13-P618.					

**\* Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	7	PPM 5.5.5 Step 4.2 If overriding the RCIC high exhaust pressure trip interlock to prevent a RCIC high exhaust pressure trip (25 psig), then perform the following:	Performs this step.		S / U
NOTE: RCIC-PS-9A and RCIC-PS-9B and associated isolation valves are located on the North wall at the bottom of Stairway S-3 (NW stairwell) outside the RCIC Room Door. NOTE: The two crescent wrenches necessary for the following pipe cap removal are pre-staged at RCIC-PS-9A and RCIC-PS-9B. There is a key(s) required to get the crescent off of its associated lock for use.					
	8	PPM 5.5.5 Step 4.2.1 Close RCIC-V-756A, (RCIC-PS-9A Instrument Isolation Valve).	Simulated closing RCIC-V-756A by turning valve clockwise.	The handwheel has stopped rotating in the clockwise direction.	S / U *
	9	Step 4.2.2 Remove the pipe cap between RCIC-PS-9A and RCIC-V-756A.	Verbalizes that plant keys would be used to unlock pre-staged crescent wrenches.  Simulates removal of the pipe cap using pre-staged crescent wrenches by turning it counter clockwise.	The crescent wrenches are unlocked.  The pipe cap is no longer attached to the pipe.	S / U *
	10	Step 4.2.3 Close RCIC-V-756B, (RCIC-PS-9B Instrument Isolation Valve).	Simulated closing RCIC-V-756B by turning it clockwise.	The handwheel has stopped rotating in the clockwise direction.	S / U *
	11	Step 4.2.4 Remove the pipe cap between RCIC-PS-9B and RCIC-V-756B.	Simulates removal of the pipe cap using pre-staged crescent wrenches by turning it counter clockwise.	The pipe cap is no longer attached to the pipe.	S / U *

**\* Items are Critical Steps**

<b>Time</b>	<b>JPM Step</b>	<b>Task Element</b>	<b>Performance Standard</b>	<b>Evaluator's Cue</b>	<b>Results</b>
<b>Termination Criteria: Student informs CRS that RCIC high temperature isolation and high exhaust pressure trips have been prevented per PPM 5.6.1.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					



## RESULTS OF JPM BYPASS RCIC TRIPS AND ISOLATIONS

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** The RCIC high area temperature isolation and the 25 psig high exhaust pressure trip have been prevented.

Overall Evaluation	JPM Completion Time
SAT / UNSAT (Circle One)	Minutes

**COMMENTS:**

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**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

A station blackout has occurred.

RCIC is operating normally and is restoring RPV level.

### Initiating Cue:

**The CRS directs you to prevent the RCIC high area temperature isolation and the 25 psig high exhaust pressure trip per PPM 5.6.2 steps 8.2.5 and 8.2.6.**

**Inform the CRS when the RCIC high area temperature isolation and the 25 psig high exhaust pressure trip have been prevented.**

**CONTROL MANIPULATIONS  
WILL NOT BE PERFORMED.**

**ALL ACTIONS AND STEPS WILL BE  
SIMULATED.**



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE RESET HPCS DG MECHANICAL OVERSPEED TRIP (Plant) – P2

LESSON LENGTH .5 HRS MAXIMUM STUDENTS 1

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Simulator Guide PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

JPM PQD Code LR001563 Rev. No. 4

Exam PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 06/04/03

REVISED BY Ron Hayden DATE 12/29/14

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

SAT Coordinator

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

Operations Training Manager

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

## MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

## JPM SETUP

---

### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

### Special Setup Instructions:

N/A

### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** EO-1572; RO-1305

**Validation Time:** 8 Minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** SOP-DG3-SHUTDOWN Rev. 12

**Location:** Plant

**NUREG 1123 Ref:** 264000 A4.04 (3.7 / 3.7)

**Performance Method:** Simulate

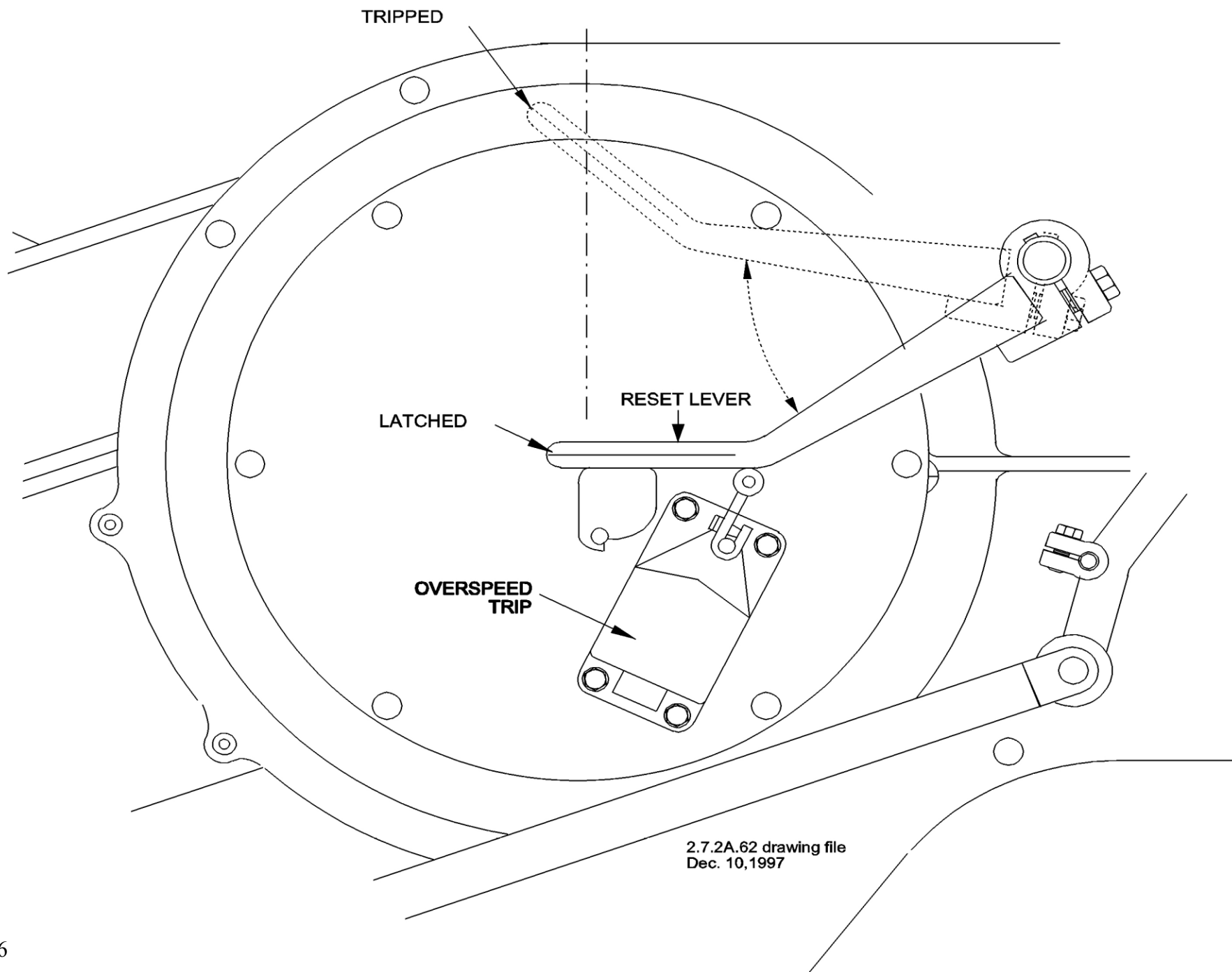
**Task Standard:** The HPCS DG mechanical overspeed trip has been reset and the Unit Mode Selector Switch is in AUTO.

## JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	The HPCS DG has tripped on mechanical overspeed.
<b>INITIATING CUE:</b>	The CRS directs you to reset the HPCS DG mechanical overspeed trip. Inform the CRS when the mechanical overspeed trip has been reset and the Unit Mode Selector Switch is in AUTO. Control manipulations will not be performed. All actions and steps will be simulated.

\* Items are Critical Steps

Time	Step	Element	Standard	Cue	Sat/Unsat
<b>EVALUATOR NOTE: When the student identifies that SOP-DG3-SHUTDOWN Section 5.3 (located in the book racks in the HPCS DG Room) is the procedure to be used, hand him a copy of that section.</b>					
NOTE: This section is to be performed if the diesel engine has tripped on mechanical overspeed, and is performed at the engine.					
	1	Step 5.3.1 Place the Unit Mode Sel Sw in MAINT (E-CP-DG/EP3).	Simulates turning the Unit Mode Selector Switch clockwise to MAINT.	The evaluator will indicate: 1. The Unit Mode Selector Switch handle is pointing to MAINT. 2. The Green MAINT light is on. 3. The Red Auto light is off.	S / U *
	2	Step 5.3.2 Relatch the engine overspeed trip lever by pushing it down until it locks in place. (The trip lever should contact its limit switch when it is reset).	Simulates relatching the red engine overspeed trip lever by pushing it down until it locks in place.	The evaluator will indicate: 1. The red lever has moved downward and locked in place. 2. The red lever has contacted the limit switch.	S / U *
	3	Step 5.3.3 Reset the lockout relay by depressing the Lockout Reset pushbutton (E-CP-DG/EP3).	Simulates depressing the black Lockout Reset pushbutton at E-CP-DG/EP3.	The Lockout Reset pushbutton has been depressed.	S / U *



Time	Step	Element	Standard	Cue	Sat/Unsat
	4	Step 5.3.4 Verify the Lockout Relay is reset, and white light (E22B-K1) is illuminated (H22-P028) (HPCS Switchgear Room).		If student asks the current status of the lockout relay the evaluator will indicate:  1. The top of the relay's handle is pointing to the left. 2. The red flag is displayed.	S / U
	5		Simulates turning the Lockout Relay hand switch clockwise. It is reset with the black flag showing and also by verifying that the white light is on.	The evaluator will indicate:  1. The Lockout Relay handle is straight up and down. 2. The black flag is displayed. 3. The white light above label HPCS-RLY-E22B-K1 is on.	S / U *
NOTE: DG-3 will start during the following step, if an auto initiation signal is present.					
	6	Step 5.3.5 Place the Unit Mode Sel Sw to AUTO (E-CP-DG/EP3).	Simulates turning the Unit Mode Selector Switch counter clockwise to AUTO.	The evaluator will indicate:  1. The Unit Mode Selector Switch handle is pointing to AUTO. 2. The Red Auto light is on. 3. The Green MAINT light is off.	S / U *
<b>Termination Criteria: Student informs CRS that the HPCS DG mechanical overspeed trip has been reset.</b>					
<b>Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## RESULTS OF JPM: RESET HPCS DG MECHANICAL OVERSPEED TRIP

**Examinee (Please Print):** \_\_\_\_\_

**Evaluator (Please Print):** \_\_\_\_\_

**Task Standard:** The HPCS DG mechanical overspeed trip has been reset and the Unit Mode Selector Switch is in AUTO.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

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**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

The HPCS DG has tripped on mechanical overspeed.

### Cue:

The CRS directs you to reset the HPCS DG mechanical overspeed trip.

Inform the CRS when the mechanical overspeed trip has been reset and the Unit Mode Selector Switch is in AUTO.

**Control manipulations will not be performed.**

**All actions and steps will be simulated.**



# INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
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COURSE TITLE	JOB PERFORMANCE MEASURE
1. <i>Introduction to the course</i>	1. <i>Understanding the course objectives and structure</i>
2. <i>Basic concepts of the course</i>	2. <i>Identifying the key concepts and theories</i>
3. <i>Application of concepts to real-world scenarios</i>	3. <i>Analyzing and evaluating real-world scenarios</i>
4. <i>Group projects and presentations</i>	4. <i>Collaborating and communicating effectively</i>
5. <i>Final exam and assessment</i>	5. <i>Assessing and reflecting on learning outcomes</i>

LESSON TITLE	RESPOND TO CONTROL ROOM HVAC HIGH RADIATION (Plant) (Alt Path)-P3
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LESSON LENGTH	.5 HRS
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## INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE \_\_\_\_\_ Rev. No. \_\_\_\_\_

SIMULATOR GUIDE PQD CODE Rev. No.

JPM PQD CODE                      LO001595                      Rev. No.                      3

EXAM PQD CODE

Rev. No.

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY      Ron Hayden      DATE      10/21/06

REVISED BY Ron Hayden DATE 12/29/14

TECHNICAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW BY \_\_\_\_\_ DATE \_\_\_\_\_

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

## Operations Training Manager

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

## Isolate Control Room Remote Air Intake

### MINOR REVISION RECORD

Minor Rev Number	Description of Revision	Affected Pages	Entered By	Effective Date	Manager Approval

### JPM SETUP

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#### Simulator ICs; Malfunctions; Triggers; Overrides:

N/A

#### Special Setup Instructions:

N/A

#### JPM Instructions:

Verify Current Procedure against JPM. If any steps have changed, the JPM should be revised.

**Tools/Equipment:** None

**Safety Items:** None

**Task Number:** RO-0114

**Validation Time:** 10 minutes

**Alternate Path:** No

**Time Critical:** No

**PPM Reference:** ABN-RAD-CR Rev. 12

**Location:** Plant

**NUREG 1123 Ref:** 288000A2.02 (3.7/3.8)

**Performance Method:** Simulate

**Task Standard:** The NW Remote Air Intake (#1) is isolated by closing WOA-V-52A and pulling fuse F4 in COHV-1.

## Isolate Control Room Remote Air Intake

### JPM CHECKLIST

<b>INITIAL CONDITIONS:</b>	A Reactor Building High Radiation signal is present. All automatic actions have been verified. The "B" Control Room Ventilation and Emergency Filtration systems have been secured and the "A" Control Room ventilation (WMA-FN-51A) and Emergency Filtration Fans (WMA-FN-54A) are operating. A Hi-Hi radiation alarm has been confirmed on the Northwest remote air intake (WOA-RIS-31A and WOA-RIS-311B read 5,000 CPM). No alarm is observed on the Southeast side (Both WOA-RIS-32A and WOA-RIS-31B read normal).
<b>INITIATING CUE:</b>	The CRS directs you to isolate both valves associated with the Northwest Remote Air Intake per ABN-RAD-CR. Notify the CRS when actions per ABN-RAD-CR have been completed for the high radiation condition. Control manipulations will not be performed. All actions and steps will be simulated.

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
<b>Candidate is given a copy of ABN-RAD-CR that includes subsequent actions AND both attachment 7.1 and 7.2.</b>					
CAUTION: If shifting of the Control Room remote air intakes is required due to radiation concerns, it should be completed within 3 hours of receipt of the Hi-Hi radiation alarm on Control Room remote air intake radiation monitors.					
NOTE: Both Control Room remote air intakes are normally lined up to supply the Control Room.					
NOTE: If both radiation monitors on one remote air intake are inoperable, then use field team survey data to determine the remote air intake with the highest radiation level.					
NOTE: Only one remote intake may be isolated at any given time.					
	1	Step 4.1 Monitor remote air intake radiation levels.	Verbalizes step - Action completed by initial conditions.		S / U
	2	Step 4.2 If a HI-HI alarm is received on one or more of the remote air intake radiation monitors, then perform the following:	Verbalizes step - Cue provided by initial conditions.		S / U

## Isolate Control Room Remote Air Intake

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	3	Step 4.2.1 Determine the remote air intake with the highest radiation level.	Verbalizes step - Cue provided by initial conditions.		S / U
	4	Step 4.2.2 Isolate the remote air intake with the highest radiation level per Attachment 7.1 or 7.2.	Determines that Attachment 7.1 is required to be performed.		S / U *
CAUTION: Operation of the CREF system with both WMA-FN-51A and WMA-FN-51B in operation, and one remote air intake isolated, can result in excessive airborne particulates inside the remote air intake ductwork, and create the inability of the CREF system to perform its design safety function					
	5	Attachment 7.1 Step 7.1.1 Verify only one Control Room Supply Fan (WMA-FN-51A or WMA-FN-51B) is in operation.	Verbalizes step - Cue provided by initial conditions.		S / U
	6	Step 7.1.2 Verify WOA-V-51B is open (SE #2) Remote intake outboard isolation.	Checks the stem position indicator on WOA-V-51B is pointed to OPEN.	The evaluator will indicate: 1. The spring's base plate is at the open pointer 2. The red arrow on the limit switch plate is pointing to open	S / U
	7	Step 7.1.3 Verify WOA-V-52B is open (SE #2) Remote intake inboard isolation.	Checks the stem position indicator on WOA-V-52B is pointed to OPEN.	The evaluator will indicate: 1. The spring's base plate is at the open pointer 2. The red arrow on the limit switch plate is pointing to open	S / U

## Isolate Control Room Remote Air Intake

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	8	Step 7.1.4 Unlock and close WOA-V-52A, NW (#1) Remote Intake Inboard Isolation.	Simulates using plant keys to unlock the lock.  Simulates using hand wheel to close WOA-V-52A.	The evaluator will indicate:  1. The lock is removed.  2. The handwheel has stopped turning in the direction indicated.  3. The spring's base plate is at the shut pointer and the red arrow on the limit switch plate is pointing to shut.	S / U *
	9	Step 7.1.5 If necessary to isolate both remote intake valves, then perform the following:	Recognizes that isolation of both RAIs valves was part of initial cue and performs this step.		S / U
	10	Step 7.1.5a Unlock and close WOA-V-51A, NW (#1) Remote Intake Outboard Isolation.	Locates valve - <b>See Evaluator's Cue.</b>	Evaluator: Show the student the danger tag picture.  (The valve is danger tagged in the open position as the valve's operator is broken).  If WOA-V-51A's valve position is checked indicate:  1. The spring's base plate is at the open pointer.  2. The red arrow on the limit switch plate is pointing to open.	S / U

## Isolate Control Room Remote Air Intake

\* Items are Critical Steps

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	11	Step 7.1.5b Verify WOA-V-51D opens, NW (#1) Remote Intake Purge.	Verbalizes step - Step cannot be performed due to previous step.	If checked the evaluator will indicate:  1. The spring's base plate is at the closed pointer.	S / U
	12	Step 7.1.6  If remote air intake # 1 is isolated using only valve WOA-V-52A, then remove fuse F4 in Control, Cable Spreading and Critical Switchgear Rooms Control Panel COHV-1 (RW 525) to Open WOA-V-51D, NW (#1) Remote Intake Purge.	Verbalizes the step.	Evaluator – Show the student the picture of the inside of COHV-1 if opening the cabinet is not desired.  A discussion of which fuse would be removed should take place.  There is a second picture that is a close up of the actual fuse block.	S / U *
			Identifies location of fuse F4 on the drawings and verbalizes the fuse would be removed (by pulling down and out on the white fuse holder).	The indicated fuse has been removed.  If student checks WOA-V-51D the evaluator will indicate:  1. The spring's base plate is at the open pointer.  2. The red arrow on the limit switch plate is pointing to open.	
<b>Termination Criteria: Student informs CRS that the NW Remote Air Intake is isolated. May add that only WOA-V-52A is closed, and Fuse F4 has been pulled.</b>					
<b>Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.</b>					

## Isolate Control Room Remote Air Intake

## RESULTS OF JPM

## RESPOND TO CONTROL ROOM HVAC HIGH RADIATION

**Examinee (Print):** \_\_\_\_\_

**Evaluator (Print):** \_\_\_\_\_

**Task Standard:** The NW Remote Air Intake (#1) is isolated by closing WOA-V-52A and pulling fuse F4 in COHV-1.

<b>Overall Evaluation</b>	<b>JPM Completion Time</b>
<b>SAT / UNSAT</b> (Circle One)	<b>Minutes</b>

**COMMENTS:**

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**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**THIS IS A PICTURE OF THE INSIDE OF PANEL COHV-1 THAT IS SHOWN TO THE STUDENT WHEN JPM STEP 12 IS PERFORMED.**

**THIS IS A PICTURE OF THE FUSE BLOCK THAT HOUSES FUSE 4  
THAT IS SHOWN TO THE STUDENT WHEN HE IDENTIFIES THE  
AREA THE FUSE BLOCK IS LOCATED IN WHEN SHOWN THE  
PREVIOUS PICTURE.**

**THIS IS A PICTURE OF A RED TAG THAT IS SHOWN TO THE  
STUDENT WHEN PERFORMING JPM STEP 10**

## STUDENT JPM INFORMATION CARD

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### Initial Conditions:

- A Reactor Building High Radiation signal is present.
- All automatic actions have been verified.
- The "B" Control Room Ventilation and Emergency Filtration systems have been secured and the "A" Control Room ventilation (WMA-FN-51A) and Emergency Filtration Fans (WMA-FN-54A) are operating.
- A Hi-Hi radiation alarm has been confirmed on the Northwest remote air intake (WOA-RIS-31A and WOA-RIS31B read 5,000 CPM).
- No alarm is observed on the Southeast side (WOA-RIS-32A and WOA-RIS31B read normal).

### Initiating Cue:

The CRS directs you to isolate both valves associated with the Northwest Remote Air Intake per ABN-RAD-CR.

Notify the CRS when actions per ABN-RAD-CR have been completed for the high radiation condition.

**CONTROL MANIPULATIONS WILL NOT BE PERFORMED.**

**ALL ACTIONS AND STEPS WILL BE SIMULATED.**



## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE Raise Power with Flow; Control Rod Exercise Surveillance - Uncoupled Rod; Complete OSP-ELEC-M701; Spurious HPCS initiation; Minimum Seismic EQ - Loss of Power to RHR-V-16A; Another MSE – Circ Water line Rupture Causes Back Pressure To Rise -Insert a Manual Scram; OBE; LOCA, DW Floor Rupture; Loss of Startup Power; RHR-P-2B Breaker Fails to Auto Close; RHR-V-16B Fails to open; Emergency Depressurize due to exceeding Drywell Temp of 330°F

LENGTH OF LESSON 1.5 Hours

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code \_\_\_\_\_ Rev. No. \_\_\_\_\_

Simulator Guide PQD Code LO001801 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 10/21/14

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: Reactor Power is 90%. Power was reduced due to economic dispatch. OSP-ELEC-M701, DG-1 monthly surveillance is in progress and completed up to step 7.3.69. SM-1 has been transferred to TR-S. There are twenty minutes left in the run. OPS2 is in DG-1 room.

Turnover: ATC – Raise Reactor power with flow to 95% power. The reactivity brief has been performed.  
 BOP – After the power increase continue with OSP-ELEC-M701, DG-1 Monthly Operability Test starting at step 7.3.70. DG-1 phone # is 8563.  
 ATC – When step 7.3.78 has been performed, perform OSP-CRD-M701, Control Rod Exercise, 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. The reactivity brief has been performed.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	R (ATC)	Raise power with Flow.
2.	T = 0	N (BOP)	Complete OSP-ELEC-M701, DG-1 Monthly Operability Test.
3.	T = 10	C (ATC) C (SRO) TS (SRO)	Perform Control Rod Exercise surveillance - OSP-CRD-M701. Second rod is uncoupled.
4.	T = 25	I (BOP) I (SRO) TS (SRO)	HPCS Spurious Injection
5.	T = 35		Minimum Seismic Earthquake. RHR-V-16A loses power.
6.	T = 40	C (SRO)	Another Seismic Tremor. CW Pipe Rupture outside Protected Area. MT Back Pressure rise requiring a Reactor scram and MT Trip.
7.	T = 50	M (All)	Operating Basis Earthquake. Loss of Startup Power.

**Critical Task is to initiate systems required to restore RPV level back to +13" to +54" level band prior to RPV level reaching -161".**

Event No.	Timeline	Event Type*	Event Description
8.	T = 55	M (All)	LOCA. Drywell Floor Rupture.
		C (BOP)	RHR-P-2B breaker fails to auto close.
9.	T = 60	C (SRO)	RHR-B-16B Fails to open results in the inability to spray the Drywell.
10.	T = 70		Emergency Depressurize due to High Drywell Temperature GT 330°F.
<b>Critical Task is to initiate an Emergency Depressurization when Drywell Temperature cannot be restored and maintained LT 330°F within 10 minutes after 330°F is reached.</b>			

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

**SCENARIO DESCRIPTION**

EVENT 1 – Power is raised to 95% with Recirc Flow.

EVENT 2 – Complete OSP-ELEC-M701 (DG-1 Monthly Operability Surveillance). This is a normal evolution that is performed at the same time OSP-CRD-M701 is being performed.

EVENT 3 – Perform OSP-CRD-M701 (Control Rod Exercise Surveillance). The second rod tested, control rod 22-59, will be uncoupled when checked. Tech Specs 3.1.3 Control Rod Operability will be referenced and Condition C will apply – Fully insert the control rod within 3 hours and disarm the rod within 4 hours. The control rod will be driven full in and isolated with cooling flow maintained.

EVENT 4 – Spurious HPCS injection. The HPCS pump will start and begin injecting into the reactor. The crew will take actions per ABN-LEVEL and verify if the initiation signal is valid or not. Two RPV levels and two containment pressure readings will be observed. The crew will determine the initiation is NOT valid and secure the HPCS pump and close the injection valve. Tech Specs will be referenced and determine TS 3.5.1 ECCS – Operating and determines Condition B applies: B.1 – Verify by administrative means RCIC System is operable when RCIC is required to be operable immediately AND B.2 - Restore HPCS System to operable status within 14 days.

EVENT 5 – Minimum Seismic Earthquake occurs which causes scaffold to fall into RHR-V-16A cubicle. This valve is one of the two spray valves that is opened to initiate Drywell sprays on RHR-A system. There are Tech Spec implications due to this valve not being operable but the scenario progresses before Tech Specs can be referenced.

EVENT 6 – Another Minimum Seismic Earthquake occurs and results in a Circ Water 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 to remove the Main Turbine from service.

EVENT 7 – After the immediate scram actions have been performed, an Operating Basis Earthquake will occur causing a loss of Startup Power and the Drywell Floor Ruptures and a LOCA (starts on time delay).

EVENT 8 – LOCA, Drywell Floor Rupture and RHR-P-2B Breaker Fails to Auto Close – is closed manually and the pump starts. The LOCA requires Wetwell and Drywell spray initiations. EOPs are entered: PPM 5.1.1, RPV Control, is entered on low RPV water level of +13” on the Reactor scram. PPM 5.2.1, Primary Containment Control, is entered at 1.68 psig Drywell pressure and other containment parameters as they occur.

EVENT 9 – When Drywell sprays are attempted on RHR-B, one spray valve, RHR-V-16B does not open, which results in an inability to spray the Drywell.

EVENT 10 – When Drywell Temperature reached 330°F, the crew will exit the pressure leg of PPM 5.1.1, RPV Control, and enter PPM 5.3.1, Emergency RPV Depressurization as Drywell temperature 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.



<b>Event No. 1</b>		
<b>Description:</b> Raise reactor power with flow to 95% power. 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 1% per minute.
	ATC	Notes Reactor Power and/or Main Generator Output. Refers to SOP-RRC-FLOW-QC quick card and performs the following: Step 2.1 Reactor Power change with RRC Flow controllers in auto: Step 2.1.1 Monitor fuel-preconditioning limits (per 9.3.18) while changing reactor power. Step 2.1.2 Raise/lower RRC flow using RTC-M/A-R675 (Master controller) as necessary. Step 2.1.3 Verify total core flow is LT 103%. Step 2.1.4 Verify RRC loop B is LT 55.9 Mlb/hr. Step 2.1.5 Notify the CRS when the change in Reactor power is complete.  At 95% power, stops the power increase.  Reports power/pressure and level after power/flow increase is complete.
<b>COMMENTS:</b>     		

<b>Event No. 2</b>		
<b>Description:</b> Complete Diesel Generator 1 Monthly Operability Test, OSP-ELEC-M701. The event is initiated by the turnover.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 20	BOP	Step 7.3.70 - Perform the following (H13-P800): a. Reduce reactive load to 0.2 Megavars using Diesel Gen 1 Voltage Regulator control switch. <b>(Turns Voltage Regulator C/S to lower)</b> b. Gradually reduce DG-1 load to 0.2 MW, over approximately one minute period, using Diesel Gen 1 Governor control switch. <b>(Turns Governor C/S to lower)</b> c. Open E-CB-DG1/7, DG-1 Output Breaker. <b>(Places CB-DG1/7 to trip)</b>
		Step 7.3.71 -Log the time when DG-1 was unloaded.
		Step 7.3.72 - Verify E-CB-DG1/7 Close Permit light is illuminated.
		Step 7.3.73 - Test governor speed control using Diesel Gen 1 Governor control switch as follows (H13-P800): a. Lower frequency to approximately 58 Hz. <b>(Turns Governor C/S to lower)</b> b. Raise frequency to approximately 62 Hz. <b>(Turns Governor C/S to raise)</b> c. Lower frequency to 60 Hz. <b>(Turns Governor C/S to lower)</b>
		Step 7.3.74 - If required (monthly), then test voltage regulator control using the Diesel Gen 1 Voltage Regulator control switch as follows (H13-P800): a. Lower voltage to the lower stop. <b>(Turns Voltage Regulator C/S to lower until voltage stops lowering)</b> b. Record the voltage and field current: (ROLEPLAY 3900V & 130A) c. Raise voltage to 4600V or the upper stop (whichever happens first). <b>(Turns Voltage Regulator C/S to raise to get 4600 volts)</b> d. Record the voltage and field current: (ROLEPLAY 4400V & 130A) e. Adjust voltage to approximately 4160 volts. <b>(Turns Voltage Regulator C/S to lower)</b>

<b>Event No. 2</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
		Step 7.3.75 - Verify DG-1 output voltage is 4160 volts (H13-P800). a. If necessary, then adjust voltage using Diesel Gen 1 Voltage Regulator control switch.
		Step 7.3.76 - Verify DG-1 frequency is 60 Hz (H13-P800). a. If necessary, then adjust frequency using Diesel Gen 1 Governor control switch.
		Step 7.3.77 - Place Engine Speed Selector switch to IDLE (E-CP-DG/RP1) <b>(Contacts OPS2 and directs placing the engine speed selector switch to IDLE).</b>
<b>BOOTH OPERATOR: Take LOA-DGN026 to IDLE and report completion.</b>		
		Step 7.3.78 - Allow DG-1 to idle for GE 15 minutes.
<b>COMMENTS:</b>		

<b>Event No. 3</b>		
<b>Description:</b> Perform OSP-CRD-M701, Control Rod Exercise. Control Rod 22-59 is not coupled. This event is initiated by shift turnover and started after Reactor Power has been raised to 95%.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 10	SRO	Directs performance of OSP-CRD-M701.
	ATC	<p>Performs OSP-CRD-M701 section 7.11 for control rod 18-59 (coupling check OK):</p> <p>Step 7.11.3 – Select the control rod to be moved (<b>Depresses pushbutton for control rod 18-59</b>).</p> <p>Step 7.11.4 – Peer verify the correct control rod is selected.</p> <p>Step 7.11.5 - Insert the control rod one notch as indicated on the Four-Rod display (<b>Depresses and releases the insert pushbutton</b>).</p> <p>Step 7.11.6 - Verify the indicated control rod position changes during control rod movement (<b>verifies position changes</b>).</p> <p>Step 7.11.7 - If control rod position is not available.....</p> <p>Step 7.11.8 – If the control rod was initially full out then perform the following:</p> <ul style="list-style-type: none"> <li>• Continuously withdraw the control rod one notch (to notch 48) as indicated on the Four Rod display (<b>Depresses the Continuous withdraw and the Withdraw pushbuttons</b>).</li> <li>• Verify the indicated control rod position changes during control rod movement.</li> </ul>

Event No. 3		
Time	Position	Applicants Actions or Behavior
		<p>NOTE: A valid coupling integrity check requires the ROD OVERTRAVEL annunciator (H13-P603-A7-1.8) not received when a continuous withdrawal signal is applied to the control rod drive.</p> <ul style="list-style-type: none"> <li>• Verify coupling integrity of the control rod (Rod Overtravel alarm not received).</li> <li>• Record stall flow on Attachment 9.2.</li> </ul> <p>Verify position 48 is illuminated or verify the full out indicating light is illuminated.</p> <p>Step 7.11.9 – If the control rod was not initially full out.....</p> <p>Step 7.11.10 – If the control rod fails to settle.....</p> <ul style="list-style-type: none"> <li>• Initial on Attachment 9.1 for each control rod that has been exercised satisfactorily (Steps 7.11.3 through 7.11.10) <b>(Initials Attachment 9.1 for rod 18-59)</b>.</li> </ul> <p>Step 7.11.12 – Peer verify the correct final control rod position.....</p> <p>Step 7.11.13 – Report any difficulties while performing the exercise...</p> <p>Step 7.11.14 - Repeat Steps 7.11.3 through 7.11.13 for all rods to be exercised at this power level.</p>
	ATC	<p>Performs OSP-CRD-M701 section 7.11 for control rod 22-59 (coupling check fails):</p> <p>Step 7.11.3 – Select the control rod to be moved <b>(Depresses pushbutton for control rod 22-59)</b>.</p> <p>Step 7.11.4 – Peer Verify the correct control rod is selected.</p> <p>Step 7.11.5 - Insert the control rod one notch as indicated on the Four-Rod display <b>(Depresses and releases the insert pushbutton)</b>.</p> <p>Step 7.11.6 - Verify the indicated control rod position changes during control rod movement <b>(verifies position changes)</b>.</p>

Event No. 3		
Time	Position	Applicants Actions or Behavior
		<p>Step 7.11.7 - If control rod position is not available.....</p> <p>Step 7.11.8 – If the control rod was initially full out then perform the following:</p> <ul style="list-style-type: none"> <li>Continuously withdraw the control rod one notch (to notch 48) as indicated on the Four Rod display (Depresses the Continuous withdraw and the Withdraw pushbuttons).</li> <li>Verify the indicated control rod position changes during control rod movement.</li> </ul> <p>NOTE: A valid coupling integrity check requires the ROD OVERTRAVEL annunciator (H13-P603-A7-1.8) not received when a continuous withdrawal signal is applied to the control rod drive.</p> <ul style="list-style-type: none"> <li>Verify coupling integrity of the control rod (Rod Overtravel no alarm received).</li> </ul>
	ATC	<p>Acknowledges 4.603.A7 1-8 ‘ROD OVERTRAVEL’ alarm and refers to ARP:</p> <ul style="list-style-type: none"> <li>Notify CRS/Shift Manager and SNE of the condition.</li> <li>If in Modes 1 or 2, then perform the required actions of Tech Spec 3.1.3.</li> </ul> <p>Informs the CRS of the rod Overtravel alarm.</p> <p>Refers the CRS to Tech Spec 3.1.3, Control Rod Operability.</p>
	SRO	<p>Contacts SNE.</p> <p>Declares Control Rod 22-59 inoperable.</p> <p>Refers to Tech Spec 3.1.3, Control Rod Operability, and determines Condition C applies: Fully insert the inoperable control rod within 3 hours AND disarm the associated CRD within 4 hours.</p> <p>Directs control rod 22-59 be fully inserted.</p>
	ATC	Depresses the insert pushbutton and inserts control rod 22-59 full in.

<b>Event No. 3</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	May direct SOP-CRD-HCU section 5.4 be performed to isolate control rod 22-59.
<b>ROLEPLAY: If directed to isolate control rod 22-59 - acknowledge direction only - no simulator manipulations need to be performed.</b>		
<b>ROLEPLAY: If asked, there are no slow or inoperable control rods.</b>		
<b>COMMENTS:</b>		

<b>Event No. 4</b>		
<p><b>Description:</b> HPCS Spurious Injection.</p> <p>This event is initiated by activating <b><u>TRIGGER 1</u></b> when Tech Specs for the uncoupled control rod have been referenced, or as directed by the scenario coordinator.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 1.</b>		
T = 35	BOP	<p>Responds to 4.601.A1 1-6, 'HPCS ACTUATED' annunciator.</p> <p>Recognizes that HPCS-P-1 is running and injecting into the core.</p> <p>Refers to 4.601.A1 1-6 'HPCS ACTUATED' ARP.</p>
	SRO	<p>Acknowledge report of pump start.</p> <p>Updates crew and enters ABN-LEVEL.</p>
	ATC	<p>Acknowledges 4.603.A8 3-7 'RPV HIGH/LOW ALERT' annunciator.</p> <p>Verifies Reactor Feed Pumps are responding to maintain RPV level.</p> <p>Reports power, pressure, and level status to CRS.</p>
	SRO	<p>Per subsequent actions of ABN-LEVEL, directs verification by two independent indications that adequate core cooling exists and that mis-operation of the automatic mode exists.</p>



<b>Event No. 4</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	<p>Observes two RPV level indications and two containment pressure indications.</p> <p>Notes that both levels and pressure indications are normal and reports that the HPCS actuation is invalid.</p>
	SRO	Directs HPCS-P-1 be stopped and HPCS-V-4 be closed.
	BOP	<p>Secures HPCS-P-1 and closes HPCS-V-4.</p> <p>Reports completion to CRS.</p> <p>Directs DG-3 operation be verified.</p>
<b>ROLEPLAY: 2 Minutes after being sent – DG3 After start checks are good.</b>		
	SRO	<p>Refers to Tech Specs 3.5.1 ECCS – Operating and determines Condition B applies: B.1 – Verify by administrative means RCIC System is operable when RCIC is required to be operable immediately AND B.2 - Restore HPCS System to operable status within 14 days.</p> <p>Contacts Work Control to investigate inadvertent HPCS initiation.</p> <p>Verifies RCIC operability.</p> <p>May also refer to PPM 1.3.83, Protected Equipment Program, for protected systems.</p>

<b>Event No. 4</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	ATC	Recognizes RPV High level alarm clears.  Verifies RPV level is being controlled by RFW.  Reports power, pressure, and level status to CRS.
<b>COMMENTS:</b>		

<b>Event No. 5</b>		
<b>Description:</b> Minimum Seismic Earthquake – Loss of power to RHR-V-16A.  This event is initiated by <b><u>ACTIVATING TRIGGER 2</u></b> after HPCS injection has been stopped and Tech Specs have been addressed - <b><u>BOOTH OPERATOR SEE BELOW INSTRUCTIONS</u></b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR: Start EQ on lowest volume and run for 10 seconds total. 5 Seconds into the MSE - ACTIVATE TRIGGER 2.</b>		
T = 20	BOP	Acknowledges 4.851.S1 2-5 'Minimum Seismic EARTHQUAKE EXCEEDED' Alarm, pulls ARP and refers the CRS to ABN-EARTHQUAKE. (Note: this annunciator automatically clears in 10 seconds).  Investigates backpanel H13-P823, Bd. L, and investigates alarm indication and reports 16 amber shock lights illuminated (indication of EQ strength).
	SRO	Updates crew and enters ABN-EARTHQUAKE.  Directs earthquake announcement be performed.  Directs monitoring of Control Room instrumentation for evidence of increasing Drywell leakage, Drywell pressure, Drywell activity, and leak detection temperatures.
<b>BOOTH OPERATOR: Meet operator at simulator booth door. Ensure you get a copy of what needs to be repeated from the operator.</b>		
	BOP	Makes announcement and directs SAS ( <b>meets booth operator at booth door</b> ) to repeat announcement on the Maintenance and Security radio channels.
	BOP / ATC	Responds to 4.601.A4 6-1 'RHR-A OUT OF SERVICE' annunciator.  Refers to ARP and BISI indications.  Recognizes RHR-V-16A has no lights lit.  Informs the CRS.

<b>Event No. 5</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Directs local investigation of RHR-V-16A breaker on MC-7B-B cubicle 7C.
<b>ROLEPLAY – Two minutes after being sent to investigate report scaffolding has fallen into and damaged the breaker for RHR-V-16A.</b>		
<b>COMMENTS:</b>		

**Event No. 6**

**Description:** Another Minimum Seismic Earthquake results in Circ Water Rupture Outside Protected Area (on a 2 minute time delay) requiring insertion of a Reactor Scram and Main Turbine Trip.

This event is initiated when ABN-EARTHQUAKE actions have been completed by **ACTIVATING TRIGGER 3 – BOOTH OPERATOR SEE BELOW INSTRUCTIONS.**

Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR: Start EQ on lowest volume and run for 5 seconds and then ACTIVATE TRIGGER 3. Allow EQ to run another 5 seconds and then stop it.</b>		
T = 35	BOP	Acknowledges 4.6851.S1 2-5 'Minimum Seismic EARTHQUAKE EXCEEDED' Alarm.  May recheck amber lights on H13-P823 Bd. L.
	SRO	May direct announcement concerning pipe rupture be performed.
	BOP	Makes announcement if directed.  Acknowledges 4.851.S2 6-1 'OFF-GAS P672 TROUBLE' alarm and may investigate.  If investigates - reports rising Offgas exhaust flow.  Reports lowering MWe output and rising MT Back Pressure.
<b>ROLEPLAY: One minute after Earthquake announcement contact the control room as OPS 4 and report a piping break between the cooling towers has resulted in a large volume of water flowing away from the plant and out into the desert.</b>		
	SRO	Updates crew and enters ABN-BACKPRESSURE.  Sets backpressure as a key parameter.  Directs power reduction to comply with Attachment 7.1 limits. Should not reduce power to LT 840 MW as Attachment 7.1 backpressure limit lowers at that point).

Event No. 6		
Time	Position	Applicants Actions or Behavior
	SRO	<p>Determines that it is necessary to trip the Main Turbine due to rising back pressure.</p> <p>Conducts a brief on impending reactor scram and Main Turbine trip.</p> <p>May direct a RRC flow reduction prior to directing the Reactor Scram.</p>
	ATC	Lowers Core Flow if directed.
	SRO	Directs ATC to insert a manual scram.
	ATC	<p>Announces “Listen up for the scram report”</p> <p>Performs immediate scram actions per PPM 3.3.1, Reactor Scram:</p> <ul style="list-style-type: none"> <li>• Places Reactor Mode Switch in SHUTDOWN</li> <li>• Monitors Power, Pressure, and Level</li> <li>• Verifies all rods inserted</li> <li>• Inserts IRMs and SRMs by depressing Power On and INSERT P/B</li> </ul> <p>Reports EOP entry on low RPV water level of +13”.</p> <p>Reports ALL RODS IN after scram report is repeated back by the CRS.</p>
	SRO	<p>Repeats back Scram Report.</p> <p>May direct MT Trip prior to its auto trip.</p> <p>Updates crew and enters PPM 5.1.1, RPV Control, on Low RPV water level (EOP entry on high RPV pressure may also be required).</p> <p>Directs restoration of RPV level to +13 inches to +54 inches with Condensate and Feed system.</p>

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	May direct stopping all Circ Water pumps. (Note: It is anticipated that when TR-S is lost on next event that is how CW Pumps will become secured).
<b>COMMENTS:</b>		

<b>Event No. 7</b>		
<p><b>Description:</b> Operating Basis Earthquake; Loss of Startup Power (on a 10 sec. time delay)</p> <p>This event is initiated by <u><b>ACTIVATING TRIGGER 4</b></u> after the scram report and after EOPs have been entered and a level band has been given – <u><b>BOOTH OPERATOR SEE BELOW INSTRUCTIONS.</b></u></p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<p><b>BOOTH OPERATOR:</b> Start EQ track on lowest volume and take 20 seconds to get to full volume. After 5 seconds <u><b>ACTIVATE TRIGGER 4</b></u>. Allow EQ track to run another 5 seconds after reaching max volume and then stop it.</p>		
<p><b>Critical Task is to initiate systems required to restore RPV level back to +13" to +54" level band prior to RPV level reaching -161".</b></p>		
T = 55	BOP	<p>Reports 4.851.S1 5-1 OPERATING BASIS EARTHQUAKE EXCEEDED' annunciator, refers to ARP and refers CRS to ABN-EARTHQUAKE.</p> <p>Investigates backpanel H13-P823 Bd. L, and reports all red and all amber shock lights illuminated (indication of EQ strength).</p>
	BOP	<p>Investigates electrical board H13-P800, when the Startup Transformer locks out and the lights go out and then come back on. Observes 4.800.C4 1-7 'XFMR TR-S LOCKOUT TRIP' annunciator alarming and updates crew that Startup Transformer is locked out and that SM-7 and SM-8 have been repowered by Backup Transformer.</p>
	SRO	<p>Due to the loss of feedwater directs RPV level restoration with RCIC and/or HPCS and/or CRD.</p>



Event No. 7		
Time	Position	Applicants Actions or Behavior
	ATC	<p>Initiates RCIC by using quick card SOP-RCIC-INJECTION-QC:</p> <p>Step 2.1.1 If not already operating, then perform the following:</p> <ol style="list-style-type: none"> <li>a. Verify RCIC manual initiation pushbutton armed.</li> <li>b. Depress and hold the RCIC manual initiation pushbutton.</li> <li>c. When all applicable RCIC valves have repositioned, then release the RCIC manual initiation pushbutton.</li> </ol> <p>Note: When RCIC initiates the following occurs:</p> <ul style="list-style-type: none"> <li>• RCIC-V-45 (Steam to Turbine) opens.</li> <li>• RCIC-V-46 (Lube Oil Cooler Water Supply) opens.</li> <li>• RCIC-P-2 (Barometric Condsr Vacuum Pump) starts.</li> <li>• RCIC-V-13 (RPV Injection) opens.</li> <li>• RCIC-V-25 and RCIC-V-26 (Steam Line Warmup Drains to Main Condenser) close.</li> <li>• RCIC-V-4 and RCIC-V-5 (Cond Pump Discharge to EDR) close.</li> <li>• SW-P-1B Starts (20 second time delay)</li> </ul> <p>May also initiate HPCS by using SOP-HPCS-INJECTION-QC quick card:</p> <p>Step 2.1 Verify Reactor level 8 seal in is reset.</p> <p>Step 2.2 If not already running, then arm and depress the HPCS manual initiation pushbutton.</p> <p>Step 2.3 Verify HPCS-P-1 running.</p> <p>Step 2.4 Verify HPCS-V-4 opens.</p> <p>Step 2.5 Operate HPCS-V-4 as necessary to maintain desired RPV level.</p>

<b>Event No. 7</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
		<p>May restart a CRD pump using 4.603.A7 3-8 'CRD CHARGE WATER PRESS LOW' ARP:</p> <p>Step 3. If neither pump is running then perform the following:</p> <ul style="list-style-type: none"> <li>a. Place CRD-FC-600 in manual (CRD Flow Controller).</li> <li>b. Reduce CRD-FC-600 output to zero.</li> <li>c. Start the standby pump.</li> <li>d. Null CRD-FC-600.</li> <li>e. Transfer CRD-FC-600 to auto.</li> </ul> <p>Uses RCIC and/or HPCS to maintain RPV Level as directed.</p>
	BOP	Recognizes MSIVs are closed, updates crew and takes manual control of RPV pressure at 800 to 1050 psig with SRV's.
	SRO	Directs RPV Pressure be maintained with SRVs with a band of 800 to 1050 psig. (Note: With MSIVs closed, RPV level band should be -50" to +54").
	BOP/ATC	Cycles SRVs as necessary to maintain RPV Pressure between 800 and 1050 psig.
	SRO	Directs actuations for low RPV water level (+13") be verified.
	BOP	Verifies and reports actuations complete.

<b>Event No. 7</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP/ATC	Recognizes that CAS compressors are not running.  Directs OPS 3 to place FW on CAS Heat Exchanger cooling and reset and restart CAS compressors A and B
<b>BOOTH OPERATOR: Two minutes after being directed place firewater on CAS and reset and restart the CAS compressors by <u>ACTIVATING TRIGGER 23</u> and report completion to control room.</b>		
<b>COMMENTS:</b>		

**Event No. 8**

**Description:** LOCA (on a 4 minute time delay from Trigger 4 activation); Drywell Floor Failure; RHR-P-2B Breaker Fails to Auto Close.

This event is initiated by trigger 4 which has already been activated.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
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	Updates crew and enters PPM 5.2.1, Primary Containment Control.  Directs actuations for 1.68 psig DW/P be verified.
	BOP	Verifies actuations for 1.68 psig Drywell Pressure (HPCS DG start, HPCS-P-2 start, HPCS-P-1 start, LPCS-P-1 start, RHR-P-2A start, RHR-P-2B start, RHR-P-2C start, EDR-V-19 close, EDR-V-20 close, FDR-V-4 close, FDR-V-4 close, Reactor scram, CW-P-1B and CW-P-1C trip, DG-1 and DG-2 start, RCC pumps trip) (Note: HPCS-P-1, if previously secured in Event 4, will not auto start as it was overridden off – it may be manually restarted).  Recognizes RHR-P-2B is not running.  Attempts to manually start RHR-P-2B by taking the control switch to start.  Recognizes the pump does start and verifies proper operation.  Reports 1.68 actuations complete and failure of RHR-P-2B to auto start to CRS.
	BOP	Observes that Wetwell and Drywell pressures are approximately the same and informs the CRS of possible Drywell floor failure.  Reports Wetwell pressure when GT 2 psig.

<b>Event No. 8</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	<p>Directs Wetwell Sprays be initiated with RHR-P-2A or RHR-P-2B.</p> <p>May also direct Suppression Pool Cooling be initiated.</p> <p>Directs sprays be terminated before Wetwell pressure drops to 0 psig.</p>
	BOP	<p>Initiates Wetwell sprays using SOP-RHR-SPRAY-WW-QC quick card:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Step 2.1.3 Open RHR-V-27A or RHR-V-27B.</p> <p>Initiates Suppression Pool Cooling (if directed) using SOP-RHR-SPC-QC quick card:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify SW-P-1A(B) running.</p> <p>Step 2.1.3 (2 handed operation authorized) Throttle open RHR-V-24A(B) to between 4500 and 7000 gpm.</p> <p>Step 2.1.4 (2 handed operation authorized) Close RHR-V-48A(B).</p> <p>Reports Wetwell sprays/ Suppression Pool cooling initiated.</p>
<b>COMMENTS:</b>		

<b>Event No. 9</b>		
<p><b>Description:</b> RHR-V-16B Fails to Open result in the inability to Spray Drywell.</p> <p>This event is active from the beginning of the scenario and is realized when RHR-V-16B opening is attempted.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>T = 65</b>	SRO	Sets Key parameter of Drywell Temperature of 285°F.
	BOP	Reports Drywell Temperature as it approaches and when it reaches 285°F.
	SRO	Ensures parameters are within DSIL, WW/L LT 51', RRC pumps are stopped and directs Drywell Cooling Fans be secured.
	ATC/BOP	<p>Stops Drywell Cooling Fans on backpanel by turning C/S for fans CRA-FC-2A, CRA-FC-1A, CRA-FC-2B, CRA-FC-1B and CRA-FC-1C to stop (these fans are NOT in the brown area on panel).</p> <p>Reports completion to CRS.</p>
	SRO	Directs Drywell sprays be initiated with RHR-P-2B.
	BOP	<p>Using SOP-RHR-SPRAY-DW-QC quick card, performs the following:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Open the following to spray the Drywell:</p> <p style="padding-left: 40px;">RHR-V-17A(B) Drywell Spray inboard isolation</p> <p style="padding-left: 40px;">RHR-V-16A(B) Drywell Spray outboard isolation</p> <p>Recognizes RHR-V-16B does not open and informs the CRS.</p>

<b>Event No. 9</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Directs EO be dispatched to open RHR-V-16B.  Sets Drywell Temperature / Drywell Pressure as KEY parameters due to lack of drywell pressure/temperature spray ability.
	ATC/BOP	Reports Drywell temperature as it rises towards 330°F.
<b>ROLEPLAY: See next event for RHR-V-16B roleplay.</b>		
<b>COMMENTS:</b>		

<b>Event No. 10</b>		
<p><b>Description:</b> EMERGENCY DEPRESSURIZATION required when Drywell Temperature reaches 330°F.</p> <p>This event is initiated when it is determined that Drywell Temperature cannot be restored and maintained LT 330°F.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>Critical Task is to initiate an Emergency Depressurization when Drywell Temperature cannot be restored and maintained LT 330°F within 10 minutes after 330°F is reached.</b>		
T = 60	BOP	Reports Drywell temperature as it approaches 330°F.
<b>ROLEPLAY – If sent, when Drywell temperature reaches 325°F report that RHR-V-16B will not open manually and that you have contacted mechanical maintenance to help get the valve open.</b>		
	SRO	<p>When Drywell Temperature cannot be restored and maintained below 330°F, determines that an Emergency Depressurization is required:</p> <p>Updates crew and exits the pressure leg of PPM 5.1.1, RPV Control, and enters PPM 5.1.3, Emergency RPV Depressurization.</p> <p>Directs preventing injection from low pressure ECCS pumps not required for adequate core cooling.</p>
	ATC/BOP	Stops low pressure ECCS injection as required to maintain RPV level.
	SRO	Requests Wetwell level and when reported GT 17 feet, directs seven SRVs, ADS preferred, be opened.
	ATC/BOP	<p>Opens seven ADS SRVs (SRVs with the red stripe on the left edge of the name plate) as directed.</p> <p>Reports 7 ADS SRVs open and RPV pressure dropping to CRS.</p>



<b>Event No. 10</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Directs RPV/L maintenance -50" to +54".
<b>Termination Cue: The scenario will be terminated when the reactor has been Emergency Depressurized and RPV level is under control in the band of -50 inches to +54 inches or as directed by the scenario coordinator.</b>		
<b>COMMENTS:</b>		

## **TURNOVER INFORMATION**

Initial conditions: Columbia is operating at 90% power due to economic dispatch. APRM-A is bypassed due to a failed power supply.

Turnover: ATC – Raise Reactor power with flow to 95% power. The reactivity brief has been performed.

BOP – After the power increase continue with OSP-ELEC-M701, DG-1 Monthly Operability Test starting at step 7.3.70. DG-1 phone # is 8563.

ATC – When step 7.3.78 has been performed, perform OSP-CRD-M701, Control Rod Exercise, 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. The reactivity brief has been performed.

## **SIMULATOR SETUP INSTRUCTIONS**

Reset to IC 214

Flag all alarmed annunciators.

Depress all illuminated BISI's.

Place a blue tag on APRM-A.

Set up earthquake machine on lowest volume and paused.

Stage a phone next to DG-1 controls – ensure cord protector used on floor.

Have copy of OSP-CRD-M701 ready.

Have copy of OSP-ELEC-M701 ready.

Place Simulator in Run.

**CREWS SHOULD BE GIVEN SURVEILLANCE PROCEDURES IN ADVANCE  
TO REVIEW – EXAM SECURITY REQUIRED.**

**SCHEDULE FILE**

<!-- This file contains a Thunder Simulations Schedule -->

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    <ACTION>Schedule Schedule/local.sch</ACTION>
    <DESCRIPTION>Local Schedule file</DESCRIPTION>
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```



## INSTRUCTIONAL COVER SHEET

PROGRAM OPERATIONS TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE Perform SGT-B System Operability surveillance; APRM Flow Unit 'A' fails upscale; TD-TE-4A fails upscale – RCIC Isolates; RRC-P-1A high vibrations; RRC-P-1A seals fail results in LOCA; Hydraulic ATWS; Reduced SLC flow; Rods Cannot be inserted; Lower Level; RWCU-V-4 fails to close; RFW Pumps trip; ATWS ED on Low RPV level

LENGTH OF LESSON 1.5 Hours

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	_____	Rev. No.	_____
Simulator Guide PQD Code	<u>LO001802</u>	Rev. No.	<u>0</u>
JPM PQD Code	_____	Rev. No.	_____
Exam PQD Code	_____	Rev. No.	_____

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

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 100% power. OSP-SGT-M702 is scheduled to be performed. APRM 'A' has a failed power supply and is bypassed.

Turnover: 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)	Perform SGT B System Operability surveillance – OSP-SGT-M702.
2.	T = 05	I (ATC) TS (SRO)	APRM Flow Unit "A" fails upscale.
3.	T=15	I (BOP) I (SRO) TS (SRO)	LD-TE-4A fails high causing a RCIC isolation and RCIC turbine trip. RCIC-V-8 does not auto close – is closed manually.
4.	T=25	R (ATC)	RRC-P-1A high vibration. Reduce reactor power with RRC flow.
5.	T = 45	C (ATC) C (SRO) M (All)	RRC-P-1A upper and lower seals fail requiring entry into single loop operations. When seals fail a LOCA begins and a manual reactor scram is inserted.
6.	T = 55	C (ATC)	Hydraulic ATWS. Reduced SLC Flow. RWCU-V-4 does not close – close RWCU-V-1 to isolate RWCU. Lower RPV Level -80" to -140".
<b>Critical Task is to terminate and prevent injection into the RPV with the exception of SLC, RCIC, and CRD, prior to lowering level. (SRO/ATC)</b>			
7.	T = 50	M (All)	Hydraulic ATWS; Scram/Reset/Scram not effective in inserting control rods; Control rods cannot be manually driven in.

Event No.	Timeline	Event Type*	Event Description
8.	T = 70	C (ATC) C (SRO)	Both RFW Pumps trip and cannot be restarted.
		M (All)	RPV level cannot be maintained due to loss of the Reactor Feed Pumps and at -183” ATWS - Emergency Depressurization is required.
Critical Task is to initiate an Emergency Depressurization when RPV water level cannot be maintained above -183” and within five minutes of RPV level reaching -183”. (SRO/ATC/BOP)			
Critical Task is during an ATWS with an Emergency Depressurization required, stop and prevent injection except from RCIC, SLC and CRD prior to any injection occurring from that system into the RPV before reaching the MSCP value for injection. (SRO/BOP/ATC)			
Critical Task is when RPV pressure is below MSCP, slowly inject into the RPV with Table 5 systems to return RPV level to -183” to LL prior to exiting Leg ‘Y’ of the level leg of PPM 5.1.2, RPV Control – ATWS. (SRO/ATC)			

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



**SCENARIO DESCRIPTION**

The scenario begins with Columbia operating at full power. APRM 'A' is INOP.

**EVENT 1** – Perform OSP-SGT-M702, SGT B Monthly Operability surveillance. This is a normal evolution for the BOP operator that has the candidate start SGT Train B.

**EVENT 2** – APRM Flow Unit "A" fails upscale due to failed instrument. The ATC operator will respond to alarms and recognize the flow unit has failed upscale. SRO will refer to Tech Spec 3.3.1.1 RPS Instrumentation and determine Condition A applies – Place channel in trip within 12 hours OR place associated trip system in trip within 12 hours.

**EVENT 3** – RCIC isolation on failed temperature instrument. RCIC-V-8 does not auto close but does close when manually attempted. Tech Specs will be referenced: References Tech Spec 3.5.3 RCIC System and determines condition A applies - Verify by administrative means High Pressure Core Spray System is operable immediately AND Restore RCIC to operable status within 14 days. Refers to Tech Spec 3.3.6.1 Primary Containment Isolation Instrumentation and determines Function 3e for LD-TE-4A's failure applies which references Condition F – Isolate the affected penetration flow path(s) within 1 hour.

**EVENT 4** – A high vibration alarm will be received for RRC-P-1A. Vibration level reports from the field will be received which require RRC-P-1A speed to be lowered and the pump will eventually be stopped (see Event 5).

**EVENT 5** – When reactor power is lowered to 97%, the lower seal for RRC-P-1A will begin to fail. When reactor power reaches 92% the upper seal for RRC-P-1A will begin to fail. This will result in a LOCA and rising Drywell pressure. A manual scram will be inserted prior to Drywell pressure reaching the automatic scram setpoint of 1.68 psig.

**EVENT 6** – When the reactor is scrammed a Hydraulic ATWS occurs. SLC will be initiated but develop only 13 gpm injection flow. Additionally, RWCU-V-4 will not close automatically or manually. RWCU-V-1 can be closed to isolate RWCU system. RPV level will be lowered to -80" to -140".

**EVENT 7** – Control rods will be attempted to be inserted per PPM 5.5.11, Alternate Control Rod Insertion. Scram – Reset – Scram is not effective in inserting control rods and control rods cannot be inserted by individually driving them.

**EVENT 8** – When the scram is reset, both Reactor Feedwater pumps trip due to failed high RPV water level instrumentation. The high RPV water level signals cannot be reset which results in RFPs not being able to be restarted and causes RPV level to drop. When RPV level cannot be restored and maintained GT -183", an ATWS Emergency Depressurization will be performed. Injection will be stopped and prevented, and seven ADS SRVs will be opened. When RPV pressure reaches Main Steam Cooling Pressure of 188 psig, RPV injection will recommence.

The scenario will be terminated when RPV level is being maintained in the given band or as directed by the scenario coordinator.

<b>Event No. 1</b>		
<b>Description:</b> Perform SGT B Monthly Surveillance OSP-SGT-M702. The event is initiated by the turnover.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 0	SRO	Directs Standby Gas Treatment System B monthly operability surveillance, OSP-SGT-M702 be performed.
<b>ROLEPLAY – If asked there are no paint fumes, etc. in SGT area and SGT integrity has been verified.</b>		
	BOP	<p>Performs the following actions for OSP-SGT-M702 steps:</p> <ul style="list-style-type: none"> <li>• 7.1.1 - Contacts OPS 2 and verifies no paint fumes.</li> <li>• 7.1.2 - Contacts OPS 2 and verifies SGT integrity.</li> <li>• 7.1.3 - Records moisture reading on SGT-MI-4B.</li> <li>• 7.1.4 - Verifies SGT-V-2B is open (Rx Bldg. inlet).</li> <li>• 7.1.5 - Verifies SGT-V-3B1 is open (fan 1B2 inlet).</li> <li>• 7.1.6 - Depresses BISI Manual Out of Service pushbutton.</li> <li>• 7.1.7 - Informs SRO to enters SGT system B as inoperable in the TS surveillance log.</li> <li>• 7.1.8 - Places SGT-DPIC-1B2 in MANUAL.</li> <li>• 7.1.9 - Adjusts SGT-DPIC-1B2 output to minimum (100%).</li> <li>• 7.1.10 - Places SGT-EHC-1B2 control switch to ON.</li> <li>• 7.1.11 - Verifies SGT-FN-1B2 auto starts 10 sec. after heaters energize.</li> <li>• 7.1.12 - Promptly opens SGT-V-5B2 (exhaust to stack).</li> <li>• 7.1.13 - Slowly adjusts SGT-DPIC-1B2 to obtain 4800 CFM <math>\pm</math> 480CFM.</li> <li>• 7.1.14 – Verifies Reactor Building pressure controller REA-DPIC-1A (B) responds (MAN or AUTO) to control Reactor Building pressure at approximately - 0.8” WC.</li> <li>• 7.1.15 – Records Date and Time.</li> </ul> <p>Standby Gas Treatment is left in this configuration for the remainder of the scenario.</p>

<b>Event No. 1</b>
<b>COMMENTS:</b>

<b>Event No. 2</b>		
<b>Description:</b> APRM Flow Unit “A” fails upscale.  The event is initiated after the SGT surveillance step 7.1.7 has been completed (CRS informed to enter SGT inoperable in Plant Logging System) by <b><u>ACTIVATING TRIGGER 1.</u></b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 1.</b>		
T = 05	ATC	Acknowledges P603.A7 2-7 ‘ROD OUT BLOCK’ and P603.A8 3-6 ‘FLOW REFERENCE OFF NORMAL’ alarms and refers to ARP.  Observes Flow Unit indications on P603 apron and reports APRM Flow Unit “A” Upscale or INOP light is illuminated.  Refers SRO to LCS 1.3.2.1 and TS 3.3.1.1 from Flow Reference Off Normal ARP.
	SRO	Refers to Tech Spec 3.3.1.1 RPS Instrumentation and determine Condition A applies – Place channel in trip within 12 hours OR place associated trip system in trip within 12 hours.  Contacts Work Control/PSRO for investigation of Flow Unit “A” failure.
	SRO	Directs bypassing Flow Unit “A”.
	ATC	Moves the Flow Unit Bypass switch to bypass Flow Unit “A” as directed.  Resets annunciators when they clear.
	SRO	Conducts Brief.
<b>COMMENTS:</b>		

Event No. 3		
<p><b>Description:</b> LD-TE-4A Fails upscale – Causes a RCIC System isolation.</p> <p>The event is initiated after the Flow Unit has been bypassed and Tech Specs have been addressed by <b><u>ACTIVATING TRIGGER 2.</u></b></p>		
Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 2.</b>		
T = 15	BOP	<p>Responds to RCIC system alarms:</p> <p>P601.A4 6-8 ‘RCIC DIV 1 OUT OF SERVICE’; P601.A4 1-5 ‘RCIC TURBINE TRIP’; P601.A12.5-2 ‘LEAK DET RCIC EQUIP AREA TEMP HI’ and P601.A3 1-4 LEAK DET RCIC EQUIP AREA TEMP HI HI’.</p> <p>Reports the P601.A3 1-4 LEAK DET RCIC EQUIP AREA TEMP HI HI annunciator is a possible EOP entry (has orange triangle on alarm window).</p> <p>Refers to ARPs.</p> <p>Reports that RCIC-V-1 is closed (green light on vertical panel is lit).</p>
	SRO	Directs back panel investigation of Leak Detection monitors on H13-P642 and H13-P632.
	BOP	<p>Investigates leak detection monitors and notes normal temperature on LD-TE-4B indicating 82°F (normal) and LD-TE-4A is indicating upscale (3 up arrows) and 400 °F on LD-TRS-608’s digital display (if checked).</p> <p>Reports observations to SRO.</p>
	BOP	<p>Observes that the white BISI (Bypass and Inoperable Status Display) light indicating DIV 1 ISOLATION SIGNAL is in.</p> <p>Refers to ARP for RCIC OUT OF SERVICE (P601.A4 6-8 ) and that it was caused by RCIC ISOL SIGNAL A INITIATION and refers to the that ARP.</p> <p>Recognizes that the automatic actions state that RCIC-V-1 and RCIC-V-8 close.</p> <p>Recognizes RCIC-V-8 is still open.</p> <p>Informs the SRO.</p>
	SRO	Directs RCIC-V-8 be closed.

<b>Event No. 3</b>		
<b>ROLEPLAY – If sent to RCIC pump room (wait two minutes) – nothing abnormal observed.</b>		
Time	Position	Applicants Actions or Behavior
	BOP	<p>Obtains key 11 from the key locker outside the Shift Managers office and takes the control switch for RCIC-V-8 to close.</p> <p>Observes RCIC-V-8 does close.</p> <p>Informs the SRO when RCIC-V-8 is closed.</p> <p>Refers the SRO to Tech Spec 3.5.3.</p>
	SRO	<p>References Tech Spec 3.5.3 RCIC System and determines condition A applies - Verify by administrative means High Pressure Core Spray System is operable immediately AND Restore RCIC to operable status within 14 days.</p> <p>Refers to Tech Spec 3.3.6.1 Primary Containment Isolation Instrumentation and determines Function 3e for LD-TE-4A's failure applies which references Condition F – Isolate the affected penetration flow path(s) within 1 hour.</p> <p>Conducts brief.</p>
<b>COMMENTS:</b>		

<b>Event No. 4</b>		
Description: High vibrations on RRC-P-1A that require the pump to be stopped.  The event is initiated after the SRO has conducted a brief for RCIC being inoperable by <b><u>ACTIVATING TRIGGER 3.</u></b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 3.</b>		
T = 25	ATC	Reports P602.A6 2-4 'RECIRC A SYSTEM VIB HIGH' alarm and references the ARP.
	SRO	Directs OPS 2 be dispatched to check Vibration Panel RRC-VMP-1 on 522 Rx. Bldg.
<b>ROLEPLAY: Two minutes after request, call 2171 and report vibrations for RRC-P-1A are:</b> <ul style="list-style-type: none"> <li>RRC-VBI-P1A/PXY = 4 PK-G &amp; rising slowly on both A/B channels.</li> <li>RRC-VBI-P1A/PZ = 4.5 PK-G &amp; rising slowly.</li> </ul> <b>(If crew delays in lowering pump speed, call as OPS 2 and report vibration levels rising slowly at the direction of the scenario coordinator.)</b>		
<b>PROCEDURE COMMENTS: ARP 4.602.A6, 2-4 step 4: if casing vibration exceeds 6.0 PK-G (on PXY) then trip RRC-P-1A and enter ABN-RRC-LOSS.</b>		
	SRO	Directs lowering RRC-P-1A (and RRC-P-1B) speed per ARP step 2c and 2d in an effort to reduce pump vibrations.  May set a key parameter of vibrations on RRC-P-1A.

<b>Event No. 4</b>		
Time	Position	Applicants Actions or Behavior
	ATC	<p>Lowers RRC pump speed as directed using SOP-RRC-FLOW-QC quick card:</p> <p>Step 2.1 Reactor Power Change with RRC Flow Controllers in Auto</p> <p>Step 2.1.1 Monitor fuel-preconditioning limits (per 9.3.18) while changing reactor power</p> <p>Step 2.1.2 Raise/Lower RRC flow using RRC-M/A-R675 (Master Control), as necessary</p> <p>Depresses the lower pushbutton on the Master Controller to lower speed as directed.</p> <p>(May also place the pumps individual controller in Manual and use it to lower pump speed).</p>
<b>ROLEPLAY: If asked, after pump speed has been reduced, vibrations are lower, but seem to be about at the original values of PXY = 4 PK-G and PZ = 4.5 PK-G, and are still rising slowly.</b>		
<b>COMMENTS:</b>		



<b>Event No. 5</b>		
<p><b>Description:</b> RRC-P-1A seal failures resulting in a LOCA, rising Drywell Pressure and a Reactor Scram.</p> <p>The event is active at the beginning of the scenario, but is only realized when Reactor Power reaches 97% (Trigger 4) by the failure of the lower seal for RRC-P-1A. At 92% power, the upper seal will fail (Trigger 5), which will result in rising Drywell Pressure.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 40	ATC	<p>While lowering pump speed, acknowledges and reports P602.A6 2-3 'RECIRC A PUMP SEAL STAGING FLOW HIGH/LOW' alarm.</p> <p>Refers to ARP.</p> <p>Recognizes the failure of the lower seal based on rising upper seal pressure.</p> <p>Refers SRO to ABN-RRC-SEAL.</p> <p>Directs an EO to check seal staging flow, RRC-FIS-39A.</p>
	SRO	<p>Updates crew and enters ABN-RRC-SEAL.</p> <p>Sets Key Parameter of Upper Seal pressure.</p>
<p><b>ROLEPLAY: Wait 2 minutes after being directed to check RRC-FIS-39A, and then report RRC-FIS-39A indicated 5 gpm.</b></p>		
<p><b>NOTE: If power is lowered to LE 92% the upper seal fails causing seal pressure to drop. RRC-P-1A should also be secured if upper seal pressure reaches 925 psig.</b></p>		
	ATC	<p>As pump speed is lowered, acknowledges and reports P602.A6 2-2 RECIRC A PUMP OUTER SEAL LEAKAGE HIGH alarm.</p> <p>Recognizes the upper seal pressure is now trending down indicating a loss of the outer seal.</p> <p>Directs an EO to check outer seal leakage (RRC-FIS-2A) and seal staging flow (RRC-FIS-7A) for RRC-P-1A.</p>
	SRO	<p>Conducts brief on the impending stopping of RRC-P-1A.</p>

<b>Event No. 5</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	ATC	Reports upper seal pressure as it drops. Informs the SRO when Key Parameter reached.
	SRO	Directs stopping RRC-P-1A by depressing the stop pushbutton.
	ATC	Stops RRC-P-1A as directed by depressing the ASD stop pushbutton.
	BOP	Acknowledges P601.A3 6-5 ' Leak Detection Drywell Flow Drain Flow High' and reports Unidentified Leakage in the drywell increasing.  Reports rising drywell pressure.
	SRO	Directs Reactor scram prior to the 1.68 psig auto scram.
<b>COMMENTS:</b>		

<b>Event No. 6</b>		
<p><b>Description:</b> Hydraulic ATWS. Reduced SLC flow. RWCU-V-4 does not close.</p> <p>This event is active at the beginning of the scenario and is realized when a manual reactor scram is inserted.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>Critical Task is to terminate and prevent injection into the RPV with the exception of SLC, RCIC, and CRD, prior to lowering level.</b>		
T = 60	ATC	<p>Manually scrams the reactor as directed and performs immediate operator actions of PPM 3.3.1, Reactor Scram:</p> <ul style="list-style-type: none"> <li>Places mode switch to shutdown</li> <li>Monitors/reports power/level/pressure</li> <li>Reports APRMs not downscale and performs the following: <ul style="list-style-type: none"> <li>Depresses the manual scram pushbuttons</li> <li>Initiates ARI</li> </ul> </li> <li>Recognizes reactor power is GT 5% and performs the following: <ul style="list-style-type: none"> <li>Informs the SRO</li> </ul> </li> </ul>
	ATC	<p>When it is recognized that depressing the manual scram pushbuttons and initiating ARI has not inserted the control rods, refers to SOP-SLC-INJECTION-QC quick card and performs the following:</p> <p>Step 2.1 Remove the SLC keylock switch blanks and insert both keys into the SLC System control switches.</p> <p>Step 2.2 Initiate SLC injection by performing the following (H13-P603):</p> <ul style="list-style-type: none"> <li>Places SLC System A control switch to the OPER position.</li> <li>Places SLC System B control switch to the OPER position.</li> </ul> <p>Step 2.3 Record the following:</p> <ul style="list-style-type: none"> <li>SLC Flow rate (~43 gpm for one pump, or 86 gpm for both pumps)</li> <li>Initial tank level</li> <li>Circle RWCU-V-4 status (should be closed)</li> </ul>

Event No. 6		
Time	Position	Applicants Actions or Behavior
	ATC	<p>Verifies the status of RWCU-V-4 and recognizes the valve is still open.</p> <p>Attempts to close RWCU-V-4 using the control switch but recognizes that the valve does not close.</p> <p>Closes RWCU-V-1 to isolate RWCU.</p> <p>Informs the CRS of status of RWCU-V-1 and RWCU-V-4.</p>
		<p>Step 2.4 Report one of the following, or similar words, to the CRS as you hand him this procedure:</p> <ul style="list-style-type: none"> <li>• SLC is injecting normally</li> <li>• SLC is partially injecting</li> <li>• SLC failed to inject</li> </ul> <p>Reports initial SLC tank level of 4800 gallons and that SLC flow rate is only 13 gpm.</p> <p>Insert SRMs and IRM by depressing the power on and insert pushbuttons.</p> <p>Reports all rods NOT in and current reactor power.</p>
	ATC	Directs local investigation of reduced SLC flow.
<b>ROLEPLAY – Wait three minutes and report relief valves lifting and you have contacted mechanical maintenance for assistance.</b>		

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	<p>Updates crew on EOP entry into PPM 5.1.1, RPV Control, and directs/verifies that the Mode Switch has been placed in SHUTDOWN.</p> <p>Updates crew and exits PPM 5.1.1, RPV Control and transitions to PPM 5.1.2, RPV Control - ATWS.</p> <p>Directs BOP to:</p> <ul style="list-style-type: none"> <li>• Inhibit ADS and take manual control of HPCS.</li> <li>• Verify actuations for +13" and -50" as they occur.</li> <li>• Directs pressure control with bypass valves in Auto.</li> </ul>
	BOP	<p>Takes both ADS control switches to the INHIBIT position and acknowledges associated alarms (P601.A3 6-1 ADS DIV 1 OUT OF SERVICE and P601.A2 6-8 ADS DIV 2 OUT OF SERVICE).</p> <p>Arms and Depresses the HPCS system initiation pushbutton while holding the control switch for HPCS-P-1 to STOP.</p> <p>Takes the control switch for HPCS-V-4 to close when it gets fully opened.</p> <p>Reports ADS inhibited and manual control of HPCS taken to SRO.</p>
	SRO	Directs PPM 5.5.6, Bypassing the MSIV Isolation Interlocks on High Tunnel Temperature and low RPV level.
	BOP	<p>Goes to EOP drawer and gets PPM 5.5.6 procedure and equipment bag containing two keys.</p> <p>Performs PPM 5.5.6:</p> <ul style="list-style-type: none"> <li>• At H13-P609 places MS-RMS-S84 to BYPASS</li> <li>• At H13-P611 places MS-RMS-S85 to BYPASS</li> </ul> <p>Updates Crew on the completion of PPM 5.5.6.</p>

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	Recognizes and reports EOP entry conditions due to Drywell pressure, Drywell temperature and Wetwell level (as they occur).
	SRO	<p>Updates crew and enters PPM 5.2.1, Secondary Containment Control.</p> <p>Establishes a key parameter: Wetwell pressure of 2 psig.</p> <p>May establish a key parameter of Drywell temperature at 285°F.</p>
	BOP	Reports when Wetwell pressure reaches 2 psig.
	SRO	Recognizes RCIC-V-1 is already closed (noted to keep Main Turbine on line).
	SRO	Directs performance of PPM 5.5.1, Overriding ECCS Valve Logic to Allow Throttling RPV Injection.
	BOP	<p>Goes to EOP drawer and pulls PPM 5.5.1 procedure and equipment bag containing 5 keys.</p> <p>Performs PPM 5.5.1:</p> <ul style="list-style-type: none"> <li>• HPCS – Override HPCS-V-4 (HPCS RPV injection valve) automatic logic by placing HPCS-RMS-S25 in the OVERRIDE position (H13-P625).</li> <li>• LPCS - Override LPCS-V-5 (LPCS RPV injection valve) automatic logic by placing LPCS-RMS-S21 in the OVERRIDE position (H13-P629).</li> <li>• RHR Loop A - Override RHR-V-42A (RHR RPV injection valve) automatic logic by placing RHR-RMS-S105 in the OVERRIDE position (H13-P629).</li> <li>• RHR Loop B - Override RHR-V-42B (RHR RPV injection valve) automatic logic by placing RHR-RMS-S106 in the OVERRIDE position (H13-P618).</li> <li>• RHR Loop C - Override RHR-V-42C (RHR RPV injection valve) automatic logic by placing RHR-RMS-S107 in the OVERRIDE position (H13-P618).</li> </ul> <p>Updates crew to completion of PPM 5.5.1, and that the ECCS injection valves are closed and throttleable.</p>

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	<p>Direct the ATC to:</p> <ul style="list-style-type: none"> <li>• Stop and prevent condensate and feedwater.</li> <li>• Lower level to a band less than –65” but greater than –183” (preferred band is –80” to –140”).</li> <li>• Commence RPV injection at -65”.</li> </ul>
	ATC	<p>Aligns the Feed and Condensate system per SOP-RFW-FCV-QC quick card as follows:</p> <ul style="list-style-type: none"> <li>• Step 2.1.1 – Start closing RFW-V-112A and RFW-V-112B</li> <li>• Step 2.1.2 – Start opening RFW-V-118.</li> <li>• Step 2.1.3 – Verify RFW-V-109 is closed.</li> <li>• Step 2.1.4 – Verify RFW-V-117A and RFW-V-117B open.</li> <li>• Step 2.1.5 – Verify RFW-LIC-620 is in manual (V selected for Valve position demand) with 0 output.</li> </ul>
		<ul style="list-style-type: none"> <li>• Step 2.1.6 – If Reactor Feed Pumps are operating then perform the following: <ul style="list-style-type: none"> <li>a. If non-ATWS, then verify RFPs have ramped down in speed</li> <li>b. Place RFW-P-1B in MDEM mode.</li> <li>c. Place RFW-P-1A in MDEM mode.</li> <li>d. Control Turbine speed as required.</li> <li>e. If desired, then place RFW-FCV-2A (B) in manual and slowly open to approximately 80%.</li> </ul> </li> <li>• Step 2.1.7 - Verify RFW-V-112A and RFW-V-112B are fully closed.</li> <li>• Step 2.1.8 - Verify RFW-V-118 is fully open.</li> </ul>

<b>Event No. 6</b>		
Time	Position	Applicants Actions or Behavior
		<ul style="list-style-type: none"> <li>Step 2.1.9 - If Reactor Feed Pumps are operating, then adjust the running RFP speed to establish ~ 200 psid across RFW-FCV-10A &amp; 10B using either Feedwater touch screen (H13-P840).</li> <li>Step 2.1.10 - Adjust RFW-LIC-620 manual output to control RPV level.</li> </ul>
		<p>Reports EOP entry on low RPV water level at +13".</p> <p>Reports Reactor Power as it drops due to lowering level.</p> <p>Maintains RPV level between -65" and -183" as directed (-80" to -140" is the preferred band).</p> <p>Does not commence feeding until RPV level drops below -65".</p>
<b>Comments:</b>		



**Event No. 7**

**Description:** Hydraulic ATWS – Insert Control Rods. No control rods will be able to be manually driven in nor insert on scram/reset/scram.

This event is active at the beginning of the scenario and is realized when a manual reactor scram is inserted.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 70	SRO	Directs PPM 5.5.11, ALTERNATE Control Rod Insertions, be performed to insert control rods.
	BOP	<p>Goes to EOP drawer and pulls procedure for PPM 5.5.11 and equipment bag.</p> <p>Performs PPM 5.5.11:</p> <p style="padding-left: 40px;">Determines that no RPS scram lights are lit and:</p> <p style="padding-left: 80px;">Removes one TB1 ARI fuse (P650 F01, F02, F03 or F04)</p> <p style="padding-left: 80px;">Removes one TB2 ARI fuse (P650 F01, F02, F03 or F04).</p> <p>Observes that some or all blue scram valve lights are lit and determines Tab B should be performed:</p> <p>Operator Actions per TAB B:</p> <p style="padding-left: 40px;">Places the SDV HIGH LEVEL TRIP control switch to BYPASS.</p> <p style="padding-left: 40px;">Determines the scram cannot be reset.</p> <p style="padding-left: 40px;">Overrides RPS trip signals per Attachment 6.1.</p>

<b>Event No. 7</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	<p>ATTACHEMNT 6.1</p> <p>At H13-P611 - Installs a jumper between RPS-RLY-K9B terminal stud 2 and RPS-RLY-K12F terminal stud 4.</p> <p>At H13-P611 - Installs a jumper between RPS-RLY-K9D terminal stud 2 and RPS-RLY-K12H terminal stud 4.</p> <p>At H13-P609 - Installs a jumper between RPS-RLY-K9A terminal stud 2 and RPS-RLY-K12E terminal stud 4.</p> <p>At H13-P609 - Installs a jumper between RPS-RLY-K9C terminal stud 2 and RPS-RLY-K12G terminal stud 4.</p>
	BOP	<p>Continues with Tab B operator actions:</p> <p>Reset the scram by depressing reset pushbuttons.</p> <p>Ensures both CRD pumps are running – may direct ABN-CRD MAXFLOW be performed.</p>
<b>ROLEPLAY: Wait two minutes and ACTIVATE TRIGGER 26. Report completion when valves are fully opened.</b>		
	BOP	<p>Determines that CRD drive header pressure can be established and performs Attachment 6.2 to bypass all RSCS rod blocks:</p> <p>At H13-P613 - Installs one jumper from terminal 7 to terminal 8 on Baily Alarm Card AHH.</p> <p>At H13-P613 - Installs one jumper from terminal 7 to terminal 8 on Baily Alarm Card AGG.</p> <p>Places the RWM bypass switch to bypass on H13-P603.</p>
	BOP	<p>Manually starts to drive control rods by starting at 10-43 and inserting every other rod in every other row.</p> <p>Reports no success in driving control rods to SRO.</p>

<b>Event No. 7</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
		<p>When the Scram Discharge Volume has been drained for more than 2 minutes initiates a manual scram by depressing the four red manual scram pushbuttons.</p> <p>If all rods did not insert, continues scram/reset/scram Tab B and raises SDV drain time by 2 minutes.</p> <p>Determines no control rod motion and requests drain time extension.</p>
<b>Comments:</b>		

<b>Event No. 8</b>		
<p><b>Description:</b> Both Reactor Feedwater Pumps trip after manual insertion of control rods has begun, or as determined by the scenario coordinator, which requires an Emergency Depressurization when RPV Level drops to -183”.</p> <p>The event is initiated after the scram has been reset per PPM 5.5.11, Alternate Control Rod Insertion, or as determined by the scenario coordinator by <b><u>ACTIVATING TRIGGER 8.</u></b></p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 8.</b>		
<b>Critical Task is to initiate an Emergency Depressurization when RPV water level cannot be maintained above -183” and within five minutes of RPV level reaching -183” as read on Fuel Zone indication.</b>		
<b>Critical Task is during an ATWS with an Emergency Depressurization required, stop and prevent injection except from RCIC, SLC and CRD prior to any injection occurring from that system into the RPV before reaching the MSCP value for injection.</b>		
<b>Critical Task is when RPV pressure is below MSCP, slowly inject into the RPV with Table 5 systems to return RPV level to -183” to LL prior to exiting Leg ‘Y’ of the level leg of PPM 5.1.2, RPV Control – ATWS.</b>		
T=60	ATC	<p>Reports reactor power as it drops due to lowering RPV level.</p> <p>Responds to P840.A1 1-1 ‘TURB A TRIP’ and P840.A1 1-5 ‘TURB B TRTRIP’ annunciators and recognizes that both Reactor feedwater pumps have tripped.</p> <p>Attempts to reset both pumps by taking the EMERG TRIP/RESET switch to reset but recognizes neither will reset and informs the SRO.</p>
	SRO	<p>Directs all injection flow be maximized (Note: All high pressure injection flow should already be injecting).</p> <p>Conducts brief/update.</p> <p>May set a Key Parameter of RPV level.</p>
	ATC	<p>Reports RPV level as it drops.</p> <p>Reports Key Parameter met (if key parameter was established) or reports RPV level at Top of Active Fuel of -161”.</p>

<b>Event No. 8</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	<p>Updates crew and exits the pressure leg of PPM 5.1.2, RPV Control – ATWS, and enters PPM 5.1.5, Emergency RPV Depressurization – ATWS.</p> <p>Enters leg “Y” of PPM 5.1.2, RPV Control – ATWS.</p>
	SRO	Directs stop and preventing all injection into the RPV except RCIC, SLC, and CRD.
	ATC	Should close Startup Flow Control Valves (even though the RFW pumps have tripped).
	SRO	Determines Wetwell level is GT 17’ and directs seven ADS SRVs be opened.
	BOP	<p>Opens 7 ADS SRVs as directed (ADS SRV’s have the red stripe on the left side of the name plates).</p> <p>Observes containment response as each SRV is opened looking for failed tail pipes.</p> <p>Reports 7 ADS SRVs are opened and RPV pressure dropping.</p>
	SRO	Set a Key Parameter of Main Steam Cooling Pressure (MSCP) of 188 psig.
	BOP	Informs SRO when MSCP is reached.
	SRO	Directs RPV level be returned to -80” to -140” level band (don’t go GT -65”) using Table 5 systems: Condensate, RCIC, CRD, RHR A/B via SDC and SLC.

<b>Event No. 8</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	ATC	Commences to feed the RPV using the Condensate and Condensate Booster pumps to regain RPV level band given.
<b>Termination Cue: The scenario will be terminated when an Emergency Depressurization has been performed, RPV Pressure has dropped to less than 188 psig, and RPV level has been returned to =80" to -140" level band or as directed by the scenario coordinator.</b>		
<b>COMMENTS:</b>		

**TURNOVER INFORMATION****Initial Conditions:**

Columbia is operating 100% power.

OSP-SGT-M702 is scheduled to be performed.

APRM 'A' has a failed power supply and is bypassed.

**Turnover:**

Perform the Standby Gas Treatment B System Monthly Operability surveillance, OSP-SGT-M702.

## **SIMULATOR SETUP INSTRUCTIONS**

Reset to IC-213.

Hang a blue Equipment Tag on the Bypass Switch for APRM A/C/E in the “A” position on H13-P603.

Have surveillance ready for each crew.



**SCHEDULE**

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<!-- This file contains a Thunder Simulations Schedule -->
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  <ITEM row = 1>
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    <DESCRIPTION>SLC-P-1A REDUCED FLOW</DESCRIPTION>
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  <ITEM row = 2>
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  <ITEM row = 5>
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<ITEM row = 8>
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<ITEM row = 13>
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</SCHEDULE>

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## **EVENT**

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<!-- This file contains a Thunder Simulations Event -->
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  <TRIGGER id="4" description="Lower Seal Failure when power is LT 97%">X03D081A &lt 97</TRIGGER>
  <TRIGGER id="5" description="Upper Seal Failure when power is LT 92%">X03D081A &lt 92</TRIGGER>
  <TRIGGER id="6" description="Small Recirc leak when RRC-P-1A LT 10 Hz">X02D117D &lt 10</TRIGGER>
</EVENT>

```



## INSTRUCTIONAL COVER SHEET

PROGRAM OPERATIONS TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE DG-3 Monthly Surveillance, Failure of HPCS-P-2; Control Rod drifts in;  
FWH-6B High Level Trip; DEH Leak Requiring Scram; Lockout of TR-S;  
DG-1 and DG-2 Fail to Auto Start; LOCA; ED on low RPV Water Level

LENGTH OF LESSON 1.5 Hours

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	<u>LO001803</u>	Rev. No.	<u>0</u>
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

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.**

# NRC SCENARIO No. 3

## Columbia Generating Station ILC NRC Exam April, 2015

Facility: Columbia

NRC Scenario No: 3

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Initial Conditions: This is a Division 3 work week. OSP-ELEC-M703, DG-3 Monthly Surveillance, is in progress. OPS 2 is standing by in the HPCS DG room and can be contacted at ext. 8563. DG-3 is running and SM-2 is being powered from TR-S per OPS-ELEC-M703. PDIS signal X108 (DG3 voltage) is not available.

Turnover Information: Continue with DG-3 monthly surveillance which has been completed through step 7.3.31.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	N (BOP)	Synchronize and load DG-3 per monthly surveillance OSP-ELEC-M703.
2.	T = 05	C (ATC) C (SRO) TS (SRO)	Control Rod 06-43 Drifts In. SRO – Tech Spec.
3.	T = 15	TS (SRO)	Failure of HPCS-P-2 requiring manual trip of DG-3. SRO - Tech Spec.
4.	T = 25	C (ATC) C (SRO) R (ATC)	High Level Trip of FWH-6B requiring reducing core flow to LE 92 Mlbm/hr. Rod Line GT 100% requiring using Fast Shutdown Sequence to insert control rods to lower rod line.
5.	T = 45	M (All)	DEH Leak - eventually requires a manual scram be inserted.

**Critical Task is to initiate a Manual Reactor Scram when the DEH Low Low Reservoir Level alarm annunciates within 15 minutes of the Low Reservoir level annunciator and prior to the MT tripping (This is a procedural requirement of ABN-DEH).**

6.	T = 55	C (ATC) C (BOP) C (SRO)	TR-S Lockout; MSIVs close; Initiate RCIC/CRD for level control.
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Event No.	Timeline	Event Type*	Event Description
7.	T = 60	I (BOP)	DG-1 and DG-2 Fail to Auto Start.
8.	T = 65	M (All)	LOCA - Spray Wetwell and Drywell.
<b>Critical Task is to initiate Drywell Sprays when Wetwell Pressure exceeds 12 psig, prior to exceeding PSP and after verifying DSIL and RHR not required for adequate core cooling.</b>			
9.	T = 75		RPV level drops to TAF. Initiate Emergency Depressurization on low RPV Level and return level to normal with low pressure ECCS pumps.
<b>Critical Task is to initiate an Emergency Depressurization after RPV water level reaches TAF and within 5 minutes of level dropping below -161 inches.</b>			

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

## SCENARIO DESCRIPTION

The scenario begins with power at 100%. DG-3 is running and SM-2 is powered from Startup to support surveillance testing of DG-3.

Turnover information is that OSP-ELEC-M703, DG-3 Monthly Surveillance, is in progress and DG-3 is running and is ready to be synchronized. The BOP operator will continue with this surveillance and sync DG-3.

**EVENT 1** - The BOP operator will continue with this surveillance and sync DG-3.

**EVENT 2** - Control rod 06-43 drifts into the core. The ATC operator will identify the drifting control rod, select it, determine which direction it is drifting, and drive it to the full in position. Tech Specs 3.1.3, Control Rod Operability will be referenced and it will be determine that Condition C applies (One or more control rods inoperable for reasons other than Condition A or B) and take actions: Fully insert the inoperable control rod within 3 hours and Disarm the associated CRD within 4 hours.

**EVENT 3** - A short time after the DG-3 is synchronized, HPCS-P-2, the HPCS Service Water pump, will trip and Service Water to DG-3 will be lost. The crew will enter ABN-SW and per the immediate actions, DG-3 will be immediately tripped locally. The SRO will review Tech Specs for HPCS DG being INOP. The SRO will enter TS 3.7.2, High Pressure Core Spray (HPCS) Service Water System and determines Condition A applies: HPCS SW System inoperable which requires declaring HPCS System Inoperable immediately. He will then refer to Tech Specs 3.5.1, ECCS Operating, and determines Condition B applies: HPCS System inoperable which requires to verify by administrative means RCIC System is operable when RCIC is required to be operable immediately and Restore HPCS System to operable status within 14 days.

**EVENT 4** - The next event is a high level trip of High Pressure Feedwater Heater 6B. Feedwater temperature will drop by GT 6°F requiring entry into ABN-POWER. Reactor Power to rise requiring the ATC Operator to lower power with flow and to drive control rods to maintain LT the 100% rod line. When the fast shutdown sequence is used to insert control rods it requires core flow to be lowered to 92 Mlbm/hr and then to 75Mlbm/hr (depending on rod line).

**EVENT 5** – When plant systems have stabilized and control rods have been inserted, the next event is a leak in the DEH system. ABN-DEH will be entered. The crew will determine, based on the alarms received in the control room that the leak rate requires insertion of a manual reactor scram and trip of the Main Turbine and Main Generator.

**EVENT 6** - When the Startup transformer, TR-S, closes in after the MT/MG trip, it will lockout. The Backup Transformer, TR-B, will close in and power SM-7 and SM-8.

When TR-S is lost the MSIVs will close causing a LOCA to develop. Manual pressure control on SRV will be required. RCIC will be initiated and CRD restarted to feed the RPV but RPV level will continue to drop.

**EVENT 7** - On the High Drywell Pressure initiation signal (1.68 psig), DG-1 and DG-2 will fail to auto start. When initiations are checked the BOP Operator will take actions and manually start both Diesel Generators.



**EVENT 8** - Containment pressures will rise requiring the crew to spray the Wetwell and the Drywell.

Note: Sprays will be removed from service to allow RPV injection after the Emergency Depressurization occurs.

**EVENT 9** - RPV level will eventually drop to Top of Active Fuel (TAF) - LT -161” and an Emergency Depressurization will be initiated to facilitate feeding with low pressure ECCS pumps.

The scenario will be terminated when RPV level is being returned to normal band and sprays have been re-initiated as appropriate.

Event No. 1		
<b>Description:</b> Synchronize DG-3 for monthly surveillance OSP-ELEC-M703. This event is initiated by the turnover sheet.		
Time	Position	Applicants Actions or Behavior
T = 0	SRO	Directs the BOP to complete OSP-ELEC-M703 starting at step 7.3.32.
	BOP (N)	Performs the following per steps in OSP-ELEC-M703: <ul style="list-style-type: none"> <li>• Step 7.3.32 - Places the CB-4DG3 Sync Selector Switch to D. GEN/BUS.</li> <li>• 7.3.33 - Raises voltage using the Voltage Regulator until Incoming voltage is higher than Running voltage.</li> <li>• 7.3.34 – PDIS is not available.</li> <li>• 7.3.35 – Takes the Governor control switch to raise until the synchronizing scope is running Slow in the Fast direction.</li> <li>• 7.3.36 – When the synchronizing scope is 5 minutes before the 12 o'clock position, places the control switch for CB-4/DG3 in the close position and: <ul style="list-style-type: none"> <li>• Verifies CB-4/DG3 closes</li> <li>• Lowers KVARs to zero or slightly positive by turning the Voltage Regulator to lower.</li> <li>• Ensures load is GE 100 KW taking the Governor control switch to raise.</li> </ul> </li> <li>• 7.3.37 – Loads DG-3 to 1300 KW over 30 seconds using the Governor control switch.</li> <li>• 7.3.38 – Adjusts KVARs to 350 out using the Voltage Regulator control switch.</li> </ul>

**NRC SCENARIO No. 3**  
**Columbia Generating Station ILC NRC Exam April, 2015**

Event No. 1		
Time	Position	Applicants Actions or Behavior
		<ul style="list-style-type: none"><li>• 7.3.39 – Places the CB-4/DG3 Synchronizing scope selector switch to off.</li><li>• 7.3.40 – Notifies Munro that DG-3 is synchronized to the grid.</li><li>• 7.3.41 – Waits two minutes</li><li>• 7.3.342 – Contacts OPS3 to verify DEA-FN-31 and DMA-FN-31 start.</li><li>• 7.3.43 – Loads DG-3 to 2340 KW and LE 2600 KW over 30 seconds using the Governor control switch.</li><li>• 7.3.44 – Adjusts KVARs to 650 out using the Voltage Regulator control switch.</li><li>• 7.3.45 – Logs the time.</li></ul>
COMMENTS:		

**Event No. 2**

**Description:** Control Rod 06-43 Drifts In.

This event is initiated when the BOP operator has synchronized the HPCS DG and KVARs are at least at 350 or at examiners discretion, and is initiated by activating **TRIGGER 1**.

Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 1.</b>		
T = 05	ATC	<p>Acknowledges P603.A7 5-7 'ROD DRIFT' annunciator and informs the CRS.</p> <p>Scans Full Core display to identify the drifting rod or refers to Rod Worth Minimizer to identify the drifting control rod.</p> <p>Identifies control rod 06-43 as the drifting control rod.</p> <p>Informs the SRO.</p>
	SRO	Updates crew and enters ABN-ROD.
	ATC	<p>Per immediate actions of ABN-ROD:</p> <ul style="list-style-type: none"> <li>• Selects control rod 06-43 and recognizes the rod is drifting into the core.</li> <li>• Depresses the Continuous Insert pushbutton.</li> <li>• Drives control rod 06-43 to its full in position.</li> <li>• Releases the continuous insert pushbutton and observes the rod remains full in.</li> </ul> <p>Informs the CRS that control rod 06-43 has been driven to its full in position and remains there with the continuous insert pushbutton released.</p>
	SRO	<p>Directs drift annunciator be reset.</p> <p>Contacts SNE to initiate a Mon Run (may initiate one manually).</p>

**ROLEPLAY:** When asked for a Mon Run inform the CRS that no thermal limits have been exceeded.

**NRC SCENARIO No. 3**  
**Columbia Generating Station ILC NRC Exam April, 2015**

<b>Event No. 2</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
		<p>Refers to Tech Spec 3.1.3, Control Rod Operability and determine Condition C applies (One or more control rods inoperable for reasons other than Condition A or B) and take actions: Fully insert the inoperable control rod within 3 hours and Disarm the associated CRD within 4 hours.</p> <p>May direct control rod 06-43 be isolated with cooling maintained.</p>
<b>ROLEPLAY: If directed to isolate the rod – acknowledge direction only – no simulator actions are required.</b>		
<b>COMMENTS:</b>		

<b>Event No. 3</b>		
<p><b>Description:</b> Failure of HPCS-P-2 (DG-3 Service Water pump Shaft Seizure).</p> <p>This event is initiated after DG-3 KVARs have been raised to 650 and the Tech Specs for the drifting control rod have been referenced and is initiated by activating <b><u>TRIGGER 2</u></b>.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 2.</b>		
T = 10	BOP	<p>Acknowledges P601.A1 6-8 'HPCS SYSTEM OUT OF SERVICE' alarm associated with the loss of HPCS-P-2. Will also observe Bypass &amp; Inoperable Status Display (BISI) light lit for HPCS SW OUT OF SERVICE.</p> <p>Scans panel and recognizes HPCS-P-2 is not running and SW-V-29 is going closed.</p> <p>Informs CRS of loss of HPCS-P-2.</p> <p>May give ABN reference and state that a local trip of DG-3 is required (immediate action of ABN-SW).</p> <p>May direct OPS 4 investigate loss of the Service Water pump.</p>
<p><b>BOOTH OPERATOR – If requested, three minutes after request inform the Control Room that HPCS-P-2 is hot to the touch and the motor looks scorched – NO fire.</b></p> <p><b>If requested, there is nothing obviously wrong at the pumps breaker.</b></p>		
	SRO	<p>Updates crew and enters into ABN-SW.</p> <p>Directs BOP to have DG-3 tripped at the local panel (if not already performed).</p>
<p><b>BOOTH OPERATOR – 30 seconds after request to trip DG-3, activate TRIGGER 20 and inform the control room that DG-3 has been tripped locally.</b></p>		

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Event No. 3		
Time	Position	Applicants Actions or Behavior
	SRO	<p>Contacts Work Control/ Work Week Manager.</p> <p>Refers to Tech Specs and enters TS 3.7.2, High Pressure Core Spray (HPCS) Service Water System and determines Condition A applies: HPCS SW System inoperable which requires declaring HPCS System Inoperable immediately.</p> <p>Refers to Tech Specs 3.5.1, ECCS Operating, and determines Condition B applies: HPCS System inoperable which requires to verify by administrative means RCIC System is operable when RCIC is required to be operable immediately and Restore HPCS System to operable status within 14 days.</p> <p>May protect systems per PPM 1.3.83, Protected Equipment Program.</p>
COMMENTS:		

**Event No. 4**

**Description:** High Level Trip of High Pressure Feedwater Heater 6B.

This event is initiated when the Tech Specs for HPCS have been referenced and is initiated by activating **TRIGGER 3**. (It takes 30 seconds to get alarm).

Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 3.</b>		
T = 30	ATC	Acknowledges P840.A2 8-4 HP HEATER 6B LEVEL HIGH' alarm and refers to ARP.
	BOP	Investigates backpanel and notes controllers for dump and drain valves in AUTO and requiring the valves to be open (and valves are opened) but level continues to rise (Note: Nothing the operator does will cause level to stop rising).  Reports that the controllers are responding but that level in FWH 6B is still high and cannot be controlled.
	ATC	Acknowledges P840.A2 7-4 HP HEATER 6B LEVEL HI TRIP' and P840.A2 9-6 ' STM DUMP VLVS NOT FULL CLOSED alarms (MSR B heater drain tank alarms may also annunciate).  Reports trip of 6B Heater and entry into ABN-POWER and ABN-FWH-Hi/Level-trip.  Due to the trip of FWH 6B, observes feedwater inlet temperature and notes that it has dropped more than 6°F (temperature starts at about 416°F and final temp is about 393°F).  Recognizes that thermal power has gone up and when GT 3486 MWT, reduces power with RRC flow to maintain LT 3486 MWT per Immediate Actions of ABN-POWER.  (Note: SRO may direct power reduction to LE 92 Mlbm/hr prior to RO reducing to LT 3486 MWT.)



<b>Event No. 4</b>		
Time	Position	Applicants Actions or Behavior
	SRO	<p>Updates crew and enters ABN-POWER and ABN-FWH-Hi/Level-trip and directs RRC flow be lowered to LE 92 Mlbm/hr core flow (should provide a target flow) per subsequent actions of ABN-POWER.</p> <p>Directs control rods be inserted per the fast shutdown sequence to maintain below the 100% rod line.</p> <p>Ensures plant operating in acceptable region of Attachment 7.1, FEEDWATER TEMPERATURE VERSUS REACTOR POWER, of ABN-POWER.</p> <p>When conditions are stable may request a Mon Run.</p>
<b>ROLEPLAY: If a Mon Run is requested, inform the CRS that no thermal limits have been violated.</b>		
	ATC	<p>Reduces core flow to LE 92 Mlbm/hr (if GT 92 Mlbm/hr). Reports Power, Pressure and Level after the flow reduction.</p> <p>Refers to the Fast Shutdown Sequence and inserts control rods as necessary to reduce rod line starting at first page to reduce the rod line LT 100% (should only take 2 or 3 rods to lower rod line) (Rods in order are 26-51, 10-27, 34-11, 50-35, 34-51, 10-35, 26-11, 50-27).</p> <p>Reports Power, Pressure and Level after the flow reduction and rod insertion.</p>
COMMENTS:		

**Event No. 5**

**Description:** DEH System Leak requiring a Manual Scram be inserted.

This event is initiated when the actions for the trip of FWH 6B are complete and control rods have been inserted and is initiated by activating **TRIGGER 4**.

Time	Position	Applicants Actions or Behavior
<b>Critical Task is to initiate a Manual Reactor Scram when the DEH Low Low Reservoir Level alarm annunciates within 15 minutes of the Low Reservoir level annunciator and prior to the MT tripping.</b>		
T = 45	BOP	<p>Acknowledges P820.B1 6-7 'DEH RESVR LEVEL LOW' annunciator and refers to ARP.</p> <p>Notes time the DEH Level Low alarm annunciated.</p> <p>Directs OPS3 to investigate locally and report level on DEH-LG-17.</p> <p>Refer CRS to ABN-DEH-LEAK.</p>
	SRO	<p>Updates crew and enters ABN-DEH-LEAK.</p> <p>Directs filling the DEH reservoir per SOP-DEH-OPS and look for DEH leaks.</p> <p>Starts 15 minute clock for step 4.1.1 of ABN-DEH-LEAK.</p> <p>May direct camera tour in an attempt to locate DEH leak.</p>
<p><b>BOOTH OPERATOR – Initial tank level will be one minute after request and remainder of reports will be consistent with time since trigger initiation as follows:</b></p> <p><b>Initial report tank level is 16.75"; Level report will be ½" less each minute after initial level report. It takes 11 minutes to get Low Low Level alarm which requires a manual scram.</b></p> <p><b>If asked to fill reservoir report that efforts are being performed to fill the reservoir.</b></p> <p><b>(Note: The MT trip is at 7.62".)</b></p>		
	BOP	<p>Acknowledges P820.B1 7-7 'DEH RESVR LEVEL LOW-LOW' annunciator and refers to ARP (It takes 11 minutes from low level alarm to get low-low alarm).</p>

Event No. 5		
Time	Position	Applicants Actions or Behavior
	SRO	<p>May direct flow reduction to 60 Mlbm/hr prior to scram.</p> <p>Directs manual scram; trip of Main Turbine, and trip of Main Generator per step 4.1.1 of ABN-DEH-LEAK.</p>
	RO	<p>Lowers RRC flow if directed.</p> <p>Performs Immediate Scram actions per PPM 3.3.1, Reactor Scram:</p> <p>Announces 'Listen up for the scram report' and:</p> <ul style="list-style-type: none"> <li>• Places MODE switch to shutdown</li> <li>• Reports APRM downscals, RPV pressure and trend and RPV level and trend.</li> <li>• Inserts IRMs and SRMs.</li> <li>• Reports EOP entry on low RPV level.</li> <li>• Reports all rods in.</li> </ul>
	BOP	<p>May, based on DEH system status, initiate a trip of the Main Turbine (if not automatically completed) by depressing the two Turbine trip pushbuttons.</p> <p>May, based on DEH system status, initiate a trip of the Main Generator (if not automatically complete) by depressing the two red Unit Emergency and Unit Overall Emergency pushbuttons.</p>

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<b>Event No. 5</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Updates crew and enters PPM 5.1.1, RPV Control, on low RPV water level of +13".
<b>BOOTH OPERATOR – When the MT trips, remove DEH annunciator malfunctions on ANN-820B1F07 and ANN-820B1G07 (DEH Low and Low Low annunciators) This simulates the accumulators discharging and refilling the DEH reservoir.</b>		
COMMENTS:		

**Event No. 6**

**Description:** Lockout of the Startup Transformer. MSIVs close, Initiate RCIC and start CRD.

This event is automatically initiated when CB-S1 breaker closes.

Time	Position	Applicants Actions or Behavior
T = 55	BOP	<p>When MT/MG trip and electrical plant transfers, investigates electrical board status.</p> <p>Recognizes when lights go out after TR-S lockout.</p> <p>Notes no power to SM-1, SM-2, SM-3, SH-5 or SH-6 and notes P800.C4 1-7 'XFMR TR-S LOCKOUT TRIP' annunciator. Checks TR-S indications and recognizes no voltage on the bus.</p> <p>Notes Backup Transformer, TR-B, has closed in and is powering SM-7 and SM-8.</p> <p>Updates crew on plants electrical board status.</p>
	BOP	<p>Recognizes MSIVs have closed and updates crew that pressure control with SRVs at a pressure band of 800 to 1050 psig.</p>
	SRO	<p>Directs pressure control with SRVs at a pressure band of 800 to 1050 psig.</p> <p>Working down the level leg of PPM 5.1.1, RPV Control, recognizes no high pressure injection sources are running.</p> <p>Directs RCIC and CRD be initiated and injection to RPV at a level band of -50" to +54".</p>

Event No. 6		
Time	Position	Applicants Actions or Behavior
	BOP	<p>Using SOP-RCIC-INJECTION-QC quick card, injects with RCIC as follows:</p> <p>Step 2.1.1 If not already operating, then perform the following:</p> <ol style="list-style-type: none"> <li>Verify the RCIC Manual Initiation pushbutton is armed.</li> <li>Depress and hold the RCIC manual initiation pushbutton.</li> <li>When all applicable RCIC valves have repositioned, then release the RCIC manual initiation pushbutton</li> </ol> <p>Note: When RCIC initiates the following occurs:</p> <ul style="list-style-type: none"> <li>RCIC-V-45 (Steam to Turbine) opens.</li> <li>RCIC-V-46 (Lube Oil Cooler Water Supply) opens.</li> <li>RCIC-P-2 (Barometric Condsr Vacuum Pump) starts.</li> <li>RCIC-V-13 (RPV Injection) opens.</li> <li>RCIC-V-25 and RCIC-V-26 (Steam Line Warmup Drains to Main Condenser) close.</li> <li>RCIC-V-4 and RCIC-V-5 (Cond Pump Discharge to EDR) close.</li> <li>SW-P-1B starts (20 second time delay).</li> </ul> <p>Verifies injection at 600 gpm (May increase injection flow to 700 gpm later in the scenario).</p>
		<p>Starts the CRD pump as directed using P603.A7 3-8 'CRD CHARGE WATER PRESS LOW' ARP:</p> <p>Step 3. If neither pump is running then perform the following:</p> <ol style="list-style-type: none"> <li>Place CRD-FC-600 in manual (CRD Flow Controller).</li> <li>Reduce CRD-FC-600 output to zero.</li> <li>Start the standby pump.</li> <li>Null CRD-FC-600.</li> <li>Transfer CRD-FC-600 to auto.</li> </ol> <p>May direct ABN-CRD-MAXFLOW be performed to facilitate running both CRD pumps.</p>

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<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – If requested, wait 3 minutes and then activate TRIGGER 26 to place both CRD suction and discharge filters on line and report completion to control room.</b>		
	BOP	Recognizes no CAS air compressors are running and contacts OPS3 and directs the reset of CAS compressors.
<b>BOOTH OPERATOR – If requested, wait 2 minutes and then initiate trigger (23) to reset CAS Air Compressors.</b>		
COMMENTS:		

**Event No. 7**

**Description:** Failure of DG-1 and DG-2 to AUTO start on Undervoltage or when DW/P reaches 1.68 psig. This event is active from the beginning of the scenario and is realized when SM-7 and SM-8 become de-energized or when DW/P rises above 1.68 psig.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 60	BOP (C)	<p>When directed to verify actuations, recognizes that neither DG-1 nor DG-2 are running.</p> <p>Takes control switches for both DG-1 and DG-2 to start and notes that they did start.</p> <p>Informs SRO of failure of DGs to auto start.</p> <p>Directs OPS2 verify DG operation after starting.</p>

**ROLEPLAY - After requested, wait 5 minutes and report DG 1 and DG2 operating normally.**

**COMMENTS:**



**Event No. 8**

**Description:** LOCA – Initiate Containment Sprays (Note: It takes about 13 minutes after the MT trips to get to TAF and 35 more seconds to get to -183”).

This event is automatically initiated (**using Event Trigger 10**) when Startup power closes in on SM-1.

Time	Position	Applicants Actions or Behavior
<b>Critical task is to initiate Drywell Sprays when Wetwell Pressure exceeds 12 psig, prior to exceeding PSP and after verifying DSIL and RHR not required for adequate core cooling.</b>		
T = 65	ATC/BOP	Recognizes rising DW Pressure and reports EOP entry at 1.68 psig.  Also reports additional primary containment EOP entries as they occur (DW/T and SP/L).
	SRO	Updates crew and enters PPM 5.2.1, Primary Containment Control and re-enters 5.1.1, RPV Control, due to high DW pressure.  Directs actuations be verified for +13” and 1.68 psig (HPCS-P-1 start, DG-3 start, HPCS-P-2 start, RHR-P-2A start, RHR-P-2B start, RHR-P-2C start, LPCS-P-1 start, SW-P-1A start, SW-P-1B start, DG-1 start, DG-2 start).
	ATC/BOP	Reports Wetwell pressure when it reaches 2 psig.
	SRO	Directs Wetwell sprays with RHR. Directs securing sprays before Wetwell pressure drops to zero psig.  May set a Key Parameter of Wetwell pressure of 12 psig and Drywell temperature of 285°F.

Event No. 8		
Time	Position	Applicants Actions or Behavior
	BOP	<p>Initiates Wetwell sprays using SOP-RHR-SPRAY-WW-QC quick card:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Step 2.1.3 Open RHR-V-27A or RHR-V-27B.</p>
		<p>Initiates Suppression Pool Cooling (if directed) using SOP-RHR-SPC-QC quick card:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify SW-P-1A(B) running.</p> <p>Step 2.1.3 (2 handed operation authorized) Throttle open RHR-V-24A(B) to between 4500 and 7000 gpm.</p> <p>Step 2.1.4 (2 handed operation authorized) Close RHR-V-48A(B).</p> <p>Reports Wetwell sprays/ Suppression Pool cooling initiated.</p>
	BOP	Reports Wetwell pressure when it reaches 12 psig and when Drywell temperature reaches 285°.
	SRO	Directs Drywell cooling fans be secured.
	BOP	Stops Drywell Cooling Fans on backpanel by turning C/S for fans CRA-FC-2A, CRA-FC-1A, CRA-FC-2B, CRA-FC-1B and CRA-FC-1C to stop (these fans are NOT in the brown area on panel).

Event No. 8		
Time	Position	Applicants Actions or Behavior
	SRO	<p>Directs Drywell Spray Initiation Limit (DSIL) verification and then drywell sprays be initiated.</p> <p>Directs securing sprays before Drywell pressure drops to zero psig.</p>
	BOP	<p>Verifies within DSIL and:</p> <p>Using SOP-RHR-SPRAY-DW-QC quick card, performs the following:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Open the following to spray the Drywell:</p> <ul style="list-style-type: none"> <li>• RHR-V-17A(B) Drywell Spray inboard isolation</li> <li>• RHR-V-16A(B) Drywell Spray outboard isolation</li> </ul> <p>Observes Drywell pressure drop and reports sprays effective.</p>
	ATC	<p>Reports RPV level dropping even with RCIC and CRD running.</p> <p>Gives RPV level reports as level continues to lower.</p>
	SRO	<p>Directs SLC initiation.</p> <p>Directs ADS be inhibited when ADS timers initiate.</p> <p>As level drops, expands RPV level band.</p>

Event No. 8		
Time	Position	Applicants Actions or Behavior
	ATC	<p>Initiates SLC as directed. Refers to SOP-SLC-INJECTION-QC quick card and performs the following:</p> <p>Step 2.1 Remove the SLC keylock switch blanks and insert both keys into the SLC System control switches.</p> <p>Step 2.2 Initiate SLC injection by performing the following (H13-P603):</p> <ul style="list-style-type: none"> <li>• Places SLC System A control switch to the OPER position.</li> <li>• Places SLC System B control switch to the OPER position.</li> </ul> <p>Step 2.3 Record the following:</p> <ul style="list-style-type: none"> <li>• SLC Flow rate (~43 gpm for one pump, or 86 gpm for both pumps)</li> <li>• Initial tank level</li> <li>• Circle RWCU-V-4 status (should be closed)</li> </ul>
		<p>Step 2.4 Report one of the following, or similar words, to the CRS as you hand him this procedure:</p> <ul style="list-style-type: none"> <li>• SLC is injecting normally</li> <li>• SLC is partially injecting</li> <li>• SLC failed to inject</li> </ul> <p>Reports initial SLC tank level of 4800 gallons and that SLC flow rate is only 86 gpm.</p>
	BOP/ATC	<p>When RPV/L drops to -129" and the ADS timers intimate, takes both ADS inhibit switches to inhibit and acknowledges BISIs.</p> <p>Reports ADS inhibited to CRS.</p>

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<b>Event No. 8</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP/ATC	Reports RPV level as it transitions from Wide Range to Fuel Zone indicators. Reports RPV level at TAF and trend continues down slow.
<b>COMMENTS:</b>		

**Event No. 9**

Description: RPV level drops to TAF. Initiate Emergency Depressurization on low RPV Level and return level to normal with low pressure ECCS pumps.

This is initiated when it is determined that RPV level cannot be restored and maintained GT -183”.

**Critical Task is to initiate an Emergency Depressurization after RPV water level reaches TAF and within 5 minutes of level dropping below -161 inches.**

Time	Position	Applicants Actions or Behavior
T = 75	SRO	<p>Determines that Emergency Depressurization is required when RPV level cannot be maintained GT -161”.</p> <p>Updates crew and exits the pressure leg of PPM 5.1.1, RPV Control, and enters PPM 5.1.3, Emergency Depressurization, and determines Wetwell level GT 17’.</p> <p>Directs 7 ADS SRVs be opened.</p>
	BOP	Opens 7 ADS SRVs as directed (ADS SRVs are ones with red stripe on left side of name plate).
	SRO	Directs Wetwell and Drywell sprays and suppression pool cooling be secured to facilitate RPV injection.
	BOP	<p>Secures Drywell and Wetwell sprays and Suppression Pool cooling as directed.</p> <p>Allows ECCS injection valves to open at 470 psig.</p> <p>Reports RPV injection as it occurs.</p> <p>Reports RPV level rising and again when GT TAF (-161 inches).</p>

Event No. 9		
Time	Position	Applicants Actions or Behavior
	SRO	Based on rate of RPV level change, injection systems available, and Wetwell pressure, directs re-initiation of Wetwell and Drywell sprays and suppression pool cooling with RHR as appropriate (Wetwell spray initiation if WW/P GT 2 psig and DW Spray initiation if WW/P GT 12 psig).
	BOP/ATC	<p>Secures injection systems as directed to return RPV level to -50" to +54" band.</p> <p>Reinitiates Wetwell and Drywell sprays as appropriate using quick card.</p> <p>Reinitiates suppression pool cooling as directed.</p>
	BOP	<p>Initiates Wetwell sprays using SOP-RHR-SPRAY-WW-QC quick card:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Step 2.1.3 Open RHR-V-27A or RHR-V-27B.</p>
	BOP	<p>Verifies within Drywell Spray Initiation Limit and:</p> <p>Using SOP-RHR-SPRAY-DW-QC quick card, performs the following:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Open the following to spray the Drywell:</p> <ul style="list-style-type: none"> <li>• RHR-V-17A(B) Drywell Spray inboard isolation</li> <li>• RHR-V-16A(B) Drywell Spray outboard isolation</li> </ul> <p>Observes Drywell pressure drop and reports sprays effective.</p>
<b>Termination Criteria: The scenario will be terminated when RPV level is being returned to normal and Wetwell and Drywell sprays have been initiated as appropriate or as directed by the scenario coordinator.</b>		

**TURNOVER INFORMATION****Initial Conditions:**

This is a Division 3 work week. OSP-ELEC-M703, DG-3 Monthly Surveillance, is in progress. OPS 2 is standing by in the HPCS DG room and can be contacted at ext. 8563. DG-3 is running and SM-2 is being powered from TR-S per OPS-ELEC-M703. PDIS signal X108 (DG3 voltage) is not available.

**Shift Turnover:**

Continue with OSP-ELEC-M703, DG-3 Monthly Surveillance, which has been completed up through step 7.3.31.



**SIMULATOR SETUP**

**Reset to IC-212.**

**Have HPCS DG Surveillance signed off thru step 7.3.31.**

**Ensure sign at SRO desk indicates a Division 3 work week.**

**Flag locked in annunciators.**

**SCHEDULE FILE**

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### EVENT FILE

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## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	Start CW-P-1B; Raise power with flow; RHR-RLY-K112C fails and RHR-V-42C opens; SDV level instrument fails, Half scram, 2 control rods scram, one not full in; Steam Leak Main Steam Tunnel; Partial Electric ATWS, Pull fuses to insert rods, SLC fails to initiate; CB-S1 fails to auto close; Main Steam Tunnel leak gets larger and spreads to a second area; Emergency Depressurize when 2 Areas GT Max Safe

LENGTH OF LESSON 1.5 Hours

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	LO001804	Rev. No.	0
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training
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DEPARTMENT	Operations Training
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PREPARED BY	Ron Hayden	DATE	10/21/14
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REVISED BY		DATE	
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VALIDATED BY		DATE	
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TECHNICAL REVIEW		DATE	
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INSTRUCTIONAL REVIEW		DATE	
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APPROVED		DATE	
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Operations Training Manager

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

Facility: Columbia

NRC Scenario No: 4

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

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\_\_\_\_\_\_\_\_\_\_  
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Initial conditions: Reactor Power is 90%. Power was reduced due to CW-P-1B not being available. The work on CW-P-1B has been completed. OPS4 is standing by in the CWPB for a start of CW-P-1B

Turnover: Start CW-P-1B. After the pump start, raise reactor power with flow to 100%. The reactivity brief has been performed.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	N (BOP)	Start CW-P-1B.
2.	T = 5	R (ATC)	Raise power with Flow.
3.	T = 10	I (BOP) I (SRO) TS (SRO)	RHR-RLY-K112C Fails and RHR-V-42C opens.
4.	T = 20	I (ATC) I (SRO) TS (SRO)	Scram Discharge Volume level instrument fails – Half Scram. 2 Control Rods Scram but one does not go full in.
5.	T = 35	M (All)	Main Steam Tunnel steam leak – Insert a manual reactor scram. One Main steam line does not isolate.
6.	T = 40	C (ATC) I (BOP)	Electric ATWS – B RPS side – Pull fuses to insert control rods. SLC fails to initiate.

**Critical Task is to insert control rods prior to exiting PPM 5.1.2 RPV Control - ATWS.**

7.	T = 60	C (BOP)	CB-S1 Fails to auto close – closed manually – repower SL-11.
8.	T = 70	C (SRO)	Main Steam Tunnel steam leak gets larger and spreads to another area.
9.	T = 70		Emergency Depressurize when 2 Areas GT Max Safe Temperatures.

**Critical task is to initiate an EMERGENCY DEPRESSURIZATION when 2 Areas have exceeded their Max Safe Operating Temperatures and within 5 minutes of establishing that the second areas temperature has exceeded its MSOT and complete actions before 15 minutes (time associated with when Emergency Director could direct evacuation of personnel at SAE).**

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

**SCENARIO DESCRIPTION**

**EVENT 1** – The BOP operator will start CW-P-1B as a normal evolution.

**EVENT 2** – Reactor power will be raised to 100% with RRC flow at the rate of 1% power per minute or 1 Hz per minute.

**EVENT 3** – The next event is a failure of RHR-RLY-K112C which is the RHR-V-42B/C Open Permissive relay. The crew will respond and find RHR-V-42C stroking open. The crew will manually close RHR-V-42C. The CRS will declare RHR-C Inoperable and enters Tech Spec 3.5.1, ECCS – Operating, and determines condition A (one low pressure ECCS injection/spray subsystem inoperable) applies which requires to restore low pressure injection/spray subsystem to operable status within 7 days. The CRS will declare RHR-RLY-K112C inop and enter Tech Spec 3.3.5.1, Emergency Core Cooling System (ECCS) Instrumentation and uses table 3.3.5.1-1 to determine the function is 2f and that condition C applies which requires to declare supported features inop when redundant feature ECCS initiation capability is inoperable within 1 hour (is not applicable) and restore channel to operable status within 24 hours.

**EVENT 4** – The next event is a failure of a Scram Discharge Volume level switch (fails high) which causes a half scram on A RPS. Due to failed fuses on the B RPS side, two control rods will scram but only one goes full in. Control rod 30-03 stops at position 10. The crew will enter ABN-ROD and reduce reactor power with flow to LE 80 Mlbm/hr. Control rod 30-03 will be manually driven full in. For the control rods - Refers to Tech Spec 3.1.3, Control Rod Operability, and determines Condition C (One or more control rods inoperable for reasons other than A or B) applies which requires to fully insert inoperable control rod within 3 hours and disarm the associated CRD within 4 hours. For the SDV Level switch – Refers to Tech Spec 3.3.1.1, Reactor Protection System (RPS) Instrumentation and determines Condition A (one or more required channels inoperable) which requires place channel in trip within 12 hours OR place associated trip system in trip within 12 hours. Recognizes that the system already in a tripped condition.

**EVENT 5** – The next event is a steam leak in the Main Steam Tunnel. As temperatures rise the crew will determine the MSIVs will eventually close and a manual reactor scram will be inserted. When the isolation for high Main Steam Tunnel temperature occurs, both the inboard and outboard MSIVs on the A Main Steam line do not close.

**EVENT 6** – When the scram is inserted, only about one quarter of the control rods will insert due to a partial Electric ATWS on the B RPS side (A RPS is tripped due to the SDV instrument failure). When SLC is started the systems will not initiate. The crew will pull RPS fuses and all control rods will insert.

**EVENT 7** – When the Main Turbine trips the startup breaker for SM-1 will not auto close. Actions will be taken to manually close the S1 breaker and then to repower SL-11.

**EVENT 8** – The Main Steam line steam leak gets bigger and spreads to a second area. The first area is the Main Steam Tunnel and Max Safe temperature is 320°F.

**EVENT 9** – The crew will Emergency Depressurize the RPV when two areas are greater than their Max Safe Operating temperatures. The second area is the RWCU Pipe Area temperature and Max Safe temperature is 340°F.

The scenario will be terminated after the Emergency Depressurization has been performed.

**Event No. 1**

**Description:** Start CW-P-1B per SOP-CW-START.

This event is initiated by shift turnover.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 0	SRO	Directs the start of CW-P-1B per SOP-CW-START.
	BOP	<p>Performs SOP-CW-START Section 5.3 actions as follows:</p> <ul style="list-style-type: none"> <li>• 5.3.1 – No actions</li> <li>• 5.3.2 – Verifies section 5.1 complete.</li> <li>• 5.3.3 – Contacts OPS4 to verify upper and lower motor bearing lube oil levels OK (Roleplay levels normal).</li> <li>• 5.3.4 – Contacts OPS4 and verifies motor air ports free of obstructions (Roleplay – motor free of obstructions).</li> <li>• 5.3.8 – Verifies CWPB bay level between 441' (23') and 445' elevation (27') (Roleplay 25').</li> <li>• 5.3.9 – Places C/S for CW-V-13B and TSW-V-115B to OPEN and when valves start to open releases switch.</li> <li>• 5.3.10 – Observes blue ready to start light on.</li> <li>• 5.3.12 Makes plant announcement of CW-P-1B start.</li> <li>• 5.3.13 – Places CW-P-1B C/S to START (verifies pump starts, discharge valve opens, and CW-V-13B and TSW-V-115B close).</li> </ul> <p>Acknowledges 4.840.A4 4-5 'CW PMP B DISCH NOT FULL OPEN' alarm.</p> <p>Informs CRS that CW-P-1B is running.</p>

**COMMENTS:**

<b>Event No. 2</b>		
<b>Description:</b> Raise Power with Flow to 100%. This event is initiated by shift turnover.		
Time	Position	Applicants Actions or Behavior
T = 5	SRO	Directs ATC to raise power with flow to achieve 100% reactor power at 1% per minute (1 Hz per minute).
	ATC	Notes Reactor Power and/or Main Generator Output.  Refers to SOP-RRC-FLOW-QC quick card and performs the following:  Step 2.1 Reactor Power change with RRC Flow controllers in auto:  Step 2.1.1 Monitor fuel-preconditioning limits (per 9.3.18) while changing reactor power.  Step 2.1.2 Raise/lower RRC flow using RTC-M/A-R675 (Master controller) as necessary.  Step 2.1.3 Verify total core flow is LT 103%.  Step 2.1.4 Verify RRC loop B is LT 55.9 Mlb/hr.  Step 2.1.5 Notify the CRS when the change in Reactor power is complete.  At 100% power, stops the power increase.  Reports power/pressure and level after power/flow increase is complete.
	ATC	Informs the CRS of Power/Pressure/Level after power increase has been completed.
<b>COMMENTS:</b>    		



<b>Event No. 3</b>		
<p><b>Description:</b> RHR-RLY-K112C (RHR B/C Injection Valve Open Permissive) fails and RHR-V-42C goes open.</p> <p>This event is initiated by activating <b>TRIGGER 1</b> after Reactor Power is at least 95%.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR: ACTIVATE TRIGGER 1.</b>		
T = 10	BOP	<p>Responds to P601.A2 4-4 'RHR B/C INJECTION VLV OPEN PERMISSIVE' alarm.</p> <p>Refers to the ARP.</p>
		Observes RHR-V-42C going open and informs the CRS.
	SRO	Observes Reactor Pressure GT 470 psig and directs RHR-V-42C be closed.
	BOP	Takes the control switch for RHR-V-42C to close, recognizes it closes, and informs the CRS.
	SRO	Directs backpanel investigation of RHR-RLY-K112B and RHR-RLY-K112C.
	BOP	<p>Investigates H13-P618 and recognizes RHR-RLY-K112C is picked up and RHR-RLY-K112B is not.</p> <p>Reports findings to CRS.</p>
	SRO	Due to RHR-V-42C opening - Declares RHR-C Inoperable and enters Tech Spec 3.5.1, ECCS – Operating, and determines condition A (one low pressure ECCS injection/spray subsystem inoperable) applies which requires to restore low pressure injection/spray subsystem to operable status within 7 days. Note: It is not anticipated but if the CRS deactivates RHR-V-42C, Tech Spec 3.6.1.3 Condition A would then be applicable.

<b>Event No. 3</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Declares RHR-RLY-K112C inop and enters Tech Spec 3.3.5.1, Emergency Core Cooling System (ECCS) Instrumentation and uses table 3.3.5.1-1 to determine the function is 2f and that condition C applies which requires to declare supported features inop when redundant feature ECCS initiation capability is inoperable within 1 hour (is not applicable) and restore channel to operable status within 24 hours.
	SRO	Conducts brief.
<b>COMMENTS:</b>		

Event No. 4		
<p><b>Description:</b> Scram Discharge Volume Level Switch fails upscale – Half Scram – Two Control Rods scram but only One goes Full In.</p> <p>The event is initiated by activating <b><u>TRIGGER 2</u></b> after Tech Specs for the RHR system have been referenced.</p>		
Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 2.</b>		
T = 10	ATC	<p>Responds to annunciator P603.A8 1-3 ‘SDV LEVEL HIGH TRIP’ and P603.A7 3-4 ‘1/2 SCRAM RPS A’.</p> <p>Recognizes a half scram on RPS A and informs the CRS.</p>
	ATC	<p>Responds to P603.A7 5-7, ‘ROD DRIFT’ alarm.</p> <p>Scans the full core display (or observes RWM screen) for drifting and/or scrammed control rods.</p> <p>Recognizes two control rods have blue scram lights lit and informs the CRS.</p>
	ATC	<p>Selects control rod 30-03 and observes it is at position 10.</p> <p>Selects control rod 34-03 and observes it is full in (position 00).</p>
	BOP	<p>Makes an announcement for half scram on RPS A system.</p> <p>Investigates backpanel for SDV level switch and recognizes RPS-RLY-K1A has dropped out.</p>
	SRO	<p>Updates crew and enters ABN-ROD.</p> <p>May set a key parameter of a third scrammed control rod.</p> <p>Refers to section 4.2 of ABN-ROD and directs core flow be lowered to LE 80 Mlbm/hr (should give a specific value).</p>

Event No. 4		
Time	Position	Applicants Actions or Behavior
	ATC	Ensures both individual pump controllers are in AUTO and depresses the Master Controller lower pushbutton to lower flow to directed value.  Informs CRS of Power/Pressure and RPV Level when flow decrease has been completed (power will be about 80% at the end of the flow reduction).
	SRO	Directs control rod 30-03 be selected and driven full in using the continuous insert pushbutton.
	ATC	Selects control rod 30-03 and depresses the continuous insert pushbutton and drives the control rod full in.  Releases the continuous insert pushbutton and verifies the control rod remains at position 00.  Informs the CRS that the control rod is full in.
	SRO	For the control rods - Refers to Tech Spec 3.1.3, Control Rod Operability, and determines Condition C (One or more control rods inoperable for reasons other than A or B) applies which requires to fully insert inoperable control rod within 3 hours and disarm the associated CRD within 4 hours.  For the SDV Level switch – Refers to Tech Spec 3.3.1.1, Reactor Protection System (RPS) Instrumentation and determines Condition A (one or more required channels inoperable) which requires place channel in trip within 12 hours OR place associated trip system in trip within 12 hours. Recognizes system already in tripped condition.
	SRO	Per ARP for ½ SCRAM SYSTEM A – directs announcement be made stopping all maintenance and surveillance testing that has a potential for generating a trip on RPS B side.
	BOP	Makes announcement as directed.
<b>COMMENTS:</b>		

**Event No. 5**

**Description:** Main Steam Tunnel Steam Leak – MSIV closure – Two MSIVs fail to close. It takes six minutes to get the first temperature alarm after trigger 3 initiation. It takes another 2 minutes to get MSIV closure and an automatic reactor scram.

This event is initiated when the Tech Specs for the SDV level switch failure have been referenced by activating **TRIGGER 3**.

Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 3.</b>		
<b>ROLEPLAY: Wait one minute after trigger 3 is activated and call the control room on x2222 and, as the security fire tour, inform the control room that it feels like there is steam coming up from between the floor plugs on the North side of the Reactor Building 522' elevation.</b>  <b>If OPS2 is sent to validate – There is definitely steam coming up from between the floor plugs.</b>		
T = 35	CRS	<p>Takes the phone call and after the call is completed performs a update and informs the crew of the potential steam leak report.</p> <p>Directs investigation of leak detection monitors on H13-P632 and H13-P642.</p>
	BOP	Investigates leak detection monitors and reports temperatures and delta temperatures rising for the Main Steam Tunnel on LD-MON-2B points A1-1 and A2-1.
	SRO	<p>Updates crew and enters ABN-HELB.</p> <p>May direct that the Reactor Building be evacuated due to a steam leak.</p>
	BOP	<p>Acknowledges P601.A3 3-8 'LEAK DET MSL TUNNEL dT HIGH' and refers to ARP.</p> <p>Provides temperature and trend on Main Steam Tunnel temperatures.</p>
	SRO	Updates crew and directs a manual scram prior to an automatic scram.
<b>NOTE: The remainder of these steps occur after the scram but are included here for continuity purposes.</b>		
		Acknowledges P601.A2 3-1 and P601.A3 1-7 'LEAK DET STEAM TUNNEL TEMP HI HI' annunciators and informs the CRS of the EOP entry.

<b>Event No. 5</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Updates the crew and enters PPM 5.3.1, Secondary Containment Control.
	BOP	When the MSIVs close, takes all of the control switches for the MSIVs to the close position.  Recognizes MS-V-22A and MS-V-28A did not close automatically and will not manually close and reports the failure of MS-V-22A and MS-V-28A to close to the CRS.
<b>COMMENTS:</b>		

Event No. 6		
<p><b>Description:</b> Electric ATWS B RPS side. SLC Fails to initiate.</p> <p>This event was activated when <b>TRIGGER 3</b> was initiated for the last event and is realized when a manual scram is inserted.</p>		
Time	Position	Applicants Actions or Behavior
<b>Critical Task is to insert control rods prior to exiting PPM 5.1.2.</b>		
T = 55	ATC	<p>Manually scrams the reactor as directed and performs immediate operator actions of PPM 3.3.1, Reactor Scram:</p> <ul style="list-style-type: none"> <li>Places mode switch to shutdown</li> <li>Monitors/reports power/level/pressure</li> <li>Reports APRMs not downscale and performs the following: <ul style="list-style-type: none"> <li>Depresses the manual scram pushbuttons</li> <li>Initiates ARI</li> </ul> </li> <li>Recognizes reactor power is GT 5% and performs the following: <ul style="list-style-type: none"> <li>Informs the SRO</li> </ul> </li> </ul>
	ATC	<p>When it is recognized that depressing the manual scram pushbuttons and initiating ARI has not inserted the control rods, refers to SOP-SLC-INJECTION-QC quick card and performs the following:</p> <p>Step 2.1 Remove the SLC keylock switch blanks and insert both keys into the SLC System control switches.</p> <p>Step 2.2 Initiate SLC injection by performing the following (H13-P603):</p> <ul style="list-style-type: none"> <li>Places SLC System A control switch to the OPER position.</li> <li>Places SLC System B control switch to the OPER position.</li> </ul> <p>Step 2.3 Record the following:</p> <ul style="list-style-type: none"> <li>SLC Flow rate (~43 gpm for one pump, or 86 gpm for both pumps)</li> <li>Initial tank level</li> <li>Circle RWCU-V-4 status (should be closed)</li> </ul>

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
		<p>Step 2.4 Report one of the following, or similar words, to the CRS as you hand him this procedure:</p> <ul style="list-style-type: none"> <li>• SLC is injecting normally</li> <li>• SLC is partially injecting</li> <li>• SLC failed to inject</li> </ul> <p>Recognizes and reports that neither SLC pump started and neither SLC suction valve opened when the key lock switches were taken to OPER.</p> <p>Insert SRMs and IRM by depressing the power on and insert pushbuttons.</p> <p>Reports all rods not in and current reactor power (about 12% and drops to downscale lit).</p> <p>Reports EOP entry on failure to scram.</p> <p>Reports an Electrical ATWS on B RPS side in that three RPS white lights are still illuminated.</p>
	CRS	<p>Updates crew on EOP entry into PPM 5.1.1, RPV Control, and directs/verifies that the Mode Switch has been placed in SHUTDOWN.</p> <p>Updates crew and exits PPM 5.1.1, RPV Control, and transitions to PPM 5.1.2, RPV Control - ATWS.</p> <p>Directs BOP to:</p> <ul style="list-style-type: none"> <li>• Inhibit ADS and take manual control of HPCS.</li> <li>• Verify pressure is being maintained by the bypass valves in Auto.</li> </ul> <p>Directs RPV level be maintained -50" to +54".</p>



<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	<p>Takes both ADS control switches to the INHIBIT position and acknowledges associated alarms.</p> <p>Arms and Depresses the HPCS system initiation pushbutton while holding the control switch for HPCS-P-1 to STOP.</p> <p>Takes the control switch for HPCS-V-4 to close when it gets fully opened.</p> <p>Reports ADS inhibited and manual control of HPCS taken to CRS.</p>
	SRO	<p>Prioritizes the power leg of PPM 5.1.2, RPV Control ATWS, and directs control rod insertion by pulling RPS fuses per PPM 5.5.11, Alternate Control Rod Insertion.</p>
	BOP	<p>Refers to PPM 5.5.11 and determines there are white RPS scram lights lit on the B RPS side and performs the following:</p> <p>Updates crew that RPS fuses are about to be removed and control rods should be inserting.</p> <p>Removes the four fuses in H13-P611 associated with B RPS:</p> <ul style="list-style-type: none"> <li>• LL-F13</li> <li>• MM-F21</li> <li>• BB-F12</li> <li>• AA-F20</li> </ul>
	ATC	<p>As RPS fuses are being removed, informs the CRS that control rods are inserting.</p> <p>When the last RPS fuse is removed, informs the CRS that all control rods are inserted.</p>
	SRO	<p>May direct SLC switches be taken to OFF.</p>

<b>Event No. 6</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	ATC	Takes the control switches for both SLC Systems to off if directed.  Reports completion to CRS.
	SRO	Updates crew and exits PPM 5.1.2, RPV Control – ATWS and enters PPM 5.1.1, RPV Control.
	SRO	Directs RPV level control at -50” to + 54” with Condensate, Feed, RCIC and HPCS as necessary.  Directs PPM 3.3.1 be completed.
	ATC	Announces reactor scram over PA.  Transfers RPV level control to Startup level control valves per SOP-RFW-FCV-QC: Step 2.1.1 Starts closing RFW-V-112A and RFW-V-112B. Step 2.1.2 Starts opening RFW-V-118. Step 2.1.3 Verifies RFW-V-109 open. Step 2.1.4 Verifies RFW-V-117A and RFW-V-117B open Step 2.1.5 Verifies RFW-LIC-620 in manual. Step 2.1.6 Places RFW-P-1B in MDEM; Places RFW-P-1A in MDEM; Adjusts turbine speed as required. Step 2.1.7 Verifies RFW-V-112A and RFW-V-112B closed. Step 2.1.8 Verifies RFW-V-118 open. Step 2.1.9 Adjusts turbine speed to get 200 psid across Startup valves. Step 2.1.10 Adjusts level in manual. Step 2.1.11 Places RFW-LIC-620 in automatic at 36”.  Informs the CRS feed pumps are on the Startup level controllers in automatic.
<b>COMMENTS:</b>		

<b>Event No. 7</b>		
<p><b>Description:</b> Breaker CB-S1 fails to auto close on transfer of electrical busses to Startup power.</p> <p>This event is active from the beginning of the scenario and is realized when the Main Turbine trips and the electrical plant transfers to the Startup Transformer.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 55	BOP	<p>Responds to the electrical boards and recognizes SM-1 is de-energized, SM-7 is on Backup power and DG-1 is running. Verifies SW-A running to support DG-1 operation.</p> <p>Observes there are no lockouts indicated on SM-1.</p> <p>Takes the sync selector switch for CB-S1 to the MAN position.</p> <p>Takes the control switch for CB-S1 to close and observes red light comes on and green light goes out and that the breaker did close to repower SM-1.</p>
	BOP	<p>Observes SL-11 not energized and may re-energize it using SOP-ELEC-480V-OPS-QC quick card:</p> <p>Step 2.1.1 Verifies SM-1 energized.</p> <p>Step 2.1.2 Verify CB-11/1 green light illuminated and green flag displayed.</p> <p>Step 2.1.3 IF CB-1/11 is open, then perform the following:</p> <ol style="list-style-type: none"> <li>a. Verify CB-1/11 white LOCKOUT CIRCUIT AVAIL light illuminated.</li> <li>b. Verify CB-1/11 green light illuminated and green flag displayed.</li> <li>c. Close CB-1/11.</li> </ol> <p>Step 2.1.4 Close CB-11/1.</p> <p>Step 2.1.5 Verify SL-11 voltage is approximately 480 (432 – 528 volts).</p> <p>Informs CRS of electrical board status and actions taken.</p>

**Event No. 7**

ATC

Recognizes a CRD pump is not running and starts a CRD pump using ARP guidance using P603.A7 3-8 'CRD CHARGE WATER PRESS LOW':

Step 3. If neither pump is running then perform the following:

- a. Place CRD-FC-600 in manual (CRD Flow Controller).
- b. Reduce CRD-FC-600 output to zero.
- c. Start the standby pump.
- d. Null CRD-FC-600.
- e. Transfer CRD-FC-600 to auto.

**COMMENTS:**

Event No. 8		
<p><b>Description:</b> Steam Leak gets larger and spreads to a second area. It takes 75 seconds to get the temperature alarm and nine minutes total to reach Max Safe temperature after trigger initiation.</p> <p>This event is initiated when control rods are inserted and SM-1 and SL-11 have been repowered by activating <b><u>TRIGGER 4.</u></b></p>		
Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 4.</b>		
<b>T = 65</b>	SRO	Sets a key parameter of Main Steam Tunnel Temperature of 320°F (Max Safe value for Main Steam Tunnel on LD-MON-2B points A1-1 and A1-2).
	BOP	<p>Reports Main Steam Tunnel temperature as it approaches and when it reached Max Safe temperature of 320°F.</p> <p><b>THIS IS FIRST AREA THAT EXCEEDED MAX SAFE TEMPERATURE – IF ON HEADSET, LET THE EVALUATORS KNOW WHEN THIS VALUE IS REACHED.</b></p>
		<p>Acknowledges P601.A2 2-2 ‘LEAK DET RWCU ROOM TEMP HI HI’ annunciator and refers to the ARP.</p> <p>Informs the CRS of EOP entry.</p> <p>Acknowledges Secondary Containment dP High annunciator and reports it as an EOP entry.</p>
	SRO	<p>Updates crew and reenters PPM 5.3.1, Secondary Containment Control.</p> <p>Directs back panel investigation of the RWCU temperature.</p>
	BOP	Investigates back panel leak detection monitors and observes temperature on LD-MON-1B point A2-4, RWCU Pipe Area RB 522 N, trending up and reports current value and trend to the CRS.

<b>Event No. 8</b>		
	SRO	Establishes a Key Parameter of Max Safe temperature of 340°F.
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	SRO	Updates crew and reenters PPM 5.3.1, Secondary Containment Control.
	BOP	Monitors RWCU Pipe Area temperature as it rises and reports when it reaches max safe temperature of 340°F.  <b>THIS IS SECOND AREA THAT EXCEEDED MAX SAFE TEMPERATURE- IF ON HEADSET, LET THE EVALUATORS KNOW WHEN THIS VALUE IS REACHED.</b>
	SRO	Directs second operator verify max safe temperature in two areas exceeded.
<b>COMMENTS:</b>		

<b>Event No. 9</b>		
<p><b>Description:</b> EMERGENCY DEPRESSURIZATION when 2 Area's exceed Max Safe Operating Temperatures.</p> <p>This event is initiated when it is determined that 2 Areas have exceeded their Max Safe Operating Temperatures (Main Steam Tunnel and RWCU Pipe Area).</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<p><b>Critical task is to initiate an EMERGENCY DEPRESSURIZATION when 2 Areas have exceeded their Max Safe Operating Temperatures and within 5 minutes of establishing that the second areas temperature has exceeded its MSOT and complete actions before 15 minutes (time associated with when Emergency Director could direct evacuation of personnel at SAE).</b></p>		
T = 70	ATC	Verifies max safe temperature exceeded in two areas and informs the CRS.
	SRO	<p>Per PPM 5.3.1, Secondary Containment Control, determines that any one parameter has exceeded its maximum safe operating value in 2 or more areas and an Emergency Depressurization is required.</p> <p>Updates crew that an Emergency depressurization is required and takes the PPM 5.1.1, RPV Control override to PPM 5.1.3, Emergency RPV Depressurization.</p>
	SRO	Determines a high drywell pressure signal is not in and Wetwell level is GT 17 foot and directs seven SRVs, ADS preferred, be opened.
	ATC/BOP	<p>Opens seven ADS SRVs as directed.</p> <p>Verifies containment response as each is opened and reports completion to CRS.</p>
	SRO	<p>Directs pumps not required for adequate core cooling be stopped from injecting.</p> <p>Directs RPV/L maintenance -50 inches to +54 inches.</p>

<b>Event No. 9</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	ATC	Maintains RPV level as required to maintain water level band.
<b>Termination Cue: The scenario can be terminated when the reactor has been Emergency Depressurized or as directed by the scenario coordinator.</b>		
<b>COMMENTS:</b>		



## **TURNOVER INFORMATION**

Initial Conditions: Reactor Power is 90%. Power was reduced due to CW-P-1B not being available. The work on CW-P-1B has just been completed. OPS4 is standing by in the CWPH for a start of CW-P-1B.

Turnover: Start CW-P-1B.

After the pump start, raise reactor power with flow to 100%. The reactivity brief has been performed.

## **SIMULATOR SETUP INSTRUCTIONS**

Reset to IC 211.  
Ensure power at 90%.  
Place Simulator in Run.

**SCHEDULE**

<!-- This file contains a Thunder Simulations Schedule -->

<SCHEDULE>

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<ITEM row = 1>
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  <ACTION>Insert malfunction BKR-EPS049 to FAI_AUT_CLOS</ACTION>
  <DESCRIPTION>CB-S1</DESCRIPTION>
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<ITEM row = 2>
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  <DESCRIPTION>MS-V-22A INBOARD MSIV</DESCRIPTION>
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<ITEM row = 3>
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<ITEM row = 4>
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<ITEM row = 5>
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<ITEM row = 6>
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  <DESCRIPTION>SCRAM LIGHT FOR 3003</DESCRIPTION>
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  <DESCRIPTION>ROD 3403 SINGLE ROD SCRAM</DESCRIPTION>
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    <DESCRIPTION>>MSL-B BREAK IN THE STEAM TUNNEL</DESCRIPTION>
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  <ACTION>Insert malfunction RLY-RPS025F to FAIL_TO_TRIP on event 3</ACTION>
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</SCHEDULE>
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## EVENT

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

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<EVENT>
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  <TRIGGER id="6" description="Mode switch out of RUN causes some rods to insert">X03I102R &lt 1</TRIGGER>
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```
</EVENT>
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## INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE Raise power with Recirc Pumps; Open CB-4888; CRD flow controller fails; HPCS-LS-2B trips, HPCS-V-1 does not auto close; MS-LS-200A fails downscale; MSR Drain Tank controller fails - Scram, MG fail to trip; LOCA, One Wetwell Spray Valve fails to open; Sprays Effective

LENGTH OF LESSON 1.5 Hours

### INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	_____	Rev. No.	_____
Simulator Guide PQD Code	<u>LO001805</u>	Rev. No.	<u>0</u>
JPM PQD Code	_____	Rev. No.	_____
Exam PQD Code	_____	Rev. No.	_____

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Ron Hayden DATE 10/21/14

REVISED BY \_\_\_\_\_ DATE \_\_\_\_\_

VALIDATED BY \_\_\_\_\_ DATE \_\_\_\_\_

TECHNICAL REVIEW \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONAL REVIEW \_\_\_\_\_ DATE \_\_\_\_\_

SAT Coordinator

APPROVED \_\_\_\_\_ DATE \_\_\_\_\_

Operations Training Manager

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

Facility: Columbia

NRC Scenario No: 5 (Spare)

Examiners: \_\_\_\_\_

Operators: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_\_\_\_\_\_  
\_\_\_\_\_

**Initial conditions:** Reactor Power is 58%. RFW-P-1A was removed from service for required maintenance and has just been placed back into Automatic operation. Dittmer has requested that CB-4888 be opened to facilitate switchyard maintenance.

**Turnover:** Raise reactor power to 65% with flow. The reactivity brief has been completed. When power is at 65%, open CB-4888.

Event No.	Timeline	Event Type*	Event Description
1.	T = 0	R (ATC)	Raise power with flow to 65% reactor power
2.	T = 10	N (BOP)	Open CB-4888
3.	T = 15	C (ATC)	CRD flow controller fails
4.	T = 20	I (BOP) TS (SRO)	HPCS-LS-2A Spurious Trip; HPCS-V-1 does not auto close
5.	T = 35	TS (SRO)	MS-LS-200A fails downscale
6.	T = 50	C (ATC) C (SRO)	MSR Drain Tank Controller Fails – Requires manual scram. MT trip.
7.	T = 60	C (BOP)	MG Fail to trip – requires manual action to trip the Main Generator.
8.	T = 65	M (ALL)	LOCA
9.	T = 70	C (BOP)	Initiate containment sprays - Wetwell Spray Valve RHR-V27A or RHR-V-27B fails to open. (First loop selected for wetwell spray.)

**Critical Task is to spray the Drywell when Wetwell pressure reaches 12 psig, prior to exceeding PSP and after verifying DSIL and RHR not required for adequate core cooling.**

**Critical Task is to secure Drywell sprays after Drywell pressure has dropped LT 12 psig and prior to Drywell pressure reaching zero psig.**

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

**SCENARIO DESCRIPTION**

**EVENT 1** –Reactor power is raised from 58% to 65% with flow by the ATC operator.

**EVENT 2** –BPA requested PCB 4888 be opened to allow BPA to perform switchyard maintenance. The BOP operator will open PCB 4888.

**EVENT 3** – When CB-4888 is opened, the CRD Drive Header Flow Control Valve controller, CRD-FCV-600, fails to 100% output signal fully opening CRD-FCV-2A (2B). The ATC operator will take manual control of CRD-FCV-600 and adjust output to achieve CRD Cooling Header flow to ~ 62 GPM and Drive Header dP to ~265 psid.

**EVENT 4** – When the actions for the failed CRD controller are completed, there will be a spurious trip of HPCS-LS-2A which causes a HPCS Suction switchover and HPCS-V-15 to open. The crew will investigate and observe that HPCS-V-1 did not auto close. The crew will take action to close HPCS-V-1. Tech Specs will be reviewed - refers to Tech Spec 3.3.5.1 and Table 3.3.5.1-1 and determines 3.e is applicable which indicates condition D applies – place channel in trip in 24 hours or align HPCS to the SP within 24 hours.

**EVENT 5** – After Tech Specs for HPCS have been addressed a downscale failure of MS-LIS-200A occurs. The crew will investigate and determine MS-LIS-200A has failed downscale. Tech Specs 3.3.6.1 Condition A will be referenced which requires placing channel in trip within 24 hours.

**EVENT 6** – A failure of the valves for a 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 MSR High Level alarm.

**EVENT 7** – When a scram is inserted, the Main Turbine will trip but the Main Generator will not trip. The crew will take actions to trip the Main Generator and will be successful when the Unit and Overall Unit pushbuttons are depressed. The Critical Task will be to trip the Main Generator.

**EVENT 8** – When the Main Generator is tripped a LOCA will occur. Containment pressure will rise to require Wetwell spray and Drywell spray initiations.

**EVENT 9** – When Wetwell Sprays are directed, the first RHR loop selected for Wetwell Sprays will have the Wetwell Spray valve fail to open. The crew will swap loops and spray initiation will be effective. Drywell sprays will be initiated at 12 psig and be effective in reducing containment pressure. Before Wetwell and Drywell pressures reach zero psig the crew will secure Wetwell and Drywell sprays.

The scenario will be terminated when Drywell sprays have been secured.

<b>Event No. 1</b>		
<b>Description:</b> Raise reactor power with flow to 70% power. 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 65% reactor power at a rate not to exceed 1% per minute.
	ATC	Notes Reactor Power and/or Main Generator Output.  Refers to SOP-RRC-FLOW-QC quick card and performs the following:  Step 2.1 Reactor Power change with RRC Flow controllers in auto:  Step 2.1.1 Monitor fuel-preconditioning limits (per 9.3.18) while changing reactor power.  Step 2.1.2 Raise/lower RRC flow using RTC-M/A-R675 (Master controller) as necessary.  Step 2.1.3 Verify total core flow is LT 103%.  Step 2.1.4 Verify RRC loop B is LT 55.9 Mlb/hr.  Step 2.1.5 Notify the CRS when the change in Reactor power is complete.  At 65% power, stops the power increase.  Reports power/pressure and level after power/flow increase is complete.
<b>COMMENTS:</b>    		

**Event No. 2**

**Description:** BPA requests PCB-4888 be opened to allow BPA to perform switchyard maintenance.  
This event is initiated by shift turnover sheet.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
T = 10	SRO	Directs PCB-4888 to be opened per SOP-ELEC-500KV-OPS section 5.1.2.
	BOP	<p>Manually opens PCB 4888:</p> <p>Step 5.1.2 a – Verifies Dittmer is informed (done per turnover sheet)</p> <p>Step 5.1.2b - Places PCB-4888 synch selector switch to manual.</p> <p>Step 5.1.2c - Places PCB-4888 switch in trip.</p> <p>Responds to P820.B1 2-4 'DEH WARNING' and P820.B1 2-5 'DEH TROUBLE' alarms (annunciates due to changing breaker position – no action required per ARP).</p> <p>Step 5.1.2d - Verify PCB-4888 opens.</p> <p>Step 5.1.2e - Places PCB-4888 synch selector switch in OFF.</p> <p>Step 5.1.2f - Informs Dittmer that PCB-4888 is open.</p> <p>Reports to CRS that PCB-4888 is open.</p>

**COMMENTS:**

**Event No. 3**

**Description:** CRD flow controller fails.

This event is initiated after the BOP operator has been given direction to open PCB-4888 by activating **TRIGGER 1**.

Time	Position	Applicants Actions or Behavior
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 1</b>		
T = 15	ATC	<p>Responds to P603.A7 3-6 'CRD DRIVE WATER FILTER DP HIGH' alarm.</p> <p>Observes CRD Cooling Header flow at 70 gpm and Drive Header/Reactor dP at 350 psid and informs the CRS.</p> <p>Refers to the ARP.</p>
	ATC	<p>Observes Flow Control Valve CRD-V-2B full open.</p> <p>Observes CRD-FC-600 red arrow upscale and the signal is at 100% and informs the CRS.</p> <p>Places CRD-FC-600 controller in manual.</p> <p>Depresses the close pushbutton to restore CRD Cooling Header flow to ~ 62 GPM and Drive Header dP to ~265 psid.</p> <p>Observes Flow Control valve dual indication and the red arrow on CRD-FC-600 returning to the 'green band'.</p>
	SRO	<p>Contacts Work Control for assistance in troubleshooting failure of the CRD-FC-600.</p>
<b>ROLEPLAY – If sent you find nothing obviously wrong at CRD. If asked dP is 9 psid.</b>		
<b>COMMENTS:</b>		



**Event No. 4**

**Description:** HPCS-LS-2B Spurious trip; HPCS-V-1 does not auto close.

This event is initiated by activating **TRIGGER 2** when Reactor Power is ~70%, or as directed by the scenario coordinator.

<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 2.</b>		
T = 20	BOP	<p>Responds to annunciator P601.A1 6-6 ‘HPCS SUCTION SWITCHOVER SUPP POOL LEVEL HIGH’ annunciator.</p> <p>Refers to H13-P601.A1 6-6 annunciator ARP.</p> <p>Recognizes both HPCS suction valves are open.</p> <p>Informs the CRS of alarm and that both HPCS-V-1 and HPCS-V-15 are open and that HPCS-V-1 should have closed when HPCS-V-15 opened.</p>
	SRO	<p>Acknowledge report.</p> <p>Directs HPCS-V-1 be closed.</p>
	BOP	Closes HPCS-V-1 and reports valve did close.
	SRO	Refers to Tech Spec 3.3.5.1 and Table 3.3.5.1-1 and determines 3.e is applicable which indicates condition D applies – place channel in trip in 24 hours or align HPCS to the SP within 24 hours Note: TS 3.3.5.1 D.1 gives the CRS one hour to declare HPCS inoperable. Once they complete D.1 actions they can exit D.1 and comply with D.2.2. TS 3.5.1 wouldn’t be entered unless they exceed the one hour time frame.

**COMMENTS:**

<b>Event No. 5</b>		
<b>Description:</b> MS-LS-200A Fails Downscale. This event is initiated by activating <b><u>TRIGGER 3</u></b> when the HPCS Tech Specs have been addressed.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR – ACTIVATE TRIGGER 3.</b>		
T = 35	BOP	Responds to annunciator P601.A12 2-1 ‘MSIV HALF TRIP SYSTEM A’ and P601.A12 2-4 ‘NS4 GROUP 1 ISOLATION RPV LEVEL LOW (-129”)’ annunciators.  Refers to H13-P601.A12 2-4 annunciator’s ARP.  Informs the CRS of alarms and investigates back panels.
	SRO	Acknowledge report.
	BOP	At H13-P609, observes instrument MS-LS-200A is reading downscale.  Reports observation to CRS.  Refers CRS to Tech Spec 3.3.6.1.
	SRO	Refers to Tech Spec 3.3.6.1 ‘Primary Containment Isolation Instrumentation’ and determines Condition A (One or more required channels inoperable) applies: place channel in trip in 24 hours (MSIV Isolation is function 1a therefore the 12 hours does not apply).
<b>COMMENTS:</b>		

<b>Event No. 6</b>		
<p><b>Description:</b> Failure of MSR Drain tank 1A level control valves HD-LIC-9A and 9A2 closed.</p> <p>The event is initiated by activating <b>TRIGGER 4</b> after Tech Specs for HPCS have been referenced.</p> <p>Note: After valve position is changed, the time it takes to get MSR drain tank high level alarm is dependent on the power level. It then takes another four minutes to get the MSR High level alarm.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<p><b>BOOTH OPERATOR – Ensure the InSight window is open with RHDC09SA1 displayed.</b></p> <p><b>BOOTH OPERATOR – Then ACTIVATE TRIGGER 4.</b></p> <p><b>BOOTH OPERATOR - In the InSight window change the value for RHDC09A1 to 0.4.</b></p>		
T = 50	BOP	<p>Acknowledges P840.A3 2-1 'MSR A DRAIN TK 1A LEVEL HIGH' alarm and refers to the ARP.</p> <p>Investigates controllers at H13-P835 to ensure they are in Auto and recognizes the controllers are opening drain valves but level continues to rise (may attempt manual operation but valve is already full open).</p> <p>Reports controllers are functioning in Auto (or Manual) and level indication is off scale high.</p>
<p><b>BOOTH OPERATOR - Three minutes after the drain tank high level alarm, change the value for RHDC09A1 to 0.35 (it is a short time before the MSR High level alarm annunciates – if annunciator does not come in slowly keep backing down on the valves position).</b></p>		
	SRO	Conduct a brief on actions if level continues to rise and MSR Level High alarm is received.
	BOP	Acknowledges P840.A3 1-1 '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.

<b>Event No. 6</b>		
	ATC	<p>Announces 'Listen up for the scram report and:</p> <ul style="list-style-type: none"><li>• Places MODE switch to shutdown</li><li>• Reports APRM downscals, RPV pressure and trend, and RPV level and trend.</li><li>• Inserts IRMs and SRMs.</li><li>• Reports EOP entry on low RPV level.</li><li>• Reports all rods in.</li></ul>
	SRO	<p>Acknowledges the scram report.</p> <p>Updates crew and enters PPM 5.1.1, RPV Control, on low RPV water level and directs actions:</p> <ul style="list-style-type: none"><li>• Verify all +13" actuations.</li><li>• Maintain RPV level in band of +13 to +54 inches with feed and condensate.</li><li>• Maintain pressure 800 to 1050 psig using DEH in Automatic.</li><li>• Complete actions of PPM 3.3.1</li></ul>

<b>Event No. 6</b>		
	ATC	<p>Lines up RFW on the Startup Flow Control Valves using SOP-RFW-FCV-QC quick card:</p> <p>Step 2.1.1 – Places RFW-V-112A and RFW-V-11B C/S to close.</p> <p>Step 2.1.2 – Places RFW-V-118 C/S to open.</p> <p>Step 2.1.3 – Observes RFW-V-109 closed.</p> <p>Step 2.1.4 – Observes RFW-V-117A and RFW-V-117B open.</p> <p>Step 2.1.5 – Observes RFW-LIC-620 in Manual and at 0% output.</p> <p>Step 2.1.6 – Places both RFW pumps in MDEM – Selects MDEM and YES.</p> <p>Step 2.1.7 – Observes RFW-V-112A and RFW-V-112B are closed.</p> <p>Step 2.1.8 – Observes RFW-V-118 open.</p> <p>Step 2.1.9 – Depresses the up and/or down arrows to adjust RFW speed to establish a 200 psid across RFW-FCV-10A and 10B.</p> <p>Maintains RPV level in ordered band.</p>
<b>COMMENTS:</b>		

<b>Event No. 7</b>		
<p><b>Description:</b> Failure of Main Generator to trip when Main Turbine Trips.</p> <p>This event is active at the beginning of the scenario and is realized when the Main Turbine trips following a reactor scram.</p>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<p><b>Critical Task is to trip the Main Generator to allow the electrical plant to transfer to the Startup transformer.</b></p>		
T = 60	BOP	<p>Recognizes that the electrical plant has not transferred to Startup power.</p> <p>Observes the countdown timer on the DEH Main Display screen and recognizes it has timed out.</p> <p>Recognizes that the Main Generator has failed to trip.</p> <p>Depresses the red Unit and Overall Unit Lockout pushbuttons.</p> <p>Verifies the electric plant transferred to the Startup Transformer.</p> <p>Informs the CRS of the failure of the Main Generator to trip and that the electrical plant has successfully transferred to the Startup Transformer.</p>
<p><b>COMMENTS:</b></p>     		

<b>Event No. 8</b>		
<b>Description: LOCA</b>  The event is initiated by activating <b><u>TRIGGER 5</u></b> and is initiated after the Main Generator has been tripped.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>BOOTH OPERATOR - ACTIVATE TRIGGER 5.</b>		
T = 65	ATC/BOP	Acknowledges P601.A3 6-5 'LEAK DET DRYWELL FLOOR DRAIN FLOW HIGH' annunciator and observes rising Drywell pressure.  Reports indication of a primary leak to the CRS.  At 1.68 psig Drywell pressure, reports EOP entry condition (and other containment entries as they occur).
	SRO	Updates the crew and enters PPM 5.2.1, Primary Containment Control, and re-enters 5.1.1, RPV Control, on high drywell pressure.  Directs 1.68 psig actuations be verified.  Sets a key parameter of 2 psig Wetwell pressure.  May direct a pressure reduction to reduce the driving force of the leak.
	BOP	Verifies 1.68 psig actuations: Observes: all ECCS pumps started and minimum flow valves opened, SW-P-1A and SW-P-1B started, DG-1 and DG-2 running, GDS for containment isolation valve closure (no yellowed bordered NSSSS groups indicated).  Notes HPCS-P-1 did not start (it was manually overridden off in Event 5).  Reports actuations verified to CRS.

<b>Event No. 8</b>		
	BOP	Reports Wetwell pressure at 2 psig.
	ATC	May direct a pressure reduction to 550 psig with BPVs to reduce leak rate.
	BOP	<p>Lowers RPV pressure if directed using SOP-DEH-QC 'Main Turbine DEH Operations Quick Card'.</p> <p>Step 2.1.1a.    Select Pressure Target.</p> <p>Step 2.1.1b    Enter desired pressure.</p> <p>Step 2.1.1c    Select OK.</p> <p>Step 2.1.1d If a change in pressure rate is desired, then perform the following:</p> <ol style="list-style-type: none"> <li>1.   Select pressure rate</li> <li>2.   Enter desired pressure rate</li> <li>3.   Select OK</li> </ol> <p>Step 2.1.1e    Select GO</p> <p>Step 2.1.1f    Select Yes</p> <p>Step 2.1.1g    Verify pressure demand and throttle pressure change at the pressure rate.</p>
<p><b>COMMENTS:</b></p>          		



<b>Event No. 9</b>		
<b>Description:</b> First Wetwell spray valve opened (either RHR-V-27A or v-27B does not open).  This event is active at the beginning of the scenario and is realized when either RHR-V-27A or RHR-V-27B opening is attempted.		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
<b>Critical Task is to spray the Drywell when Wetwell pressure reaches 12 psig, prior to exceeding PSP and after verifying DSIL and RHR not required for adequate core cooling.</b>		
<b>Critical Task is to secure Drywell sprays after Drywell pressure has dropped LT 12 psig and prior to Drywell pressure reaching zero psig.</b>		
T = 70	SRO	Directs Wetwell Spray using either RHR A or B spray loops.
	BOP	Refers to SOP-RHR-SPRAY-WW-QC quick card to initiate Wetwell sprays:  Step 2.1.1 Verify RHR-P-2A(B) running. Step 2.1.2 Verify RHR-V-42A(B) closed. Step 2.1.3 Open RHR-V-27A(B) (Suppression Pool Spray)  Attempts to open RHR-V-27A(B) and recognizes it does not open.  Reports failure of RHR-V-27A(B) to open to the CRS.
<b>BOOTH OPERATOR – After the attempt to open the first Wetwell spray valve has been made, remove the malfunction on the other RHR loop’s spray valve.</b>		
	SRO	Directs Wetwell sprays on the opposite side’s RHR loop.

<b>Event No. 9</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	<p>Refers to SOP-RHR-SPRAY-WW-QC quick card to initiate Wetwell sprays:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Step 2.1.3 Open RHR-V-27A(B) (Suppression Pool Spray)</p> <p>Opens RHR-V-27A/B and reports sprays initiated with no effect on containment pressure.</p>
	SRO	<p>Directs Wetwell sprays be secured prior to Wetwell pressure reaching zero psig.</p> <p>Sets Key parameter of 12 psig in the Wetwell.</p>
	BOP	Reports Wetwell pressure at 12 psig.
	SRO	Directs RRC pumps be verified off and Drywell Cooling fans be secured.
	BOP/ATC	<p>Verifies RRC pumps off and secures the Drywell Cooling fans on back panels (bottom row of containment fans with the switches that are not in the brown area on the panel).</p> <p>Reports completion to the CRS.</p>
	SRO	Directs Drywell sprays (should be initiated on opposite loop that Wetwell sprays are on).

<b>Event No. 9</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	<p>Refers to SOP-RHR-SPRAY-DW-QC quick card and:</p> <p>Step 2.1.1 Verify RHR-P-2A(B) running.</p> <p>Step 2.1.2 Verify RHR-V-42A(B) closed.</p> <p>Step 2.1.3 Open the following to spray the drywell:</p> <p style="padding-left: 40px;">RHR-V-17A(B)</p> <p style="padding-left: 40px;">RHR-V-16A(B)</p> <p>Verifies flow to the Drywell.</p> <p>Reports Drywell sprays initiated and containment pressures decreasing.</p>
<b>BOOTH OPERATOR – After Drywell sprays have been initiated reduce leak to 0.3.</b>		
	SRO	Directs Drywell sprays be secured before Drywell pressure drops to zero psig.
	BOP/ATC	<p>Reports Main Steam Tunnel temperature alarms.</p> <p>When MSIVs close: Updates crew that MSIVs are closed and pressure control is with SRVs at 800 to 1050 psig (or the current pressure band).</p>
	SRO	<p>Directs pressure control with SRVs and gives a pressure band.</p> <p>May direct pressure reduction to 550# to reduce the leak rate.</p>

<b>Event No. 9</b>		
<b>Time</b>	<b>Position</b>	<b>Applicants Actions or Behavior</b>
	BOP	Observes Drywell and Wetwell pressures as they drop.  Prior to Drywell pressure reaching zero psig, secures drywell sprays by closing RHR-V-16A/B and RHR-V-17A/B per SOP-RHR-SPRAY-DW-QC.  Reports Drywell sprays secured to the CRS.
<b>Termination Cue: The scenario can be terminated when Drywell sprays have been secured or as directed by the scenario coordinator.</b>		
<b>COMMENTS:</b>		

## **TURNOVER INFORMATION**

Initial conditions: Reactor Power is 58%.

RFW-P-1A was removed from service for required maintenance and has just been placed back into Automatic operation.

Dittmer has requested that CB-4888 be opened to facilitate switchyard maintenance.

Turnover: Raise reactor power to 65% with flow. The reactivity brief has been completed.

When power is at 65%, open CB-4888.

## **SIMULATOR SETUP INSTRUCTIONS**

Reset to IC 200.

Place Simulator in Run.

Open InSight window from Thunderbar and display RHDC09A1 (don't change valve position).

Flag locked in annunciators.

**SCHEDULE FILE**

```
<!-- This file contains a Thunder Simulations Schedule -->
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  <ITEM row = 1>
    <TIME>1</TIME>
    <ACTION>Insert malfunction MAL-GEN001 to FAIL TO TRIP</ACTION>
    <DESCRIPTION>MAIN GENERATOR TRIP/FAIL TO TRIP</DESCRIPTION>
  </ITEM>

  <ITEM row = 2>
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    <ACTION>Insert malfunction MOV-RHR016F to FAIL_AS_IS</ACTION>
    <DESCRIPTION>RHR-V-27A SUPP POOL SPRAY</DESCRIPTION>
  </ITEM>

  <ITEM row = 3>
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    <ACTION>Insert malfunction MOV-RHR017F to FAIL_AS_IS</ACTION>
    <DESCRIPTION>RHR-V-27B SUPP POOL SPRAY</DESCRIPTION>
  </ITEM>

  <ITEM row = 4>
    <ACTION>Insert malfunction MOV-CSS001F to FAIL_AUTO_CLOSE</ACTION>
    <DESCRIPTION>HPCS-V-1 PUMP SUCTION FROM CST</DESCRIPTION>
  </ITEM>

  <ITEM row = 5>
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    <EVENT>1</EVENT>
    <ACTION>Insert malfunction CNH-CRD001E to 100 on event 1</ACTION>
    <DESCRIPTION>CRD-FC-600 FLOW CONTROL (M/A STATION) AUTO OUTPUT</DESCRIPTION>
  </ITEM>

  <ITEM row = 6>
    <TIME>1</TIME>
    <EVENT>2</EVENT>
    <ACTION>Insert malfunction BST-PCN009F to SPURIOUS_TRIP on event 2</ACTION>
    <DESCRIPTION>HPCS-LS-2B</DESCRIPTION>
  </ITEM>
```

```
<ITEM row = 7>
  <TIME>1</TIME>
  <EVENT>3</EVENT>
  <ACTION>Insert override IND-RRS084A to -150 on event 3</ACTION>
  <DESCRIPTION>MS-LI-200A METER</DESCRIPTION>
</ITEM>

<ITEM row = 8>
  <TIME>1</TIME>
  <EVENT>3</EVENT>
  <ACTION>Insert malfunction BST-RRS124F to SPURIOUS_TRIP on event 3</ACTION>
  <DESCRIPTION>MS-LS-200A ISOL GP 1</DESCRIPTION>
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<ITEM row = 9>
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  <EVENT>4</EVENT>
  <ACTION>Insert malfunction AOV-FWH060F to FAIL_AS_IS on event 4</ACTION>
  <DESCRIPTION>HD-LCV-9A2 HD-TK-1A LEVEL CONTROL DUMP VLV</DESCRIPTION>
</ITEM>

<ITEM row = 10>
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  <EVENT>4</EVENT>
  <ACTION>Insert malfunction AOV-FWH059F to FAIL_AS_IS on event 4</ACTION>
  <DESCRIPTION>HD-LCV-9A1 HD-TK-1A LEVEL CONTROL VALVE</DESCRIPTION>
</ITEM>

<ITEM row = 11>
  <TIME>1</TIME>
  <EVENT>5</EVENT>
  <ACTION>Insert malfunction MAL-RRS004A to 0.9 on event 5</ACTION>
  <DESCRIPTION>RECIRC LINE RUPT</DESCRIPTION>
</ITEM>

</SCHEDULE>
```



Facility: Columbia				Date of Exam: 4/24/15				Operating Test No.: 1										
A P P L I C A N T	E V E N T  T Y P E	Scenarios												T O T A L	M I N I M U M <sup>(*)</sup>			
		1			2			3			4							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P					
																R	I	U
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/> U1, U2	RX													0	1	1	0	
	NOR													0	1	1	1	
	I/C							2,4,6			3,4,8			6	4	4	2	
	MAJ							5,8			5			3	2	2	1	
	TS							2,3			3,4			4	0	2	2	
RO <input type="checkbox"/> R1, R4 <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX										2		1	1	1	0		
	NOR									1			1	1	1	1		
	I/C									6,7		4,6	4	4	4	2		
	MAJ									5,8		5	3	2	2	1		
	TS												0	0	2	2		
RO <input type="checkbox"/> R2, R3 <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U	RX							4					1	1	1	0		
	NOR											1	1	1	1	1		
	I/C							2,6				3,6,7	5	4	4	2		
	MAJ							5,8				5	3	2	2	1		
	TS												0	0	2	2		
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> I1, I4 <input type="checkbox"/> SRO-U	RX							4					1	1	1	0		
	NOR					1							1	1	1	1		
	I/C	3,4 6,9				3		2,6					7	4	4	2		
	MAJ	7,8				5,7,8		5,8					6	2	2	1		
	TS	3,4											2	0	2	2		

Facility: Columbia			Date of Exam: 4/24/15			Operating Test No.: 1												
A P P L I C A N T	E V E N T  T Y P E	Scenarios																
		1			2			3			4			T O T A L	M I N I M U M <sup>(*)</sup>			
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P					
															R	I	U	
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> <b>I2, I5</b> SRO-U <input type="checkbox"/>	RX		1												1	1	1	0
	NOR									1					1	1	1	1
	I/C		3		3,5 8					6,7					6	4	4	2
	MAJ		7,8		5,7 8					5,8					6	2	2	1
	TS				2,3										2	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> <b>I3, I6</b> SRO-U <input type="checkbox"/>	RX					4									1	1	1	0
	NOR			2											1	1	1	1
	I/C			4,8		2,5, 6,8		2,4,6							9	4	4	2
	MAJ			7,8		5,7,8		5,8							6	2	2	1
	TS							2,3							2	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> <b>I7, I10</b> SRO-U <input type="checkbox"/>	RX											2			1	1	1	0
	NOR						1								1	1	1	1
	I/C	3,4, 6,9					3					4,6			7	4	4	2
	MAJ	7,8					5,7,8					5			5	2	2	1
	TS	3,4													2	0	2	2
RO <input type="checkbox"/> SRO-I <input type="checkbox"/> <b>I8, I11</b> SRO-U <input type="checkbox"/>	RX		1												1	1	1	0
	NOR												1		1	1	1	1
	I/C		3		3,5 8								3,6,7		7	4	4	2
	MAJ		7,8		5,7 8								5		5	2	2	1
	TS				2,3										2	0	2	2

Facility: Columbia			Date of Exam: 4/24/15			Operating Test No.: 1												
A P P L I C A N T	E V E N T  T Y P E	Scenarios												T O T A L	M I N I M U M(*)			
		1			2			3			4							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P					
																R	I	U
RO <input type="checkbox"/>	RX					4									1	1	1	0
	NOR			2											1	1	1	1
SRO-I <input type="checkbox"/> I9, I12	I/C			4,8		2,5 6,8						3,4,8			9	4	4	2
SRO-U <input type="checkbox"/>	MAJ			7,8		5,7,8						5			5	2	2	1
	TS											3,4			2	0	2	2

## Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO additionally serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
2. Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (\*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.

Facility: Columbia		Date of Examination: April 2015		Operating Test No.: 1												
Competencies	APPLICANTS															
	U1 , U2				R1 , R4				R2 , R3				I1 , I4			
	RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions			2,3 4,5 6,8 9	4,5 6,8 9			3,5 6,7 9	4,6			2,4 6 8	3,4 6,7 8	3,4 6,7 8	3,7 8	2,4 6	
Comply With and Use Procedures (1)			2,4 5,8 9	4,5 6,8 9			1,5 6,7 8,9	4,5 6			2,4 8,9	6,7 9	3,4 5,6 7,8	3,7 8	2,4	
Operate Control Boards (2)							1,6 7,8 9	2,4 5,6			2,4 6 9	1,3 6,7 9		1,3 7,8	2,4 6	
Communicate and Interact			2,3 4,5 6,8 9	4,5 6,8 9			5,8 9	4,5 6			2,4 6	3,5 6,8	4,6 7,8 10	3,7 8	2,4 6	
Demonstrate Supervisory Ability (3)			2,4 5,6 8,9	4,5 6,8 9									4,5 7,8 10			
Comply With and Use Tech. Specs. (3)			2,3	3,4									3,4			
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.																

Facility: Columbia		Date of Examination: April 2015		Operating Test No.: 1												
Competencies	APPLICANTS															
	I2 , I5				I3 , I6				I7 , I10				I8 , I11			
	RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	3,6 7	3,4 5,6 7,8	3,5 6,7 9		4,5 8,9 10	2,4 5,7 8	2,3 4,5 6,8 9		3,4 6,7 8	3,7 8		4,6	3,6 7	3,4 5,6 7,8		3,4 6,7 8
Comply With and Use Procedures (1)	3,6 7	3,5 7,8	1,5 6,7 8,9		4,6 9 10	2,4 7,8	2,4 5,8 9		3,4 5,6 7,8	3,7 8		4,5 6	3,6 7	3,5 7,8		6,7 8,9
Operate Control Boards (2)	1,3 6,7		1,6 7,8 9		2,4 8 10	4,7 8				1,3 7,8		2,4 5,6	1,3 6,7			1,3 6,7 9
Communicate and Interact	3,6 7	3,4 5,7 8	5,8 9		4,5 6,9 10	4,5 6,8	2,3 4,5 6,8 9		4,6 7,8 10	3,7 8		4,5 6	3,6 7	3,4 5,7 8		3,5 6,8
Demonstrate Supervisory Ability (3)		3,4 5,6 8					2,4 5,6 8,9		4,5 7,8 10					3,4 5,6 8		
Comply With and Use Tech. Specs. (3)		2,3					2,3		3,4					2,3		
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.																

Facility: Columbia		Date of Examination: April 2015				Operating Test No.: 1										
Competencies	APPLICANTS															
	<b>I9, I12</b> RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	4,5 8,9 10	2,4 5,7 8		4,5 6,8 9												
Comply With and Use Procedures (1)	4,6 9 10	2,4 7,8		4,5 6,8 9												
Operate Control Boards (2)	2,4 8 10	4,7 8														
Communicate and Interact	4,5 6,9 10	4,5 6,8		4,5 6,8 9												
Demonstrate Supervisory Ability (3)				4,5 6,8 9												
Comply With and Use Tech. Specs. (3)				3,4												
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.																

*Instructions: Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant*