Facility: Columbia Generating Station   Date of Examination: 2/27/17

Examination Level: RO ☒ SRO ☐   Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A-1 Conduct of Operations K/A: 2.1.20 (4.6 / 4.6)	(N)(R)	PERFORM ALTERNATE POWER CALCULATION WORKSHEET Description: Determines that the Core Thermal Power Validation is satisfactory by performing PPM 9.3.1 Attachment 7.4 (Alternate Power Calculation Worksheet).
A-2 Conduct of Operations K/A: 2.1.25 (3.9 / 4.2)	(M)(P)(R)	MAIN TURBINE CHANGE OF LOAD RATE DETERMINATION Description: Determine the Main Turbine Load Change Recommendation when raising Main Turbine load from 12% to 70%.
A-3 Equipment Control K/A: 2.2.41 (3.5 / 3.9) **OPEX AR 00314141**	(N)(R)	VALIDATE FUSE INSTALLATION PER PPM 1.3.47 (RO) Description: For the RO Candidate, given circumstance requiring fuse replacement and an electrical print, determine correct replacement fuse and provide justification.
A-4 Radiation Control K/A: 2.3.7 (3.5 / 3.6)	(N)(R)	DETERMINE RWP/ALARA TASK TO USE FOR CLEARANCE TASK Description: When hanging a Clearance Order tag, determination the proper RWP and ALARA Task to sign on to to accomplish the task.

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs) **(0)**
(N)ew or (M)odified from bank (≥ 1) **(4)**
(P)revious 2 exams (≤ 1; randomly selected) **(1)**

Facility: Columbia Generating Station | Date of Examination: 2/27/17

Examination Level: RO ☐ SRO ☒ | Operating Test Number: 1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A-5 Conduct of Operations K/A: 2.1.7 (4.4 / 4.7)	(D)(R)	DETERMINE ACTION BASED ON PLANT CONDITIONS AND PROCEDURAL GUIDANCE Description: Given equipment status and an electrical bus lockout, determine required operator action based on existing plant conditions.
A-6 Conduct of Operations K/A: 2.1.25 (3.9 / 4.2)	(M)(R)	DETERMINE THE OPERABILITY OF THE SLC SYSTEM Description: Given OSP-INST-H101 (Shift and Daily Instrument Checks for Modes 1, 2 & 3), and CSP-SLC-M101 (Chemistry SLC Surveillance), determine the operability status of the Standby Liquid Control (SLC) System.
A-7 Equipment Control K/A: 2.2.41 (3.5 / 3.9) **OPEX AR 00314141**	(N)(R)	VALIDATE FUSE INSTALLATION PER PPM 1.3.47 (SRO) Description: For the SRO Candidate, given circumstance requiring fuse replacement and an electrical print, validate that the correct replacement fuse was chosen and provide justification.
A-8 Radiation Control K/A: 2.3.11 (3.8 / 4.3)	(D)(P)(R)	ESTIMATE MAIN CONDENSER AIR EJECTOR GROSS GAMMA ACTIVITY RATE AND DETERMINE ACTIONS Description: Estimate Main Condenser air ejector Gross gamma activity rate and determine that a reactor power reduction is required to maintain Main Condenser Gross activity LT the LCO 3.7.5 limit.
A-9 Emergency Plan K/A: 2.4.41 (2.9 / 4.6)	(M)(R)	COMPLETE CLASSIFICATION NOTIFICATION FORM (CNF) FOR SAE Description: Given a dose projection printout, classify the event and complete Classification Notification Form. **(Time Critical)**

NOTE:	**All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).**
* Type Codes & Criteria:	(C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 4 for SROs) **(2)** (N)ew or (M)odified from bank (≥ 1) **(3)** (P)revious 2 exams (≤ 1; randomly selected) **(1)**

JPM A-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR INITIAL TRAINING
COURSE TITLE	ADMIN JOB PERFORMANCE MEASURE
LESSON TITLE	PERFORM ALTERNATE POWER CALCULATION WORKSHEET (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	A-1	Rev. No.	2
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	01/31/17
REVISED BY	Dave E. Crawford	DATE	02/09/17

TECHNICAL REVIEW BY:		DATE	
INSTRUCTIONAL REVIEW BY:		DATE	
APPROVED BY:	Operations Training Manager	DATE	

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

Setup Instructions:

Print a copy of Attachment 7.4, Alternate Power Calculation Worksheet, from PPM 9.3.1, Manual Core Heat Balance.

Have a calculator available.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: Calculator

Safety Items: None

Task Number:

Validation Time: 15 minutes

Alternate Path: No

Time Critical: No

PPM Reference: PPM 9.3.1 Rev 15

Location: Any

NUREG 1123 Ref: 2.1.20 4.6 / 4.6

Performance Method: Perform

Task Standard:

Determine that the Core Thermal Power Validation is satisfactory by properly calculating CTP_{TFSP} to be between 87.6% and 87.7% ($\geq$ 87.6% and $\leq$ 87.7%) and determining that $CTP_{CALC} - CTP_{TFSP}$ is $\leq$ 2%.

INITIAL CONDITIONS:	A Manual Core Heat Balance was performed in accordance with PPM 9.3.1, Manual Core Heat Balance. The following parameters are provided to you from PPM 9.3.1, Attachment 7.1, DATA Collection Form, and PPM 9.3.1, Attachment 7.2, Calculation of Reactor Core Power. • CTP_{CALC} = 87.6% • MS-PI-20B (Turbine First Stage Pressure)(line 13c of attachment 7.1) = 559.2 psig • B041 (Total Steam Flow)(line 14b of attachment 7.1) = 12.9 Mlb/hr
INITIATING CUE:	You have been directed to perform PPM 9.3.1 Attachment 7.4, Alternate Power Calculation Worksheet, in order to validate the calculation. Select answer below and return sheet to examiner when task is complete.

JPM Start Time: _____________

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	1	Step 1 Record the Percent Core Thermal Power calculated on Attachment 7.2 line 27.	Records CTP_{CALC} (**87.6%**)		S / U
	2	Step 2 If the calculated percent CTP is GT 96% then plot the calculated percent CTP on the following figure as a function of the Turbine First Stage Pressure computer point X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c.	Recognizes that CTP is less than 96% and **N/A**s the step.		S / U
	3	Step 3 If the calculated percent CTP is GT 96% and is within the acceptable area then the CTP validation is satisfactory.	Recognizes that CTP is less than 96% and **N/A**s the step.		S / U

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	Step 4 If the calculated CTP is LE 96% then complete the following calculation to calculate the expected percent CTP based on the Turbine First Stage Pressure computer point X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c.	Substitutes turbine first stage pressure provided in the initial conditions into the formula (MS-PI-20B): CTP_{TFSP} = 11.7 + (0.1358 * **559.2**) Determines that: CTP_{TFSP} = **87.64%** Determines that: CTP_{CALC} (87.6%) **–** CTP_{TFSP} (87.64%) = **-0.04%**.	Accept value within the range of **87.6%** to **87.7%** for CTP_{TFSP}. (≥ 87.6% and ≤ 87.7%)	S / U*
	5	Step 5 If the calculated percent CTP is GT 20% and LT 30% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 7%. If the difference is within 7% then the CTP validation is satisfactory.	Recognizes that power is higher than 30% and **N/As** the step.		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	6	Step 6 If the calculated percent CTP is GE 30% and LE 96% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 2%. If the difference is within 2% then the CTP validation is satisfactory.	Identifies that the calculated value is within the required band as follows: CTP_{CALC} (87.6%) – CTP_{TFSP} (87.64%) = **-0.04%**. Determines that -0.04% is within the required 2% difference.		S / U*

Termination Criteria: Student hands completed Student JPM Answer Sheet to the examiner.

JPM Stop Time: _____________

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM:

Examinee (Please Print): ____

Evaluator (Please Print): ____

Task Standard:

Determine that the Core Thermal Power Validation is satisfactory by properly calculating CTP_{TFSP} to be between 87.6% and 87.7% (≥ 87.6% and ≤ 87.7%) and determining that $CTP_{CALC} - CTP_{TFSP}$ is ≤ 2%.

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

COMMENTS:

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Evaluator's Signature: ___________________________ Date: _________________________

Initial Conditions:

A Manual Core Heat Balance was performed in accordance with PPM 9.3.1, Manual Core Heat Balance.

The following parameters are provided to you from PPM 9.3.1, Attachment 7.1, DATA Collection Form, and PPM 9.3.1, Attachment 7.2, Calculation of Reactor Core Power.

- CTP_{CALC} = 87.6%
- MS-PI-20B (Turbine First Stage Pressure)(line 13c of attachment 7.1) = 559.2 psig
- B041 (Total Steam Flow)(line 14b of attachment 7.1) = 12.9 Mlb/hr

Initiating Cue:

You have been directed to perform PPM 9.3.1 Attachment 7.4, Alternate Power Calculation Worksheet, in order to validate the calculation.

Select answer below and return sheet to examiner when task is complete.

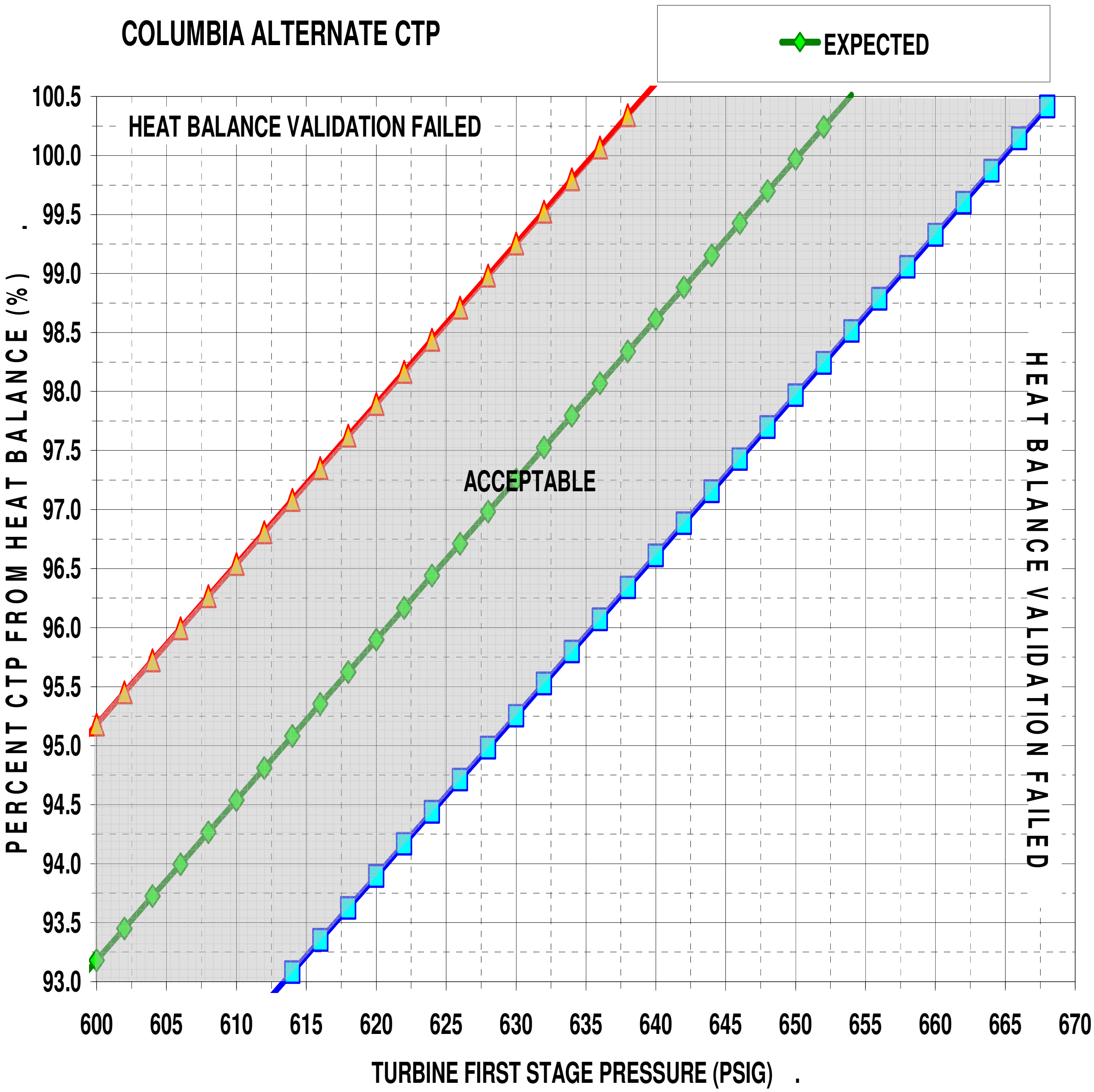
CTP validation **was / was not** (circle one) satisfactory.

ALTERNATE POWER CALCULATION WORKSHEET

1. Record the Percent Core Thermal Power calculated on Attachment 7.2 line 27. Initial

   CTP_{CALC} = Calculated Percent Core Thermal Power = 87.6%

2. If the calculated percent CTP is GT 96% then plot the calculated percent CTP on the following figure as a function of the Turbine First Stage Pressure computer point X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c. N/A



3. If the calculated percent CTP is GT 96% and is within the acceptable area then the CTP validation is satisfactory. N/A

4. If the calculated CTP is LE 96% then complete the following calculation to calculate the expected percent CTP based on the Turbine First Stage Pressure computer point X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c. Initial

   CTP_{TFSP} = 11.7 + (0.1358 * (Turbine First Stage Pressure)) = % CTP

   CTP_{TFSP} = 11.7 + (0.1358 * (559.2 psig)) = 87.64 % CTP

   $CTP_{CALC-TFSP} = CTP_{CALC} - CTP_{TFSP}$ = 87.6% - 87.64% = -0.04%

5. If the calculated percent CTP is GT 20% and LT 30% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 7%. If the difference is within 7% then the CTP validation is satisfactory. N/A

6. If the calculated percent CTP is GE 30% and LE 96% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 2%. If the difference is within 2% then the CTP validation is satisfactory. Initial

7. If the CTP validation based on the Turbine First Stage Pressure was satisfactory in the previous steps then the following steps are not required and may be marked "N/A". Initial

Candidate does not have to continue past step 7, but may elect to do so.

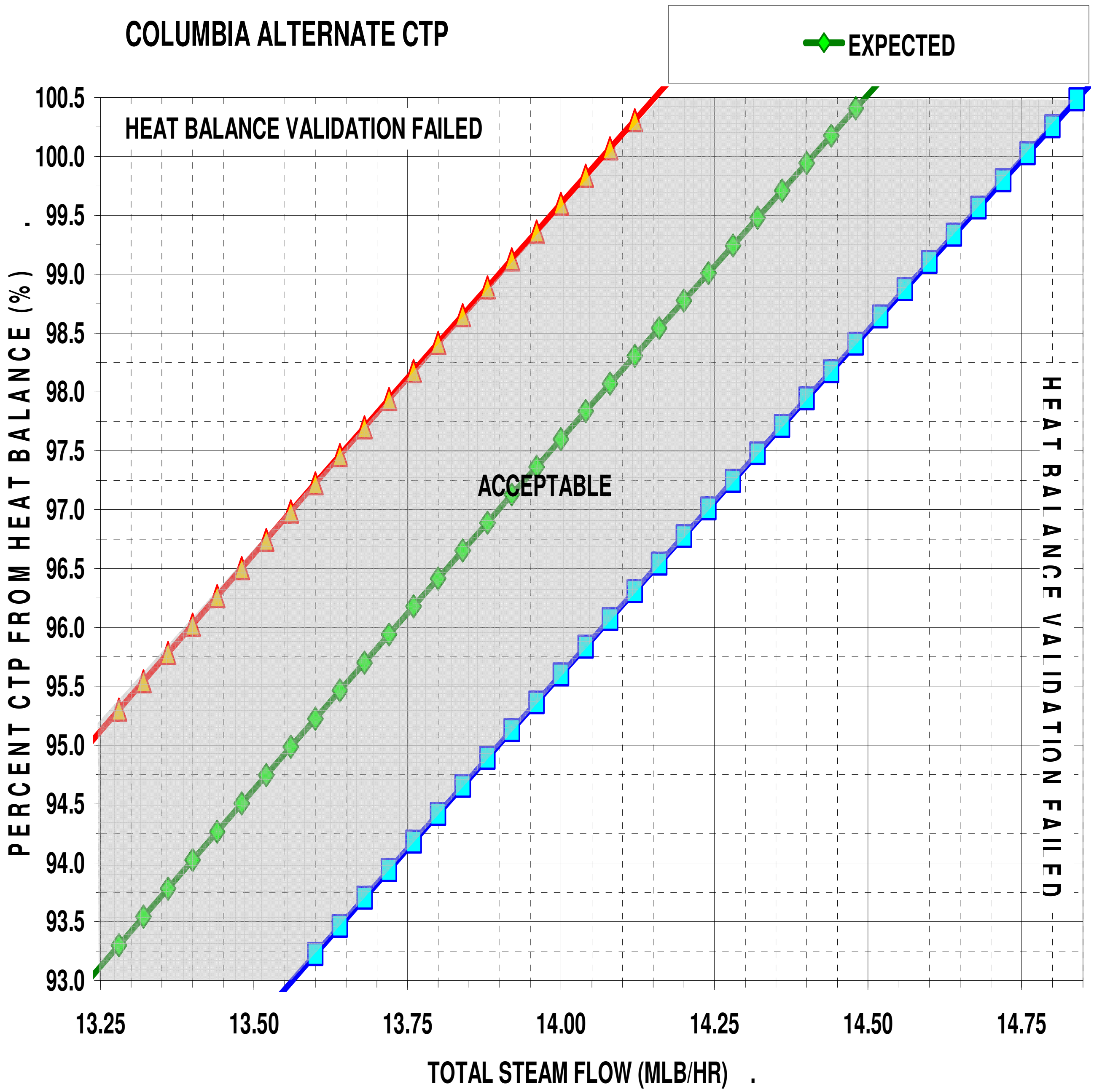
8. If the Steam Flow computer point X132 was recorded on attachment 7.1 line 14a then convert the value to MLB/HR with the following equation. N/A

   Total Steam Flow = X132 / $1x10^6$ = ______________ / $1x10^6$ = ______________ Mlb/hr

9. If the Steam Flow computer point B041 or panel indication from RFW-FR-607 was recorded on attachment 7.1 line 14b or 14c then record the value in MLB/HR below. Initial

   Total Steam Flow = □ B041 or □ RFW-FR-607 = 12.9 Mlb/hr

10. If the calculated percent CTP is GT 96% then plot the calculated percent CTP on the following figure as a function of the Total Steam Flow recorded above. N/A



11. If the calculated percent CTP is GT 96% and is within the acceptable area then the CTP validation is satisfactory. N/A

12. If the calculated CTP is LE 96% then complete the following calculation to calculate the expected percent CTP based on the Total Steam Flow from lines 2 or 3. Initial

CTP_{ws} = -4.6 + (8.7 * (Total Steam Flow)) – (0.1 * (Total Steam Flow)^2) = % CTP

CTP_{ws} = -4.6 + (8.7 * (12.9)) – (0.1 * (12.9)^2) = 90.99 % CTP

$CTP_{CALC-WS}$ = CTP_{CALC} - CTP_{ws} = 87.6% - 90.99% = -3.39%

13. If the calculated percent CTP is GT 20% and LT 30% then verify the difference between the calculated percent CTP and the Steam Flow expected percent CTP is LE to 5%. If the difference is within 5% then the CTP validation is satisfactory. N/A

14. If the calculated percent CTP is GE 30% and LE 96% then verify the difference between the calculated percent CTP and the Steam Flow expected percent CTP is LE to 4%. If the difference is within 4% then the CTP validation is satisfactory. Initial

> NOTE: The Alternate Power Calculations can both fail due to operation with the Feed Water Temperature reduced below the normal value. This is a normal and expected condition during FFTR operation or with a #5 or #6 Feed Water Heater out of service.

15. If the CTP validation based on the Turbine First Stage Pressure and Total Steam Flow are both NOT satisfactory then the discrepancy should be investigated to determine the cause.
    a. Review the calculations on Attachment 7.2 for potential math errors.
    b. Review the input data on Attachment 7.1 for potential input data errors.
    c. If the feed water temperature is more than 10 °F below the normal Feed Water Temperature displayed on the chart on the following page then no additional action is required. The Alternate Power Calculations are failed due to the Feed Water Temperature.

16. If the CTP validation based on the Turbine First Stage Pressure and Total Steam Flow are both NOT satisfactory and the cause cannot be determined then plant operation should be conservatively restricted until the discrepancies are justified. {P-123752}

JPM A-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: OPERATIONS TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: MAIN TURBINE CHANGE OF LOAD RATE DETERMINATION (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	A-2	Rev. No.	4
Exam PQD Code		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Ron Hayden   DATE: 10/21/14

REVISED BY: Dave E. Crawford   DATE: 02/08/17

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:

Ensure student has access to a calculator, ruler, and a copy of SOP-MT-START.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: Calculator; Clear Ruler

Safety Items: None

Task Number: RO-0325

Validation Time: 10 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: SOP-MT-START Rev. 26

Location: Any

NUREG 1123 Ref: 2.1.25 (3.9 / 4.2)

Performance Method: Perform

Task Standard:

The time needed to change main turbine load has been calculated and written in the space provided on the Student JPM Information Card and is within the range allowed. Specifically, the following must be satisfied:

- Correlated 12% to a First Stage Steam Temperature of 100°F (accept 95°F to 105°F)
- Correlated 70% load to a First Stage Steam Temperature of 250°F (accept 245°F to 255°F)
- Calculated the temperature difference (250°F - 100°F) to be 150°F (accept 140°F to 160°F)
- Plotted First Stage Steam Temperature Change to Time to Change Load-Hours using the 20,000 cycles curve and determined that the time to change load is 1.1 hours (accept a range of 1.05 to 1.20 hours/63 to 72 minutes).

JPM CHECKLIST

INITIAL CONDITIONS:	Columbia is in the process of starting up. The Main Turbine is on the line and is currently 12% loaded.
INITIATING CUE:	You have been directed to determine the time required to change load from 12% to a load of 70%. 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 sheet back to the examiner.

*** Items are Critical Steps**

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: ______________					
	1		Refers to Attachment 6.1 of SOP-MT-START.		S / U
	2	SOP-MT-START Attachment 6.1	Referred to example at bottom of Attachment 6.1 to determine use of graphs: • Percent Rated Load vs. First Stage Temp Change • Time to change Load vs. First Stage Temp Change		S / U
	3		Correlated 12% load to a First Stage Steam Temperature of 100°F (accept 95°F to 105°F).	Accept a range of 95° to 105°	S / U *
	4		Correlated 70% load to a First Stage Steam Temperature of 250°F (accept 245°F to 255°F).	Accept a range of 245° to 255°	S / U *
	5		Calculated the temperature difference (250°F - 100°F) to be 150°F (accept 140°F to 160°F).	Accept a range of 140° to 160°	S / U *
	6		Plotted First Stage Steam Temperature Change to Time to Change Load-Hours using the 20,000 cycles curve and determined that the time to change load is 1.1 hours.	Accept a range of 1.05 hours to 1.2 hours (63 to 72 minutes)	S / U *
Termination Criteria: Student hands completed JPM Information Card to the examiner.					
JPM Stop Time:______________					

Time	Step	Task Element	Performance Standard	Evaluator's Cue	Results
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM:

Examinee (Please Print): ____

Evaluator (Please Print): ____

Task Standard:
The time needed to change main turbine load has been calculated and written in the space provided on the Student JPM Information Card and is within the range allowed. Specifically, the following must be satisfied:

- Correlated 12% to a First Stage Steam Temperature of 100°F (accept 95°F to 105°F)
- Correlated 70% load to a First Stage Steam Temperature of 250°F (accept 245°F to 255°F)
- Calculated the temperature difference (250°F - 100°F) to be 150°F (accept 140°F to 160°F)
- Plotted First Stage Steam Temperature Change to Time to Change Load-Hours using the 20,000 cycles curve and determined that the time to change load is 1.1 hours (accept a range of 1.05 to 1.20 hours).

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

COMMENTS:

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Evaluator's Signature: ___________________________ Date: _________________________

STUDENT JPM INFORMATION CARD

Initial Conditions:

Columbia is in the process of starting up. The Main Turbine is on the line and is currently 12% loaded.

Initiating Cue:

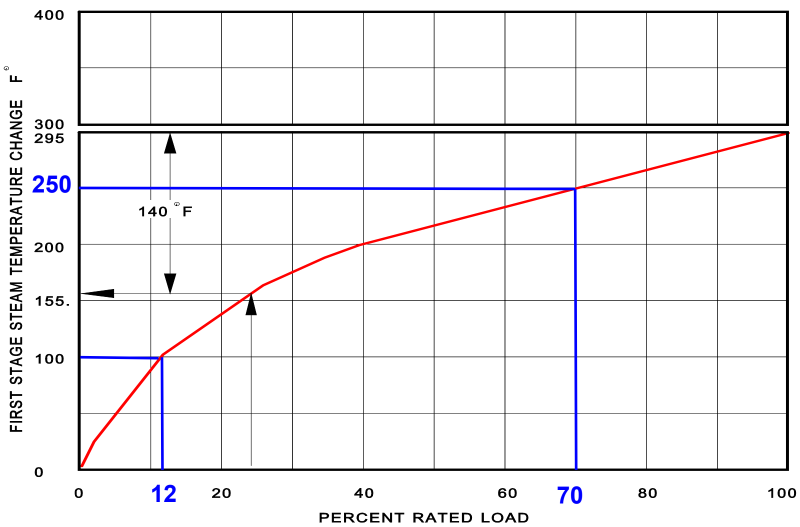
You have been directed to determine the time required to change load from 12% to a load of 70%.

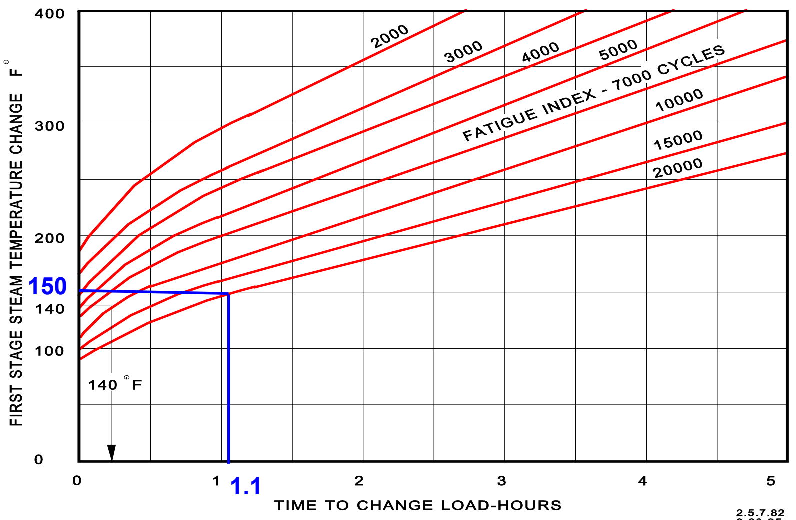
Assume a fatigue index of 20,000 cycles.

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

The time required to change load from 12% to 70% is: ____________________

LOAD CHANGING RECOMMENDATIONS (HPT FIRST STAGE TEMP CHANGE)





CT-23813-A

<u>EXAMPLE</u> (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.

<u>PROCEDURE</u>

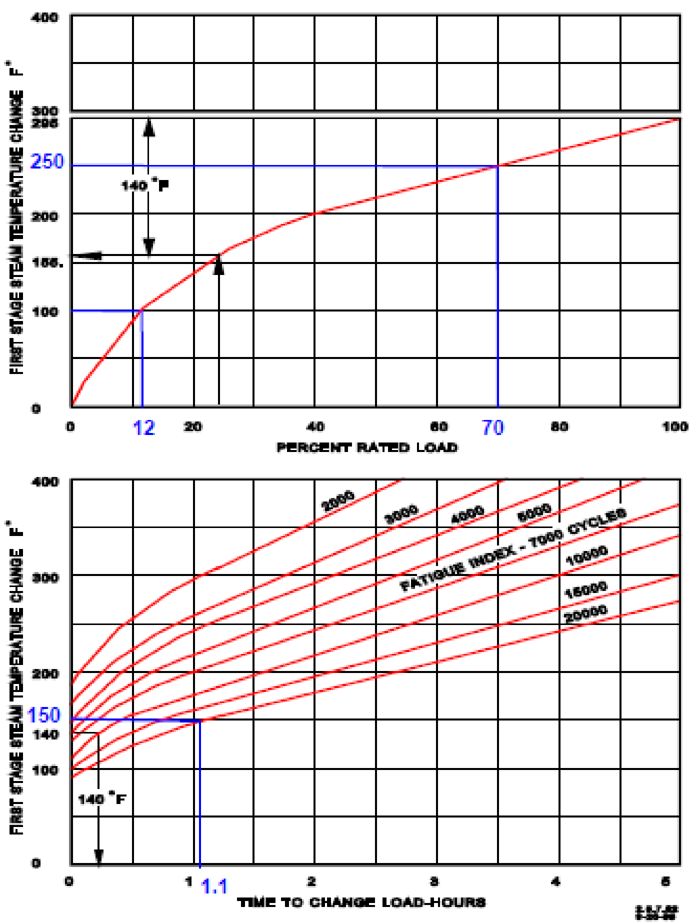
Enter Figure 1 at 25% load and 100% load and determine from curve the first stage temperature change from 0 to 25% load to be 155° F and from 0 to 100% load to be 295° F. By subtracting the 0-25% temperature change from the 0-100% change, the first stage temperature change that occurs in raising load from 25% to 100% is 295° - 155° =140° 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 min.= 6%/min.

END

JPM KEY

LOAD CHANGING RECOMMENDATIONS (HPT FIRST STAGE TEMP CHANGE)



CT-23813-A

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° - 155° =140° 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 min.= 6%/min.

END

JPM A-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	VALIDATE FUSE INSTALLATION PER PPM 1.3.47 (RO) (Admin)

LENGTH OF LESSON 0.5 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code		Rev. No.	
JPM PQD Code	A-3	Rev. No.	2
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Steve Bruce	DATE	12/05/16
REVISED BY	Dave E. Crawford	DATE	1/30/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Obtain a cleared fuse (BUSS F10A/250V/1A) and a choice of 3 replacement fuses (BUSS F10A/250V/1A, BUSS F10A/250V/10, and BUSS F10A/250V/20A for the student to select from. Ensure the fuses look similar (same labels).

Provide a copy of EWD-15E-042 and PPM 1.3.47 (Fuse Replacement Control).

It is recommended to provide a magnifying glass to assist in reading the fuse ratings as well as containers marked with “Cleared Fuse” and “Replacement Fuse” to help them from getting mixed up for the candidate.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: Fuses (as specified above)

Safety Items: None

Task Number: RO-0570

Validation Time: 10 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: PPM 1.3.47 Rev. 11

Location: Any

NUREG 1123 Ref: 2.2.41 (3.5 / 3.9)

Performance Method: Perform

Task Standard: Student determines that the replacement fuse should be a 10A fuse and hands the correct fuse to the CRS (evaluator). The correct fuse is marked with “250V 10A” on one end and “BUSS F10A” on the other end.

JPM CHECKLIST

SETUP:	Provide the student with EWD-15E-042, PPM 1.3.47, the cleared fuse, and three choices of replacement fuses.
INITIAL CONDITIONS:	CRD-LIS-601B, MS-LIS-200B, and MS-LIS-300B have lost power. Plant conditions are now stable. EFIN troubleshooting has identified that fuse GG-F02 in H13-P611 has cleared.
INITIATING CUE:	The CRS directs you to determine the correct replacement fuse. All potential replacement fuses have come from the warehouse and have been validated for use in the plant. Inform the CRS of your decision by completing the Student JPM Information Card provided with justification of your answer and by handing the CRS (evaluator) the card with the correct replacement fuse.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: ___________					
	1	Evaluates EWD-15E-042.	Determines that the rating for fuse GG-F02 is 10A.		S / U *
	2	Evaluates the cleared fuse.	Determines that the cleared fuse rating is 1A. Candidate must properly read "250V 1A" portion of fuse rating and should not read "BUSS F10A" portion of rating as documented in Attachment 9.1 of PPM 1.3.47.	May not refer to cleared (blown fuse) in determining the correct fuse.	S / U

	3	Evaluates available replacement fuses by looking at the rating printed on the fuse.	Determines that the fuse marked as a 10A fuse is the correct fuse. Candidate must properly read “250V 10A” portion of fuse rating and should not read “BUSS F10A” portion of rating as documented in Attachment 9.1 of PPM 1.3.47.	May refer to PPM 1.3.47 to help identify correct fuse.	S / U *
	4	Informs the CRS.	Informs the CRS that the replacement for fuse GG-F02 should be a 10A fuse and provides the correct replacement fuse to the CRS. Candidate should provide fuse with rating of “250V 10A” to the examiner. The “BUSS F10A” defines the type of fuse, not the rating.	Evaluator may need to prompt the candidate to provide the correct replacement fuse.	S / U *
Termination Criteria: The student turns in the completed answer sheet and selected fuse for replacement to the evaluator.					
JPM Stop Time: _____________					
Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM:

Examinee (Please Print): ____

Evaluator (Please Print): ____

Task Standard: Student determines that the replacement fuse should be a 10A fuse and hands the correct fuse to the CRS (evaluator). The correct fuse is marked with "250V 10A" on one end and "BUSS F10A" on the other end.

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

COMMENTS:

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Evaluator's Signature: __________________________ **Date:** ________________________

Initial Conditions:

CRD-LIS-601B, MS-LIS-200B, and MS-LIS-300B have lost power. Plant conditions are now stable.

EFIN troubleshooting has identified that fuse GG-F02 in H13-P611 has cleared.

Initiating Cue:

The CRS directs you to determine the correct replacement fuse.

All potential replacement fuses have come from the warehouse and have been validated for use in the plant.

Inform the CRS of your decision by completing the Student JPM Answer Sheet provided with justification of your answer and by handing the CRS (evaluator) the card along with the correct replacement fuse.

STUDENT JPM ANSWER SHEET

The correct replacement fuse is: ________________

Provide your justification below:

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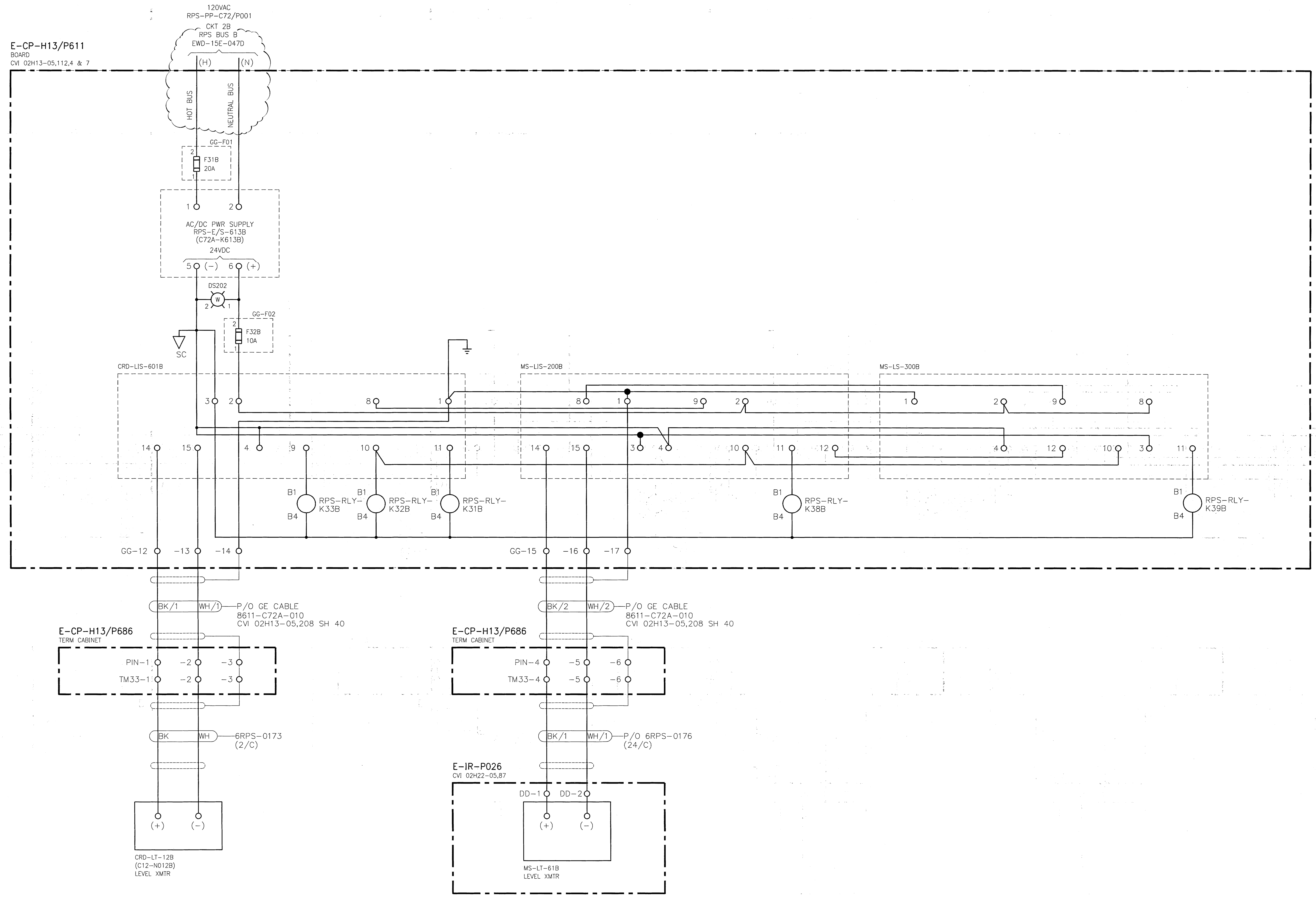


NOTES:

1. FOR GENERAL NOTES SEE EWD-15E-000.

REF DWG	DESCRIPTION
E537-9C	CONN WIRING DIAG (E-CP-H13/P686)
E539-4	CONN WIRING DIAG FOR RPS (E-IR-P026)
E539-24	CONN WIRING DIAG REACTOR INSTR & CNTL
02C72-05,3,13	RPS ELEMENTARY DIAGRAM

SAFETY RELATED

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

REV	DATE	DESCRIPTION	DWN	CHK	APVD
4	7-21-11	REDRAWN AND REVISED PER 7095-357.	HL	KB	LJK
5	11-12-12	REVISED PER 8504 (H/8-9)	GRP	[illegible]	[illegible]

SIGNATURE		DATE
APPROVED	L. J. KOSTER	7-21-11
CHECKED	K. BOOTHROYD	7-20-11
DRAWN	H. LE	05-20-11

TITLE: ELECTRICAL WIRING DIAGRAM REACTOR PROTECTION SYSTEM TRIP UNITS CRD-LT-12B & MS-LT-61B

DWG NO. EWD-15E-042

REV. 5

Verify Revision Information Prior To Use	Initials	
	Date	

Number: 1.3.47	Use Category: INFORMATION	Major Rev: 011 Minor Rev: 001 Page: 1 of 17
Title: Fuse Replacement Control		

PLANT PROCEDURES MANUAL	PCN#: N/A
1.3.47	Effective Date: 12/12/14

DESCRIPTION OF CHANGES

Justification (required for major revision)

Page(s)	Description (including summary, reason, initiating document, if applicable)
	1. Added reference to MI-1.8 Conduct of Maintenance 2. Added reference to PPM 1.3.1 OPERATING POLICIES, PROGRAMS AND PRACTICES 3. Added reference to ARCR 231072, "LPCS-FCV-11 lose position indication when opening" 4. Changed Plant Technical to Plant Technical Engineering at step 6.1.2. 5. Clarified search requirements in step 6.4.1d 6. Added instruction to retain and forward a blown fuse to the Fuse Program Engineer for evaluation, step 7.1. 7. Deleted step 7.3 "For fuses that have labels, install fuses such that the labels are visible." This step has been iincorporated in MI-1.8 Conduct of Maintenance. Changed reference to PPM 1.6.2 which has been superseded by SWP-DOC-01 and clarified exceptions for the exact fuse replacement, step 7.6
	Minor Rev 001 - Added attachment for fuse type identification; minor reformatting.

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides instructions and administrative controls necessary to assure control of Plant fuses and establish a record of fuse replacements.

2.0 DISCUSSION

2.1 This procedure governs replacement of all Plant fuses unless specifically exempted by procedure.

2.2 This procedure does not apply to removal and subsequent installation of the same fuse, per PPM 1.3.64.

2.3 Fuse replacement internal to discrete non-safety related end devices, such as CCTV cameras and CRTs, are not required to be entered on the Fuse Control Log Sheet.

2.4 Fuses may be drawn from the warehouse or Fuse Control Station. The Fuse Control Log Sheet, Attachment 9.2, is to be filled out regardless of where replacement fuses are obtained. {3.3}

2.5 Fuse replacement is allowed "one time only" per event. Subsequent events will be documented via WR, WO or CR.

3.0 REFERENCES

3.1 OER 81007A (SOER 81015) Partial Loss of DC Power {3.1}

3.2 PER 294-0526, Fuse Replacement Results in Potential Damage to Valve and Motor {3.2}

3.3 PER 297-0263, Replacement Fuses Not Documented in Fuse Control Log {3.3}

3.4 PER 297-0934, INPO OE 8637, Bussmann Fuse Failure (Type KT Fuse) {P-145869}

3.5 PER 201-0155, Fuse Replacement Without Updating EW {P-175476}

3.6 RECA AU 297-058-A, Quality Audit Report {P-144582}

3.7 PER 299-0856, Inadequate Corrective Actions - Min 20 and 30 AMP Fuses

3.8 PER 205-0502, Wrong Fuse Installed

3.9 SWP-CAP-01, Corrective Action Program

3.10 SWP-MAI-01, Work Management Process Overview

3.11 MI-1.8 Conduct of Maintenance

3.12 PPM 1.3.1 OPERATING POLICIES, PROGRAMS AND PRACTICES

3.13 CR 2-05-08774, Improper Records Retention {P-235291}

3.14 PPM 1.3.42, Troubleshooting Plant Systems and Equipment

3.15 PPM 1.3.64, Plant Clearance Orders

3.16 AR-CR 231072 LPCS-FCV-11 lost position indication when opening

3.17 AR-CR 314141 CRD-LIS-601B fuse non-conforming condition

4.0 DEFINITIONS

4.1 Fuse Control Log Sheet

Located at Fuse Control Station and Electric Shop for providing inventory control of installed fuses except as exempted from this procedure. Information on the Fuse Control Log Sheet is completed by the User/Installer of the fuse with review for completeness by the Fuse Control Station Attendant or Supervisor.

4.2 Fuse Control Station

A location designated by the Maintenance organization where fuses are stored and issued in a controlled manner. A Fuse Control Log is maintained at the Fuse Control Station and Electric Shop.

4.3 Fuse Files

Fuse Files contain the Limitations on Use and the Acceptance Tag for each fuse. The Fuse Files are located in the Fuse Control Station.

4.4 Limitations on Use

Information containing special instructions or restrictions associated with use of an item.

4.5 Replacement

In the context of this procedure, replacement is defined as removal of an existing fuse and installation of a new fuse.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Coordinate fuse replacement activity with Operations to assure that acceptable Plant status is maintained.

5.2 The steps in this procedure can be performed in any order.

5.3 Take special precautions when replacing a blown fuse. If the fuse cleared due to a fault, replacing the fuse could cause a high fault current.

5.4 Do not replace a fuse in a MOV circuit without first consulting Electrical Maintenance Supervision. {3.2}

5.5 Deenergize power circuits prior to fuse removal or installation with the following exceptions:

- Fuses may be removed or installed under load for circuits less-than 150 volts and less-than-or-equal-to 15 amps with Shift Manager's permission

- Fuses may be removed or installed under load if directed by an approved procedure or Work Request

6.0 RESPONSIBILITIES

6.1 Maintenance Manager

6.1.1 Establish the Fuse Control Station and assure completion of Fuse Control Log entries.

6.1.2 Coordinate with Plant Technical Services Engineering to facilitate quarterly technical reviews.

6.2 Fuse User/Installer

6.2.1 Perform fuse replacement under proper Plant procedures.

6.2.2 Document fuse replacement as directed by this procedure. Include information sufficient to identify the specific fuse installed.

6.3 Fuse Control Station Attendant/Supervisor

6.3.1 Review Fuse Control Log Sheets to ensure that all applicable fields are complete and maintain the fuse inventory at the fuse control station.

6.3.2 Fax or email a copy of Fuse Log to Fuse Program Engineer weekly.

6.3.3 Submit completed Fuse Log sheets to Records Control.

6.3.4 Maintain Fuse Files.

6.4 Technical Services/System Engineering (Fuse Program Engineer)

6.4.1 Retrieve and review the completed Fuse Control Log Sheets weekly to verify that Plant configuration is being maintained as designed. Perform weekly review in the following manner:

a. Collect log sheets from the Fuse Control Station.

b. Enter data from the Fuse Control Log into the master database.

c. For every fuse replacement, verify the proper fuse was installed.

d. Perform an AR search and Ops log search to ensure that there is an entry in the Fuse Log for all reported fuse replacements.

e. Search the master database of the Fuse Log for reoccurring or repeat failures.

6.4.2 Resolve recurring failures of specific fuses or other design discrepancies per applicable Plant procedures.

7.0 PROCEDURE

> **CAUTION**
>
> Fuse replacement must be coordinated with Operations to assure that acceptable Plant status is maintained.

> **CAUTION**
>
> Do not replace fuses in an MOV circuit without first consulting Electrical Maintenance Supervision. {3.2}

7.1 Replace fuses per applicable procedures. Troubleshoot per PPM 1.3.42. Rework per SWP-MAI-01 and SWP-CAP-01, if appropriate. If conditions warrant, investigate the reason for a blown fuse prior to installing a new fuse. If the reason is known (e.g., overload, short circuit, ground, bad relay coil, etc.), document it in the Additional Information section of the Fuse Control Log. If there is no apparent reason for a blown fuse, note it in the Fuse Control Log and forward the blown fuses to the Fuse Program Engineer for evaluation IAW with MI-1.8 and PPM 1.3.1. The results of the evaluation will be entered into the comments section of the fuse log. {AR-231072}

7.2 If no PMT is to be performed after fuse replacement, then check fuse continuity. It is preferred to check fuse continuity after installation, if practical. {P-144582}

7.3 If a fuse is found in a spared circuit, notify Maintenance Supervisor. Remove fuse after an engineering review has confirmed it is in a spared circuit.

7.4 Do not mix approved fuse types (for example FRS and TRS) in the same three-phase circuits or DC circuits.

7.5 Use the following to determine which fuses to replace:

- Three phase power fuses - replace all three fuses
- DC power fuses - replace both fuses
- Circuits with secondary fuses (Double Fused) - replace primary <u>and</u> secondary fuses

7.6 Obtain replacement fuse(s) from the Fuse Control Station, use attachment 9.1 as necessary to verify fuse type and rating. Replace fuse(s) with the exact type and rating as the one being replaced. If required fuse is not available from Fuse Control Station, Warehouse 75, or the main warehouse then contact Maintenance Supervisor or Technical Services/Systems Engineering for direction. Fill out Fuse Control Log Sheet, Attachment 9.2, regardless of where replacement fuse(s) is obtained. {3.1} {3.3}

7.6.1 Two exceptions to the "replace with exact type" requirement are:

a. When an As Found fuse is known to be the wrong type and/or rating, install the correct fuse based on a review of verified design documents by the Maintenance Supervisor or Technical Services/Systems Engineering. Enter drawing reference(s) on the Fuse Control Log Sheet under "Additional Information". {3.1}

b. When an “as found” fuse has been shown to be the wrong size based on the results of trouble shooting, operating experience, or review of vendor documents. In this case a fuse can be used that is different than the “as found” fuse after obtaining Engineering approval per an approved plant process. {P-175476}

In either of the above cases, replacement fuses shall be sized based on the fuse sizing criteria in design Engineering procedure EES-5. If the fuse sizing change impacts information on plant drawings the applicable drawings must be redlined in accordance with SWP-DOC-01 and an action request initiated to make the changes to the associated drawings. {P-175476}, {AR-231072}

7.7 Review and comply with the Limitations on Use for the fuse. The Limitations on Use are located in the Fuse File.

7.8 Fill out Fuse Control Log Sheet, Attachment 9.2. Complete all applicable fields.

- Fuse Control Log Reviewer or Supervisor Initials
- Load EPN
- Fuse Location
- Fuse Number, Compartment Number or Circuit Number
- Type and Rating of fuse removed (As Found)
- Type and Rating of fuse drawn from the Fuse Control Station for installation. If installed fuse was not replaced with the exact type and rated fuse per Section 7.6, record name of person who authorized substitution in Additional Information column.
- Quantity of fuses drawn for the given EPN
- WR/WO number, N/A if not applicable

- Name and Initials of Installer, Date of installation
- Additional Information, if applicable

7.9 Return the Fuse Control Log Sheet to the Fuse Control Station Attendant or Supervisor to verify all applicable fields are completed.

8.0 DOCUMENTATION

Completed Fuse Control Log Sheets satisfy all documentation requirements. Retain completed sheets in accordance with the Plant Administrative Procedures.

9.0 ATTACHMENTS

9.1 Fuse Type Identification

9.1 Fuse Log

FUSE TYPE IDENTIFICATION

IDENTIFICATION OF FUSES

Fuses have identifications printed on them. The printing on the fuse will identify the physical size, the type of fuse, and the fuse ratings.

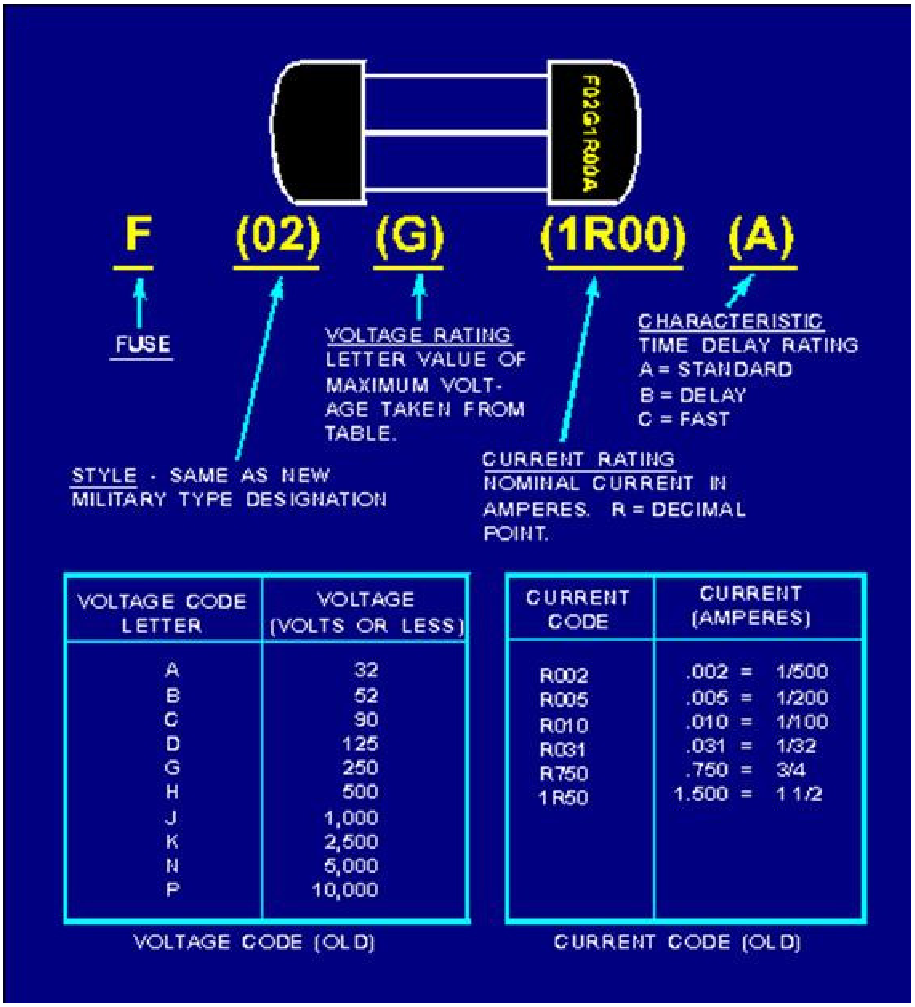
There are four different systems used to identify fuses. The systems are the old military designation, the new military designation, the old commercial designation, and the new commercial designation. All four systems are presented here, so you will be able to identify a fuse no matter which designation is printed on the fuse.

You may have to replace an open fuse that is identified by one system with a good fuse that is identified by another system. The designation systems are fairly simple to understand and cross-reference once you are familiar with them.

OLD MILITARY DESIGNATION

Figure 2-8 shows a fuse with the old military designation. The tables in the lower part of the figure show the voltage and current codes used in this system. The upper portion of the figure is the explanation of the old military designation. The numbers and letters in parentheses are the coding for the fuse shown in figure 2-8.

Figure 2-8. - Old type military fuse designation.



The old military designation always starts with "F," which stands for fuse. Next, the set of numbers (02) indicates the style.

Style means the construction and dimensions (size) of the fuse. Following the style is a letter that represents the voltage rating of the fuse (G).

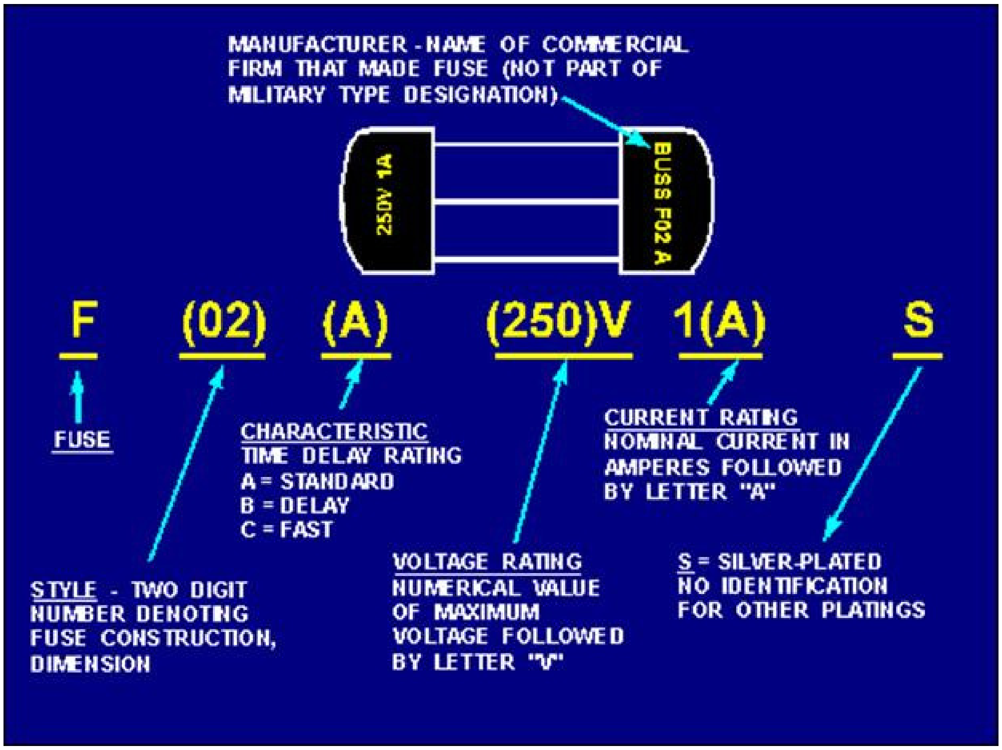
The voltage code table in figure 2-8 shows each voltage rating letter and its meaning in volts. In the example shown, the voltage ratings is G, which means the fuse should be used in a circuit where the voltage is 250 volts or less. After this is a set of three numbers and the letter "R," which represent the current rating of the fuse. The "R" indicates the decimal point. In the example shown, the current rating is 1R00 or 1.00 ampere. Some other examples of the current rating are shown in the current code table of figure 2-8. The final letter in the old military designation (A) indicates the time delay rating of the fuse.

While the old military designation is still found on some fuses, the voltage and current ratings must be "translated," since they use letters to represent numerical values. The military developed the new military designations to make fuse identification easier.

NEW MILITARY DESIGNATION

Figure 2-9 is an example of a fuse coded in the new military designation. The fuse identified in the example in figure 2-9 is the same type as the fuse used as an example in figure 2-8.

Figure 2-9. - New type military fuse designation.



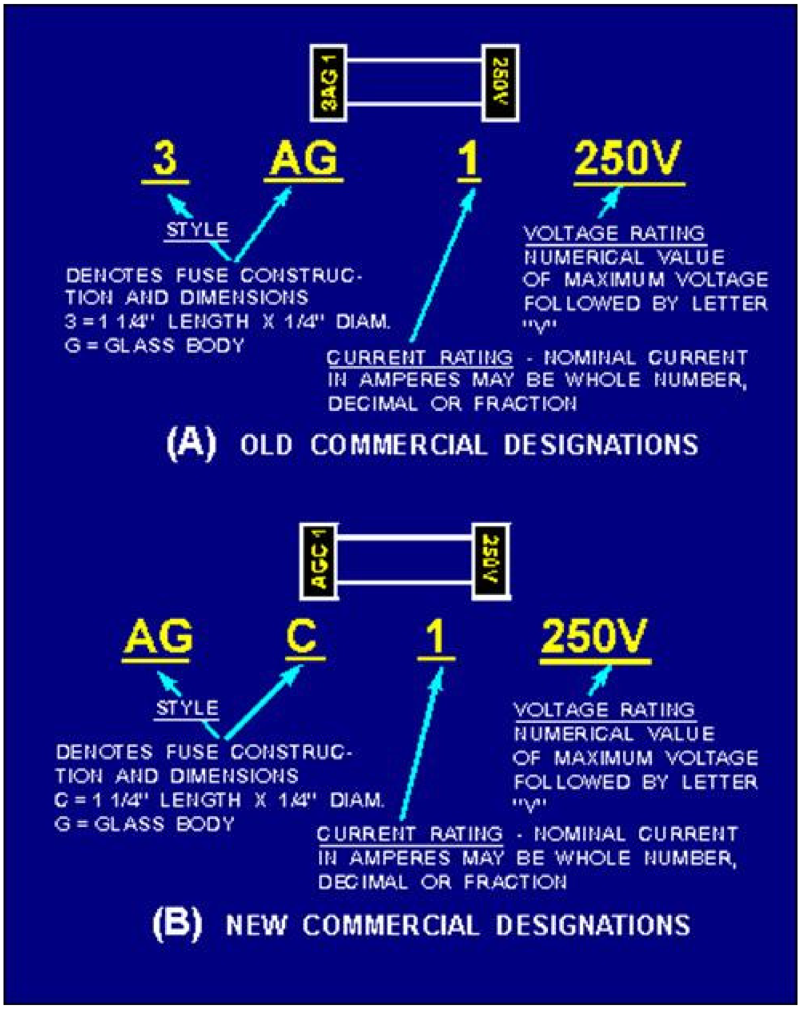
The new military designation always starts with the letter "F," which stands for fuse. The set of numbers (02) next to this indicates the style. The style numbers are identical to the ones used in the old military designation and indicate the construction and dimensions of the fuse. Following the style designation is a single letter (A) that indicates the time delay rating of the fuse. This is the same time delay rating code as indicated in the old military designation, but the position of this letter in the coding is changed to avoid confusing the "A" for standard time delay with the "A" for ampere. Following the time delay rating is the voltage rating of the fuse (250) V. In the old military designation, a letter was used to indicate the voltage rating. In the new military designation, the voltage is indicated by numbers followed by a "V," which stands for volts or less. After the voltage rating, the current rating is given by numbers followed by the letter "A." The current rating may be a whole number (1A), a fraction (1/500 A), a whole number and a fraction (1 1/2A), a decimal (0.250A), or a whole number and a decimal (1.50A). If the ferrules of the fuse are silver-plated, the current rating will be followed by the letter "S." If any other plating is used, the current rating will be the last part of the fuse identification.

As you can see, the new military designation is much easier to understand than the old military designation.

You may find a fuse coded in one of the commercial designations.

The commercial designations are fairly easy to understand and figure 2-10 shows the old and new commercial designations for the same type of fuse that was used in figures 2-8 and 2-9.

Figure 2-10. - Commercial designations for fuses:



OLD COMMERCIAL DESIGNATION

Figure 2-10, view A, shows the old commercial designation for a fuse. The first part of the designation is a combination of letters and numbers (three in all) that indicates the style and time delay characteristics. This part of the designation (3AG) is the information contained in the style and time delay rating portions of military designations.

In the example shown, the code 3AG represents the same information as the underlined portions of F02 G 1R00 A from figure 2-8 (Old Military Designation) and F02A 250VIAS from figure 2-9 (New Military Designation). The only way to know the time delay rating of this fuse is to look it up in the manufacturer's catalog or in a cross-reference listing to find the military designation. The catalog will tell you the physical size, the material from which the fuse is constructed, and the time delay rating of the fuse. A 3AG fuse is a glass-bodied fuse, 1/4 inch X 1 1/4 inches (6.35 millimeters X 31.8 millimeters) and has a standard time delay rating.

Following the style designation is a number that is the current rating of the fuse (1). This could be a whole number, a fraction, a whole number and a fraction, a decimal, or a whole number and a decimal. Following the current rating is the voltage rating; which, in turn, is followed by the letter "V," which stands for volts or less (250V).

NEW COMMERCIAL DESIGNATION

Figure 2-10, view B, shows the new commercial designation for fuses. It is the same as the old commercial designation except for the style portion of the coding. In the old commercial system, the style was a combination of letters and numbers. In the new commercial system, only letters are used. In the example shown, 3AG in the old system becomes AGC in the new system. Since "C" is the third letter of the alphabet, it is used instead of the "3" used in the old system. Once again, the only way to find out the time delay rating is to look up this coding in the manufacturer's catalog or to use a cross-reference listing. The remainder of the new commercial designation is exactly the same as the old commercial designation.

END

Fuse Control Log

Reviewer Initials	Load EPN (e.g., LPCS-P-2)	Fuse Location (e.g., MC-7B)	Fuse No, Comp No, or Ckt No. (e.g., TBL-F14)	As Found Type/Rating (e.g., TRS 25)	Replacement Type/rating (e.g., TRS 25)	(1) Qty	WR/WO No. If Applicable (N/A If Not)	New Fuse Conti-nuity Check (✓)	(3) Installer Name (Print)	Init.	Date	(2) Additional Information (e.g., If Fuse Is Not Used Then Give the Reason) or N/A if not applicable

(1) Replace all three fuses for three phase circuits, both for DC power circuits and secondary fuses where used. Do not mix fuse types.

(2) Provide additional information as necessary to enable others to locate the specific fuse replaced and review the installation for conformance to design requirements.

(3) Fuse(s) replaced with exact type and rating as the installed fuse per Section 7.0. If installed fuse was not replaced with exact type and rated fuse, identify in the Additional Information column the name of the person who authorized the substitution per Section 7.6.

END

JPM A-4

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: LICENSED OPERATOR INITIAL TRAINING

COURSE TITLE: ADMIN JOB PERFORMANCE MEASURE

LESSON TITLE: DETERMINE RWP/ALARA TASK TO USE FOR CLEARANCE TASK (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	A-4	Rev. No.	1
Exam PQD Code		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Dave E. Crawford   DATE: 01/20/17

REVISED BY: Dave E. Crawford   DATE: 02/05/17

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

Setup Instructions:

Print out copy of ATTACHMENT 1 for student use.

JPM Instructions:

Verify current procedure against JPM. If any steps have changed, the JPM should be revised.

Tools/Equipment: N/A

Task Number:

Prerequisite Training: N/A

Reference: GEN-RPP-01 R8; GEN-RPP-02 R34

NUREG 1123 Ref: 2.3.7 (3.5 / 3.6)

Safety Items: N/A

Validation Time: 8 minutes

Time Critical: No

Location: Any

Performance Method: Perform

Task Standard: Candidate fills out the Student JPM Answer Sheet to indicate that the Ops High Rad Area (HRA) RWP 30003963 is required to be signed on to under ALARA Task # 011458161008.

SURVEY MAP REDACTED

JPM CHECKLIST

INITIAL CONDITIONS:	Columbia Generating Station is shutdown for a refueling outage.
INITIATING CUE:	You have been directed by the Control Room Supervisor to hang Danger tag serial number 41020 as part of tagout D-HPCS-V-102R18-001. Health Physics has been contacted. A separate Clearance Tag Hang List was previously used to hang tag serial numbers 41014 through 41019. Review the task and from the information provided and fill out the Student JPM Answer Sheet to indicate which RWP and ALARA Task is required to be used to hang tag serial number 41020. Give the Student JPM Answer Sheet to the evaluator when complete.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: _________					
	1	Reviews the Clearance Tag Hang List to determine component to hang tag on.	Recognizes that tag SN 41020 is to be hung on the HPCS-V-4 handwheel.		S / U
	2	Reviews the Survey Map for the Reactor Building 522' areas to determine radiological conditions affecting HPCS-V-4.	Recognizes that HPCS-V-4 is located in a High Radiation Area (HRA) and that a HRA Entry RWP is required.		S / U
	3	Refers to available choice of RWPs on provided card.	Determines that HRA Entry RWP # 30003963 is needed to perform task.		S / U *

	4	Refers to available choice of ALARA Tasks under HRA Entry RWP 30003963.	Determines that ALARA Task # 011458161008 is the one to be used.		S / U *
	5	Records RWP and ALARA Task numbers to Student JPM Answer Sheet	Records RWP # 30003963 and ALARA Task # 011458161008 on answer sheet.		S / U *

Termination Criteria: Student hands completed Student JPM Answer Sheet to the examiner.

JPM Stop Time: _____________

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM:

Examinee (Please Print): ____

Evaluator (Please Print): ____

Task Standard: Candidate fills out the Student JPM Answer Sheet to indicate that the Ops High Rad Area (HRA) RWP 30003963 is required to be signed on to under ALARA Task # 011458161008.

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

<u>COMMENTS:</u>

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Evaluator's Signature: ____________________________ **Date:** __________________________

STUDENT JPM INFORMATION CARD

Initial Conditions:

Columbia Generating Station is shutdown for a refueling outage.

Cue:

- You have been directed by the CRS to hang Danger tag serial number 41020 as part of tagout D-HPCS-V-102R18-001.
- Health Physics has been contacted.
- A separate Clearance Tag Hang List was previously used to hang tag serial numbers 41014 through 41019.

Review the task and from the information provided, fill out the Student JPM Answer Sheet to indicate which RWP and ALARA Task is required to be used to hang tag serial number 41020. Provide Justification.

Give the Student JPM Answer Sheet to the evaluator when complete.

STUDENT JPM ANSWER SHEET

RWP # ________________ must be signed onto to perform task.

ALARA Task # ________________ is the one to be used.

Justification:

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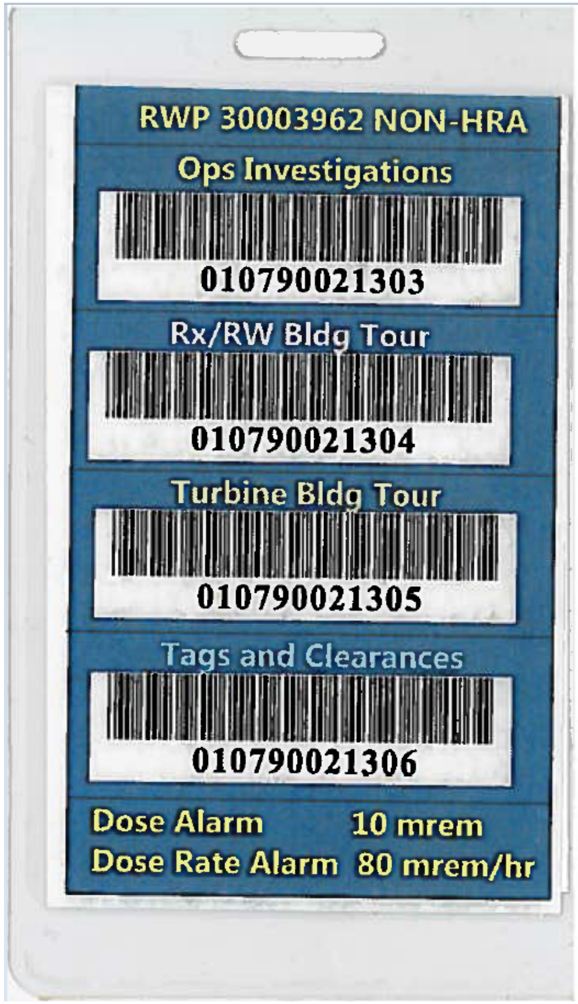
Clearance Tag Hang List
Tagout: DANGER 01
Clearance: D-HPCS-V-102R18-001 *16:08*

Tag Serial No.	Tag Type	Equipment ----- * Equipment Description * Equipment Location	Ver. Req.	Place. Seq.	Placement Configuration ----- * Notes	Placement 1st Verif Date/Time	Placement 2nd Verif Date/Time
41014	Equipment	HPCS-RMS-P/1 ----- * RMS-FOR-BKR HPCS * W -501- - -L0/13.0-MAIN CR	IV	1	AUTO AFTER STOP ----- *		
41015	Danger	E-FUSE-SM4/FU13 ----- * FUSE FOR HPCS-P-1 BKR CLOSE 15A * D -441-* - -* -SM-4	IV	2	REMOVED ----- *		
41016	Danger	E-FUSE-SM4/FU14 ----- * FUSE FOR HPCS-P-1 BKR TRIP 35A * D -441-* - -* -SM-4	IV	3	REMOVED ----- *		
41017	Danger	HPCS-CB-P1 ----- * 4160 V HPCS-P-1 BRKR * D -441-D114- -Q5/4.4 -SM-4	IV	4	RACKED OUT ----- *		
41018	Equipment	HPCS-RMS-V/4 ----- * RMS FOR HPCS-V-4 H13-P601 * W -501- - -L0/13.0-MAIN CR	IV	5	AUTO AFTER CLOSED ----- *		
41019	Danger	HPCS-42-4A5B ----- * HPCS-V-4 HPCS PUMP DISCH * D -441-D114- -Q2/4.1 -	IV	6	OFF ----- *		
41020	Danger	HPCS-V-4 ----- * Injection Line MOV * R-541-R404-.-M3/7.3	IV	7	CLOSED ----- *		

Component	Print Number
HPCS-RMS-P/1	EWD-7E-022
E-FUSE-SM4/FU13	EWD-7E-022
E-FUSE-SM4/FU14	EWD-7E-022
HPCS-CB-P1	EWD-7E-022
HPCS-RMS-V/4	EWD-7E-016
HPCS-42-4A5B	EWD-7E-016
HPCS-V-4	M520

Page 1 of 1

RWP Card (Front and Back)



JPM A-5

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	DETERMINE ACTION BASED ON PLANT CONDITIONS AND PROCEDURAL GUIDANCE (SRO)(Admin)		
LESSON LENGTH	.5 HRS		

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	A-5	Rev. No.	4
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	02/15/15
REVISED BY	Dave E. Crawford	DATE	02/07/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Have copies of ABN-CORE and ABN-RRC-LOSS available for student reference.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: None

Safety Items: None

Task Number: SRO-0659

Validation Time: 15 minutes

Alternate Path: No

Time Critical: No

PPM Reference: ABN-CORE Rev. 16;
ABN-RRC-LOSS Rev. 13

Location: Any

NUREG 1123 Ref: 2.1.7 (4.4 / 4.7)

Performance Method: Perform

Task Standard:
Determine that a reactor SCRAM is required due to operating in Region A of the Power to Flow map with the OPRM inoperable, per ABN-CORE step 3.2.

JPM CHECKLIST

INITIAL CONDITIONS	With Columbia operating at full power, a common cause failure of the OPRMs required the CRS to direct placing both OPRM Manual Enable/Bypass switches in the BYPASS position. Three hours later a lockout on SH-5 occurs. The following plant conditions are reported by CRO1: Reactor power 50%. Active loop drive flow is 27500 gpm. Rod line is 85%.
INITIATING CUE:	From the information given, determine the procedural action required. On the Student JPM Answer Sheet provided, indicate what that action is and provide the procedural reference (including step) for that action. When completed hand the Student JPM Answer Sheet back to the examiner.

*** Items are Critical Steps**

Time	Step	Element	Standard	Evaluator's Cue	Sat/Unsat
JPM Start Time: _____________					
	1	Plots operating points given.	Determines operation is now in Region A of the Single Loop Power to Flow map (using Attachment 6.1 of ABN-RRC-LOSS).		S / U *
	2	Determines required procedural action based on conditions given.	Refers to ABN-CORE (Step 3.2) and determines that a manual reactor scram is required due to operating in Region A of the Power to Flow map with the OPRMs inoperable.		S / U *
	3	Fills out answer sheet.	Indicates that a "Manual Scram" is required per ABN-CORE (Step 3.2).		S / U *
	4	Fills out answer sheet (reason).	Indicates that a scram is required because of operation in Region A of the Power to Flow map with the OPRMs inoperable.		S / U *
Termination Criteria: Student hands completed Student JPM Answer Sheet to the examiner.					
JPM Stop Time: _____________					
Transfer the following to the "Results of JPM" page: Any Unsat step(s) and JPM completion time.					

JPM RESULTS:

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: Determine that a reactor SCRAM is required due to operating in Region A of the Power to Flow map with the OPRM inoperable, per ABN-CORE step 3.2.

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

<u>COMMENTS:</u>

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Evaluator's Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION CARD

Initial Conditions:

With Columbia operating at full power, a common cause failure of the OPRMs required the CRS to direct placing the OPRM Manual Enable/Bypass switches in the BYPASS position.

Three hours later a lockout on SH-5 occurs.

The following plant conditions are reported by CRO1:

- Reactor power is 50%.
- Active loop drive flow is 27500 gpm
- Rod line is 85%

Initiating Cue:

From the information given, determine the procedural action required.

On the Student JPM Answer Sheet provided, indicate what that action is and provide the procedural reference (including step) for that action. Also include the reason for that action.

When completed hand the Student JPM Answer Sheet back to the examiner.

The action required is:

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The reason for the action is:

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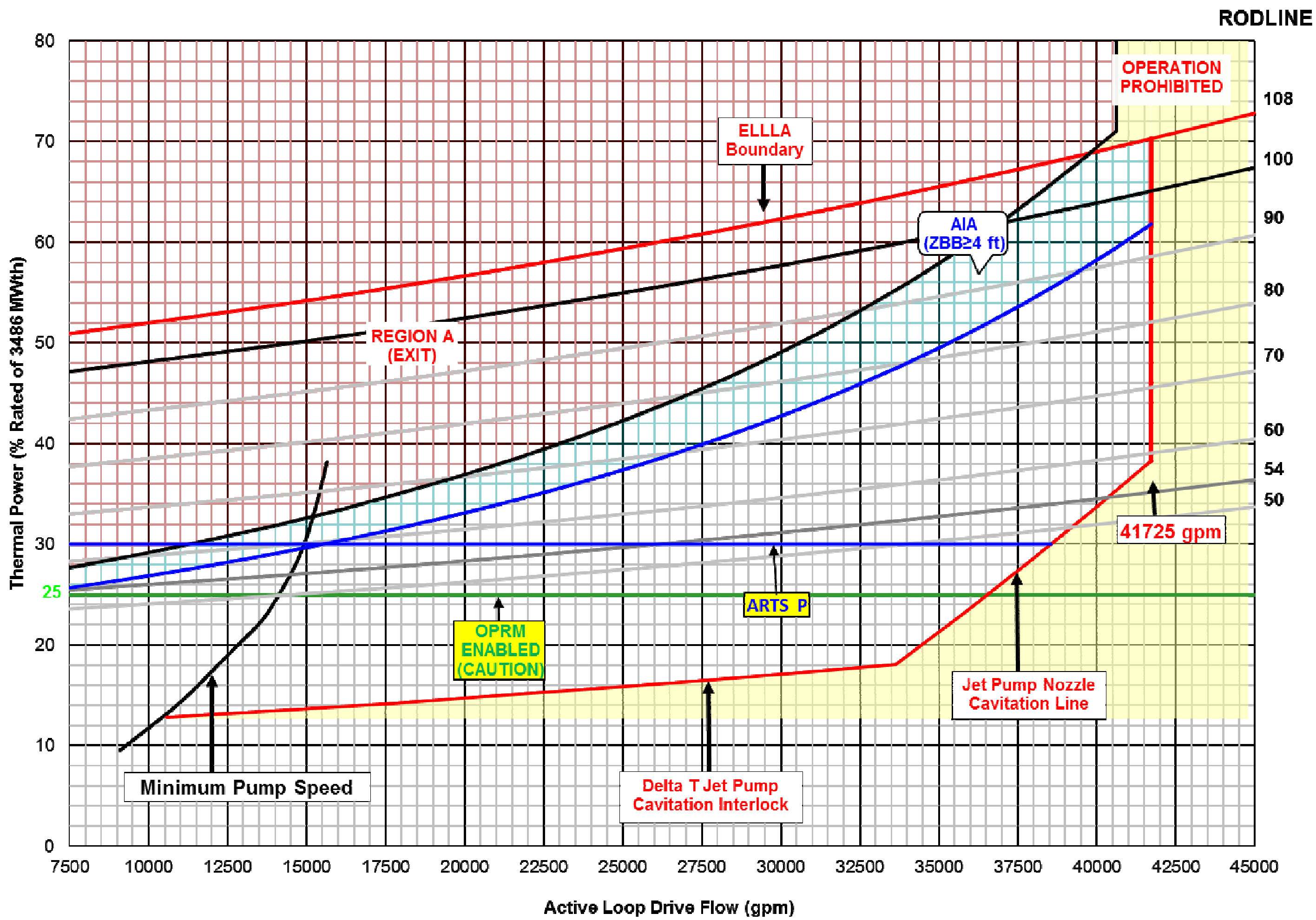
The action is per procedure/step: _______________/________

SINGLE LOOP POWER/FLOW MAP



END

Attachment 6.1, Single Loop Power/Flow Map

JPM A-6

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR/STA REQUALIFICATION TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	DETERMINE THE OPERABILITY OF THE SLC SYSTEM (SRO)(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	A-6	Rev. No.	3
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	02/03/17
REVISED BY		DATE	

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Print out a filled out copy of OSP-INST-H101. The only remaining steps of the procedure should be steps 53, 54, and 55. Print out a fully completed copy of CSP-SLC-M101 that indicates Boron Concentration of 14.3 % weight. Have both available for student reference.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

The evaluator and student will use current procedure. The evaluator should mark off steps as they are completed, note comments, and transfer the comments to the "Results of JPM" page.

Tools/Equipment: N/A

Safety Items: N/A

Task Number: SRO-0163

Validation Time: 10 Minutes

Prerequisite Training: N/A

Time Critical: No

PPM Reference: OSP-INST-H101 Rev. 86
CSP-SLC-M101 Rev. 14

Location: Any

NUREG 1123 Ref: 2.1.25 (3.9 / 4.2)

Performance Method: Perform

Task Standard:
Determine that SLC is NOT operable per step #53 of OSP-INST-H101 by graphing SLC Temperature (64°F) vs. SLC Tank Concentration (14.3 % weight) in the "Unacceptable Operation" region on Attachment 9.6.

JPM CHECKLIST

INITIAL CONDITIONS:	The plant is operating at 100% power. Chemistry added water to the SLC tank 4 hours ago and have just completed surveillance CSP-SLC-M101, Standby Liquid Control Boron Concentration Test. SLC-TIC-2 indicates 64°F SLC-LI-601, SLC-LI-1 and TDAS X077 all indicate 4900 gallons.
INITIATING CUE:	Determine SLC Operability and provide justification for your answer on this information card. Return this sheet to evaluator when complete.

*** Items are Critical Steps**

Time	Step	Element	Standard	Sat/Unsat
JPM Start Time: _____________				
	1	Reviews copy of CSP-SLC-M101.	Determines from Attachment 9.1 of CSP-SLC-M101, that SLC concentration is 14.3 weight % Boron	S / U *
	2	Reviews OSP-INST-H101 step #53.	Determines the need to use ATT. 9.6 for comparison.	S / U
	3	Reviews ATT. 9.6 of OSP-INST-H101	Determines SLC concentration/temperature is outside of the acceptable region. Refers to NOTE 4.	S / U *
	4	Reviews OPS-INST-H101 step #55.	Determines the need to use Att. 9.7 for comparison.	S / U
	5	Reviews ATT. 9.7 of OPS-INST-H101.	Determines SLC Tank volume is acceptable.	S / U

*** Items are Critical Steps**

Time	Step	Element	Standard	Sat/Unsat
	6	Fills in answer sheet.	Fills in answer sheet that SLC is NOT operable.	S / U *

Termination Criteria: Student hands completed Student JPM Answer Sheet to the examiner.
JPM Stop Time: _____________
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM:

Examinee (Please Print): ______________________________________

Evaluator (Please Print): ______________________________________

Task Standard: Determine that SLC is NOT operable per step #53 of OSP-INST-H101 by graphing SLC Temperature (64°F) vs. SLC Tank Concentration (14.3 % weight) in the "Unacceptable Operation" region on Attachment 9.6.

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

COMMENTS:

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Evaluator's Signature: _________________________ **Date:** _______________________

STUDENT JPM INFORMATION CARD

Initial Conditions:

The plant is operating at 100% power.

Chemistry added water to the SLC tank 4 hours ago and have just completed surveillance CSP-SLC-M101, Standby Liquid Control Boron Concentration Test.

SLC-TIC-2 indicates 64 °F

SLC-LI-601, SLC-LI-1 and TDAS X077 all indicate 4900 gallons.

Cue:

Determine SLC Operability and provide justification for your answer on this information card. Return this sheet to evaluator when complete.

ANSWER

The SLC System is:

☐ OPERABLE

☐ NOT OPERABLE

Justification for answer:

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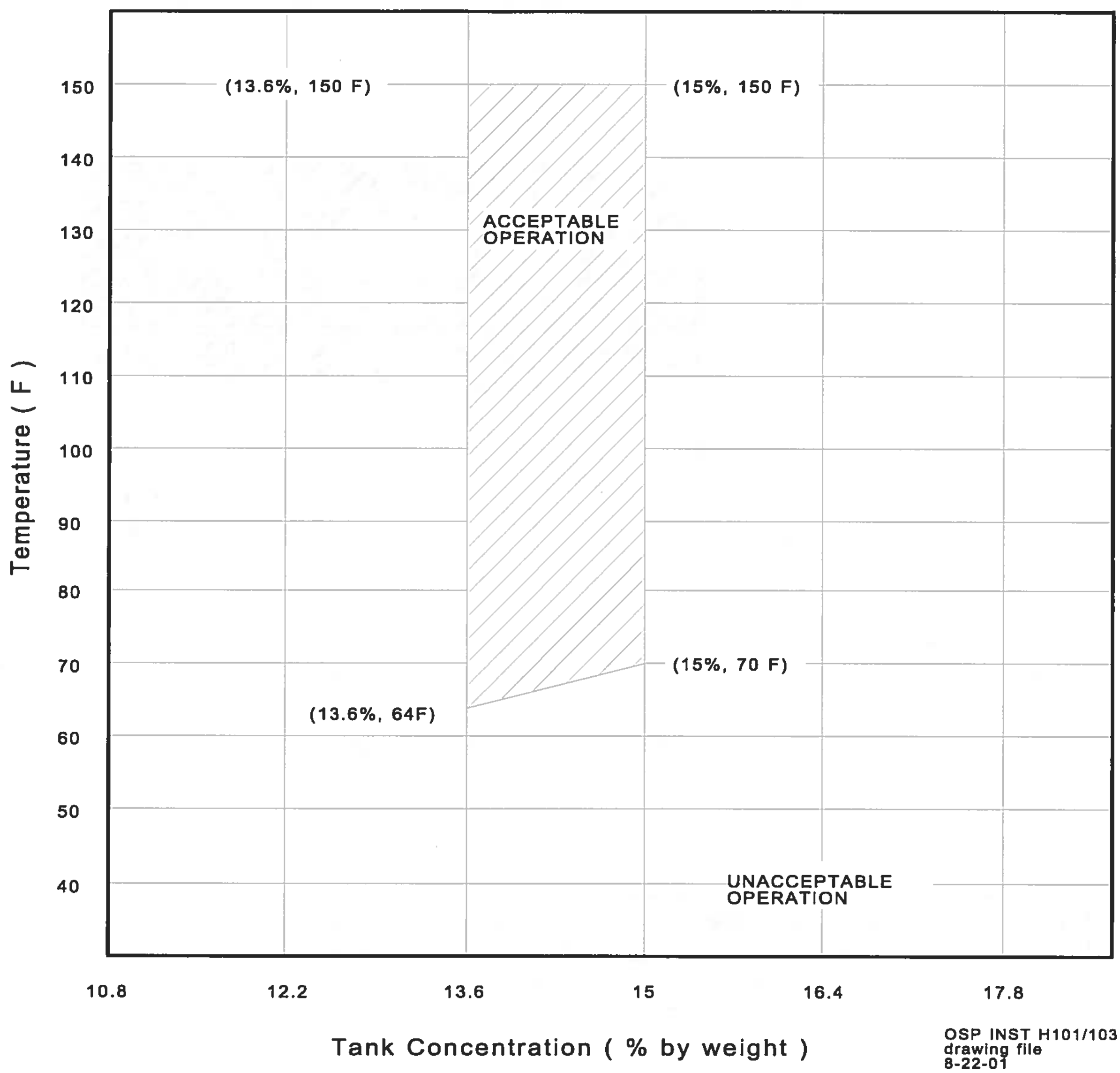
STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 50	1-2-3	Spent Fuel Pool Level	N/A	N/A	22.5	GE 22'4" over top of irradiated fuel NOTES 1 & 2 Log Values	3.7.7.1
# 51	1-2-3	SGT Operating Hours	SGT-FU-1A	Elapse Time Meter	223.8	LT 720 hours operating time. NOTE 3 Log Values	3.6.4.3.2
			SGT-FU-1B	Elapse Time Meter	157.2		
# 52	1-2-3	WMA-FU Operating Hours	MC-7F (RW 525)	WMA-FN-54A Elapse Time Meter	103.3	LT 720 hours operating time. NOTE 3 Log Values	3.7.3.2
			MC-8F (RW 525)	WMA-FN-54B Elapse Time Meter	83.5		
# 53	1-2-3	SLC Solution Temp	Local (Column N, 4.1)	SLC-TIC-2		Obtain solution concentration from Chemistry and graph results on Attachment 9.6 NOTE 4 Log Values	3.1.7.2 3.1.7.8
# 54	1-2-3 NOTES 5 & 6	SLC Storage Tank Concentration	N/A	N/A		Instruct Chemistry to verify concentration of boron is within the limits of TS Figure 3.1.7-1 Log Concentration and Initials if Notes 5 or 6 apply. Otherwise, Log N/A	3.1.7.4
# 55	1-2-3	SLC Storage Tank Volume NOTE 8	H13-P603	SLC-LI-601		Obtain solution concentration from Chemistry and graph results on Attachment 9.7 Log Values NOTE 7	3.1.7.1
			eDNA	TDAS X077			
			R548 M8/4.4 @ H22-P011	SLC-LI-1			

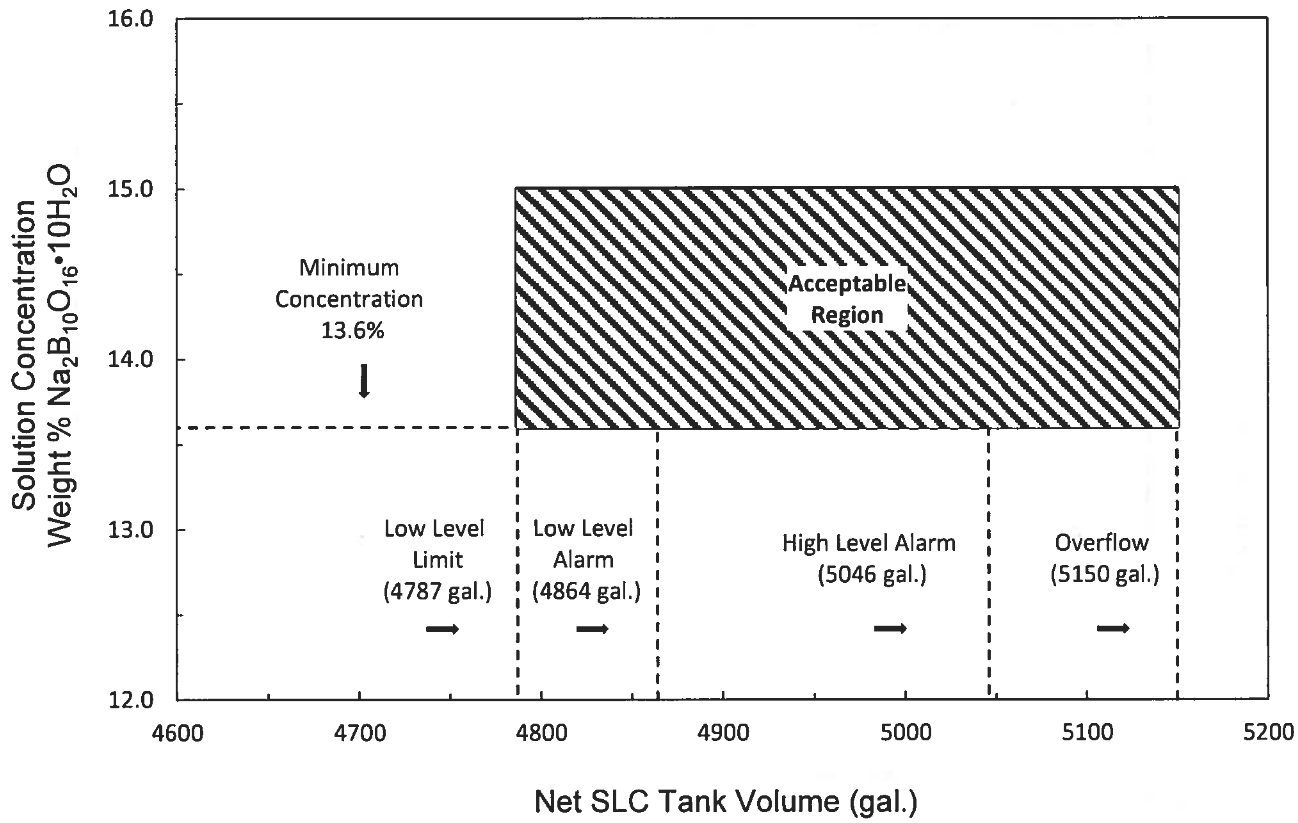
NOTE 1: Tech Spec Limit is 22' above the fuel assemblies; however, to ensure minimum level for moving irradiated fuel, 22' 4" is used as a limit.
NOTE 2: If level is LT 22' 4", then stop moving irradiated fuel.
NOTE 3: Notify Mechanical Maintenance to perform MSP-SGT-B103(4) (for SGT) and MSP-WMA-B103(4) (for WMA) at 720 hours. If 900 hours is exceeded, the associated unit should be declared inoperable due to exceeding the surveillance interval for charcoal sampling. {C-8327}
NOTE 4: If the solution temperature has fallen below the specified temperature, then declare SLC inoperable. Return the temperature to the specified band, then perform OSP-SLC-B703 within 24 hours to verify pump suction piping is not blocked.
NOTE 5: Once within 24 hours after solution temperature is restored within the limits of TS Figure 3.1.7-1. Otherwise, N/A.
NOTE 6: Once within 24 hours after water or boron is added to solution. Otherwise, N/A.
NOTE 7: If level is GT 4950 gallons, then consider sparging and heating tank per SOP-SLC-SPARGE/LEVEL to reduce level.
NOTE 8: Record all three tank levels for trending. Use SLC-LI-601 OR TDAS X077 for determining SLC solution concentration. {M-RULE AS 313942-60-01}

SODIUM PENTABORATE SOLUTION TEMPERATURE - SR 3.1.7.2



END

SODIUM PENTABORATE TANK, VOLUME vs. CONCENTRATION REQUIREMENTS - SR 3.1.7.1



NOTE:	The minimum required volume to ensure reactor shutdown is 4587 gal. The low level limit (4587 + 200 gal) includes 200 gal process margin to minimize air entrainment in the pumps.

END

ENERGY NORTHWEST

JPM A-7

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	VALIDATE FUSE INSTALLATION PER PPM 1.3.47 (SRO) (Admin)

LENGTH OF LESSON 0.5 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code		Rev. No.	
JPM PQD Code	A-7	Rev. No.	2
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Steve Bruce	DATE	12/05/16
REVISED BY	Dave E. Crawford	DATE	1/30/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Obtain a cleared fuse (BUSS F10A/250V/1A) and a choice of 3 replacement fuses (BUSS F10A/250V/1A, BUSS F10A/250V/10, and BUSS F10A/250V/20A for the student to select from. Ensure the fuses look similar (same labels).

Provide a copy of EWD-15E-042 and PPM 1.3.47 (Fuse Replacement Control).

It is recommended to provide a magnifying glass to assist in reading the fuse ratings as well as containers marked with "Cleared Fuse" and "Replacement Fuse" to help them from getting mixed up for the candidate.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: Fuses (as specified above)

Safety Items: None

Task Number: SRO-0212

Validation Time: 10 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: PPM 1.3.47 Rev. 11

Location: Any

NUREG 1123 Ref: 2.2.41 (3.5 / 3.9)

Performance Method: Perform

Task Standard: Student determines that the replacement fuse should be a 10A fuse and hands the correct fuse to the SM (evaluator). The correct fuse is marked with "250V 10A" on one end and "BUSS F10A" on the other end.

JPM CHECKLIST

SETUP:	Provide the student with EWD-15E-042 (see Attachment 1), PPM 1.3.47, the cleared fuse, and three choices of replacement fuses.
INITIAL CONDITIONS:	CRD-LIS-601B, MS-LIS-200B, and MS-LIS-300B have lost power. Plant conditions are now stable. EFIN troubleshooting has identified that fuse GG-F02 in H13-P611 has cleared.
INITIATING CUE:	The SM directs you as the FIN Team SRO to independently validate the correct replacement fuse. All potential replacement fuses have come from the warehouse and have been validated for use in the plant. Inform the SM of your decision by completing the JPM Answer Sheet provided with justification of your answer and by handing the SM (evaluator) the correct replacement fuse.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
Start Time: ____________					
	1	Evaluates EWD-15E-042 (Attachment 1).	Determines that the rating for fuse GG-F02 is 10A.		S / U *
	2	Evaluates the cleared fuse.	Determines that the cleared fuse rating is 1A. Candidate must properly read "250V 1A" portion of fuse rating and should not read "BUSS F10A" portion of rating as documented in Attachment 9.1 of PPM 1.3.47.	May not refer to cleared (blown fuse) in determining the correct fuse.	S / U

	3	Evaluates available replacement fuses by looking at the rating printed on the fuse.	Determines that the fuse marked as a 10A fuse is the correct fuse. Candidate must properly read “250V 10A” portion of fuse rating and should not read “BUSS F10A” portion of rating as documented in Attachment 9.1 of PPM 1.3.47.	May refer to PPM 1.3.47 to help identify correct fuse.	S / U *
	4	Informs the SM.	Informs the SM that the replacement for fuse GG-F02 should be a 10A fuse and provides the correct replacement fuse to the SM. Candidate should provide fuse with rating of “250V 10A” to the examiner. The “BUSS F10A” defines the type of fuse, not the rating.	Evaluator may need to prompt the candidate to provide the correct replacement fuse.	S / U *
Termination Criteria: The student turns in the completed answer sheet and selected fuse for replacement.					
JPM Stop Time: ____________					
Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM:

Examinee (Please Print): ____

Evaluator (Please Print): ____

Task Standard: Student determines that the replacement fuse should be a 10A fuse and hands the correct fuse to the SM (evaluator). The correct fuse is marked with “250V 10A” on one end and “BUSS F10A” on the other end.

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

COMMENTS:

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Evaluator's Signature: ___________________________ **Date:** _________________________

STUDENT JPM INFORMATION CARD

Initial Conditions:

CRD-LIS-601B, MS-LIS-200B, and MS-LIS-300B have lost power.

Plant conditions are now stable.

EFIN troubleshooting has identified that fuse GG-F02 in H13-P611 has cleared.

Initiating Cue:

The SM directs you as the FIN Team SRO to independently validate the correct replacement fuse.

All potential replacement fuses have come from the warehouse and have been validated for use in the plant.

Inform the SM of your decision by completing the Student JPM Answer Sheet provided with justification of your answer and by handing the SM (evaluator) the card along with the correct replacement fuse.

The correct replacement fuse is: ________________

Provide your justification below:

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JPM A-8

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 (SRO)(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	A-8	Rev. No.	8
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	10/21/06
REVISED BY	Dave E. Crawford	DATE	02/10/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY	Operations Training Manager	DATE	

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

Setup Instructions:

Provide student 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: Calculator

Task Number: SRO-0658

Alternate Path: No

PPM Reference: ABN-OG Rev. 4

NUREG 1123 Ref: 2.3.11 (3.8 / 4.3)

Safety Items: N/A

Validation Time: 10 minutes

Time Critical: No

Location: Any

Performance Method: Perform

Task Standard: Main Condenser air ejector gross gamma activity rate has been properly calculated per ABN-OG, step 4.1.4 and used to justify reactor power reduction as directed by ABN-OG, step 4.1.5.

JPM CHECKLIST

INITIAL CONDITIONS:	Columbia is operating at full power. Various alarms are locked in due to suspected fuel pin damage. OFFGAS POST TREATMENT RADIATION MONITOR, OG-RIS-601A, is in alarm. Refer to the parameters indicated on the attached handout.
INITIATING CUE:	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
			Start Time: ___________		
	1	Determines procedure.	Recognizes entry condition into ABN-OG and refers to procedure.		S / U
	2	Reviews radiation readings on WEA-RIS-14, RW Building Vent Exhaust Rad Monitor, and TEA-RIS-13, Turbine Building Vent Exhaust Rad Monitor, as indicated on handout.	Determines that radiation readings are normal and entry into section 4.2 of ABN-OG is not required. Determines that section 4.1 should be used.		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).	Determines OG-RR-604 indication on handout reads **7.8E+03 (7800) mr/Hr**.		S / U *
	4	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).	Determines OG-FR-620 indication on handout reads **43.0 SCFM**.		S / U *
	5	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).	Multiplies 7800 x 43.0 = **335,400**.		S / U *

	6	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).	Divides 355,400 by 1000 = **335.4 (mCi/sec)**		S / U *
	7	ABN-OG Step 4.1.5 Determines required action.	Based on a Main Condenser Gross gamma activity reading of 335.4 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 *

Termination Criteria: Hands the JPM Answer Sheet to the examiner.

JPM Stop Time:______________

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM:

Examinee (Please Print): ______________________________________

Evaluator (Please Print): ______________________________________

Task Standard: Main Condenser air ejector gross gamma activity rate has been properly calculated per ABN-OG, step 4.1.4 and used to justify reactor power reduction as directed by ABN-OG, step 4.1.5.

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

COMMENTS:

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Evaluator's Signature: _________________________ **Date:** _______________________

STUDENT JPM INFORMATION CARD

Initial Conditions:

Columbia is operating at full power. Various alarms are locked in due to suspected fuel pin damage.

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

Refer to the parameters indicated on the attached handout.

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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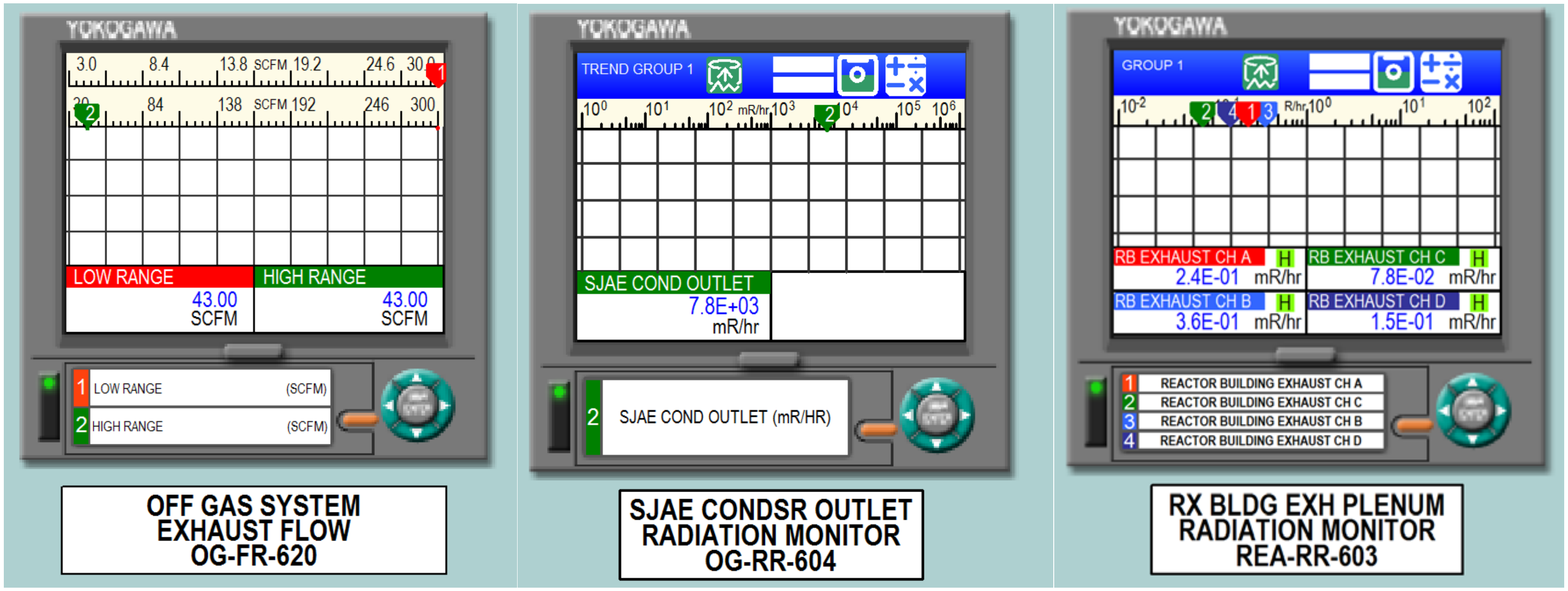
YOKOGAWA
LOW RANGE
43.00
SCFM
HIGH RANGE
43.00
SCFM
1 LOW RANGE (SCFM)
2 HIGH RANGE (SCFM)
OFF GAS SYSTEM
EXHAUST FLOW
OG-FR-620
YOKOGAWA
TREND GROUP 1
SJAE COND OUTLET
7.8E+03
mR/hr
2 SJAE COND OUTLET (mR/HR)
SJAE CONDSR OUTLET
RADIATION MONITOR
OG-RR-604
YOKOGAWA
GROUP 1
RB EXHAUST CH A H
2.4E-01 mR/hr
RB EXHAUST CH C H
7.8E-02 mR/hr
RB EXHAUST CH B H
3.6E-01 mR/hr
RB EXHAUST CH D H
1.5E-01 mR/hr
1 REACTOR BUILDING EXHAUST CH A
2 REACTOR BUILDING EXHAUST CH C
3 REACTOR BUILDING EXHAUST CH B
4 REACTOR BUILDING EXHAUST CH D
RX BLDG EXH PLENUM
RADIATION MONITOR
REA-RR-603

WEA-RIS-14

CHANNEL STATUS
CH 1
CH 2
CH 3
CH 4
OPER
OPER
OPER
OPER
SELECTED DISPLAYS
PREV
NEXT
1.10E-06 µCi/cc
Channel 1
1.52E-03 µCi/cc
Channel 2
1.10E-06 µCi/cc
Channel 3
5.99E+01 µCi/sec
Channel 4
CHANNEL SELECT
PREV
NEXT
MENU
SELECT
NORM
SUPV
CURRENT ACTIVITY

TEA-RIS-14

CHANNEL STATUS
CH 1
CH 2
CH 3
CH 4
OPER
OPER
OPER
OPER
SELECTED DISPLAYS
PREV
NEXT
2.79E-06 µCi/cc
Channel 1
-7 -6 -5 -4 -3 -2 -1
1.78E-03 µCi/cc
Channel 2
-3 -2 -1 0 1 2 3
2.79E-06 µCi/cc
Channel 3
-7 -6 -5 -4 -3 -2 -1 0 1 2 3
4.19E+02 µCi/sec
Channel 4
1 2 3 4 5 6 7 8 9 10 11
CHANNEL SELECT
PREV
NEXT
MENU
SELECT
NORM
CURRENT ACTIVITY

JPM A-9

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	COMPLETE CLASSIFICATION NOTIFICATION FORM (SAE) (SRO)(TC)(Admin)		
LESSON LENGTH	.5 HRS		

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	A-9	Rev. No.	9
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	05/10/01
REVISED BY	Dave E. Crawford	DATE	2/10/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Provide for student a completed URI Dose Assessment (with emergency classification hidden) that supports the administration of this JPM and a blank copy of the paper Classification Notification Form (Form 24075 R24).

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: 12 Minutes

Alternate Path: No

Time Critical: Yes 30 Minutes

PPM Reference: PPM 13.8.1 Rev. 36

Location: Simulator

NUREG 1123 Ref: 2.4.41 (2.9/4.6)

Performance Method: Perform

Task Standard: Applicant classifies event as a SAE (5.1.S.2) within 15 minutes due to Thyroid CDE dose at 1.2 miles of GT 500 mrem. Applicant correctly completes and submits Classification Notification Form within 15 minutes of classification.

JPM CHECKLIST

INITIAL CONDITIONS:	The plant has experienced an event that has resulted in the following conditions: The plant scrammed an hour ago. A release has been ongoing for 3 hours and 44 minutes. Release rate is stable. A URI Does Assessment has been performed.
INITIATING CUE:	The Shift Manager has directed you to complete the Classification Notification Form based only upon the results of the completed Dose Assessment. This is the initial classification of this event. Present the completed CNF to the Shift Manager for signature. This is a Time Critical JPM and your time starts now.

*** Items are Critical Steps**

Time	Step	Element	Standard	Evaluator's Cue	Sat/Unsat
JPM (Classification) Start Time: ______________________					
	1	Classifies event	Classifies event as a SAE <u>within 15 minutes</u> based upon Thyroid CDE dose at 1.2 miles of GT 500 mrem.		S / U *****
NOTE: THIS STOPS THE FIRST 15 MINUTE CLOCK AND STARTS THE NEXT 15 MINUTE NOTIFICATION CLOCK					
Classification Stop Time / Notification Start Time: ______________________					
	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 a date and time		S / U *
	7	Block 5	Checks c. (Site Area Emergency)		S / U *
	8	Block 6	Determines that this block is N/A due to classification not being a General Emergency		S / U *

*** Items are Critical Steps**

Time	Step	Element	Standard	Evaluator's Cue	Sat/Unsat
	9	Block 7	Checks "No"		S / U *
	10	Block 8	Enters 7 for Wind Speed		S / U *
	11	Block 8	Enters 300 for degrees		S / U *
	12	Block 8	Checks No for Precipitation		S / U *
	13	Block 8	Enters 'A' as Stability Classification		S / U *
	14	Block 9	Checks Release		S / U *
	15	Block 10	Checks Airborne		S / U *
	16	Block 11	Enters a date and time for Estimated Start of Release (3 hours 44 minutes ago)		S / U *
	17	Block 12	Checks "Yes". Checks "250mr/hr Thyroid" -OR- Checks "Unfiltered or Unmonitored Release"		S / U *
	18	Block 13	Enters 5.1.S.2 for EAL#		S / U *
	19	Block 14	Checks b.		S / U

JPM (Notification) Stop Time:____________________

Termination Criteria: Student hands the examiner the completed CNF.

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: Applicant classifies event as a SAE (5.1.S.2) within 15 minutes due to Thyroid CDE dose at 1.2 miles of GT 500 mrem. Applicant correctly completes and submits Classification Notification Form within 15 minutes of classification.

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

COMMENTS:

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Evaluator's Signature: ______________________ **Date:** __________

A-9 Rev. 9

Initial Conditions:

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

- The plant scrammed an hour ago
- A release has been ongoing for 3 hours and 44 minutes
- Release rate is stable.

A URI Dose Assessment has been performed.

Initiating Cue:

The Shift Manager has directed you to complete a Classification Notification Form based **only** on the results of the completed Dose Assessment.

This is the initial classification of this event.

Present the completed CNF to the Shift Manager for signature.

THIS IS A TIME CRITICAL JPM
and your time starts now

From:	Gaddy, Vincent
To:	Farina, Thomas
Subject:	RE: CGS Request for Modification of JPM A-9 Critical Step
Date:	Monday, March 13, 2017 9:01:33 AM

TJ,

I agree with your assessment and recommendation.

Vince

From: Farina, Thomas
Sent: Wednesday, March 08, 2017 11:00 AM
To: Gaddy, Vincent <Vincent.Gaddy@nrc.gov>
Subject: CGS Request for Modification of JPM A-9 Critical Step

Vince,
Following administration of JPM A-9 onsite last week, CGS requested a change to one of the approved critical steps. Specifically, JPM stem 17 is a critical step which requires that an applicant identify that requirements for distribution of KI tablets are met, and check off the reason that the requirements are met on the offsite notification form. KI requirements are met for 2 separate reasons: 1) estimated dose rate to thyroid exceeds 250 mr/hr at site boundary, and 2) unfiltered or unmonitored release in progress. The approved JPM step requires that the applicant check both reasons in order to pass the step and JPM. The licensee requests that this step be modified to an "or" statement, meaning that if the applicant checks either reason, the JPM step is satisfied. I've attached their request, the proposed modification to the JPM, and the JPM key.

I support this request from the licensee. Whether an applicant identifies only one reason or both, the same PAR recommendation is submitted to offsite authorities. I'll use your response to this email as justification to modify the JPM step or leave as-is.

Thanks, Please call me if you have questions,
TJ

Question (JPM A-9)

Should JPM A-9 step 17 (critical step) require that BOTH "250mr/hr Thyroid" and "Unfiltered or Unmonitored Release" be checked on the classification form?

Answer (JPM A-9)

Whether one or both checkboxes are checked, the resultant protective action recommendation is the same. Further, PPM 13.2.1, Emergency Exposure Levels / Protective Action Guides, step E.1 clearly states that offsite agencies should be notified that Washington State criteria for administering KI are met based on the following:

- Projected or actual 250 mrem/hr to the Thyroid at 1.2 miles, **OR**
- Air sample results > 1.4 x 10-7 uCi/cc I-131 at 1.2 miles, **OR**
- Unfiltered or unmonitored release from a nuclear power plant

Because of the OR statement in PPM 13.2.1, Columbia Generating Station requests that step 17 of JPM A-9 be changed such that the candidate passes the step if they select EITHER "250mr/hr Thyroid" OR "Unfiltered or Unmonitored Release".

Columbia Generating Station **Monday, November 28, 2016 16:55**

Method: Detailed Assessment - Monitored Release

Release Pathway: <RCS> <Turb Bldg> <Exhaust> <Env> PRF: 4.00E-01

Drywell HUT: = N/A Drywell Sprays: = N/A Supp Pool HUT: = N/A Supp Pool Status: = N/A

Rx Bldg HUT: = N/A SBGT Filters: = N/A Turb Bldg HUT: = < 2 Hours RW Bldg HUT: = N/A

Source Term: Reactor Core Accident - Clad

Time After S/D (hh:mm): 1:00

Release Duration (hh:mm): 6:00 ETE (hh:mm): [N/A]

CGS 33ft Tower

Wind: From 300° @ 7 mph

Stability Class: A

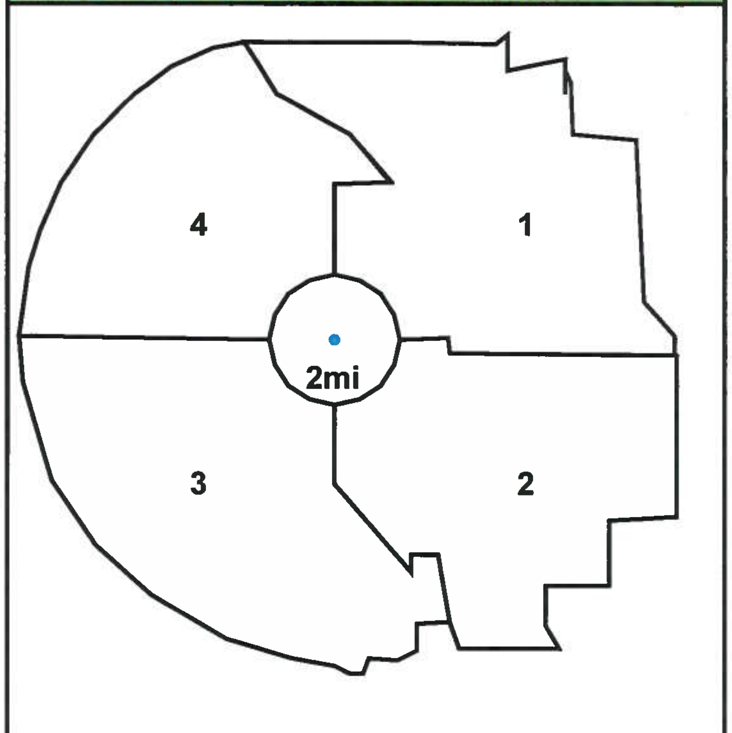
Precipitation: None

Monitor: Turb Bldg Readings: 1.30E-01 uCi/cc Flowrate: 355000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	7.99E+00	9.20E+00	1.48E+02	1.04E+02	2.61E+02	3.74E+03
1.5	4.60E+00	5.28E+00	8.71E+01	6.07E+01	1.53E+02	2.20E+03
2.0	2.54E+00	2.86E+00	4.92E+01	3.41E+01	8.62E+01	1.25E+03
3.0	1.72E+00	3.20E+00	2.61E+01	1.78E+01	4.71E+01	6.60E+02
4.0	1.13E+00	2.08E+00	1.75E+01	1.19E+01	3.14E+01	4.41E+02
5.0	9.52E-01	1.76E+00	1.51E+01	1.02E+01	2.70E+01	3.81E+02
7.0	6.24E-01	1.15E+00	1.03E+01	6.91E+00	1.84E+01	2.61E+02
10.0	4.68E-01	8.62E-01	8.35E+00	5.46E+00	1.47E+01	2.11E+02

Assessment Data Results Saved to File:
Columbia Generating Station 10Miles Monitored Release 11282016 165547.URI7

Evacuation Areas From 0 to 10 Miles



No PAGs Exceeded

Release Rates (Ci / sec)	
Particulate	6.19E-01 (2.2%)
Iodine	1.19E+01 (41.7%)
Noble Gas	1.60E+01 (56.1%)

Reviewed By: ______________________________

Isotopic Release Rates

This is a Drill

Columbia Generating Station **Monday, November 28, 2016 16:55**

Method: Detailed Assessment - Monitored Release \ Source Term: Reactor Core Accident - Clad

Noble Gasses in Ci/sec

Kr-85	4.57E-02	Kr-85m	8.68E-01	Kr-87	1.17E+00	Kr-88	2.19E+00	Xe-131m	5.98E-02
Xe-133	8.87E+00	Xe-133m	2.79E-01	Xe-135	2.16E+00	Xe-138	3.97E-01		

Iodines in Ci/sec

I-131	1.75E+00	I-132	1.89E+00	I-133	3.44E+00	I-134	1.78E+00	I-135	3.06E+00

Particulates in Ci/sec

Cs-134	3.08E-01	Cs-136	9.77E-02	Cs-137	2.14E-01	Sb-127	0.00E+00	Sb-129	0.00E+00
Te-129m	0.00E+00	Te-131m	0.00E+00	Te-132	0.00E+00	Ba-140	0.00E+00	Sr-89	0.00E+00
Sr-90	0.00E+00	Sr-91	0.00E+00	Mo-99	0.00E+00	Ru-103	0.00E+00	Ru-106	0.00E+00
La-140	0.00E+00	Y-91	0.00E+00	Ce-144	0.00E+00	Np-239	0.00E+00		

This is a Drill

Additional Meteorological Inputs

This is a Drill

Columbia Generating Station **Monday, November 28, 2016 16:55**

CGS 33ft Tower Wind Speed: 7.0 mph Wind Direction From: 300° Delta T: -2.50 Stab Class: A Precip: None

This is a Drill

Miscellaneous Inputs and Data

This is a Drill

Release Point Elevation: 36 meters

Plume Exposure Duration (Release duration + Plume travel time): 7.43 hours

Additional Monitor Information: Turb Bldg reads in units of uCi/cc

- Conversion Factor: 1.0000E+06
- Background Subtract: 2.1400E-06
- Isotopic Conversion Factors are in place for this monitor and were used in the calculation.)

This is a Drill

EDE to TEDE Ratios

This is a Drill

Distance	EDE / TEDE Ratio with Iodine	EDE / TEDE Ratio without Iodine
2 - Miles	0.05	0.19
5 - Miles	0.10	0.33
10 - Miles	0.09	0.30

TIMES RECORDED ON FORM ARE BASED ON START TIME OF JPM.

COLUMBIA GENERATING STATION CLASSIFICATION NOTIFICATION FORM (CNF)

1 **Type of Event:**
a. ☐ **Emergency**
b. ☒ **Drill**

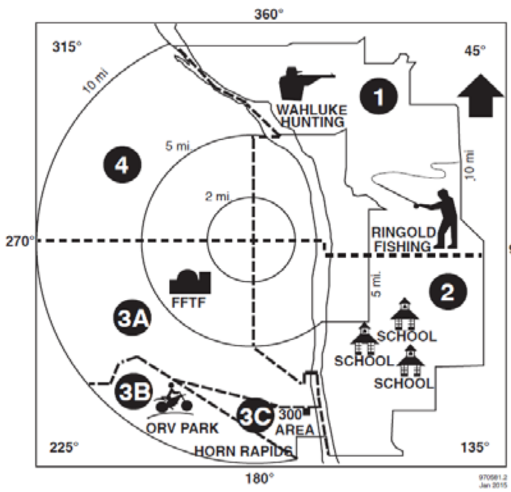
2 **No:** 1

3 **Notification Provided By: (Emergency Director)**
Name (Print): Print Name
Phone: (509)

4 **Classification/Status**

	Time:	Date:
a. ☒ Initial Classification	Time	Date
b. ☐ Reclassification		
c. ☐ Termination		
d. ☐ PAR Changes/Additions		
e. ☐ Information		

Section Map



5 a. ☐ **UNUSUAL EVENT**
No Offsite Protective Actions Recommended

b. ☐ **ALERT**
No Offsite Protective Actions Recommended

c. ☒ **SITE AREA EMERGENCY**
Automatic Protective Action Recommendation
EVACUATE:
- Columbia River
- Ringold Fishing Area
- Wahluke Hunting Area
- Schools in EPZ
- Horn Rapids Recreation Area/ORV Park

d. ☐ **GENERAL EMERGENCY**
Automatic Protective Action Recommendation
EVACUATE:
- Columbia River
- Ringold Fishing Area
- Wahluke Hunting Area
- Schools in EPZ
- Horn Rapids Recreation Area/ORV Park

8 **Meteorological Data:**
Wind Speed: 7 mph from 300 degrees
Precipitation: ☐ Yes ☒ No
Stability Classification A

6 **PROTECTIVE ACTION RECOMMENDATIONS**
IF a **General Emergency** is declared,
THEN **Refer** to PPM 13.2.2 “Determining PARs”.
IF A GE is NOT declared, This section is Not Applicable

9 ☐ No Release(Block 10,11&12 are N/A) ☒ Release

10 **Type of release:**
☐ N/A
☒ Airborne
☐ Water

11 **Estimated Start of Release:**
☐ N/A Start Time - 3 hr 44min
Time/Date: Time/Date
Release Terminated:
Time/Date: ______

Basis for PARs: ☒ Not Applicable ☐ Radiological ☐ Plant

0-2 miles	2-10 miles			
All Sections	Section 1	Section 2	Section 3	Section 4
	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**
☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**
☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**

12 **State Criteria met for administering KI…**(Information only)
☐ N/A
☐ No
☒ Yes ☒ 250 mrem/hr thyroid
☐ 1.4×10^{-7} μci/cc I-131
☒ Unfiltered or unmonitored release

7 **Security Event:** ☐ Yes ☒ No
Responding personnel are to report to:
☐ On-Site Facilities
☐ Alternate Facilities, Energy Northwest Office Complex, 3000 George Washington Way

13 **EAL#** 5.1.S.2
Description; Offsite Release

Additional Information;______

14 **Prognosis of Situation:** a. ☐ **Unknown** b. ☒ **Stable** c. ☐ **Escalating** d. ☐ **Improving**

15 **Emergency Director Approval Signature:**

24075 R24

Completion of Classification Notification Form (CNF)

Completing the form

Block 1. Type of event: For actual emergencies, the block "Emergency" should be checked.
For drills or exercises, the block "Drill" should be checked.

Block 2. Classification Form Number: This is a sequential number indicating the order of offsite notifications.
The first CNF is #1 followed by #2, etc.

Block 3. Notification provided by. This is the name of the Emergency Director providing the information for the Crash call. Phone number is the number at which the notifier can be contacted.

Block 4. Classification/Statues: a-e.

Item a or b: The time listed is the time at which the ED declares the emergency classification or upgrade. This time starts the 15-minute notification requirement.

Item c.: Termination, no Classification Level should exist or be marked.
A CNF and Crash must be initiated at the termination of a drill or actual event.

Item d.: If additional PARs are required after the CNF for the GE has been transmitted, complete this block. The need for additional PARs requires notifications be completed within 15 minutes of the time in the block.

Item e.: Periodic information updates such as release information, KI, prognosis, and changes in Met conditions should be provided at least once an hour.

Block 5. Check block for appropriate emergency classification.
(UNUSUAL EVENT, ALERT, SITE AREA EMERGENCY, GENERAL EMERGENCY)

Block 6. When a General Emergency is declared, Refer to PPM 13.2.2 "Determining Protective Action Recommendations", Check applicable sections/actions and communicated during the Crash call for the GE.
If a GE is NOT declared, this section is N/A and does NOT need to be filled in.

Block 7. Identify whether the event is security based (Auto Dialer Scenario 191) and reporting location for Offsite Response Organization (ie. County and State Personnel) responding to CGS.

Block 8. Enter Meteorological data. Following a release, if meteorological data changes ensure additional PARs are considered and provide offsite notification. To convert Delta T to stability class, refer to PPM 13.8.1.

Block 9. If there is a No RELEASE, then blocks 10, 11 & 12 are N/A.
If there is a RELEASE then enter information in blocks 10, 11 & 12.
If RELEASE starts after CNF and CRASH notification has been completed, then provide new CNF and Crash notifications to offsite agencies as soon as RELEASE Criteria has been met.

Block 10. If there is a RELEASE, mark it as airborne or water.

Block 11. If there is a RELEASE, enter the start time. Enter stop time following release termination.

Block 12. The block with information on the State's criteria for KI is an <u>information</u> notification <u>not</u> a PAR.

Block 13. Enter the EAL number. Provide a short description of the event. Do not use jargon and avoid acronyms.

Block 14. Enter Prognosis of Situation. This is a judgment call primarily relating to the condition of the reactor.

Block 15. Ensure the Emergency Director has signed the form prior to transmittal to the offsite agencies.

Additional information to consider when completing the CNF

- CNF must be filled out in entirely prior to transmittal to offsite agencies. Transmittal of the CNF should occur prior to initiation of each Crash Call. The requirement to complete 15-minute notifications to the offsite agencies should not be delayed if the time needed to complete the form would impact the notification requirement. In cases where the Crash Call is initiated prior to transmittal, the form should be filled out and transmitted as soon as possible.
- When the Control Room is providing emergency classifications, they will ensure the SCC has received the CNF at which time the SCC will follow up with the offsite agencies to ensure they have received the information. If the SCC is not available, the Control Room Notifier must provide the information block by block to the offsite agencies.
- If the CNF information is being communicated from the EOF or TSC, all information on the form must be verbally communicated. When communicating the CNF information, it must be communicated block by block for each of the blocks.
- If an error on the CNF is recognized during the Crash Call, the correction should be noted on the CNF, initialed, and communicated during the Crash Call.
- If an error is recognized in block 4, 5, 6, 8, 9, 10, 11, 12 or 13 after the Crash Call has concluded, a new corrected CNF with the next sequential number should be completed, transmitted, and followed up with a Crash Call.

1 **Type of Event:** a. ☐ **Emergency** b. ☐ **Drill**	**COLUMBIA GENERATING STATION** **CLASSIFICATION NOTIFICATION FORM (CNF)**	2 **No:** _____

3 **Notification Provided By: (Emergency Director)**

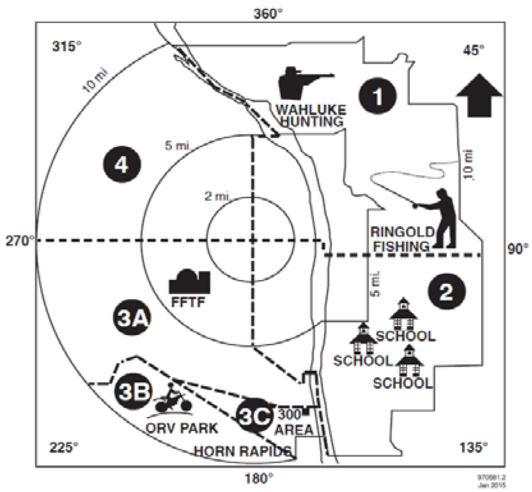
Name (Print): ______________________

Phone: (509) ____________________

4 **Classification/Status**

	Time:	Date:
a. ☐ Initial Classification		
b. ☐ Reclassification		
c. ☐ Termination		
d. ☐ PAR Changes/Additions		
e. ☐ Information		

Section Map



5 a. ☐ **UNUSUAL EVENT**
No Offsite Protective Actions Recommended

b. ☐ **ALERT**
No Offsite Protective Actions Recommended

c. ☐ **SITE AREA EMERGENCY**

Automatic Protective Action Recommendation
EVACUATE:
- Columbia River
- Ringold Fishing Area
- Wahluke Hunting Area
- Schools in EPZ
- Horn Rapids Recreation Area/ORV Park

d. ☐ **GENERAL EMERGENCY**

Automatic Protective Action Recommendation
EVACUATE:
- Columbia River
- Ringold Fishing Area
- Wahluke Hunting Area
- Schools in EPZ
- Horn Rapids Recreation Area/ORV Park

8 **Meteorological Data:**
Wind Speed: ______ mph from ______ degrees
Precipitation: ☐ Yes ☐ No
Stability Classification _______

6 **PROTECTIVE ACTION RECOMMENDATIONS**
IF a **General Emergency** is declared,
THEN **Refer** to PPM 13.2.2 “Determining PARs”.
IF A GE is NOT declared, This section is Not Applicable

9 ☐ No Release(Block 10,11&12 are N/A) ☐ Release

Basis for PARs: ☐ Not Applicable ☐ Radiological ☐ Plant

0-2 miles	2-10 miles			
All Sections	Section 1	Section 2	Section 3	Section 4
	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**	☐ **Monitor & Prepare**
☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**	☐ **Shelter In Place**
☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**	☐ **Evacuate**

10 **Type of release:**
☐ N/A
☐ Airborne
☐ Water

11 **Estimated Start of Release:**
☐ N/A
Time/Date: _____________
Release Terminated:
Time/Date: _____________

12 **State Criteria met for administering KI…**(Information only)
☐ N/A
☐ No
☐ Yes ☐ 250 mrem/hr thyroid
☐ 1.4 x 10^{-7} µci/cc I-131
☐ Unfiltered or unmonitored release

7 **Security Event:** ☐ Yes ☐ No
Responding personnel are to report to:
☐ On-Site Facilities
☐ Alternate Facilities, Energy Northwest Office Complex, 3000 George Washington Way

13 **EAL#** _________

Description; _____________

Additional Information; _____________

14 **Prognosis of Situation:** a. ☐ **Unknown** b. ☐ **Stable** c. ☐ **Escalating** d. ☐ **Improving**

15 **Emergency Director Approval Signature:**

Completion of Classification Notification Form (CNF)

Completing the form

Block 1. Type of event: For actual emergencies, the block "Emergency" should be checked.
For drills or exercises, the block "Drill" should be checked.

Block 2. Classification Form Number: This is a sequential number indicating the order of offsite notifications. The first CNF is #1 followed by #2, etc.

Block 3. Notification provided by. This is the name of the Emergency Director providing the information for the Crash call. Phone number is the number at which the notifier can be contacted.

Block 4. Classification/Statues: a-e.

Item a or b: The time listed is the time at which the ED declares the emergency classification or upgrade. This time starts the 15-minute notification requirement.

Item c.: Termination, no Classification Level should exist or be marked.
A CNF and Crash must be initiated at the termination of a drill or actual event.

Item d.: If additional PARs are required after the CNF for the GE has been transmitted, complete this block. The need for additional PARs requires notifications be completed within 15 minutes of the time in the block.

Item e.: Periodic information updates such as release information, KI, prognosis, and changes in Met conditions should be provided at least once an hour.

Block 5. Check block for appropriate emergency classification.
(UNUSUAL EVENT, ALERT, SITE AREA EMERGENCY, GENERAL EMERGENCY)

Block 6. When a General Emergency is declared, Refer to PPM 13.2.2 "Determining Protective Action Recommendations", Check applicable sections/actions and communicated during the Crash call for the GE.
If a GE is NOT declared, this section is N/A and does NOT need to be filled in.

Block 7. Identify whether the event is security based (Auto Dialer Scenario 191) and reporting location for Offsite Response Organization (ie. County and State Personnel) responding to CGS.

Block 8. Enter Meteorological data. Following a release, if meteorological data changes ensure additional PARs are considered and provide offsite notification. To convert Delta T to stability class, refer to PPM 13.8.1.

Block 9. If there is a No RELEASE, then blocks 10, 11 & 12 are N/A.
If there is a RELEASE then enter information in blocks 10, 11 & 12.
If RELEASE starts after CNF and CRASH notification has been completed, then provide new CNF and Crash notifications to offsite agencies as soon as RELEASE Criteria has been met.

Block 10. If there is a RELEASE, mark it as airborne or water.

Block 11. If there is a RELEASE, enter the start time. Enter stop time following release termination.

Block 12. The block with information on the State's criteria for KI is an <u>information</u> notification <u>not</u> a PAR.

Block 13. Enter the EAL number. Provide a short description of the event. Do not use jargon and avoid acronyms.

Block 14. Enter Prognosis of Situation. This is a judgment call primarily relating to the condition of the reactor.

Block 15. Ensure the Emergency Director has signed the form prior to transmittal to the offsite agencies.

Additional information to consider when completing the CNF

- CNF must be filled out in entirely prior to transmittal to offsite agencies. Transmittal of the CNF should occur prior to initiation of each Crash Call. The requirement to complete 15-minute notifications to the offsite agencies should not be delayed if the time needed to complete the form would impact the notification requirement. In cases where the Crash Call is initiated prior to transmittal, the form should be filled out and transmitted as soon as possible.
- When the Control Room is providing emergency classifications, they will ensure the SCC has received the CNF at which time the SCC will follow up with the offsite agencies to ensure they have received the information. If the SCC is not available, the Control Room Notifier must provide the information block by block to the offsite agencies.
- If the CNF information is being communicated from the EOF or TSC, all information on the form must be verbally communicated. When communicating the CNF information, it must be communicated block by block for each of the blocks.
- If an error on the CNF is recognized during the Crash Call, the correction should be noted on the CNF, initialed, and communicated during the Crash Call.
- If an error is recognized in block 4, 5, 6, 8, 9, 10, 11, 12 or 13 after the Crash Call has concluded, a new corrected CNF with the next sequential number should be completed, transmitted, and followed up with a Crash Call.

Facility: Columbia Generating Station	Date of Examination: 2/27/17
Exam Level: RO ☒ SRO-I ☐ SRO-U ☐	Operating Test No.: 1

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
S-1: TRANSFER BUS SM-3 FROM TR-S TO TR-N & TRANSFER SM-8 FROM TR-B TO SM-3 Description: Transfer 4160 VAC Bus SM-3 from the Startup Transformer to the Normal Transformer and then transfer 4160 VAC Bus SM-8 from the Backup Transformer to SM-3 K/A: 262001.A4.04 (3.6 / 3.7)	(A)(M)(S)	6
S-2: RESPOND TO LOSS OF SHUTDOWN COOLING Description: Restore Residual Heat Removal (RHR) Loop B shutdown cooling per SOP-RHR-SDC (RHR Loop B Shutdown Cooling Quick Restart). K/A: 205000.A2.06 (3.4 / 3.5)	(D)(L)(S)	4
S-3: HPCS SYSTEM INITIATION Description: Initiate High Pressure Core Spray (HPCS) system per SOP-HPCS-INJECTION and restore RPV level back to directed band. Following start of the HPCS pump its minimum flow valve will fail to automatically close once RPV injection has occurred (resulting in a lower injection rate into the RPV). Valve must be manually closed to maximize injection. K/A: 209002.A4.04 (3.1 / 3.1)	(A)(N)(EN)(L)(S)	2
S-4: INITIATE CR HVAC IN MANUAL PRESSURIZATION MODE Description: Place both trains of Control Room Ventilation in the Manual Pressurization Mode of operation per SOP-HVAC/CR-OPS (inlet damper for one of the Control Room Emergency Filter Units fail to auto open and must be opened manually). K/A: 290003.A4.03 (2.8 / 2.8)	(A)(M)(EN)(S)	9
S-5: RE-ESTABLISH SECONDARY CONTAINMENT/START RB HVAC Description: Restart Reactor Building (RB) HVAC using RB Outside Air Fan 1A and RB Exhaust Air Fan 1A per SOP-HVAC RB-RESTART-QC to re-establish Secondary Containment integrity. K/A: 290001.A4.01 (3.3 / 3.4)	(D)(P)(S)	5
S-6: LOWER RPV PRESSURE USING DEH Description: Recognize that auto control of bypass valves to lower RPV pressure to a target of 550 psig does not work and that the manual lowering of RPV pressure at a rate LE 50 psig per minute through manual control of Bypass Valves would be required. K/A: 241000.A4.02 (4.1 / 4.1)	(A)(D)(L)(P)(S)	3
S-7: (RPS) RESTORE RPS A FROM ALTERNATE POWER SOURCE Description: Transfer RPS A to its Alternate power supply by performing subsequent steps in ABN-RPS. K/A: 212000.A2.01 (3.7 / 3.9)	(D)(P)(S)	7

S-8: Swap RCC Heat Exchangers Description: Direction is provided to swap RCC Heat Exchangers from RCC-HX-1C in service to RCC-HX-1A in service. K/A: 400000.A4.01 (3.1 / 3.0)	(N)(S)	8
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P-1: RESTART RPS-MG-1 AND REPOWER RPS BUS Description: Direction is provided to restart the RPS Motor Generator (RPS-MG-1) which supplies power to RPS Bus 'A' using SOP-RPS-START. During the start the expected voltage indication is not present requiring manual reset of the MG overvoltage trip. The Underfrequency indicator remains lit and must manually be reset. K/A: 212000.A2.01 (3.7 / 3.9)	(A)(D)(R)	6
P-2: INSERT CONTROL RODS BY VENTING SCRAM AIR HEADER Description: Based on initial conditions provided, recognize that manually venting the scram air header is the next action to take in an attempt to insert control rods. K/A: 295037.EA1.05 (3.9 / 4.0)	(D)(E)(R)	1
P-3: REMOTE SHUTDOWN PANEL ACTIVATION DURING A CONTROL ROOM EVACUATION **(Time Critical)**** Description: Based on a Main Control Room evacuation due to fire, and from a designated starting point, transit to the Remote Shutdown Panel and activate panel within required time using ABN-CR-EVAC Attachment 7.2. K/A: 295016 AA1.07 (4.2 / 4.3) **** Ref: OI-69, TCOA-3/TCOA-4**	(D)(E)(R)	7

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five 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 **(5)**
(C)ontrol room	
(D)irect from bank	≤ 9 **(7)**
(E)mergency or abnormal in-plant	≥ 1 **(2)**
(EN)gineered safety feature	≥ 1 **(2)** (control room system)
(L)ow-Power / Shutdown	≥ 1 **(3)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 **(4)**
(P)revious 2 exams	≤ 3 **(3)** (randomly selected)
(R)CA	≥ 1 **(3)**
(S)imulator	

Facility: Columbia Generating Station Date of Examination: 2/27/17

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test No.: 1

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
S-1: TRANSFER BUS SM-3 FROM TR-S TO TR-N & TRANSFER SM-8 FROM TR-B TO SM-3 Description: Transfer 4160 VAC Bus SM-3 from the Startup Transformer to the Normal Transformer and then transfer 4160 VAC Bus SM-8 from the Backup Transformer to SM-3 K/A: 262001.A4.04 (3.6 / 3.7)	(A)(M)(S)	6
S-2: RESPOND TO LOSS OF SHUTDOWN COOLING Description: Restore Residual Heat Removal (RHR) Loop B shutdown cooling per SOP-RHR-SDC (RHR Loop B Shutdown Cooling Quick Restart). K/A: 205000.A2.06 (3.4 / 3.5)	(D)(L)(S)	4
S-3: HPCS SYSTEM INITIATION Description: Initiate High Pressure Core Spray (HPCS) system per SOP-HPCS-INJECTION and restore RPV level back to directed band. Following start of the HPCS pump its minimum flow valve will fail to automatically close once RPV injection has occurred (resulting in a lower injection rate into the RPV). Valve must be manually closed to maximize injection. K/A: 209002.A4.04 (3.1 / 3.1)	(A)(N)(EN)(L)(S)	2
S-4: INITIATE CR HVAC IN MANUAL PRESSURIZATION MODE Description: Place both trains of Control Room Ventilation in the Manual Pressurization Mode of operation per SOP-HVAC/CR-OPS (inlet damper for one of the Control Room Emergency Filter Units fail to auto open and must be opened manually). K/A: 290003.A4.03 (2.8 / 2.8)	(A)(M)(EN)(S)	9
S-5: RE-ESTABLISH SECONDARY CONTAINMENT/START RB HVAC Description: Restart Reactor Building (RB) HVAC using RB Outside Air Fan 1A and RB Exhaust Air Fan 1A per SOP-HVAC RB-RESTART-QC to re-establish Secondary Containment integrity. K/A: 290001.A4.01 (3.3 / 3.4)	(D)(P)(S)	5
S-6: LOWER RPV PRESSURE USING DEH Description: Recognize that auto control of bypass valves to lower RPV pressure to a target of 550 psig does not work and that the manual lowering of RPV pressure at a rate LE 50 psig per minute through manual control of Bypass Valves would be required. K/A: 241000.A4.02 (4.1 / 4.1)	(A)(D)(L)(P)(S)	3
S-8: Swap RCC Heat Exchangers Description: Direction is provided to swap RCC Heat Exchangers from RCC-HX-1C in service to RCC-HX-1A in service. K/A: 400000.A4.01 (3.1 / 3.0)	(N)(S)	8

In-Plant Systems* (3 for RO); 3 for SRO-I); (3 or 2 for SRO-U)		
P-1: RESTART RPS-MG-1 AND REPOWER RPS BUS	(A)(D)(R)	6
Description: Direction is provided to restart the RPS Motor Generator (RPS-MG-1) which supplies power to RPS Bus 'A' using SOP-RPS-START. During the start the expected voltage indication is not present requiring manual reset of the MG overvoltage trip. The Underfrequency indicator remains lit and must manually be reset.		
K/A: 212000.A2.01 (3.7 / 3.9)		
P-2: INSERT CONTROL RODS BY VENTING SCRAM AIR HEADER	(D)(E)(R)	1
Description: Based on initial conditions provided, recognize that manually venting the scram air header is the next action to take in an attempt to insert control rods.		
K/A: 295037.EA1.05 (3.9 / 4.0)		
P-3: REMOTE SHUTDOWN PANEL ACTIVATION DURING A CONTROL ROOM EVACUATION **(Time Critical)****	(D)(E)(R)	7
Description: Based on a Main Control Room evacuation due to fire, and from a designated starting point, transit to the Remote Shutdown Panel and activate panel within required time using ABN-CR-EVAC Attachment 7.2.		
K/A: 295016 AA1.07 (4.2 / 4.3) **** Ref: OI-69, TCOA-3/TCOA-4**		

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five 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 **(5)**
(C)ontrol room	
(D)irect from bank	≤ 8 **(6)**
(E)mergency or abnormal in-plant	≥ 1 **(2)**
(EN)gineered safety feature	≥ 1 **(2)** (control room system)
(L)ow-Power / Shutdown	≥ 1 **(3)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 **(4)**
(P)revious 2 exams	≤ 3 **(2)** (randomly selected)
(R)CA	≥ 1 **(3)**
(S)imulator	

Facility: Columbia Generating Station Date of Examination: 2/27/17

Exam Level: RO ☐ SRO-I ☐ SRO-U ☒ Operating Test No.: 1

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
S-5: RE-ESTABLISH SECONDARY CONTAINMENT/START RB HVAC Description: Restart Reactor Building (RB) HVAC using RB Outside Air Fan 1A and RB Exhaust Air Fan 1A per SOP-HVAC RB-RESTART-QC to re-establish Secondary Containment integrity. K/A: 290001.A4.01 (3.3 / 3.4)	(D)(P)(S)	5
S-2: RESPOND TO LOSS OF SHUTDOWN COOLING Description: Restore Residual Heat Removal (RHR) Loop B shutdown cooling per SOP-RHR-SDC (RHR Loop B Shutdown Cooling Quick Restart). K/A: 205000.A2.06 (3.4 / 3.5)	(D)(L)(S)	4
S-3: HPCS SYSTEM INITIATION Description: Initiate High Pressure Core Spray (HPCS) system per SOP-HPCS-INJECTION and restore RPV level back to directed band. Following start of the HPCS pump its minimum flow valve will fail to automatically close once RPV injection has occurred (resulting in a lower injection rate into the RPV). Valve must be manually closed to maximize injection. K/A: 209002.A4.04 (3.1 / 3.1)	(A)(N)(EN)(L)(S)	2
In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P-1: RESTART RPS-MG-1 AND REPOWER RPS BUS Description: Direction is provided to restart the RPS Motor Generator (RPS-MG-1) which supplies power to RPS Bus 'A' using SOP-RPS-START. During the start the expected voltage indication is not present requiring manual reset of the MG overvoltage trip. The Underfrequency indicator remains lit and must manually be reset. K/A: 212000.A2.01 (3.7 / 3.9)	(A)(D)(R)	6
P-3: REMOTE SHUTDOWN PANEL ACTIVATION DURING A CONTROL ROOM EVACUATION **(Time Critical)**** Description: Based on a Main Control Room evacuation due to fire, and from a designated starting point, transit to the Remote Shutdown Panel and activate panel within required time using ABN-CR-EVAC Attachment 7.2. K/A: 295016 AA1.07 (4.2 / 4.3) **** Ref: OI-69, TCOA-3/TCOA-4**	(D)(E)(R)	7

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five 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	2-3 **(2)**
(C)ontrol room	
(D)irect from bank	≤ 4 **(4)**
(E)mergency or abnormal in-plant	≥ 1 **(1)**
(EN)gineered safety feature	≥ 1 **(1)** (control room system)
(L)ow-Power / Shutdown	≥ 1 **(2)**
(N)ew or (M)odified from bank including 1(A)	≥ 1 **(1)**
(P)revious 2 exams	≤ 2 **(1)**
(R)CA	≥ 1 **(2)**
(S)imulator	

JPM P-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	RESTART OF RPS-MG-1 AND REPOWER RPS BUS (Plant) (Alt Path)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	P-1	Rev. No.	6
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	6/10/08
REVISED BY	Dave E. Crawford	DATE	02/10/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

None

Special Setup Instructions:

None

JPM Instructions:

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

The student is given SOP-RPS-START Sections 5.1 and 5.3.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0248

Validation Time: 12 Minutes

Alternate Path: Yes

Time Critical: No

PPM Reference: SOP-RPS-START Section 5.1 and 5.3 Rev. 5

Location: Plant

NUREG 1123 Ref: 212000A2.01 (3.7 / 3.9)

Performance Method: Simulate

Task Standard: RPS-MG-1 is running with RPS-CB-MG1 (generator output breaker) closed, and RPS-EPA-3A and RPS-EPA-3C (EPA breakers) reset and closed.

JPM CHECKLIST

INITIAL CONDITIONS:	RPS Division A has been de-energized due to a fault. The fault has been identified and corrected.
INITIATING CUE:	The CRS directs you to restart RPS-MG-1 and repower the Division A RPS bus in accordance with SOP-RPS-START section 5.1 and 5.3. Precautions and Limitations have been reviewed and are satisfied. Inform the CRS when the RPS EPA breakers have been closed. 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
JPM Start Time: _______________					
	1	Step 5.1.1 Verify RPS-DISC-7A1B is Closed (RPS Bus Mtr Gen MG-1 Supply Breaker) (E-MC-7A).	Observes RPS-DISC-7A1B's handle.	The handle is pointing to On.	S / U
	2	Step 5.1.2 Perform the following at E-CP-C72/S001A (RPS-MG-1 Control Panel):	Performs this step.		S / U
	3	Step 5.1.2a Verify Motor Off indicating light illuminated (Green).	Observes the Green Motor Off indicating light is on.	The Green light is on.	S / U
	4	Step 5.1.2b Verify RPS-CB-MG1 Open (Generator Output Breaker).	Observes RPS-CB-MG1 is open with lever in Off position.	Indicate that the lever is pointed downward (towards off).	S / U
	5	Step 5.1.2c Depress and Hold RPS-RMS-MG1/ START, pushbutton (Motor On).	Simulates depressing and holding RPS-RMS-MG1/START, MOTOR ON pushbutton depressed.	The start pushbutton is depressed. Red light On, Green light Off The motor starts to make noise and starts to spin.	S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	6	Step 5.1.2d Verify the following: • Motor Off indicating light extinguished (Green) • Motor On light illuminates (Red)	Observes the Green Motor Off indicating light off and the Red Motor On indicating light is on.	The Green light is off and the Red light is on.	S / U
	7	Step 5.1.2e When RPS-MG-1 has come up to speed, then release RPS-RMS- MG1/START pushbutton.	Simulates releasing the MOTOR ON pushbutton (when cue is read).	The MG motor is spinning at a constant speed and noise.	S / U *
NOTE: Motor On pushbutton doubles as an Over Voltage Trip Reset pushbutton.					
Alt Path	8	Step 5.1.2f If voltage is not indicated at rated speed, then momentarily depress RPS-RMS-MG1/ START, Motor On pushbutton to reset the overvoltage trip.	Verbalizes that voltage indication would be expected on RPS-VM-MG1A. Simulates momentarily depressing the RPS-RMS-MG1/START, Motor On pushbutton.	Indicate zero volts on RPS-VM-MG1A. <u>When</u> the pushbutton has been depressed and released then: Indicate 120 volts on RPS-VM-MG1A.	S / U *
	9	Step 5.1.2g Verify RPS-VM-MG1A voltage stabilizes at about 120 VAC.	Observes voltage on RPS-VM-MG1A.	Continue to indicate 120 volts on RPS-VM-MG1A.	S / U
	10	5.1.2h Close RPS-CB-MG1.	Simulates closing RPS-CB-MG1 by pushing up on lever to On.	Indicate that the lever is pointed up (towards On).	S / U *
	11	Step 5.1.3 Proceed to Section 5.3.	Performs section 5.3 as follows:		S / U
	12	Step 5.3.1 Verify Section 5.1 completed.	Recognizes Section 5.1 was just completed.		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	13	Step 5.3.2 Obtain required EPA breaker keys from the Control Room key locker: • Key 166 (RPS C72-S003-A Div A Test) (RPS-EPA-3A) • Key 168, (RPS C72-S003-B Div A Test) (RPS-EPA-3B)	Verbalizes where the EPA breaker keys # 166 & 168 are located (Control Room in key locker outside Shift Managers office).	The student does not have to go to the control room to obtain keys – an explanation on where the keys are is sufficient. You have obtained the keys.	S / U *
	14	Step 5.3.3 Close RPS-EPA-3A as follows (EPA Breaker) (RPS-MG2 Room):	Performs this step.		S / U
	15	Step 5.3.3a Verify breaker keylock switch S-1 in Normal.	Observes S-1 is in Normal position.	The keylock switch is pointed to Normal.	S / U
	16	Step 5.3.3b Verify breaker keylock switch S-2 in OPER.	Observes S-2 is in OPER position.	The keylock switch is pointed to OPER.	S / U
	17	Step 5.3 3c Verify the Power In indicator illuminated.	Observes Power In Indicator is on.	The Red, RPS-MG-1 Power In light is on.	S / U
	18	Step 5.3.3d If any of the following indicators are illuminated, then rotate keylock switch S-2 to RESET, and return to OPER • Overvoltage • Undervoltage • Underfrequency • Power Out	Observes the following indicators: • Overvoltage • Undervoltage • Underfrequency • Power Out	All indicator lights are off.	S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	19	Step 5.3.3e Verify the following indicators extinguished: • Overvoltage • Undervoltage • Underfrequency • Power Out	Verifies the following indicators are extinguished: • Overvoltage • Undervoltage • Underfrequency • Power Out	All indicator lights are off.	S / U
	20	Step 5.3.3f Open RPS-EPA-3A to reset it.	Simulates opening EPA breaker RPS-EPA-3A by pushing down on lever towards OFF position.	Indicate that the breakers lever is in the lowered position (towards Off).	S / U *
	21	Step 5.3.3g Close RPS-EPA-3A.	Simulates closing EPA breaker RPS-EPA-3B by pushing up on lever towards ON position.	Indicate that the breakers lever is in the raised position (towards On).	S / U *
	22	Step 5.3.3h Verify the Power Out indicator illuminated.	Observes the Power Out indicator is on.	The Red RPS-EPA-3C Power Out light is on.	S / U
NOTE: EPA breakers are designed such that the undervoltage lights for RPS-EPA breakers may illuminate indicating an undervoltage condition without activating the undervoltage trip circuit.					
	23	Step 5.3.4 If the under voltage light is illuminated and the breaker is closed, then initiate a work request.	Verifies under voltage light is not on with breaker closed.	The under voltage light is off.	S / U
	24	Step 5.3.5 Close RPS-EPA-3C as follows (EPA Breaker) (RPS-MG2 Room).	Performs this step.		S / U
	25	Step 5.3.5a Verify breaker keylock switch S-1 in the NORMAL.	Observes S-1 is in Normal position.	The keylock switch is pointed to Normal.	S / U
	26	Step 5.3.5b Verify breaker keylock switch S-2 in the OPER.	Observes S-2 is in OPER position.	The keylock switch is pointed to OPER.	S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	27	Step 5.3.5c Verify the Power In indicator illuminated.	Observes Power In Indicator is on.	The Power In light is lit.	S / U
Alt Path	28	Step 5.3.5d If any of the following indicators are not extinguished, then rotate keylock switch S-2 to the RESET position, and return to OPER • Overvoltage • Undervoltage • Underfrequency • Power Out Recognizes need to reset	Observes the following indicators: • Overvoltage • Undervoltage • Underfrequency • Power Out Simulates rotating Keylock switch S-2 to RESET and back to OPER.	All indicators are off except the white under frequency light is on. The switch has been turned to RESET and back to OPER.	S / U *
	29	Step 5.3.5e Verify the following indicators extinguished: • Overvoltage • Undervoltage • Underfrequency • Power Out	Verifies the following indicators are extinguished: • Overvoltage • Undervoltage • Underfrequency • Power Out	All indicator lights are off.	S / U
	30	Step 5.3.5f Open RPS-EPA-3C to reset it.	Simulates opening EPA breaker RPS-EPA-3C by pushing down on lever towards OFF position.	Indicate that the breakers lever is in the lowered position (towards Off).	S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	31	Step 5.3.5g Close RPS-EPA-3C.	Simulates closing EPA breaker RPS-EPA-3C by pushing up on lever towards ON position.	Indicate that the breakers lever is in the raised position (towards On).	S / U *
	32	Step 5.3.5h Verify the Power Out indicator illuminated.	Observes the Power Out indicator is on.	The Power Out light is on.	S / U
NOTE: EPA breakers are designed such that the undervoltage lights for RPS-EPA breakers may illuminate indicating an undervoltage condition without activating the undervoltage trip circuit.					
	33	Step 5.3.5i If the under voltage light is illuminated and the breaker is closed, then initiate a work request.	Verifies under voltage light is off with the breaker closed.	The under voltage light is off.	S / U
Termination Criteria: Student informs the CRS that RPS-EPA-3A and RPS-EPA-3C breakers are closed.					
JPM Stop Time: _______________					
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

Examinee (Print): ______________________________

Evaluator (Print): ______________________________

Task Standard: RPS-MG-1 is running with RPS-CB-MG1 (generator output breaker) closed, and RPS-EPA-3A and RPS-EPA-3C (EPA breakers) reset and closed.

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

COMMENTS:

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Evaluator's Signature: ______________________ **Date:** __________

Initial Conditions:

RPS Division A has been de-energized due to a fault

The fault has been identified and corrected

Initiating Cue:

- **The CRS directs you to restart RPS-MG-1 and repower the Division A RPS bus in accordance with SOP-RPS-START section 5.1 and 5.3.**
- **Precautions and Limitations have been reviewed and are satisfied.**
- **Inform the CRS when the RPS EPA breakers have been closed.**

THE PERFORMANCE OF THIS JPM IS SIMULATED.

CONTROL MANIPULATIONS <u>WILL NOT</u> BE PERFORMED.

JPM P-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: INSERT CONTROL RODS BY VENTING SCRAM AIR HEADER (Plant)

LESSON LENGTH: .5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	P-2	Rev. No.	3
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Ron Hayden DATE: 05/11/06

REVISED BY: Dave E. Crawford DATE: 02/10/17

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:

None

JPM Instructions:

The student is handed the Student Information JPM Card and PPM 5.5.11 Tab D.

Tools/Equipment: Pre staged EOP Tools

Safety Items: Hard Hat; Safety Glasses; Gloves

Task Number: RO-0680

Validation Time: 9 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: PPM 5.5.11 Rev. 8

Location: Plant

NUREG 1123 Ref: 295037 EA1.05 (3.9 / 4.0)

Performance Method: Simulate

Task Standard: The SCRAM air header has been vented and components restored to initial configuration upon completion of PPM 5.5.11 Tab D.

JPM CHECKLIST

INITIAL CONDITIONS:	A scram has been initiated and the blue scram lights are extinguished at H13-P603. Reactor pressure is stable at 930 psig and Reactor Power is 38%.
INITIATING CUE:	The CRS has directed you to insert control rods by venting the Scram Air Header per PPM 5.5.11 Tab D. Inform the CRS when Tab D has been completed. The performance of this JPM will be simulated. Control manipulations will not be performed.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time:_______________					
	1	Close CRD-V-95, Scram Air Header Isolation	Simulates turning the handwheel for CRD-V-95 clockwise to close valve	Handwheel rotates in the clockwise direction until it stops moving. If observed, VPI points to shut.	S / U *
	2	Close CRD-V-729, CRD-PI-13 Isolation	Simulates turning the handwheel for CRD-V-729 clockwise to close valve	Handwheel rotates in the clockwise direction until it stops moving. If observed, VPI points to shut.	S / U *
Note/Caution: Pressurized air will be released when drain plug is removed from CRD-PI-13 which could cause personnel injury					
	3	Remove instrument drain plug for CRD-PI-13	Retrieve wrench from EOP Toolbox, simulates rotating the instrument drain plug counterclockwise on CRD-PI-13 until drain plug is removed	Drain plug removed and in hand	S / U *
	4	Open CRD-V-729, CRD-PI-13 isolation	Simulates turning the handwheel for CRD-V-729 counter-clockwise to open the valve	Air can be heard/felt coming from drain line Handwheel rotates in the counter-clockwise direction until it stops moving. If observed, VPI points to open.	S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	5	When scram air header is fully depressurized and no further rod motion observed	Verifies CRD-PI-13 indicates the air header is depressurized Contacts the Control Room to verify the status of rod motion.	Air can no longer be heard/felt coming from drain line Indicate 0 psig on the gauge face Inform the candidate that no further rod motion is observed	S / U
	6	Restore system alignment as follows:			
	7	Close CRD-V-729	Simulates turning the handwheel for CRD-V-729 clockwise until valve is closed	Handwheel rotates in the clockwise direction until it stops moving. If observed, VPI points to shut.	S / U *
	8	Install instrument drain plug for CRD-PI-13	Simulates inserting the drain plug back into the pipe and simulates turning the drain plug for CRD-PI-13 clockwise to reinstall it	Plug is connected to the pipe and has stopped turning	S / U *
	9	Open CRD-V-729	Simulates turning the handwheel CRD-V-729 counter-clockwise until valve is opened	Handwheel rotates in the counter-clockwise direction until it stops moving. If observed, VPI points to open.	S / U *
	10	Open CRD-V-95	Simulates turning the handwheel for CRD-V-95 counter-clockwise until valve is opened	Handwheel rotates in the counter-clockwise direction until it stops moving. If observed, VPI points to open.	S / U *

Termination Criteria: Student informs the CRS that actions to vent Scram Air Header have been completed.

JPM Stop Time:_______________

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

INSERT CONTROL ROD BY VENTING SCRAM AIR HEADER

Examinee (Print): ______________________________

Evaluator (Print): ______________________________

Task Standard: The SCRAM air header has been vented and components restored to initial configuration upon completion of PPM 5.5.11 Tab D.

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

COMMENTS:

____

Evaluator's Signature: ______________________________ **Date:** ______________

Initial Conditions:

A scram has been initiated and the blue scram lights are extinguished at H13-P603.

Reactor pressure is stable at 930 psig and Reactor Power is 38%.

Initiating Cue:

- **The CRS has directed you to insert control rods by venting the Scram Air Header per PPM 5.5.11 Tab D.**
- **Inform the CRS when actions for Tab D have been completed**

THE PERFORMANCE OF THIS JPM IS SIMULATED

CONTROL MANIPULATIONS <u>WILL NOT</u> BE PERFORMED

Number: 5.5.11	Use Category: CONTINUOUS	Major Rev: 008 Minor Rev: 001 Page: 8 of 13
Title: Alternate Control Rod Insertions		

VENT SCRAM AIR HEADER
(CRD-IR-3, RB 522' SE corner)

D

CLOSE CRD-V-95, Scram Air Header Isolation

CLOSE CRD-V-729, CRD-PI-13 Isolation

Pressurized air will be released when drain plug is removed from CRD-PI-13 which could cause personnel injury.

REMOVE instrument drain plug for CRD-PI-13

OPEN CRD-V-729, CRD-PI-13 Isolation

WHEN
scram air header is fully depressurized
AND
no further rod motion observed

RESTORE system alignment as follows:

1. **CLOSE** CRD-V-729
2. **INSTALL** insrument drain plug for CRD-PI-13
3. **OPEN** CRD-V-729
4. **OPEN** CRD-V-95

INFORM CRS

JPM P-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	REMOTE SHUTDOWN PANEL ACTIVATION DURING A CONTROL ROOM EVACUATION (Plant) (Time Critical)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	P-3	Rev. No.	6
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	08/24/06
REVISED BY	Dave E. Crawford	DATE	02/10/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

This JPM should be started from the outside of the exit door from the Control Room. The student should be handed the JPM Information Card and the examiner will read the initial conditions and cue to the student.

It expected that the student will go to the Remote Shutdown Room to get a copy of ABN-CR-EVAC. When the procedure is identified in the RSD Room, then hand the student a copy of Attachment 7.2.

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-1057, SRO-0251

Validation Time: 9 Minutes

Alternate Path: No

Time Critical: YES - 10 Minutes

PPM Reference: ABN-CR-EVAC Rev. 35

Location: Plant

NUREG 1123 Ref: 295016 AA1.07 (4.2 /4.3)

Performance Method: Simulate

Task Standard: Remote Shutdown Panel Activation has been accomplished within 10 minutes from the Shift Manager directing a reactor scram.

JPM CHECKLIST

EVALUATORS NOTE: Start this JPM outside the Control Room Exit door. Per the initiating cue, "your time starts now" will be considered Time 0.	
INITIAL CONDITIONS:	The SM has just directed a reactor scram due to a control room fire. Operators are completing the immediate actions of ABN-CR-EVAC.
INITIATING CUE:	Starting from just outside of the exit door from the Control Room, the CRS has directed you to perform Attachment 7.2 to activate the Remote Shutdown Panel. The performance of this JPM will be simulated. No control manipulations will be performed. This is a time critical JPM and your time starts now.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time:_______________					
WHEN THE STUDENT HAS ENTERED THE RSD ROOM AND HAS A COPY OF ABN-CR-EVAC IN HAND, GIVE THE STUDENT HIS COPY OF ATTACHMENT 7.2.					
Note: The RSD panel must be activated within 10 minutes from the time the Shift Manager (or designee) orders a reactor scram due to a design basis fire.					
CAUTION: Failure to transfer RCIC flow control to EMERG may cause RCIC to trip when DP-S1-1A feeder is tripped in the subsequent step.					
	1	Step 7.2.1 Place RCIC-RMS-RSTS7 in EMERG (RCIC FLOW CONTROL RCIC-FIC-1R POWER TRANSFER) (C61-P001, RSD).	Simulates placing RCIC-RMS-RSTS7 (transfer switch 1) in the EMERG position	The switches arrow is pointing to EMERG	S / U *
Note: De-energizing DP-S1-1A will defeat the automatic ADS function from Division 1.					

*** Items are Critical Steps**

<table>
<tr><th>Time</th><th>JPM Step</th><th>Task Element</th><th>Performance Standard</th><th>Evaluator’s Cue</th><th>Results</th></tr>
<tr><td></td><td>2</td><td>Step 7.2.2
Verify open the following breakers on DP-S1/1 within 15 minutes (Battery Charger Room 1):
• E-DISC-DPS11/2B (IN-3A feeder)
• E-DISC-DPS11/2C (DP-S1-1A feeder)
• E-DISC-DPS11/2D (IN-3B feeder)</td><td>Simulates opening breakers on DP-S1/1:
• IN-3A feeder (Cubicle 2B - simulates turning handle CW to OFF position)
• DP-S1-1A feeder (Cubicle 2C - simulates turning handle CCW to OFF position)
• IN-3B feeder (Cubicle 2D - simulates turning handle CW to OFF position)</td><td>Each breaker is found in the ON position.
As each breaker is opened: The handle is pointing to the OFF position</td><td>S / U *</td></tr>
<tr><td></td><td>3</td><td>Step 7.2.3
Place the following four (4) power transfer switches to EMERG (E-CP-ARS, ARSD):
• 41
• 47
• 48
• 59</td><td>In ARSD Room, simulates placing the following power transfer switches to the EMERG position:
• 41
• 47
• 48
• 59</td><td>Each switch is found with the arrow pointing to NORMAL
As each switch is turned: The switches arrow is pointing to EMERG</td><td>S / U *</td></tr>
<tr><td></td><td>4</td><td>Step 7.2.4
Place all five (5) FRTS power transfer switches to EMERG (E-CP-FRTP, RSD):
• 31
• 32
• 33
• 34
• 35</td><td>In RSD Room, simulates placing the following power transfer switches to EMERG:
• 31
• 32
• 33
• 34
• 35</td><td>Each switch is found with the arrow pointing to NORMAL
As each switch is turned: The switches arrow is pointing to EMERG</td><td>S / U *</td></tr>
</table>

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	5	Step 7.2.5 Place the following twelve (12) power transfer switches to EMERG (EC61-P001, RSD): • 2 and 5 • 6 and 7 • 8 and 11 • 12 and 13 • 15 and 16 • 17 and 18	Simulates placing the following power transfer switches to EMERG: • 2 and 5 • 6 and 7 • 8 and 11 • 12 and 13 • 15 and 16 • 17 and 18	Each switch is found with the arrow pointing to NORMAL As each switch is turned: The switches arrow is pointing to EMERG	S / U *
	6	Step 7.2.6 Place the following four (4) power transfer switches to EMERG (H22-P100, RSD): • 21 • 22 • 23 • 24	Simulates placing the following power transfer switches to EMERG: • 21 • 22 • 23 • 24	Each switch is found with the arrow pointing to NORMAL As each switch is turned: The switches arrow is pointing to EMERG	S / U *
	7	Notify the CRS that Attachment 7.2 is complete.	Notifies CRS that attachment 7.2 is complete.	Inform the student that the JPM is complete.	S /U

Termination Criteria: Student informs CRS that Attachment 7.2 is complete.

JPM Stop Time:_______________

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM
REMOTE SHUTDOWN PANEL ACTIVATION DURING A CONTROL ROOM EVACUATION

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: Remote Shutdown Panel Activation has been accomplished within 10 minutes from the Shift Manager directing a reactor scram.

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

<u>COMMENTS:</u>

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Evaluator's Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION CARD

Initial Conditions:

- The SM has just directed a reactor scram due to a control room fire.
- Operators are completing the immediate actions of ABN-CR-EVAC.

Initiating Cue:

- **Starting from just outside of the exit door from the Control Room, the CRS has directed you to perform Attachment 7.2 to activate the Remote Shutdown Panel.**
- **The performance of this JPM will be simulated.**
- **No control manipulations will be performed.**
- **This is a time critical JPM and your time starts now.**

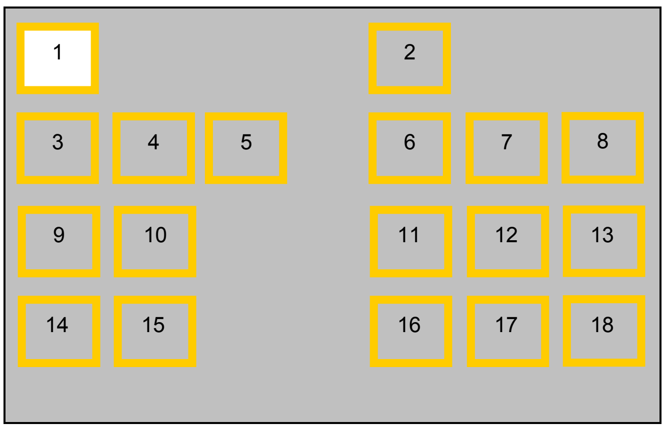
7.2 Remote Shutdown Panel Activation and DP-S1/1A Deenergization (CRO1)

NOTE: The RSD panel must be activated within 10 minutes from the time the Shift Manager (or designee) orders a reactor scram due to a design basis fire.

CAUTION

Failure to transfer RCIC flow control to EMERG may cause RCIC to trip when DP-S1-1A feeder is tripped in the subsequent step.

7.2.1 **PLACE** RCIC-RMS-RSTS7 in **EMERG** (RCIC FLOW CONTROL RCIC-FIC-1R POWER TRANSFER) (C61-P001, RSD). • 1 ______

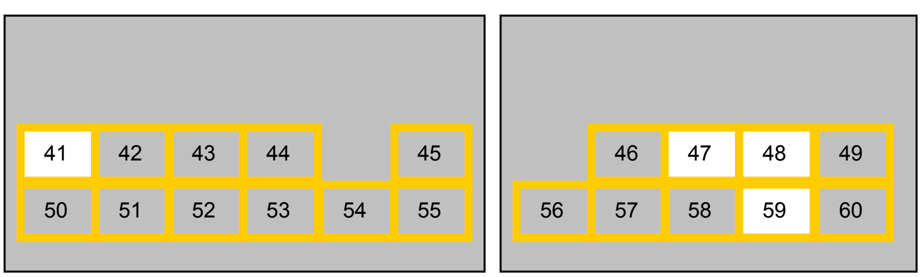


NOTE: De-energizing DP-S1-1A will defeat the automatic ADS function from Division 1.

★ 7.2.2 **VERIFY OPEN** the following breakers on DP-S1/1 within 15 minutes (Battery Charger Room 1):

- E-DISC-DPS11/2B (IN-3A feeder) ______
- E-DISC-DPS11/2C (DP-S1-1A feeder) ______
- E-DISC-DPS11/2D (IN-3B feeder) ______

★ 7.2.3 **PLACE** the following four (4) power transfer switches to **EMERG** (E-CP-ARS, ARSD): {C-9091}

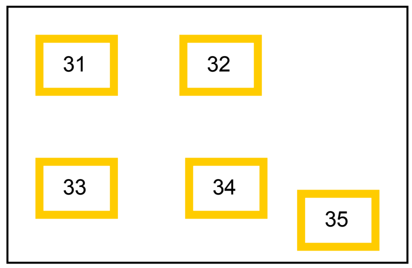


- 41 ______
- 47 ______
- 48 ______
- 59 ______

Attachment 7.2, Remote Shutdown Panel Activation (CRO1)

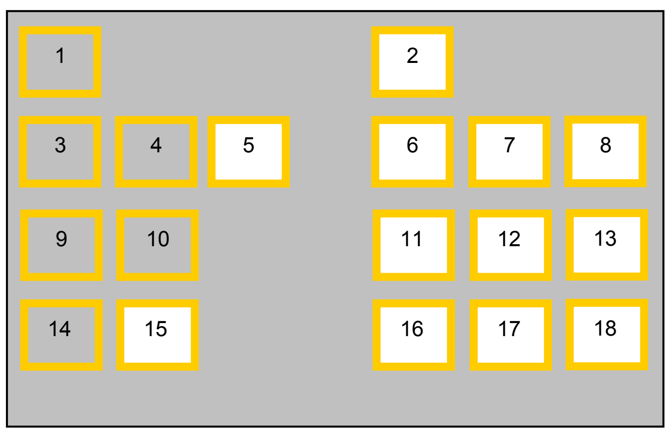
Number: ABN-CR-EVAC	Use Category: CONTINUOUS	Major Rev: 034 Minor Rev: 001 Page: 23 of 63
Title: Control Room Evacuation and Remote Cooldown		

★ 7.2.4 **PLACE** all five (5) FRTS power transfer switches to **EMERG** (E-CP-FRTP, RSD). {C-9083}



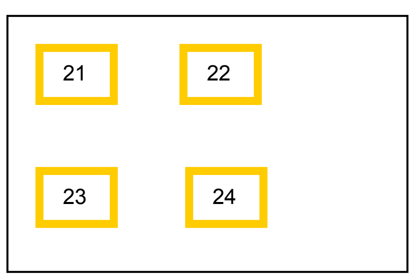
- 31 ______
- 32 ______
- 33 ______
- 34 ______
- 35 ______

★ 7.2.5 **PLACE** the following twelve (12) power transfer switches to **EMERG** (C61-P001, RSD)**:**



- 2 ______
- 5 ______
- 6 ______
- 7 ______
- 8 ______
- 11 ______
- 12 ______
- 13 ______
- 15 ______
- 16 ______
- 17 ______
- 18 ______

★ 7.2.6 **PLACE** the following four (4) power transfer switches to **EMERG** (H22-P100, RSD):



- 21 ______
- 22 ______
- 23 ______
- 24 ______

7.2.7 **NOTIFY** the CRS that Attachment 7.2 is complete. ______

END

Attachment 7.2, Remote Shutdown Panel Activation (CRO1)

JPM S-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	TRANSFER SM-3 FROM TR-S TO TR-N & TRANSFER SM-8 FROM TR-B TO SM-3 (Sim)(Alt Path)		
LESSON LENGTH	.5 HRS		

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-1	Rev. No.	2
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	01/20/17
REVISED BY	Dave E. Crawford	DATE	02/05/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY		DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Any IC where SM-3 is being powered from TR-N and SM-8 is being powered by TR-B. A startup IC is preferred to add operational validity.

Insert malfunction BKR-EPS051 to FA_AUT_TRIP

Special Setup Instructions:

None

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0611

Validation Time: 15 minutes

Alternate Path: Yes

Time Critical: No

PPM Reference: SOP-ELEC-4160V-OPS Section 5.3 and Section 5.10 Rev. 12

Location: Simulator

NUREG 1123 Ref: 262001A4.04 (3.6 / 3.7)

Performance Method: Perform

Task Standard: SM-3 has been transferred from the Startup Transformer to the Normal Transformer per SOP-ELEC-4160V-OPS. SM-8 has been transferred from the Backup Transformer to SM-3 in accordance with SOP-ELEC-4160V-OPS.

JPM CHECKLIST

INITIAL CONDITIONS:	Plant startup is in progress. All busses have been transferred from TR-S to TR-N other than SM-3. SM-8 is aligned to TR-B due to maintenance being conducted on breaker E-CB-8/3. Maintenance has just been completed on breaker E-CB-8/3 and it is ready for post maintenance testing.
INITIATING CUE:	The CRS has directed you to transfer SM-3 from TR-S to TR-N in accordance with SOP-ELEC-4160V-OPS. The CRS has also directed you to transfer SM-8 from TR-B to SM-3 to support post maintenance testing in accordance with SOP-ELEC-4160V-OPS. All Prerequisites / Precautions and Limitations have been addressed. CRS has addressed Tech Specs.

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
JPM Start Time: ______________					
<u>NOTE</u>: The control and indications necessary to perform this section are located at H13-P800 (Bd C).					
	1	Step 5.3.1 **VERIFY** E-CB-N1/3 white LOCKOUT CIRCUIT AVAIL light illuminated.	Observes CB-N1/3 white Lockout Circuit Avail light is illuminated		S / U
	2	Step 5.3.2 **VERIFY** E-CB-N1/3 green light illuminated and green flag displayed.	Observes CB-N1/3 green light illuminated and green flag displayed		S / U
	3	Step 5.3.3 **VERIFY** E-CB-S3 white LOCKOUT CIRCUIT AVAIL light illuminated.	Observes CB-S3 white Lockout Circuit Avail light illuminated		S / U

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
	4	Step 5.3.4 **VERIFY** E-CB-S3 red light illuminated.	Observes CB-S3 red light illuminated		S / U
	5	Step 5.3.5 **PLACE** E-CB-N1/3 Sync Selector switch in **MAN**.	Places CB-N1/3 Sync Selector switch to the MAN position		S / U *
	6	Step 5.3.6 **VERIFY** voltage present on both incoming and running buses.	Observes voltages present on both incoming and running buses		S / U
NOTE: The blue Sync Permit light for E-CB-N1/3 is illuminated from initiation of breaker closure until closure actually occurs.					
NOTE: E-CB-S3 should automatically trip when E-CB-N1/3 closes.					
NOTE: H13-800.C3.3-3, BKR S3 TRIP will alarm when the following step is performed.					
	7	Step 5.3.7 **CLOSE** E-CB-N1/3.	Places CB-N1/3 control switch to close by turning to the right		S / U *

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
Alt Path	8	Step 5.3.8 **VERIFY** E-CB-S3 auto trips.	Observes CB-S3 red light illuminated and green light out and then manually trips E-CB-S3. Reports to CRS that E-CB-S3 failed to automatically trip (communications not considered a critical step).		S / U *
	9	Step 5.3.9 **PLACE** E-CB-S3 control switch in **TRIP**.	Recognizes that E-CB-S3 is already in trip from previous step and takes no action.		S / U
	10	Step 5.3.10 **VERIFY** E-CB-S3 green light illuminated and green flag displayed.	Observes S3 green light illuminated and green flag displayed		S / U
	11	Step 5.3.11 **PLACE** E-CB-N1/3 Sync Selector switch in **OFF**.	Places CB-N1/3 Sync Selector switch to the OFF position		S / U

NOTE: The controls and indications necessary to perform this section are located at H13-P800 (Bd C).					
	12	Step 5.10.1 **PERFORM** the following prior to transferring SM-8 to SM-3: If E-CB-3/8 is open, THEN **CLOSE** E-CB-3/8 as follows: If TR-S is supplying SM-3, THEN **VERIFY** SM-3 has sufficient capacity to carry SM-8.	Candidate identifies that E-CB-3/8 is already closed. Marks first part of step "N/A". Candidate recognizes that SM-3 is being powered by TR-N. Marks second part of step "N/A".		S / U
	13	Step 5.10.2 **VERIFY** E-CB-8/3 white LOCKOUT CIRCUIT AVAIL light illuminated.	Candidate verifies that E-CB-8/3 white LOCKOUT CIRCUIT AVAIL light is illuminated.		S / U
	14	Step 5.10.3 **VERIFY** E-CB-8/3 green light illuminated and green flag displayed.	Candidate verifies that E-CB-8/3 green light illuminated and green flag displayed.		S / U
	15	Step 5.10.4 **VERIFY** E-CB-B8 white LOCKOUT CIRCUIT AVAIL light illuminated.	Candidate verifies that E-CB-B8 white LOCKOUT CIRCUIT AVAIL light illuminated.		S / U
	16	Step 5.10.5 **VERIFY** E-CB-B8 red light illuminated.	Candidate verifies that E-CB-B8 red light illuminated.		S / U

	17	Step 5.10.6 **PLACE** E-CB-8/3 Sync Selector switch in **MANUAL**.	Candidate places E-CB-8/3 Sync Selector switch in MANUAL.		S / U *
	18	Step 5.10.7 **VERIFY** voltage present on both incoming and running buses.	Candidate verifies that voltage is present on both incoming and running buses.		S / U
NOTE: The blue Sync Permit light for E-CB-8/3 is illuminated from initiation of breaker closure until closure actually occurs.					
NOTE: E-CB-B8 should automatically trip when E-CB-8/3 closes.					
NOTE: H13-800.C.5.5-3 BACKUP XFMR BKR B8 TRIP will alarm when the following step is performed.					
NOTE: H13-800.C4.3-5 TR-B REV PWR RELAY may alarm when the following step is performed.					
NOTE: Closing E-CB-8/3 causes E-CB-B8 to trip open. This renders E-CB-B8 automatic closure inoperable until E-CB-B8 control switch is placed in TRIP. Although E-TR-B become inoperable instantaneously E-TR-S becomes operable when E-CB-8/1 is closed, therefore only one offsite supply is inoperable at a time.					
	19	Step 5.10.8 IF required to maintain TR-B available**,** THEN **STATION** a dedicated operator at E-CB-B8.	Candidate asks for CRS direction (optional). Candidate directs an Equipment Operator to be stationed at E-CB-B8.	As CRS directs that TR-B remain available. As equipment operator, state that you are stationed at E-CB-B8	S / U

	20	Step 5.10.9 IF TR-B is required to be operable, THEN **ENTER** E-TR-B as inoperable in the Plant Logging System. Refer to LCO 3.8.1 and 3.8.2.	Candidate asks for CRS direction.	As CRS, state that log entries will be made.	S / U
	21	Step 5.10.10 **CLOSE** E-CB-8/3.	Candidate closes E-CB-8/3.		S / U *

Termination Criteria: Student completes assigned tasks through procedure step 5.10.10 (JPM Step 21).

JPM Stop Time: ______________

Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.

RESULTS OF JPM

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: SM-3 has been transferred from the Startup Transformer to the Normal Transformer per SOP-ELEC-4160V-OPS. SM-8 has been transferred from the Backup Transformer to SM-3 in accordance with SOP-ELEC-4160V-OPS.

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

COMMENTS:

Evaluator's Signature: ______________________________ **Date:** ______________

STUDENT JPM INFORMATION CARD

Initial Conditions:

Plant startup is in progress. All busses have been transferred from TR-S to TR-N other than SM-3. SM-8 is aligned to TR-B due to maintenance being conducted on breaker E-CB-8/3. Maintenance has just been completed on breaker E-CB-8/3 and it is ready for post maintenance testing.

Initiating Cue:

The CRS has directed you to transfer SM-3 from TR-S to TR-N in accordance with SOP-ELEC-4160V-OPS.

The CRS has also directed you to transfer SM-8 from TR-B to SM-3 to support post maintenance testing in accordance with SOP-ELEC-4160V-OPS.

- All Prerequisites / Precautions and Limitations have been addressed.
- CRS has addressed Tech Specs.

JPM S-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	RESPOND TO A LOSS OF SHUTDOWN COOLING (Sim)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-2	Rev. No.	2
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	12/29/16
REVISED BY	Dave E. Crawford	DATE	02/07/17

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:

Manually place simulator in MODE 4 with RHR-P-2B lined-up for SDC with SW-P-1B operating. Insert inadvertent closure of RHR-V-8 and RHR-V-9. Perform steps to secure RHR Loop “B” Shutdown Cooling Lineup using SOP-RHR-SDC (Section 5.5).

Special Setup Instructions:

Place Danger Tag on RHR-V-64B (RHR “B” Min Flow valve control switch)

Have copy of SOP-RHR-SDC, section 5.7, available for student (ensure all of section 3 and 4 initialed (or N/A’d and initialed), as appropriate for plant conditions and steps 5.7.1 & 5.7.2 initialed with step 5.7.3 marked N/A and initialed.)

Clear BISIs on H13-P601 after simulator placed in RUN

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Consider allowing student to review initial conditions and que prior to entering simulator (time saver).

Tools/Equipment: None

Task Number: RO-1300

Alternate Path: Yes

PPM Reference: SOP-RHR-SDC rev 25

NUREG 1123 Ref: 205000.A2.06 (3.4 / 3.5)

Safety Items: None

Validation Time: 15

Time Critical: No

Location: Simulator

Performance Method: Perform

Task Standard: RHR pump B started and shutdown cooling flow re-established between 5400 gpm and 8000 gpm in accordance with SOP-RHR-SDC steps 5.7.4 through 5.7.23.

JPM CHECKLIST

INITIAL CONDITIONS:	Given the following: • The reactor is in Mode 4. • RHR Loop B was in Shutdown Cooling when RHR-V-8 and RHR-V-9 inadvertently closed, tripping RHR-P-2B. • Shutdown Cooling has been off for 30 minutes. • No activities have occurred that could cause the formation of voids in RHR-B. • RHR Loop B Shutdown Cooling lineup has been secured per SOP-RHR-SDC, Section 5.5. • SW-P-1B is operating per SOP-SW-START.
INITIATING CUE:	The CRS directs you to restore RHR Loop B shutdown cooling per SOP-RHR-SDC, section 5.7, RHR Loop B Shutdown Cooling Quick Restart. All Precautions and Limitations have been reviewed. Steps 5.7.1 – 5.7.3 are complete. Begin at step 5.7.4.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: ______________					
CAUTION: To prevent failure of the RHR pumps due to excessive radiation exposure, alternate shutdown cooling, by Suppression Pool Cooling, is the only allowable mode for shutdown cooling once a degraded core condition has been identified.					
CAUTION: Two Loop RHR Shutdown Cooling operations may cause actuation of Excess Flow Trip Isolation if ICP-RHR-Q901, RHR SDC Mode High Flow Isolation – CFT/CC, has not been completed within its required surveillance interval.					
CAUTION: Failure to warm the RHR pump suction line may cause excessive thermal stress on the RHR injection line/Recirculation piping tee.					
NOTE: This section is used if the Delta-T between RHR B Heat Exchanger Outlet and RRC-P-1A Suction (RRC-TR-650, pt. 1, or TDAS pt. X292) is LT 80 degrees F.					
NOTE: If normal Shutdown Cooling cannot be used, then refer to ABN-RHR-SDC-ALT.					

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
NOTE: Technical Specifications require Reactor Vessel and head flange temperatures be maintained GT 80 degrees F when the Vessel head bolting studs are being tensioned. (SR 3.4.11.7)					
NOTE: If core decay heat is present, or if system metal temperature is high, a recirculation pump of RHR pump (do not use a recirculation pump if an RHR pump is available) along with a means of determining Reactor water temperature should be kept in service.					
Examiner Note: Candidate may bring up Shutdown Cooling screen on PDIS computer to validate system parameters.					
	1	Step 5.7.4 VERIFY RHR-V-8 OPEN (RHR Shutdown Cooling Suction Outboard Isolation) (H13-P601).	• Observed RHR-V-8 CLOSED. • Repositioned RHR-V-8 Switch to open. • Observed that RHR-V-8 Red Light is ON and Green Light is OFF.		S / U *
	2	Step 5.7.5 VERIFY RHR-V-9 OPEN (RHR Shutdown Cooling Suction Inboard Isol) (H13-P601).	• Observed RHR-V-9 CLOSED. • Repositioned RHR-V-9 Switch to open. • Observed that RHR-V-9 Red Light is ON and Green Light is OFF.		S / U *
	3	Step 5.7.6 VERIFY RHR-V-4B CLOSED (Pump Suction from Supp Pool) (H13-P601).	Observed RHR-V-4B Red Light is OFF and Green Light is ON.		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	Step 5.7.7 **VERIFY** RHR-V-6B **OPEN** (Shutdown Cooling Suction) (H13-P601).	Observed RHR-V-6B Red Light is ON and Green Light is OFF.		S / U
	5	Step 5.7.8 IF RHR-V-6B, RHR-V-8, or RHR-V-9 were closed, AND any activity occurred that could cause the formation of voids while they were closed, THEN **FILL** and **VENT** RHR-P-2B suction piping as follows:	N/A per initial cue.		S / U
	6	Step 5.7.9 **VERIFY** RRC-P-1B **OFF** per SOP-RRC-SHUTDOWN.	Observed RRC-P-1B Red RUN Light is OFF and Green STOP Light is ON.		S / U
<u>NOTE</u>: IF CRD Recirculation Pump seal purge is in operation, do <u>not</u> close both RRC-V-67B and RRC-V-23B.					
	7	Step 5.7.10 **VERIFY** one of the following **CLOSED**. N/A the other. • RRC-V-67B (preferred) (Recirc Pump B Discharge) (H13-P602) • RRC-V-23B (Recirc Pump B Suction) (H13-P602)	Verified RRC-V-67B Red Light is OFF and Green Light is ON		S / U

	8	Step 5.7.11 IF unable to close either RRC-V-23B or RRC-V-67B, THEN **REFER** to ABN-RHR-SDC-ALT.	N/A (RRC-V-67B already closed)		S / U
<u>NOTE</u>: IF the RRC pump is not in service, than an alternate RRC temperature as determined by the CRS/Shift Manager should be used.					
	9	Step 5.7.12 IF RHR-SDC-B has been off GT two hours, THEN **VERIFY** the ΔT between RHR B Heat Exchanger Outlet (RHR-TRS-601 or TDAS pt. X059) and RRC-P-1A Suction (RRC-TR-650, pt. 1, or TDAS pt. X292) is LT 80° F. • RRC pump suction temperature. ______F • RHR B Heat Exchanger (HX) Outlet temperature. ______F • ΔT between suction and HX Outlet temperatures. ______F	N/A per initial cue.		S / U
	10	Step 5.7.13 **VERIFY** RHR-V-3B is **CLOSED** (RHR-HX-1B Isolation) (H13-P601).	Verified RHR-V-3B Red Light is OFF and Green Light is ON.		S / U

	11	Step 5.7.14 **CLOSE** or **VERIFY CLOSED** RHR-V-48B (RHR-HX-1B Shell Side Bypass) (H13-P601).	Verified RHR-V-48B Red Light is OFF and Green Light is ON. (valve already closed)		S / U
NOTE: The following steps are designed to minimize the potential of a water hammer when RHR-P-2B is started.					
Examiner Note: Power is available to RHR-V-53B.					
	12	Step 5.7.15 IF power is available to RHR-V-53B, THEN **THROTTLE OPEN** RHR-V-48B approximately 8 seconds.	• Verified either RHR-V-53B Red or Green Light is ON. • Repositioned and held RHR-V-48B to open for approximately 8 seconds and released. • Verified both RHR-V-48B Red and Green Lights are ON.		S / U *
	13	Step 5.7.16 IF required, THEN **LOG** RPV cooldown rate per OSP-RCS-C102.	Informs CRS about OSP-RCS-C102 surveillance requirement.	Acknowledge report and state that another operator will be assigned to the surveillance.	S / U
	14	Step 5.7.17 IF starting the RHR pump during refuel activities, THEN **NOTIFY** the Refuel Supervisor RPV water clarity may be reduced.	N/A (not refueling)		S / U

	15	Step 5.7.18 **VERIFY** SW-P-1B operating per SOP-SW-START.	• Verified SW-P-1B Red Light is ON and Green Light is OFF • Observed flow was indicating in normal band.		S / U
CAUTION: Exceeding a flow of 8000 gpm or failure to maintain 800 gpm may cause RHR pump damage/failure.					
NOTE: Attachment 6.1 shows RHR recommended operating conditions.					
NOTE: With RHR B PUMP DISCH PRESS HIGH/LOW in alarm, RHR-P-2B may be started for EOP related activities.					
Examiner Note: Two-handed operation is allowed.					
Examiner Note: Only first bullet (pump start) required to satisfy Critical Step.					
	16	Step 5.7.19 **START** RHR-P-2B.	• Rotated RHR-P-2B control-switch to start. • Verified Red Light is ON and Green Light is OFF • Observed discharge pressure increased.		S / U *

Examiner Note: Power is available to RHR-V-53B. Two-handed operation is allowed.					
Examiner Note: Only second bullet (open RHR-V-53B) required to satisfy Critical Step.					
	17	Step 5.7.20 IF power is available to RHR-V-53B, THEN **IMMEDIATELY OPEN** RHR-V-53B (Shutdown Cooling Return) (H13-P601).	• Verified either RHR-V-53B Red or Green Light is ON. • Rotated RHR-V-53B control-switch to Open. • Verified RHR-V-53B Red Light is ON and Green Light is OFF.		S / U *
	18	Step 5.7.21 IF power is not available to RHR-V-53B, AND RHR-V-53B has been left **OPEN**, THEN **IMMEDIATELY THROTTLE OPEN** RHR-V-48B approximately 8 seconds:	N/A (power available)		S / U
	19	Step 5.7.22 IF flow is not GE 3000 gpm, THEN **THROTTLE** RHR-V-48B to establish approximately 3000 gpm.	Verified flow LT 3000 gpm then rotated and held RHR-V-48B control-switch in Open until approximately 3000 gpm flow was established.		S / U

Examiner Note: Critical Step met if flow within range of 5400 gpm to 8000 gpm.					
	20	Step 5.7.23 After 30 seconds, **THROTTLE** RHR-V-48B to establish GT 5400 gpm but LT 8000 gpm (preferably GT 7000 gpm).	Rotated and held RHR-V-48B control-switch in Open until GT 5400 gpm but LT 8000 gpm was established (preferably GT 7000 gpm).		S / U *
Termination Criteria: Steps 5.7.4 through 5.7.23 complete.					
JPM Stop Time: ______________					
Transfer the following to the "Results of JPM" page: Any Unsat step – indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

Examinee (Print): ______________________________

Evaluator (Print): ______________________________

Task Standard: RHR pump B started and shutdown cooling flow re-established between 5400 gpm and 8000 gpm in accordance with SOP-RHR-SDC steps 5.7.4 through 5.7.23.

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

COMMENTS:

Evaluator's Signature: ______________________ **Date:** __________

S-2 Rev. 2

STUDENT JPM INFORMATION CARD

Initial Conditions:

Given the following:

- The reactor is in Mode 4.
- RHR Loop B was in Shutdown Cooling when RHR-V-8 and RHR-V-9 inadvertently closed, tripping RHR-P-2B.
- Shutdown Cooling has been off for 30 minutes.
- No activities have occurred that could cause the formation of voids in RHR-B.
- RHR Loop B Shutdown Cooling lineup has been secured per SOP-RHR-SDC, Section 5.5.
- SW-P-1B is operating per SOP-SW-START.

Initiating Cue:

The CRS directs you to restore RHR Loop B shutdown cooling per SOP-RHR-SDC, section 5.7, RHR Loop B Shutdown Cooling Quick Restart.

All Precautions and Limitations have been reviewed.

Steps 5.7.1 – 5.7.3 are complete (begin at step 5.7.4)

JPM S-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	HPCS SYSTEM INITIATION (Sim)(Alt Path)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-3	Rev. No.	4
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	12/29/16
REVISED BY	Dave E. Crawford	DATE	02/10/17

TECHNICAL REVIEW BY		DATE	
INSTRUCTIONAL REVIEW BY	SAT Coordinator	DATE	
APPROVED BY	Operations Training Manager	DATE	

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:

Initialize to IC-212
Execute associated Schedule/Event files

Special Setup Instructions:

Insert a manual scram and allow RPV/L to recover to about 0” then trip both RFPs. Reduce RPV inventory to -40 inches

Insert malfunction MOV-CSS004F to FAIL_AUTO_CLOSE

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0235

Validation Time: 10 minutes

Alternate Path: Yes

Time Critical: No

PPM Reference: SOP-HPCS-INJECTION-QC Rev. 4

Location: Simulator

NUREG 1123 Ref: 209002 A4.04 (3.1 / 3.1)

Performance Method: Perform

Task Standard: HPCS-P-1 is running. HPCS Min Flow valve (HPCS-V-12) has been manually closed. RPV level is in the band of +13” to +54” with HPCS-V-4 closed without causing a Level 8 trip.

JPM CHECKLIST

INITIAL CONDITIONS:	A failure of the master controller caused RPV level to drop. The Control Room Supervisor directed a manual scram. Both Reactor Feed Pumps tripped as RPV level approached 0". PPM 5.1.1, RPV Control, has been entered. RCIC system in not available.
INITIATING CUE:	The CRS has directed you to initiate the HPCS system, verify proper system operation, and restore RPV level back to a band of +13" to +54". Inform the CRS when system operation has been verified; RPV level is in the band of +13" to +54", and HPCS-V-4 has been closed.

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
JPM Start Time: ______________					
	1	Step 2.1 Verify Reactor Level 8 Seal-in (HPCS-RMS-E22A/S6) is reset	Observes Level 8 amber seal-in light is not lit		S / U
	2	Step 2.2 If not already running, then ARM and DEPRESS the HPCS MANUAL INITIATION pushbutton	Rotates the collar in the clockwise direction and depresses the pushbutton to initiate HPCS		S / U *
	3	Step 2.3 Verify HPCS-P-1 running	Observes HPCS-P-1 Red light on and Green light off. May also verify discharge pressure and amps		S / U
	4	Step 2.4 Verify HPCS-V-4 open (RPV Injection)	Observes HPCS-V-4 Red light on and Green light off		S / U

Evaluator note: Min Flow valve (HPCS-V-12) should automatically close when HPCS injection rate exceeds ~1300 gpm. Student should recognize that HPCS-V-12 is full open when it should have closed.					
Alt Path	5	Recognize HPCS-V-12 failed to close with RPV injection flow above 1300 gpm.	Manually closes HPCS-V-12 when RPV injection flow rate exceeds ~1300 gpm but before HPCS-V-4 is closed following level restoration.		S / U *
	6	Step 2.5 Operate HPCS-V-4 as necessary to maintain the desired RPV level	• Observes RPV level and when level is approaching +13” and prior to RPV level reaching +54” takes the control switch for HPCS-V-4 to closed and observes Green light on and Red light off. • Level is in band immediately following HPCS-V-4 closure.		S / U *
	7	Verifies proper HPCS System operation (given in Initiating Cue to perform)	Observes indications that HPCS DG is running Observes that HPCS-P-2 Green light is off and Red light is on		S / U S / U
Termination Criteria: Student reports RPV level restored to specified band using HPCS. HPCS-V-4 is closed.					
JPM Stop Time: _______________					
Transfer the following to the “Results of JPM” page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: HPCS-P-1 is running. HPCS Min Flow valve (HPCS-V-12) has been manually closed. RPV level is in the band of +13” to +54” with HPCS-V-4 closed without causing a Level 8 trip.

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

COMMENTS:

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Evaluator's Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION CARD

Initial Conditions:

- A failure of the master controller caused RPV level to drop.
- The Control Room Supervisor directed a manual scram.
- Both Reactor Feed Pumps tripped as RPV level approached 0”.
- PPM 5.1.1, RPV Control, has been entered.
- RCIC system in not available.

Initiating Cue:

The CRS has directed you to initiate the HPCS system, verify proper system operation, and restore RPV level back to a band of +13” to +54”.

Inform the CRS when system operation has been verified; RPV level is in the band of +13” to +54”, and HPCS-V-4 has been closed.

Number: SOP-HPCS-INJECTION-QC	Use Category: CONTINUOUS	Major Rev: 004
Title: HPCS RPV Injection - Quick Card		Minor Rev: 003 Page: 4 of 6

2.0 PROCEDURE

2.1 **VERIFY** Reactor Level 8 Seal-in (HPCS-RMS-E22A/S6) is **RESET**. _____

2.2 IF not already running,
THEN **ARM** and **DEPRESS** the HPCS MANUAL INITIATION pushbutton. _____

2.3 **VERIFY** HPCS-P-1 running. _____

2.4 **VERIFY** HPCS-V-4 **OPEN** (RPV Injection). _____

2.5 **OPERATE** HPCS-V-4, as necessary, to maintain the desired RPV level. _____

JPM S-4

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	INITIATE CR HVAC IN MANUAL PRESSURIZATION MODE (Sim)(Alt Path)		
LESSON LENGTH	.5 HRS		

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-4	Rev. No.	2
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Steve Bruce	DATE	11/16/16
REVISED BY	Dave E. Crawford	DATE	02/05/17

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:

INITIALIZE to IC-210 or any MODE with CR HVAC in normal line-up.

<u>AND</u> perform ONE the following:

- Load JPM S-4.SCH file and JPM S-4.EVT files
- Enter following into a newly created Schedule file and Event file:

  Schedule file:

  - Insert malfunction MOV-RWB005F to FAIL_AUTO_OPEN
  - Insert override OVR-RWB023D to ON
  - Insert malfunction MOV-RWB002F to CLOSE on event 1
  - Insert override OVR-RWB027A to OFF on event 1
  - Insert override OVR-RWB027B to OFF on event 1
  - Insert override STL-CRHVAC221 to ON on event 1
  - Insert STL-CRHVAC221 to ON on event 1
  - Insert override OVR-RWB023D to OFF on event 2

  Event file:

  - XWNI096C == 1 (Auto inserts Trigger 1)
  - km05sp(5) == 1 (Auto inserts Trigger 2)

Special Setup Instructions:

Note: TRIGGER 1 – "Removal of Fuse 3 in HVAC Panel COHV-2 on RW 525" can be accomplished by turning switch for TMU-V-18A (on H13-P824) to CLOSE (performed by evaluator) or via the Booth.

Provide copy of SOP-HVAC/CR-OPS with steps 5.12.1 & 5.12.2 initialed as complete.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0502

Validation Time: 7 Minutes

Alternate Path: Yes

Time Critical: No

PPM Reference: SOP-HVAC/CR-OPS Rev. 24

Location: Simulator

NUREG 1123 Ref: 290003 A4.03 (2.8 / 2.8)

Performance Method: Perform

Task Standard: Control Room Ventilation Train "B" has been placed in Control Room Pressurization Mode per SOP-HVAC/CR-OPS, section 5.12.

JPM CHECKLIST

INITIAL CONDITIONS:	Control Room HVAC is normal operation with WMA-FN-51B running.
INITIATING CUE:	CRS has directed Control Room Ventilation Train "B" be placed in Pressurization Mode per SOP-HVAC/CR-OPS section 5.12. All Precautions and Limitations have been reviewed. Steps 5.12.1 and 5.12.2 are complete. Inform CRS when task is complete.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: _____________					
Note: Unless otherwise noted, all control switches and annunciators are located on H13-P826.					
Examiner Note: Start at step 5.12.4 for CR HVAC Train B.					
	1	Step 5.12.3 is N/A	N/A because direction is to lineup CR HVAC Train B		S / U
	2	Step 5.12.4.a. **VERIFY** WMA-FN-51B running (Recirc Fan).	Verified WMA-FN-51B Red light ON and the Green light OFF		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	3	Step 5.12.4.b. **VERIFY** the following intake pathways locked open: (H13-P826) Remote Intake Number 1 (NW) Isol): WOA-V-51A (Remote Air Intake No. 1 **LOCKED OPEN** WOA-V-52A (Remote Air Intake No. 1 **LOCKED OPEN** Remote Intake Number 2 (SE) Isol): WOA-V-51B (Remote Air Intake No. 2 **LOCKED OPEN** WOA-V-52B (Remote Air Intake No. 2 **LOCKED OPEN**	Verified (4) valves open by observing Red Light ON and Green Light OFF on H13-P826. Verified LOCKED OPEN by Lock Valve Checklist or Field Operator.	If asked, valves in this step are verified locked open as annotated in the Lock Valve Checklist PPM 1.3.29, page 38. If asked to verify as a field operator, report the valves in this step are verified locked open.	S / U
	4	Step 5.12.4.c. **CLOSE** the following: WOA-V-51C (Outside Air Intake) WOA-V-52C (Outside Air Intake)	Rotated WOA-V-51C control-switch to close and verified Red Light OFF and Green Light ON. Rotated WOA-V-52C control-switch to close and verified Red Light OFF and Green Light ON.		S / U *
Examiner Note: ROLEPLAY: Grant permission as CRS/Shift Manager to install temporary modification.					

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	5	Step 5.12.4.d. **REQUEST PERMISSION** from CRS/Shift Manager to install temporary modification to disable (fail closed) WMA-AD-51B1 (Fresh Air Inlet).	Formally requested permission from CRS/Shift Manager to install temporary Modification per SOP-HVAC/CR-OPS.	ROLEPLAY: Grant permission as CRS/Shift Manager to install temporary modification.	S / U
Simulator Operator: <u>When directed</u>, insert Trigger 1					
	6	Step 5.12.4.e. **REMOVE** Fuse 3 in HVAC Panel COHV-2. (Ref. EWD-84E-002)	Directs field operator to remove fuse 3 in HVAC Panel COHV-2 and waits for report from field that fuse removal is complete.	<u>After Trigger 1 is inserted:</u> ROLEPLAY: Report as field operator and simultaneous verifier that Fuse 3 in HVAC Panel COHV-2 on RW 525' has been removed.	S / U *
	7	Step 5.12.4.f. **START** WMA-FN-54B by placing control switch in **ON** (Emergency Filter Unit Fan).	Rotated WMA-FN-54B control-switch to ON, observed Red Light ON and Green Light OFF.		S / U *
	8	Step 5.12.4.g.1. **VERIFY** the following occurs: 1) WMA-FN-54B starts.	WMA-FN-54B Red Light ON and Green Light OFF.		S / U
Examiner Note: The next 2 steps constitute the Alternate Path portion of the JPM.					

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
Alt Path	9	Step 5.12.4.g.2. **VERIFY** the following occurs: 2) WMA-AD-54B1 **OPEN** (WMA-FU-54B Inlet).	WMA-AD-54B1 Red Light OFF and Green Light ON. Examinee recognizes WMA-AD-54B1 failed to OPEN and turns control-switch to open and verifies Red Light ON and Green Light Off.		S / U *
Alt Path	10	Step 5.12.4.g.3. **VERIFY** the following occurs: 3) WEA-FN-51 stops (Toilet/Kitchen Exhaust Fan).	WEA-FN-51 Red Light ON and Green Light OFF Examinee recognizes WEA-FN-51 failed to turn off and turns control-switch to OFF and verifies Red Light OFF and Green Light ON.		S / U *
	11	Step 5.12.4.g.4. **VERIFY** the following occurs: 4) WEA-AD-51 **CLOSED** (Outlet Damper).	WEA-AD-51 Red Light OFF and Green Light ON.		S / U
	12	Step 5.12.4.g.5. **VERIFY** the following occurs: 5) WMA-AD-54B2) **CLOSED** (WMA-FU-54B Inlet Bypass)	Verified the following: WMA-AD-54B2 Red Light OFF and Green Light ON.		S / U
JPM Stop Time: _____________					
Termination Criteria: Control Room HVAC Train "B" has been placed in Control Room Pressurization Mode.					

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
Terminating Cue: Student reports Control Room HVAC Train "B" has been placed in Control Room Pressurization Mode.					
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

Examinee (Print): ____

Evaluator (Print): ____

Task Standard:
Control Room Ventilation Train "B" has been placed in Control Room Pressurization Mode per SOP-HVAC/CR-OPS, section 5.12.

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

COMMENTS:

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Evaluator's Signature: ____________________________ **Date:** __________

Initial Conditions:

Control Room HVAC is in normal operation with WMA-FN-51B running.

Initiating Cue:

CRS has directed Control Room Ventilation Train “B” be placed in Pressurization Mode per SOP-HVAC/CR-OPS section 5.12. **All Precautions and Limitations have been reviewed.** **Steps 5.12.1 and 5.12.2 are complete.** **Inform CRS when task is complete.**

JPM S-5

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	RE-ESTABLISH SECONDARY CONTAINMENT/START RB HVAC (Sim)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-5	Rev. No.	3
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	06/03/08
REVISED BY	Dave E. Crawford	DATE	02/06/17

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:

None

Special Setup Instructions:

Reset to any IC. Turn off both ROA and REA fans. Allow secondary D/P to decay such that all expected annunciators are received. Acknowledge all associated annunciators.

JPM Instructions:

Verify current procedure against JPM. Revise JPM if any steps have changed.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0497

Validation Time: 8 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: SOP-HVAC/ RB-RESTART-QC Rev. 1

Location: Simulator

NUREG 1123 Ref: 290001 A4.01 (3.3 / 3.4)

Performance Method: Perform

Task Standard: ROA-FN-1A and REA-FN-1A are running with REA-DPIC-1A in Auto and adjusted to achieve approximately -0.8” W.G.

JPM CHECKLIST

INITIAL CONDITIONS:	A series of events occurred that resulted in no running Reactor Building Supply or Exhaust fan. PPM 5.3.1, Secondary Containment Control, was entered due to high Reactor Building differential pressure. Prior to starting Standby Gas Treatment, the Control Room received information that Reactor Building HVAC could be restarted.
INITIATING CUE:	The CRS directs you to restart RB HVAC by starting ROA-FN-1A and REA-FN-1A per SOP-HVAC RB-RESTART-QC. Inform the CRS when Secondary Containment may be declared operable. Simulate all plant announcements.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
JPM Start Time: _____________					
Student uses the quick card to perform this JPM.					
	1	Step 2.1 Place REA-DPIC-1A(1B) (ΔP Control RX Bldg/Outside) in manual.	Places toggle for REA-DPIC-1A to the Manual position.		S / U *
	2	Step 2.2 Set REA-DPIC-1A(1B) output signal at approximately 60% of scale	Depresses the open and/or closed pushbutton for REA-DPIC-1A to have red indicator at approximately 60% of scale.		S / U *
	3	Step 2.3 Place the control switch for the following fans in PULL-TO-LOCK: • ROA-FN-1A (Reactor Bldg Supply Fan) • ROA-FN-1B (Reactor Bldg Supply Fan) • REA-FN-1A (Reactor Building Exhaust Fan) • REA-FN-1B (Reactor Building Exhaust Fan)	Turns the handles counter-clockwise and pulls out to engage the Pull-To-Lock position for: • ROA-FN-1A (Reactor Bldg Supply Fan) • ROA-FN-1B (Reactor Bldg Supply Fan) • REA-FN-1A (Reactor Building Exhaust Fan) • REA-FN-1B (Reactor Building Exhaust Fan)		S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	Step 2.4 Verify the following valves are open: • ROA-V-1 (RB Supply Outboard Isolation) • ROA-V-2 (RB Supply Inboard Iso) • REA-V-1 (RB Exhaust Inboard Iso) • REA-V-2 (RB Exhaust Outboard Isol)	Observes the Red light on and Green light off for: • ROA-V-1 • ROA-V-2 • REA-V-1 • REA-V-2		S / U
	5	Step 2.5 (2H) Place REA-RMS-FN1A(B) in Start (Reactor Bldg Exhaust Fan Control Switch).	Depresses the control switch handle for REA-FN-1A to the neutral position. Turns the same handle clockwise to the Start position and then releases it.	If student attempts to make a plant announcement STOP THEM. Inform them to make a simulated announcement.	S / U *
	6	Step 2.6 When REA-FN-1A(1B) breaker closure is observed (red light), then immediately place ROA-RMS-FN1A(B) in Start (Reactor Bldg Supply Fan Control Switch).	Observes the red light for REA-FN-1A comes on. Depresses the control switch handle for ROA-FN-1A to the neutral position. Turns the same handle to the Start position and releases it.		S / U *
	7	Step 2.7 Manually adjust REA-DPIC-1A(1B) controller output until Reactor Building pressure on REA-DPR-1A(1B) is approximately -0.80 W.G.	Adjusts REA-DPIC-1A to achieve approximately -0.8" W.G.. on REA-DPR-1A.		S / U *
	8	Step 2.8 Null REA-DPIC-1A (1B), and place REA-DPIC-1A (1B) in AUTO.	Turns thumbwheel until REA-DPIC-1A is nulled <u>or</u> waits until red arrow lines up with green band and then moves lever to AUTO position.		S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	9	Step 2.9 Place the control switch for the following non-running fans in the NORMAL-after-STOP position. • ROA-FN-1B(1A) • REA-FN-1B(1A)	Depresses the control switch handles for ROA-FN-1B and REA-FN-1B from PTL and allows switches to go to the neutral position. Observes the green flag is visible on each switch.		S / U
	10	Step 2.10 Notify the CRS that Secondary Containment may be declared operable.	Informs the CRS that Secondary Containment may be declared operable.		S / U
Termination Criteria: Student informs CRS that Secondary Containment may be declared operable.					
JPM Stop Time: _____________					
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: ROA-FN-1A and REA-FN-1A are running with REA-DPIC-1A in Auto and adjusted to achieve approximately -0.8" W.G.

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

COMMENTS:

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Evaluator's Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION CARD

Initial Conditions:

A series of events occurred that resulted in no running Reactor Building Supply or Exhaust fan.

PPM 5.3.1, Secondary Containment Control, was entered due to high Reactor Building differential pressure.

Prior to starting Standby Gas Treatment, the Control Room received information that Reactor Building HVAC could be restarted.

Initiating Cue:

The CRS directs you to restart RB HVAC by starting ROA-FN-1A and REA-FN-1A per SOP-HVAC RB-RESTART-QC. Inform the CRS when Secondary Containment may be declared operable. Simulate all plant announcements.

Number: SOP-HVAC/RB-RESTART-QC	Use Category: CONTINUOUS	Major Rev: 001
Title: Reactor Building HVAC Restart - Quick Card		Minor Rev: 001 Page: 4 of 4

2.0 PROCEDURE

NOTE: This procedure may be used if reactor building ventilation has been lost and the cause has been corrected.

2.1 **PLACE** REA-DPIC-1A(1B) (ΔP Control RX Bldg/Outside) in **MANUAL**. _____

2.2 **SET** REA-DPIC-1A(1B) output signal at approximately 60% of scale. _____

2.3 **PLACE** the control switch for the following fans in **PULL-TO-LOCK**:

- ROA-FN-1A (Reactor Bldg Supply Fan) _____
- ROA-FN-1B (Reactor Bldg Supply Fan) _____
- REA-FN-1A (Reactor Building Exhaust Fan) _____
- REA-FN-1B (Reactor Building Exhaust Fan) _____

2.4 **VERIFY** the following valves are **OPEN**:

- ROA-V-1 (Reactor Bldg Supply Outboard Isolation) _____
- ROA-V-2 (Reactor Bldg Supply Inboard Isolation) _____
- REA-V-1 (Reactor Bldg Exhaust Inboard Isolation) _____
- REA-V-2 (Reactor Bldg Exhaust Outboard Isolation) _____

2H 2.5 **PLACE** REA-RMS-FN1A(B) in **START** (Reactor Bldg Exhaust Fan). _____

2.6 WHEN REA-FN-1A(1B) breaker closure is observed (red light),
THEN **IMMEDIATELY PLACE** ROA-RMS-FN1A(B) in **START** (Reactor Bldg Supply Fan). _____

2.7 **MANUALLY ADJUST** REA-DPIC-1A(1B) controller output until Reactor Building pressure on REA-DPR-1A(1B) is approximately -0.8" WC _____

2.8 **NULL** REA-DPIC-1A(1B), _____
AND **PLACE** REA-DPIC-1A(B) in **AUTO**. _____

2.9 **PLACE** the control switch for the following non-running fans in the **NORMAL-after-STOP** position.

- ROA-FN-1B(1A) _____
- REA-FN-1B(1A) _____

2.10 **NOTIFY** the CRS that Secondary Containment may be declared operable. _____

2.11 **NOTIFY** Chemistry that RB HVAC has been restarted. _____

ENERGY NORTHWEST

JPM S-6

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: LOWER RPV PRESSURE USING DEH (Sim) (Alt Path)

LESSON LENGTH: .5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-6	Rev. No.	3
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Ron Hayden DATE: 10/21/14

REVISED BY: Dave E. Crawford DATE: 02/10/17

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:

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

Special Setup Instructions:

Reduce RPV pressure to 605 psig using DEH in AUTO.

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: RPV pressure lowered at a rate of LE 50 psig per minute to LE 550 psig using BPV MANUAL mode.

JPM CHECKLIST

INITIAL CONDITIONS:	Columbia was operating at full power when a scram was required. Pressure has been lowered to 605 psig to facilitate feeding the RPV with the Condensate Booster Pumps per SOP-DEH-QC.
INITIATING CUE:	The CRS directs you to lower RPV pressure to 550 psig at the rate of 50 psig per minute 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
JPM Start Time:_______________					
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 Turbine Start Up, Reactor Startup Display, or Main Display.		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

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	10	f. Select YES.	Selects YES.		S / U
Alt Path	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.	What available action do you recommend to lower RPV pressure?	S / U
EVALUATOR: If SOP-DEH-OPS is referenced, when section for manual bypass valve operation is found, cue to use the DEH Quick Card.					
	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 due to initial pressure (605psig) being in close proximity to target pressure (550psig)		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	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.					
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.					
	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 a pressure reduction that does not exceed 50 psig per minute.		S / U *
If JPM step 19 was performed, skip JPM steps 20, 21, and 22 (which are now NOT critical step).					
	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 *
	23	When RPV pressure approaches/reaches 550 psig, closes Bypass Valves.	Selects BPV Lower.		S / U *
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.					
	24		Selects the JOG button until the BPVs are closed.		S / U *
	25		Selects Fast Action.		S / U
	26		Selects Go.		S / U *
	27		Selects Yes.		S / U *
Termination Criteria: When the BPVs are closed, inform the Student that the termination point of the JPM has been reached.					
JPM Stop Time:_______________					

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM
LOWER RPV PRESSURE USING BPVs IN MANUAL

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: RPV pressure lowered at a rate of LE 50 psig per minute to LE 550 psig using BPV MANUAL mode.

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

COMMENTS:

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Evaluator's Signature: ______________________________ **Date:** ____________

Initial Conditions:

Columbia was operating at full power when a scram was required. Pressure has been lowered to 605 psig to facilitate feeding the RPV with the Condensate Booster Pumps per SOP-DEH-QC.

Initiating Cue:

The CRS directs you to lower RPV pressure to 550 psig at the rate of 50 psig per minute per SOP-DEH-QC. **Inform the CRS when RPV pressure is 550 psig.**

Verify Revision Information Prior To Use	Initials	
	Date	

Number: SOP-DEH-QC	Use Category: CONTINUOUS	Major Rev: 005 Minor Rev: N/A Page: 1 of 6
Title: Main Turbine DEH Operations Quick Card		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-DEH-QC	Effective Date: 06/11/13

2.0 PROCEDURE

2.1 Initiating Pressure Change in Auto Pressure Control

> 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.

2.1.1 Initiate Pressure setpoint change as follows (Turbine Start-Up, Reactor Start Display) or (Main Display):

a. **SELECT** PRESSURE TARGET. _____

b. **ENTER** desired pressure. _____

c. **SELECT** OK. _____

d. IF a change in pressure rate is desired, THEN **PERFORM** the following:

1) **SELECT** PRESSURE RATE. _____

2) **ENTER** desired PRESSURE RATE. _____

3) **SELECT** OK. _____

e. **SELECT** GO. _____

f. **SELECT** YES. _____

g. **VERIFY** PRESS DEMAND and THROTTLE PRESS change at the PRESSURE RATE. _____

2.2 Manual Bypass Valve Operation

2.2.1 **OPERATE** the Bypass Valves Manually as follows (Turbine Start-Up, Reactor Start screen):

> 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.

a. **SELECT** BPV MANUAL. _____

b. **SELECT** YES. _____

c. IF Rapid Bypass Valve movement is desired,
THEN **SELECT** FAST ACTION. _____

d. IF opening Bypass Valves,
THEN **SELECT** BPV RAISE. _____

e. IF closing Bypass Valves,
THEN **SELECT** BPV LOWER. _____

> NOTE: The JOG button illuminates green when the command is accepted, and extinguishes when the command is complete.

f. IF incremental Bypass Valve movement is desired,
THEN **DEPRESS** JOG button once for each 1% of valve demand change desired. _____

g. **SELECT** GO for full range motion to 100% demand or 0% demand. _____

h. **SELECT** YES. _____

i. IF desired to stop BPV motion,
THEN **DEPRESS** HOLD. _____

j. **ESTABLISH** desuperheat spray at approximately 150 psig (COND-PI-40), by one or more of the following methods. N/A method(s) not used.

- **PLACE** COND-PCV-40 to **OPEN** (Desuper Spray Press Control) _____
- **PLACE** COND-V-178 to **OPEN** (Desuper Spray Bypass) _____
- **PLACE** COND-PIC-40 in **MANUAL** (TB 441, IR-9) to establish desuperheat spray at ~100 psig. _____

2.3 Manual Throttle Pressure Control

2.3.1 **OPERATE** Throttle Pressure Control in Manual as follows:
(Turbine Start-Up, Rx Start panel)

> NOTE: Throttle pressure control in manual directly controls Governor Valve and/or Bypass Valve demand signal. Raising the demand signal causes the valve(s) to open and lowering the demand signal causes the valve(s) to close. There is no feedback in this mode. This mode is very difficult to control pressure in and would generally not be used.

a. **SELECT** TP AUTO/MANUAL. _____

b. **SELECT** TP MANUAL. _____

c. **SELECT** YES. _____

d. To lower pressure **SELECT** DEMAND RAISE. _____

e. To raise pressure **SELECT** DEMAND LOWER. _____

f. IF Rapid Valve movement is desired,
THEN **SELECT** FAST ACTION and verify it illuminates. _____

> NOTE: The JOG button illuminates green when the command is accepted, and extinguishes when the command is complete.

g. IF incremental valve movement is desired,
THEN **DEPRESS** JOG button once for each 1% of valve demand change desired. _____

h. **SELECT** GO for full range motion to 100% demand or 0% demand. _____

i. **MONITOR** valve position and RPV pressure during valve motion. _____

j. IF it is desired to stop BPV motion,
THEN **DEPRESS** HOLD. _____

k. **ESTABLISH** desuperheat spray at approximately 150 psig (COND-PI-40), by one or more of the following methods. N/A method(s) not used.

- **PLACE** COND-PCV-40 to **OPEN** (Desuper Spray Press Control) _____
- **PLACE** COND-V-178 to **OPEN** (Desuper Spray Bypass) _____
- **PLACE** COND-PIC-40 in **MANUAL** (TB 441, IR-9) to establish desuperheat spray at ~100 psig. _____

JPM S-7

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	INITIAL LICENSED OPERATOR TRAINING
COURSE TITLE	JOB PERFORMANCE MEASURE
LESSON TITLE	RESTORE RPS A FROM ALTERNATE POWER SOURCE (Sim)
LESSON LENGTH	.5 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-7	Rev. No.	2
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Ron Hayden	DATE	9/02/06
REVISED BY	Dave E. Crawford	DATE	02/08/17

TECHNICAL REVIEW BY		
INSTRUCTIONAL REVIEW BY		
APPROVED BY	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:

Initialize to IC-214 or any IC with a normal electrical lineup with all load centers energized.
Ensure AR-EX-1B is in service.

Special Setup Instructions:

Insert malfunction MOT-EPS-0001G at 100%.
Acknowledge all annunciators, and allow plant to stabilize.

JPM Instructions:

Verify the current procedure against the JPM. If the procedure is a different revision than listed in the JPM, ensure the critical steps still match. If the critical steps have changed, the JPM should be revised.

The evaluator and student shall use current procedure. The evaluator should mark off steps as they are completed, note comments, and transfer the comments to the "Results of JPM" page.

Tools/Equipment: None

Safety Items: None

Task Number: RO-0248

Validation Time: 15 minutes

Alternate Path: No

Time Critical: No

PPM Reference: ABN-RPS Rev. 11

Location: Simulator

NUREG 1123 Ref: 212000 A2.01 (3.7 / 3.9)

Performance Method: Perform

Task Standard: RPS-A shifted to the Alternate Power Supply without causing a Reactor SCRAM. RPS half scram reset. RPS restoration completed per steps 4.6 through 4.8.

JPM CHECKLIST

INITIAL CONDITIONS:	A loss of RPS "A" occurred 20 minutes ago. All maintenance and surveillance testing has been stopped. Investigation revealed a failure of the "A" RPS MG set motor. ABN-RPS has been completed through step 4.5.
INITIATING CUE:	The CRS has directed you to transfer RPS "A" to its Alternate power supply by performing steps 4.6 through 4.8 of ABN-RPS. Inform the CRS when the subsequent actions for ABN-RPS have been completed and RPS "A" has been restored.

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
TIME START:________________					
Examiner Note: The candidate is given ABN-RPS					
Note: Due to loss of RPS A power to APRM Voter 1 and 3, the APRM Chassis 1 and 3 will default to the RUN setpoint. Due to loss of RPS B power to APRM Voter 2 and 4, the APRM Chassis 2 and 4 will default to the RUN setpoint.					
	1	Step 4.6 **PERFORM** the following to reenergize RPS:	**Proceeds to 4.6.1.**		
	2	Step 4.6.1 IF the condition of the RPS MG set is known to be operable, AND the RPS bus is known to be operable, THEN **RESTART** the RPS MG set, AND **REPOWER** the bus per SOP-RPS-START and SOP-RPS-OPS.	**N/A** The status of the A RPS MG set is NOT known to be operable. The initiating cue directs the candidate to restore power from the Alternate Source.		S / U

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
	3	Step 4.6.2. IF the condition of the RPS MG set is uncertain, THEN **REPOWER** RPS A or B from H13-P610 as follows:	**Proceeds to 4.6.2.a**		S / U
	4	Step 4.6.2.a. **VERIFY** power available from the Reactor Protection System Alternate Power Supply, MC-6B, by observing the Alternate Feed white light illuminated.	Check power available from the RPS Alternate Power Supply, MC-6B, by observing the Alternate Feed white light illuminated.		S / U
CAUTION: The MG Set Transfer switch is break before make and positioning it to the wrong supply will result in a full REACTOR SCRAM.					
	5	Step 4.6.2.b. IF repowering RPS A, THEN **PLACE** RPS Power Source Select switch in ALT A position.	Place the RPS power source selector switch in the position (ALT A) to be powered from the Alternate Supply		S / U *
	6	Step 4.6.2.c. IF repowering RPS B, THEN **PLACE** RPS Power Source Select switch in ALT B position.	**N/A** RPS B was not de-energized.		S / U

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
	7	Step 4.7.1 When RPS power has been restored stabilized, then perform the following:	If restoring RPS A then perform the following:		
	8	Step 4.7.1.a. **RESET** the Half SCRAM at H13-P603.	Reset the Half Scram at H13-P603		S / U *
	9	Step 4.7.1.b. **RESET** Main Steam Line Rad Monitor alarms at H13-P606: • MS-RIS-610A • MS-RIS-610C	Reset Main Steam Line Rad Monitor alarms at H13-P606.		S / U *
	10	Step 4.7.1.c. **DEPRESS** the following pushbuttons at H13-P601: • Isolation logic A&B reset pushbutton • Isolation logic C&D reset pushbutton	Depresses the "Isolation logic A & B" and "Isolation logic C & D" reset pushbuttons at H13-P601.		S / U *
	11	Step 4.7.1.d. **RETURN** RWCU to service per SOP-RWCU-START.	**N/A** Read the candidate the cue for this step.	**Inform the candidate that another operator is placing RWCU into service and to continue with ABN-RPS.**	S / U

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
	12	Step 4.7.1.e **RESET** RC-1 by depressing WMA-RMS-FAZ/3AXY pushbutton.	Resets RC-1 by depressing WMA-RMS-FAZ/3AXY pushbutton.		S / U *
	13	Step 4.7.1.f. **RESET** RC-2 by depressing WMA-RMS-FAZ/3BXY pushbutton.	Resets RC-2 by depressing WMA-RMS-FAZ/3BXY pushbutton.		S / U *
	14	Step 4.7.1.g. RHR SDC was in service, THEN **REFER** to ABN-RHR-SDC-LOSS.	**N/A** SDC was not in service.		S / U
	15	Step 4.7.1.h. **OPEN** RRC-V-20.	Opens RRC-V-20		S / U *
	16	Step 4.7.1.i. **OPEN** EDR-V-20.	Opens EDR-V-20		S / U *
	17	Step 4.7.2 IF restoring RPS B, THEN **PERFORM** the following.	**N/A** RPS B remains energized.		S / U
	18	Step 4.8. **OPEN** the following: (H13-P601) • FDR-V-3 • FDR-V-4	Verifies FDR-V-3 Open Opens FDR-V-4		S / U *

Termination Criteria: Candidate completes steps 4.6 through 4.8 of ABN-RPS.

*** Items are Critical Steps**

Time	Step	Element	Standard	Cue	Sat/Unsat
TIME STOP:_______________					
Transfer the following to the "Results of JPM" page: Any Unsat step - indicate if step was a Critical Step; JPM completion time.					

RESULTS OF JPM

RESTORE RPS A FROM ALTERNATE POWER SOURCE

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: RPS-A shifted to the Alternate Power Supply without causing a Reactor SCRAM. RPS half scram reset. RPS restoration completed per steps 4.6 through 4.8.

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

COMMENTS:

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Evaluator's Signature: ______________________________ **Date:** ______________

STUDENT JPM INFORMATION CARD

Initial Conditions:

- **A loss of RPS “A” occurred 20 minutes ago.**
- **All maintenance and surveillance testing has been stopped.**
- **Investigation revealed a failure of the “A” RPS MG set motor.**
- **ABN-RPS has been completed through step 4.5.**

Initiating Cue:

The CRS has directed you to transfer RPS “A” to its Alternate power supply by performing steps 4.6 through 4.8 of ABN-RPS.

Inform the CRS when the subsequent actions for ABN-RPS have been completed and RPS “A” has been restored.

ENERGY NORTHWEST

JPM S-8

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	LICENSED OPERATOR TRAINING		
COURSE TITLE	JOB PERFORMANCE MEASURE		
LESSON TITLE	Swap RCC Heat Exchangers		
LESSON LENGTH	.5 HRS		

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE	S-8	Rev. No.	3
EXAM PQD CODE		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave Crawford	DATE	1/20/17
REVISED BY	Dave Crawford	DATE	02/10/17

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:

This JPM is designed to have the candidate place RCC-HX-1A in service and remove RCC-HX-1C from service per SOP-RCC-OPS. To setup the simulator, select an IC where RCC is in the normal lineup and supports this heat exchanger swap. Normally, IC 15 is already in the proper configuration for this JPM.

INITIALIZE to IC-15 or any IC that supports shifting from RCC-HX-1C to RCC-HX-1A.

Special Setup Instructions:

This JPM requires the candidate to use the plant computer to display a system flow. ENSURE that the plant computer screen is cleared PRIOR to the start of the JPM so each candidate has to display the point themselves.

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:

Validation Time: 10 Minutes

Alternate Path: No

Time Critical: No

PPM Reference: SOP-RCC-OPS rev 4

Location: Simulator

NUREG 1123 Ref: 400000 A4.01 (3.1 / 3.0)

Performance Method: Perform

Task Standard: RCC-HX-1A is placed in service and RCC-HX-1C is removed from service per SOP-RCC-OPS section 5.2.

JPM CHECKLIST

INITIAL CONDITIONS:	The CRS has directed you to place RCC-HX-1A in service and remove RCC-HX-1C from service per SOP-RCC-OPS section 5.2. Equipment Operators have verified that RCC-V-3A is OPEN. TSW-V-63A and TSW-V-267A have also been verified to be OPEN. RCC-HX-1A does NOT need to be vented. SOP-RCC-OPS Prerequisites, Precautions, and Limitations have been reviewed.
INITIATING CUE:	The CRS has directed you perform section 5.2 of SOP-RCC-OPS to place RCC-HX-1A in service and remove RCC-HX-1C from service.

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
EVALUATOR NOTE: Ensure that plant computer screens are cleared from the previous JPM before starting.					
JPM Start Time:_______________					
	1	Step 5.2.1 **VERIFY** Heat Exchanger Inlet valve is open for the idle heat exchanger. N/A the valves not affected. • RCC-V-3A	Candidate identifies that RCC-V-3A is already open per the initiating cue, marks RCC-V-3A as open and completes the step.		S / U
	2	Step 5.2.2 **VERIFY** the following valves are open for the idle heat exchanger: N/A the valves not affected. • TSW-V-63A • TSW-V-267A	Candidate identifies that TSW-V-63A and TSW-V-267A are already open per the initiating cue, marks these valves as open then completes the step.		S / U
	3	Step 5.2.3 <ins>IF</ins> the heat exchanger has been fully isolated, <ins>THEN</ins> **VENT** the isolated heat exchanger as follows:	Candidate identifies in the initiating cue that heat exchangers DO NOT need to be vented. The step is marked "N/A"		S / U

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	4	Step 5.2.4 **OPEN** the TSW outlet valve. N/A the valves not affected. • TSW-V-64A	Candidate fully opens throttle valve TSW-V-64A by holding the control switch to OPEN.		S / U*
	5	Step 5.2.5 **OPEN** the RCC outlet valve. N/A the valves not affected. (The third heat exchanger should now be in service). N/A the valves not affected. • RCC-V-4A	Candidate fully opens throttle valve RCC-V-4A holding the control switch in OPEN.		S / U *
	6	Step 5.2.6 IF a heat exchanger is to be removed from service, THEN **REMOVE** the selected heat exchanger from service by closing the outlet valves: N/A the valves not affected. • TSW-V-64C • RCC-V-4C	Candidate closes throttle valve TSW-V-64C by holding the control switch in the CLOSE position. Candidate closes throttle valve RCC-V-4C by holding the control switch in the CLOSE position.		S / U *

*** Items are Critical Steps**

Time	JPM Step	Task Element	Performance Standard	Evaluator's Cue	Results
	7	Step 5.2.7 **THROTTLE OPEN** the off-line heat exchanger outlet valve to allow approximately 200 400gpm flow, as indicated on PDIS Signal Tag F124, to maintain proper water chemistry in the off-line heat exchanger. N/A the valves not affected. • TSW-V-64C	Candidate uses plant computer to display point F124 for RCC-HX-1C. There are multiple ways to do this any of which are appropriate provided the value is displayed in real time. Candidate throttles TSW-V-64C to establish 200-400GPM flow.		S / U *

Terminating Criteria: RCC-HX-1A is in service and RCC-HX-1C is removed from service.

JPM Stop Time:_______________

Transfer the following to the "Results of JPM" page: Any Unsat step – indicate if the step was a Critical Step; JPM completion time.

RESULTS OF JPM
RESPOND TO INDICATIONS OF A FIRE

Examinee (Print): ____

Evaluator (Print): ____

Task Standard: RCC-HX-1A is placed in service and RCC-HX-1C is removed from service per SOP-RCC-OPS section 5.2.

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

COMMENTS:

Evaluator's Signature: ________________________________ **Date:** ______________

Initial Conditions:

- The CRS has directed you to place RCC-HX-1A in service and remove RCC-HX-1C from service per SOP-RCC-OPS section 5.2.
- Equipment Operators have verified that RCC-V-3A is OPEN. TSW-V-63A and TSW-V-267A have also been verified to be OPEN.
- RCC-HX-1A does NOT need to be vented.
- SOP-RCC-OPS Prerequisites, Precautions, and Limitations have been reviewed.

Initiating Cue:

The CRS has directed you perform section 5.2 of SOP-RCC-OPS to place RCC-HX-1A in service and remove RCC-HX-1C from service.

ENERGY NORTHWEST	SC-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	RWCU NRHX fouling causes high temperature isolation on RWCU-V-4; CRD-P-1A trips requiring CRD-P-1B to be started; HPCS-P-1 control power failure (Tech Spec); RRC-FT-14A fails low causing APRM-CHS-1 to trip; SRV MS-RV-2B inadvertently opens (will close upon fuse removal); LOCA from RRC-P-1B suction line requiring manual scram; Spray Wetwell and Drywell; RFW-FIC-620 controller failure with RFW-V-109 failing to open and RFW-V-112A & B failing to open once closed; RCIC–FIC-600 fails low on startup requiring manual trip of RCIC turbine; Initiate Emergency Depressurization (ED) on low RPV level and restore RPV level to above TAF

LENGTH OF LESSON 1.5 Hours

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	SC-1	Rev. No.	1
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	12/22/16
REVISED BY	Dave E. Crawford	DATE	02/09/17
VALIDATED BY		DATE	

TECHNICAL REVIEW		DATE	
INSTRUCTIONAL REVIEW		DATE	
APPROVED		DATE	

Facility: Columbia Generating Station	Scenario No.: 1	Op Test No.: 1	
Examiners: ______ ______ ______		Operators: ______ ______ ______	

Initial Conditions:	The reactor is in Mode 1 at 100% power. RCIC Operability Test surveillance was just completed to satisfy Post Maintenance Testing (PMT) requirements and has been returned to a Standby status and declared operable. RHR-SYS-B was placed in Suppression Pool Cooling three (3) hours ago to restore Suppression Pool temperature following the testing and to satisfy RHR-P-2B PMT requirements. LCO 3.5.1 A.1, LCO 3.6.1.5 A.1, LCO 3.6.2.3 A.1, and RFO 1.6.1.5 A.1 have been entered for RHR-SYS-B being inoperable.
Turnover:	Maintain RHR-P-2B in operation for the next three (3) hours to satisfy pump PMT requirements for operability.

Critical Tasks:

CT-1	Initiate Drywell sprays when Wetwell pressure exceeds 12 psig but prior to exceeding PSP, after verifying Drywell parameters are within DSIL and RHR is NOT required for adequate core cooling.
CT-2	Initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) after RPV water level reaches TAF (-161 inches) and within 10 minutes of level dropping below TAF. CT considered met if any combination of 7 Safety Relief Valves are opened.
CT-3	After ED, and within 10 minutes of RPV pressure lowering to 200 psig, restore and maintain RPV water level above TAF (-161 inches) using Low Pressure ECCS systems.

NOTE: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	Malf No.	Event Type*	Event Description
1	TRG-2	C (BOP,SRO) TS (SRO)	RWCU NRHX fouling causes high temperature isolation signal to RWCU system. RWCU-V-4 will not close requiring manual closure of RWCU-V-1 (Tech Spec)
2	TRG-3	C (ATC,SRO)	CRD-P-1A trips requiring CRD-P-1B to be started
3	TRG-4	TS (SRO)	HPCS-P-1 control power failure (Tech Spec)
4	TRG-5	I (ATC,SRO)	RRC-FT-14A fails low causing APRM-CHS-1 to trip
5	TRG-6	C (BOP,SRO) R (ATC,SRO)	SRV MS-RV-2B inadvertently opens (will close upon fuse removal)
6	TRG-7	M (ALL)	LOCA from RRC-P-1B suction line requiring manual scram
			Spray Wetwell and Drywell **(CT #1)**
7	N/A	C (ATC,SRO)	RFW-FIC-620 controller failure with RFW-V-109 failing to open and RFW-V-112A & B failing to open once closed
8	N/A	C (BOP)	RCIC–FIC-600 fails low on startup requiring manual trip of RCIC turbine
9	N/A	---	Initiate Emergency Depressurization (ED) on low RPV level and restore RPV level to above TAF **(CT #2) (CT #3)**

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

Target Quantitative Attributes	Actual	Description
Malfunctions after EOP entry (1-2)	**2**	Inability to inject with feedwater; RCIC-FIC-600 output fails low
Abnormal events (2-4)	**5**	RWCU NRHX fouling; RWCU-V-4 will not close; CRD-P-1A trip; HPCS control power failure; SRV MS-RV-2B opens
Major transients (1-2)	**1**	LOCA from RRC-P-1B suction line
EOPs entered/requiring substantive actions (1-2)	**2**	PPM 5.1.1 (RPV Control); PPM 5.2.1 (Primary Containment Control)
EOP contingencies requiring substantive actions (0-2)	**1**	PPM 5.1.3 (Emergency RPV Depressurization)
Critical tasks (2-3)	**3**	See Critical Task Determination table

Trigger (TRG-x)	Evaluator Directed	How Triggered	Purpose	Malfunction Numbers
TRG-2	YES	Manually	Event Initiator	HTX-RCC010F
TRG-3	YES	Manually	Event Initiator	BKR-CRD001
TRG-4	YES	Manually	Event Initiator	BKR-CSS001
TRG-5	YES	Manually	Event Initiator	XMT-RRS036A
TRG-6	YES	Manually	Event Initiator	OVR-RRS022D
TRG-7	YES	Manually	Event Initiator	MAL-RRS004B
TRG-8		Automatically	Malf Trigger	MAL-RRS004D
TRG-9		Automatically	Malf Trigger	MOV-CFW044F
TRG-10		Automatically	Malf Trigger	MOV-CFW045F
TRG-11	**YES**[(2)]	Manually	Malf Trigger	BKR-CFW004; BKR-CFW005; BKR-CFW006
			Initial Condition	MAL-FWC011
			Initial Condition	MOV-RWC010F
			Initial Condition	MOV-CFW043F
			Initial Condition	CNH-RCI002B

[(2)] Contingency action (see Event 7 description).

SCENARIO 1 SUMMARY

Event 1

(TRG-2) Reactor Water Cleanup Non-Regenerative Heat Exchanger (RWCU-HX-2A/2B NRHX) fouling causes a rising temperature at the outlet of the NRHX leading to the RWCU filter demineralizers. The crew takes actions per ARP 4.602.A5 6-8 (CLEANUP FLTR INLET TEMP HI) to include monitoring temperature, verifying system lineup, and ensuring proper Reactor Closed Cooling (RCC) flow to the RWCU NRHX exist. When the crew recognizes that the RWCU NRHX outlet temperature is approaching 140°F, and isolation appears imminent, CRO-2 will stop the running RWCU pump (RWCU-P-1A) and attempt to close the RWCU Suction Outboard Isolation Motor-Operated Valve (MOV) (RWCU-V-4), which will not close. The crew will close the Inboard Isolation MOV (RWCU-V-1) to isolate RWCU.

The CRS refers to Technical Specifications and determines the following actions apply:

- LCO 3.6.1.3 A.1 – Isolate the affected penetration flow path (within 4 hours) by use of at least **one closed and de-activated automatic valve**, closed manual valve, blind flange or check valve with flow through the valve secured.
- LCO 3.6.1.3 A.2 – Verify the affected penetration flow path is isolated once per 31 days for isolation devices outside primary containment.

Event 2

(TRG-3) Control Rod Drive Pump 1A (CRD-P-1A) inadvertently trips requiring the ATC operator to start CRD-P-1B per ARP H13-P603 A-7 3-8 (CRD CHARGE WATER PRESS LOW). Actions include placing the CRD Flow Controller in Manual, zeroing the output and then starting CRD-P-1B. The controller is then nulled and placed back in Auto and CRD system parameters restored.

Event 3

(TRG-4) High Pressure Core Spray (HPCS-P-1) control power fails (fuses blow) due to electrical fault. The BOP operator refers to ARP 601.A1 6-8 (HIGH PRESSURE CORE SPRAY SYSTEM OUT OF SERVICE). If directed to investigate, the HPCS pump control power fuses are reported as blown. Any attempt to replace fuses will result in fuses again blowing.

With both RHR-SYS-B and HPCS inoperable, the CRS refers to Technical Specifications and determines the following additional actions apply:

- LCO 3.5.1 B.1 – Immediately verify by administrative means that RCIC is operable
- LCO 3.5.1 B.2 – Restore HPCS system to operable status within 14 days
- LCO 3.5.1 C.1 – Restore RHR-SYS-B or HPCS system to operable status within 72 hours

Event 4

(TRG-5) A downscale failure of Reactor Recirculation Flow Transmitter 14A (RRC-FT-14A) occurs causing Channel 1 of the Average Power Range Monitor (APRM-CHS-1) to trip. With only one (1) "vote" sent to the 2-out-of-4 voter logic no half-scram or reactor trip signals are generated. The crew takes actions per annunciator 603.A8 3-6 (FLOW REFERENCE OFF NORMAL). The CRS directs the ATC operator to bypass APRM-CHS-1.

With APRM-CHS-1 inoperable (and bypassed), the CRS refers to Technical Specifications and determines that only three (3) APRM channels are required to be operable and that no Technical Specification actions are required.

Event 5

(TRG-6) Non-ADS Safety Relief Valve (SRV) MS-RV-2B inadvertently opens. The crew confirms this by observing at least one of the following: 1) Rise on MS-RV-2B tailpipe temperature on MS-TR-614; 2) Rising Suppression Pool temperature or level; or 3) Reduction in Main Generator output of ~70 MWe. The CRS enters ABN-SRV and directs the ATC operator to reduce reactor power to < 90% using Reactor Recirculation (RRC) flow. The BOP attempts to close the SRV using the control switch. The valve will not close requiring the BOP to remove solenoid fuses per Attachment 7.1. Once fuses are removed the SRV closes. Entry into PPM 5.2.1 (Primary Containment Control) will be required if Suppression Pool level exceeds +2 inches or wetwell temperature exceeds 90°F.

Event 6

(TRG-7) A primary leak from the RRC-P-1B suction line occurs. The crew takes actions to identify and isolate the leak per ABN-LEAK which will not be successful. The leak continues to increase until degrading plant parameters require a manual reactor scram. The crew takes actions per PPM 3.3.1 (Reactor Scram), PPM 5.1.1 (RPV Control), and PPM 5.2.1 (Primary Containment Control). The crew initiates Wetwell sprays when Wetwell pressure reaches 2 psig and initiates Drywell sprays when Wetwell pressure exceeds 12 psig but prior to exceeding the Pressure Suppression Pressure (PSP) limit (PPM 5.2.1 Figure F) and after verifying Drywell parameters are within the Drywell Spray Initiation Limit (DSIL) (PPM 5.2.1 Figure E) and RHR is NOT required for adequate core cooling **(CT #1)**. RHR will be re-aligned from Drywell spray to LPCI injection after emergency depressurization is initiated. Due to a loss of sufficient RPV injection, RPV level continues to lower requiring the crew to emergency depressurize the RPV because sufficient high pressure injections system are not available.

Event 7

Total loss of feedwater injection occurs: Reactor Feedwater Flow Indicating Controller (RFW-FIC-620) output fails low and FWH 6A/6B Bypass Valve (RFW-V-109) fails to open preventing RFW injection into the RPV. RFW-HX-6A & B Discharge to Rx Discharge MOVs (RFW-V-112A & B) fail to open (if attempted) after being initially closed to support feeding with the RFW Flow Control Valves (RFW-FCV-10A/B).

Examiner Note: If the ATC operator fails to close either RFW-V-112A or RFW-V-112B then with specific Examiner direction, Trigger 11 will be entered to cause a trip of all running Condensate Booster pumps to ensure a total loss of feedwater injection occurs which is needed to support Critical Tasks.

Event 8

Reactor Core Isolation Cooling Flow Indicating Controller (RCIC-FIC-600) fails low on RCIC system startup requiring a manual trip of the RCIC turbine.

Event 9

With insufficient high pressure injection sources available, and with RPV level continuing to lower, the CRS enters PPM 5.1.3 (Emergency RPV Depressurization) and initiates emergency depressurization by opening seven (7) Safety Relief Valves (ADS preferred) after RPV water level reaches TAF (-161 inches) and within 10 minutes of level dropping below TAF. **(CT #2)** After ED, and within 10 minutes of RPV pressure lowering to 200 psig, the crew will restore and maintain RPV water level above TAF (-161 inches) using Low Pressure ECCS systems. **(CT #3)** Wetwell and Drywell sprays can be reinitiated per PPM 5.2.1 when not needed for adequate core cooling.

TERMINATION CRITERIA: The scenario will be terminated when Emergency Depressurization has been performed and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.

Critical Task Determination

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT #1 - Initiate Drywell sprays when Wetwell pressure exceeds 12 psig but prior to exceeding PSP, after verifying Drywell parameters are within DSIL and RHR is NOT required for adequate core cooling.	Primary containment pressures at or above specified limits pose a direct threat to primary containment integrity and the pressure suppression function. (Ref: PPM 13.1.1A (Classifying the Emergency – Technical Bases) Attachment 4.1 section 3)	Procedural direction in PPM 5.2.1 (Primary Containment Control - step P-7) when Wetwell pressure exceeds 12 psig.	The operator will manually open Drywell spray isolation valves.	Valve position will change and Drywell spray flow will increase.
CT #2 - Initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) after RPV water level reaches TAF (-161 inches) and within 10 minutes of level dropping below TAF.	Preclude core damage by establishing conditions that allow low pressure ECCS systems to restore water level above TAF (Safety Limit) (Ref: CGS Technical Specifications - 2.1.1.3)	Procedural direction in PPM 5.1.1 (RPV Control - step L-15) when RPV Level cannot be restored and maintained above -186 inches.	The operator will manually open 7 Safety Relief Valves (ADS preferred) to emergency depressurize the RPV.	The valve light indications for each of the 7 Safety Relief Valves will change from Green lit to Red lit when control switch is taken to Open. Reactor pressure will lower in response.
CT #3 - After ED, and within 10 minutes of RPV pressure lowering to 200 psig, restore and maintain RPV water level above TAF (-161 inches) using Low Pressure ECCS systems.	Preclude core damage by establishing conditions that allow low pressure ECCS systems to restore water level above TAF (Safety Limit) (Ref: CGS Technical Specifications - 2.1.1.3)	Procedural direction in PPM 5.1.1 (RPV Control - step L-16) which directs restoring and maintaining RPV level above -186 inches and ultimately above TAF.	All available low pressure ECCS systems are aligned to restore RPV level.	Indication of applicable ECCS system flow. RPV level rises to greater than TAF.

<table>
<tr><td colspan="3">EVENT No. 1</td></tr>
<tr><td colspan="3">Description: RWCU NRHX fouling causes high temperature isolation signal to RWCU system. RWCU-V-4 (Suction Outboard Isolation MOV), will not close requiring manual closure of RWCU-V-1 Suction Inboard Isolation MOV).

Event is activated using TRIGGER 2.</td></tr>
<tr><td colspan="3">BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 2</u></td></tr>
<tr><th>Time</th><th>Position</th><th>Applicants Actions or Behavior</th></tr>
<tr><td></td><td>BOP/ATC</td><td>☐ Acknowledges annunciator 602.A5 6-8 (CLEANUP FLTR INLET TEMP HIGH) and informs CRS</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following steps are from ARP 4.602.A5 6-8 (CLEANUP FLTR INLET TEMP HIGH)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>:

<u>NOTE</u>: RWCU isolation trips at GE 140°F (RWCU-V-4 only).</td></tr>
<tr><td></td><td>BOP</td><td>☐ 1: Checks (and continues to monitor) RWCU NRHX Outlet temperature on RWCU-TI-607 (may be done prior to pulling ARP)</td></tr>
<tr><td></td><td></td><td>☐ 3: Refers to SOP-RCC-OPS and verifies proper RCC flow to NRHX (requires field support)</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If sent to verify proper RCC flow to NRHX</u>, report “RCC flow to NRHX is normal and has not changed during the shift. RCC-V-8 is in the proper throttled position.”</td></tr>
<tr><td></td><td>BOP</td><td>☐ 4: Monitors RCC HX Outlet temperature</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If sent to verify proper RCC HX outlet temperature</u>, report “RCC HX outlet temperature is normal.”</td></tr>
<tr><td></td><td>BOP</td><td>☐ 6: Verifies RWCU flow is normal</td></tr>
<tr><td></td><td></td><td>☐ 7: Dispatches field operators to perform walk-downs and to verify proper RCC and RWCU system alignment</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If sent to check for any RCC leakage</u>, report “No signs of RCC leakage found.”</td></tr>
<tr><td></td><td>BOP</td><td>☐ 8: If temp approaches 140°F and isolation appears imminent (it will be):
• Stops RWCU-P-1A
• Attempts to close RWCU-V-4 (fails to close)
• Closes RWCU-V-1
• Verifies closed RWCU-V-44</td></tr>
</table>

EVENT No. 1 (CONTINUED)		
		☐ If RWCU automatically generates isolation signal (if crew does not respond in time): • Reports RWCU-V-4 failed to close automatically and could not be closed manually • Closes RWCU-V-1 • Verifies trip of RWCU-P-1A
	CRS	☐ Will establish a Key Plant Parameter to isolate RWCU prior to exceeding 140°F on the NRHX outlet
		☐ Directs isolating RWCU per the ARP prior to exceeding 140°F on the NRHX outlet
		Evaluates Technical Specifications and determines the following actions apply: ☐ LCO 3.6.1.3 A.1 – Isolate the affected penetration flow path (within 4 hours) by use of at least **one closed and de-activated automatic valve**, closed manual valve, blind flange or check valve with flow through the valve secured. ☐ LCO 3.6.1.3 A.2 – Verify the affected penetration flow path is isolated once per 31 days for isolation devices outside primary containment.

Event Comments:

Event No. 2 may be initiated after RWCU-V-1 has been closed and Tech Specs evaluated (or as directed by the Exam team) and is activated using **TRIGGER 3**.

EVENT No. 2		
Description: CRD-P-1A trips requiring CRD-P-1B to be started Event is activated using **TRIGGER 3**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 3		
Time	**Position**	**Applicants Actions or Behavior**
	ATC	☐ Acknowledges annunciator 603.A7 3-8 (CRD CHARGE WATER PRESS LOW) and recognizes that the running CRD pump tripped and informs CRS
Examiner Note: CRS will mark time to track potential entry into LCO 3.1.5 (Control Rod Scram Accumulators) – No Tech Spec call expected to be made based on little time required to start CRD pump.		
	CRS	☐ Notes time 2nd rod accumulator alarm comes in without CRD pump running
Examiner Note: Following steps are from ARP 4.603.A7 3-8 (CRD CHARGE WATER PRESS LOW) (May also use ABN-CRD) which are used to start CRD-P-1B.		
BOOTH ROLEPLAY – If sent to investigate CRD-P-1A breaker at SM-7, wait 1 minute then report CRD-P-1A breaker is tripped with flags dropped on instantaneous overcurrent for phases A and C.		
	ATC	☐ 1: Checks CRD-PIS-600 (Charging Water Header Pressure at H13-P603) - will be LT 1300 psig
		☐ 2: Determines if either CRD pump is running (neither pump will be running)
		☐ 3a: Places CRD-FC-600 in manual
		☐ 3b: Reduces CRD-FC-600 output to zero
		☐ 3c: Starts CRD pump 1B
		☐ 3d: Nulls CRD-FC-600
		☐ 3e: Transfers CRD-FC-600 to Auto
		☐ 3f: IF necessary, then adjust CRD-V-3 (Drive/Cooling Water Pressure Control) to 255-265 psid on CRD-DPI-602 (Drive HDR/RX ΔP)
	CRS	☐ Evaluates Technical Specification 3.1.5 (no entry Condition exists)
		☐ Directs CRD-P-1B to be Protected per PPM 1.3.83 (Protected Equipment Program) Attachment 7.1 (based on CRD-P-1A unavailability)
Event Comments:		
EVENT No. 3 may be initiated after CRD-P-1B started and CRD parameters restored (or as directed by the Exam team) and is activated using **TRIGGER 4**.		

<table>
<tr><td colspan="3">EVENT No. 3</td></tr>
<tr><td colspan="3">Description: HPCS-P-1 control power failure (Tech Spec)
Event is activated using TRIGGER 4.</td></tr>
<tr><td colspan="3">BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 4</u></td></tr>
<tr><th>Time</th><th>Position</th><th>Applicants Actions or Behavior</th></tr>
<tr><td rowspan="3"></td><td rowspan="2">BOP</td><td>☐ Acknowledges annunciator 601.A1 6-8 (HPCS OUT OF SERVICE) and recognizes a loss of HPCS pump breaker position indication and informs CRS</td></tr>
<tr><td>☐ Notes that BISI for CB HPCS OUT OF SERV is lit</td></tr>
<tr><td>ATC</td><td>☐ Continues to monitor reactor power, pressure and level</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following step is from ARP 4.601.A1 6-8 (HPCS OUT OF SERVICE)</td></tr>
<tr><td></td><td>BOP</td><td>☐ 1: Refers to BISI (CB HPCS OUT OF SERV) (ARP Attachment 1 - Page 4) to determine actions required (see below)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following steps are from ARP 4.601.A1 6-8 (Attachment 1 – Page 4)</td></tr>
<tr><td></td><td>BOP</td><td>☐ 1: Directs field operator to check status of HPCS Pump breaker (HPCS-CB-P1) and associated breaker control power fuses</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If sent to check status of the HPCS Pump breaker</u>, wait 1 minute then report “HPCS Pump breaker is racked in with breaker open. Have loss of local breaker indication.”</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If sent to check status of the HPCS Pump breaker control power fuses</u>, wait 1 minute then report “Both the HPCS breaker close and trip fuses appear blown.”</td></tr>
<tr><td></td><td>BOP</td><td>☐ 2: Refers CRS to Technical Specification 3.5.1</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following steps are from ARP 4.601.A1 6-8 (HPCS OUT OF SERVICE)</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">CRS</td><td>☐ 3: Refers to PPM 1.10.1 (Notifications and Reportable Events) to determine reportability requirements:
• 8 hour reportable to NRC based on Prevention of a Safety Function per 10 CFR 52.72(b)(3)(v)(D)</td></tr>
<tr><td>Evaluates Technical Specifications and determines the following actions apply:
☐ LCO 3.5.1 B.1 – Immediately verify by administrative means that RCIC is operable
☐ LCO 3.5.1 B.2 – Restore HPCS system to operable status within 14 days
☐ LCO 3.5.1 C.1 – Restore RHR-SYS-B or HPCS system to operable status within 72 hours</td></tr>
</table>

<table>
<tr><td colspan="3">EVENT No. 3 (CONTINUED)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: If HPCS pump control power fuses are replaced they will blow again.</td></tr>
<tr><td></td><td>CRS</td><td>☐ May direct HPCS control power fuses be replaced or removed or request troubleshooting assistance before doing so.</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to replace the HPCS Pump control power fuses</u>, wait 1 minute then report "Replaced the trip and close control power fuses for the HPCS Pump. Appears the fuses may have blown again."</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to remove the HPCS Pump control power fuses</u>, wait 1 minute then report "Control power fuses for the HPCS Pump have been removed."</td></tr>
<tr><td></td><td>CRS</td><td>☐ Directs the following systems to be Protected per PPM 1.3.83 (Protected Equipment Program) Attachment 7.1 (based on HPCS unavailability)
RCIC-P-1
LPCS-P-1
DG-SYS-A
DG-SYS-B
ADS-SYS-A
ADS-SYS-B
SW-SYS-A
SW-SYS-B</td></tr>
<tr><td colspan="3">Event Comments:</td></tr>
<tr><td colspan="3">EVENT No. 4 may be initiated after CRS evaluates Tech Specs (or as directed by the Exam team) and is activated using TRIGGER 5.</td></tr>
</table>

EVENT No. 4

Description: RRC-FT-14A fails low causing APRM-CHS-1 to trip

Event is activated using **TRIGGER 5**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 5

Time	Position	Applicants Actions or Behavior
	ATC	☐ Acknowledges annunciator 603.A8 3-6 (FLOW REFERENCE OFF NORMAL) and informs CRS
Examiner Note: Following steps are from ARP 4.603.A8 3-6 (FLOW REFERENCE OFF NORMAL)		
	ATC	☐ 1: Determine which channel is causing the alarm by checking RBM ODA (H13-P603) or RBM chassis (H13-P608) (BOP will have to check P608)
	BOP	☐ May investigates RBM chassis at H13-P608 (as a backup to H13-P603 indications)
	ATC	☐ 2: If CRS directs, bypasses failed channel (APRM "A") at H13-P603 – Annunciator clears
		☐ 3: Refers CRS to Technical Specification 3.3.1.1 and LCS 1.3.2.1
	CRS	☐ Directs bypassing APRM "A"
		Evaluates Technical Specification 3.3.1.1 and LCS 1.3.2.1 and determines the minimum number of required APRMs remain operable and that no Technical Specification or LCS actions apply.

Event Comments:

EVENT No. 5 may be initiated after APRM "A" is bypassed (or as directed by the Exam team) and is activated using **TRIGGER 6.**

EVENT No. 5

Description: SRV MS-RV-2B inadvertently opens (will close upon fuse removal)
Event is activated using **TRIGGER 6**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 6

Time	Position	Applicants Actions or Behavior
	BOP	☐ Acknowledges annunciator 601.A2 5-8 (SRV OPEN) and informs CRS
Examiner Note: Following step is from ARP 4.601.A2 5-8 (SRV OPEN)		
	BOP	☐ 1: Refers CRS to ABN-SRV
	CRS	☐ Enters ABN-SRV and directs subsequent actions
Examiner Note: Following steps are from ABN-SRV		
		NOTE: Division 1 (A) ADS SRV open demand signal is indicated by the SRV red light lit on H13-P628 and H13-P601 vertical section. NOTE: Division 2 (B) ADS SRV open demand signal is indicated by the SRV red light lit on H13-P631 and H13-P601 vertical section. NOTE: Actual SRV position from the SRV LVDT is indicated on H13-P601, horizontal section.
	CRS	☐ 4.1: May establish a Key Plant Parameter of Suppression Pool temperature of less than 110°F (not expected to reach)
	BOP	☐ 4.2: Verifies SRV MS-RV-2B is open by one or more of the following: • Rising tailpipe temperature (H13-P614) • Rising Suppression Pool temperature or level • Reduction in Main Generator output (approx. 70 MWe)
Examiner Note: Following three steps are required since reactor power is > 90 percent. (May get High Level Alarm, 4.603.A8 1-7)		
	BOP	☐ 4.4.1: Places control switch for SRV MS-RV-2B to Open
	ATC	☐ 4.4.2: Reduces reactor power to < 90% using RRC flow
	BOP	☐ 4.4.3: Places control switch for SRV MS-RV-2B to Off

EVENT No. 5 (CONTINUED)		
Examiner Note: SRV remains open requiring removal of fuses.		
	CRS	☐ 4.6: Directs removal of SRV fuses for SRV MS-RV-2B per Attachment 7.1
Examiner Note: BOP should remove badge, rings, and conductive materials and don protective eye-wear (ISPM-20 or ISPM-7 for electrical safety).		
Examiner Note: Refer to Simulator Guide (page 31) in reference to ABN-SRV Attachment 7.1.		
	ATC	☐ Monitors for a change in SRV position status while fuses are pulled
Examiner Note: Applicants are trained to leave fuses on floor just outside the cabinet.		
	BOP	☐ 4.6: Removes fuses (using fusepullers) listed on ABN-SRV (Attachment 7.1) (Fuses BB-F29 and BB-F30 will be removed from Panel H13-P628)
	CRS	☐ Enters PPM 5.2.1 (Primary Containment Control) if wetwell level exceeds +2 inches (which corresponds to Tech Spec limit of 31 ft 1.75 inches)
Examiner Note: Already in Suppression Pool cooling.		
	CRS	☐ Enters (or re-enters) PPM 5.2.1 (Primary Containment Control) if wetwell temperature exceeds 90°F
Examiner Note: High wetwell level will likely occur requiring entry into LCO 3.6.2.2. High wetwell temperature requiring EOP entry should not occur. There are no applicable TS actions associated with the faulty non-ADS SRV (tracking only).		
	CRS	4.9: Evaluates Technical Specifications and determines the following actions apply: ☐ SRV MS-RV-2B: NONE ☐ High wetwell level > 31 feet 1.75 inches: LCO 3.6.2.2 A.1 - Restore Suppression Pool water level to within limits within 2 hours ☐ High wetwell temperature > 90°F: LCO 3.6.2.1 A.1 – Verify Suppression Pool average temperature is ≤ 110°F once per hour AND Restore Suppression Pool average temperature to ≤ 90°F within 24 hours
		☐ 4.10: May discuss need to perform OSP-CVB/IST-M701 within 12 hours of SRV opening
		☐ 4.11: May discuss need to initiate Condition Report to evaluate reactivity event per PPM 1.3.79
Event Comments:		

EVENT No. 6 may be initiated after fuses have been removed for SRV MS-RV-2B and associated Tech Specs evaluated (or as directed by the Exam team) and is activated using **TRIGGER 7**.

Time	Position	Applicants Actions or Behavior
EVENT No. 6		
Description: LOCA from RRC-P-1B suction line requiring manual scram Event is activated using **TRIGGER 7**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 7		
Time	**Position**	**Applicants Actions or Behavior**
	BOP	☐ Acknowledges annunciator 601.A3 6-5 (LEAK DETECTION DRYWELL FLOOR DRAIN FLOW HIGH) and observes rising Drywell pressure
		☐ Reports indications of primary leak to CRS
		☐ Pulls up DSIL curve on GDS to check for excessive Drywell pressure for given Drywell temperature (curve slopes to the right)
Examiner Note: Following steps are from ARP 4.601.A3 6-5 (LEAK DETECTION DRYWELL FLOOR DRAIN FLOW HIGH)		
	BOP	☐ 1: May check Drywell Floor Drain flow GE 5 GPM as read on EDR-FRS-623 (already have evidence of significant leak)
		☐ 3: Refers CRS to ABN-LEAKAGE
		☐ 4: Continues to monitor containment parameters due to RCS leakage
		☐ 5: May refer CRS to Technical Specification 3.4.5
	CRS	☐ Enters ABN-LEAKAGE
Examiner Note: Following steps are from ABN-LEAKAGE		
Examiner Note: ABN assumes a smaller initial leak rate which can be diagnosed over time. Only relevant actions will be performed.		
	BOP	☐ 4.1.3: Monitors Containment radiation monitors at RAD Board 22 and 23 (may not get to this)
		☐ 4.1.4: Monitors Drywell temperature and pressure (in progress)
	CRS	☐ 4.1.9: Directs ROs to investigate source of leak and isolate if possible (unisolable)
Examiner Note: CRS will direct manual scram before automatic high Drywell pressure scram occurs. If time permits RRC flow may be reduced to 74Mlbm/hr before scram inserted.		
	CRS	☐ Updates crew and directs ATC to scram the reactor
Examiner Note: Following steps are Immediate Actions from PPM 3.3.1 (Reactor Scram)		

EVENT No. 6 (CONTINUED)		
	ATC	☐ 6.1.1: Places Reactor Mode Switch to Shutdown
		☐ 6.1.2: Monitors reactor power, pressure and level
		☐ 6.1.5: Inserts SRM and IRM monitors (detectors)
		☐ After above three steps ATC makes scram report to CRS: • Mode switch is in Shutdown • APRMs are downscale • RPV pressure is (value and trend) • RPV level is (value and trend) • EOP entry on low RPV level (and possibly high Drywell pressure)
		☐ 6.1.6: After CRS repeat back, reports all control rods are IN
	CRS	☐ Enters PPM 5.1.1 (RPV Control) on low RPV level (+13 inches)
		☐ Enters PPM 5.2.1 (Primary Containment Control) and re-enters PPM 5.1.1 on high Drywell pressure (1.68 psig)
Examiner Note: Following steps are Subsequent Actions from PPM 3.3.1 (Reactor Scram)		
	ATC	☐ 6.2.5.a: Verify Recirc pumps have run back to 15 Hz
		☐ 6.2.6: Range down on IRMs, as necessary, to follow power decrease
	BOP	☐ 6.2.7: Make PA announcement for reactor scram
Examiner Note: See Event 8 for feedwater actions per SOP-RFW-FCV-QC quick card. Should a Level 8 occur (+54.5 inches), there will be no impact on the remainder of the scenario due to a loss of reactor feedwater.		
	ATC	☐ 6.2.8: Transfers level control to RFW-FCV-10A/B per SOP-RFW-FCV-QC
	BOP	☐ 6.2.9: If necessary (with Main Generator load < 50 MWe): • If Main Turbine did not trip – simultaneously depress both Emerg Trip pushbuttons (H13-P820) • If Main Generator did not trip –depress either Unit Emergency Tip pushbutton or Unit Overall Trip pushbutton (H13-P800) • Verify power transfer to Startup Transformer (TR-S)
	CRS	☐ Directs 1.68 psig and +13 inch actuations be verified (EOP 5.1.1 L-1)

EVENT No. 6 (CONTINUED)		
	BOP	☐ Verifies 1.68 psig actuations - Observes: • All ECCS pumps started (except for HPCS) and min flow valves opened • Both service water pumps (SW-P-1A & B) started • EDG-1 & EDG-2 running • GDS status for containment isolation valve closure (no yellowed border NSSSS groups indicated) ☐ Verifies +13 inch actuations – Observes: • GDS status for containment isolation valve closure (no yellowed border NSSSS groups indicated) ☐ Reports actuations verified to CRS
	CRS	☐ Works down the Primary Containment Pressure leg of PPM 5.2.1 (RPV Containment Control) and sets a Key Plant Parameter of 2 psig Wetwell pressure (EOP 5.2.1 P-5)
	BOP	☐ Reports when Wetwell pressure reaches 2 psig
	CRS	☐ Directs Wetwell Spray using RHR “B” or “A” spray loops (EOP 5.2.1 P-6)
	BOP	☐ Refers to SOP-RHR-SPRAY-WW-QC quick card to initiate Wetwell Sprays: • 2.1.1: Verify RHR-P-2A(B) running • 2.1.2: Verify RHR-V-42A(B) closed (LPCI injection valve) • 2.1.3: Open RHR-V-27A(B) (Suppression Pool Spray valve) • 2.1.4: Before Wetwell Spray drops below 0.0 psig, or when directed by the CRS, then close RHR-V-27A(B)
	CRS	☐ Directs Wetwell Sprays be secured prior to Wetwell pressure reaching 0.0 psig (EOP 5.2.1 P-4)
		☐ Works down the Primary Containment Pressure leg of PPM 5.2.1 (RPV Containment Control) and sets Key Plant Parameter of 12 psig in the Wetwell (EOP 5.2.1 P-7)
		☐ Works down the Drywell Temperature leg of PPM 5.2.1 (RPV Containment Control) and sets Key Plant Parameter of 285 °F in the Drywell (not expected to be reached during scenario) (EOP 5.2.1 DT-3)
	BOP	☐ Reports Wetwell pressure at 12 psig

EVENT No. 6 (CONTINUED)

CT #1 - Initiate Drywell sprays when Wetwell pressure exceeds 12 psig but prior to exceeding PSP, after verifying Drywell parameters are within DSIL and RHR is NOT required for adequate core cooling.

<u>Examiner Note</u>: Although it is expected that CRO2 will verify within DSIL, CT # 1 is considered met even if DSIL not verified provided sprays initiated when within DSIL.

	CRS	☐ Directs CRO2 to verify within DSIL (Drywell Spray Initiation Limit – Fig. E on PPM 5.2.1 (Primary Containment Control)) (EOP 5.2.1 P-8)
	BOP	☐ Reports Drywell parameters within DSIL
	CRS	☐ Verifies RHR-P-2A not currently needed to ensure Adequate Core Cooling
		☐ Directs RRC pumps be verified off and Drywell Cooling fans be secured (EOP 5.2.1 P-11.1)
	BOP	☐ Verifies RRC pumps off and secures the Drywell Cooling fans on back panel (bottom row of containment fans with switches that are not in the brown area on the panel) ☐ Reports completion to CRS
	CRS	**<u>CAUTION</u>** Operate Drywell sprays and Wetwell sprays on opposite loops if possible. DO NOT initiate multiple loops of containment sprays simultaneously. ☐ Directs Drywell Sprays (should be initiated on opposite loop that Wetwell Sprays are on (EOP 5.2.1 P-11.2)
	BOP	☐ Refers to SOP-RHR-SPRAY-DW-QC quick card: • 2.1.1: Verify RHR-P-2A(B) is running • 2.1.2: Verify RHR-V-42A(B) closed (LPCI injection valve) • 2.1.3: Open the following to spray the Drywell: ▪ RHR-V-17A(B) (Drywell Spray Inboard Isolation) ▪ RHR-V-16A(B) (Drywell Spray Outboard Isolation) • 2.1.4: Before Drywell pressure drops below 0.0 psig, or when directed by the CRS, then close the following: ▪ RHR-V-16A(B) ▪ RHR-V-17A(B)

EVENT No. 6 (CONTINUED)		
	CRS	☐ Directs Drywell Sprays be secured before Drywell pressure drops to zero (EOP 5.2.1 P-10)
	BOP/ATC	☐ Reports Main Steam Tunnel temperature alarms ☐ When MSIVs close: Updates crew that MSIVs are closed and pressure control is with SRVs at 800 to 1050 psig (or current pressure band)
	CRS	☐ May direct RPV pressure reduction to a band of 500 to 600 psig (but not expected in order to conserve inventory)
	BOP	☐ Lowers RPV pressure if directed using SOP-DEH-QC (Main Turbine DEH Operations Quick Card): • 2.1.1a: Selects PRESSURE TARGET • 2.1.1b: Enters desired pressure • 2.1.1c: Selects OK • 2.1.1.d: If change in pressure rate is desired: ▪ 1: Selects PRESSURE RATE ▪ 2: Enters desired PRESSURE RATE ▪ 3: Selects OK • 2.1.1.e: Selects GO • 2.1.1.f: Selects YES • 2.1.1.g: Verifies pressure demand and throttle pressure change at the pressure rate.

Event Comments:

EVENT No. 7 is activated at the beginning of the scenario and is realized when ability to feed reactor with feedwater system has been lost.

EVENT No. 7		
Description: RFW-FIC-620 controller failure with RFW-V-109 failing to open and RFW-V-112A & B failing to open once closed		
Time	**Position**	**Applicants Actions or Behavior**
Examiner Note: Following steps are from SOP-RFW-FCV-QC (Transfer RPV Level Control to RFW-FCV-10A/10B - Quick Card).		
Examiner Note: If the ATC operator fails to close either RFW-V-112A or RFW-V-112B below (i.e. one or both valves remain open) then direct insertion of Trigger 11 to cause a trip of all running Condensate Booster pumps to ensure a total loss of feedwater injection occurs which is needed to support Critical Tasks.		
	ATC	☐ 2.1.1: (2-handed operation) Starts closing RFW-V-112A and RFW-V-112B
		☐ 2.1.2: Starts opening RFW-V-118
		☐ 2.1.3: Verifies RFW-V-109 is closed
		☐ 2.1.4: (2-handed operation) Verifies RFW-V-117A and RFW-V-117B open
		☐ 2.1.5: Verifies RFW-LIC-620 is in Manual (V selected for Valve position demand with 0 output)
		☐ 2.1.6: IF Reactor Feed Pump(s) (RFP) are operating, then performs the following: • 2.1.6.a: Verifies RFPs have ramped down in speed • 2.1.6.b: Places RFW-P-1B in MDEM mode • 2.1.6.c: Places RFW-P-1B in MDEM mode • 2.1.6.d: Controls turbine speed as required • 2.1.6.e: If desired, then places RFW-FCV-2A(B) in Manual and slowly open to approximately 80%

<table>
<tr><td colspan="3">EVENT No. 7 (CONTINUED)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: RFW-HX-6A & B Discharge to Rx Discharge MOVs (RFW-V-112A & B) will fail to open (if attempted) after being closed below.</td></tr>
<tr><td rowspan="3"></td><td rowspan="3">ATC</td><td><u>CAUTION</u>
Uncontrolled injection may occur if RPV pressure drops below 600 psig with RFW-V-112A and RFW-V-112B NOT FULLY CLOSED.
☐ 2.1.7: Verifies RFW-V-112A and RFW-V-112B are fully closed</td></tr>
<tr><td>☐ 2.1.8: Verifies RFW-V-118 is fully open</td></tr>
<tr><td>☐ 2.1.9: IF Reactor Feed Pump(s) (RFP) are operating, then adjusts the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Controller failure will not allow step 2.1.10 below to be performed.</td></tr>
<tr><td></td><td>ATC</td><td>☐ 2.1.10: Adjusts RFW-LIC-620 manual output to control RPV level – Will be unsuccessful</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: For step below RFW-V-109 fails to open and RFW-V-118 is already fully open.</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">ATC</td><td>☐ 2.1.12: If unable to control RPV level with RFW-FCV-10A/B, then considers throttling RFW-V-109 or RFW-V-118 to control RPV level</td></tr>
<tr><td>☐ Reports to CRS existing faults with feedwater and the inability to feed</td></tr>
<tr><td colspan="3">Event Comments:</td></tr>
<tr><td colspan="3">EVENT No. 8 is activated at the beginning of the scenario and is realized when RCIC system is started manually or automatically starts on low RPV level (-50 inches).</td></tr>
</table>

<table>
<tr><td colspan="3">EVENT No. 8</td></tr>
<tr><td colspan="3">Description: RCIC–FIC-600 fails low on startup requiring manual trip of RCIC turbine</td></tr>
<tr><th>Time</th><th>Position</th><th>Applicants Actions or Behavior</th></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Indications of RCIC controller failure will be the same whether RCIC is started manually below or RCIC started automatically on low RPV level (- 50 inches)</td></tr>
<tr><td></td><td>CRS</td><td>☐ (If not already running) Directs manual start of RCIC for RPV level control</td></tr>
<tr><td></td><td>BOP</td><td>☐ Refers to SOP-RCIC-INJECTION-QC quick card:
• 2.1.1.a: Verifies the RCIC Manual Initiation Pushbutton in Armed
• 2.1.1.b: Depresses and hold the RCIC Manual Initiation pushbutton
• 2.1.1.c: When all applicable RCIC valves have repositioned, then releases the RCIC Manual Initiation pushbutton

<u>NOTE</u>: When RCIC initiates the following occurs:
• RCIC-V-45 (Steam to Turbine) opens.
• RCIC-V-46 (Lube Oil Cooler Water Supply) opens.
• RCIC-P-2 (Barometric Condsr Vacuum Pump) starts.
• RCIC-V-13 (RPV Injection) opens.
• RCIC-V-25 and RCIC-V-26 (Steam Line Warmup Drains to Main Condenser) close.
• RCIC-V-4 and RCIC-V-5 (Cond Pump Discharge to EDR) close.
• SW-P-1B starts (20 second time delay).</td></tr>
<tr><td></td><td></td><td>☐ Recognizes RCIC turbine speed oscillating below minimum requirement of 2100 RPM (with no RPV injection flow) and that the RCIC controller (RCIC–FIC-600) output is zero</td></tr>
<tr><td></td><td></td><td>☐ Shifts RCIC controller (RCIC–FIC-600) to Manual and presses the right OPEN pushbutton in an attempt to raise controller output (RCIC Turbine speed) – Will be unsuccessful
☐ Reports RCIC controller problem (and inability to inject with RCIC) to CRS</td></tr>
</table>

EVENT No. 8 (CONTINUED)

	CRS	☐ May direct trip of RCIC turbine based on above report
Examiner Note: ATC may trip RCIC turbine based on direction from CRS or after recommending to CRS in which case RCIC ARPs may not be immediately addressed. RCIC may auto trip on high backpressure.		
	ATC	☐ Acknowledges annunciator 603.A4 1-4 (RCIC TURBINE BEARING OIL PRESSURE LOW) and informs CRS
Examiner Note: Following steps are from ARP 4.603.A4 1-4 (RCIC TURBINE BEARING OIL PRESSURE LOW)		
	BOP	NOTE: RCIC-DT-1 RPM must be GE 2100 RPM to verify adequate lube oil pressure/flow (RCIC Turbine). ☐ 1: If not required for inventory control, then trip RCIC-DT-1 manually (RCIC Turbine)
		☐ 2: Verify RCIC-V-46 is closed
	CRS	☐ May inform Security of the unavailability of RCIC system
BOOTH ROLEPLAY – If sent to investigate status of RCIC system locally, wait until RCIC has been tripped, then report "RCIC is not running and nothing abnormal was found."		

Event Comments:

EVENT No. 9 is to Initiate Emergency Depressurization (ED) on low RPV level and restore RPV level to above TAF

EVENT No. 9		
Description: Initiate Emergency Depressurization (ED) on low RPV level and restore RPV level to above TAF		
Time	**Position**	**Applicants Actions or Behavior**
	CRS	☐ Works down the level leg of PPM 5.1.1 (RPV Control) and recognizes that CRD and SLC are the only high pressure injection sources available (EOP 5.1.1 L-3 (Table 1))
	ATC	☐ Direct field operator perform ABN-CRD-MAXFLOW to facilitate starting a second CRD pump
BOOTH ROLEPLAY – <u>If sent to perform field actions for ABN-CRD-MAXFLOW</u>, <u>insert Trigger 26</u> and wait 1 minute, then report "Field actions for ABN-CRD-MAXFLOW are complete."		
	ATC	☐ Completes MCR actions per ABN-CRD-MAXFLOW: • 4.8.1: Place CRD-FC-600 in Manual • 4.8.2: Start the second CRD pump to have both pumps in service **CAUTION** Do not exceed a maximum continuous amps (35 amps), on the CRD pumps. • 4.8.3: Adjust CRD-FC-600 to throttle open CRD-FCV-2A(2B) • 4.8.4: Throttle opens CRD-V-3 to maximize flow to the RPV
		☐ Gives RPV level reports as level continues to lower
	CRS	☐ Directs SLC initiation (EOP 5.1.1 L-12 (Table 3))
		☐ Directs ADS be inhibited when ADS Timers initiate (EOP 5.1.1 L-5)
		☐ Expands level band as RPV level drops (EOP 5.1.1 L-6)
		☐ Directs BOP to verify containment isolations as RPV level lowers to -50 inches and again at -129 inches (EOP 5.1.1 L-1)

EVENT No. 9 (Continued)		
	BOP	☐ Verifies the following containment isolation valves closed at -50 inches (as seen at the Isolation Control System panel or on GDS): • EDR-V-19 / EDR-V-20 • FDR-V-3 / FDR-V-4 • RHR-V-49 / RHR-V-40 • RHR-V-9 / RHR-V-8 • RWCU-V-1 / RWCU-V-4 • RRC-V-19 / RRC-V-20 • RHR-V-60A / RHR-V-75A • RHR-V-60B / RHR-V-75B • TIP isolation valves
	BOP	☐ Verifies the following ADDITIONAL containment isolation valves closed at -129 inches (as seen at the Isolation Control System panel or on GDS): • MS-V-22A / MS-V-28A • MS-V-22B / MS-V-28B • MS-V-22C / MS-V-28C • MS-V-22D / MS-V-28D • MS-V-67A • MS-V-67B • MS-V-67C • MS-V-67D • MS-V-16 • MS-V-19

EVENT No. 9 (CONTINUED)		
	ATC	☐ Initiates SLC as directed - Refers to SOP-SLC-INJECTION-QC quick card: • 2.1: Removes the SLC keylock switch blanks and inserts both keys into the SLC system control switches • 2.2: Initiates SLC injection by performing the following (H13-P603): ▪ Places SLC System "A" control switch to the OPER position ▪ Places SLC System "B" control switch to the OPER position • 2.3: Records the following: ▪ SLC flowrate (~43 gpm for one pump or ~86 gpm for both) ▪ Initial tank level ▪ Circles RWCU-V-4 status (should be closed) • 2.4: Reports one of the following, or similar words, to the CRS as they hand the CRS the procedure: ▪ SLC is injecting normally ▪ SLC is partially injecting ▪ SLC failed to inject ☐ Reports initial tank level of 4800 gallons and that SLC flowrate is 86 gpm
	BOP/ATC	☐ When RPV level drops to -129 inches and the ADS Timers initiate, inhibits ADS
		☐ Reports ADS inhibited to CRS
		☐ Reports RPV level as it transitions from Wide Range to Fuel Zone
		☐ Reports RPV level at TAF and trending down
	CRS	☐ Determines that Emergency Depressurization (ED) is required when RPV level cannot be maintained > -161 inches (EOP 5.1.1 L6)

EVENT No. 9 (CONTINUED)		
TIME RPV LEVEL AT TAF _______________		
CT #2 - Initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) after RPV water level reaches TAF (-161 inches) and within 10 minutes of level dropping below TAF.		
	CRS	☐ Updates crew and exits the pressure leg of PPM 5.1.1 (RPV Control) via override and enters PPM 5.1.3 (Emergency RPV Depressurization)
		☐ Determines that with high Drywell pressure signal sealed in, low pressure ECCS systems will be required to maintain Adequate Core Cooling (and therefore will not be stopped and prevented) (EOP 5.1.3 P-3)
		☐ Determines Wetwell level is above 17 feet (EOP 5.1.3 P-4)
		☐ Directs 7 SRVs be opened (ADS preferred) (ADS SRVs are those with the red stripe on left side of their nameplate) (EOP 5.1.3 P-5)
	BOP	☐ Opens 7 SRVs (ADS preferred) as directed while verifying proper containment response as each is opened and reports completion to CRS
	CRS	☐ Directs Wetwell and Drywell sprays and Suppression Pool Cooling be secured to maximize RPV injection (EOP 5.1.1 L-16)
	BOP	☐ When directed, refers to SOP-RHR-SPRAY-WW-QC quick card to secure Wetwell Sprays: • 2.1.4: Closes RHR-V-27A(B)
		☐ When directed, refers to SOP-RHR-SPRAY-DW-QC quick card to secure Drywell Sprays: • 2.1.4: ▪ Closes RHR-V-16A(B) ▪ Closes RHR-V-17A(B)

EVENT No. 9 (CONTINUED)		
	BOP	☐ When directed secures Suppression Pool Cooling (on RHR "B" loop) by closing RHR-V-24B. (If manually overridden open)
CT #3 - After ED, and within 10 minutes of RPV pressure lowering to 200 psig, restore and maintain RPV water level above TAF (-161 inches) using Low Pressure ECCS systems.		
	BOP	☐ Allows ECCS injection valves to automatically open at 470 psig
		☐ Reports RPV injection as it occurs, when level is rising, and again when level is restored above TAF (-161 inches)
	CRS	☐ When below TAF, maximizes RPV injection with all available systems (requiring securing of all Sprays and Suppression Pool Cooling) (EOP 5.1.1 L-16)
		☐ When above TAF, provided enough injection available, directs re-initiation of Wetwell and Drywell sprays and Suppression Pool Cooling with RHR as appropriate (Wetwell Spray initiation if Wetwell pressure reaches 2 psig and Drywell Spray initiation if Wetwell pressure exceeds 12 psig)
	BOP/ATC	☐ Secures injection systems as directed to return RPV level to -50 inches to +54 inches band
	BOP	☐ Reinitiates Wetwell and Drywell Sprays as appropriate using quick cards
		☐ Refers to SOP-RHR-SPRAY-WW-QC quick card to initiate Wetwell Sprays: • 2.1.1: Verify RHR-P-2A(B) running • 2.1.2: Verify RHR-V-42A(B) closed (LPCI injection valve) • 2.1.3: Open RHR-V-27A(B) (Suppression Pool Spray valve) • 2.1.4: Before Wetwell Spray drops below 0.0 psig, or when directed by the CRS, then closes RHR-V-27A(B)

EVENT No. 9 (CONTINUED)		
	CRS	☐ Verifies Drywell parameters within DSIL (EOP 5.2.1 P-8)
		☐ Verifies RHR-P-2A(B) not currently needed to ensure Adequate Core Cooling
		CAUTION Operate Drywell sprays and Wetwell sprays on opposite loops if possible. DO NOT initiate multiple loops of containment sprays simultaneously. ☐ Directs Drywell Sprays (should be initiated on opposite loop that Wetwell Sprays are on (EOP 5.2.1 P-11.2)
	BOP	☐ Refers to SOP-RHR-SPRAY-DW-QC quick card: • 2.1.1: Verify RHR-P-2A(B) is running • 2.1.2: Verify RHR-V-42A(B) closed (LPCI injection valve) • 2.1.3: Open the following to spray the Drywell: ▪ RHR-V-17A(B) (Drywell Spray Inboard Isolation) ▪ RHR-V-16A(B) (Drywell Spray Outboard Isolation) • 2.1.4: Before Drywell pressure drops below 0.0 psig, or when directed by the CRS, then close the following: ▪ RHR-V-16A(B) ▪ RHR-V-17A(B)
	CRS	☐ Directs Drywell Sprays be secured before Drywell pressure drops to zero psig (EOP 5.2.1 P-10)

Event Comments:

TERMINATION CRITERIA: The scenario will be terminated when Emergency Depressurization has been performed and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.

<u>SRV FUSE LIST</u>

SRV	SOLENOID	FUSE	PANEL
MS-RV-1A	C	BB-F35 BB-F36	H13-P628
MS-RV-1B	C	BB-F27 BB-F28	H13-P628
MS-RV-1C	C	BB-F17 BB-F18	H13-P628
MS-RV-1D	C	BB-F37 BB-F38	H13-P628
MS-RV-2A	C	BB-F19 BB-F20	H13-P628
MS-RV-2B	C	BB-F29 BB-F30	H13-P628
MS-RV-2C	C	BB-F25 BB-F26	H13-P628
MS-RV-2D	C	BB-F23 BB-F24	H13-P628
MS-RV-3A	C	BB-F21 BB-F22	H13-P628
MS-RV-3B	C	BB-F33 BB-F34	H13-P628
MS-RV-3C	C	BB-F31 BB-F32	H13-P628
MS-RV-3D	A	BB-F15 BB-F16	H13-P628
	C	BB-F53 BB-F54	H13-P628
	B	AA-F15 AA-F16	H13-P631
	A	EE-F01 EE-F02	E-CP-ARS*
MS-RV-4A	A	BB-F11 BB-F12	H13-P628
	B	AA-F11 AA-F12	H13-P631
	C	BB-F49 BB-F50	H13-P628
	B	CC-F29 CC-F30	C61-P001

TURNOVER

Initial Conditions:

- Columbia is operating at 100% power
- RCIC Operability Test surveillance was just completed to satisfy Post Maintenance Testing (PMT) requirements and has been returned to a Standby status and declared operable
- RHR-SYS-B was placed in Suppression Pool Cooling three (3) hours ago to restore Suppression Pool temperature following the testing and to satisfy RHR-P-2B PMT requirements (see marked up procedure)
- LCO 3.5.1 A.1, LCO 3.6.1.5 A.1, LCO 3.6.2.3 A.1, and RFO 1.6.1.5 A.1 have been entered for RHR-SYS-B being inoperable

Shift Turnover:

- Maintain RHR-P-2B in operation for the next three (3) hours to satisfy pump PMT requirements for operability.

ENERGY NORTHWEST

SC-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	Lower RRC Flow to 90% using Flow (enter GV Sequential Mode); CRD-FC-600 Fails High; LPCS-P-2 Trips (TS); MS-PS-23D Fails causing Half Scram (2 Rods Scram but 1 does not Fully Insert – Can Manually Insert)(TS); FPC-P-1B Trip (FPC-P-1A Fails to Auto Start); Trip of E-CB-1/7 with Scram (ATWS) occurring on Auto-Shift to TR-B; Hydraulic ATWS (Lower Level to -140” to -80”); Reduced SLC Injection Flow; RWCU-V-4 Fails to Auto Close; Scram-Reset-Scram not Effective in Inserting Rods (Manual Insertion Permitted)

LENGTH OF LESSON 1.5 Hours

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	SC-2	Rev. No.	1
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	12/22/16
REVISED BY	Dave E. Crawford	DATE	02/08/17
VALIDATED BY		DATE	

TECHNICAL REVIEW		DATE	
INSTRUCTIONAL REVIEW		DATE	
APPROVED	Operations Training Manager	DATE	

Facility:	Columbia Generating Station	Scenario No.:	2	Op Test No.:	1
Examiners:	______		Operators:	______	
	______			______	
	______			______	

Initial Conditions:	Columbia is operating at 100% power. Control Rod Drive (CRD) Pump 1B (CRD-P-1B) is out of service for extended Maintenance. CRD-P-1A is Protected.
Turnover:	Lower reactor power to 90% using Reactor Recirculation flow per PPM 3.2.6 (Power Maneuvering) after assuming the shift based on BPA Load Following request. Steps 5.1.1 thru 5.1.6 of PPM 3.2.6 are complete. Proper margin to Pre-Conditioned Status (PCS) exists per PPM 9.3.18. The Reactivity brief has been performed.

Critical Tasks:

CT-1	During ATWS with power > 5%, terminate and prevent injection with exception of SLC, RCIC, and CRD, into the RPV until RPV level is -65 inches to establish a Lowered Level (LL). -AND- Maintain RPV level above -186 inches. Short excursions below -186 inches does not constitute failure of CT provided level restored and maintained above -186 inches within 10 minutes of going below -186 inches.
CT-2	With reactor scram required and the reactor not shutdown, commence inserting control rods per PPM 5.5.11 Attachment 6.1 Tab B prior to transitioning to Tab E.

NOTE: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	Malf.	Event Type*	Event Description
1	N/A	R (ATC) N (BOP)	Lower reactor power with Reactor Recirculation (RRC) flow to 90% for load following per PPM 3.2.6 (which includes placing Main Turbine into Governor Valve Sequential Valve Mode)
2	TRG-2	I (ATC)	CRD Drive Header Flow Control Valve controller (CRD-FC-600) output fails high while in automatic
3	TRG-3	C (BOP,SRO) TS (SRO)	RHR-SYS-A/LPCS Keep Fill Pump (LPCS-P-2) trips (Tech Spec)
4	TRG-4	C (ATC,SRO) TS (SRO)	Failure of MS-PS-23D which causes a half scram on RPS “B” side. Two control rods scram but one does not go full in (must be manually inserted) (Tech Spec)
5	TRG-5	C (BOP)	Ground causes FPC-P-1B to spuriously trip (FPC-P-1A fails to auto start)
6	TRG-6	M (ALL)**	Trip of E-CB-1/7 with transfer of SM-7 to Backup Transformer resulting in reactor trip signal Hydraulic ATWS - Lower RPV Level -80 inches to -140 inches **(CT #1) (CT #2)**
7	N/A	N/A	SLC-P-1A shaft shears when pump starts and SLC-P-1B develops a discharge flow blockage which limits SLC injection flow.
8	N/A	C (ATC)	RWCU-V-4 does not auto close on SLC initiation but can be closed manually.
9	N/A	C (BOP)	Scram/Reset/Scram not effective in inserting control rods - Control rods can be manually driven in

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications
**** Event forms a portion of significant CGS PSA Accident Sequence (TTC044) (Ref: PSA-1-SM-0001 (Rev 7))**

Target Quantitative Attributes	Actual	Description
Malfunctions after EOP entry (1-2)	**3**	Reduced SLC injection capability; RWCU-V-4 fails to auto close; Scram-reset-scram ineffective
Abnormal events (2-4)	**4**	CRD-FC-600 failure; LPCS-P-2 shaft seizure; RPS “B” half scram (2 control rods inadvertently scram); FPC-P-1B trip
Major transients (1-2)	**1**	E-CB-1/7 breaker trip leading to hydraulic ATWS
EOPs entered/requiring substantive actions (1-2)	**1**	PPM 5.1.1 (RPV Control)
EOP contingencies requiring substantive actions (0-2)	**1**	PPM 5.1.2 (RPV Control – ATWS)
EOP based Critical tasks (2-3)	**2**	See Critical Task Determination table

Trigger (TRG-x)	Evaluator Directed	How Triggered	Purpose	Malfunction Numbers
TRG-2	YES	Manually	Event Initiator	CNH-CRD001E; BST-CRD001F
TRG-3	YES	Manually	Event Initiator	PMP-CSS004S
TRG-4	YES	Manually	Event Initiator	BST-RRS067F; MAL-RMC007-3835; MAL-RMC007-1815; MAL-RMC005-1815
TRG-5	YES	Manually	Event Initiator	MOT-FPC002G
TRG-6	YES	Manually	Event Initiator	BKR-EPS003; MAL-CRD007A1; MAL-CRD007A2; MAL-CRD007B1; MAL-CRD007B2
TRG-7		Manually	Field Action	BKR-RHR001
TRG-8		Manually	Field Action	BKR-CSS002
TRG-9		Automatically	Malf Trigger	BST-CRD001F
TRG-10		Automatically	Malf Trigger	MAL-RMC007-1815; MAL-RMC005-1815
			Initial Condition	BST-FPC020F
			Initial Condition	PMP-SLC001B
			Initial Condition	BKR-CRD002
			Initial Condition	PMP-SLC002F
			Initial Condition	MOV-RWU010F

Event 1

The Scenario starts from 100% power with Control Rod Drive (CRD) Pump 1B (CRD-P-1B) out of service for extended maintenance. Once the crew has the shift, the ATC operator lowers reactor power (for load following) using Reactor Recirculation (RRC) flow to 90% per PPM 3.2.6 (Power Maneuvering). The BOP operator takes the Main Turbine out of Governor Valve Optimization mode per SOP-MT-GV/OPTIMIZATION (Section 5.2) prior to the RRC flow reduction.

Event 2

(TRG-2) CRD Drive Header Flow Control Valve controller (CRD-FC-600) output fails high while in automatic which causes 603.A7 5-8 (CRD PUMP SUCTION FLTR D HIGH) annunciator to come in caused by abnormally high system flow. Upon finding the CRD-FC-600 controller output failed high, the ATC operator informs the CRS and shifts the controller to manual and restores CRD system parameters to normal. Annunciator will clear once system parameters restored to normal.

Event 3

(TRG-3) The shaft on RHR-SYS-A/LPCS Keep Fill Pump (LPCS-P-2) seizes causing a trip of the pump. The RHR A PUMP DISCH PRESS HIGH/LOW annunciator alarms shortly after LPCS-P-2 trips. The LPCS PUMP DISCH PRESS HIGH/LOW annunciator will alarm ~13 minutes after LPCS-P-2 trips (unless LPCS pump started before then). Based on system status and ARP direction, the CRS will direct the BOP operator to start the Low Pressure Core Spray (LPCS) Pump (and place into Suppression Pool Mixing per SOP-LPCS-SP) to maintain system availability provided the LPCS PUMP DISCH PRESS HIGH/LOW annunciator is not in alarm. To prevent an inadvertent start of Residual Heat Removal (RHR) Pump 2A (RHR-P-2A) and therefore a potential for water hammer, the CRS will direct control power fuses removed (TRG-7) from the RHR-P-2A starting circuit. If LPCS pump is not started and the LPCS PUMP DISCH PRESS HIGH/LOW annunciator is received, LPCS Pump control power fuses will also be removed (TRG-8). The CRS will refer to ABN-RHR-DEPRESS as time permits to determine system recovery actions.

With RHR-P-2A and LPCS inoperable, the CRS refers to Technical Specifications and Licensee Controlled Specifications and determines the following actions are applicable:

- LCO 3.5.1 A.1 (RHR-SYS-A & LPCS are both tracked as inoperable) - Restore respective subsystem to operable status within 7 days
- LCO 3.5.1 C.1 - Restore either RHR-SYS-A or LPCS subsystem to operable status within 72 hours
- LCO 3.6.1.5 A.1 - Restore RHR-SYS-A Drywell Spray subsystem to operable status within 7 days
- LCO 3.6.2.3 A.1 - Restore RHR-SYS-A Suppression Pool Cooling subsystem to operable status within 7 days
- RFO 1.6.1.5 A.1 - Restore RHR-SYS-A Suppression Pool Spray subsystem to operable status within 7 days

Note that LCOs 3.4.6, 3.4.9, and 3.6.1.3 are considered but not applicable with the plant in Mode 1.

Event 4

(TRG-4) Main Steam pressure switch 23D (MS-PS-23D) fails high causing Reactor Protection System (RPS) relay K5D (RPS-RLY-K5D) to actuate a RPV Pressure High Trip Scram relay (as evidenced by annunciator 603.A8 2-2 (RPV PRESS HIGH TRIP)). This actuation causes a half scram on the RPS “B” side with all RPS “B” white RPS scram lights de-energized. The ATC operator will determine that two control rods (38-35 and 18-15) inadvertently scrammed during the half scram and that control rod 18-15 only partially inserted. The CRS enters ABN-ROD, section 4.2, for inadvertently scrammed rods. The ATC operator reduces RRC flow to 74 Mlbm/hr at 5% per minute. Following flow reduction, an attempt is made to fully insert control rod 18-15 using the CONTINUOUS INSERT pushbutton (which will be successful). The crew diagnoses the instrument failure and determines the half scram cannot be reset.

The CRS refers to Technical Specifications and determines that TS 3.3.1.1 (RPS Instrumentation) Action A.1 or A.2 requires affected channel or affected trip system, respectively, to be placed in TRIP within 12 hours. In addition, control rod 18-15 is considered inoperable for not fully inserting when inadvertently scrammed. LCO 3.1.3 (Control Rod Operability) Action C.1 requires rod 18-15 to be fully inserted within 3 hours and its associated CRD (HCU) disarmed within four hours.

Event 5

(TRG-5) Bus 81 ground as sensed on MC-8BB which powers Fuel Pool Cooling Pump 1B (FPC-P-1B) causes FPC-P-1B to trip when power fuses blow. With this power loss, the standby Fuel Pooling Cooling pump (FPC-P-1A) will not auto start. ARP 4.627.FPC2.3-1 (CIRCULATION PUMP B DISCHARGE PRESSURE LOW) directs entry into ABN-FPC-LOSS. The BOP operator will manually start FPC-P-1A to re-establish fuel pool cooling. Resetting the Bus 81 ground annunciator (TRG-1) will be successful, if attempted, since ground cleared upon the FPC-P-1B power fuses blowing. Since the status of the FPC-P-1B thermal overloads are unknown at this point the BOP operator may place the FPC-P-1B control switch in the IR-69 position to allow reset of associated overloads.

Event 6

(TRG-6) Trip of CB-1/7 (4160V feed from SM-1 to SM-7) results in an automatic transfer of Division 1 AC safety bus (SM-7) to the Backup Transformer (TR-B). The transient results in a trip of the LPCS Pump (previously started) and a loss of RPS Motor Generator “A” power to RPS “A”. With a RPS “B” half scram signal already present, a full scram signal now exists. The ATC operator recognizes a scram should have occurred and that an ATWS condition exists. The ATC operator takes scram actions including pressing all Manual scram pushbuttons and initiating ARI logic. Both trains of SLC are started due to reactor power being > 5%.

The CRS enters PPM 5.1.1 (RPV Control) and transitions into PPM 5.1.2 (RPV Control – ATWS) and directs the BOP operator to inhibit ADS and to take manual control of HPCS. The CRS addresses the level leg first and directs the BOP operator to perform PPM 5.5.6 (Bypassing MSIV Low RPV Level and High Steam Tunnel Temperature interlocks) to allow MSIVs to stay open on subsequent RPV level reduction. PPM 5.5.1 (Overriding ECCS Valve Logic To Allow Throttling ECCS Injection) is also performed. The CRS then directs stopping and preventing all injection into the RPV except for SLC, CRD and RCIC. When level reaches -65 inches, the ATC operator will restart injection into the RPV through the RFW Startup flow control valve to maintain a RPV Level band of -80 to -140 inches. **(CT #1)** The CRS directs an RPV pressure band of 800 to 1050 psig with the Digital Electro-Hydraulic (DEH) system in automatic. If reactor power is above 25%, the capacity of the RFW Start-up flow line will be exceeded and the ATC operator will have to augment flow by opening RFW-V-109 (Bypass valve for Feedwater Heaters 6A and 6B). The BOP operator performs PPM 5.5.11 (Alternate Control Rod Insertions) in an attempt to insert control rods.

This event forms a portion of significant CGS PSA Accident Sequence (TTC044) (Ref: PSA-1-SM-0001 (Rev 7))

Event 7

Standby Liquid Control (SLC) Pump 1A fails due to a sheared shaft and SLC Pump 1B discharge is partially blocked resulting in a reduced SLC injection flow in the RPV at approximately 18 gpm. This injection rate will cause reactor power to drop slowly but not prior to the crew lowering RPV level to -80 to -140 inches. Reactor Water Cleanup Valve 4 (RWCU-V-4) does not auto close on the SLC initiation but will be closed manually.

Event 8

Reactor Water Cleanup Valve 4 (RWCU-V-4) does not auto close on the SLC initiation but will be closed manually.

Event 9

Control rods insertion will be attempted per PPM 5.5.11 (Alternate Control Rod Insertions). **(CT #2)** Since hydraulic ATWS occurred (no white RPS scram lights lit), the BOP operator will remove two (2) ARI fuses and bypass (via switch) the Scram Discharge Volume (SDV) High Level trip. CRD-P-1A will be found tripped and will have to be restarted before a re-scram is attempted. The Scram – Reset – Scram method of control rod insertion is not effective requiring the BOP operator to bypass the Rod Worth Minimizer (RWM) and manually insert control rods individually using CRD drive pressure.

TERMINATION CRITERIA: The scenario will be terminated when RPV level is being maintained between -80 inches to -140 inches, one attempt at scram-reset-scram has been completed, and manual insertion of control rods has commenced OR as directed by the Examination Team.

Critical Task Determination Table

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT #1 - During ATWS with power > 5%, terminate and prevent injection with exception of SLC, RCIC, and CRD, into the RPV until RPV level is -65 inches to establish a Lowered Level (LL). -AND- Maintain RPV level above -186 inches. Short excursions below -186 inches does not constitute failure of CT provided level restored and maintained above -186 inches within 10 minutes of going below -186 inches	This is a procedural requirement of PPM 5.1.2 (RPV Control – ATWS). Allowing SLC, RCIC and CRD injection avoids conflicts with other instructions in the EOPs such as injecting SLC and inserting control rods. Stopping other injection sources prevents potential fuel damage due to cold water injection. (Ref: PPM 5.0.10 Rev 21, section 8.3.4.) -AND- Prevent unnecessary significant challenge to containment or the RPV.	Procedural direction by PPM 5.1.2 Step L-6 directs lowering RPV level to < -65 inches by stopping and preventing all injection into RPV except from boron injections systems, RCIC and CRD, defeating interlocks if necessary. -AND- Procedural direction by PPM 5.1.2 Step L-12 directs maintaining RPV level from -140 inches to -80 inches (best practice band) with outside shroud injection systems (Table 5). OI-15 (EOP and EAL Clarifications), Section 4.3.2.b.)	Crew stops and prevents injection with the exception of SLC, RCIC, and CRD. -AND- Crew uses Reactor Feedwater system to maintain RPV level above -186 inches. (ED required if level cannot be restored and maintained above -186 inches)	RPV level and reactor power start lowering. -AND- RPV level indication.
CT #2 - With reactor scram required and the reactor not shutdown, commence inserting control rods per PPM 5.5.11 Attachment 6.1 Tab B prior to transitioning to Tab E.	This is a procedural requirement of PPM 5.1.2 (RPV Control – ATWS). Provides a method to shutdown the reactor when required, lowering the reactors energy state, to prevent exceeding primary containment design limits and minimize the potential consequences of power oscillations. (Ref: PPM 5.0.10 Rev 21, section 8.3.6.)	Reactor scram required and reactor not shutdown.	Crew uses alternate methods to insert control rods per PPM 5.5.11 Attachment 6.1 Tab B	Reactor power is decreasing. Control rod Full-In lights as rods are fully inserted.

EVENT No. 1		
Description: Lower reactor power with Reactor Recirculation (RRC) flow to 90% for load following per PPM 3.2.6 (which includes placing Main Turbine into Governor Valve Sequential Valve Mode). Event is initiated by the turnover and starts with PPM 3.2.6 step 5.1.7.		
Time	**Position**	**Applicants Actions or Behavior**
Examiner Note: Power reduction may be considered complete following an observable reduction in reactor power.		
Examiner Note: Following steps are from PPM 3.2.6 (Power Maneuvering) which was previously completed (marked up) through step 5.1.6.		
	CRS	NOTE: The CRS or Shift Manager may authorize steps to be N/A'd to take into account current plant configuration or conditions, or target power level. ☐ 5.1.7 Records date and time downpower initiated.
		☐ 5.1.8 Directs BOP to enter Sequential Valve Operation per SOP-MT-GV/OPTIMIZATION (Section 5.2).
Examiner Note: Following steps are from SOP-MT-GV/OPTIMIZATION (Section 5.2)		
	BOP	Performs the following to enter Sequential Valve Operation: 5.2.1 If VPL DEMAND is not at 100%, then set VPL DEMAND to 100% as follows (Menu, Main Display): ☐ SELECT VPL TARGET. ☐ ENTER 100%. ☐ SELECT OK. ☐ SELECT GO. ☐ SELECT YES. ☐ VERIFY GO illuminated. ☐ VERIFY VPL DEMAND ramps to VPL TARGET value.

EVENT No. 1 (CONTINUED)		
	BOP	5.2.2 Completes entry into Sequential Valve Mode as follows: ☐ SELECT SEQUENTIAL VALVE MODE. ☐ SELECT YES. ☐ VERIFY GV-1 and GV-4 move to their pre-optimization positions (approximately equal). ☐ VERIFY SEQUENTIAL VALVE MODE is illuminated.
Examiner Note: Following steps are a continuation of PPM 3.2.6 (Power Maneuvering).		
	CRS	☐ 5.1.10 Assigns an individual to track thermal power changes.
Examiner Note: Crew will track change in power as scenario progresses.		
	CRS	☐ 5.1.11 & 5.1.12 If thermal power changes GT 15% in one hour, then notify Chemistry to evaluate the Offgas release rate.
Examiner Note: Main Generator output will not be reduced to 1000 MWe as specified in step 5.1.15 since reactor power reduction is only to 90%.		
	CRS	☐ 5.1.15 Directs ATC to lower power with flow to achieve 90% reactor power at a rate not to exceed 1% per minute.
Examiner Note: Following steps are from Quick Card SOP-RRC-FLOW-QC.		
Examiner Note: The BOP is expected to act as peer checker for this evolution.		
	ATC	Lowers reactor power using RRC Flow per SOP-RRC-FLOW-QC (Section 2.1): NOTE: Per PPM 1.3.84, the performer verifies and verbalizes to the peer checker the following information: • Whether the controllers are in Auto or Manual • Which controller will be used (Master or Individual) • The direction of the intended change • The current parameter (Hz, % Rx Power, Core Flow, MWe, Loop Flow, etc.) • The target parameter (Hz, % Rx Power, Core Flow, MWe, Loop Flow, etc.) • The button the performer intends to use to change RRC pump frequency
Examiner Note: Sufficient margin to fuel-preconditioning limits exist as specified in turnover.		

EVENT No. 1 (CONTINUED)		
	ATC	☐ 2.1.1 Informs CRS to monitor fuel-preconditioning limits (per 9.3.18) while changing reactor power.
		☐ 2.1.2 Verifies both RRC individual flow controllers are in Auto and then lowers RRC flow using RRC-M/A-R675 (Master Control) Lower pushbutton, as necessary, to achieve a ≤ 1% per minute power change until 90% power is achieved.
		☐ 2.1.3 Verifies total core flow is LT 105%.
		☐ 2.1.4 Verifies RRC loop A and B is LT 57.5 Mlb/hr.
		☐ 2.1.5 Notifies the CRS when the change in Reactor power is complete.
Comments:		
Event No. 2 is initiated after CRS gets the report that the power reduction is complete (or as directed by the Exam team) and is activated using **TRIGGER 2**.		

Event No. 2

Description: CRD Drive Header Valve controller (CRD-FC-600) output fails high while in automatic.

Event is activated using **TRIGGER 2**.

BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 2</u>

Time	Position	Applicants Actions or Behavior
	ATC	Responds to 'CRD PUMP SUCTION FLTR ΔP HIGH' alarm (P603.A7 5-8).
		☐ Observes CRD Cooling Header flow at ~70 gpm and Drive Header/Reactor D/P at ~350 psid and informs the CRS before referring to ARP.
<u>Examiner Note</u>: Steps below to take manual control are authorized per PPM 1.3.1 (Operating Policies, Programs and Practices) step 4.6.4.		
<u>Examiner Note</u>: Steps below may be performed without a procedure as permitted by OI-9 (Operations Standards and Expectations) section 16.3.1.		
	ATC	☐ Observes Flow Control Valve (CRD-V-2B) full open.
		☐ Observes CRD Flow Controller (CRD-FC-600) red arrow upscale and the signal is near 100% and informs the CRS.
		☐ Places CRD-FC-600 controller in manual.
		☐ Depresses the close pushbutton to restore CRD Cooling Header flow to ~62 GPM and Drive Header D/P to ~265 psid.
		☐ Observes CRD-V-2B dual indication and the red arrow on CRD-FC-600 returning to the 'green band'.
Examiner Note: Following step is from ARP P603.A7 5-8 (CRD Pump Suction Filter D/P HIGH). Only step 1 applies since controller failure is causing the alarm due to excessive flow.		
Examiner Note: BOP may perform below step while ATC performs manipulations.		
	BOP	☐ 1: Checks CRD-dPIS-15 (CRD Pump Suction Filter Differential Pressure) (CRD-IR-1A).
BOOTH ROLEPLAY – If sent to check suction filter D/P, wait 1 minute then report D/P at 9 psid (if suction filter annunciator locked in) or 5 psid (if suction filter annunciator cleared).		
BOOTH ROLEPLAY – If sent to investigate, wait 1 minute then report "Nothing abnormal found with CRD system".		
	CRS	☐ Contacts Work Control for assistance in troubleshooting controller failure.

Comments:

Event No. 3 is initiated after CRS gets the report that CRD parameters have been returned to normal (or as directed by the Exam team) and is activated using **TRIGGER 3**.

Event No. 3

Description: RHR-SYS-A/LPCS Keep Fill Pump (LPCS-P-2) trip (Tech Spec)

Event is activated using **TRIGGER 3**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 3

Time	Position	Applicants Actions or Behavior
Examiner Note: RHR 'A' discharge low pressure alarm comes in shortly after LPCS-P-2 (Keep Fill) pump shaft seizes. Pump continues to run for several seconds before tripping on over current.		
	BOP	Responds to 'RHR A PUMP DISCH PRESS HIGH/LOW' alarm (P601.A4 3-1).
		☐ Observes RHR Loop 'A' discharge pressure at ~20 psig (Low) and informs the CRS before referring to ARP.
Examiner Note: Below alarms/indications come in when the keep fill pump breaker trips open.		
Examiner Note: Below Out Of Service alarms along with the illuminated BYPASS AND INOPERABLE STATUS PANEL (BISI) for LPCS-P-2 Power Loss/OL is used to determine the required ARP actions. RHR 'A' and LPCS BISIs both light (and require the same ARP actions) since they have the Keep Fill pump in common. Either ARP may be used.		
	BOP	Several seconds later responds to the 'RHR A OUT OF SERVICE' and 'LPCS OUT OF SERVICE' alarms (P601.A4 6-1 & P601.A3 6-3, respectively) and associated BISIs caused by LPCS-P-2 (keep fill pump) power loss/overload.
		☐ Observes panel indication lost for LPCS-P-2 (power loss due to breaker trip) and informs CRS before referring to ARP.
Examiner Note: CRS may give priority to starting LPCS pump to maintain its availability before other ARP actions are performed. RHR 'A' pump should not be started.		
Examiner Note: LPCS low pressure alarm comes in ~13 min after keep fill pump shaft seizes. CRS has sufficient time to direct LPCS pump started before LPCS discharge low pressure alarm is received. If crew does not start the LPCS Pump then its control power fuses should be removed following receipt of the LPCS discharge low pressure alarm (P601.A3 5-3).		
BOOTH OPERATOR – If directed to remove control power fuses for LPCS Pump, wait 1 minute then ACTIVATE TRIGGER 8. Report "LPCS Pump control power fuses have been removed."		
BOOTH OPERATOR – If asked, pre-start checks for LPCS and RHR Pump "A" are complete.		
Examiner Note: Following step is from ARP 4.601.A4 6-1 for RHR 'A' Out of Service (or ARP 4.601.A3 6-3 for LPCS Out of Service). Either will direct actions for LPCS-P-2 PWR LOSS/OL.		
	BOP	☐ 1. Requests permission from CRS to start LPCS-P-1 per SOP-LPCS-SP (LPCS Suppression Pool Mixing) to maintain operability.
Examiner Note: Following steps (to start LPCS-P-1) are from SOP-LPCS-SP (LPCS Suppression Pool Mixing) section 5.1.		
Examiner Note: It is expected the CRS will allow an auto start of Service Water Pump 'A'.		

Event No. 3 (CONTINUED)		
	BOP	☐ 5.1.2 Informs CRS to ENTER LPCS-SYS-1 as inoperable, but available, in the Plant Logging System.
		CAUTION To minimize cavitation and increased pump hydraulic loads/vibrations, minimize operating with LPCS-FCV-11 (Minimum Flow) as its only discharge path. {C-9448} NOTE: H13-P601.A3-5.1, ADS LPCS/RHR A PUMP RUNNING PERMISIVE alarm is an expected alarm when LPCS-P-1 starts. NOTE: SW-P-1A may be allowed to auto start following LPCS-P-1 start.
		☐ 5.1.3 Starts LPCS-P-1 (should make plant announcement before starting).
		☐ 5.1.4 Verifies LPCS-FCV-11 opens during low flow conditions (approximately 800 gpm) (Minimum Flow Bypass).
		☐ 5.1.5 Throttles open LPCS-V-12 for approximately 6400 gpm (Test Bypass to Suppression Pool).
	BOP	☐ 5.1.6 Verifies LPCS-FCV-11 closes (approximately 800 gpm).
		☐ 5.1.7 Verifies SW-P-1A running.
		☐ 5.1.8 Notifies HP that radiological conditions may have changed.
		☐ 5.1.9 Monitors Suppression Pool temperatures.
Examiner Note: Following step is a continuation of ARP for RHR ‘A’ (or LPCS) Out of Service (loss of Keep Fill pump)		
	BOP	☐ 2. Refers to ARP 4.601.A4 3-1 (RHR A PUMP DISCH PRESS HIGH/LOW).
Examiner Note: Following steps are from ARP 4.601.A4 3-1 (RHR A PUMP DISCH PRESS HIGH/LOW.		
	BOP	☐ 1. Checks RHR Loop ‘A’ pressure at the following: • RHR-PI-612A (H13-P601) • RHR-PIS-22A (H22-P018, RB 501) • TDAS pt. X155
		☐ 4.a IF not operating RHR per the EOPs, then inhibits RHR-P-2A start by pulling its control power fuses.

Event No. 3 (CONTINUED)		
BOOTH OPERATOR – If directed to report RHR Loop 'A' discharge pressure on instrument rack H22-P018 in RB 501, wait 1 minute then report "Instrument rack H22-P018 pressure indicates ________ psig" (refer to soft panel and report to nearest 5 psig increment).		
BOOTH OPERATOR – If directed to remove control power fuses for <u>RHR Pump 'A'</u>, wait 1 minute then ACTIVATE <u>TRIGGER 7</u>. Report "RHR Pump 2A control power fuses have been removed."		
	BOP	☐ 4.b Checks operation of LPCS-P-2 (Water Leg Pump).
BOOTH ROLEPLAY – If sent to investigate status of LPCS-P-2 locally at the pump, wait 1 minute then report "LPCS-P-2 is warm to the touch and not running."		
		☐ 4.c Verifies the following valves are closed: • RHR-V-16A (Upper Drywell Spray) • RHR-V-17A (Upper Drywell Spray) • RHR-V-24A (Test Line Isolation) • RHR-V-27A (Suppression Pool Spray) • RHR-V-42A (LPCI Isolation)
<u>Examiner Note</u>: CRS may refer to below procedure but no verifiable actions will be performed.		
	CRS	☐ 4.d Refers to ABN-RHR-DEPRESS (Starting RHR Loop A Following Depressurization) due to loss of the Keep Fill system.
<u>Examiner Note</u>: Of the Technical Specification referenced below in the ARP, only LCO 3.5.1, 3.6.1.5 and 3.6.2.3 apply. Other LCOs apply which are not listed in the ARP. See end of this event for all applicable CRS Technical Specification actions.		
	CRS	☐ 5. Refers CRS to Technical Specifications 3.4.6, 3.4.9, 3.5.1, 3.6.1.5, 3.6.2.3, and 3.6.1.3 and Licensee Controlled Specifications 1.3.4.6.
<u>Examiner Note</u>: Following step is a continuation of ARP for RHR 'A' (or LPCS) Out of Service (loss of Keep Fill pump)		
	BOP	☐ 3. Checks the status of the breaker, control power fuses, or thermal overloads for LPCS-P-2 at LPCS-42-7B6B.
BOOTH ROLEPLAY – If sent to investigate status of LPCS-P-2 at the breaker, wait 1 minute then report "The breaker at LPCS-42-7B6B was found tripped. There is a mild acrid odor near the breaker." (NO FIRE)		
	BOP	☐ 4. Refers CRS to Technical Specifications 3.5.1, 3.4.9, 3.6.1.5 and 3.6.2.3.

Event No. 3 (CONTINUED)		
	CRS	Evaluates Technical Specifications and determines the following Required Actions apply:
		☐ LCO 3.5.1 A.1 (RHR-SYS-A & LPCS are both tracked as inoperable) - Restore respective subsystem to operable status within 7 days ☐ LCO 3.5.1 C.1 - Restore either RHR-SYS-A or LPCS subsystem to operable status within 72 hours ☐ LCO 3.6.1.5 A.1 - Restore RHR-SYS-A Drywell Spray subsystem to operable status within 7 days ☐ LCO 3.6.2.3 A.1 - Restore RHR-SYS-A Suppression Pool Cooling subsystem to operable status within 7 days
		Evaluates Licensee Controlled Specifications (LCS) and determines the following Required Action applies:
		☐ RFO 1.6.1.5 A.1 - Restore RHR-SYS-A Suppression Pool Spray subsystem to operable status within 7 days
Examiner Note: LCOs 3.4.6, 3.4.9, and 3.6.1.3 are considered but not applicable.		
	CRS	☐ Direct postings for Protected Equipment to include RHR B, RHR C, HPCS, HPCS SW, DG2, DG3, and SW-B

Comments:

Event No. 4 is initiated after LPCS has been placed into Suppression Pool Mixing and the required Tech Spec Actions entered (or as directed by the Exam team) and is activated using **TRIGGER 4**.

Event No. 4

Description: Failure of MS-PS-23D which causes a half scram on RPS "B" side. Two control rods scram but one does not go full in (must be manually inserted) (Tech Spec)

Event is activated using **TRIGGER 4**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 4

Time	Position	Applicants Actions or Behavior
Examiner Note: The PRV High Pressure Trip causes the half scram on RPS 'B'.		
	ATC	☐ Responds to 'RPV PRESS HIGH TRIP' (P603.A8 2-2) and '½ SCRAM SYSTEM B' (P603.A8 3-4) alarms and informs CRS.
		☐ Validates that a half scram occurred on RPS 'B' (all white RPS 'B' scram lights de-energized) and informs the CRS.
Examiner Note: The Rod Accumulator Trouble results from the two rods which scrammed on the half scram.		
	ATC	☐ Responds to 'ROD ACCUMULATOR TROUBLE' (P603.A7 6-7) alarm.
		☐ Scans the full core display (or observes RWM screen) for drifting and/or scrammed control rods.
		☐ Recognizes two control rods have blue SCRAM lights lit and flashing ACCUM lights and informs the CRS.
		☐ Selects control rod 38-35 and observes it full in.
		☐ Selects control rod 18-15 and observes it partially inserted.
		☐ Acknowledges Rod Accumulator Trouble alarm from P603 to allow any subsequent Rod Accumulator Trouble inputs to activate alarm.
	CRS	☐ Refers to Technical Specification 3.1.5 in response to rod 18-15 which failed to fully insert on scram.
Examiner Note: Following steps are from ARP 4.603.A8 3-4 (½ SCRAM SYSTEM B).		
	ATC	☐ 2.a. Checks the Full Core Display for individual control rods that may have scrammed (may have been previously performed).
	CRS	☐ 2.b. Enters ABN-ROD (Control Rod Faults).
		☐ 2.c. Stops all maintenance or surveillance testing that has the potential for generating a trip on the unaffected RPS channel (A).
Examiner Note: Failed pressure switch (MS-PS-23D) which failed in the TRIP condition caused the half scram which cannot be bypassed (without maintenance support). The half scram cannot be immediately reset.		

Event No. 4 (CONTINUED)		
	CRS	☐ 4. Refers to Technical Specification 3.3.1.1 for failed RPS instrument.
Examiner Note: Following steps are from ABN-ROD (Control Rod Faults) section 4.2 (note that there are no Immediate Actions that are currently applicable per section 3.2).		
	ATC	☐ 4.2.1 Reduce core flow to 74 Mlbm/hr at 5% per minute (core flow is > 80 Mlbm/hr (on MS-FR-613 at H13-P603)).
	CRS	☐ 4.2.2 If thermal power changes GT 15% in one hour, then notify Chemistry to evaluate the Offgas release rate.
	ATC	☐ 4.2.4.a. Selects the affected control rod(s) and verifies position (may have been previously performed).
Examiner Note: Control rod 18-15 is the partially inserted rod.		
	ATC	☐ 4.2.4.b.1) Selects control rod 18-15 and depresses the CONTINUOUS INSERT Pushbutton at H13-P603.
		☐ 4.2.4.b.2) Drives control rod 18-15 to its FULL IN position.
		☐ 4.2.4.b.3) Releases the CONTINUOUS INSERT Pushbutton.
		☐ 4.2.4.b.4) Verifies control rod 18-15 remains in the FULL IN position.
		☐ 4.2.4.c. If necessary, reset the rod accumulator trouble annunciator using the accumulator trouble acknowledge pushbutton (H13-P603).
		☐ 4.2.4.d. If necessary, reset the control rod drift annunciator using the rod drift reset pushbutton (H13-P603).
	CRS	☐ 4.2.4.e. Refers to Technical Specifications (Reactivity).
		☐ 4.2.4.f. Initiates (or directs) a MON run to verify acceptable thermal limits and preconditioning.
Examiner Note: Following steps are from ARP 4.603.A8 2-2 (RPV PRESS HIGH TRIP). Step 2.c. cannot be performed (RPS 'B' will not reset).		
	BOP	☐ 2.a. Determines cause for half scram by investigating backpanel area and observing that RPS relay (RPS-RLY-K5D) has dropped out.
BOOTH ROLEPLAY – If sent to investigate MS-PS-23D and/or B, wait 1 minute then report "Nothing appears abnormal with MS-PS-23D(B)".		

Event No. 4 (CONTINUED)		
Examiner Note: CRS may also declare rod Control rod 38-35 inoperable based on not knowing reason for rod scram.		
	CRS	Evaluates Technical Specifications and determines the following Required Actions apply:
		☐ LCO 3.1.3 C.1 – Fully insert control rod 18-15 within 3 hours. ☐ LCO 3.1.3 C.2 – Disarm CRD for control rod 18-15 within 4 hours. ☐ LCO 3.3.1.1 A.1 – Place High Pressure trip channel in TRIP **–OR–** LCO 3.3.1.1 A.2 – Place RPS 'B' trip system in TRIP
Comments:		
Event No. 5 is initiated after control rod 18-15 is fully inserted and required Tech Spec Actions entered (or as directed by the Exam team) and is activated using **TRIGGER 5**.		

Event No. 5		
Description: Ground causes FPC-P-1B to spuriously trip (FPC-P-1A fails to auto start). Event is activated using **TRIGGER 5**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 5		
Time	**Position**	**Applicants Actions or Behavior**
Examiner Note: 'FPC BOARD FPC-2 TROUBLE' is an alarm informing the BOP that there is an alarm on backpanel H13-P627 (Fuel Pool Cooling Div 2 panel).		
	BOP	☐ Responds to 'BUS 81 GROUND' (P800.C5 3-5) and 'FPC BOARD FPC-2 TROUBLE' (P851-S2) alarms and informs CRS.
Examiner Note: Below Out Of Service alarm along with the illuminated BYPASS AND INOPERABLE STATUS PANEL (BISI) for Fuel Pool Cooling Pump 1B Loss is used to determine the required ARP actions.		
	BOP	Responds to 'FPC DIV 2 OUT OF SERVICE' (P627.FPC2 4-1) alarm and identifies BISI (FPC-P-1B PWR LOSS) as cause. Informs CRS.
Examiner Note: Following steps are from ARP 4.627.FPC2 4-1 (FPC DIV 2 OUT OF SERVICE).		
Examiner Note: FPC-P-1B power fuses blew which requires a manual start of FPC-P-1A.		
	BOP	NOTE: If the power or control fuses have blown, then FPC-P-1A must be manually started from H13-P626.
		☐ Manually starts FPC-P-1A and inform CRS.
	CRS	☐ Enters ABN-FPC-LOSS on entry condition (unplanned loss of FPC).
Examiner Note: Following steps are from ABN-FPC-LOSS section 4.1. CRS may only direct steps 4.1.1 and 4.1.2.a be performed based on ground fault on FPC-P-1B. **Step 4.1.2.a is not required to be completed prior to moving to the next event.**		
	BOP	☐ 4.1.1 Monitor Spent Fuel Pool level and temperature as directed.
		☐ 4.1.2.a. Place FPC-P-1B control switch in the IR-71(69) position.
Examiner Note: Following steps are from ARP 4.800.C5 3-5 (BUS 81 GROUND).		
Examiner Note: Ground will be reported to be on Bus E-MC-8BB.		
	BOP	☐ 1. Directs area operator to investigate ground location on the SL-81 Ground Fault Indication Panel.
Examiner Note: Alarm in MCR will clear (once locally reset) since power fuses (upon blowing) removed the ground for FPC-P-1B which is powered from E-MC-8BB.		
Examiner Note: Although step 3 below directs exit of ARP, CRS may still perform steps 7. & 8.		

Event No. 5 (CONTINUED)		
	BOP	☐ 2. & 3. Directs area operator to attempt to reset ground alarm locally (ground alarm relay resets).
	CRS	☐ 7. Maintains grounded circuit de-energized by not replacing fuses for FPC-P-1B until troubleshooting plan developed.
		☐ 8. Directs Work Request be generated for repair of grounded circuit.

BOOTH ROLEPLAY – <u>If sent to investigate ground location</u>, wait 1 minute then report "SL-81 ground appears to be on MC-8BB."

BOOTH OPERATOR – <u>If directed to attempt to reset ground alarm locally</u>, wait 1 minute then ACTIVATE <u>TRIGGER 1</u>. Report ground indication on MC-8BB is cleared."

Comments:

Event No. 6 is initiated when crew actions for loss of Fuel Pool cooling are complete (or as directed by the Exam team) and is activated using **TRIGGER 6**.

Event No. 6

Description: Trip of E-CB-1/7 with transfer of SM-7 to Backup Transformer results in reactor trip signal.

Event is activated using **TRIGGER 6**.

BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 6</u>

Time	Position	Applicants Actions or Behavior
	BOP	☐ Acknowledges annunciator 800.C3 6-1 (BKR 1/7 TRIP) and informs CRS
		☐ Reports that Bus SM-7 momentarily lost power and automatically transferred to the Backup Transformer
	ATC	☐ Reports half scram on RPS "A" with failure to scram (half scram on RPS "B" already exists)
<u>Examiner Note</u>: Following steps are Immediate Actions from PPM 3.3.1 (Reactor Scram)		
	ATC	☐ 6.1.1: Places Reactor Mode Switch to Shutdown
		☐ 6.1.2: Monitors reactor power, pressure and level
		☐ 6.1.3: (2 handed operation) Since APRMs are not downscale the following is performed: • 6.1.3.a: Depresses the Manual Scram pushbuttons • 6.1.3.b: Initiates ARI
		☐ 6.1.4: Recognizes that reactor power is > 5% and informs the CRS (See Event 7 for SLC actions)
	CRS	☐ Updates crew on EOP entry into PPM 5.1.1, RPV Control, and directs/verifies that the Mode Switch has been placed in SHUTDOWN
	CRS	☐ Updates crew and exits PPM 5.1.1 (RPV Control) and transitions to PPM 5.1.2 (RPV Control – ATWS)
		☐ Directs BOP to: • Inhibit ADS and take manual control of HPCS • Verify actuations for +13" and -50" as they occur • Directs pressure control with bypass valves in Auto
	BOP	☐ 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)

Event No. 6 (CONTINUED)		
		☐ Arms and Depresses the HPCS system initiation pushbutton while holding the control switch for HPCS-P-1 to STOP
		☐ Takes the control switch for HPCS-V-4 to close when it gets fully opened
		☐ Reports to CRS that ADS is inhibited and manual control of HPCS has been established
	CRS	☐ Directs PPM 5.5.6 be performed (Bypassing the MSIV Isolation Interlocks on High Tunnel Temperature and low RPV level)
	BOP	☐ Goes to EOP drawer and gets PPM 5.5.6 procedure and equipment bag containing two keys
		☐ Performs PPM 5.5.6: • At H13-P609 places MS-RMS-S84 to BYPASS • At H13-P611 places MS-RMS-S85 to BYPASS ☐ Updates crew upon completion
	BOP	☐ Recognizes and reports EOP entry conditions due to Drywell pressure, Drywell temperature and Wetwell level (as they occur)
	CRS	☐ Updates crew and enters PPM 5.2.1 (Secondary Containment Control) ☐ Establishes a key parameter: Wetwell pressure of 2 psig ☐ May establish a key parameter of Drywell temperature at 285°F
	BOP	☐ Reports when Wetwell pressure reaches 2 psig
	CRS	☐ Directs RCIC-V-1 closed (if Main Turbine online)
	BOP	☐ If directed, closes RCIC-V-1
	CRS	☐ Directs performance of PPM 5.5.1 (Overriding ECCS Valve Logic to Allow Throttling RPV Injection)

Event No. 6 (CONTINUED)

	BOP	☐ Goes to EOP drawer and pulls PPM 5.5.1 procedure and equipment bag containing 5 keys and performs PPM 5.5.1: • HPCS – Override HPCS-V-4 (HPCS RPV injection valve) automatic logic by placing HPCS-RMS-S25 in the OVERRIDE position (H13-P625) • LPCS - Override LPCS-V-5 (LPCS RPV injection valve) automatic logic by placing LPCS-RMS-S21 in the OVERRIDE position (H13-P629) • RHR Loop A - Override RHR-V-42A (RHR RPV injection valve) automatic logic by placing RHR-RMS-S105 in the OVERRIDE position (H13-P629) • RHR Loop B - Override RHR-V-42B (RHR RPV injection valve) automatic logic by placing RHR-RMS-S106 in the OVERRIDE position (H13-P618) • RHR Loop C - Override RHR-V-42C (RHR RPV injection valve) automatic logic by placing RHR-RMS-S107 in the OVERRIDE position (H13-P618) ☐ Updates crew to completion of PPM 5.5.1, and that the ECCS injection valves are closed and throttleable

CT #1 - During ATWS with power > 5%, terminate and prevent injection with exception of SLC, RCIC, and CRD, into the RPV until RPV level is -65 inches to establish a Lowered Level (LL).
-AND-
Maintain RPV level above -186 inches. Short excursions below -186 inches does not constitute failure of CT provided level restored and maintained above -186 inches within 10 minutes of going below -186 inches.

Examiner Note: Refer to Simulator Guide (page 32) for RPV Level Range information.

	CRS	☐ Directs the ATC to: • Stop and prevent condensate and feedwater • Lower level to a band less than –65 inches but greater than –186 inches (preferred band is –80 inches to –140 inches) • Commence RPV injection at -65 inches
	ATC	☐ Aligns the Feed and Condensate system per SOP-RFW-FCV-QC quick card as follows: • 2.1.1: Starts closing RFW-V-112A and RFW-V-112B • 2.1.2: Starts opening RFW-V-118 • 2.1.3: Verifies RFW-V-109 is closed • 2.1.4: Verifies RFW-V-117A and RFW-V-117B open • 2.1.5: Verifies RFW-LIC-620 is in manual (V selected for Valve position demand) with 0 output

Event No. 6 (CONTINUED)

		☐ 2.1.6: If Reactor Feed Pumps are operating then perform the following: • b. Places RFW-P-1B in MDEM mode • c. Places RFW-P-1A in MDEM mode • d. Controls Turbine speed as required • e. If desired, then places RFW-FCV-2A (B) in manual and slowly open to approximately 80% ☐ 2.1.7: Verifies RFW-V-112A and RFW-V-112B are fully closed ☐ 2.1.8: Verifies RFW-V-118 is fully open ☐ 2.1.9: If Reactor Feed Pumps are operating, then adjusts the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840) ☐ 2.1.10: Adjusts RFW-LIC-620 manual output to control RPV level

Examiner Note: CRO1 will be monitoring the wide range level instruments to maintain RPV level between -80 inches and -140 inches. One or more of the following will be used:

- **Wide Range Rx Level, MS-LI-604, on panel H13-P603**
- **Reactor Press/Wide Range LVL, MS-LR/PR-623A or B, on panel H13-P601**
- **GDS display on H13-P602**

If level lowers to below -147 inches on the wide range instruments, Reactor Fuel Zone Comp, MS-LR-615, on panel H13-P601 will be used.

Event No. 6 (CONTINUED)		
	ATC	☐ Reports EOP entry on low RPV water level at +13" ☐ Reports Reactor Power as it drops due to lowering level ☐ Maintains RPV level between -65 inches and –186 inches as directed (-80 inches to -140 inches is the preferred band) ☐ Does not commence feeding until RPV level drops below -65 inches
	CRS	☐ Directs PPM 5.5.11, ALTERNATE Control Rod Insertions, be performed to insert control rods (see Event 9)
	BOP	☐ Reports trip of LPCS pump (started during Event 3)

Comments:

Event No. 7 is activated at the beginning of the scenario and is realized when SLC system is started.

Event No. 7

Description: SLC-P-1A shaft shears when pump starts and SLC-P-1B develops a discharge flow blockage which limits SLC injection flow

Event is activated at the beginning of the scenario and is realized when SLC system is started.

Time	Position	Applicants Actions or Behavior
	ATC	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: ☐ 2.1: Removes the SLC keylock switch blanks and insert both keys into the SLC System control switches
		☐ 2.2: Initiates SLC injection by performing the following (H13-P603): • Places SLC System A control switch to the OPER position • Places SLC System B control switch to the OPER position
		☐ 2.3: Records the following: • SLC Flow rate (~43 gpm for one pump, or 86 gpm for both pumps) ▪ Will record reduced flowrate of ~24 gpm • Initial SLC tank level • Circle RWCU-V-4 status (should be closed but is open)
		☐ Reports to CRS that SLC is injecting at a reduced flowrate
		☐ Directs field operator to investigate problems with SLC

BOOTH ROLEPLAY – If directed to investigate SLC, wait 1 minute and report "It appears that SLC Pump "A" has a broken shaft and that there is a flow restriction with SLC train 'B'."

Comments:

Event No. 8 is activated at the beginning of the scenario and is realized when SLC system is started and RWCU-V-4 does not automatically close.

Event No. 8

Description: RWCU-V-4 does not auto close on SLC initiation but can be closed manually

Event is activated at the beginning of the scenario and is realized when SLC system is started and RWCU-V-4 does not automatically close.

Time	Position	Applicants Actions or Behavior
	ATC	☐ After starting both SLC pumps, recognizes that RWCU-V-4 did not automatically close ☐ Takes manual action to close RWCU-V-4 (Successful) ☐ Reports issue with RWCU-V-4 to CRS with action taken

Comments:

Event No. 9 is activated at the beginning of the scenario and is realized when Scram/Reset/Scram proves ineffective.

Event No. 9

Description: Scram/Reset/Scram not effective in inserting control rods - Control rods can be manually driven in

Event is activated at the beginning of the scenario and is realized when Scram/Reset/Scram proves ineffective.

Time	Position	Applicants Actions or Behavior
Examiner Note: Refer to Simulator Guide (pages 29 through 31) in reference to PPM 5.5.11.		
	BOP	☐ Goes to EOP drawer and pulls procedure for PPM 5.5.11 and equipment bag to perform PPM 5.5.11: ☐ Performs PPM 5.5.11: • Determines that no RPS scram lights are lit and: ▪ Removes one TB1 ARI fuse (P650 F01, F02, F03 or F04) ▪ Removes one TB2 ARI fuse (P650 F01, F02, F03 or F04) ☐ Observes that some or all blue scram valve lights are lit and determines Tab B should be performed: • Places the SDV HIGH LEVEL TRIP control switch to BYPASS • Ensures both CRD pumps are running – may direct ABN-CRD MAXFLOW be performed • Determines the scram cannot be reset • Overrides RPS trip signals per Attachment 6.1: ▪ At H13-P611 - Installs a jumper between RPS-RLY-K9B terminal stud 2 and RPS-RLY-K12F terminal stud 4 ▪ At H13-P611 - Installs a jumper between RPS-RLY-K9D terminal stud 2 and RPS-RLY-K12H terminal stud 4 ▪ At H13-P609 - Installs a jumper between RPS-RLY-K9A terminal stud 2 and RPS-RLY-K12E terminal stud 4 ▪ At H13-P609 - Installs a jumper between RPS-RLY-K9C terminal stud 2 and RPS-RLY-K12G terminal stud 4
BOOTH ROLEPLAY – If directed to perform ABN-CRD-MAXFLOW, wait 1 minute and activate Trigger 26. Report completion when valves are fully opened.		

Event No. 9 (CONTINUED)

CT #2 - With reactor scram required and the reactor not shutdown, commence inserting control rods per PPM 5.5.11 Attachment 6.1 Tab B prior to transitioning to Tab E.

	BOP	☐ Continues with Tab B operator actions: • Resets the scram by depressing reset pushbuttons • Determines that CRD drive header pressure can be established • Places the RWM bypass switch to bypass on H13-P603 • Manually starts to drive control rods by starting at 10-43 and inserting every other rod in every other row • Informs CRS having success driving control rods in • 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. If all rods did not insert, continues scram/reset/scram per Tab B and raises SDV drain time by 2 minutes • Determines no control rod motion do to Scram/Reset/Scram and requests drain time extension

Comments:

TERMINATION CRITERIA: The scenario will be terminated when RPV level is being maintained between -80 inches to -140 inches, one attempt at scram-reset-scram has been completed, and manual insertion of control rods has commenced OR as directed by the Examination Team.

PPM 5.5.11 ALTERNATE ROD INSERTION
(Attachment 6.1)

Any control rod not fully inserted

The following may be entered at any time based on fault, with CRS permission,

C – Scram Individual Control Rods
D – Vent Scram Air Header
E – Vent CR Over Piston Volumes

Any white RPS SCRAM light lit

NO

REMOVE one TB1 ARI fuse:

PANEL	FUSE
P650	F01
P650	F02
P650	F03
P650	F04

REMOVE one TB2 ARI fuse:

PANEL	FUSE
P650	F01
P650	F02
P650	F03
P650	F04

Some or All Blue SCRAM valve lights lit

NO

D

YES

B

YES

REMOVE applicable divisional RPS fuses, based on lit white RPS scram lights, as necessary to insert a full scram.:

PANEL	FUSE	EPN (contractor)	Trip System/ Group
P609	LL-F13	C72A-F18A	A1
P609	LL-F14	C72A-F18E	A2
P609	BB-F12	C72A-F18C	A3
P609	BB-F13	C72A-F18G	A4
P611	LL-F13	C72A-F18B	B1
P611	MM-F21	C72A-F18F	B2
P611	BB-F12	C72A-F18D	B3
P611	AA-F20	C72A-F18H	B4

IF SDV Vent and Drain Valves don't close,
THEN **REMOVE** SDV VENT AND DRAIN VALVE fuses, if required:

PANEL	FUSE	EPN (contractor)	SDV PILOT SOLENOIDS
P609	MM-F20	C72A-F17A	CRD-SPV-9A/182A
P611	MM-F20	C72A-F17B	CRD-SPV-9B/182B

All Rods IN

YES

INFORM CRS

INSTALL the following fuses removed above:

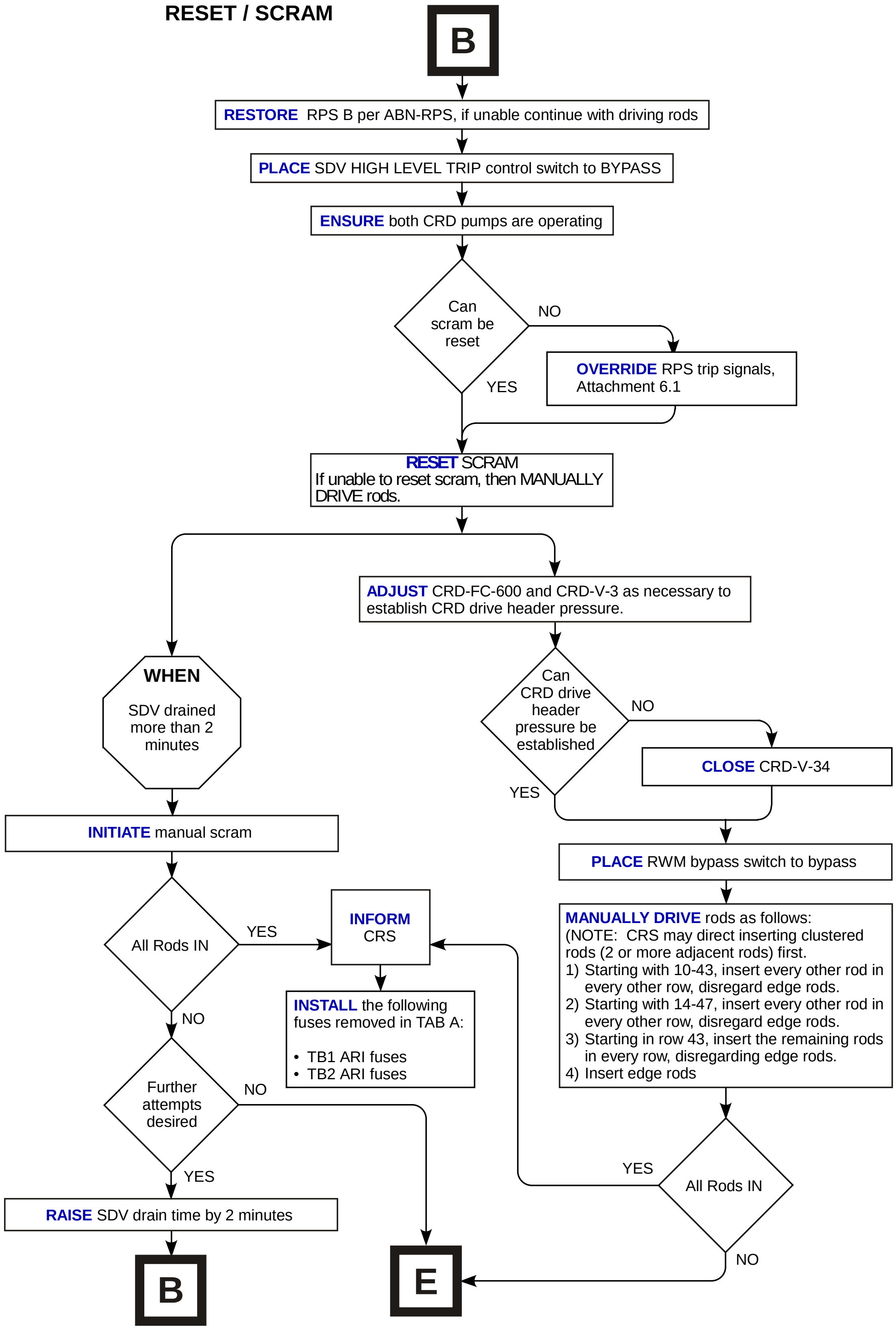
- RPS SCRAM fuses
- SDV VENT AND DRAIN VALVE fuses

NO

Perform concurrently

B **C** **E**

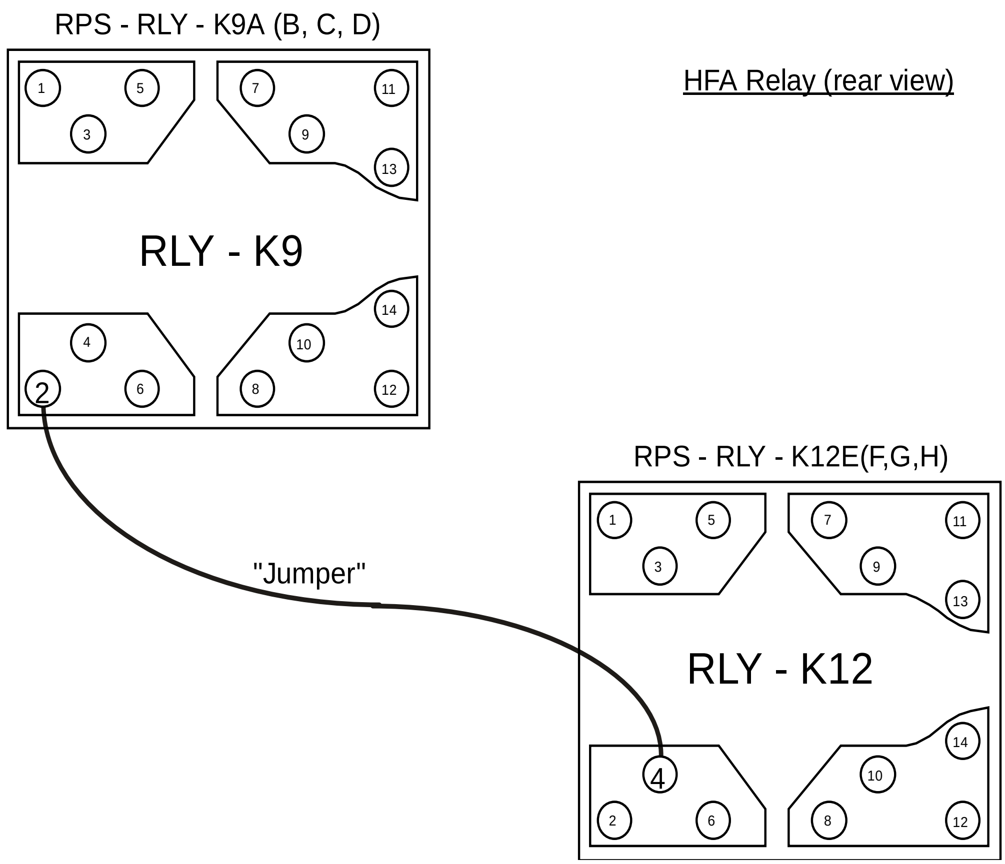
PPM 5.5.11 ALTERNATE ROD INSERTION (Attachment 6.1)



PPM 5.5.11 ALTERNATE ROD INSERTION (Attachment 6.1)

Overriding RPS Trips

- At H13-P611:
  - **INSTALL** a jumper between **RPS-RLY-K9B**, terminal **stud 2**, and **RPS-RLY-K12F**, terminal **stud 4.**
  - **INSTALL** a jumper between **RPS-RLY-K9D**, terminal **stud 2**, and **RPS-RLY-K12H**, terminal **stud 4.**
- At H13-P609:
  - **INSTALL** a jumper between **RPS-RLY-K9A**, terminal **stud 2**, and **RPS-RLY-K12E**, terminal **stud 4**.
  - **INSTALL** a jumper between **RPS-RLY-K9C**, terminal **stud 2**, and **RPS-RLY-K12G**, terminal **stud 4.**



REACTOR WATER LEVEL INSTRUMENT RANGES

Instrument	Range (in.)	Drywell Temp Range (°F)	Minimum Usable Level (in.)
Wide Range	-150 to +60	100 - 550	-147
Fuel Zone Range	-310 to -110	100 - 550	-310
Narrow Range	0 to +60	100 - 550	+5
Upset Range	0 to +180	100 - 160 161 - 200 201 - 250 251 - 300 301 - 350 351 - 400 above 400	+0 +15 +36 +59 +86 +117 +151
Shutdown Flooding Range	0 to +400	100 - 150 151 - 200 201 - 250 251 - 300 301 - 350 351 - 400 above 400	+20 +33 +49 +67 +87 +112 +205

Initial Conditions:

- Columbia is operating at 100% power
- CRD-P-1B is out of service for extended Maintenance
- CRD-P-1A is Protected

Shift Turnover:

- Lower power to 90% using Reactor Recirculation flow per PPM 3.2.6 (Power Maneuvering) after assuming the shift based on BPA Load Following request
- Steps 5.1.1 thru 5.1.6 of PPM 3.2.6 are complete
- Proper margin to Pre-Conditioned Status (PCS) exists per PPM 9.3.18
- The Reactivity brief has been performed

SC-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	Place RHR-SYS-A in SP Cooling (LPCS/RHR "A" ADS Permissive fails to annunciate) (Tech Spec); Rod (26-19) drifts out. Once inserted, control rod to drift out again (Tech Spec); SW-P-1A trips which requires RHR-P-2A to be secured; RFP "B" vibrations rise requiring RRC Flow reduction and manual trip of RFP "B"; OBE causes steam leak in RCIC Pump Room with Failure of RCIC-V-8 and RCIC-V-63 to fully close; Manual scram inserted; Steam leak develops in the Main Steam Tunnel; MS-V-22A and MS-V-28A through D fail to automatically close (MS-V-28A through D can be closed manually but does not isolate leak); Emergency Depressurization required on two Max Safes

LENGTH OF LESSON 1.5 Hours

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	SC-3	Rev. No.	1
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	12/22/16
REVISED BY	Dave E. Crawford	DATE	02/08/17
VALIDATED BY		DATE	
TECHNICAL REVIEW		DATE	
INSTRUCTIONAL REVIEW		DATE	
APPROVED		DATE	

Facility:	Columbia Generating Station	Scenario No.: 3	Op Test No.: 1
Examiners:	____________	Operators:	____________
	____________		____________
	____________		____________

Initial Conditions:	Columbia is operating at 85% power due to economic dispatch. Safety Relief Valve 2C (MS-RV-2C) is known to be leaking. Suppression Pool high temperature alarms (601.A11.1-3 and 601.A12.1-3) have just annunciated. Reactor Closed Cooling (RCC) Pump 1B is tagged out for planned maintenance. RCC-P-1A and RCC-P-1C are protected.
Turnover:	After shift turnover place RHR-P-2A in Suppression Pool Cooling (using maximum cooling) and allow SW-P-1A to auto start per SOP-RHR-SPC (section 5.1) – Steps 5.1.1 through 5.1.4 are complete. Associate Tech Specs and LCS action statements have been entered for RHR-SYS-A being inoperable but available. • LCO 3.5.1 Action A.1 which requires restoring RHR-SYS-A to operable status within 7 days • LCO 3.6.1.5 Action A.1 which requires restoring RHR-SYS-A drywell spray subsystem to operable status within 7 days • LCO 3.6.2.3 Action A.1 which requires restoring RHR-SYS-A suppression pool cooling subsystem to operable status within 7 days • RFO 1.6.1.5 Action A.1 which requires restoring RHR-SYS-A suppression pool spray subsystem to operable status within 7 days The pre-evolution brief has been completed and operators are stationed near both pumps.

Critical Tasks:

CT-1	With reactor at power and with primary system discharging into secondary containment, manually scram reactor before any area exceeds its maximum safe operating temperature.
CT-2	With a primary system discharging into secondary containment and area temperature exceeding maximum safe operating level in more than one area, initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of second MSOT being exceeded. CT considered met if any combination of 7 Safety Relief Valves are opened. Note: If the crew properly elects to invoke the "EMERG DEPRESS is anticipated" override in ppm 5.1.1 (RPV Control) and in doing so, the second maximum safe operating level is not exceeded, this Critical Task is considered to be met.

<u>NOTE</u>: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	Malf.	Event Type*	Event Description
1	N/A	N (BOP) TS (SRO)	Place RHR-SYS-A in Suppression Pool Cooling (LPCS/RHR "A" ADS Permissive fails to annunciate during pump start) (Tech Spec) **
2	TRG-2	C (ATC,SRO) TS (SRO)	Control rod (26-19) drifts out. Once inserted, releasing the continuous insert pushbutton allows the control rod to drift out again, requiring the control rod to be isolated (Tech Spec)
3	TRG-3	C (BOP,SRO) TS (SRO)	Standby Service Water Pump 1A (SW-P-1A) trips which requires Residual Heat Removal Pump 2A (RHR-P-2A) (currently in Suppression Pool Cooling) to be manually secured (Tech Spec)

4	TRG-4	C (ATC,BOP,SRO)	Reactor Feed Pump (RFP) "B" vibrations rise requiring RRC Flow reduction and manual trip of the "B" RFP
5	TRG-5	M (ALL)	Operating Bases Earthquake causes a steam leak in the RCIC Pump Room with Failure of RCIC-V-8 and RCIC-V-63 to fully close (preventing RCIC leak isolation). Manual scram inserted before first secondary containment max safe operating temperature is reached **(CT #1)**
6	N/A	M (ALL)	Steam leak develops in the Main Steam Tunnel
7	N/A	C (BOP)	MS-V-22A and MS-V-28A through D fail to automatically close (MS-V-28A through D can be closed manually but does not isolate leak)
8	N/A	---	Emergency Depressurization (PPM 5.1.3) is performed when two areas exceed their max safe operating temperature **(CT #2)**
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications			
**** Ref: Columbia OE (AR-00049685 – Root Cause Analysis of RHR-PS-19A Isolation Mispositioning Event)**			

Target Quantitative Attributes	Actual	Description
Malfunctions after EOP entry (1-2)	**1**	Several MSIVs fail to automatically close and one cannot be closed
Abnormal events (2-4)	**3**	ADS Permissive fails on RHR pump "A" start; Rod 26-19 drifts out; RFB "B" high vibrations
Major transients (1-2)	**2**	RCIC steam leak requiring scram; Main steam line break
EOPs entered/requiring substantive actions (1-2)	**2**	PPM 5.1.1 (RPV Control); PPM 5.3.1 (Secondary Containment Control)
EOP contingencies requiring substantive actions (0-2)	**1**	PPM 5.1.3 (Emergency RPV Depressurization)
EOP based Critical tasks (2-3)	**2**	See Critical Task Determination table

Trigger (TRG-x)	Evaluator Directed	How Triggered	Purpose	Malfunction Numbers
TRG-2	YES	Manually	Event Initiator	MAL-RMC004-2619
TRG-3	YES	Manually	Event Initiator	BKR-SSW001
TRG-4	YES	Manually	Event Initiator	ANN-840A1G05; MAL-FPT005B
TRG-5	YES	Manually	Event Initiator	MAL-RWB001; MAL-RCI004
TRG-6		Manually	Event Initiator	MAL-RMC004-2619
TRG-7		Manually	Field Action	ANN-840A1G05
TRG-8		Automatically	Malf Trigger	MAL-RRS006A; MAL-RCI004
TRG-9		Automatically	Malf Trigger	MAL-RRS006A
			Initial Condition	BST-RHR014F
			Initial Condition	AOV-RRS003F
			Initial Condition	MOV-RCI012F
			Initial Condition	MOV-RCI016F
			Initial Condition	RLY-NSF097F
			Initial Condition	BKR-RCC002

SCENARIO 3 SUMMARY

Event 1

As part of the turnover, and with annunciators for Suppression Pool high temperature in alarm (601.A11 1-3 and 601.A12 1-3), CRO-2 will place Residual Heat Removal Loop "A" (RHR-SYS-A) into Suppression Pool Cooling mode per SOP-RHR-SPC (Suppression Pool Cooling/Spray/Discharge /Mixing). Standby Service Water Pump (SW-P-1A) will be allowed to auto start as permitted by procedure.

During RHR-P-2A pump start for entering Suppression Pool cooling mode, an isolated pressure switch (RHR-PS-19A) prevents the LPCS/RHR "A" ADS Permissive alarm from annunciating on P601. The CRS refers to Technical Specifications and determines that LCO 3.3.5.1 (Emergency Core Cooling System (ECCS) Instrumentation) Action A.1 applies which directs entry into the Condition referenced in Table 3.3.5.1-1 for the channel (Function 4.e) immediately (Condition G). ACTION G.2 directs restoring channel to operable status within 8 days.

Previous Columbia OE (Ref: AR-00049685 – Root Cause Analysis of RHR-PS-19A Isolation Mispositioning Event dated 4/1/2007) involved isolation of same pressure switch which was not discovered until RHR-P-2A was started and the ADS Permissive annunciator did not come in as expected.

Event 2

(TRG-2) Control rod 26-19 drifts out of the core. CRO-1 recognizes the rod drift and takes Immediate Actions to fully insert the control rod using the Continuous Insert pushbutton. The CRS enters ABN-ROD. When the Insert pushbutton is released, the control rod begins again to drift out of the core. CRO-1 re-inserts the control rod full-in (and keeps the Continuous Inset pushbutton pressed) while the crew takes action to isolate the HCU for control rod 26-19 (TRG-6). The CRS declares control rod 26-19 inoperable. The CRS refers to Technical Specifications and determines that LCO 3.1.3 (Control Rod Operability) Action C.1 applies which requires rod 26-19 to be fully inserted within 3 hours and Action C.2 which requires associated CRD (HCU) disarmed within four hours.

Event 3

(TRG-3) Standby Service Water Pump 1A (SW-P-1A) trips on motor winding overcurrent which requires Residual Heat Removal Pump 2A (RHR-P-2A) (currently in Suppression Pool Cooling) to be manually secured per ABN-SW. Standby Service Water System "A" (SW-SYS-A) not being available requires that the DG1 Diesel Engine Mode Selector be placed MAINT (Maintenance) effectively making DG1 inoperable.

The CRS declares SW-SYS-A and DG1 inoperable and refers to Technical Specifications and determines that the following applies:

- LCO 3.7.1 Action B.1 which requires restoring SW-SYS-A to operable status within 72 hours
- LCO 3.8.1 Action B.1 which requires performing SR 3.8.1.1 for operable offsite circuits (OSP-ELEC-W101 (Offsite Station Power Alignment Check)) within 1 hour and every 8 hours thereafter
- LCO 3.8.1 Action B.2 which requires declaring required feature(s) supported by DG 1, inoperable when the redundant required feature(s) are inoperable within 4 hours of DG1 going inoperable concurrent with the inoperability of the redundant required feature(s)
- LCO 3.8.1 Action B.3.1 which requires determining operable DGs are not inoperable due to common cause failure within 24 hours **- OR -** LCO 3.8.1 Action B.3.2 which requires performance of SR 3.8.1.2 for operable DGs within 24 hours (if not performed in the past 24 hours)
- LCO 3.8.1 Action B.4.1 which requires restoring DG1 to operable status within 72 hours of DG1 becoming inoperable AND within 6 days of failure to meet LCO (the 72 hours is more restrictive in this case) **- OR -** LCO 3.8.1 Action B.4.2.1 which requires establishing risk management actions for the alternate AC sources within 72 hours AND LCO 3.8.1 Action B.4.2.2 which requires DG1 to be restored to operable status within 14 days after being declared inoperable but in no case longer than 17 days from failure to meet LCO

Evaluator note: Although several Technical Specification actions are involved, the CRS will only have to refer to LCO 3.7.1 Condition B and LCO 3.8.1 Condition B to find them.

Event 4

(TRG-4) Vibrations start to rise above the ALERT setpoint on Reactor Feed Pump (RFP) "B" as indicated by annunciator P840.A1.7-5 (Turbine B Vibration Trouble) and validated on (local) vibration instrument RFW-VBI-1B/XS/T1BXY (Turbine Radial Inboard Bearing Vibration). Feed pump bias is adjusted to minimize load on RFP "B" in an attempt to reduce vibration (which is unsuccessful). Vibration level will exceed the DANGER setpoint requiring Reactor Recirculation flow to be incrementally reduced in 1% to 5% step changes while monitoring vibration level. Vibration level remains above the DANGER setpoint even after Reactor Recirculation (RRC) flow has been reduced to 74 Mlbm/hr. RFP "B" is manually tripped per ARP direction. The CRS may direct tripping of RFP "B" before the flow reduction is complete if equipment damage is a concern. Following the trip, the high vibration annunciator will clear if crew attempts a local reset (TRG-7). As RPV level lowers due to the feed pump trip, both Reactor Recirculation (RRC) Pumps will runback to 30 Hz causing reactor power to stabilize at a lower level of ~68% power.

Event 5

(TRG-5) An earthquake (OBE) causes annunciator 851.S-1 5-1 (Operating Basis Earthquake Exceeded) to alarm. ABN-EARTHQUAKE is entered. Concurrently, a steam leak in the RCIC Pump Room develops resulting in RCIC Equipment Area high temperature alarms. PPM 5.3.1 (Secondary Containment Control) and ABN-HELB (Line Break) are entered on Reactor Building (RB) area high temperature. Crew attempts to isolate steam leak as directed by PPM 5.3.1 (Secondary Containment Control). Control Room notifies plant personnel of safety hazard and directs evacuation of affected areas. Neither RCIC-V-63 (RCIC Steam Supply Inboard Isolation) nor RCIC-V-8 (RCIC Turbine Steam Supply Isolation) will automatically close. Manual attempts to shut RCIC-V-63 and RCIC-V-8 are unsuccessful.

CRS enters PPM 5.1.1 (RPV Control) and directs a manual reactor scram before reaching the max safe operating temperature for the RCIC Pump room **(CT #1)**. All control rods fully insert. The CRS WILL direct a reactor pressure reduction to 500 to 600 psig to reduce leak rate.

Event 6

Three (3) minutes after the scram, Main Steam Line "A" piping ruptures causing an unisolable steam leak. The CRS re-enters PPM 5.3.1 (Secondary Containment Control) based on a second unisolable steam leak in Secondary Containment resulting in high Main Steam Tunnel temperature.

Event 7

Following the Main Steam Line "A" rupture, the outboard MSIVs fail to AUTO close due to failure of a logic relay but can be manually closed. MSIV 22A (MS-V-22A) fails to AUTO close due to mechanical failure. Inability to manually close MS-V-22A results in an unisolable leak into secondary containment.

Event 8

The CRS directs entry into PPM 5.1.3 (Emergency RPV Depressurization) once Main Steam Tunnel Temperature exceeds its max safe operating value of 330°F based on two secondary containment areas greater than max safe operating value. With a primary system discharging into secondary containment and area temperature exceeding maximum safe operating level in more than one area, Emergency Depressurization (ED) is initiated by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of second MSOT being exceeded. **(CT #2)** RPV level will be restored using Condensate Booster Pumps following Emergency Depressurization.

TERMINATION CRITERIA: The scenario will be terminated when an Emergency Depressurization has been performed and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.

Critical Task Determination

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT #1 - With reactor at power and with primary system discharging into secondary containment, manually scram reactor before any area exceeds its maximum safe operating temperature.	If secondary containment temperature exceeds its maximum safe operating value, adequate core cooling, containment integrity, safety of personnel, or continued operability of equipment required to perform EOP flowchart actions can no longer be assured. (Ref: PPM 5.0.10 Rev 21, section 8.9.3 k.1))	Procedural direction by PPM 5.3.1 (EOP for Secondary Containment Control) Step SC-14 directs entering PPM 5.1.1 (which requires placing Reactor Mode Switch in Shutdown) before any area exceeds its maximum safe operating temperature.	The operator will manually scram reactor by placing Reactor Mode Switch in Shutdown.	All control rods will fully insert.
CT #2 - With a primary system discharging into secondary containment and area temperature exceeding maximum safe operating level in more than one area, initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of second MSOT being exceeded. Note: If the crew properly elects to invoke the “EMERG DEPRESS is anticipated” override in ppm 5.1.1 (RPV Control) and in doing so, the second maximum safe operating level is not exceeded, this Critical Task is considered to be met.	The criteria of "2 or more areas" identifies the increase in parameter trend as a wide spread problem which may pose a direct and immediate threat to secondary containment integrity, equipment located in the secondary containment, continued safe operation of the plant, and personnel both on and off site. (Ref: PPM 5.0.10 Rev 21, section 8.9.3 k.3))	Procedural direction by PPM 5.3.1 (EOP for Secondary Containment Control) Step SC-15 directs Emergency Depressurizing reactor when a primary system (RCIC) is discharging into secondary containment and two or more area temperatures are exceeding their maximum safe operating level.	The operator will manually open 7 Safety Relief Valves (ADS preferred) to emergency depressurize the RPV.	The valve light indications for each of the 7 Safety Relief Valves will change from Green lit to Red lit when control switch is taken to Open. Reactor pressure will lower in response.

<table>
<tr><td colspan="3">EVENT No. 1</td></tr>
<tr><td colspan="3">Description: Place RHR-SYS-A in Suppression Pool Cooling (LPCS/RHR “A” ADS Permissive fails to annunciate during pump start) (Tech Spec)
Event is initiated by the CRS as part of the shift turnover.</td></tr>
<tr><th>Time</th><th>Position</th><th>Applicants Actions or Behavior</th></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Below evolution was pre-briefed by the crew before entering the simulator. Steps 5.1.1 through 5.1.4 were previously completed.</td></tr>
<tr><td></td><td>CRS</td><td>☐ Directs CRO-2 to place RHR-SYS-A into Suppression Pool Cooling mode using SOP-RHR-SPC (section 5.1 starting with step 5.1.5)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following steps are from SOP-RHR-SPC (starting with step 5.1.5)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Annunciator 601.A3 5-1 (ADS LPCS/RHR A Pump Permissive) will fail to alarm when RHR-P-2A started. May take crew a minute or so to validate proper pump starting response.</td></tr>
<tr><td></td><td>BOP</td><td><u>CAUTION</u>
To minimize cavitation and elevated pump hydraulic loads/vibrations, minimize operating with RHR-FCV-64A (Minimum Flow) as its only discharge path. {C-9448}

<u>NOTE</u>: If H13-P601.A4-3.1, RHR A PUMP DISCH PRESS HIGH/LOW, is in alarm, RHR-P-2A may be started for EOP related activities.
<u>NOTE</u>: H13-P601.A3-5.1, ADS LPCS/RHR A PUMP RUNNING PERMISSIVE alarm is an expected alarm when RHR-P-2A starts.

☐ 5.1.5: Starts RHR-P-2A (and verifies proper pump starting indications)
• Breaker closed red indication above pump control switch
• Pump current spikes then returns to normal
• Verifies annunciator 601.A3 5-1 (ADS LPCS/RHR A Pump Permissive) alarms
▪ Notes alarm does not come in and informs the CRS</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: With RHR pump running on min flow, it is expected the CRS will direct BOP to continue evolution while referring to Technical Specifications.</td></tr>
<tr><td></td><td>CRS</td><td>☐ Acknowledges report and directs CRO-2 to continue evolution</td></tr>
<tr><td></td><td>BOP</td><td>☐ 5.1.6: Verifies RHR-FCV-64A opens during low flow conditions (approximately 800 gpm) (Minimum Flow Bypass) (H13-P601)</td></tr>
</table>

EVENT No. 1 (CONTINUED)		
	BOP	**CAUTION** RHR-V-24A should be opened just enough to achieve the desired flow, to minimize the amount of time required to realign following an auto initiation signal and the amount of drain down following a LOP/LOCA. Restrict RHR-V-24A to approximately 20 seconds open (7000 gpm). {C-8793} NOTE: Minimize the amount of time spent in Suppression Pool Cooling. NOTE: If required due to plant conditions, RHR-V-48A may be closed concurrently with opening RHR-V-24A. ☐ 5.1.7: (2-handed operation) Throttles open RHR-V-24A to between 2500 and 7000 gpm, as determined by the CRS (Suppression Pool Cooling/Test Return) (H13-P601)
		☐ 5.1.8: Verifies RHR-FCV-64A closes (approximately 800 gpm)
		☐ 5.1.9: Verifies SW-P-1A running
		☐ 5.1.10: If maximum cooling is desired, then closes RHR-V-48A (RHR-HX-1A Shell Side Bypass) (H13-P601)
		☐ 5.1.11: If minimum cooling is desired, then performs the following: • 5.1.11.a: Throttles open RHR-V-48A (RHR-HX-1A Shell Side Bypass) (H13-P601) • 5.1.11.b: Throttles closed RHR-V-3A (RHR-HX-1A Outlet) (H13-P601)
		☐ 5.1.12: Maintains Suppression Pool temperature between 55°F and 90°F
		☐ 5.1.13: Notifies HP that radiological conditions may have changed

EVENT No. 1 (CONTINUED)

	BOP	☐ Refers to ARP 601.A3 5-1 (ADS LPCS/RHR A Pump Permissive)

<u>Examiner Note</u>: Following step is from ARP 4.601.A3 5-1 (ADS LPCS/RHR A Pump Permissive)

<u>Examiner Note</u>: Refer to the following:

5-1 WINDOW	SOURCE	AUTOMATIC ACTIONS
ADS LPCS/RHR A PUMP RUNNING PERMISSIVE	RHR A Discharge Pressure GE 125 psig (RHR-PS-19A) or (RHR-PS-16A) or LPCS-P-1 Discharge Pressure GE 144 psig (LPCS-PS-1) or (LPCS-PS-9)	None

The SOURCE (as shown) on the ARP page insinuates that RHR-PS-19A OR RHR-PS-16A is needed to the cause the alarm while in actuality, both are needed to cause the alarm. In this case, RHR-PS-19A will be found to be isolated (prior CGS OE) thereby preventing the alarm.

In any case, the CRS should refer to the applicable Technical Specification.

	BOP	☐ 1. CRO-2 refers CRS to Technical Specification 3.3.5.1
	CRS/BOP	☐ Dispatches operator or calls Work Week Manager to investigate the status of RHR pressure switches (RHR-PS-16A and 19A)

BOOTH NOTE: If directed to investigate both pressure switches at once then, wait 1 minute and make both reports at once.

BOOTH ROLEPLAY – <u>If directed to investigate anything abnormal with RHR-PS-16A</u>, wait 1 minute then report "Nothing abnormal found with RHR-PS-16A."

BOOTH ROLEPLAY – <u>If directed to investigate anything abnormal with RHR-PS-19A</u>, wait 1 minute then report "RHR-PS-19A was found isolated."

	CRS	Evaluates Technical Specification 3.3.5.1 and determines the following action applies: ☐ LCO 3.3.5.1 Action G.2 – Restore channel (RHR-PS-19A) to operable status within 8 days

<u>Comments:</u>

EVENT No. 2 may be initiated once RHR "A" is in Suppression Pool Cooling and ADS Function Tech Spec has been addressed (or as directed by the Exam team) and is activated using **TRIGGER 2**.

EVENT No. 2		
Description: Control rod (26-19) drifts out. Once inserted, releasing the continuous insert pushbutton allows the control rod to drift out again, requiring the control rod to be isolated (Tech Spec) Event is activated using **TRIGGER 2**.		
BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 2</u>		
Time	**Position**	**Applicants Actions or Behavior**
	BOP	☐ Responds to H13-P603, peer checks what rod is drifting, and acknowledges and resets the ROD DRIFT alarm (603.A7 5-7)
<u>Examiner Note</u>: Following Immediate Action steps are from ABN-ROD (section 3.1)		
	ATC	**<u>NOTE</u>**: The definition of a drifting control rod is any control rod that triple notches (moves two or more notches beyond its intended position) following a withdraw or Insert signal (directional control valve failure or stuck collet), or any rod that moves at least one notch from its original position with no Withdraw or Insert signal applied. {AR-226687} ☐ 3.1.2: Selects the drifting control rod (26-19)
		☐ 3.1.3: Performs the following: • 3.1.3.a: Depresses the Continuous Insert pushbutton • 3.1.3.b: Drives the control rod to its FULL IN position
		<u>NOTE</u>: If the control rod drifts back out when the CONTINUOUS INSERT pushbutton is released, then the CONTINUOUS INSERT pushbutton will need to be held depressed until the control rod can be isolated. • 3.1.3.c: Releases the Continuous Insert pushbutton • 3.1.3.d: If the control starts to drift back out, then performs the following: ▪ 3.1.3.d.1): Depresses and Holds the Continuous Insert pushbutton ▪ 3.1.3.d.2): Informs CRS that control rod 26-19 needs to be isolated at its HCU
	CRS	☐ Enters ABN-ROD
	BOP	☐ Directs field operator to hydraulically isolate control rod 26-19 per ABN-ROD step 4.1.2.a
BOOTH ROLEPLAY – <u>If directed to hydraulically isolate control rod 26-19</u>, wait 1 minute then insert <u>Trigger 6</u>, report "Control rod 26-19 hydraulically isolated per ABN-ROD, step 4.1.2.a."		

EVENT No. 2 (CONTINUED)

Examiner Note: Following Subsequent Action steps are from ABN-ROD (section 4.1)

	ATC	☐ 4.1.2.b: Once report received control rod 26-19 hydraulically isolated, releases the Continuous Insert pushbutton
		☐ 4.1.3: Resets the Control Rod Drift annunciator using ROD DRIFT RESET pushbutton on H13-P603 (may be already reset by CRO-2)
	CRS	☐ 4.1.5: Notifies the SNE
		☐ 4.1.6: Initiates (or direcs) a MON Run to verify acceptible thermal limits and preconditioning
		☐ 4.1.7: Determines if the problem is generic in nature (CRS will call SNEs and station management to make this determination)
		☐ 4.1.8: Refers to Technical Specification 3.1.3 (see next page)
		☐ 4.1.9 & 4.1.10: Performed by calling for help external to the Main Control Room (Event 3 may occur prior to the CRS making these notifications).

Examiner Note: Management expectation is to declare the control rod INOP (even though it is not considered INOP per Technical Specifications).

	CRS	Evaluates Technical Specifications and determines the following actions apply: ☐ LCO 3.1.3 C.1 – Insert control rod 26-19 within 3 hours ☐ LCO 3.1.3 C.2 – Disarm control rod 26-19 HCU within 4 hours

Comments:

EVENT No. 3 is initiated after control rod 26-19 HCU has been isolated and associated Tech Spec addressed (or as directed by the Exam team) and is activated using **TRIGGER 3**.

EVENT No. 3

Description: Standby Service Water Pump 1A (SW-P-1A) trips which requires RHR Pump 2A (RHR-P-2A) (currently in Suppression Pool Cooling) to be manually secured (Tech Spec)

Event is activated using **TRIGGER 3**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 3

Examiner Note: This event starts with several BISIs (Bypass and Inoperable Status Indicators) common with SW-P-1A to illuminate which causes several annunciators to alarm. The main annunciator the CRO-2 should pursue is at H13-P840 (840.A5 2-2 (SW Pump A Motor OL/ Gnd))

Time	Position	Applicants Actions or Behavior
	BOP	☐ Amongst all annunciators in alarm, recognizes that a trip of Service Water Pump 1A has occurred
		☐ Silences lower priority annunciators and refers to ARP 840.A5 2-2 (SW Pump A Motor OL/ Gnd)
Examiner Note: Following steps are from ARP 840.A5 2-2 (SW Pump A Motor OL/ Gnd)		
	BOP	☐ 1: If SW-P-1A tripped then perform the following:
		• 1.d: Refers CRS to ABN-SW • 1.e: Informs CRS the DG1 Diesel Engine Mode Selector needs to be placed in MAINT (effectively make DG inoperable) • 1.f: Informs CRS to complete OSP-ELEC-W101 within 1 hour
		☐ 4: Refers CRS to Technical Specification 3.7.1
	CRS	☐ Enters ABN-SW
BOOTH ROLEPLAY – If directed to place DG 1 Diesel Engine Mode Selector in MAINT, wait 1 minute then insert Trigger 10, report "DG 1 Diesel Engine Mode Selector is in MAINT."		
BOOTH ROLEPLAY – If directed to investigate why SW-P-1A tripped, report "SW-P-1A motor is very hot to the touch. Its breaker was found tripped. Overcurrent relay flags are dropped out."		
Examiner Note: Following steps are from ABN-SW (section 4.2)		
	CRS	☐ 4.2.1: Places DG1 in MAINT (may have been previously performed)
Examiner Note: When CRS discusses need to complete OSP-ELEC-W101 (Offsite Station Power Alignment Check) inform them that it will be performed by another RO.		
	CRS	☐ 4.2.3: Directs OSP-ELEC-W101 completed within 1 hour of DG1 being declared inoperable

EVENT No. 3 (CONTINUED)		
	BOP	☐ 4.2.5: IF SW "A" flow is lost (non LOCA), and Adequate Core Cooling and Containment Integrity is assured, then secures the following operating pump: • RHR-P-2A
Examiner Note: CRS may direct CRO-2 to exit the Suppression Pool Cooling lineup on RHR Loop "A".		
Examiner Note: Following steps are from SOP-RHR-SPC (section 5.2)		
	BOP	☐ 5.2.1: Notifies HP that the actions to stop Suppression Pool Cooling may potentially change radiological conditions.
		☐ 5.2.2: Verifies RHR-V-3A open
		NOTE: RHR-V-24A may be closed concurrently with opening RHR-V-48A. ☐ (Two handed operation) 5.2.3: Verifies RHR-V-48A open
		CAUTION To minimize cavitation and elevated pump hydraulic loads/vibrations, minimize operating with RHR-FCV-64A (Minimum Flow) as its only discharge path. {C-9448} ☐ (Two handed operation) 5.2.4: Closes RHR-V-24A
		☐ 5.2.5: Stops RHR-P-2A (may already be stopped)
		☐ 5.2.6: Verifies RHR-V-64A closed
Examiner Note: Crew will not have time to complete step below.		
	BOP	☐ 5.2.7: Verifies RHR Loop "A" is in Standby Status per SOP-RHR-STBY
Examiner Note: Continuing steps from ABN-SW (section 4.2)		
	CRS	☐ 4.2.12: Enters SW-SYS-A and DG-SYS-A as inoperable in the Plant Logging System (see below)
		Evaluates Technical Specifications and the LCS and determines the following actions apply: ☐ LCO 3.7.1 Action B.1 which requires restoring SW-SYS-A to operable status within 72 hours ☐ LCO 3.8.1 Action B.1 which requires performing SR 3.8.1.1 for operable offsite circuits (OSP-ELEC-W101 (Offsite Station Power Alignment Check)) within 1 hour and every 8 hours thereafter (discussed earlier)

EVENT No. 3 (CONTINUED)

		☐ LCO 3.8.1 Action B.2 which requires declaring required feature(s) supported by DG 1, inoperable when the redundant required feature(s) are inoperable within 4 hours of DG1 going inoperable concurrent with the inoperability of the redundant required feature(s) ☐ LCO 3.8.1 Action B.3.1 which requires determining operable DGs are not inoperable due to common cause failure within 24 hours **– OR –** ☐ LCO 3.8.1 Action B.3.2 which requires performance of SR 3.8.1.2 for operable DGs within 24 hours (if not performed in the past 24 hours) ☐ LCO 3.8.1 Action B.4.1 which requires restoring DG1 to operable status within 72 hours of DG1 becoming inoperable AND within 6 days of failure to meet LCO (the 72 hours is more restrictive in this case) **– OR –** ☐ LCO 3.8.1 Action B.4.2.1 which requires establishing risk management actions for the alternate AC sources within 72 hours AND LCO 3.8.1 Action B.4.2.2 which requires DG1 to be restored to operable status within 14 days after being declared inoperable but in no case longer than 17 days from failure to meet LCO
		☐ Directs the following systems to be Protected per PPM 1.3.83 (Protected Equipment Program) Attachment 7.1 (based on SW Pump "A" and DG1 unavailability) • DG-SYS-B • SW-SYS-B • HPCS (P-1, DG, & SW) • RHR-SYS-B • RHR-SYS-C • E-TR-S • E-TR-B • ADS-SYS-B • H13-P800 Bd. C Control and Indication areas

Comments:

EVENT No. 4 is initiated after RHR Pump "A" is secured and associated Tech Specs addressed (or as directed by the Exam team) and is activated using **TRIGGER 4**.

EVENT No. 4		
Description: Reactor Feed Pump (RFP) "B" vibrations rise requiring RRC Flow reduction and manual trip of the "B" RFP Event is activated using **TRIGGER 4**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 4		
Time	**Position**	**Applicants Actions or Behavior**
	ATC	☐ Acknowledges annunciator 804.A1 7-5 (TURB B VIB TROUBLE) and informs CRS
Examiner Note: Vibration levels for RFP "B" Turbine Radial Inboard Bearing (see ARP page below) are considered at the ALERT setpoint when it reaches 3 mls and at the DANGER setpoint when it reaches 4.5 mls.		

SOURCES	ALERT SETPOINT	DANGER SETPOINT
RFW-VBI-XE/P1B - Pump Axial Thrust Displacement (second NOTE)	± 15 mls	± 18 mls
RFW-VBI-1B/XS/P0BXY - Pump Radial Outboard Bearing Vibration	3 mls	4.5 mls
RFW-VBI-1B/XS/P1BXY - Pump Radial Inboard Bearing Vibration (see NOTE)	3 mls	4.5 mls
RFW-VBI-XE/T1B - Turbine Axial Thrust Displacement (first NOTE)	± 12 mls	± 15 mls
RFW-VBI-1B/XS/T1BXY - Turbine Radial Inboard Bearing Vibration	3 mls	4.5 mls
RFW-VBI-1B/XS/T01BXY - Turbine Radial Outboard Bearing Vibration	3 mls	4.5 mls
RFW-VBI-1B/XS/TE - Turbine Eccentricity	4 mls	6 mls

Examiner Note: Following steps are from ARP 804.A1 7-5 (TURB B VIB TROUBLE)		
	BOP	☐ 1: Directs field operator to investigate source of the vibration using RFW-VMP-1 on TB 441 Elev
BOOTH ROLEPLAY – If sent to investigate high vibrations on vibration panel, wait 1 minute then report "RFP "B" Turbine Radial Inboard Bearing, EPN RFW-VBI-1B/XS/T1BXY, reads 3.1 mls up slow. All other bearing vibration levels are normal."		
BOOTH ROLEPLAY – If sent to investigate high vibrations locally at turbine, wait 1 minute then report "RFP "B" Turbine sounds slightly different than what I'm used to hearing."		
	BOP	☐ 2: Verifies reported vibration is above is above the applicable alarm setpoint (3 mls)

<table>
<tr><td colspan="3">EVENT No. 4 (CONTINUED)</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Bearing vibration will continue to rise above the DANGER level (4.5 mls) even after ARP step 4 is completed below.</td></tr>
<tr><td></td><td>BOP</td><td><u>NOTE</u>: A maximum delta RPM of 350 RPM between the RFTs, not to exceed a flow rate of 19,000 gpm and 4900 RPM on the lead RFT.
☐ 4: If any value is above the ALERT setpoint, but below the DANGER setpoint, then adjust the lead Feed Pump bias to minimize load on the affected Reactor Feedwater Pump/Turbine (“B”) as follows:
• Raise RFW-P-1A Speed using RFT-COMP-1or RFT-COMP-2 (Pump Control Screen)
• Lower RFW-P-1B Speed using RFT-COMP-1or RFT-COMP-2 (Pump Control Screen)
• Verify feed pump speed controllers are stable and not hunting</td></tr>
<tr><td></td><td></td><td>☐ Directs field operator to report current vibrations on the RFP “B” Turbine Radial Inboard Bearing</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to report current vibrations on vibration panel BEFORE BIAS ADJUSTMENT MADE</u>, then report “RFP “B” Turbine Radial Inboard Bearing reads <u>3.6 mls</u> up slow.</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to report current vibrations on vibration panel AFTER BIAS ADJUSTMENT MADE (50 RPM Bias Change)</u>, then report “RFP “B” Turbine Radial Inboard Bearing reads <u>4.7 mls</u> up slow.”</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to report current vibrations on any other bearing</u> report “All other bearing vibration levels are normal.”</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – If directed to report when bearing vibration level reaches the DANGER setpoint of 4.5 mls then only report <u>AFTER BIAS ADJUSTMENT MADE</u>, that the “RFP “B” Turbine Radial Inboard Bearing reads <u>4.5 mls</u> up slow.”</td></tr>
<tr><td></td><td>ATC</td><td>☐ 5: If any indicated value is sustained at or above the DANGER setpoint following feed pump load reduction via bias adjustment, then reduce Reactor Power with Reactor Recirculation flow incrementally, within the capacity of one Reactor Feed Pump, to reduce vibrations (Consider 1-5% step changes in Reactor Power while monitoring vibrations)</td></tr>
<tr><td></td><td>SRO</td><td>☐ Directs CRO-1 to reduce reactor power with RRC flow using (1-5%) step changes while monitoring bearing vibrations</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Intent is to report bearing vibration level above the DANGER (4.5 mls) setpoint throughout the flow reduction. Vibration level will continue to trend up slowly but once power has been reduced approximately 5%, a call will come in from the field that the “B” RFP is vibrating excessively and the operator is leaving the area due to safety concerns.</td></tr>
</table>

EVENT No. 4 (CONTINUED)		
	CRS	☐ 6: If any indicated value is sustained at or above the DANGER setpoint following feed pump load reduction via bias adjustment, then reduce Reactor Power with Reactor Recirculation flow incrementally, within the capacity of one Reactor Feed Pump, to reduce vibrations (Consider 1-5% step changes in Reactor Power while monitoring vibrations) ☐ CRS directs power reduction
	ATC	Reduces reactor power with RRC flow as follows: ☐ Notes reactor power and/or Main Generator output (MWe) ☐ Refers to SOP-RRC-FLOW-QC quick card and performs the following per section 2.1 (Reactor Power change with RRC Flow controllers in Auto): • 2.1.1: Monitors fuel pre-conditioning limits (per PPM 9.3.18) while changing reactor power • 2.1.2: Lowers RRC flow using RTC-M/A-R675 (Master controller) as necessary (below sub-steps are good practice steps) ▪ Observes lowering frequency on both RRC pumps ▪ Verifies reactor power lowers and RFPs respond to maintain RPV level • 2.1.3: Verifies total core flow is less than 105% • 2.1.4: Verifies RRC Loop A and B is less than 57.5 Mlbm/hr • 2.1.5: Notifies CRS when change in power is complete
BOOTH ROLEPLAY – <u>If directed to report current vibrations during power reduction</u>, then report "RFP "B" Turbine Radial Inboard Bearing reads <u>5.2 mls</u> up slow."		
BOOTH ROLEPLAY – <u>Once reactor power has been lowered approximately 5%</u>, make the following report (make it sound urgent): "The "B" RFP is vibrating excessively and I am leaving the area due to safety concerns."		
<u>Examiner Note</u>: If the same operator adjusted RFP bias and performed the downpower, cue the CRS after he directs tripping RFW-P-1B that the SM desires the [other operator: CRO1 or CRO2] to trip the pump.		
	CRS	☐ Directs tripping RFW-P-1B per step 6 of ARP (840.A1 7-5) or out of concerns for equipment safety
	ATC	☐ Trips the "B" Feed Turbine
		☐ Monitors for RRC Runback to 30Hz (both pumps)
		☐ Verifies RFP "A" responds properly to transient in controlling RPV level
		☐ When plant stabilizes, provides reactor power, pressure and level to CRS

EVENT No. 4 (CONTINUED)

	BOP	☐ Make plant announcement concerning reactor power and RFP status
		☐ Follows up with ARP 840.A1 1-5 (TURB B TRIP) (as time permits) • 1: Verifies proper RRC Runback occurred • 2: Verifies MS-V-172B closed (RFW-P-1B High Press Stop Valve) • 3: Verifies BS-V-60B closed (RFW-P-1B Low Press Stop Supply) NOTE: The following occurs after turbine 1st stage pressure reaches LT 10 psig. • 4: Verifies the following open: ▪ BS-V-44B (BS-V-60B Body Drain) ▪ BS-V-45B (RFW-DT-1B Stage Drain) ▪ MS-V-142B (RFW-P-1B HP Stop Above Seat Drain) NOTE: 30 seconds after MS-V-172B and BS-V-60B close, the following will occur. • 5: Verifies RFW-FCV-2B is closed (Pump Minimum Flow) • 6: When RFW-DT-1B slows to less than 1 rpm, and lube oil is available, then place RFW-DT-1B Turning Gear Control to Auto Engage
		☐ May direct field operator to reset vibration panel alarms (to clear MCR annunciator)

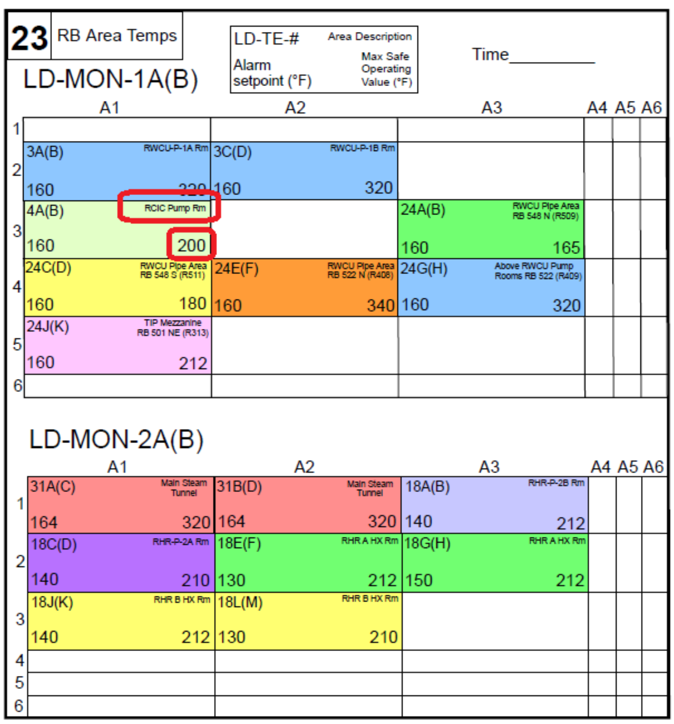
BOOTH ROLEPLAY – If directed to reset local vibration panel alarm, then activate TRG-7 (MCR annunciator will clear)

Comments:

EVENT No. 5 is initiated after the “B” RFP has been tripped and the plant is stabilized (or as directed by the Exam team) and is activated using **TRIGGER 5**

EVENT No. 5		
Description: Operating Bases Earthquake causes a steam leak in the RCIC Pump Room with Failure of RCIC-V-8 and RCIC-V-63 to fully close (preventing RCIC leak isolation). Manual scram inserted before first secondary containment max safe operating temperature is reached. Event is activated using **TRIGGER 5**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 5		
Examiner Note: First annunciator (601.A3 5-7 (LEAK DET RCIC EQUIP AREA ΔT HIGH)) indicative of RCIC steam leak does occur not until about 3 minutes after the OBE.		
Examiner Note: RCIC maximum safe operating temperature (1st Max Safe) will not be reached for at least the next 15 minutes.		
Time	**Position**	**Applicants Actions or Behavior**
	BOP	☐ Acknowledges annunciator 851.S1 5-1 (OPERATING BASIS EARTHQUAKE EXCEEDED) and informs CRS
Examiner Note: Following steps are from ARP 4.851.S1 5-1 (OPERATING BASIS EARTHQUAKE EXCEEDED)		
	BOP	☐ 1: Identifies alarm on H13-P823 (Board L) (CRO-2 "goes to the back" to check Board "L" indications) – Reports all red and all amber shock lights illuminated (indication of seismic strength) ☐ 2: Refers CRS to ABN-EARTHQUAKE
	CRS	☐ Enters ABN-EARTHQUAKE
Examiner Note: Following steps are from ABN-EARTHQUAKE (due to higher plant priorities only certain actions will be listed here – Crew may not get to all of them)		
	CRS	☐ 4.2: Verify adequate systems are available for safe shutdown and cooldown of reactor (will verify equipment operability against turnover sheet)
		☐ 4.4: Discusses need to initiate controlled reactor shutdown per PPM 3.2.1
	BOP	☐ 4.7: Makes announcement per ABN-EARTHQUAKE step 4.7
		☐ 4.8: Directs SAS (Secondary Alarm Station) to repeat above announcement on the Alternate Security/ Area Wide and Security radio channels
BOOTH ROLEPLAY – If directed to repeat announcement as SAS, then repeat back direction (CRO-2 does this by talking over the chain to the Booth Operator or calling the Booth)		
	CRS	☐ 4.10: Directs crew to check for any indications of RCS leakage or any other equipment issues
	BOP	☐ 4.11: Directs field operator to check the Spent Fuel Pool for damage
BOOTH ROLEPLAY – If directed to check Spent Fuel Pool for damage, wait 1 minute then report "There are no signs of damage to the Spend Fuel Pool."		

EVENT No. 5 (CONTINUED)		
	ATC	☐ Actively monitors reactor power, pressure and level for abnormalities
		☐ 4.1.14 Checks neutron monitoring system for proper operation and changes
	CRS	☐ 4.1.15: Directs initial plant inspection
<u>Examiner Note</u>: RCIC steam leak starts. Annunciator 601.A3 5-7 (LEAK DET RCIC EQUIP AREA ∆T HIGH) comes in first quickly followed by annunciators 601.A3 1-4 & 601.A2 1-2 (LEAK DET RCIC EQUIP AREA TEMP HI-HI). CRO-2 should address the higher priority alarms.		
	BOP	☐ Acknowledges annunciators 601.A3 1-4 / 601.A-2 1-2 (Leak Detection RCIC Equip Area Hi-Hi) and informs CRS
<u>Examiner Note</u>: Following steps from ARPs 601.A3 1-4 / 601.A2 1-2 (Leak Detection RCIC Equip Area Hi-Hi)		
	BOP	☐ 1: Identifies alarming point(s) on LD-MON-1A on H13-P632
		☐ 2: Compares alarming point(s) on LD-MON-1B on H13-P642
		☐ 3: Informs CRS of alarming points and trend (RCIC Pump Room ∆T > 50°F) (which is a PPM 5.3.1 (Secondary Containment Control) entry condition)
	CRS	☐ Enters PPM 5.3.1 (Secondary Containment Control) on RCIC Pump Room ∆T > 50°F (Table 22)
	BOP	☐ 4 & 5: Determines the status of the following RCIC components: • RCIC-V-63 (should be closed but remains intermediate) • RCIC-V-76 closed (already closed) • RCIC-V-8 (should be closed but remains intermediate) • RCIC Turbine (should be tripped and is tripped) ☐ Reports to CRS that RCIC-V-63 and RC-V-8 did not fully close (indicate intermediate) and that RCIC did not isolate
		☐ 6: May direct field operator to SAFELY investigate possible steam leak in the RCIC Pump Room (before becoming too large)
BOOTH ROLEPLAY – <u>If directed to investigate RCIC Pump Room leak</u>, wait 1 minute then report "The RCIC Pump Room appears unsafe to enter based on high temperature and humidity."		
	BOP	☐ 8 & 10: Refers CRS to ABN-HELB and to Technical Specification 3.3.6.1

EVENT No. 5 (CONTINUED)		
Examiner Note: Following steps are from ABN-HELB (Line Break) (section 4.2)		
	BOP	☐ Makes evacuation announcement as directed
	CRS	☐ Directs CRO-2 to obtain the keys for RCIC-V-8 and RC-V-63 and attempt to manually shut them (May also be directed from 5.3.1, SC-9, below)
	BOP	☐ With keys in hand, inserts one key into keylock switch for RCIC-V-63 and takes it to close ☐ Inserts second key into keylock switch for RCIC-V-8 and takes it to close ☐ Reports to CRS that RCIC could not be manually isolated (RCIC-V-63 and RCIC-V-8 did not close)
	CRS	☐ Requests assistance in getting RCIC-V-8 closed (more accessible than RCIC-V-63) although any attempt will be unsuccessful
BOOTH ROLEPLAY – <u>If directed to close RCIC-V-8 locally</u>, wait 5 minutes then report "I'm here with maintenance. We could not close RCIC-V-8. It appears mechanically bound."		
Examiner Note: Refer to Simulator Guide (page 29) for full page MSOT values.		
	CRS	☐ Establishes a Key Plant Parameter for RCIC Pump Room temperature below the Max Safe value of 200°F (see below) 
	BOP	☐ Trends RCIC Pump Room temperature as Key Plant Parameter and notifies CRS when value reached

EVENT No. 5 (CONTINUED)		
CT #1 - With reactor at power and with primary system discharging into secondary containment, manually scram reactor before any area exceeds its maximum safe operating temperature.		
	CRS	☐ When notified Key Plant Parameter has been reaced, updates the crew on plant conditions then enters PPM 5.1.1 (RPV Control)
		☐ Directs CRO1 to scram the reactor
Examiner Note: Following steps are Immediate Actions from PPM 3.3.1 (Reactor Scram)		
	ATC	☐ 6.1.1: Places Reactor Mode Switch to Shutdown
		☐ 6.1.2: Monitors reactor power, pressure and level
		☐ 6.1.5: Inserts SRM and IRM monitors (detectors)
		☐ After above three steps CRO1 makes scram report to CRS: • Mode switch is in Shutdown • APRMs are downscale • RPV pressure is (value and trend) • RPV level is (value and trend) • EOP entry on low RPV level (and possibly high Drywell pressure)
		☐ 6.1.6: After CRS repeat back, reports all control rods are IN
	CRS	☐ Enters PPM 5.1.1 (RPV Control) on low RPV level (+13 inches)
		☐ Directs CRO2 to verify containment isolations occurred at +13 inches
	BOP	☐ Verifies +13 inch containment isolation valves closed on the Isolation Control panel: • RHR-V-8, RHR-V-9 • RHR-V-40, RHR-V-49 • RHR-V-60A, RHR-V-60B • RHR-V-75A, RHR-V-75B

EVENT No. 5 (CONTINUED)

Examiner Note: Following steps are Subsequent Actions from PPM 3.3.1 (Reactor Scram)

	ATC	☐ 6.2.5.a: Verify Recirc pumps have run back to 15 Hz
		☐ 6.2.6: Range down on IRMs, as necessary, to follow power decrease
	BOP	☐ 6.2.7: Make PA announcement for reactor scram
	ATC	☐ 6.2.8: Transfers level control to RFW-FCV-10A/B per SOP-RFW-FCV-QC quick card
	BOP	☐ 6.2.9: If necessary (with Main Generator load < 50 MWe): • If Main Turbine did not trip – simultaneously depress both Emerg Trip pushbuttons (H13-P820) • If Main Generator did not trip –depress either Unit Emergency Tip pushbutton or Unit Overall Trip pushbutton (H13-P800) • Verify power transfer to Startup Transformer (TR-S)

Examiner Note: Following steps are from SOP-RFW-FCV-QC (Transfer RPV Level Control to RFW-FCV-10A/10B - Quick Card).

	ATC	☐ 2.1.1: (2-handed operation) Starts closing RFW-V-112A and RFW-V-112B
		☐ 2.1.2: Starts opening RFW-V-118
		☐ 2.1.3: Verifies RFW-V-109 is closed
		☐ 2.1.4: (2-handed operation) Verifies RFW-V-117A and RFW-V-117B open
		☐ 2.1.5: Verifies RFW-LIC-620 is in Manual (V selected for Valve position demand with 0 output)
		☐ 2.1.6: IF Reactor Feed Pump(s) (RFP) are operating, then performs the following: • 2.1.6.a: Verifies RFPs have ramped down in speed • 2.1.6.b: Places RFW-P-1B in MDEM mode • 2.1.6.c: Places RFW-P-1B in MDEM mode • 2.1.6.d: Controls turbine speed as required • 2.1.6.e: If desired, then places RFW-FCV-2A(B) in Manual and slowly open to approximately 80%

EVENT No. 5 (CONTINUED)

	ATC	**CAUTION** Uncontrolled injection may occur if RPV pressure drops below 600 psig with RFW-V-112A and RFW-V-112B NOT FULLY CLOSED. ☐ 2.1.7: Verifies RFW-V-112A and RFW-V-112B are fully closed
		☐ 2.1.8: Verifies RFW-V-118 is fully open
		☐ 2.1.9: IF Reactor Feed Pump(s) (RFP) are operating, then adjusts the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840)
		☐ 2.1.10: Adjusts RFW-LIC-620 manual output to control RPV level
		☐ 2.1.12: If unable to control RPV level with RFW-FCV-10A/B, then considers throttling RFW-V-109 or RFW-V-118 to control RPV level
	CRS	☐ Directs CRO-2 to maintain RPV pressure band from 800 to 1050 psig using DEH in automatic (WILL direct CRO-2 to establish a new pressure band of 500-600 psig with DEH in automatic to reduce the driving head of the leak into secondary containment)
	BOP	☐ Lowers RPV pressure if directed using SOP-DEH-QC (Main Turbine DEH Operations Quick Card): • 2.1.1a: Selects PRESSURE TARGET • 2.1.1b: Enters desired pressure • 2.1.1c: Selects OK • 2.1.1.d: If change in pressure rate is desired: ▪ 1: Selects PRESSURE RATE ▪ 2: Enters desired PRESSURE RATE ▪ 3: Selects OK • 2.1.1.e: Selects GO • 2.1.1.f: Selects YES • 2.1.1.g: Verifies pressure demand and throttle pressure change at the pressure rate.

Comments:

EVENT No. 6 is activated at the beginning of the scenario and is realized 3 minutes after the Reactor Mode Switch is taken to Shutdown.

EVENT No. 6

Description: Steam leak develops in the Main Steam Tunnel

Event is activated at the beginning of the scenario and is realized 3 minutes after the Reactor Mode Switch is taken to Shutdown.

BOOTH OPERATOR: TRG-9 will automatically insert to worsen the MST steam leak once RPV pressure lowers to 750 psig. BE READY to manually insert Trigger 9 (if necessary) to ensure Main Steam Tunnel Temperature DOES NOT trend back down. This will require close coordination with the Scenario Coordinator.

Examiner Note: First annunciator (601.A3 3-8 (LEAK DET MSL TUNNEL ∆T HIGH)) indicative of a Main Steam Line break does not occur until about 6 minutes after the scram.

Examiner Note: Annunciator 601.A3 3-8 (LEAK DET MSL TUNNEL ∆T HIGH) comes in first quickly followed by annunciators 601.A3 1-7 & 601.A2 3-1 (LEAK DET MSL TUNNEL TEMP HIGH). CRO-2 should address the higher priority alarms.

	BOP	☐ Acknowledges annunciators 601.A3 1-7 / 601.A2 3-1 (LEAK DET MSL TUNNEL TEMP HIGH) and informs CRS

Examiner Note: Following steps from ARPs 601.A3 1-7 / 601.A2 3-1 (LEAK DET MSL TUNNEL TEMP HIGH)

	BOP	☐ 1: Identifies alarming point(s) on LD-MON-2A on H13-P632
		☐ 2: Compares alarming point(s) to temperatures on LD-MON-2B on H13-P642 and recognizes steam leak appears to be on MSL "A"
		☐ 3: Informs CRS of alarming points and trend on MSL "A" (MSL Tunnel > 80°F) (which is a PPM 5.3.1 (Secondary Containment Control) entry condition)
	CRS	☐ Re-enters PPM 5.3.1 (Secondary Containment Control) on MSL Tunnel ∆T > 80°F (Table 22)
	BOP	☐ 4 & 5: Determines the status of the NSSSS Group 1 isolation which should have occurred – See Event 7 (next page)

Comments:

EVENT No. 7 is activated at the beginning of the scenario and is realized when the MSIVs do not close as expected.

EVENT No. 7

Description: MS-V-22A and MS-V-28A through D fail to automatically close (MS-V-28A through D can be closed manually but does not isolate leak)

Event is activated at the beginning of the scenario and is realized when the MSIVs do not close as expected.

	BOP	☐ Recognizes that MS-V-22A and MS-V-28A through D failed to automatically close based on Group 1 isolation signal
		☐ Attempts to close MS-V-22A and MS-V-28A through D and notes that all valves closed except for MS-V-22A
		☐ Informs CRS of the failure of MS-V-22A and MS-V-28A through D to auto close and that after manual close attempt all valves closed with exception of MS-V-22A
		☐ Takes MSIV switches for those MSIVs that automatically shut to the Closed position
		☐ Informs crew that pressure control is with SRVs (using previously provided band)
		☐ Reports that Main Steam Tunnel temperature continues to rise

Comments:

EVENT No. 8 is an Emergency Depressurization (PPM 5.1.3) when two areas exceed their max safe operating temperature

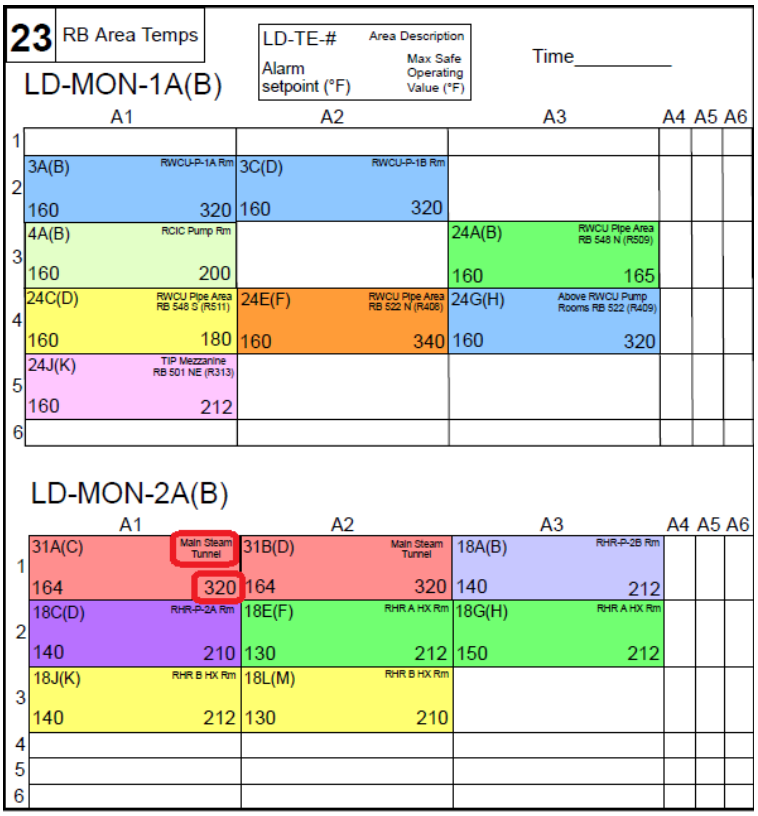
EVENT No. 8

Description: Emergency Depressurization (PPM 5.1.3) is performed when two areas exceed their max safe operating temperature

SECOND MAX SAFE EXCEEDED: _______________

Examiner Note: Refer to Simulator Guide (page 29) for full page MSOT values.

	CRS	☐ Establishes a Key Plant Parameter for Main Steam Tunnel temperature of 320°F (Max Safe value) (see below)



	BOP	☐ Trends MSL Tunnel temperature as Key Plant Parameter and notifies CRS when value reached
	CRS	☐ Directs second operator verify max safe temperature in two areas has been exceeded
	ATC	☐ Verifies max safe temperature in two areas has been exceeded

EVENT No. 8 (CONTINUED)

CT #2 - With a primary system discharging into secondary containment and area temperature exceeding maximum safe operating level in more than one area, initiate Emergency Depressurization (ED) by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of second MSOT being exceeded.

Note: If the crew properly elects to invoke the "EMERG DEPRESS is anticipated" override in ppm 5.1.1 (RPV Control) and in doing so, the second maximum safe operating level is not exceeded, this Critical Task is considered to be met.

	CRS	☐ When verified Key Plant Parameter has been reached, updates the crew on plant conditions, exits the pressure leg of PPM 5.1.1 (RPV Control) via override then enters PPM 5.3.1 (Emergency RPV Depressurization)
		☐ Determines a high Drywell pressure signal is not sealed in
		☐ Determines Wetwell level is > 17 feet
		☐ Directs 7 SRVs be opened (ADS preferred) (ADS SRVs are those with the red stripe on left side of their nameplate)
	BOP	☐ Opens 7 SRVs (ADS preferred) as directed while verifying proper containment response as each is opened and reports completion to CRS
	CRS	☐ Directs pumps not required for Adequate Core Cooling be stopped from injecting
		☐ Directs RPV level band of -50 to +54 inches
	ATC	☐ Maintains RPV level as required to maintain RPV level band

Comments:

TERMINATION CRITERIA: The scenario will be terminated when an Emergency Depressurization has been performed and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.

REACTOR BUILDING TEMPERATURE LIMITS (INCLUDING MSOT LIMITS)

23	RB Area Temps

LD-TE-#	Area Description
Alarm setpoint (°F)	Max Safe Operating Value (°F)

Time__________

LD-MON-1A(B)

	A1	A2	A3	A4	A5	A6
1						
2	3A(B) RWCU-P-1A Rm 160 320	3C(D) RWCU-P-1B Rm 160 320				
3	4A(B) RCIC Pump Rm 160 200		24A(B) RWCU Pipe Area RB 548 N (R509) 160 165			
4	24C(D) RWCU Pipe Area RB 548 S (R511) 160 180	24E(F) RWCU Pipe Area RB 522 N (R408) 160 340	24G(H) Above RWCU Pump Rooms RB 522 (R409) 160 320			
5	24J(K) TIP Mezzanine RB 501 NE (R313) 160 212					
6						

LD-MON-2A(B)

	A1	A2	A3	A4	A5	A6
1	31A(C) Main Steam Tunnel 164 320	31B(D) Main Steam Tunnel 164 320	18A(B) RHR-P-2B Rm 140 212			
2	18C(D) RHR-P-2A Rm 140 210	18E(F) RHR A HX Rm 130 212	18G(H) RHR A HX Rm 150 212			
3	18J(K) RHR B HX Rm 140 212	18L(M) RHR B HX Rm 130 210				
4						
5						
6						

TURNOVER

Initial Conditions:

- Columbia is operating at 85% power due to economic dispatch
- Safety Relief Valve 2C (MS-RV-2C) is known to be leaking
- Suppression Pool high temperature alarms (601.A11.1-3 and 601.A12.1-3) have just annunciated
- Reactor Closed Cooling (RCC) Pump 1B is tagged out for planned maintenance
- RCC-P-1A and RCC-P-1C are protected

Shift Turnover:

- After shift turnover place RHR-P-2A in Suppression Pool Cooling (using maximum cooling) and allow SW-P-1A to auto start per SOP-RHR-SPC (section 5.1) – Steps 5.1.1 through 5.1.4 are complete.
- Associate Tech Specs and LCS action statements have been entered for RHR-SYS-A being inoperable but available
  - LCO 3.5.1 Action A.1 which requires restoring RHR-SYS-A to operable status within 7 days
  - LCO 3.6.1.5 Action A.1 which requires restoring RHR-SYS-A drywell spray subsystem to operable status within 7 days
  - LCO 3.6.2.3 Action A.1 which requires restoring RHR-SYS-A suppression pool cooling subsystem to operable status within 7 days
  - RFO 1.6.1.5 Action A.1 which requires restoring RHR-SYS-A suppression pool spray subsystem to operable status within 7 days
- The pre-evolution brief has been completed and operators are stationed near both pumps

ENERGY NORTHWEST

INSTRUCTIONAL COVER SHEET

SC-4

PROGRAM TITLE	OPERATIONS TRAINING
COURSE TITLE	COLUMBIA GENERATING STATION SIMULATOR EXAMINATION
LESSON TITLE	Withdraw Control Rods during Startup; REA-FN-1B Trip requiring PPM 5.3.1 Entry and SGTS Start (TS); IRM "A" Upscale Failure with Half Scram; Loss of SL-11 (Re-energized from Alternate Source); RCIC-P-1 Coupling Found Broken; RHR-P-2B Suction Rupture (Lowering WW Level); SW-V-29 Fails to Auto Open; FDR-V-607 Fails to Close; Manual Scram on Low WW Level (Mode Switch Failure – Scram Pushbuttons Successful); ED performed on Low WW Level (One ADS Valve Fails to Open)

LENGTH OF LESSON 1 Hour

Lesson Plan PQD Code		Rev. No.	
Simulator Guide PQD Code	SC-4	Rev. No.	1
JPM PQD Code		Rev. No.	
Exam PQD Code		Rev. No.	

DIVISION TITLE	Nuclear Training		
DEPARTMENT	Operations Training		
PREPARED BY	Dave E. Crawford	DATE	01/20/17
REVISED BY	Dave E. Crawford	DATE	02/08/17
VALIDATED BY		DATE	

TECHNICAL REVIEW		DATE	
INSTRUCTIONAL REVIEW		DATE	
APPROVED		DATE	

Operations Training Manager

Facility:	Columbia Generating Station	Scenario No.:	4	Op Test No.:	1
Examiners:				Operators:	

Initial Conditions:	The reactor is in Mode 2 (Reactor startup). Reactor is critical at 5% power with RPV pressure at 500 psig. DEH is in Auto with Bypass Valves at 19.5% open. DEH pressure setpoint is 600 psig with pressurization rate set to 6 psig/minute but will remain in Hold until rods are withdrawn to establish Bypass Valves approximately 30% open. Reactor Building Exhaust Fan 1A (REA-FN-1A) is out of service for extended maintenance.
Turnover:	Withdraw control rods as required to establish and maintain Bypass Valves approximately 30% open in preparation for the SJAE second stage steam supply shift per ppm 3.1.2 step Q34. Next in-sequence rod is from Group 35, Step 08 (rod 06-39). Continue RPV pressure rise to 600 psig at 6 psig/minute when Bypass Valves are approximately 30% open.

Critical Tasks:

CT-1	Manually scram the reactor before wetwell level drops below 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601).
CT-2	When wetwell level cannot be maintained above 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601), initiate emergency depressurization by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of wetwell level lowering to 19 feet 2 inches. CT considered met if any combination of 7 Safety Relief Valves are opened.

<u>NOTE</u>: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R (ATC)	Withdraw control rods as required to establish and maintain the bypass valves approximately 30% open
2	TRG-2	C (BOP,SRO) TS (SRO)	Trip of REA-FN-1B results in a high reactor building pressure and entry into PPM 5.3.1 (EOP - Secondary Containment Control) (Tech Spec)
3	TRG-3	I (ATC,SRO)	IRM “A” fails upscale resulting in a half scram
4	TRG-4	C (BOP,SRO)	Differential current lockout of transformer (TR-1/11) results in a loss of SL-11 (due to the failure to automatically transfer to SL-21) which requires bus to be manually transferred to SL-21
5	N/A	C (ATC**,SRO) TS (SRO)	RCIC-P-1 coupling discovered broken (Tech Spec)
6	TRG-6	M (ALL)	Failure of the RHR-P-2A suction line results in lowering wetwell level (RHR-V-4A fails to close preventing isolation of leak)
			FDR-V-607 fails to auto close due to a failed level switch (which allows flooding to continue into RCIC Pump Room). Cannot be closed manually
7	N/A	C (BOP)	SW-V-29 fails to auto open when HPCS-P-2 is started for wetwell makeup

8	N/A	C (ATC)	Reactor mode switch fails to scram reactor, requiring use of manual scram pushbuttons to scram reactor prior to wetwell level lowering to 19 feet 2 inches **(CT #1)**
9	N/A	---	Prior to wetwell level going below 19 feet 2 inches, the crew determines that wetwell level cannot be maintained ≥ 19 feet 2 inches and initiates RPV Emergency Depressurization (ED) with 7 SRVs opened **(CT #2)**
		C (BOP)	One ADS SRV (MS-RV-4D) fails to open requiring manually opening one non-ADS SRV **(CT #2)**
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specifications			
** Normally assigned to BOP. NRC Evaluator will have to direct CRS to use ATC.			

Target Quantitative Attributes	Actual	Description
Malfunctions after EOP entry (1-2)	**3**	SW-V-29 fails to auto open; Mode switch failure; ADS SRV fails to open
Abnormal events (2-4)	**3**	Fan REA-FN-1B trip; IRM “A” trip with half scram; Loss of SL-11
Major transients (1-2)	**2**	Primary containment failure; Manual scram
EOPs entered/requiring substantive actions (1-2)	**3**	PPM 5.1.1 (RPV Control); PPM 5.2.1 (Primary Containment Control); PPM 5.3.1 (Secondary Containment Control);
EOP contingencies requiring substantive actions (0-2)	**1**	PPM 5.1.3 (Emergency RPV Depressurization)
EOP-based Critical Tasks (2-3)	**2**	See Critical Task Determination table

Trigger (TRG-x)	Evaluator Directed	How Triggered	Purpose	Malfunction Numbers
TRG-2	YES	Manually	Event Initiator	PMP-SCN010S
TRG-3	YES	Manually	Event Initiator	MAL-NIS002A
TRG-4	YES	Manually	Event Initiator	ANN-800C3A02; BKR-EPS001; BKR-EPS004
TRG-6	YES	Manually	Event Initiator	MAL-RHR001; XMT-PCN006A; XMT-PCN007A; XMT-PCN003A; XMT-PCN004A
TRG-7		Manually	Event Initiator	BKR-RHR001
			Initial Condition	BKR-SCN001
			Initial Condition	MOV-SSW009F
			Initial Condition	MOV-RHR029F
			Initial Condition	SRV-RRS016C
			Initial Condition	AOV-SCN014F
			Initial Condition	OVR-RPS001A

SCENARIO 4 SUMMARY

Event 1

With reactor power at ~5% and reactor pressure at ~500 psig during reactor startup, RO1 withdraws control rods per SOP-CR-MOVEMENT (Control Rod Movement) to establish and maintain Main Turbine Bypass Valves (BPVs) approximately 30% open as directed by PPM 3.1.2 (Startup Flowchart), Attachment 7.3, step Q34.

Event 2

(TRG-2) Trip of Reactor Building Exhaust Fan 1B (REA-FN-1B) results in a high Reactor Building pressure and entry into PPM 5.3.1 (EOP - Secondary Containment Control). Secondary containment becomes inoperable. ARP 4.812.R2 9-1 (REACTOR BUILDING EXHAUST FAN B TRIP) directs starting REA-FN-1A which cannot be started (out-of-service). Subsequent ARP direction requires CRO2 to isolate Reactor Building HVAC and starting the Standby Gas Treatment system to return Reactor Building pressure to within the TS limit (≥ 0.25 inch of vacuum water gauge). The CRS refers to Technical Specifications and determines that TS 3.6.4.1 (Secondary Containment), Action A.1 applies which requires restoring secondary containment to operable status within 4 hours.

Event 3

(TRG-3) IRM "A" fails upscale resulting in an IRM upscale trip and Neutron Monitor System trip annunciators and a half scram. Per the ARP and when directed by the CRS, CRO1 bypasses IRM "A" and resets the half-scram. The CRS refers to Technical Specifications 3.3.1.1 (RPS Instrumentation) and determines that the minimum number of IRM instruments required remains operable and that no TS actions are required.

Event 4

(TRG-4) Differential current lockout of transformer (TR-1/11) supplying 480V Bus SL-11 occurs which de-energizes the bus due to CB-21/11 failing to auto close. After accessing what caused the lockout, and when directed, CRO2 repowers SL-11 from SL-21 using the Quick Card (SOP-ELEC-480V-OPS-QC).

Event 5

Call comes into the Control Room reporting RCIC turbine coupling to the RCIC pump was found broken. CRS will direct the RCIC turbine to be tripped. The CRS refers to Technical Specifications and determines that TS 3.5.3 (RCIC System), Action A.1 applies which immediately requires verifying that HPCS is operable by administrative means AND Action A.2 which requires restoring RCIC system to operable status within 14 days.

Event 6

(TRG-6) A break on the Residual Heat Removal Pump 2A (RHR-P-2A) suction line causes wetwell level to lower. ABN-FLOODING is entered. When attempting to close the RHR-P-2A Motor-Operated suction valve (RHR-V-4A), the valve fails open. The CRS enters PPM 5.2.1 (EOP - Primary Containment Control) on Suppression Pool low level. Crew should direct removal of control power fuses (TRG-7) for RHR-P-2A as time permits.

FDR-V-607, the cross-connect valve between the RHR-SYS-A and Reactor Core Isolation Cooling (RCIC) rooms fails to auto close due to a failed level switch (which allows flooding to continue into RCIC Pump Room). The valve cannot be manually closed. The CRS re-enters PPM 5.3.1 (EOP - Secondary Containment Control) due high RHR-SYS-A and RCIC room levels. The leak from the Suppression Pool is not considered a "Primary System discharging into Secondary Containment" and therefore a controlled reactor shutdown is required for high RCIC room water level (6 inches above floor).

Event 7

The crew takes actions to restore wetwell level using the High Pressure Core Spray (HPCS) pump (HPCS-P-1) per PPM 5.5.23 (Emergency Suppression Pool Makeup). During this lineup, the HPCS Standby Service Water Pump (HPCS-P-2) discharge valve (SW-V-29) fails to auto open when HPCS-P-2 is started, requiring CRO2 to manually open the valve. HPCS is ineffective is restoring Suppression Pool level.

Event 8

The CRS enters PPM 5.1.1 (EOP - RPV Control) and directs manually scramming the reactor prior to wetwell level reaching 19 feet 2 inches. **(CT #1)** The reactor will not scram when the mode switch is taken to SHUTDOWN. CRO1 identifies the failure to scram and takes actions per PPM 3.3.1 (Reactor Scram) to scram the reactor. The Manual Scram Pushbuttons are effective in inserting all control rods.

Event 9

Prior to wetwell level going below 19 feet 2 inches, the CRS determines that wetwell level cannot be maintained ≥ 19 feet 2 inches and directs Emergency Depressurization (ED) per PPM 5.1.3 by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of wetwell level lowering to 19 feet 2 inches. **(CT #2)**

One Automatic Depressurization System (ADS) Safety Relief Valve (MS-RV-4D) fails to open during the ED requiring CRO2 to manually open a non-ADS SRV. **(CT #2)**

TERMINATION CRITERIA: The scenario will be terminated when emergency depressurization has commenced (7 SRVs open) and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.

Critical Task	Safety Significance	Cueing	Measurable Performance Indicators	Performance Feedback
CT #1 – Manually scram the reactor before wetwell level drops below 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601).	Ensures reactor is scrammed and shutdown before requirement to Emergency Depressurize (ED) is reached. If ED is anticipated (see PPM 5.1.1 P-1 override), dumping steam to main condenser via Main Turbine bypass valves may be used to reduce reactor pressure before the requirement to ED occurs. ED would still be performed if required by EOPs. (Ref: PPM 5.0.10 Rev 21, 8.8.2 f))	Procedural direction by PPM 5.2.1 (EOP for Primary Containment Control) Step L-5 directs entering PPM 5.1.1 (which requires placing Reactor Mode Switch in Shutdown) once it is determined that wetwell level cannot be maintained above 19 feet 2 inches.	The operator will manually scram reactor by placing Reactor Mode Switch in Shutdown (and follow up with all Manual Scram pushbuttons when RMS fails to scram the reactor).	All control rods fully insert.
CT #2 - When wetwell level cannot be maintained above 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601), initiate emergency depressurization by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of wetwell level lowering to 19 feet 2 inches. .	Suppression of pressure from blowdown (Emergency Depressurization) through the downcomers cannot be assured for water levels below 19 feet 2 inches. (Ref: PPM 5.0.10 Rev 21, 7.12.3)	Procedural direction by PPM 5.2.1 (EOP for Primary Containment Control) Step L-6 directs Emergency Depressurizing reactor when Wetwell water level cannot be maintained above 19 feet 2 inches.	The operator will manually open 7 Safety Relief Valves (ADS preferred) to emergency depressurize the RPV.	The valve light indications for each of the 7 Safety Relief Valves will change from Green lit to Red lit when control switch is taken to Open. Reactor pressure will lower in response.

EVENT No. 1

Description: Withdraw control rods as required to establish and maintain the bypass valves approximately 30% open.

Event is initiated by Turnover.

Time	Position	Applicants Actions or Behavior
	CRS	☐ Directs RO1 to withdraw control rods to establish and maintain the BPVs approximately 30% open (per startup flowchart step Q34)
Examiner Note: Following steps are from SOP-CR-MOVEMENT (Control Rod Movement)		
Examiner Note: The next 5 rods to withdraw in the startup sequence are as follows (each will be moved from position 8 to 12): 06-39, 30-47, 46-31, 30-15, 14-31		
	ATC	☐ 5.1.1 References the Startup Rod Withdrawal sequence (Pull) sheets to identify next rod to withdrawal (control rod 06-39) ☐ 5.1.2 Selects control rod to be moved (currently at position 08) NOTE: The WITHDRAW button should be held until the WITHDRAW lamp illuminates. [GE SIL 626]. ☐ 5.1.4: • Presses and releases the Withdrawal button • Verifies rod is moving in the expected direction (out) and settles at position 10 • Repeats above two bulleted steps to move same rod from 10 to 12 ☐ 5.1.6 Verifies control rod 06-39 has settled at position 12 ☐ 5.1.7 Annotates completed move on the pull sheet ☐ Continues rod withdrawal with next rod in sequence (control rod 30-47) by repeating above steps
	BOP	☐ Peer checks RO1 during rod manipulations
		☐ Periodically reports Bypass Valve position to CRO1
	ATC	☐ Reports to CRS when Bypass Valves are approximately 30% open

Comments:

EVENT No. 2 may be initiated after first rod (06-39) is withdrawn to position 12 (or as directed by the Exam team) and is activated using **TRIGGER 2**.

EVENT No. 2		
Description: Trip of REA-FN-1B results in a high reactor building pressure and entry into PPM 5.3.1 (EOP - Secondary Containment Control) (Tech Spec) Event is activated using **TRIGGER 2**.		
BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 2</u>		
Time	**Position**	**Applicants Actions or Behavior**
	BOP	☐ Acknowledges annunciator 812.R2 9-1 (RX BLDG EXH FAN B TRIP)
		☐ Determines that fan REA-FN-1B has tripped
		☐ Reports annunciator and status of fan REA-FN-1B to the CRS
<u>Examiner Note</u>: Following steps are from ARP 812.R2 9-1 (RX BLDG EXH FAN B TRIP)		
	BOP	☐ 1: Verifies REA-FN-1B tripped (may have been previously completed)
		☐ 2: Notes that REA-FN-1A cannot be started (undergoing maintenance) and informs CRS that a Standby Gas Treatment train will have to be started
	CRS	☐ 3.a: Directs CRO2 to start either Standby Gas Treatment train 1A or 1B per the SOP-SGT-START-DIV1(2)-QC (Standby Gas Treatment Start – Quick Card)
		☐ Calls for assistance in getting REA-FN-1A or REA-FN-1B back
	BOP/ATC	☐ Acknowledges annunciator 602.A5 2-8 (SEC PRESS ∆P HIGH) when it comes in and informs CRS
<u>Examiner Note</u>: Following steps are from ARP 602.A5 2-8 (SEC PRESS ∆P HIGH)		
	BOP/ATC	☐ 1 & 2: Checks REA-DPR-1A(B) for RB Pressure (already known to be near zero) and refer to CRS to ppm 3.8.1 (Secondary Containment Control)
		☐ 3: Refers CRS to Technical Specification 6.3.4.1
		☐ Refers to annunciator 812.R1 7-3 (SEC PRESS CONTR "A" ΔP HIGH/LOW) and 812.R2 7-1 (SEC PRESS CONTR "B" ΔP HIGH/LOW) and notes they are expected for the plant condition (no RB HVAC)
	CRS	☐ Enters PPM 5.3.1 (Secondary Containment Control) on low RB differential pressure
		Evaluates Technical Specifications and determines the following action applies: ☐ LCO 6.3.4.1 A.1 – Restore secondary containment to operable status within 4 hours

EVENT No. 2 (CONTINUED)		
Examiner Note: Following steps are from SOP-SGT-START-DIV1-QC (Standby Gas Treatment Start – Quick Card) assuming Div 1 is started (Div 2 components are in parentheses)		
Examiner Note: All bullets in steps 3.1.1 & 3.1.2 below are performed regardless of which Standby Gas Treatment train is started.		
	BOP	NOTE: The non-running fans should be placed to PTL first. ☐ 3.1.1: (2 handed operation) Places the following fans to Pull to Lock • ROA-FN-1A • ROA-FN-1B • REA-FN-1A • REA-FN-1B
		☐ 3.1.2: Closes the following valves: • ROA-V-1 • ROA-V-2 • REA-V-1 • REA-V-2
		☐ 3.1.3: Momentarily turns SGT-FN-1A1 (SGT-FN-1B2) fan control switch from Auto to PTL SYS.START
		☐ 3.1.4: Verifies the following items: • Main Heaters energize as indicated by the Main Heater ON light and A1 (B2) amp meters • SGT-V-5A1 (SGT-V-5B2) opens (Exhaust to Stack) • SGT-FN-1A1 (SGT-FN-1B2) starts (within 10 seconds)
Examiner Note: Following are steps from ARP 812.R2 9-1 (RX BLDG EXH FAN B TRIP)		
	BOP	☐ 3.b: Notifies Chemistry to monitor Reactor Building ventilation per ODCM 6.1.2.1 and LCS 1.3.3.1 ☐ 3.c: Refers CRS to ODCM 6.1.2.1 and LCS 1.3.3.1
		☐ 4: Refers CRS to ABN-HVAC (no actionable items)
		☐ Monitors secondary containment D/P with a Standby Gas Treatment train running and informs CRS when secondary containment D/P has been restored

EVENT No. 2 (CONTINUED)		
	CRS	☐ Validates restoration of secondary containment integrity - exits LCO 3.6.4.1 ☐ Evaluates exiting of PPM 5.3.1 (Secondary Containment Control)
Comments:		
EVENT No. 3 may be initiated after Secondary Containment integrity has been restored and Tech Specs addressed (or as directed by the Exam team) and is activated using **TRIGGER 3**.		

<table>
<tr><td colspan="3">EVENT No. 3</td></tr>
<tr><td colspan="3">Description: IRM “A” fails upscale resulting in a half scram
Event is activated using TRIGGER 3.</td></tr>
<tr><td colspan="3">BOOTH OPERATOR – <u>As briefed or when directed</u> activate <u>TRIGGER 3</u></td></tr>
<tr><th>Time</th><th>Position</th><th>Applicants Actions or Behavior</th></tr>
<tr><td></td><td>ATC</td><td>☐ Acknowledges annunciators 603.A7 1-5 (IRM ACEG UPSCL TRIP OR INOP) and 603.A7 3-4 (½ SCRAM SYSTEM A)</td></tr>
<tr><td></td><td></td><td>☐ Checks for control rod motion</td></tr>
<tr><td></td><td></td><td>☐ Reports to CRS that a half scram occurred (RPS “A” white RPS scram lights de-energized) due to IRM upscale and that no rod motion has occurred</td></tr>
<tr><td></td><td>BOP</td><td>☐ Makes PA announcement “Half Scram system ‘A’. Stop all maintenance and surveillance testing on RPS system B.”</td></tr>
<tr><td></td><td>CRS</td><td>☐ Calls Work Week Manager or Operations Management for assistance</td></tr>
<tr><td colspan="3"><u>Examiner Note</u>: Following are steps from ARP 603.A7 3-4 (½ SCRAM SYSTEM A)</td></tr>
<tr><td></td><td>ATC</td><td>☐ 2.a: Checks for scrammed rods (may have already been performed)</td></tr>
<tr><td></td><td>BOP</td><td>☐ 2.c: Make announcement to stop work (may have already been made)</td></tr>
<tr><td></td><td>ATC</td><td>☐ Positions IRM Bypass Switch to bypass IRM “A”</td></tr>
<tr><td></td><td></td><td>☐ 3: Resets half scram by doing the following:
3.a: Depresses RPS-RMS-S5A (RPS Logic A1/B1 Reset pushbutton) (H13-P603).
3.b: Depresses RPS-RMS-S5B (RPS Logic A2/B2 Reset Pushbutton) (H13-P603)
3.c: Verifies the Scram group solenoid lights for Groups 1, 2, 3 and 4 are illuminated (H13-P609 & H13-P603)
3.d: Verifies the Backup Scram System lights have extinguished (H13-P603)</td></tr>
<tr><td></td><td></td><td>☐ 4: Refers the CRS to Technical Specification 3.3.1.1 and LCS 1.3.2.1</td></tr>
<tr><td></td><td>CRS</td><td>☐ Evaluates Technical Specification 3.3.1.1 and LCS 1.3.2.1 and determines that the minimum number of channels required for IRM operability exists and that no T.S. action statements need be entered</td></tr>
</table>

EVENT No. 3 (CONTINUED)
Comments:
EVENT No. 4 may be initiated after ½ scram has been reset and Tech Specs addressed (or as directed by the Exam team) and is activated using **TRIGGER 4**.

EVENT No. 4		
Description: Differential current lockout of transformer (TR-1/11) results in a loss of SL-11 (due to the failure to automatically transfer to SL-21) which requires bus to be manually transferred to SL-21 Event is activated using **TRIGGER 4**.		
BOOTH OPERATOR – As briefed or when directed activate TRIGGER 4		
	BOP	☐ Acknowledges annunciator 800.C3 1-2 (XFMR TR-1/11 DIFF LOCKOUT) and notes 480 VAC Bus SL-11 has de-energized – Reports annunciator and bus status to CRS
	CRS	☐ Enters ABN-ELEC-SM1/SM7
Examiner Note: Following are steps from ARP 800.C3 1-2 (XFMR TR-1/11 DIFF LOCKOUT)		
Examiner Note: CB 21/11 would normally automatically close to immediately re-energize bus SL-11. In this case CB 21/11 failed to auto close causing a loss of bus SL-11. SOP-ELEC-480V-OPS-QC quick card will be used or guidance in PPM 1.3.1 to manually close CB 21/11.		
	BOP	☐ 1: Verifies that both CB-1/11 & CB 11/1 feeder breakers tripped open (as expected based on alarm) but that CB 21/11 did not close
	CRS	☐ 3: Requests plant assistance for cause of transformer lockout
Examiner Note: Following are steps from ABN-ELEC-SM1/SM7 (section 4.7)		
	BOP	☐ 4.7.1: Verifies DEH-P-1B is running
		NOTE: IF E-SL-11 is not re-powered, THEN RFW-V-118 cannot be opened and RFW-V-112A cannot be closed to support a RFW-FCV-10 lineup, if required due to Reactor Scram. ☐ 4.7.3: Verifies SL-11 lockout is reset
	CRS	☐ 4.7.4: When the E-SL-11 problems have been corrected, then restore SL-11 to service per SOP-ELEC-480V-OPS-QC (there are not issues with SL-11 itself)
		☐ 4.7.5: When SL-11 is returned to service then restore SL-11 loads to service per SOP-ELEC-SM1-MAINT (the CRS will make note of this)
	BOP	☐ 4: Determines that normal source to Bus SL-11 unavailable but energizes SL-11 using SOP-ELEC-480V-OPS-QC quick card

EVENT No. 4 (CONTINUED)

Examiner Note: Following are steps from SOP-ELEC-480V-OPS-QC quick card (section 2.4)

	BOP	☐ 2.4.1: Verifies CB-21/2 closed
		☐ 2.4.2: Verifies CB-11/1 green light illuminated and green flag displayed
		☐ 2.4.3: Verifies CB-21/11 green light illuminated and green flag displayed
		☐ 2.4.4: Closes CB-21/11
		☐ 2.4.5: Verifies SL-11 voltage is approximately 480 (432-528) volts
		☐ 2.4.6: Verifies (and maintains) E-TR-1/11 load ≤ 277 amps

Comments:

EVENT No. 5 may be initiated after Bus SL-11 has been re-energized (or as directed by the Exam team) and is initiated with a call to the Main Control Room.

EVENT No. 5

Description: RCIC-P-1 coupling discovered broken (Tech Spec)

Event is initiated after Bus SL-11 has been restored (or as directed by the Exam team) and commences with a call to the Main Control Room.

BOOTH OPERATOR – Call the Main Control Room and report the following as OPS-2: "I discovered several pieces of RCIC pump coupling on the floor in the RCIC Pump room. The pump looks detached from the turbine. I am exiting the area since RCIC looks unsafe if there is an auto start."

	CRS	☐ Directs CRO1 to trip RCIC turbine
Examiner Note: For CRO1 credit the CRS will have to be directed to ensure CRO1 gets assigned task while CRO2 monitors reactor parameters.		
	ATC	☐ Trips RCIC turbine as directed by pressing RCIC Manual trip pushbutton or by closing RCIC-V-1
		☐ Refers to ARP 601.A4 1-5 (RCIC TURBINE TRIP) for follow up actions
Examiner Note: Following are steps from ARP 601.A4 1-5 (RCIC TURBINE TRIP)		
	ATC	☐ 1: Verifies RCIC-V-1 is closed (RCIC Turbine Trip and Throttle Valve) (H13-P601)
		☐ 2: Verifies RCIC-V-46 is closed
		☐ 5: Refers CRS to Technical Specification 3.5.3
	CRS	☐ 6: Informs Security to take compensatory actions for RCIC out of service
		Enters RCIC as inoperable in the Plant Logging system - Evaluates Technical Specifications and determines the following actions apply: ☐ LCO 3.5.3 Action A.1 applies which immediately requires verifying that HPCS is operable by administrative means (it is) ☐ LCO 3.5.3 Action A.2 which requires restoring RCIC system to operable status within 14 days
		☐ Request assistance on RCIC investigation and unplanned unavailability
		☐ Protects HPCS-P-1, HPCS DG and HPCS Service Water systems

Comments:

EVENT No. 6 may be initiated after RCIC has been tripped and Tech Specs addressed (or as directed by the Exam team) and is activated using **TRIGGER 6**.

EVENT No. 6

Description: Failure of the RHR-P-2A suction line results in lowering wetwell level (RHR-V-4A fails to close preventing isolation of leak)

Event is activated using **TRIGGER 6**.

BOOTH OPERATOR – As briefed or when directed activate TRIGGER 6

Time	Position	Applicants Actions or Behavior
	BOP	☐ Acknowledges annunciator 602.A13 2-1 (REACTOR BLDG FLOOR SUMP R1 LEVEL HI-HI) and informs CRS
Examiner Note: Following are steps from ARP 602.A13 2-1 (REACTOR BLDG FLOOR SUMP R1 LEVEL HI-HI)		
	BOP	☐ 1: Determines Sump Pump status by calling Radwaste Control Room to ensure that either FDR-P-1A or 1B is running
BOOTH ROLEPLAY – If directed to report status of FDR-P-1A and 1B sump pumps, report both floor drain sump pumps are running.”		
	BOP	**WARNING** Flooding in the Power Block may cause personnel injury. Use extreme caution when investigating the source of the flooding. ☐ 2: Sends field operator to investigate RI Sump level (and possible flooding) in RHR “A” pump room ☐ Ensures they understand that this is a potentially hazardous situation and that they need to take the appropriate precaution NOTE: This step is also directed from ABN-FLOODING step 4.1.1

BOOTH ROLEPLAY – If directed to investigate possible flooding in RHR “A” pump room, wait 1 minute and:

If alarm 601.A4 5-3 has not come in report “I hear a big inrush of water in the RHR ‘A’ pump room. The Sump is overflowing with several inches of water on the floor.”

If alarm 601.A4 5-3 has already come in report “I hear a big inrush of water in the RHR ‘A’ pump room with about a foot of water of water on the floor and rising. I'm leaving due to safety concerns.”

EVENT No. 6 (CONTINUED)		
	BOP	☐ 3: Notes that FDR-V-607 (RCIC Floor Drain Sump FDR Sump R1 Inlet) did not automatically close and attempts to manually close it on H13-P632 ☐ Reports to CRS that FDR-V607 did not auto close and could not be closed manually
		☐ Acknowledges annunciator 601.A4 5-3 (RHR A PUMP ROOM WATER LEVEL HIGH) and informs CRS ☐ Refers CRS to ppm 5.3.1 (Secondary Containment Control) (per ARP)
Examiner Note: Primary indications used for Suppression Pool (Wetwell) water level during this event are CMS-LR-3 or 4, on H13-P601.		
	BOP	☐ Acknowledges annunciator 601.A12 2-3 or 601.A11 2-3 (SUPP POOL LEVEL HIGH/LOW) ☐ Observes lowering level in the Suppression Pool (Wetwell) and provides crew update
Examiner Note: Due to timing of actions, steps performed for ABN-FLOODING are not listed here but instead are referenced as actions occur. See note for last BOP action on page 16, 4th CRS action below, CRS action at bottom of page, and last ATC action on page 18 for ABN-FLOODING actions.		
	CRS	☐ Enters ABN-FLOODING
		☐ Enters 5.3.1 (Secondary Containment Control) on RB water level above alarm setpoint of 6 inches (RHR Pump Room "A")
		☐ Enters ppm 5.2.1 (Primary Containment Control) based on low suppression level (-2 inches)
		☐ Directs CRO2 to verify RHR-P-2A secured and then to shut RHR-V-4A (Pump Suction from Supp Pool) in an attempt to isolate the leak (as directed by ppm 5.3.1 (Secondary Containment Control) step SC-9) or ABN-FLOODING
Examiner Note: RHR-V-4A will lose indication (both green and red lights off) when attempt is made to close the valve due to an open control circuit.		
	BOP	☐ Reports after isolation attempt that RHR-V-4A did not close and that Suppression Pool level continues to lower
	CRS	☐ Directs CRO2 to make announcement per ABN-FLOODING step 4.2

<table>
<tr><td colspan="3">EVENT No. 6 (CONTINUED)</td></tr>
<tr><td></td><td>BOP</td><td>☐ Since flooding was confirmed by report/plant indications:
• 4.2.1: Sounds “Alert” Tone for 5 to 10 seconds
• 4.2.2: Alert station personnel to flooding in the affected room(s)
• 4.2.3: Evacuate all unnecessary personnel (may already be done)
• 4.2.4: Refer to PPM 13.5.1 for localized evacuation</td></tr>
<tr><td></td><td>CRS</td><td>☐ Sets a Key Plant Parameter for Suppression Pool (Wetwell) level sufficiently above 19 feet 2 inches (to allow margin for actions needed to ED later on before reaching 19 feet 2 inches)</td></tr>
<tr><td></td><td>ATC/BOP</td><td>☐ 4.1.2: Trends Key Plant Parameter for Suppression Pool (Wetwell) level</td></tr>
<tr><td></td><td>ATC</td><td>☐ Directs field operator to remove trip and close (control power) fuses for RHR-P-2A (per ABN-Flooding Attachment 7.1 (section 7.1.1)</td></tr>
<tr><td colspan="3">BOOTH ROLEPLAY – <u>If directed to pull the control power fuses for RHR-P-2A</u>, wait 1 minute then activate <u>TRIGGER 7</u> then report “The trip and close fuses have been removed for RHR-P-2A.”</td></tr>
<tr><td colspan="3"><u>Comments:</u></td></tr>
<tr><td colspan="3">EVENT No. 7 is activated at the beginning of the scenario and is realized when SW-V-29 fails to auto open.</td></tr>
</table>

EVENT No. 7

Description: SW-V-29 fails to auto open when HPCS-P-2 is started.

Event is activated at the beginning of the scenario and is realized when SW-V-29 fails to auto open.

Examiner Note: Crew may not pursue option to raise Wetwell level depending on rate of Wetwell level decrease.

Time	Position	Applicants Actions or Behavior

	BOP	☐ When directed to perform ppm 5.5.23 (Emergency Suppression Pool Makeup) the following actions are taken (per section 4)
		• 4.1: Verifies HPCS-V-1 is open (Pump Suction from CST)
		• 4.2: Starts HPCS-P-1
		• 4.3: Verifies HPCS-V-12 opens (HPCS-P-1 Minimum Flow Bypass)
		• 4.4: Starts HPCS-P-2 (HPCS Service Water Pump)
		• 4.5: Verifies SW-V-29 opens (Service Water Pump Discharge)
		  ▪ Observes that SW-V-29 did NOT automatically open and therefore attempts to open it manually
		  ▪ Reports to the CRS that SW-V-29 did not automatically open but was able to be opened manually
		• 4.6 is N/A (no HPCS auto initiation signal present)
		• 4.7: Throttles open HPCS-V-23 (Test Bypass To Suppression Pool)
		• 4.8: Adjusts flow as necessary to a maximum of 7175 GPM to fill the Suppression Pool
		• 4.9: Verifies HPCS-V-12 closes
		• 4.10: Monitors Suppression Pool level
		☐ Reports to CRS that HPCS is making up to Suppression Pool but Suppression Pool level continues to lower

EVENT No. 8 is activated at the beginning of the scenario and is realized when the Mode Switch is positioned to Shutdown and no scram occurs.

EVENT No. 8		
Description: Reactor mode switch fails to scram reactor, requiring use of manual scram pushbuttons to scram reactor prior to wetwell level lowering to 19 feet 2 inches. Event is activated at the beginning of the scenario and is realized when the Mode Switch is positioned to Shutdown and no scram occurs.		
Time	**Position**	**Applicants Actions or Behavior**
CT #1 - Manually scram the reactor before wetwell level drops below 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601).		
	ATC/BOP	☐ Reports when Key Plant Parameter met for Suppression Pool (Wetwell) low level
	CRS	☐ When notified Key Plant Parameter has been reached for Wetwell level, updates the crew on plant conditions then enters PPM 5.1.1 (RPV Control)
		☐ Directs CRO1 to scram the reactor
Examiner Note: Following steps are Immediate Actions from PPM 3.3.1 (Reactor Scram)		
	ATC	☐ 6.1.1: Places Reactor Mode Switch to Shutdown • Observes that the control rods DID NOT go in (no BLUE scram lights lit on full core display) • Observes that APRMs do not indicate downscale (all 4 APRM downscale status lights on H13-P603 are not lit)
		☐ 6.1.2: Monitors reactor power, pressure and level (no change)
		☐ 6.1.3: IF APRM's are not downscale, THEN **PERFORM** the following: • 6.1.3.a: **DEPRESS** the Manual Scram Pushbuttons • 6.1.3.b: **INITIATE** ARI
		☐ 6.1.5: Inserts SRM and IRM monitors (detectors) (some are not fully inserted during this point in the startup)

EVENT No. 8 (CONTINUED)		
	ATC	☐ After above steps CRO1 makes scram report to CRS: • Mode switch is in Shutdown • APRMs are downscale • RPV pressure is (value and trend) • RPV level is (value and trend) • No EOP entry (reactor power is < 5%)
		☐ 6.1.6: Reports all control rods are IN
Examiner Note: Following steps are Subsequent Actions from PPM 3.3.1 (Reactor Scram)		
	ATC	☐ 6.2.6: Range down on IRMs, as necessary, to follow power decrease
	BOP	☐ 6.2.7: Make PA announcement for reactor scram
	ATC	☐ 6.2.8: Transfers level control to RFW-FCV-10A/B per SOP-RFW-FCV-QC quick card (No action – already on startup level controller in Auto)
	CRS	☐ Sets a Key Plant Parameter for Suppression Pool (Wetwell) level sufficiently above 19 feet 2 inches to allow a controlled Emergency Depressurization

EVENT No. 9		
Description: Prior to wetwell level going below 19 feet 2 inches, the crew determines that wetwell level cannot be maintained ≥ 19 feet 2 inches and initiates RPV Emergency Depressurization (ED) with 7 SRVs opened (SRV MS-RV-4D) fails to open requiring manually opening one non-ADS SRV)		
Time	**Position**	**Applicants Actions or Behavior**
Time Wetwell Level < 19.2 Feet _______________ (Suppression Pool WR LVL (CMS-LR-3 or 4, on H13-P601))		
CT #2 - When wetwell level cannot be maintained above 19 feet 2 inches (as read on CMS-LR-3 or 4 on H13-P601), initiate emergency depressurization by opening seven (7) Safety Relief Valves (ADS preferred) within 10 minutes of wetwell level lowering to 19 feet 2 inches.		
	CRS	☐ When notified Key Plant Parameter has been reached for Wetwell level, updates the crew on plant conditions, exits the pressure leg of PPM 5.1.1 (RPV Control) via override P-1 (1st) then enters PPM 5.3.1 (Emerg Depressurization)
		☐ Determines a high Drywell pressure signal is not sealed in
		☐ Determines Wetwell level is > 17 feet
		☐ Directs 7 SRVs be opened (ADS preferred) (ADS SRVs are those with the red stripe on left side of their nameplate)
Examiner Note: Proper containment response (comparing Wetwell and Drywell pressures as each SRV is opened to detect tailpipe failure) will be difficult at an already low RPV pressure.		
	BOP	☐ Opens 7 SRVs (ADS preferred) as directed while verifying proper containment response as each is opened and reports completion to CRS • Observes that SRV (MS-RV-4D) did not open • Opens one other non-ADS SRV ☐ Reports 7 SRV opened and that SRV 4D failed to open requiring the opening of another SRV
	CRS	☐ Directs RPV level band of +13 to +54 inches
	ATC	☐ Maintains RPV level as required to maintain RPV level band
TERMINATION CRITERIA: The scenario will be terminated when emergency depressurization has commenced (7 SRVs open) and RPV level is being controlled in the prescribed band OR as directed by the Examination Team.		

TURNOVER

Initial Conditions:

- The reactor is in Mode 2 (Reactor startup).
- Reactor is critical at 5% power with RPV pressure at 500 psig.
- DEH is in Auto with Bypass Valves at 19.5% open.
- DEH pressure setpoint is 600 psig with pressurization rate set to 6 psig/minute but will remain in Hold until rods are withdrawn to establish Bypass Valves approximately 30% open.
- Reactor Building Exhaust Fan 1A (REA-FN-1A) is out of service for extended maintenance.

Shift Turnover:

- Withdraw control rods as required to establish and maintain Bypass Valves approximately 30% open in preparation for the SJAE second stage steam supply shift per ppm 3.1.2 (Startup Flowchart) step Q34.
- Next in-sequence rod is from Group 35, Step 08 (rod 06-39).
- Continue RPV pressure rise to 600 psig at 6 psig/minute when Bypass Valves are approximately 30% open.

U1

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION SRO	Scenario 1 ATC	Scenario 1 BOP	Scenario 2 CREW POSITION SRO	Scenario 2 ATC	Scenario 2 BOP	Scenario 3 CREW POSITION SRO	Scenario 3 ATC	Scenario 3 BOP	Scenario 4 CREW POSITION SRO	Scenario 4 ATC	Scenario 4 BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO ☐ SRO-I ☐ SRO-U ☒	RX	5												**1**	1	1	0
	NOR													**0**	1	1	1
	I/C	1,2,4, 5,7						2,3,4						**8**	4	4	2
	MAJ	6						5,6						**3**	2	2	1
	TS	1,3						1,2,3						**5**	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

I1

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenarios 1			Scenarios 2			Scenarios 3			Scenarios 4			TOTAL	MINIMUM(*)		
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX	5				1								**2**	1	1	0
	NOR													**0**	1	1	1
	I/C	1,2,4,5,7				2,4,8		2,3,4						**11**	4	4	2
	MAJ	6				6		5,6						**4**	2	2	1
	TS	1,3						1,2,3						**5**	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

I2

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenarios 1 SRO	1 ATC	1 BOP	2 SRO	2 ATC	2 BOP	3 SRO	3 ATC	3 BOP	4 SRO	4 ATC	4 BOP	TOTAL	MINIMUM(*) R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX													0	1	1	0
	NOR													0	1	1	1
	I/C			1,5,8	3,4				2,4					7	4	4	2
	MAJ			6	6				5,6					4	2	2	1
	TS				3,4									2	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

I3

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 SRO	Scenario 1 ATC	Scenario 1 BOP	Scenario 2 SRO	Scenario 2 ATC	Scenario 2 BOP	Scenario 3 SRO	Scenario 3 ATC	Scenario 3 BOP	Scenario 4 SRO	Scenario 4 ATC	Scenario 4 BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO ☐ SRO-I ☒ SRO-U ☐	RX	5				1								2	1	1	0
	NOR													0	1	1	1
	I/C	1,2,4, 5,7				2,4,8		2,3,4						11	4	4	2
	MAJ	6				6		5,6						4	2	2	1
	TS	1,3						1,2,3						5	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

I4

Facility: Columbia Generating Station		Date of Exam: 2/27/2017						Operating Test No.: 1									
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2			3			4						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX													0	1	1	0
	NOR													0	1	1	1
	I/C			1,5,8	3,4				2,4					7	4	4	2
	MAJ			6	6				5,6					4	2	2	1
	TS				3,4									2	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

I5

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION SRO	ATC	BOP	Scenario 2 CREW POSITION SRO	ATC	BOP	Scenario 3 CREW POSITION SRO	ATC	BOP	Scenario 4 CREW POSITION SRO	ATC	BOP	TOTAL	MINIMUM(*) R	I	U
RO ☐ SRO-I ☒ SRO-U ☐	RX		5											1	1	1	0
	NOR													0	1	1	1
	I/C		2,4,7		3,4									5	4	4	2
	MAJ		6		6									2	2	2	1
	TS				3,4									2	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																
RO ☐ SRO-I ☐ SRO-U ☐	RX																
	NOR																
	I/C																
	MAJ																
	TS																

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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

R1

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 SRO	Scenario 1 ATC	Scenario 1 BOP	Scenario 2 SRO	Scenario 2 ATC	Scenario 2 BOP	Scenario 3 SRO	Scenario 3 ATC	Scenario 3 BOP	Scenario 4 SRO	Scenario 4 ATC	Scenario 4 BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☒ SRO-I ☐ SRO-U ☐	RX		5											**1**	1	1	0
	NOR						1			1				**2**	1	1	1
	I/C		2,4,7				3,5,9			3,7				**8**	4	4	2
	MAJ		6				6			5,6				**4**	2	2	1
	TS													**0**	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

R2

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenarios 1 CREW POSITION SRO	1 ATC	1 BOP	2 CREW POSITION SRO	2 ATC	2 BOP	3 CREW POSITION SRO	3 ATC	3 BOP	4 CREW POSITION SRO	4 ATC	4 BOP	TOTAL	MINIMUM(*) R	I	U
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☒ SRO-I ☐ SRO-U ☐	RX		5											**1**	1	1	0
	NOR						1			1				**2**	1	1	1
	I/C		2,4,7				3,5,9			3,7				**8**	4	4	2
	MAJ		6				6			5,6				**4**	2	2	1
	TS													**0**	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

R3

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 SRO	Scenario 1 ATC	Scenario 1 BOP	Scenario 2 SRO	Scenario 2 ATC	Scenario 2 BOP	Scenario 3 SRO	Scenario 3 ATC	Scenario 3 BOP	Scenario 4 SRO	Scenario 4 ATC	Scenario 4 BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO ☐	RX														1	1	0
SRO-I ☐	NOR														1	1	1
SRO-U ☐	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☒	RX					1								**1**	1	1	0
SRO-I ☐	NOR									1				**1**	1	1	1
SRO-U ☐	I/C			1,5,8		2,4,8				3,7				**8**	4	4	2
	MAJ			6		6				5,6				**4**	2	2	1
	TS													**0**	0	2	2
RO ☐	RX														1	1	0
SRO-I ☐	NOR														1	1	1
SRO-U ☐	I/C														4	4	2
	MAJ														2	2	1
	TS														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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

R4

Facility: Columbia Generating Station Date of Exam: 2/27/2017 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION SRO	Scenario 1 CREW POSITION ATC	Scenario 1 CREW POSITION BOP	Scenario 2 CREW POSITION SRO	Scenario 2 CREW POSITION ATC	Scenario 2 CREW POSITION BOP	Scenario 3 CREW POSITION SRO	Scenario 3 CREW POSITION ATC	Scenario 3 CREW POSITION BOP	Scenario 4 CREW POSITION SRO	Scenario 4 CREW POSITION ATC	Scenario 4 CREW POSITION BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														0	2	2
RO ☒ SRO-I ☐ SRO-U ☐	RX													0	1	1	0
	NOR						1							1	1	1	1
	I/C						3,5,9		2,4					5	4	4	2
	MAJ						6		5,6					3	2	2	1
	TS													0	0	2	2
RO ☐ SRO-I ☐ SRO-U ☐	RX														1	1	0
	NOR														1	1	1
	I/C														4	4	2
	MAJ														2	2	1
	TS														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 (SRO-I) 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 SRO-I *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 one-for-one 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.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

U-1 Competencies	RO ☐ SRO-I ☐ SRO-U ☒				RO ☐ SRO-I ☐ SRO-U ☒				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	6,9						5,6,8									
Comply With and Use Procedures (1)	5, 6,9						4,8									
Operate Control Boards (2)																
Communicate and Interact	5,6,9						6,8									
Demonstrate Supervisory Ability (3)	6,9						4,5,8									
Comply With and Use Tech. Specs. (3)	1,3						1,2,3									

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

I1																
	RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
Competencies	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	6,9					2,4					5,6,8					
Comply With and Use Procedures (1)	5,6,9					4,6					4,8					
Operate Control Boards (2)						2,6,8										
Communicate and Interact	5,6,9					4,6					6,8					
Demonstrate Supervisory Ability (3)	6,9										4,5,8					
Comply With and Use Tech. Specs. (3)	1,3										1,2,3					

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

I2 Competencies	RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	1,5, 8					3,4					2,4					
Comply With and Use Procedures (1)	5,6					4,6					2,5					
Operate Control Boards (2)	1,5 8										2,4, 5					
Communicate and Interact	1,5, 6					3,4, 6					2,4, 5					
Demonstrate Supervisory Ability (3)						3,4, 6										
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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

I3 Competencies	RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	6,9					2,4					5,6, 8					
Comply With and Use Procedures (1)	5, 6,9					4,6					4,8					
Operate Control Boards (2)						2,6, 8										
Communicate and Interact	5,6, 9					4,6					6,8					
Demonstrate Supervisory Ability (3)	6,9										4,5, 8					
Comply With and Use Tech. Specs. (3)	1,3										1,2, 3					

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

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I4 Competencies	RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	1,5, 8					3,4					2,4					
Comply With and Use Procedures (1)	5,6					4,6					2,5					
Operate Control Boards (2)	1,5 8										2,4, 5					
Communicate and Interact	1,5, 6					3,4, 6					2,4, 5					
Demonstrate Supervisory Ability (3)						3,4, 6										
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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

I5 Competencies	RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☒ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	4,7					3,4										
Comply With and Use Procedures (1)	2,6					4,6										
Operate Control Boards (2)	2,4, 6															
Communicate and Interact	2,6, 7					3,4, 6										
Demonstrate Supervisory Ability (3)						3,4, 6										
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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

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R1	RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
Competencies	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	4,7					3,5					1,3,4					
Comply With and Use Procedures (1)	5,6					1,3,9					1,3,4					
Operate Control Boards (2)	2,4,6					1,3,5,9					1,3,7,8					
Communicate and Interact	2,6,7					3,5					3,4,8					
Demonstrate Supervisory Ability (3)																
Comply With and Use Tech. Specs. (3)																

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

R2 Competencies	RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	4,7					3,5					1,3,4					
Comply With and Use Procedures (1)	5,6					1,3,9					1,3,4					
Operate Control Boards (2)	2,4,6					1,3,5,9					1,3,7,8					
Communicate and Interact	2,6,7					3,5					3,4,8					
Demonstrate Supervisory Ability (3)																
Comply With and Use Tech. Specs. (3)																

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

R3 Competencies	RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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	1,5, 8					2,4					1,3, 4					
Comply With and Use Procedures (1)	5,6					4,6					1,3, 4					
Operate Control Boards (2)	1,5 8					2,6, 8					1,3, 7,8					
Communicate and Interact	1,5, 6					4,6					3,4, 8					
Demonstrate Supervisory Ability (3)																
Comply With and Use Tech. Specs. (3)																

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)

Facility: Columbia Gen. Sta. Date of Examination: 2/27/2017 Operating Test No.: 1

R4 Competencies	RO ☒ SRO-I ☐ SRO-U ☐				RO ☒ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	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		3,5					2,4									
Comply With and Use Procedures (1)		1,3, 9					2,5									
Operate Control Boards (2)		1,3, 5,9					2,4,5									
Communicate and Interact		3,5					2,4,5									
Demonstrate Supervisory Ability (3)																
Comply With and Use Tech. Specs. (3)																

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. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.)