ENERGY NORTHWEST

ILC-25 A-1 (RO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM A-1 (RO)

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE		Rev. No.	
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Kyle Christianson / Dave Crawford DATE: 11/30/22

REVISED BY: DATE:

TECHNICAL REVIEW BY: DATE:

INSTRUCTIONAL REVIEW BY: DATE:

APPROVED BY: DATE:

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines that the Core Thermal Power Validation is satisfactory by properly calculating CTP_{TFSP} to be between 85.7% and 85.9% (≥ 85.7% and ≤ 85.9%) and determining that $CTP_{CALC} – CTP_{TFSP}$ is ≤ 4%.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 20 Minutes

Task Applicability: **RO** ☑ SRO ☐

Task Number and Title: RO-1616 Perform Functions Necessary for the Management and Control of Plant Systems and Equipment.

K/A Importance Factors: **RO:** 4.4 **SRO:** 4.7

K/A Number: 2.1.7

K/A Statement: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.1 – Conduct of Operations

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (<u>when directed by the JPM</u>):
    - Student JPM Information Sheet **(Page 11)**
    - Student JPM Answer Sheet **(Page 12)**
    - PPM 9.3.1 **(JPM A-1 ILC-25 Ref 1.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:

- Calculator
- Clear ruler
- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 9.3.1	017	N/A

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

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):

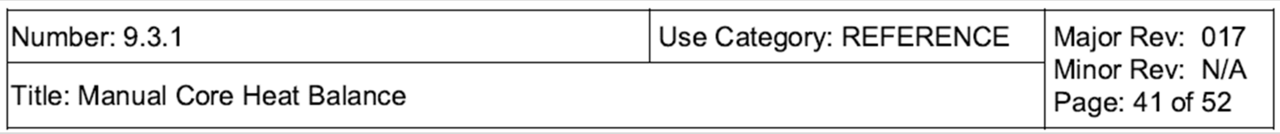
CTP_{CALC} = 87.6%	Line 27 (Percent Core Thermal Power) of Att. 7.2.
T017 = 559.2 psig	Line 13b (Turbine First Stage Pressure) of Att. 7.1.
B041 = 12.9 Mlb/hr	Line 14b (Reactor Steam Flow) of Att. 7.1.

Initiating Cue:

- You have been directed to perform PPM 9.3.1 Attachment 7.4 (Alternate Power Calculation Worksheet), to validate the calculation.
- Annotate on the Student JPM Answer Sheet whether the Core Thermal Power (CTP) validation was satisfactory (or NOT) and provide justification for your answer based on your calculation results).
- Return Student JPM Answer Sheet to examiner when complete.

START TIME:___________

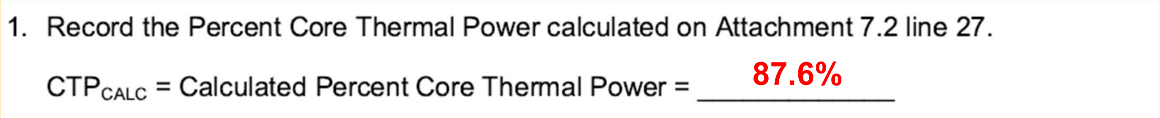
Examiner Note:	**Provide candidate with the following:** • **Student JPM Information Sheet** • **Student JPM Answer Sheet** • **Student Reference #1 (marked-up pages of PPM 9.3.1)**



Number: 9.3.1	Use Category: REFERENCE	Major Rev: 017 Minor Rev: N/A Page: 41 of 52
Title: Manual Core Heat Balance		

STEP / STANDARD	SAT / UNSAT
Examiner Note: **Even though the information below is provided in initial conditions, this has been classified as a critical step. A transposition error could result in the inability to successfully complete procedure.**	

Step 1:



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

CTP$_{CALC}$ = Calculated Percent Core Thermal Power = 87.6%

Standard:

- Record CTP$_{CALC}$ = **87.6%** from initial conditions provided.

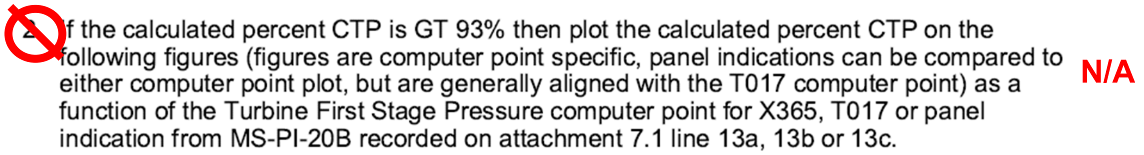
CRITICAL STEP

___SAT

___UNSAT

___N/A

Step 2:



🛇 2. If the calculated percent CTP is GT 93% then plot the calculated percent CTP on the following figures (figures are computer point specific, panel indications can be compared to either computer point plot, but are generally aligned with the T017 computer point) as a function of the Turbine First Stage Pressure computer point for X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c. N/A

Standard:

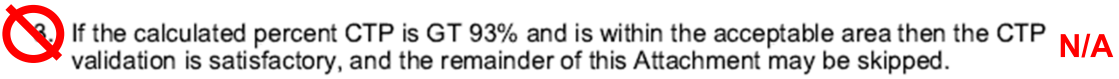
- Recognizes that CTP is LT 93% and does not perform this step.
- May mark N/A next to the step (There is not a signature block) or circle slash the step and move on to step 3.

___SAT

___UNSAT

___N/A

Step 3:



🛇 3. If the calculated percent CTP is GT 93% and is within the acceptable area then the CTP validation is satisfactory, and the remainder of this Attachment may be skipped. N/A

Standard:

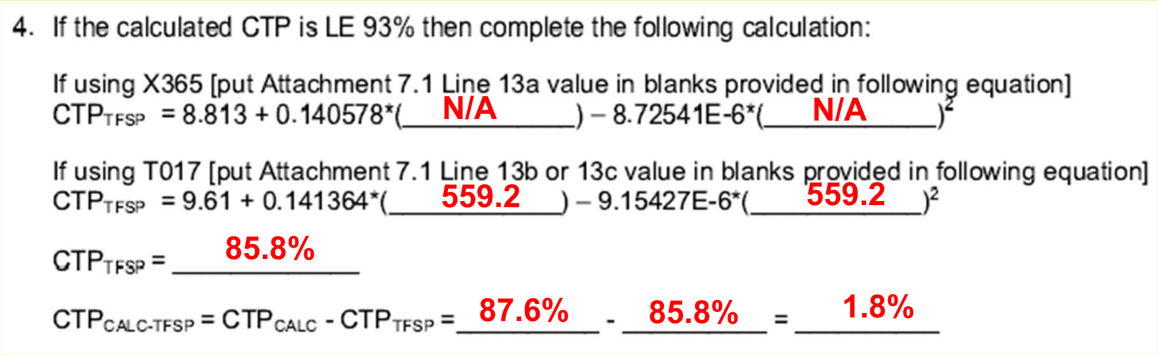
- Recognizes that CTP is LT 93% and does not perform this step.
- May mark N/A next to the step (There is not a signature block) or circle slash the step and move on to step 4.

___SAT

___UNSAT

___N/A

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>
Step 4:



4. If the calculated CTP is LE 93% then complete the following calculation:

If using X365 [put Attachment 7.1 Line 13a value in blanks provided in following equation]
$CTP_{TFSP} = 8.813 + 0.140578*(\underline{\text{N/A}}) - 8.72541E\text{-}6*(\underline{\text{N/A}})^2$

If using T017 [put Attachment 7.1 Line 13b or 13c value in blanks provided in following equation]
$CTP_{TFSP} = 9.61 + 0.141364*(\underline{559.2}) - 9.15427E\text{-}6*(\underline{559.2})^2$

$CTP_{TFSP} = \underline{85.8\%}$

$CTP_{CALC\text{-}TFSP} = CTP_{CALC} - CTP_{TFSP} = \underline{87.6\%} - \underline{85.8\%} = \underline{1.8\%}$

Standard:

- **(Non-critical)** Recognizes that we are **NOT** using X365 – Inserts N/A for the spaces associated with using X365.
- Recognizes that we are using T017 – Inserts **559.2** for the spaces associated with using T017:

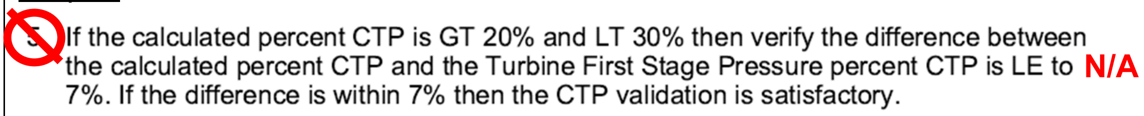
$$CTP_{TFSP} = 9.61 + (0.141364)(559.2) - 9.15427E\text{-}6\,(559.2)^2$$
$$CTP_{TFSP} = 9.61 + (0.141364)(559.2) - (0.00000915427)(312704.64)$$
$$CTP_{TFSP} = 9.61 + 79.05 - 2.86$$
$$CTP_{TFSP} = 88.66 - 2.86$$
$$CTP_{TFSP} = 85.8$$

- Determines that: **CTP_{CALC} (87.6%) – CTP_{TFSP} (85.8%) = 1.8%.**
</td><td>
CRITICAL STEP

___SAT

___UNSAT

___N/A
</td></tr>
<tr><td>
Step 5:



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

Standard:

- Recognizes that CTP is GT 30% and does not perform this step.
- May mark N/A next to the step (there is not a signature block) or circle slash the step and move on to step 6.
</td><td>
___SAT

___UNSAT

___N/A
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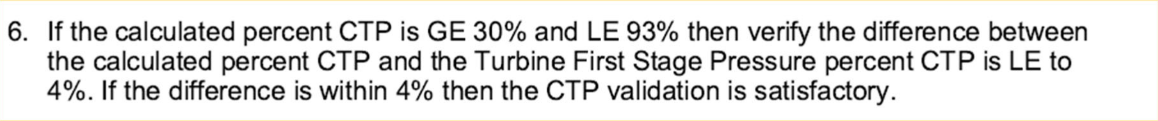
<tr><td>
Step 6:



6. If the calculated percent CTP is GE 30% and LE 93% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 4%. If the difference is within 4% then the CTP validation is satisfactory.

Standard:

- Determines from step 4 that the difference is **1.8%** which is within the acceptable range (**LE 4%**) and therefore the **CTP Validation is satisfactory**.
</td><td>
CRITICAL STEP

___SAT

___UNSAT

___N/A
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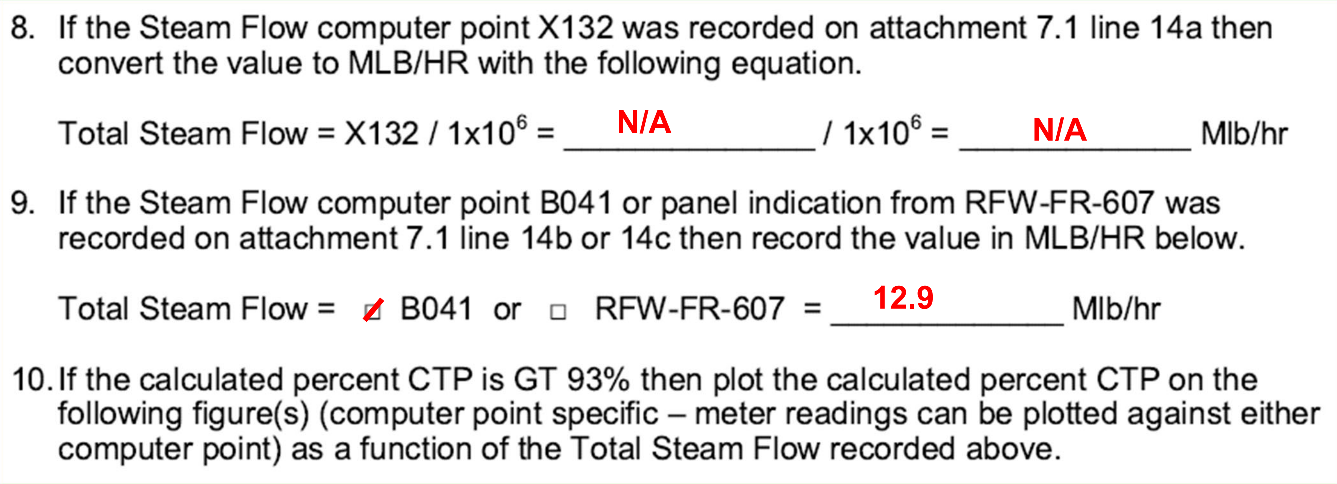
</table>

STEP / STANDARD	SAT / UNSAT
Step 7: 7. If the CTP validation based on the Turbine First Stage Pressure was satisfactory in the previous steps then the following steps related to Main Steam flow are not required and may be skipped. **N/A** Standard: • This step is not required due to previous step satisfactory, marks step N/A.	____SAT ____UNSAT ____N/A

Examiner Cue: **Candidate should turn in Student JPM Answer Sheet at this point of the JPM if all calculations were made correctly. The steps listed below are for Examiner reference if the candidate continued beyond step 7.**

EXAMINER REFERENCE: If candidate proceeds beyond step 7



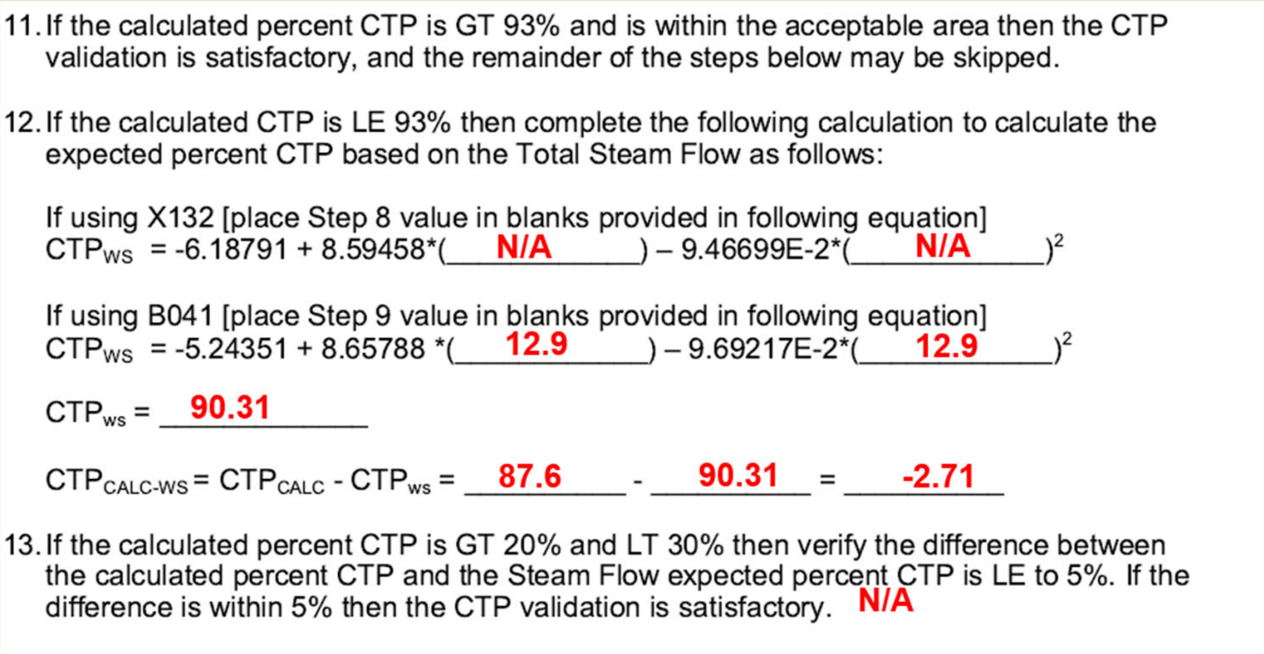
8. If the Steam Flow computer point X132 was recorded on attachment 7.1 line 14a then convert the value to MLB/HR with the following equation.

Total Steam Flow = X132 / 1×10^6 = N/A / 1×10^6 = N/A 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.

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

10. If the calculated percent CTP is GT 93% then plot the calculated percent CTP on the following figure(s) (computer point specific – meter readings can be plotted against either computer point) as a function of the Total Steam Flow recorded above.



11. If the calculated percent CTP is GT 93% and is within the acceptable area then the CTP validation is satisfactory, and the remainder of the steps below may be skipped.

12. If the calculated CTP is LE 93% then complete the following calculation to calculate the expected percent CTP based on the Total Steam Flow as follows:

If using X132 [place Step 8 value in blanks provided in following equation]
CTP_{WS} = -6.18791 + 8.59458*(N/A) – 9.46699E-2*(N/A $)^2$

If using B041 [place Step 9 value in blanks provided in following equation]
CTP_{WS} = -5.24351 + 8.65788 *(12.9) – 9.69217E-2*(12.9 $)^2$

CTP_{ws} = 90.31

$CTP_{CALC-WS} = CTP_{CALC} - CTP_{ws}$ = 87.6 - 90.31 = -2.71

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

STEP / STANDARD	SAT / UNSAT

EXAMINER REFERENCE: If candidate proceeds beyond step 7

14. If the calculated percent CTP is GE 30% and LE 93% 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. **TRUE**

> <u>NOTE</u>: 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. **Only expected to look at this step if calculations were performed incorrectly**
    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. {AR-7.1}
Only expected to look at this step is calculations were performed incorrectly

Examiner Cue: **Inform the candidate that the JPM is complete.**

STOP TIME: ___________

JPM ANSWER KEY
(COMPLETED)

CTP validation [✓ **is**] / **is NOT** (circle one choice) satisfactory.

Justification: (**and applicable calculation results that lead to justification**)

Words to the effect: CTP from Turbine First Stage Pressure (TFSP) Was calculated to be 85.8%. When subtracted from the calculated CTP (87.6%), the result was 1.8%. This value is LE 4% which Validates the CTP calculation.

RESULTS OF JPM ILC-25 JPM A-1 (RO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Determines that the Core Thermal Power Validation is satisfactory by properly calculating CTP_{TFSP} to be between 85.7% and 85.9% (≥ 85.7% and ≤ 85.9%) and determining that CTP_{CALC} – CTP_{TFSP} is ≤ 4%.**

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

COMMENTS:

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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

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%	Line 27 (Percent Core Thermal Power) of Att. 7.2.
T017 = 559.2 psig	Line 13b (Turbine First Stage Pressure) of Att. 7.1.
B041 = 12.9 Mlb/hr	Line 14b (Reactor Steam Flow) of Att. 7.1.

Initiating Cue:

- You have been directed to perform PPM 9.3.1 Attachment 7.4 (Alternate Power Calculation Worksheet), to validate the calculation.
- Annotate on the Student JPM Answer Sheet whether the Core Thermal Power (CTP) validation was satisfactory (or NOT) and provide justification for your answer based on your calculation results).
- Return Student JPM Answer Sheet to examiner when complete.

STUDENT JPM ANSWER SHEET

CTP validation **is / is NOT** (circle one choice) satisfactory.

Justification: (**<u>and applicable calculation results that lead to justification</u>**)

Verify Revision Information Prior To Use	Initials	GS
	Date	Today

Number: 9.3.1	Use Category: REFERENCE	Major Rev: 017 Minor Rev: N/A Page: 1 of 52
Title: Manual Core Heat Balance		

PLANT PROCEDURES MANUAL	PCN#: N/A
9.3.1	Effective Date: 08/05/21

GS – Gojira Shi

DESCRIPTION OF CHANGES

Justification (required)
Include the basis and current configuration of upper, lower, and default values for heat balance and core monitoring system software inputs.

Page(s)	**Description (including summary, reason, initiating document, if applicable)**
3, 18, 19, 50, 51	Include the basis and current configuration of upper, lower, and default values for heat balance and core monitoring system software inputs. These limits are added to document the basis behind the current limits for consideration in future changes that may be desired as a result of modifications made to the heat balance or core monitoring system inputs. (AR 392740-14-01).
17	Add a documentation section as required by SWP-PRO-03.

1.0 PURPOSE

This procedure provides a method to compute the Core Thermal Power (CTP) based on specified plant parameters. This procedure can be used for the following:

- Using current plant data to calculate the current CTP.
- Using plant data to confirm the results calculated by the Plant Process Computers (PPCV or TDASV) or the Core Monitoring Computers.
- As a backup CTP calculation when either the Plant Process Computer System or Core Monitoring Computers are not calculating the CTP or the calculation is degraded.
- This procedure can be used with past plant data to calculate the CTP during past operation.
- This procedure can be used with projected plant data to evaluate the effects on CTP during potential future operating conditions.
- This procedure also provides information to support evaluating the acceptability of the input parameters based on previous normal and off-normal operation.
- Document the upper, lower, and default values used by the plant process computer and ACUMEN software for calculation of the heat balance and core monitoring inputs (Attachment 7.6).

2.0 DISCUSSION

The Heat Balance is a process of defining a control boundary around the reactor vessel and subtracting all of the energy flowing inward through the boundary from all of the energy exiting outward from the boundary. The net difference is the power produced within the boundary which is defined as the Core Thermal Power. (See Attachment 7.3 for a graphical representation of this boundary and the heat crossing it.)
The Heat Balance Equation is as follows:

CTP = QFW + QCR + QCU + QRAD – QPUMP

Where: CTP = Core Thermal Power in Megawatts (MW).
QFW = Q_{FW} =Net energy of the Feed Water System (MW).
QCR = Q_{CR} =Net energy of the Control Rod Drive System (MW).
QCU = Q_{CU} =Net energy of the Reactor Water Cleanup System (MW).
QRAD = Q_{RAD} =Net energy of radiative sources (MW).
QPUMP = Q_{PUMP} =Net energy of the Reactor Recirculation Pumps (MW).

The parameter with the most significant impact on the heat balance is the net energy from the Feed Water system (QFW). The Feed Water Flow measurement accounts for more than 99.5% of the calculated CTP at normal full power conditions. Therefore, it is desired to have the most accurate available data source when determining the Feed Water Flow. The next most important parameters are the Feed Water Temperature and the Reactor Pressure.

Both the Process Computer and the Core Monitoring Computer can use a selection of Primary and Secondary plant instruments for the Core Thermal Power calculation. The plant instrument data can be obtained from different sources, such as Process Computer Points, TDAS Computer Points, Leading Edge Flow Meter and from the Fieldbus Interface Module (FIM) receiver. The selection of which specific plant instruments are being used in the Process Computer Heat Balance calculation is controlled from the Process Computer N4 “Heat Balance & APRM Calibration” menu. Different computer points have different calibration accuracy, signal filtering and drift performance. As a result the calculated Core Thermal Power will be slightly different when using a different selection of plant instruments than those being used by the Process Computer for its Heat Balance calculation. On the N4 menu the Primary points are preferred because they are the most accurate and stable. Use of the Secondary points is acceptable when the Primary points are inoperable, are being calibrated, are degraded or as directed by the CRS based on plant conditions.

The order of preference for which plant data source to utilize is denoted in Attachment 7.1, however the user should also consider the impact of instrument operability and accuracy during the selection of each data point. The procedure provides guidance for the inclusion of conservatism to be added to the Manual CTP Calculation based on the source data to account for allowed instrument calibration accuracy.

{OE-7.15}

If the Process Computer (PPCV or TDASV) and/or the Core Monitoring Computer are not calculating Reactor Power, but they are still collecting plant data, the desired Heat Balance data can be obtained from the Process Computer and/or the Core Monitoring Computer. Data may also be obtained from the Plant Display and Information System (PDIS). If the Process Computer and the Core Monitoring Computers are inoperative, Heat Balance data can be collected from field and Plant Panel Instrumentation. The data collected from all sources will be entered into Attachment 7.1 of this procedure and used to calculate the Core Thermal Power. The Core Thermal Power can be calculated using the PC based PPM 9.3.1 Heat Balance Spread Sheet (if available) or manually using Attachment 7.2.

The equations and steam tables in Attachment 7.2 will yield results that are within 0.1% of the results calculated by the Plant Process Computer when using the exact same input data. If different input data is used the calculated Core Thermal Power will not exactly match the Process Computer results but should normally be within 1%. This is due to the different calibration accuracy of the different data sources. The computer points are normally more accurate than the panel meter readings. For this reason it is normal and is acceptable to calculate a slightly different Core Thermal Power when using alternate data sources.

3.0 PREREQUISITES

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The steam table approximations used in the Process Computer and in this procedure are not valid for a Reactor Pressures less than 800 psia or greater than 1100 psia. The steam table approximations used in the Process Computer and in this procedure are based on a fitting of the 1967 ASME steam tables and are within 0.15% of the latest International Association for the Properties of Water and Steam formulation IAPWS-IF97 recommended for the steam power industry use. Do not use this procedure for Reactor Steam Dome Pressures less than 800 psia or greater than 1100 psia. {AR-7.1}

4.2 The analog plant Feed Water Flow Dp measurement instrumentation is not accurate for low power conditions, less than approximately 10% CTP. Do not use the analog feedwater flow points for performance of this procedure for Reactor CTP calculations when less than 10% of rated. {AR-7.1}

4.3 The Turbine First Stage Pressure alternate power correlation is only valid when bypass valves are closed. The acceptance criteria for the alternate power correlations are as follows:

Alternate CTP based on	Acceptance Criteria (based on CTP range)		
	GE 20% - LT 30%	GE 30% - LE 93%	GT 93%
Turbine First Stage Pressure	± 7%	± 4%	± 2%
Reactor Steam Flow	± 5%	± 4%	± 2%

4.4 If both alternate power calculations are not within their given tolerances, the discrepancy should be investigated. Plant operation should be conservatively restricted until the discrepancies are resolved and at least one alternate power calculation is within its tolerance band.

4.5 If both alternate power calculations are outside their tolerances and indicate above 100% CTP, the Core Thermal Power should be reduced to a conservative level until at least one alternate power calculation is within its tolerance band, except as stated below for reduced Feed Water temperature operation.

4.6 Operation with a #5 or #6 Feed water heater isolated or bypassed will impact the alternate power calculations. Since this is an expected condition a CTP reduction is not required when operating with a reduced Feed Water temperature.

4.7 Bi-stable Core Flow causes normal fluctuations in the CTP of approximately 0.5% at full power conditions. This is a normal condition due to the design of the Recirculation system piping. The power fluctuations are not under the direct control or the operators. This condition was evaluated in the NRC SER for Adhering to the Licensed Thermal Power Limit (ML082690105). Per the SER the fluctuations due to Bi-stable and Feed Pump Hunting can be averaged out to calculate the average CTP for use in ensuring compliance with the Licensed Thermal Power Limit. The Process Computer normally uses an average of 60 data points at 1 second intervals for each heat balance parameter for its CTP calculation. An average of up to 15 minutes may be used when required to smooth out the effects of Bi-stable and Feed Pump Hunting. {OE-7.16}

4.8 The Reactor Water Level is normally maintained relatively constant by the Feed Water control system. If the Reactor Water Level variation is greater than ± 2" (e.g. due to feed pump hunting) then the data collection period can be extended up to 15 minutes as necessary to average out the Feed Water flow variation.

4.9 Reactor Water Cleanup (RWCU) flow normally is returned to the reactor vessel through the feed water lines. If RWCU Blow down is in progress then additional energy will be lost to the condenser from the flow through RWCU-FCV-33. This procedure does not correctly model that energy removal. At rated conditions with a Blow down flow of approximately 100 gpm the power loss rate is approximately 5 MWt from the Blow down flow.

4.10 Plant instruments used for data collection are normally maintained within their calibration frequencies. If an instrument reading is suspect regarding a parameter, cross check the parameter with a backup or redundant instrument.

4.11 During the performance of instrumentation calibrations in accordance with plant procedures some computer points may be inoperable at different times due to the calibration process. The following table provides guidance on which procedures and parameters are affected with respect to the Process Computer Heat Balance calculation. During the performance of these procedures the indicated alternate parameter should be used in this procedure.

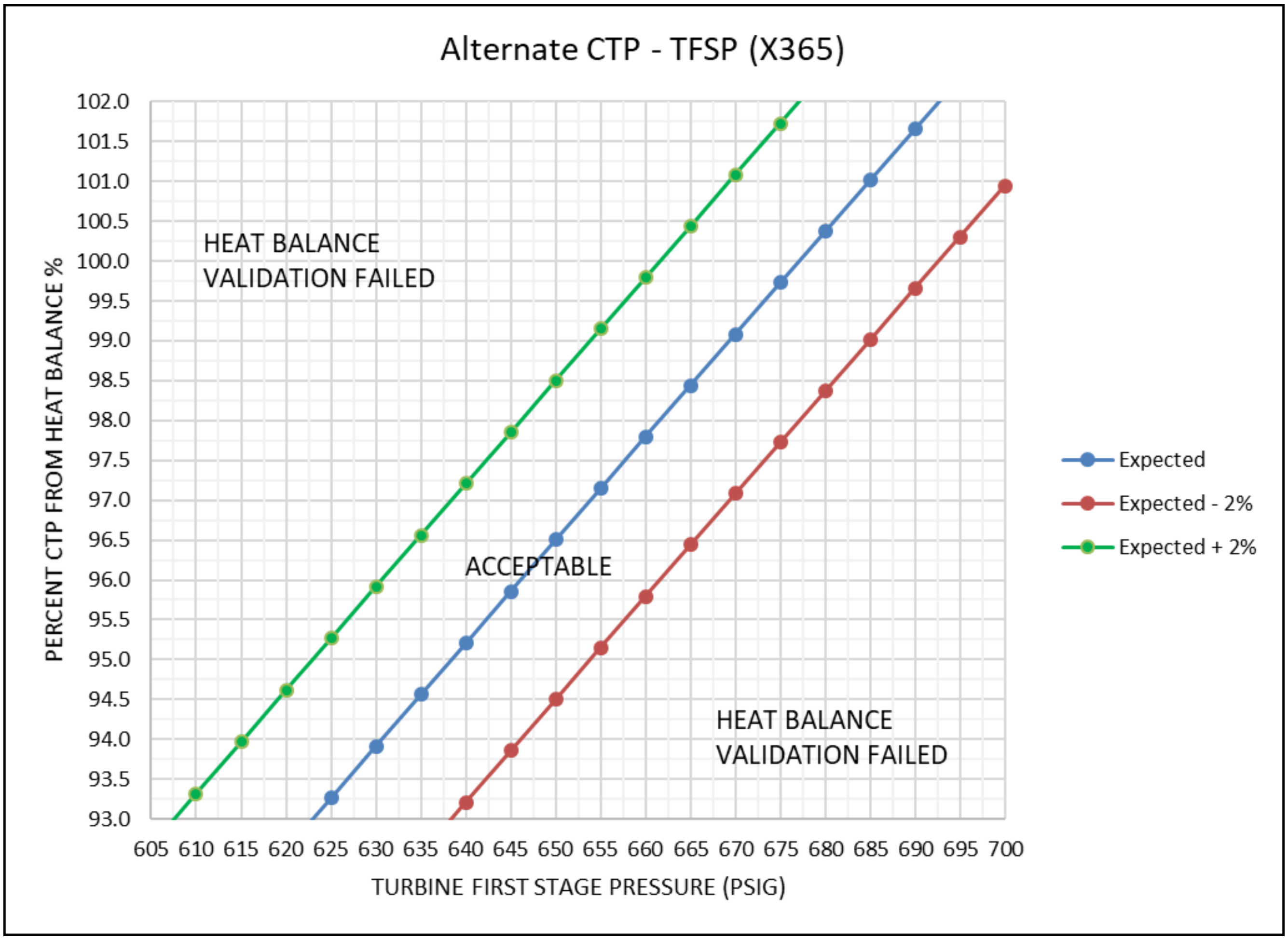
Procedure	Instrument being calibrated	Parameter Affected	Alternative Parameter to use
ICP-RFW-A301	RFW-FT-802A	MVB022, B022A, B022ACOR, B022ALEF, X149, B050, B051, RFW-FI-604A, RFW-FR-607	LEFM0206, B022DLEF, B022DCOR, B022D, F020
ICP-RFW-A302	RFW-FT-802B	MVB023, B023A, B023ACOR, B023ALEF, X135, B052, B053, RFW-FI-604B, RFW-FR-607	LEFM0222, B023DLEF B023DCOR, B023D, F020
ICP-RFW-A303	RFW-FT-803A	B022DP, B022D, B022DCOR, B022DLEF, B050, B051	LEFM0206, B022ALEF, B022ACOR, B022A, F020
ICP-RFW-A304	RFW-FT-803B	B023DP, B023D, B023DCOR, B023DLEF, B052, B053	LEFM0222, B023ALEF, B023ACOR, B023A, F020
ICP-RFW-B301	RFW-TT-603A RFW-TT-603B	B050, B052, B022ALEF, B022DLEF, B023ACOR, B023DCOR	LEFM0210, B051, F020, X149, X135, RFW-FI-604A, RFW-FI-604B
ICP-RFW-B302	RFW-TT-603C RFW-TT-603D	B051, B053, B022ALEF, B022DCOR, B023ALEF, B023DCOR	LEFM0226, B052, F020, X149, X135, RFW-FI-604A, RFW-FI-604B

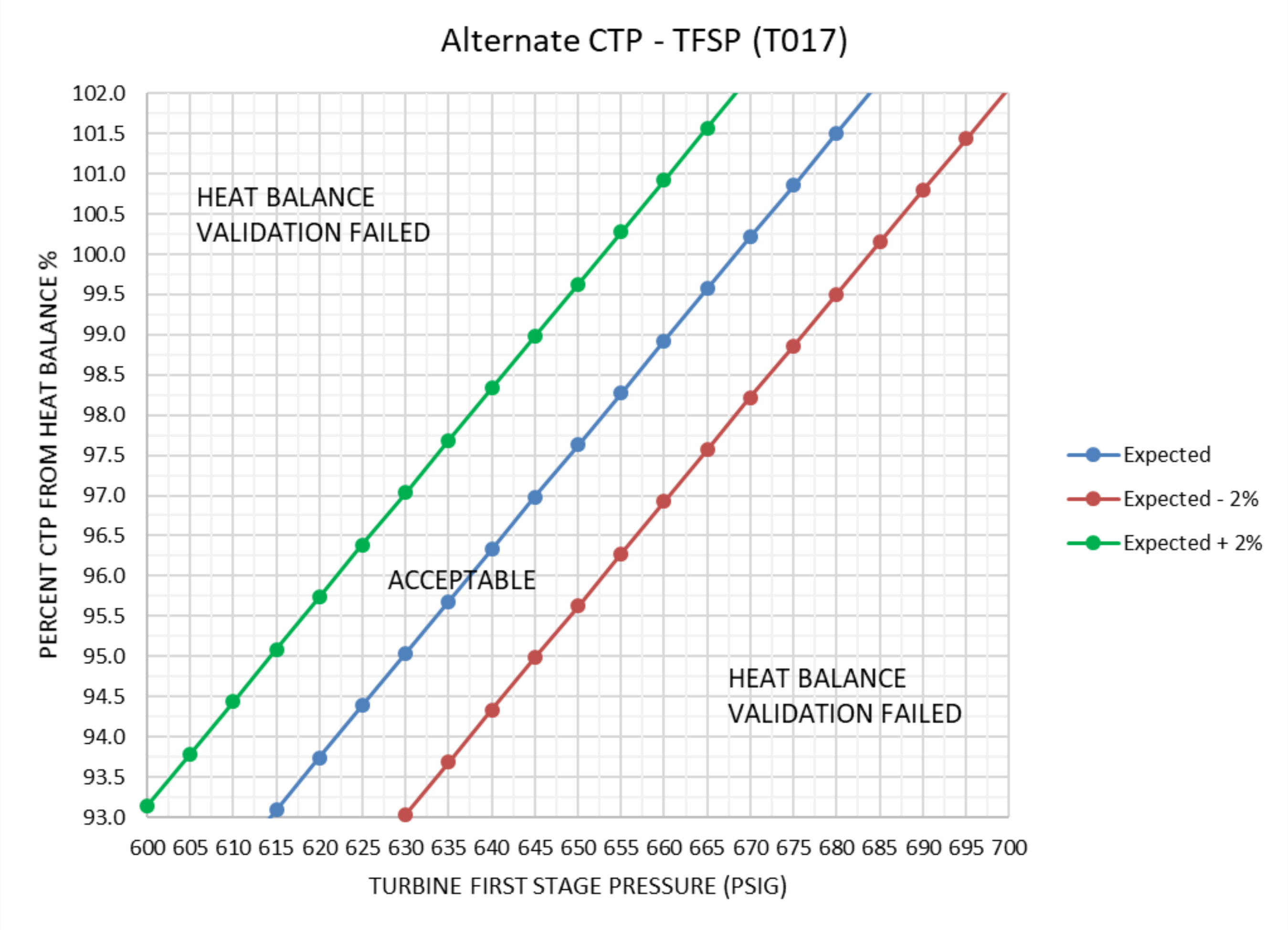
ALTERNATE POWER CALCULATION WORKSHEET

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

   CTP_{CALC} = Calculated Percent Core Thermal Power = ______________

2. If the calculated percent CTP is GT 93% then plot the calculated percent CTP on the following figures (figures are computer point specific, panel indications can be compared to either computer point plot, but are generally aligned with the T017 computer point) as a function of the Turbine First Stage Pressure computer point for X365, T017 or panel indication from MS-PI-20B recorded on attachment 7.1 line 13a, 13b or 13c.





3. If the calculated percent CTP is GT 93% and is within the acceptable area then the CTP validation is satisfactory, and the remainder of this Attachment may be skipped.

4. If the calculated CTP is LE 93% then complete the following calculation:

   If using X365 [put Attachment 7.1 Line 13a value in blanks provided in following equation]
   CTP_{TFSP} = 8.813 + 0.140578*(______________) – 8.72541E-6*(______________)^{2}

   If using T017 [put Attachment 7.1 Line 13b or 13c value in blanks provided in following equation]
   CTP_{TFSP} = 9.61 + 0.141364*(______________) – 9.15427E-6*(______________)^{2}

   CTP_{TFSP} = ______________

   $\text{CTP}_{\text{CALC-TFSP}}$ = CTP_{CALC} - CTP_{TFSP} =___________ - ___________ = ___________

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.

6. If the calculated percent CTP is GE 30% and LE 93% then verify the difference between the calculated percent CTP and the Turbine First Stage Pressure percent CTP is LE to 4%. If the difference is within 4% then the CTP validation is satisfactory.

7. If the CTP validation based on the Turbine First Stage Pressure was satisfactory in the previous steps then the following steps related to Main Steam flow are not required and may be skipped.

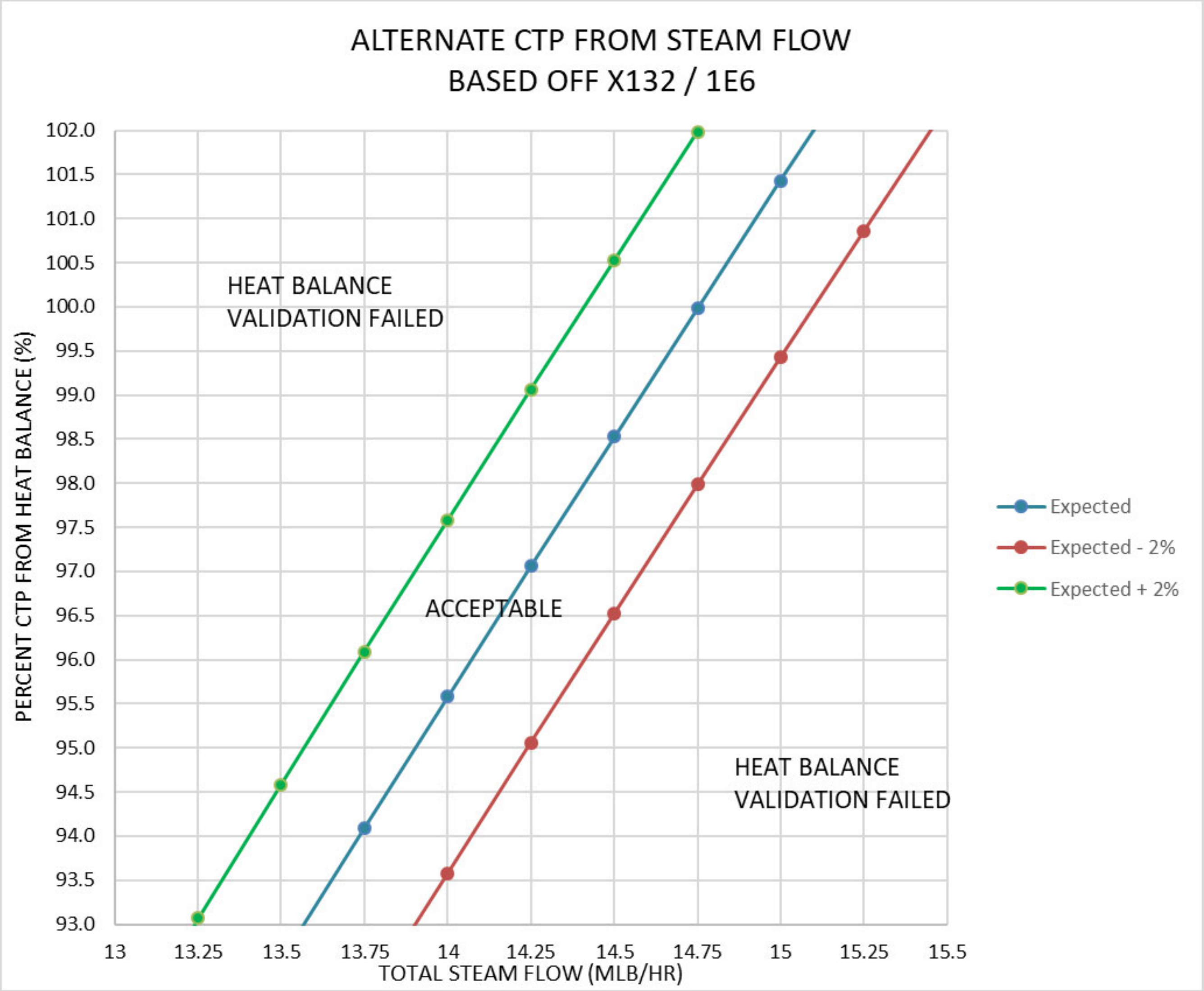
8. If the Steam Flow computer point X132 was recorded on attachment 7.1 line 14a then convert the value to MLB/HR with the following equation.

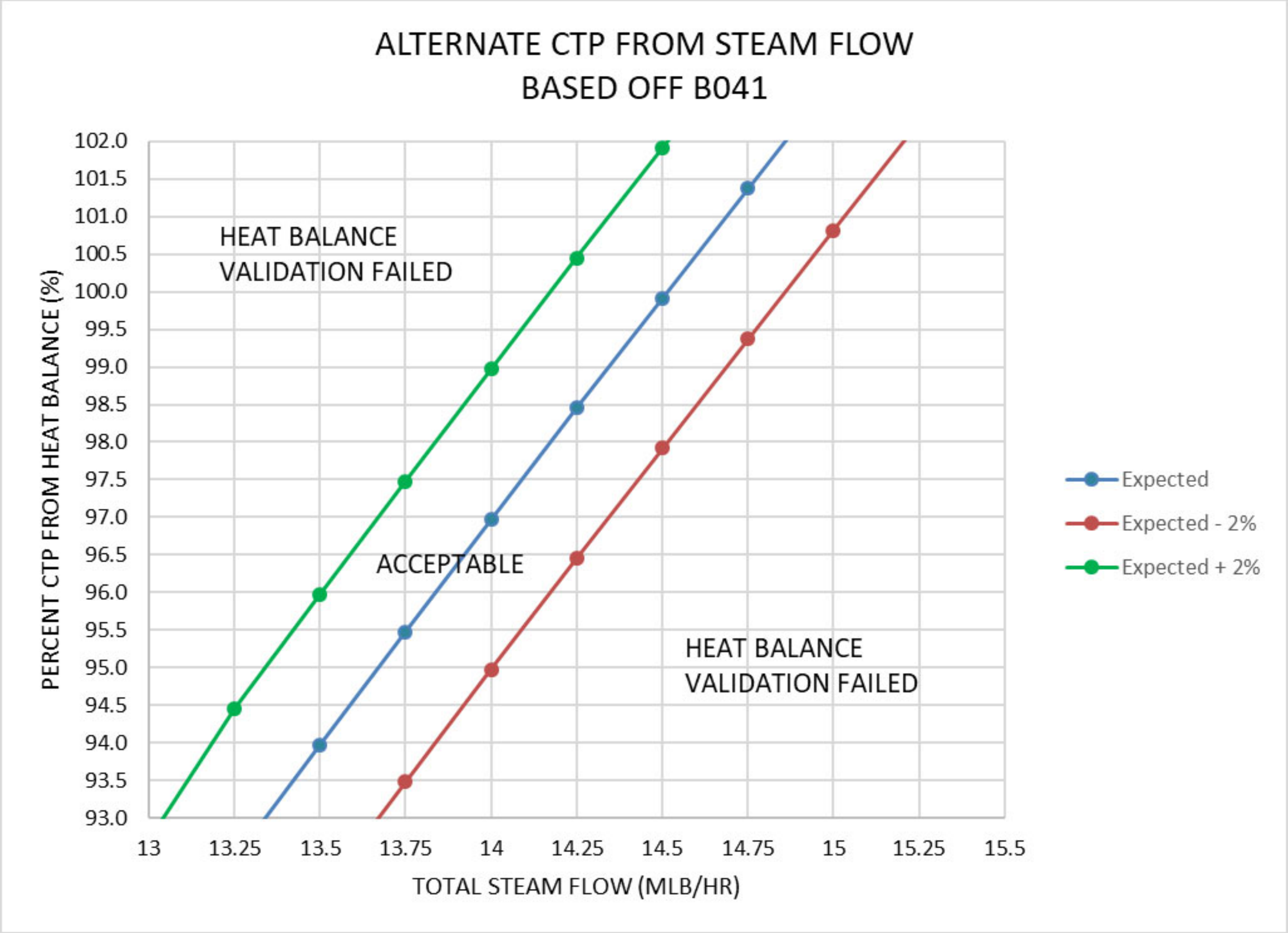
   Total Steam Flow = X132 / $1x10^6$ = _______________ / $1x10^6$ = ______________ Mlb/hr

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.

   Total Steam Flow = ☐ B041 or ☐ RFW-FR-607 = ______________ Mlb/hr

10. If the calculated percent CTP is GT 93% then plot the calculated percent CTP on the following figure(s) (computer point specific – meter readings can be plotted against either computer point) as a function of the Total Steam Flow recorded above.





11. If the calculated percent CTP is GT 93% and is within the acceptable area then the CTP validation is satisfactory, and the remainder of the steps below may be skipped.

12. If the calculated CTP is LE 93% then complete the following calculation to calculate the expected percent CTP based on the Total Steam Flow as follows:

    If using X132 [place Step 8 value in blanks provided in following equation]
    CTP_{WS} = -6.18791 + 8.59458*(_____________) – 9.46699E-2*(_____________)^2

    If using B041 [place Step 9 value in blanks provided in following equation]
    CTP_{WS} = -5.24351 + 8.65788 *(_____________) – 9.69217E-2*(_____________)^2

    CTP_{ws} = ______________

    $CTP_{CALC\text{-}WS}$ = CTP_{CALC} - CTP_{ws} = ___________ - ___________ = ___________

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.

14. If the calculated percent CTP is GE 30% and LE 93% 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.

> 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.

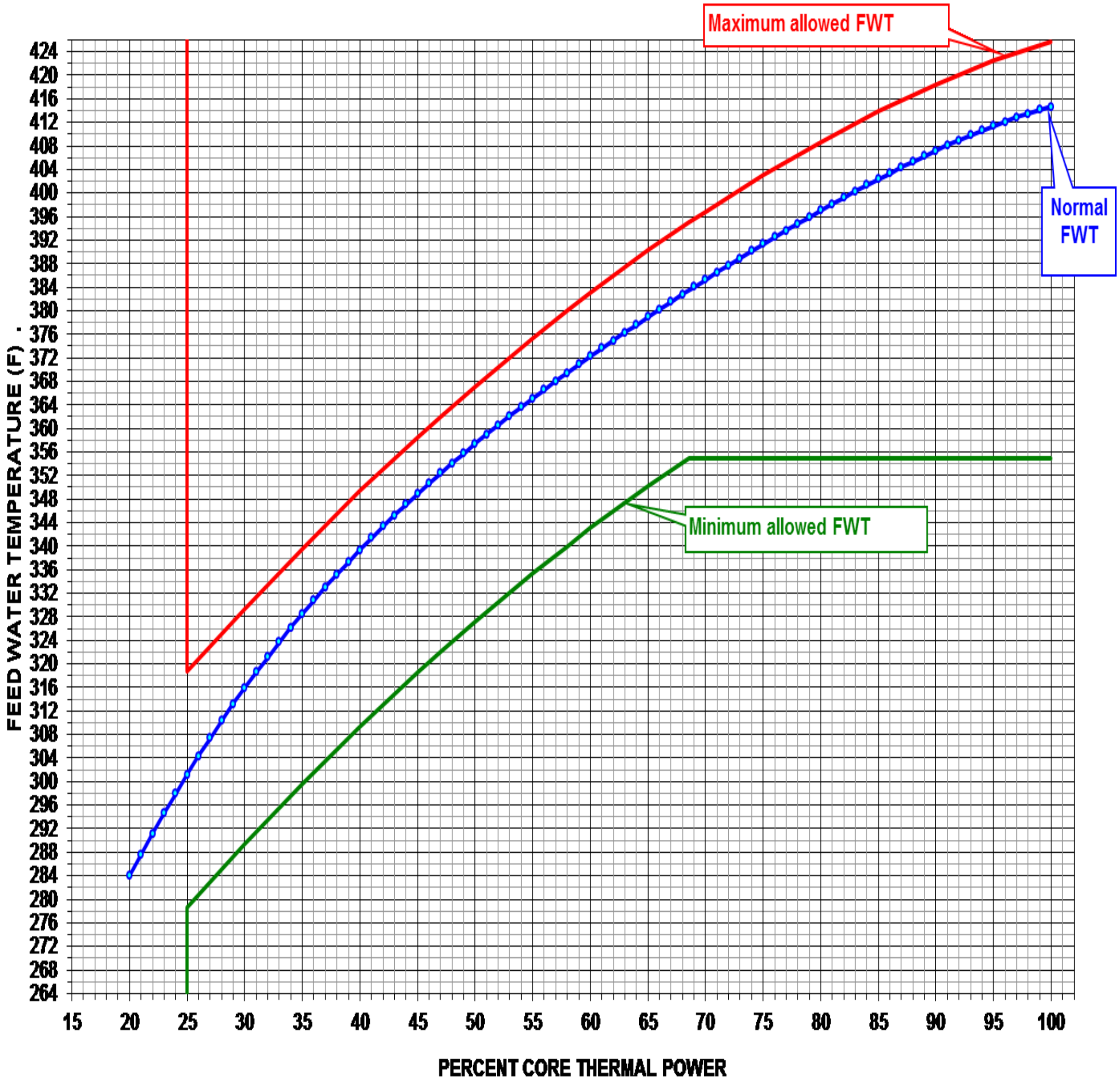
15. If the CTP validation based on the Turbine First Stage Pressure and Total Steam Flow are both NOT satisfactory then the discrepancy should be investigated to determine the cause.
    a. Review the calculations on Attachment 7.2 for potential math errors.
    b. Review the input data on Attachment 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. {AR-7.1}

Completed By (Name/Date): ________________________ / ____________

Verified By (Name/Date): ________________________ / ____________

The following figure shows the normal Feed Water Temperature based on past operation. The Alternate Power Calculations correlations for the Turbine First Stage Pressure and Total Steam Flow are based on operation following this normal Feed Water Temperature.



END

ENERGY NORTHWEST

ILC-25 A-2 (RO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM A-2 (RO)

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______
SIMULATOR GUIDE PQD CODE ______ Rev. No. ______
JPM PQD CODE ______ Rev. No. ______
EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Jeff Lux / Dave Crawford DATE: 11/30/22

REVISED BY: ______ DATE: ______

TECHNICAL REVIEW BY ______ ______

INSTRUCTIONAL REVIEW BY ______ ______

APPROVED BY ______ ______
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines the following (through graphing or calculation):**

- **10% Rated Load Steam Temperature Change:** **75°F - 90°F**
- **90% Rated Load Steam Temperature Change:** **275°F - 290°F**
- **MT First Stage Steam Temperature Change:** **185°F - 215°F**
- **Time Allowed to Change Load:** **2 hours, 10 min TO 3 hours, 10 min**
- **Load Rate of Change Required:** **0.42%/min to 0.62%/min**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☑ SRO ☐

Task Number and Title: RO-0325 Load the Main Turbine Generator (DEH Mode 4).

K/A Importance Factors: **RO:** 4.6 **SRO:** 4.6

K/A Number: 2.1.20

K/A Statement: Ability to interpret and execute procedure steps.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.1 – Conduct of Operations

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 10)**
    - Student JPM Answer Sheet **(Page 11)**
    - SOP-MT-START (Att. 6.1) **(JPM A-2 ILC-25 Ref 1.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:

- Calculator
- Ruler
- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-MT-START	034	N/A

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

Initial Conditions:

- Columbia is in the process of starting up.
- The Main Turbine (MT) is online and is currently 10% loaded.

Initiating Cue:

- The CRS directs you to determine the TIME REQUIRED and the LOAD CHANGE RATE needed to raise MT load from 10% to 90%.
- Use a fatigue index of 20,000 cycles.
- Show ALL your work (<u>plotted points & calculations</u>) on Attachment 6.1 and answer the questions on the Student JPM Information Sheet.
- Return Student JPM Answer Sheet and Att. 6.1 to examiner when complete.

START TIME:____________

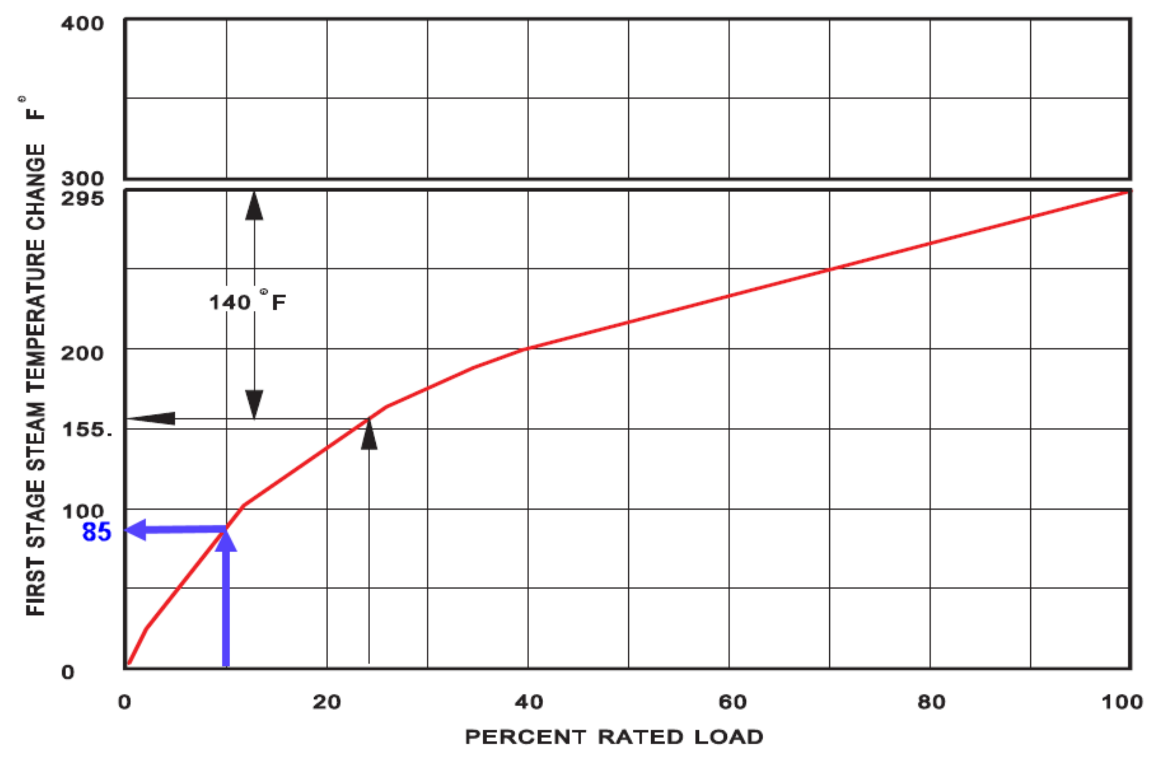
Examiner Note: **Provide candidate with the following:**

- **Student JPM Information Sheet**
- **Student JPM Answer Sheet**
- **Student Reference #1 (SOP-MT-START Att. 6.1)**

STEP / STANDARD	SAT / UNSAT

Step 1:

Determine the First Stage Steam Temperature Change from 0 to 10% Rated Load.



Standard:

- Refers to graph on Attachment 6.1 and plots **10% Rated Load** to a **First Stage Steam Temperature Change of 85°F**. **(Accept 75°F - 90°F)**

CRITICAL STEP

____SAT

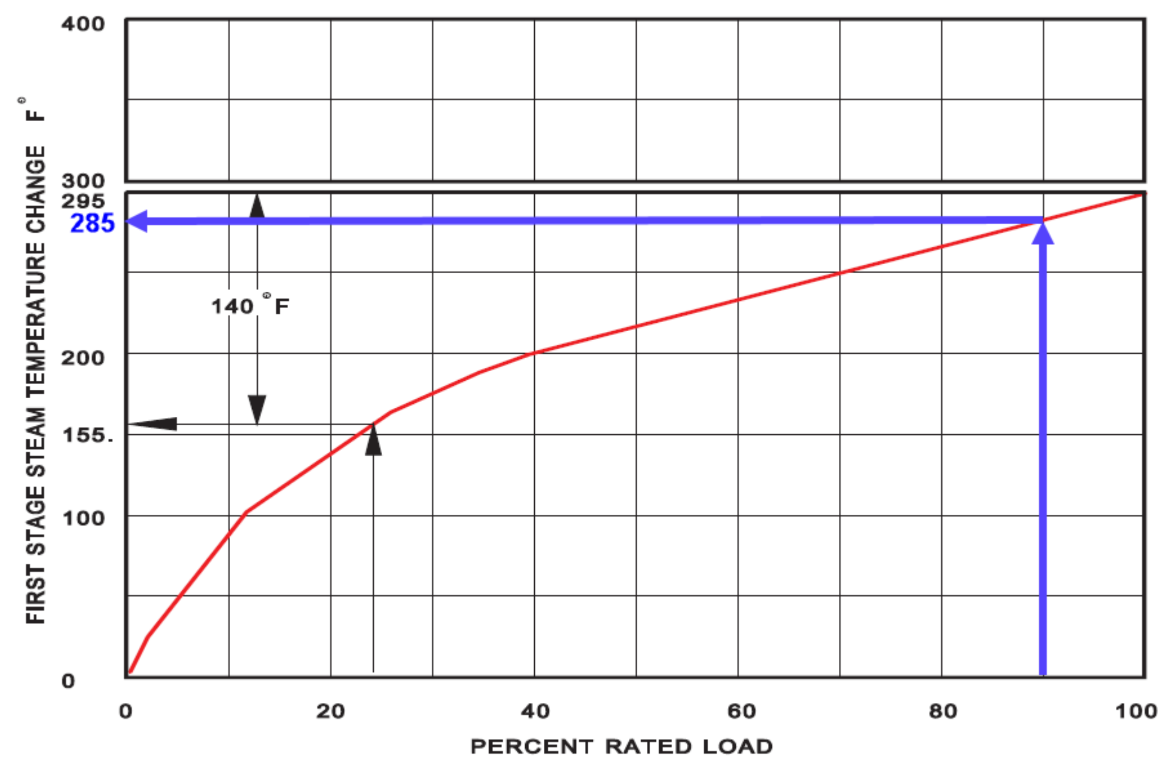
____UNSAT

____N/A

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>

<u>Step 2:</u>

Determine the First Stage Steam Temperature Change from 0 to 90% Rated Load.



<u>Standard:</u>

- Refers to graph on Attachment 6.1 and plots **90% Rated Load** to a **First Stage Steam Temperature Change of 285°F**. **(Accept 275°F – 290°F)**

</td><td>

CRITICAL STEP

____SAT

____UNSAT

____N/A

</td></tr>
<tr><td>

<u>Step 3:</u>

Calculate the First Stage Steam Temperature Change difference.

<u>Standard:</u>

- Subtracts the **0-10% temperature change** from the **0-90% temperature change**: **285°F - 85°F = 200°F** **(Accept 185°F - 215°F)**

</td><td>

CRITICAL STEP

____SAT

____UNSAT

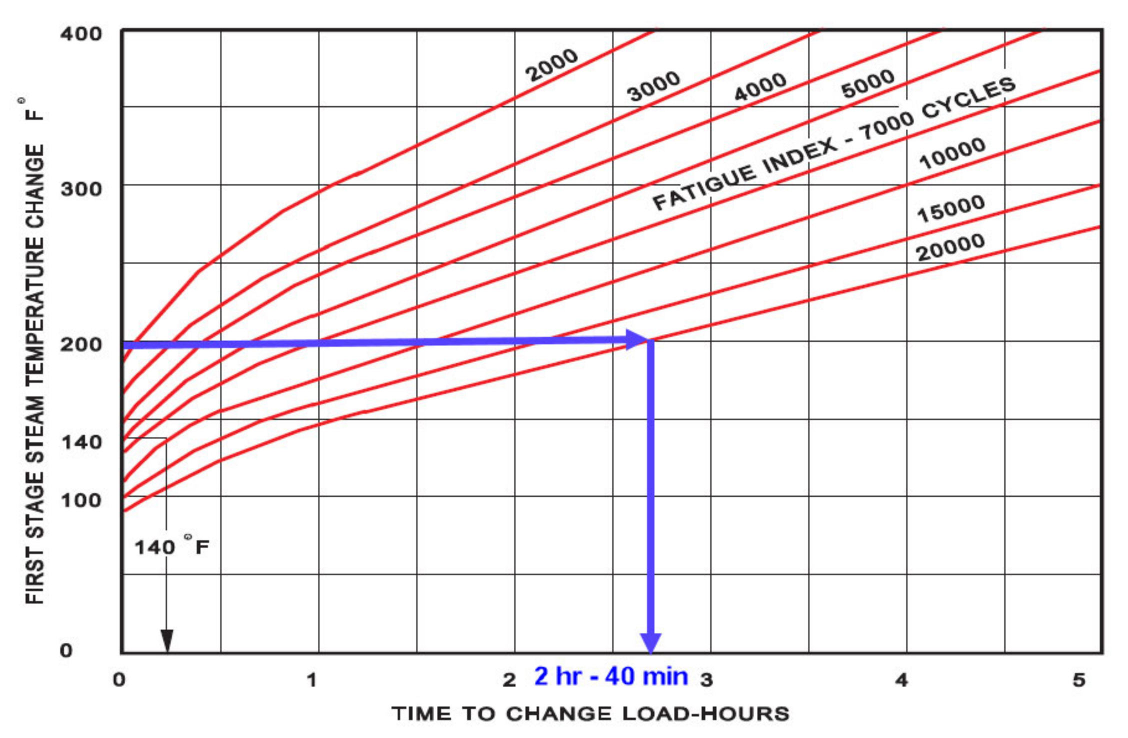
____N/A

</td></tr>
</table>

STEP / STANDARD | **SAT / UNSAT**

Step 4:

Determines the time to change load from 10% Rated Load to 90% Rated Load.



Standard:

- Refers to graph on Attachment 6.1 and plots **200°F ± 15°F** to the **20,000-cycle fatigue index curve** and determines **Time to Change Load to be 2 hours and 40 minutes**. **(Accept from 2 hours 10 min to 3 hours 10 min)**

CRITICAL STEP

____SAT

____UNSAT

____N/A

Step 5:

Determines the load change rate.

Standard:

- Calculates the load change rate:

(90%-10%) / (2 hours + 40 min) = 80/160 %/min = .5%/min

(Accept from 0.42%/min to 0.62%/min)

CRITICAL STEP

____SAT

____UNSAT

____N/A

Examiner Cue: **Inform the candidate that the JPM is Complete.**

STOP TIME: ___________

JPM ANSWER SHEET

(COMPLETED)

COMPARE THE CANDIDATE'S ATTACHMENT 6.1 PAPERWORK AND STUDENT ANSWER SHEET AGAINST THE FOLLOWING:

- **10% Rated Load Steam Temperature Change: 75°F - 90°F**
- **90% Rated Load Steam Temperature Change: 275°F - 290°F**
- **MT First Stage Steam Temperature Change: 185°F - 215°F**
- **Time required to change load: 2 hrs 10 min to 3 hrs 10 min**
- **Load change rate allowed: 0.42% / min to 0.62% / min**

RESULTS OF JPM ILC-25 JPM A-2 (RO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: Determines the following (through graphing or calculation):
- **10% Rated Load Steam Temperature Change: 75°F - 90°F**
- **90% Rated Load Steam Temperature Change: 275°F - 290°F**
- **MT First Stage Steam Temperature Change: 185°F - 215°F**
- **Time Allowed to Change Load: 2 hours, 10 min to 3 hours, 10 min**
- **Load Rate of Change Required: 0.42%/min to 0.62%/min**

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

COMMENTS:

____

____

____

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Examiner Signature: ______________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is in the process of starting up.
- The Main Turbine (MT) is online and is currently 10% loaded.

Initiating Cue:

- The CRS directs you to determine the TIME REQUIRED and the LOAD CHANGE RATE needed to raise MT load from 10% to 90%.
- Use a fatigue index of 20,000 cycles.
- Show ALL your work (plotted points & calculations) on Attachment 6.1 and answer the questions on the Student JPM Information Sheet.
- Return Student JPM Answer Sheet and Att. 6.1 to examiner when complete.

STUDENT JPM ANSWER SHEET

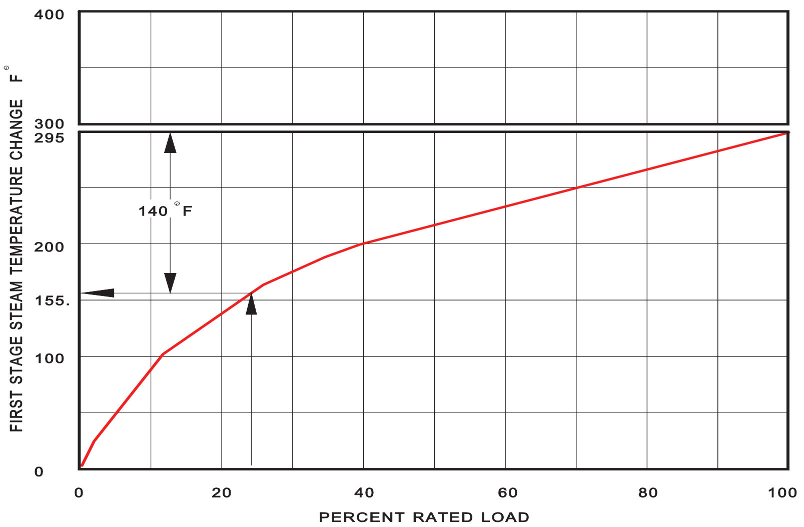
- **Ensure Attachment 6.1 shows your work (plot points and calculations).**

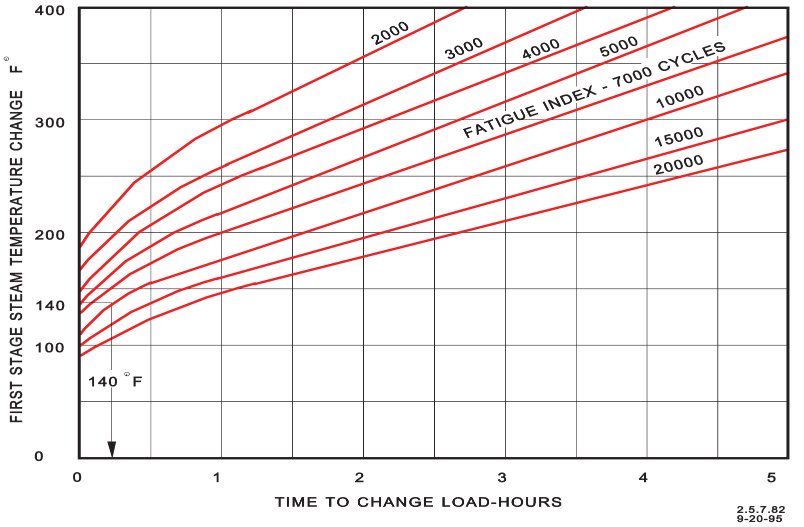
- **Answer the following:**

Time required to change load: _______________

Load change rate allowed: _______________

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

ENERGY NORTHWEST

ILC-25 A-3 (RO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM A-3 (RO)

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______
SIMULATOR GUIDE PQD CODE ______ Rev. No. ______
JPM PQD CODE ______ Rev. No. ______
EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Kyle Christianson / Dave Crawford DATE: 12/01/22

REVISED BY: ______ DATE: ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines (using hose markings and vendor data) that HOSE #3 is the appropriate hose and fitting combination to use during the performance of OSP-RPV-R801 Step 9.1.12.a.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☐

Task Number and Title: RO-1616 Perform Functions Necessary for the Management and Control of Plant Systems and Equipment.

K/A Importance Factors: **RO:** 3.7 **SRO:** 4.1

K/A Number: 2.2.12

K/A Statement: Knowledge of surveillance procedures.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.2 – Equipment Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 12)**
    - Student JPM Answer Sheet **(Page 13)**
    - OSP-RPV-R801 (Page 25) & Vendor Data **(JPM A-3 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- Ensure the 4 sample hoses (designated for JPM) are available for student inspection.

Tools or Equipment:

- Clear ruler
- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
OSP-RPV-R801	035	N/A

Administration Location:
Admin – Exam Security posted room.

STUDENT BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

Initial Conditions:

- Columbia is in a refueling outage.
- Preparations are being made to perform an LLRT per OSP-RPV-R801.
- You are the LLRT RO in charge of preparations.
- An LLRT EO is preparing to install a mechanical jumper (high pressure hose) between RFW-V-30A/31A (Steam Tunnel) to MS-V-25B/26B (Steam Tunnel) in accordance with Step 9.1.12.a.

Initiating Cue:

- The LLRT EO has requested your assistance to determine the appropriate hose with fittings that will meet the requirements of Step 9.1.12 of OSP-RPV-R801 based on vendor data and hose markings.
- Inform the EO of your determination by circling the correct hose on the Student JPM Answer Sheet.
- Return the Student JPM Answer Sheet to examiner when complete.

START TIME:___________

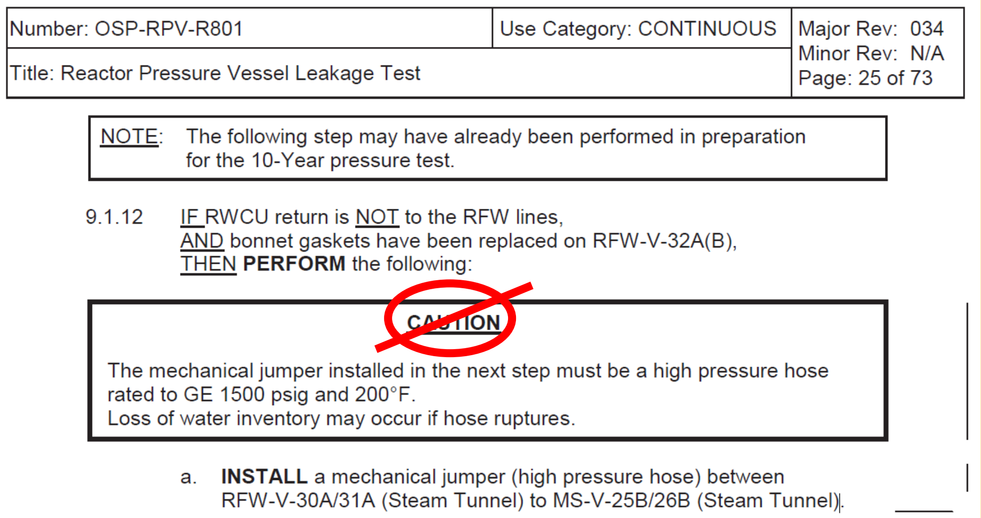
STEP / STANDARD	**SAT / UNSAT**

Examiner Note: **Provide Candidate with the following:**

- **Student JPM Information Sheet**
- **Student JPM Answer Sheet**
- **Student Reference #1 (OSP-RPV-R801 [Page 25] & Vendor Data)**
- **Hoses #1 through #4**

Examiner Note: **This JPM tests Columbia OE. During R-25, the incorrect hose was selected during the RPV Leakage Test contrary to the work instructions. The hose ruptured during testing. This event is documented under CR 421766.**

Step 1:



Number: OSP-RPV-R801	Use Category: CONTINUOUS	Major Rev: 034 Minor Rev: N/A Page: 25 of 73
Title: Reactor Pressure Vessel Leakage Test		

NOTE: The following step may have already been performed in preparation for the 10-Year pressure test.

9.1.12 IF RWCU return is NOT to the RFW lines, AND bonnet gaskets have been replaced on RFW-V-32A(B), THEN **PERFORM** the following:

CAUTION

The mechanical jumper installed in the next step must be a high pressure hose rated to GE 1500 psig and 200°F.
Loss of water inventory may occur if hose ruptures.

a. **INSTALL** a mechanical jumper (high pressure hose) between RFW-V-30A/31A (Steam Tunnel) to MS-V-25B/26B (Steam Tunnel). _____

Standard:

- Reads Caution. Determines hose must be rated for: **≥ 1500 psig AND ≥ 200ºF**

CRITICAL STEP

____SAT

____UNSAT

____N/A

Examiner Note:	**JPM Steps 2, 3, and 4 below may be performed in any order.**
STEP / STANDARD	**SAT / UNSAT**
Step 2: Inspects Hose #1.  Standard: - Determines hose **does NOT meet** requirements because it has a **working pressure of 300 psig (as identified on the hose itself)** which is less than the required ≥ 1500 psig rating.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**

Step 3:

Inspects Hose #2.

Standard:

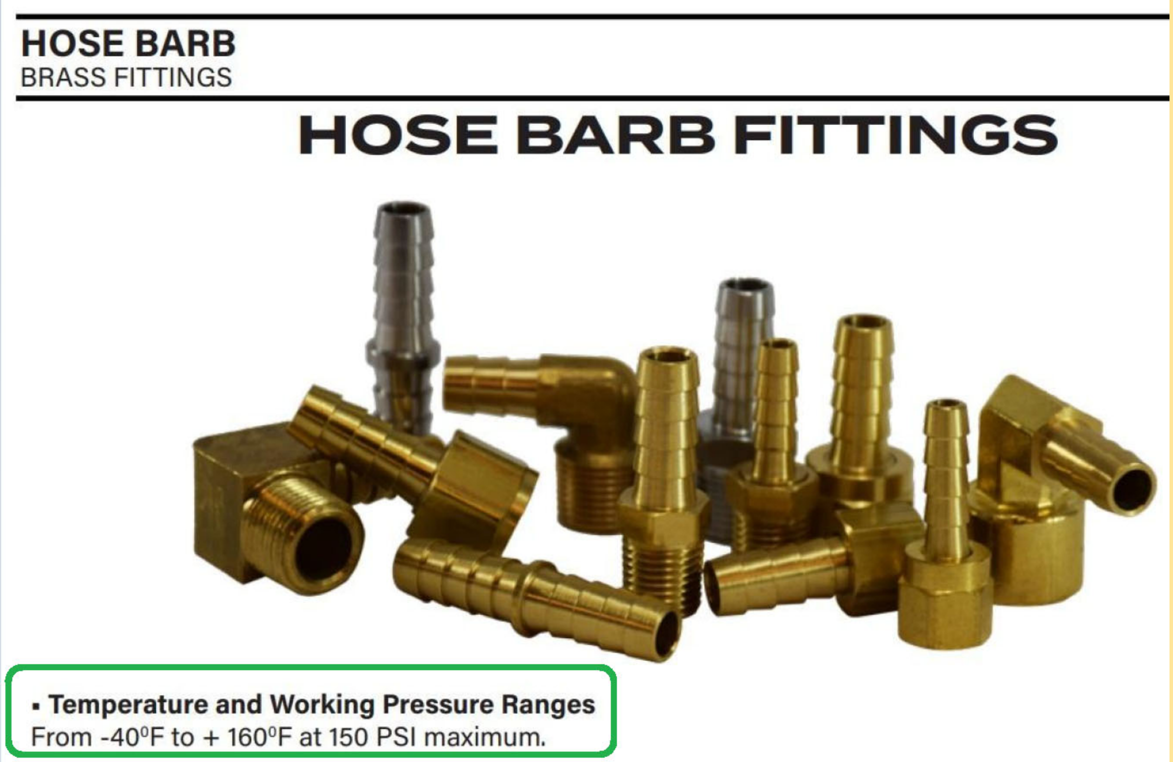
- Determines hose **does NOT meet** requirements because it has **brass hose barb fittings which are rated up to 160ºF and 150 psi** which is less than the required ≥ 200ºF and ≥ 1500 psig. (SEE BELOW from student reference)

CRITICAL STEP

____SAT

____UNSAT

____N/A



HOSE BARB
BRASS FITTINGS

HOSE BARB FITTINGS

- **Temperature and Working Pressure Ranges**
  From -40ºF to + 160ºF at 150 PSI maximum.

STEP / STANDARD	**SAT / UNSAT**

Step 4:

Inspects Hose #3.

Standard:

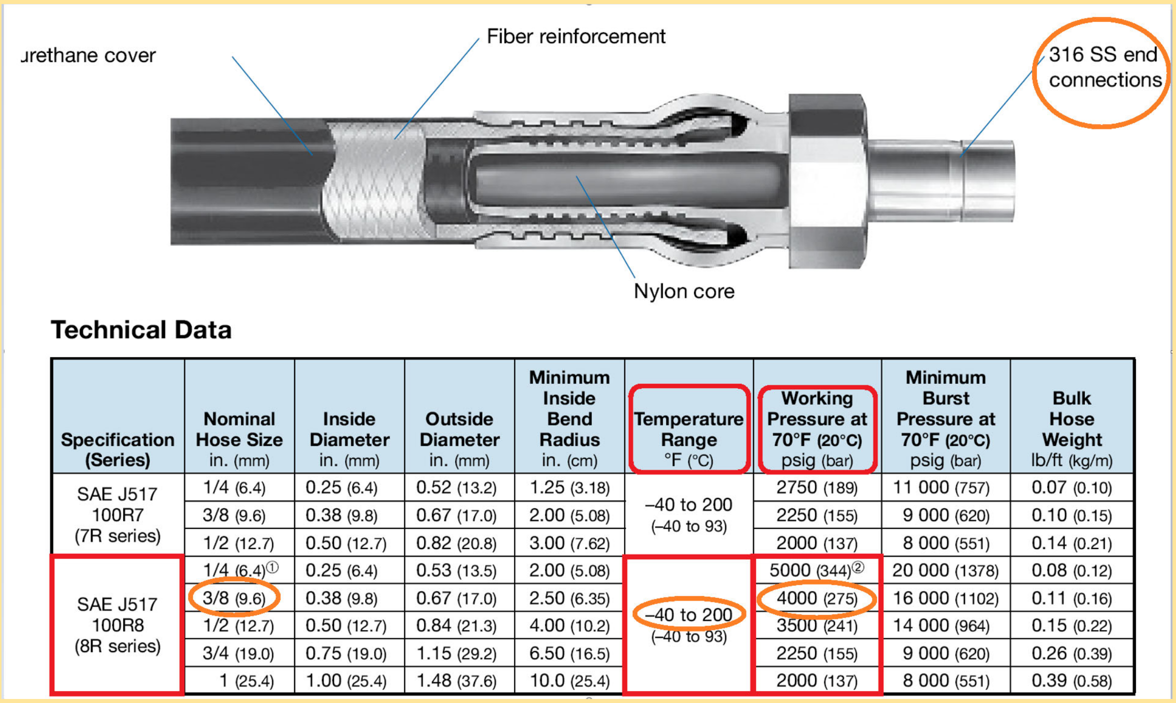
- Determines hose **DOES MEET** the requirements because it is a **Swagelok 100R8 hose with integral Swagelok 316 SS end connections**. Per the technical data, the **hose and fitting combination is rated at 4000 psig with a temperature range of minus (-) 40ºF to 200ºF** which meets the required ≥ 200ºF and ≥ 1500 psig rating. (SEE BELOW from student reference)

CRITICAL STEP

____SAT

____UNSAT

____N/A



Technical Data

Specification (Series)	Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
SAE J517 100R7 (7R series)	1/4 (6.4)	0.25 (6.4)	0.52 (13.2)	1.25 (3.18)	–40 to 200 (–40 to 93)	2750 (189)	11 000 (757)	0.07 (0.10)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.00 (5.08)		2250 (155)	9 000 (620)	0.10 (0.15)
	1/2 (12.7)	0.50 (12.7)	0.82 (20.8)	3.00 (7.62)		2000 (137)	8 000 (551)	0.14 (0.21)
SAE J517 100R8 (8R series)	1/4 (6.4)①	0.25 (6.4)	0.53 (13.5)	2.00 (5.08)	–40 to 200 (–40 to 93)	5000 (344)②	20 000 (1378)	0.08 (0.12)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.50 (6.35)		4000 (275)	16 000 (1102)	0.11 (0.16)
	1/2 (12.7)	0.50 (12.7)	0.84 (21.3)	4.00 (10.2)		3500 (241)	14 000 (964)	0.15 (0.22)
	3/4 (19.0)	0.75 (19.0)	1.15 (29.2)	6.50 (16.5)		2250 (155)	9 000 (620)	0.26 (0.39)
	1 (25.4)	1.00 (25.4)	1.48 (37.6)	10.0 (25.4)		2000 (137)	8 000 (551)	0.39 (0.58)

STEP / STANDARD	**SAT / UNSAT**
Step 5: Inspects Hose #4.  Standard: • Determines hose **does NOT meet** requirements because it has a **working pressure of 300 psig (as identified on the hose itself)** which is less than the required ≥ 1500 psig rating.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 5: Completes answer sheet. Standard: • Answers that only Hose #3 meets requirements.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: **Inform the candidate that the JPM is Complete.**	

STOP TIME: ___________

JPM ANSWER KEY
(COMPLETED)

Answer:

Circle the correct hose # to be used for this evolution:

1 2 [✓ 3] 4

RESULTS OF JPM ILC-25 JPM A-3 (RO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Determines (using hose markings and vendor data) that HOSE #3 is the appropriate hose and fitting combination to use during the performance of OSP-RPV-R801 Step 9.1.12.a.**

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

COMMENTS:

____

____

____

____

____

____

____

____

____

____

Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is in a refueling outage.
- Preparations are being made to perform an LLRT per OSP-RPV-R801.
- You are the LLRT RO in charge of preparations.
- An LLRT EO is preparing to install a mechanical jumper (high pressure hose) between RFW-V-30A/31A (Steam Tunnel) to MS-V-25B/26B (Steam Tunnel) in accordance with Step 9.1.12.a.

Initiating Cue:

- The LLRT EO has requested your assistance to determine the appropriate hose with fittings that will meet the requirements of Step 9.1.12 of OSP-RPV-R801 based on vendor data and hose markings.
- Inform the EO of your determination by circling the correct hose number on the Student JPM Answer Sheet.
- Return the Student JPM Answer Sheet to examiner when complete.

STUDENT JPM ANSWER SHEET

Circle the correct hose # to be used for this evolution:

1	**2**	**3**	**4**

NOTE: The following step may have already been performed in preparation for the 10-Year pressure test.

9.1.12 IF RWCU return is NOT to the RFW lines,
AND bonnet gaskets have been replaced on RFW-V-32A(B),
THEN **PERFORM** the following:

CAUTION

The mechanical jumper installed in the next step must be a high pressure hose rated to GE 1500 psig and 200°F.
Loss of water inventory may occur if hose ruptures.

a. **INSTALL** a mechanical jumper (high pressure hose) between RFW-V-30A/31A (Steam Tunnel) to MS-V-25B/26B (Steam Tunnel). _____

b. **OPEN** the following valves:

- MS-V-25B (Steam Tunnel) _____
- MS-V-26B (Steam Tunnel) _____
- RFW-V-30A (Steam Tunnel) _____
- RFW-V-31A (Steam Tunnel) _____

NOTE: The following step de-energizes all MSRV A, B, C solenoids. This is being done to protect the valve from an inadvertent lift. The safety function of the valve is unaffected. H13.P601.A3-6.1, ADS DIV 1 OUT OF SERVICE; BISI 3-2; H13.P601.A2-6.8, ADS DIV 2 OUT OF SERVICE; and BISI 3-2 annunciate.

9.1.13 **PERFORM** the following to de-energize all MSRV solenoids:

a. **OPEN** E-DISC-DPS11A/8 (ADS DIV 1) (Main Control Room). _____

Simultaneous Verification _____

b. **OPEN** E-DISC-DPS12A/5 (ADS DIV 2) (Main Control Room). _____

Simultaneous Verification _____

Hose and Flexible Tubing

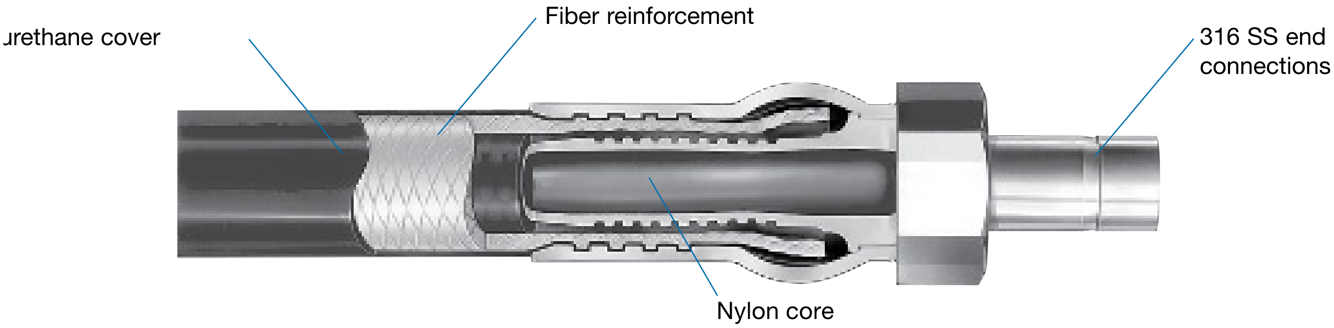
Hose Assemblies, Bulk Hose, Flexible Tubing, and End Connections

- Core materials include metal, PTFE, PFA, vinyl, nylon, polyethylene, and rubber
- Nominal hose sizes 1/8 to 2 in.
- Wide range of fractional and metric end connections
- Custom lengths available
- Optional covers, tagging, and testing

7R and 8R Series Nylon Hose

Features

- SAE general-purpose, hydraulic, nylon hose.
- Smooth-bore nylon core.
- Size range of 1/4 to 1 in. and working pressures up to 5000 psig (344 bar).
- Internal fiber reinforcement enhances hose pressure rating.
- Smooth black polyurethane cover is perforated to prevent blistering.
- Polyurethane cover resists abrasion.
- Select 8R series hose assemblies are approved to ECE R110; see page 105 for more information.
- Designed for use in hydraulic applications where outgassing is a concern.
- Options include hose covers and spring guard. See page 103 for details.
- For electrical properties, see page 5 for details.



Technical Data

Specification (Series)	Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
SAE J517 100R7 (7R series)	1/4 (6.4)	0.25 (6.4)	0.52 (13.2)	1.25 (3.18)	–40 to 200 (–40 to 93)	2750 (189)	11 000 (757)	0.07 (0.10)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.00 (5.08)		2250 (155)	9 000 (620)	0.10 (0.15)
	1/2 (12.7)	0.50 (12.7)	0.82 (20.8)	3.00 (7.62)		2000 (137)	8 000 (551)	0.14 (0.21)
SAE J517 100R8 (8R series)	1/4 (6.4)①	0.25 (6.4)	0.53 (13.5)	2.00 (5.08)	–40 to 200 (–40 to 93)	5000 (344)②	20 000 (1378)	0.08 (0.12)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.50 (6.35)		4000 (275)	16 000 (1102)	0.11 (0.16)
	1/2 (12.7)	0.50 (12.7)	0.84 (21.3)	4.00 (10.2)		3500 (241)	14 000 (964)	0.15 (0.22)
	3/4 (19.0)	0.75 (19.0)	1.15 (29.2)	6.50 (16.5)		2250 (155)	9 000 (620)	0.26 (0.39)
	1 (25.4)	1.00 (25.4)	1.48 (37.6)	10.0 (25.4)		2000 (137)	8 000 (551)	0.39 (0.58)

① 1/4 in. (6.4 mm) size does not meet SAE J517 impulse cycle requirements at maximum temperature and minimum bend radius.

② Pressure-temperature ratings may be limited by the end connections.

Cleaning and Packaging

Swagelok nylon hose components are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each hose is bagged individually and boxed; longer hoses are coiled, bagged, and boxed.

Ordering Information and Dimensions

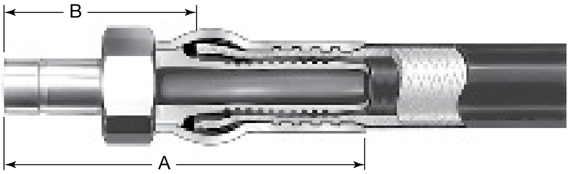
- For custom hose assemblies, see page for 95 for hose sizes, end connections, lengths, and options.

7R, 8R, and 7N Series Nylon Hose and 7P Series Polyethylene Hose

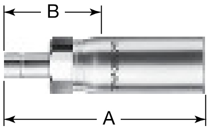
End Connections

Select an ordering number.

To determine the cut length of bulk hose for field assembly, subtract dimension *B* for each end connection from the desired overall length.



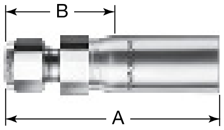
Swagelok Tube Adapters



Tube Adapter Size	Nominal Hose Size	Ordering Number	Dimensions				End Connection Designator
			A	B	Minimum Inside Diameter	Maximum Outside Dimension	
Dimensions, in. (mm)							
1/4	1/4	SS-TP4-TA4	2.48 (63.0)	1.45 (36.8)	0.15 (3.8)	0.80 (20.3)	TA4①
3/8	1/4	SS-TP4-TA6	2.47 (62.7)	1.44 (36.6)	0.15 (3.8)	0.80 (20.3)	TA6
	3/8	SS-TP6-TA6	2.82 (71.6)	1.51 (38.4)	0.24 (6.1)	0.87 (22.1)	TA6①
1/2	1/2	SS-TP8-TA8	3.40 (86.4)	1.84 (46.7)	0.36 (9.1)	1.09 (27.7)	TA8①
5/8	1/2	SS-TP8-TA10	3.40 (86.4)	1.84 (46.7)	0.39 (9.9)	1.09 (27.7)	TA10①
3/4	3/4	SS-TP12-TA12	3.70 (94.0)	1.95 (49.5)	0.56 (14.2)	1.31 (33.1)	TA12
1	1	SS-TP16-TA16	4.47 (113)	2.26 (57.4)	0.76 (19.3)	1.60 (40.5)	TA16
Dimensions, mm (in.)							
6	1/4 in.	SS-TP4-TM6	63.0 (2.48)	36.8 (1.45)	3.8 (0.15)	20.3 (0.80)	TM6①
8	1/4 in.	SS-TP4-TM8	62.7 (2.47)	36.6 (1.44)	3.8 (0.15)	20.3 (0.80)	TM8①
10	3/8 in.	SS-TP6-TM10	71.6 (2.82)	38.4 (1.51)	6.1 (0.24)	22.1 (0.87)	TM10①
12	1/2 in.	SS-TP8-TM12	86.4 (3.40)	46.7 (1.84)	9.1 (0.36)	27.7 (1.09)	TM12①

① ECE R110 approval available.

Swagelok Tube Fittings



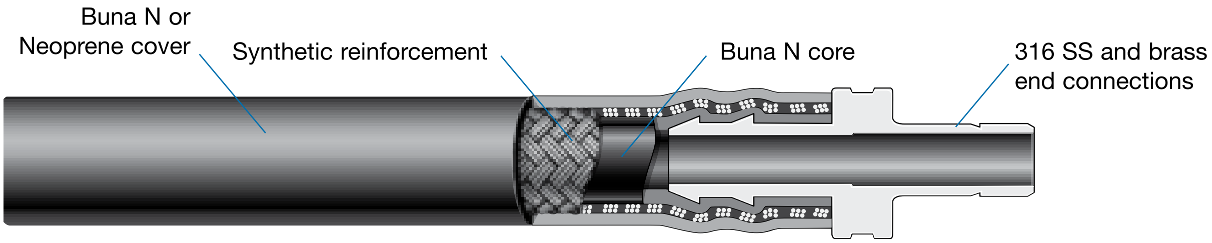
Tube Fitting Size	Nominal Hose Size	Ordering Number	Dimensions				End Connection Designator
			A	B	Minimum Inside Diameter	Maximum Outside Dimension	
Dimensions, in. (mm)							
1/4	1/4	SS-TP4-SL4	2.57 (65.3)	1.54 (39.1)	0.15 (3.8)	0.80 (20.3)	SL4①
3/8	3/8	SS-TP6-SL6	2.94 (74.7)	1.63 (41.4)	0.24 (6.1)	0.87 (22.1)	SL6①
1/2	1/2	SS-TP8-SL8	3.30 (83.8)	1.74 (44.2)	0.36 (9.1)	1.09 (27.7)	SL8①
Dimensions, mm (in.)							
6	1/4 in.	SS-TP4-SM6	65.3 (2.57)	39.1 (1.54)	3.8 (0.15)	20.3 (0.80)	SM6①
8	1/4 in.	SS-TP4-SM8	65.5 (2.58)	39.4 (1.55)	3.8 (0.15)	20.3 (0.80)	SM8①
10	1/4 in.	SS-TP4-SM10	71.9 (2.83)	45.7 (1.80)	3.8 (0.15)	22.1 (0.87)	SM10
	3/8 in.	SS-TP6-SM10	74.9 (2.95)	41.7 (1.64)	6.1 (0.24)	22.1 (0.87)	SM10①
12	1/2 in.	SS-TP8-SM12	83.8 (3.30)	44.2 (1.74)	9.1 (0.36)	27.7 (1.09)	SM12①

① ECE R110 approval available.

PB Series Rubber Hose

Features

- Ozone-resistant, general-purpose rubber hose with push-on connections.
- Smooth-bore Buna N core.
- Size range of 1/4 to 1 in. and working pressures up to 350 psig (24.1 bar).
- Internal fiber reinforcement enhances hose pressure rating and ensures connection retention.
- Hose cover resists abrasion.
- Cover is flame-resistant in accordance with 30CFR Part 18.
- Designed for use in general-purpose, compressed air applications and oil transfer.
- Bulk hose and end connections available for field assembly; custom assemblies also available.
- Standard hose color is blue; other hose colors include black, green, gray, red, and yellow.
- Black hose color provides additional UV and ozone resistance due to Neoprene cover.
- Options include tags. See page 103 for details.
- For electrical properties, see page 5 for details.



Technical Data

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at –40 to 70°F (–40 to 20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
1/4 (6.4)	0.26 (6.6)	0.51 (12.8)	3.00 (7.62)	–40 to 200 (–40 to 93)	350 (24.1)	1400 (96.4)	0.09 (0.13)
3/8 (9.7)	0.39 (9.9)	0.67 (17.0)	3.00 (7.62)		300 (20.6)	1200 (82.6)	0.14 (0.20)
1/2 (12.7)	0.50 (12.7)	0.75 (19.0)	5.00 (12.7)		300 (20.6)	1200 (82.6)	0.14 (0.20)
3/4 (19.0)	0.76 (19.3)	1.07 (27.2)	7.00 (17.8)		300 (20.6)	1200 (82.6)	0.25 (0.37)
1 (25.4)	1.00 (25.4)	1.34 (34.0)	10.00 (25.4)	–20 to 200 (–28 to 93)	300 (20.6)①	1200 (82.6)	0.33 (0.49)

① Working pressure of 1 in. PB hose is 300 psig (20.6 bar) from –20 to 70°F (-28 to 20°C)

Pressure-Temperature Ratings

Ratings maintain a minimum factor of 4:1 between working pressure and minimum burst pressure.

Nominal Hose Size, in.	1/4	3/8, 1/2, 3/4	1
Temperature, °F (°C)	**Working Pressure,** psig (bar)		
–40 (–40)	350 (24.1)	300 (20.6)	—
–20 (–28) to 70 (20)	350 (24.1)	300 (20.6)	300 (20.6)
100 (37)	315 (21.7)	270 (18.6)	270 (18.6)
150 (65)	210 (14.4)	180 (12.4)	180 (12.4)
200 (93)	100 (6.8)	80 (5.5)	80 (5.5)

Cleaning and Packaging

Swagelok PB series rubber hose components are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each custom hose assembly is bagged individually and boxed; longer hoses are coiled, bagged, and boxed. Bulk rubber hose is packaged and shipped in reels.

⚠ **Users must evaluate compatibility in systems containing heated water-based fluids—some conditions may affect the Buna N core.**

PB Series Rubber Hose

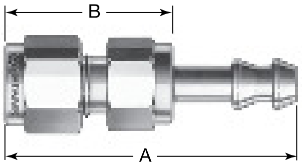
End Connections

Select a basic ordering number and add **SS** for 316 SS or **B** for brass.

Example: **SS**-PB4-SL4

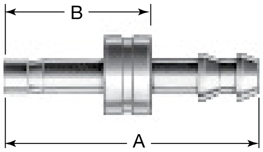
To determine the cut length of bulk hose for field assembly, subtract dimension B for each end connection from the desired overall length.

Swagelok Tube Fittings



Tube Fitting Size in.	Nominal Hose Size in.	Basic Ordering Number	Dimensions, in. (mm)				End Connection Designator
			A	B	Minimum Inside Diameter	Maximum Outside Dimension	
1/4	1/4	-PB4-SL4	1.82 (46.2)	1.08 (27.4)	0.15 (3.8)	0.65 (16.5)	SL4
3/8	3/8	-PB6-SL6	2.02 (51.3)	1.17 (29.7)	0.26 (6.6)	0.87 (22.1)	SL6
1/2	1/2	-PB8-SL8	2.34 (59.4)	1.31 (33.3)	0.36 (9.1)	1.01 (25.7)	SL8

Swagelok Tube Adapters



Tube Adapter Size	Nominal Hose Size	Basic Ordering Number	Dimensions				End Connection Designator
			A	B	Minimum Inside Diameter	Maximum Outside Dimension	
Dimensions, in. (mm)							
1/4	1/4	-PB4-TA4	1.77 (45.0)	1.03 (26.2)	0.15 (3.8)	0.54 (13.7)	TA4
3/8	3/8	-PB6-TA6	1.97 (50.0)	1.12 (28.4)	0.23 (5.8)	0.71 (18.0)	TA6
1/2	1/2	-PB8-TA8	2.43 (61.7)	1.40 (35.6)	0.33 (8.4)	0.81 (20.6)	TA8
3/4	3/4	-PB12-TA12	3.14 (79.8)	1.50 (38.1)	0.57 (14.5)	1.08 (27.4)	TA12
1	1	-PB16-TA16	4.11 (104)	1.88 (47.8)	0.79 (20.1)	1.41 (35.8)	TA16
Dimensions, mm (in.)							
6	1/4 in.	-PB4-TM6	45.0 (1.77)	26.2 (1.03)	3.8 (0.15)	13.7 (0.54)	TM6
8	1/4 in.	-PB4-TM8	45.7 (1.80)	26.9 (1.06)	3.8 (0.15)	13.7 (0.54)	TM8
	3/8 in.	-PB6-TM8	49.3 (1.94)	27.7 (1.09)	5.3 (0.21)	18.0 (0.71)	TM8
10	3/8 in.	-PB6-TM10	50.0 (1.97)	28.4 (1.12)	6.6 (0.26)	18.0 (0.71)	TM10
12	1/2 in.	-PB8-TM12	61.7 (2.43)	35.6 (1.40)	8.1 (0.32)	20.6 (0.81)	TM12
18	3/4 in.	-PB12-TM18	79.8 (3.14)	38.1 (1.50)	13.7 (0.54)	27.4 (1.08)	TM18
25	1 in.	-PB16-TM25	104 (4.11)	47.8 (1.88)	19.6 (0.77)	35.8 (1.41)	TM25

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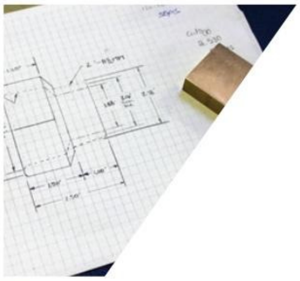

MFM Midland Metal
A MIDLAND INDUSTRIES COMPANY

AMC Anderson Metals
A MIDLAND INDUSTRIES COMPANY

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FIND US ON: f 📷 in

HOSE BARB FITTINGS

- **Temperature and Working Pressure Ranges**

From -40⁰F to + 160⁰F at 150 PSI maximum.

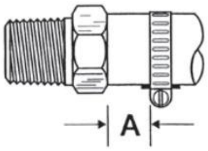
- **Tolerance**

+/- .02 on all dimensions. Dimension Data can change without notice. Please call us when dimensions are critical.

Note: These fittings are intended for use with hose clamp, similar type clamp or a crimped ferrule.

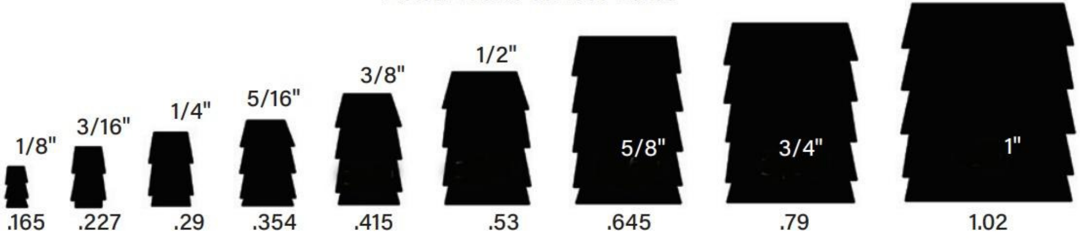
- **Assembly Instructions**

1- Cut hose cleanly and squarely to length.
2- Slide clamp on hose.
3- Lubricate hose. Push hose on fitting until hose bottoms against stop ring or hex.
4- Position hose clamp as shown below and secure with a screwdriver or wrench. Maintain "A" dimension noted below for proper clamp positioning.



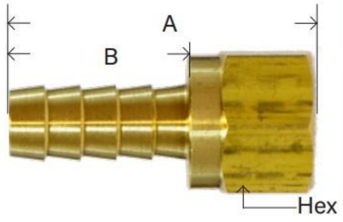
Hose Size	A
3/16"	1/4"
1/4"	1/4"
5/16"	1/4"
3/8"	1/8"
1/2"	1/8"
5/8"	1/8"
3/4"	1/8"

Actual Profile of Hose Barbs



HOSE BARB
BRASS FITTINGS

DUAL 45°/ 37° FLARE SWIVEL



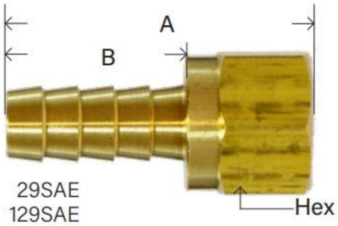
CRIMP STYLE

PART #	HOSE ID X DUAL SEAT	THREAD	A	B	HEX	APPROX. WT. LBS.	LIST PRICE
32107	3/16" x 1/4"	7/16-20	1.34	0.75	0.56	0.04	---
32107C**	3/16 X 1/4	7/16-20	1.42	0.78	0.56	0.04	---
32337	1/4" x 1/4"	7/16-20	1.56	0.97	0.56	0.04	---
32337C**	1/4" X 1/4"	7/16-20	1.60	0.97	0.56	0.04	---
32102	1/4" x 5/16"	1/2-20	1.61	0.97	0.62	0.06	---
32339	5/16" x 5/16"	1/2-20	1.60	0.97	0.62	0.06	---
32340	3/8" x 1/2"	3/4-16	1.68	0.97	0.87	0.10	---
32341	1/2" x 1/2"	3/4-16	1.68	0.97	0.87	0.10	---
32341C**	1/2" X 1/2"	3/4-16	1.75	0.97	0.87	0.09	---
32342	1/2" x 5/8"	7/8-14	1.76	0.97	1.00	0.12	---
32394**	5/8" x 5/8"	7/8-14	1.83	0.97	1.00	0.14	---
32394C	5/8" x 5/8"						

** Swivel crimp style

KDS

FEMALE 45° FLARE SWIVEL



29SAE
129SAE

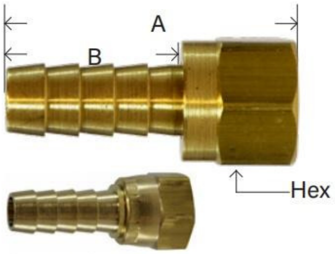
CRIMP STYLE

PART #	HOSE I.D. X FEMALE 45° FLARE	UNF THREAD	A	B	HEX	APPROX. WT. LBS.	LIST PRICE
32326	3/16" x 3/16"	3/8-24	1.19	0.75	0.43	0.04	---
30295**	3/16" x 3/8"	5/8-18	1.82	0.90	0.75	0.04	---
32101	1/4" x 1/4"	7/16-20	1.57	0.97	0.56	0.04	---
32103	1/4" x 3/8"	5/8-18	1.64	0.97	0.75	0.08	---
32104	5/16" x 5/16"	1/2-20	1.61	0.97	0.62	0.05	---
32327	5/16" x 3/8"	5/8-18	1.67	0.97	0.75	0.08	---
32105	3/8" x 3/8"	5/8-18	1.64	0.97	0.75	0.08	---
32105C**	3/8" x 3/8"	5/8-18	1.71	0.97	0.75	0.07	---
32106	3/8" x 1/2"	3/4-16	1.81	0.97	0.87	0.10	---
32100	1/2" x 1/2"	3/4-16	1.68	0.97	0.87	0.12	---
32328	3/4" x 3/4"	1-1/16-14	2.00	0.97	1.25	0.20	---

** Swivel crimp style (crimped on the outside of fitting)

29SAE 209ASF 146HBLFSV KF-NS 128 FSS 146 144

FEMALE 37° J.I.C. FLARE SWIVEL



CRIMP STYLE

PART #	HOSE ID X FEMALE 37° FLARE	THREAD	A	B	HEX	APPROX. WT. LBS.	LIST PRICE
32334	1/4" x 3/8"	9/16-18	1.60	0.97	0.68	0.06	---
32335	5/16" x 3/8"	9/16-18	1.60	0.97	0.68	0.06	---
32336	3/8" x 3/8"	9/16-18	1.60	0.97	0.68	0.10	---
32336C	3/8" X 3/8"	9/16-18	1.66	0.97	0.68	0.06	---
32338	3/4" x 3/4"	1-1/16-12	2.00	0.97	1.25	0.20	---
32338SS	3/4" x 3/4"	1-1/16-12	2.00	0.97	1.25	0.24	---
32338C	3/4" x 3/4"	1-1/16-12	2.13	1.19	1.25	0.20	---
32397	1" x 1"	1-5/16-12	2.31	1.19	1.50	0.33	---
32397C	1" x 1"						

KJS

REUSABLE MALE FITTINGS

29RU17

PART #	HOSE ID	HOSE OD	MALE NPTF	LIST PRICE
32727	1/4"	1/2"	1/4"	---
32726	1/4"	5/8"	1/4"	---
32742	3/8"	5/8"	1/4"	---
32744	3/8"	11/16"	1/4"	---
32725	3/8"	3/4"	1/4"	---
32747	3/8"	5/8"	3/8"	---
32750	3/8"	11/16"	3/8"	---
32746	1/2"	7/8"	1/2"	---

The choice when **every job** matters.

Powering Business Worldwide

NAHAD HOSE SAFETY INSTITUTE MEMBER

EC115

Hydraulic hose

Meets: EN 857 Type 1SC

LAYLINE EXAMPLE:

WINNER EC115-08 12.7 MM (0.50 IN) DN12 | EN857 1SC • MSHA IC-84/41 DNV-GL • USCG | 160 BAR (2300 PSI) -40°C to +100°C -40°F to +212°F 1A • Z 2PC • 1R

CONSTRUCTION: Inner Tube: Synthetic rubber Reinforcement: 1 steel braid Cover: Synthetic rubber

PART	SIZE DIMENSIONS				PRESSURE				BEND		WEIGHT	
#	Hose I.D.		Hose O.D. (nominal)		Working Pressure		Min. Burst Pressure		Min. Bend Radius		Weight	
	mm	in	mm	in	bar	psi	bar	psi	mm	in	kg/m	lbs/ft
EC115-04	6.4	0.25	12.6	0.50	225	3,250	900	13,000	50	1.97	0.18	0.12
EC115-06	9.5	0.38	16.0	0.63	180	2,600	720	10,400	63	2.48	0.26	0.17
EC115-08	12.7	0.50	19.4	0.77	160	2,300	640	9,200	90	3.54	0.34	0.23
EC115-10	15.9	0.62	22.4	0.88	130	1,900	520	7,600	100	3.94	0.42	0.28
EC115-12	19.0	0.75	26.0	1.02	105	1,525	420	6,100	120	4.72	0.50	0.34
EC115-16	25.4	1.00	33.8	1.33	88	1,275	352	5,100	160	6.30	0.74	0.50
EC115-20	31.8	1.25	41.2	1.62	63	925	252	3,700	210	8.27	0.99	0.67
EC115-24	38.1	1.50	48.0	1.89	50	725	200	2,900	300	11.81	1.20	0.81
EC115-32	50.8	2.00	61.0	2.41	40	580	160	2,320	400	15.75	1.50	1.01

TYPICAL APPLICATION:
Hydraulic system service with petroleum and water based fluids, for general industrial service.

AGENCY SPECIFICATIONS:

MSHA Approved
DNV-GL
USCG

OPERATING TEMPERATURE: -40°C to +100°C (-40°F to +212°F)

FITTINGS: 1A/Z-Series | Two-piece Winner | 1R Field Attachable

EC215

Hydraulic hose

Meets: EN 857 Type 2SC

LAYLINE EXAMPLE:

WINNER EC215-06 9.5 mm (0.38 in) DN10 | EN857 2SC • ISO 18752 MSHA IC-84/41 • DNV-GL • USCG | 345 BAR (5000 PSI) -40°C to +100°C -40°F to +212°F HALF BEND 1A • Z 2R • 2PC

CONSTRUCTION: Inner Tube: Synthetic rubber Reinforcement: 2 steel braid Cover: Synthetic rubber

PART	SIZE DIMENSIONS				PRESSURE				BEND		WEIGHT	
#	Hose I.D.		Hose O.D. (nominal)		Working Pressure		Min. Burst Pressure		Min. Bend Radius		Weight	
	mm	in	mm	in	bar	psi	bar	psi	mm	in	kg/m	lbs/ft
EC215-04	6.4	0.25	13.5	0.53	400	5,800	1,600	23,200	50	1.97	0.28	0.19
EC215-06	9.5	0.38	17.5	0.69	345	5,000	1,380	20,000	65	2.56	0.41	0.28
EC215-08	12.7	0.50	20.8	0.82	275	4,000	1,100	16,000	90	3.54	0.57	0.38
EC215-10	15.9	0.62	24.0	0.94	250	3,650	1,000	14,600	100	3.94	0.68	0.46
EC215-12	19.0	0.75	27.9	1.10	215	3,125	860	12,500	120	4.72	0.81	0.54
EC215-16	25.4	1.00	35.7	1.40	165	2,400	660	9,600	160	6.30	1.17	0.79
EC215-20	31.8	1.25	43.9	1.73	125	1,800	500	7,200	250	9.84	1.56	1.05
EC215-24	38.1	1.50	51.0	2.01	100	1,450	400	5,800	300	11.81	1.81	1.22
EC215-32	50.8	2.00	63.4	2.50	90	1,300	360	5,200	400	15.75	2.36	1.59

TYPICAL APPLICATION:
Hydraulic system service with petroleum and water based fluids, for general industrial service.

AGENCY SPECIFICATIONS:

MSHA Approved
DNV-GL
USCG

OPERATING TEMPERATURE: -40°C to +100°C (-40°F to +212°F)

FITTINGS: 1A/Z-Series | Two-piece Winner | 2R Field Attachable

ENERGY NORTHWEST

ILC-25 A-4 (RO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM A-4 (RO)

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE		Rev. No.	
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Kyle Christianson / Dave Crawford DATE 12/01/22

REVISED BY: DATE

TECHNICAL REVIEW BY: DATE

INSTRUCTIONAL REVIEW BY: DATE

APPROVED BY: DATE

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determination is made that the Operations Locked High Rad Area (LHRA) RWP 30004835 is required to be signed on to under ALARA Task # 011458171502.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☐

Task Number and Title: 11261 Comply with RWP requirements during normal or abnormal conditions.

K/A Importance Factors: **RO:** 3.2 **SRO:** 3.7

K/A Number: 2.3.12

K/A Statement: Knowledge of radiological safety principles and procedures pertaining to licensed operator duties, such as response to radiation monitor alarms, containment entry requirements, fuel handling responsibilities, access to locked high-radiation areas, or alignment of filters.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.3 – Radiation Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 9)**
    - Student JPM Answer Sheet **(Page 10)**
    - Attachment 1 – Survey Map **(Pages 11 through 13)**
    - Attachment 2 – Operations RWP Card **(Page 14)**

Special Setup Instructions:
None.

Tools or Equipment:

- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
GEN-RPP-01	009	001
GEN-RPP-02	034	N/A

Administration Location:
Admin – Exam Security posted room.

STUDENT BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

Initial Conditions:

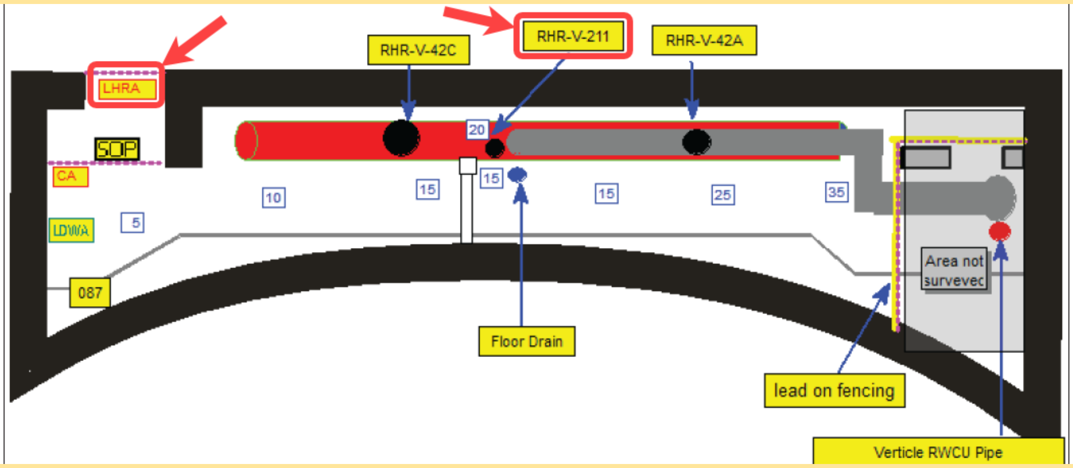
- Columbia is shutdown for a refueling outage.
- RHR-C has been drained.
- RHR-V-211 (High Point Vent) for RHR-C is being danger tagged open to maintain RHR-C depressurized.

Initiating Cue:

- The SSS directs you to determine the appropriate RWP and ALARA Task you will be using to access RHR-V-211.
- Review the provided Survey Map and Operations RWP Card.
- Inform the SSS of your determination by completing the Student JPM Answer Sheet.
- Return Student JPM Answer Sheet to examiner when complete.

START TIME:____________

Examiner Note:	**Provide Candidate with the following:** • **Student JPM Information Sheet** • **Student JPM Answer Sheet** • **Attachment 1 – Survey Map** • **Attachment 2 – Operations RWP Card**

STEP / STANDARD	**SAT / UNSAT**
Step 1: Reviews Survey Map.  Standard: • Determines RHR-V-211 is in a locked high radiation area (LHRA).	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	SAT / UNSAT
<u>Step 2:</u> Reviews Operations RWP Card.  Ops LHRA RWP 30004835 Investigations 011458171501 Walkdowns & Clearance Orders 011458171502 Dose Alarm 100 mRem Dose Rate Alarm 800 mRem/hr <u>Standard:</u> • Determines designated Operations **RWP** for LHRA is **30004835**. • Determines designated **ALARA Task** for clearance orders is **011458171502**. • Updates answer sheet with determinations.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: **Inform the candidate that the JPM is Complete.**	

STOP TIME: ___________

JPM ANSWER SHEET
COMPLETED

RWP: 30004835

ALARA Task: 011458171502

RESULTS OF JPM ILC-25 JPM A-4 (RO)

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: **Determination is made that the Operations Locked High Rad Area (LHRA) RWP 30004835 is required to be signed on to under ALARA Task # 011458171502.**

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

COMMENTS:

____

____

____

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Examiner Signature: ______________________________ **Date:** ______________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is shutdown for a refueling outage.
- RHR-C has been drained.
- RHR-V-211 (High Point Vent) for RHR-C is being danger tagged open to maintain RHR-C depressurized.

Initiating Cue:

- The SSS directs you to determine the appropriate RWP and ALARA Task you will be using to access RHR-V-211.
- Review the provided Survey Map and Operations RWP Card.
- Inform the SSS of your determination by completing the Student JPM Answer Sheet.
- Return Student JPM Answer Sheet to examiner when complete.

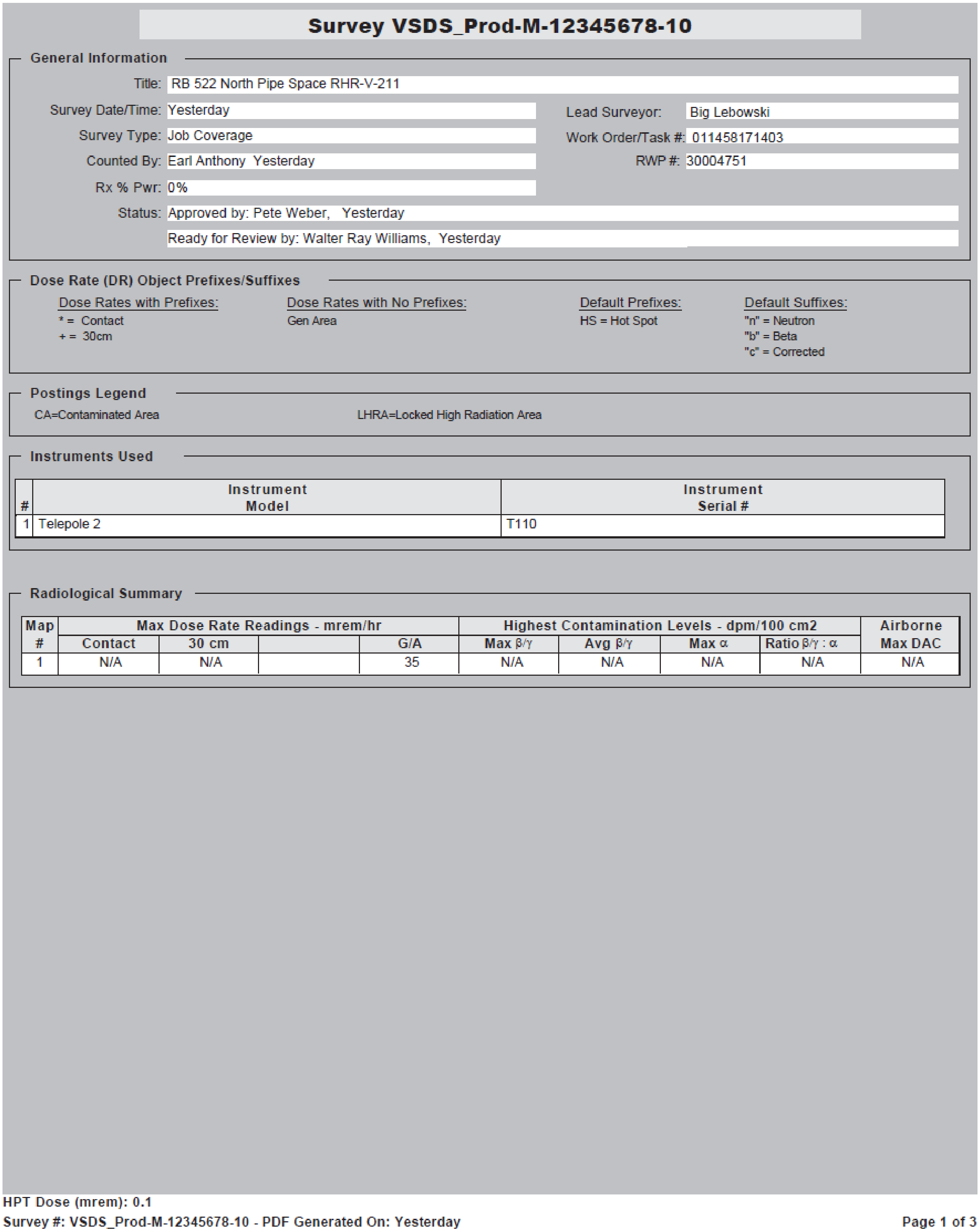
JPM ANSWER SHEET

RWP: ____________________

ALARA Task: ____________________

Attachment 1 – Survey Map

VSDS Standard Map Survey Report
DIC 1517



Survey VSDS_Prod-M-12345678-10

General Information

Title: RB 522 North Pipe Space RHR-V-211

Survey Date/Time: Yesterday

Lead Surveyor: Big Lebowski

Survey Type: Job Coverage

Work Order/Task #: 011458171403

Counted By: Earl Anthony Yesterday

RWP #: 30004751

Rx % Pwr: 0%

Status: Approved by: Pete Weber, Yesterday

Ready for Review by: Walter Ray Williams, Yesterday

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:	Dose Rates with No Prefixes:	Default Prefixes:	Default Suffixes:
* = Contact	Gen Area	HS = Hot Spot	"n" = Neutron
+ = 30cm			"b" = Beta
			"c" = Corrected

Postings Legend

CA=Contaminated Area

LHRA=Locked High Radiation Area

Instruments Used

#	Instrument Model	Instrument Serial #
1	Telepole 2	T110

Radiological Summary

Map	Max Dose Rate Readings - mrem/hr				Highest Contamination Levels - dpm/100 cm2				Airborne
#	Contact	30 cm		G/A	Max β/γ	Avg β/γ	Max α	Ratio β/γ : α	Max DAC
1	N/A	N/A		35	N/A	N/A	N/A	N/A	N/A

HPT Dose (mrem): 0.1

Survey #: VSDS_Prod-M-12345678-10 - PDF Generated On: Yesterday

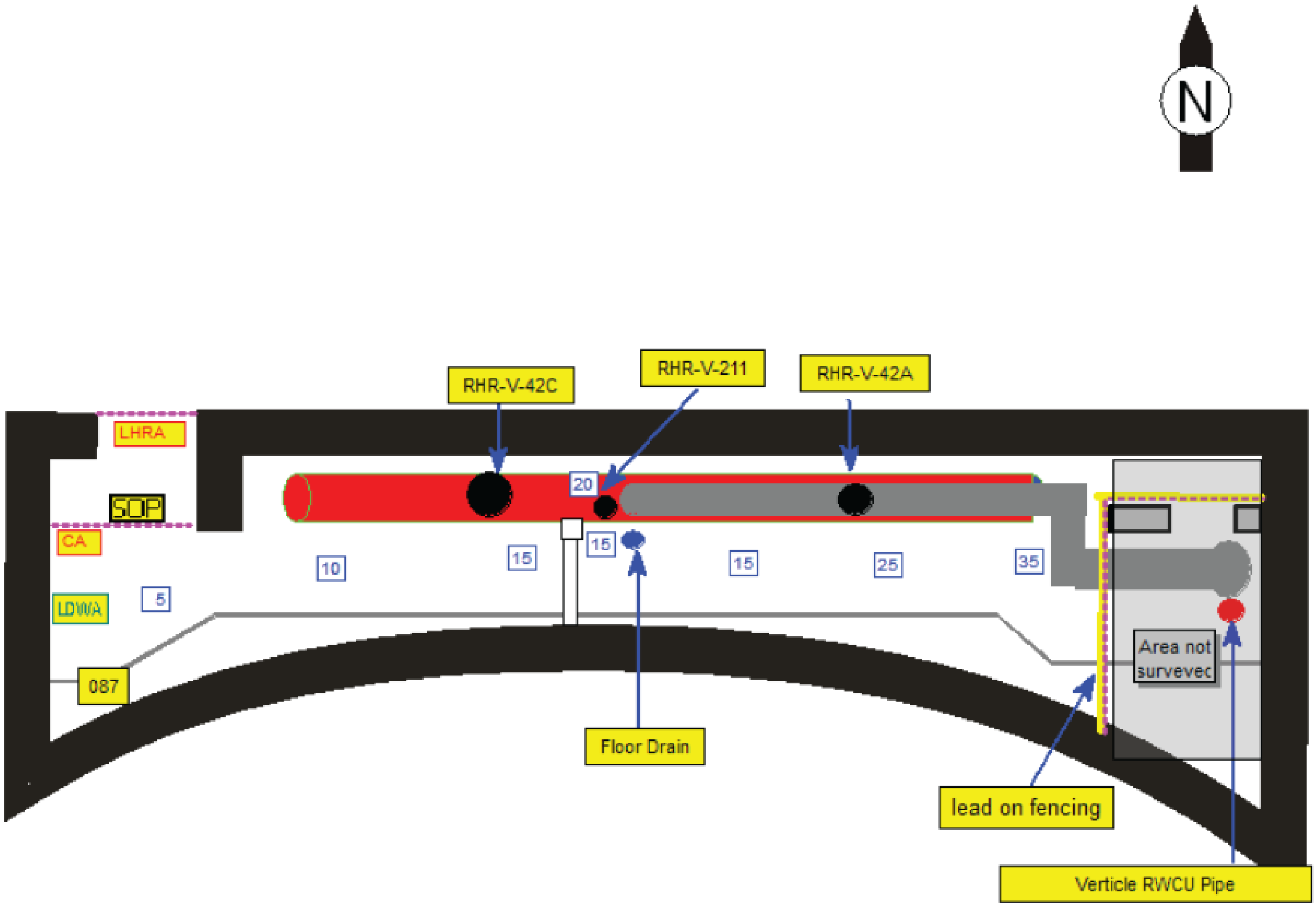
Page 1 of 3

Attachment 1 – Survey Map

VSDS Standard Map Survey Report

DIC 1517

RB 522 North Pipe Space	**Survey #: VSDS_Prod-M-XXXXXXX-10**	**Date/Time: Yesterday**



Comments:

Summary of Highest Readings
(All available values may not be listed)

Smears	**Air Samples & Wipes**

Type: Job Coverage

Symbol Legend (for example only)

Dose Rate
*150 Contact Reading
+75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear
15 Air Sample
0 RM
15 Wipe

RWP #: 30004751
Reactor Power = 0%

Dose rates in mrem/hr & Smears <1k dpm/100 cm2 unless noted

Lead Surveyor: Big Lebowski	Status: Approved by: Pete Weber, Yesterday
Location Code: RB	Bldg/Area Name: 522
Location Description: RB 522 North Pipe Space	

HPT Dose (mrem): 0.1
Survey #: VSDS_Prod-M-12345678-10 - PDF Generated On: Yesterday

Image File: RB\RB-522-North-Pipe-Space
Page 2 of 3

Attachment 1 – Survey Map

VSDS Standard Map Survey Report

DIC 1517

Data Point Details

Survey #: VSDS_Prod-M-20211209-10

Map: RB\RB-522-North-Pipe-Space

#	Type	Inst.	Value	Units	Position	Notes
DR	γ	N/A	15	mrem/hr		
DR	γ	N/A	5	mrem/hr		
DR	γ	N/A	10	mrem/hr		
DR	γ	N/A	15	mrem/hr		
DR	γ	N/A	35	mrem/hr		
DR	γ	N/A	25	mrem/hr		
DR	γ	N/A	20	mrem/hr		
DR	γ	N/A	15	mrem/hr		
	Text		Verticle RWCU Pipe			
	Text		lead on fencing			
	Text		087			
	Text		RHR-V-42C			
	Text		RHR-V-211			
	Text		RHR-V-42A			
	Text		Floor Drain			
	Posting		CA			
	Posting		LHRA			

Attachment 2 – Operations RWP Card

RWP 30004834 NON-HRA

Ops Investigations

010790021801

Rx/RW Bldg Tour

010790021802

Turbine Bldg Tour

010790021803

Tags and Clearances

010790021804

Dose Alarm 10 mrem

Dose Rate Alarm 80 mrem/hr

Front

2022

Ops HRA RWP 30004833

Investigations

011458161501

Walkdowns & Clearance Orders

011458161508

Dose Alarm 50 mRem

Dose Rate Alarm 300 mRem/hr

Ops LHRA RWP 30004835

Investigations

011458171501

Walkdowns & Clearance Orders

011458171502

Dose Alarm 100 mRem

Dose Rate Alarm 800 mRem/hr

Back

ENERGY NORTHWEST

ILC-25 A-5 (SRO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM A-5 (SRO)

LESSON LENGTH 0.4HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ________ Rev. No. ________

SIMULATOR GUIDE PQD CODE ________ Rev. No. ________

JPM PQD CODE ________ Rev. No. ________

EXAM PQD CODE ________ Rev. No. ________

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 11/28/22

REVISED BY ________ DATE ________

TECHNICAL REVIEW BY ________ DATE ________

INSTRUCTIONAL REVIEW BY ________ DATE ________

APPROVED BY ________ DATE ________

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines RODLINE to be 80 ± 1 and Rx power to be 64 ± 1% after flow reduction which places plant in the "FWH OOS REGION" of Attachment 7.1. Determines actions required per ABN-POWER are steps 4.3.1.d, 4.3.1.e, and 4.3.2 through 4.3.6.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 20 Minutes

Task Applicability: RO ☐ **SRO** ☑

Task Number and Title: SRO-0643 Direct response to an unplanned feedwater temperature reduction.

K/A Importance Factors: RO: 4.4 **SRO:** 4.7

K/A Number: 2.1.7

K/A Statement: Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.1 – Conduct of Operations

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - Student JPM Information Sheet **(Page 13)**
  - Student JPM Answer Sheet **(Page 14)**
  - ABN-POWER **(JPM A-5 ILC-25 Ref 1.PDF)**
  - PPM 9.3.12 **(JPM A-5 ILC-25 Ref 2.PDF)**
  - Two-Loop Power-Flow Map **(JPM A-5 ILC-25 Ref 3.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:
- Clear ruler
- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 9.3.12	038	N/A
ABN-POWER	018	N/A
ABN-CORE	021	N/A

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the Candidate.

Initial Conditions:

- Columbia is near the End-of-Cycle and has entered both stages of Final Feedwater Temperature Reduction (FFTR).
- Columbia is currently at 82% Rx Power with all rods out and core flow at 113 Mlbm/hr.
- Feedwater Inlet Temperature is stable at 372ºF.

Later on:

- RFW-HX-6A spuriously trips.
- Core flow was lowered to 74 Mlbm/hr per ABN-POWER.
- Feedwater Inlet Temperature is now stable at 352ºF.

Initiating Cue:

- Determine what Feedwater Temperature vs Reactor Power region the plant is in and PROVIDE JUSTIFICATION.
- Determine what specific steps per ABN-POWER are REQUIRED to be performed as a result.
- List your answers on the Student JPM Answer Sheet and return the sheet to the Examiner when complete.

START TIME:___________

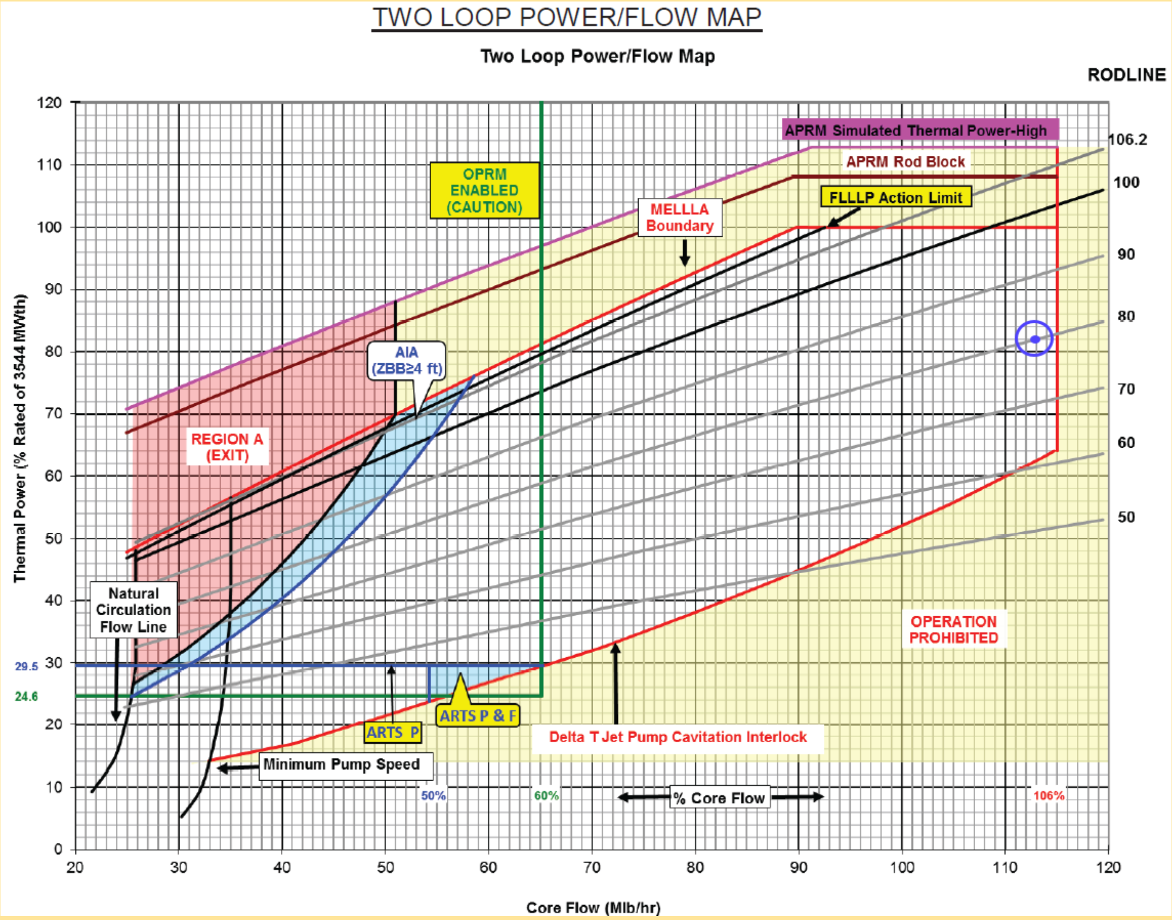
Examiner Note: **Provide candidate with the following:**

- **Student JPM Information Sheet**
- **Student JPM Answer Sheet**
- **Student Reference #1 (marked-up copy of ABN-POWER)**
- **Student Reference #2 (pages of PPM 9.3.12)**
- **Student Reference #3 (Two-Loop Power/Flow Map)**

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Since all rods are out, student may erroneously assume the plant RODLINE is 100 and not perform this step.**	

Step 1:

Reviews Two-Loop Power/Flow Map to determine RODLINE.



Standard:

- Graphs initial power and flow (**82%** vs **113** Mlbm/hr).
- Determines RODLINE is **80 ± 1**.

CRITICAL STEP

____SAT

____UNSAT

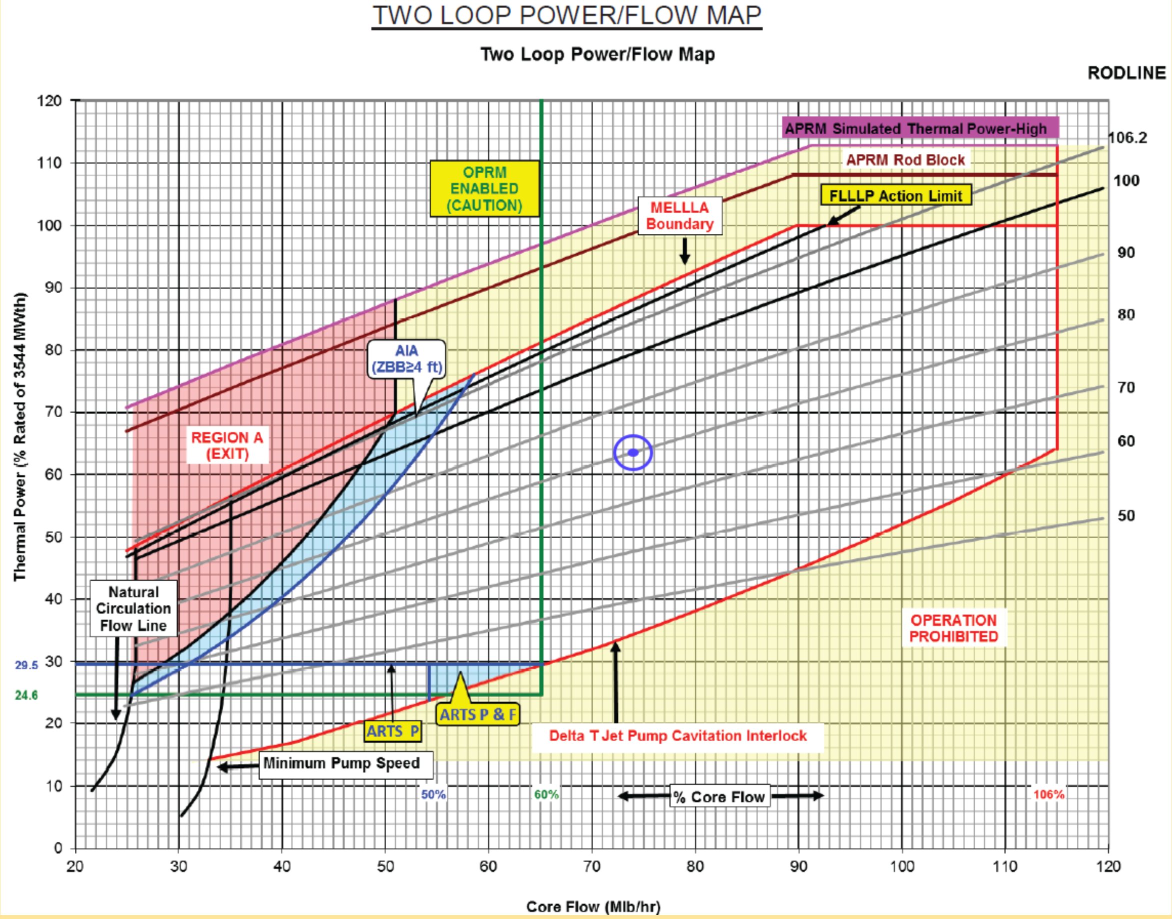
____N/A

STEP / STANDARD | **SAT / UNSAT**

Examiner Note: **Erroneously using a RODLINE of 100 (from previous step) and plotting against core flow below will result in an erroneous reactor power value of ~79%.**

Step 2:

Reviews Two-Loop Power/Flow Map to determine power after flow reduction using previously determined RODLINE.



Standard:

- Graphs flow and RODLINE (Flow at **74 Mlbm/hr** vs RODLINE at **80 ± 1**).
- Determines Rx Power is **64 ± 1%**.

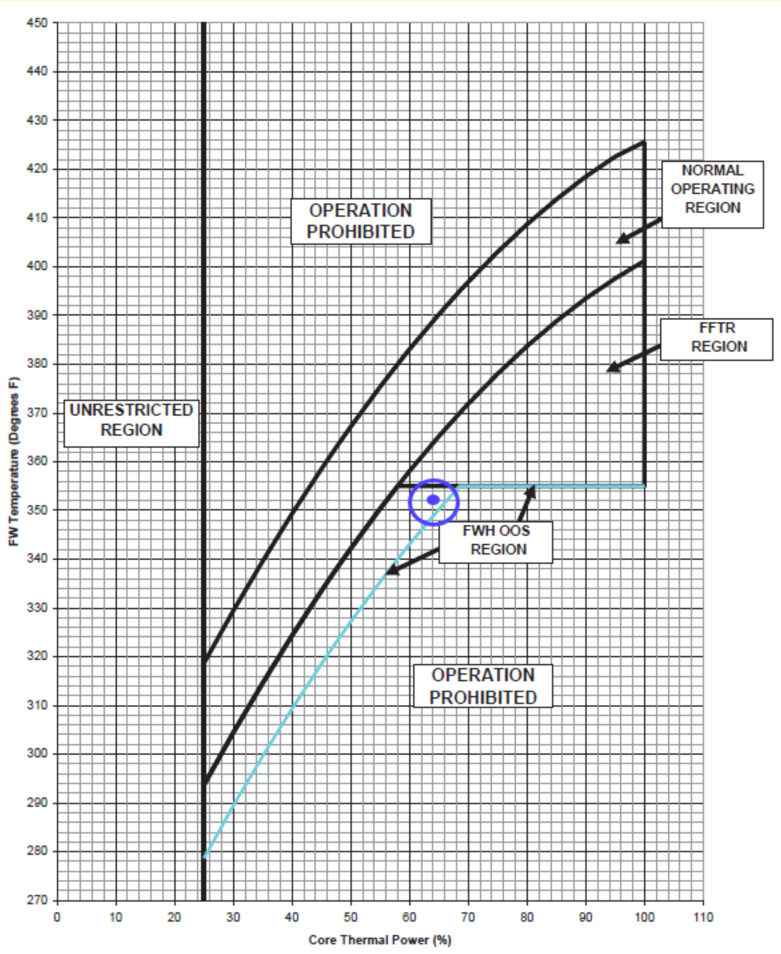
CRITICAL STEP

____SAT

____UNSAT

____N/A

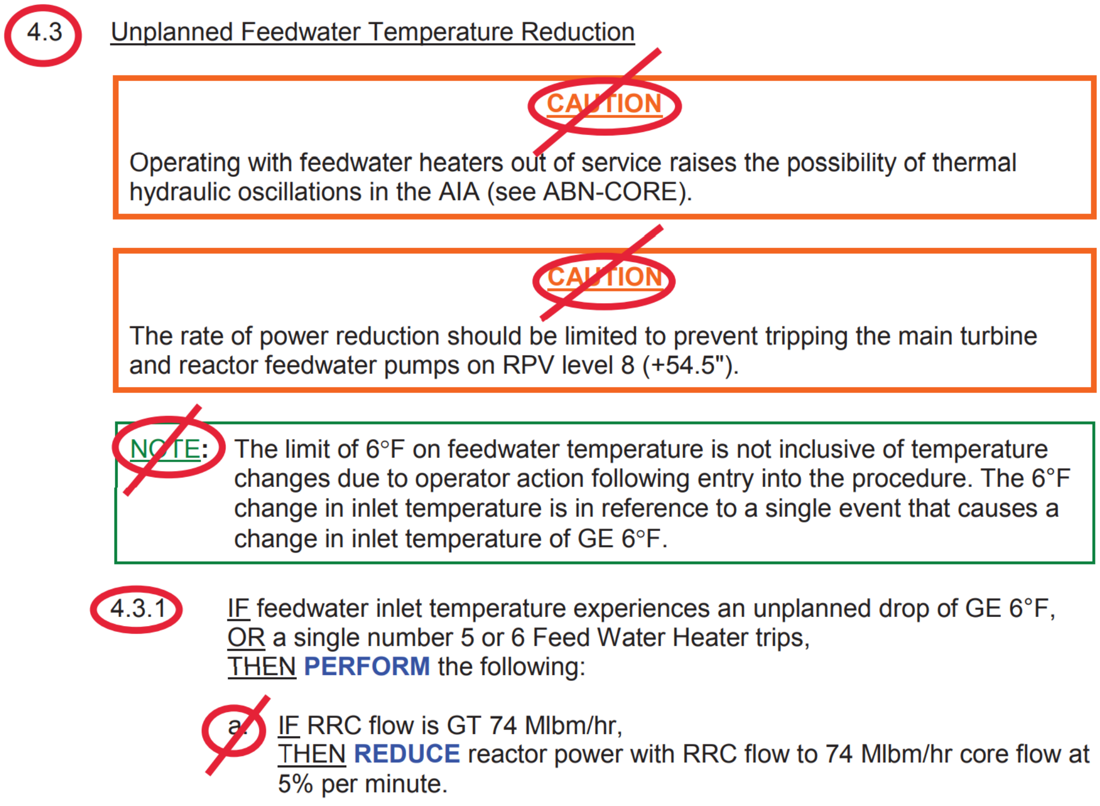
Examiner Note:	**Erroneously using a reactor power of ~79% (from previous step) and plotting against feedwater temperature below leads one to believe that the plant is operating in the “OPERATION PROHIBITED” region (vice the FWH OOS region).**

STEP / STANDARD	**SAT / UNSAT**
Step 3: Reviews ABN-POWER Attachment 7.1 (Feedwater Temperature vs Reactor Power) to determine current region of operation.  Standard: • Graphs Rx power and feedwater temperature (**64 ± 1%** vs **352ºF**). • Determines region is “FWH OOS REGION”. • Updates Student JPM Answer Sheet.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**

Step 4:

Reviews ABN-POWER Section 4.3, Unplanned Feedwater Temperature Reduction, for applicable actions.



4.3 Unplanned Feedwater Temperature Reduction

~~CAUTION~~

Operating with feedwater heaters out of service raises the possibility of thermal hydraulic oscillations in the AIA (see ABN-CORE).

~~CAUTION~~

The rate of power reduction should be limited to prevent tripping the main turbine and reactor feedwater pumps on RPV level 8 (+54.5").

~~NOTE~~: The limit of 6°F on feedwater temperature is not inclusive of temperature changes due to operator action following entry into the procedure. The 6°F change in inlet temperature is in reference to a single event that causes a change in inlet temperature of GE 6°F.

4.3.1 IF feedwater inlet temperature experiences an unplanned drop of GE 6°F, OR a single number 5 or 6 Feed Water Heater trips, THEN **PERFORM** the following:

~~a.~~ IF RRC flow is GT 74 Mlbm/hr, THEN **REDUCE** reactor power with RRC flow to 74 Mlbm/hr core flow at 5% per minute.

Standard:

- Recognizes from Initial Conditions that 4.3.1.a has been completed.

____SAT

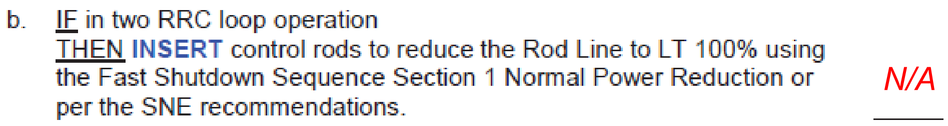
____UNSAT

____N/A

Examiner Note: **Erroneously using a RODLINE of 100 (from previous step) would prompt performance of following step (which is unnecessary).**

Step 5:

Reviews Step 4.3.1.b.



b. IF in two RRC loop operation THEN **INSERT** control rods to reduce the Rod Line to LT 100% using the Fast Shutdown Sequence Section 1 Normal Power Reduction or per the SNE recommendations. *N/A*

Standard:

- Recognizes that RODLINE is already LT 100% and N/A's step.

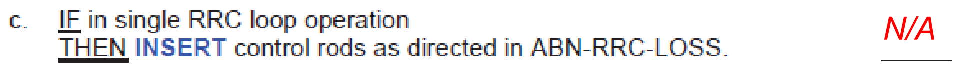
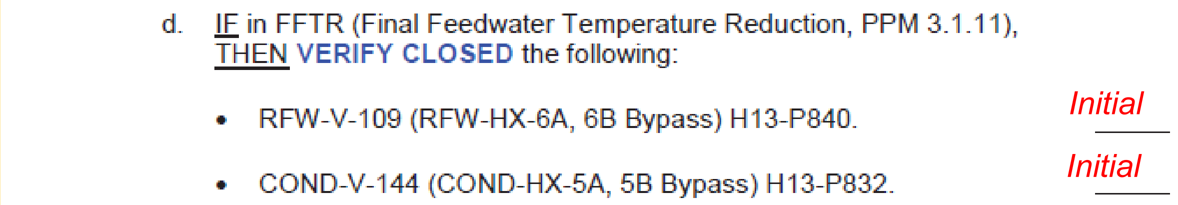
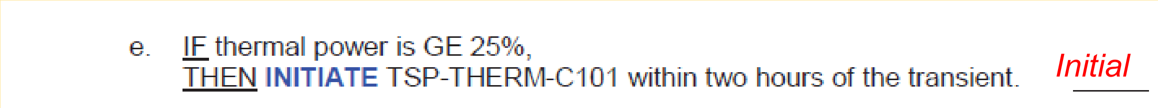
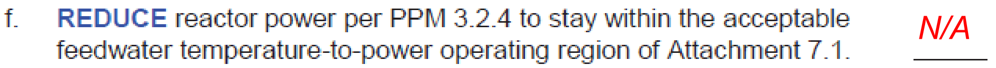
____SAT

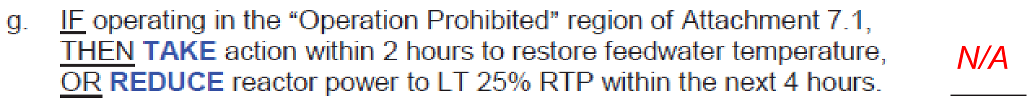
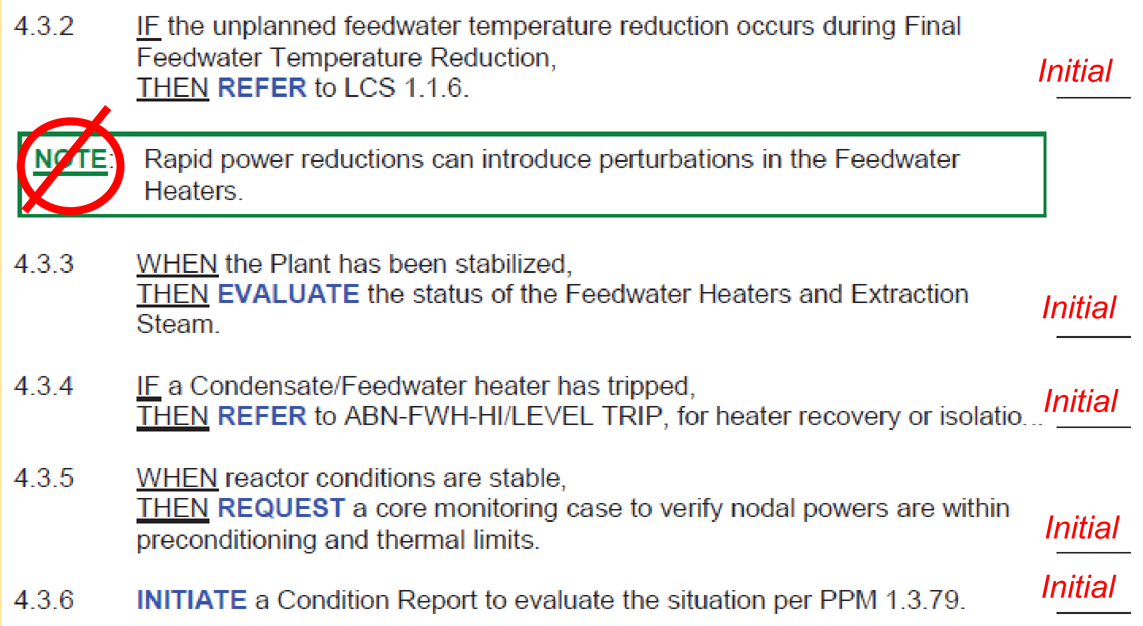
____UNSAT

____N/A

If the student requests an SNE recommendation:

Examiner Cue: "The SNE has no recommendation.".

STEP / STANDARD	**SAT / UNSAT**
Step 6: Reviews Step 4.3.1.c.  c. IF in single RRC loop operation THEN **INSERT** control rods as directed in ABN-RRC-LOSS. *N/A* Standard: • Recognizes that the plant is in two loop operation and N/A's step.	___SAT ___UNSAT ___N/A
Step 7: Reviews Step 4.3.1.d.  d. IF in FFTR (Final Feedwater Temperature Reduction, PPM 3.1.11), THEN **VERIFY CLOSED** the following: • RFW-V-109 (RFW-HX-6A, 6B Bypass) H13-P840. *Initial* • COND-V-144 (COND-HX-5A, 5B Bypass) H13-P832. *Initial* Standard: • Recognizes that the plant is in FFTR and performs step. • Updates Student JPM answer sheet.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Step 8: Reviews Step 4.3.1.e.  e. IF thermal power is GE 25%, THEN **INITIATE** TSP-THERM-C101 within two hours of the transient. *Initial* Standard: • Recognizes that the plant is at ~64% power and performs step. • Updates Student JPM answer sheet.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Examiner Note: **If student previously concluded that the plant is operating in the "OPERATION PROHIBITED" region, they will erroneously conclude that below two steps need to be performed.**	
Step 9: Reviews Step 4.3.1.f.  f. **REDUCE** reactor power per PPM 3.2.4 to stay within the acceptable feedwater temperature-to-power operating region of Attachment 7.1. *N/A* Standard: • Recognizes that the plant is in an acceptable region of Attachment 7.1 and N/A's step.	___SAT ___UNSAT ___N/A

STEP / STANDARD	**SAT / UNSAT**
Step 10: Reviews Step 4.3.1.g.  g. IF operating in the "Operation Prohibited" region of Attachment 7.1, THEN **TAKE** action within 2 hours to restore feedwater temperature, OR **REDUCE** reactor power to LT 25% RTP within the next 4 hours. *N/A* Standard: - Recognizes that the plant is in an acceptable region of Attachment 7.1 and N/A's step.	____SAT ____UNSAT ____N/A
Step 11: Reviews remaining steps.  4.3.2 IF the unplanned feedwater temperature reduction occurs during Final Feedwater Temperature Reduction, THEN **REFER** to LCS 1.1.6. *Initial* NOTE: Rapid power reductions can introduce perturbations in the Feedwater Heaters. 4.3.3 WHEN the Plant has been stabilized, THEN **EVALUATE** the status of the Feedwater Heaters and Extraction Steam. *Initial* 4.3.4 IF a Condensate/Feedwater heater has tripped, THEN **REFER** to ABN-FWH-HI/LEVEL TRIP, for heater recovery or isolatio… *Initial* 4.3.5 WHEN reactor conditions are stable, THEN **REQUEST** a core monitoring case to verify nodal powers are within preconditioning and thermal limits. *Initial* 4.3.6 **INITIATE** a Condition Report to evaluate the situation per PPM 1.3.79. *Initial* Standard: - These steps are all applicable and are added to the Student JPM Answer Sheet.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
If the student requests a core monitoring case per step 4.3.5: **Examiner Cue: "Demand a core monitoring case.".**	
Examiner Cue: Inform the candidate that the JPM is Complete.	

STOP TIME: ____________

JPM ANSWER SHEET

Feedwater Temperature vs Reactor Power region determination:

FWH OOS REGION

What is your justification for the above determination?

Determined RODLINE based on initial conditions. Used RODLINE to determine Rx power following flow reduction. Plotted Rx power vs. feedwater temperature on ATT 7.1 to determine region operating in. (or words to this effect)

Examiner Note: Candidate plotting the correct coordinates on the Power-Flow map AND ABN-POWER Attachment 7.1 may be used for justification as well.

What steps were REQUIRED to be performed per ABN-POWER:
(List specific ABN steps)

ABN-POWER Steps 4.3.1.d, 4.3.1.e, and 4.3.2 through 4.3.6

RESULTS OF JPM ILC-25 JPM A-5 (SRO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Determines RODLINE to be 80 ± 1 and Rx power to be 64 ± 1% after flow reduction which places plant in the "FWH OOS REGION" of Attachment 7.1. Determines actions required per ABN-POWER are steps 4.3.1.d, 4.3.1.e, and 4.3.2 through 4.3.6.**

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

COMMENTS:

____

____

____

____

____

____

____

____

____

____

Examiner Signature: ______________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is near the End-of-Cycle and has entered both stages of Final Feedwater Temperature Reduction (FFTR).
- Columbia is currently at 82% Rx Power with all rods out and core flow at 113 Mlbm/hr.
- Feedwater Inlet Temperature is stable at 372ºF.

Later on:

- RFW-HX-6A spuriously trips.
- Core flow was lowered to 74 Mlbm/hr per ABN-POWER.
- Feedwater Inlet Temperature is now stable at 352ºF.

Initiating Cue:

- Determine what Feedwater Temperature vs Reactor Power region the plant is in and PROVIDE JUSTIFICATION.
- Determine what specific steps per ABN-POWER are REQUIRED to be performed as a result.
- List your answers on the Student JPM Answer Sheet and return the sheet to the Examiner when complete.

STUDENT JPM ANSWER SHEET

Feedwater Temperature vs Reactor Power region determination:

____

What is your justification for the above determination?

____

____

____

____

____

What steps were REQUIRED to be performed per ABN-POWER:
(List specific ABN steps)

____

____

____

____

____

Verify Revision Information Prior To Use	Initials	T. S.
	Date	Today.

Number: ABN-POWER	Use Category: CONTINUOUS	Major Rev: 018 Minor Rev: N/A Page: 1 of 17
Title: Unplanned Reactor Power Change		

PLANT PROCEDURES MANUAL	PCN#: N/A
ABN-POWER	Effective Date: 08/05/21

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	Description (including summary, reason, initiating document, if applicable)
9,14	Added step to verify valves closed if in Final Feedwater Temperature Reduction mode to align with PPM 3.1.11 (AR-417173)

1.0 ENTRY CONDITIONS

1.1 Unplanned Reactor Power Change

A noticeable unplanned reactor power change is indicative of changing plant conditions. This procedure should not be entered for normal fluctuations of reactor power observed on the APRMs due to fluctuations in the boiling boundary. This procedure should also not be entered for a reactor power change associated with a reactor scram. This procedure should not be entered for a planned reactor power change directed by a Reactivity Control Plan (RCP). Typically, small power changes are not identifiable on the APRMs but can be identified on PPCRS. Power changes can be caused by a number of things including:

- ⊙ RPV inlet temperature change
- ⊙ #5 or #6 Feed Water Heater Trip Indication
- Core flow change (Automatic RRC pump speed change)
- Core flow change (Due to operator Core Flow change for unplanned conditions)
- Jet Pump Failure
- Resin intrusion
- RPV pressure change
- Neutron poison changes due to reactor power changes

NOTE: The following procedures should be referred to for the specific identified conditions:

- Control rod drift or single control rod scram - ABN-ROD
- RRC pump trip - ABN-RRC-LOSS
- DEH failure - ABN-PRESSURE
- SRV actuation - ABN-SRV
- Main steam line isolation (not in RUN, LT 1060 psig) - ABN-PRESSURE

2.0 AUTOMATIC ACTIONS

- Possible rod withdrawal block from APRMs or RBMs.
- Possible RPS full or half scram from neutron monitoring system inputs.

3.0 IMMEDIATE OPERATOR ACTIONS

3.1 IF Thermal Power has exceeded the following:

- 3544 MWT when both LEFMs are in Check Plus mode
- 3533 MWT when either LEFM is in the Check Mode
- 3486 MWT when either LEFM is in Failure mode

THEN **REDUCE** Thermal Power to less than the limits listed above.

3.2 RRC Flow Control System Failure

NOTE: The preferred method for stopping an RRC pump is by use of the STOP pushbuttons or by opening E-CB-RRA(B).

3.2.1 IF RRC pump speed is rising for one pump
AND cannot be controlled,
THEN **STOP** the affected RRC pump. _____

3.2.2 IF RRC pump speed is rising for both pumps
AND cannot be controlled,
THEN **PERFORM** the following:

a. **SCRAM the Reactor** per PPM 3.3.1. _____

b. IF the RRC pump(s) did not runback following the scram,
THEN **STOP** the affected RRC pump(s). _____

c. IF both RRC pumps were stopped,
THEN **EXIT** to ABN-RRC-LOSS. _____

3.2.3 IF RRC pump speed has changed for one pump,
AND the ratio of the pump speeds is GT 2 to 1,
THEN **STOP** the affected pump. _____

4.0 SUBSEQUENT OPERATOR ACTIONS

~~NOTE~~: Refer to Section 4.1 for RRC Flow change.
Refer to Section 4.2 for Jet Pump failure.
Refer to Section 4.3 for a unplanned feedwater temperature reduction.

4.1 RRC Flow Change

CAUTION

Reducing the core flow to LT ~64% may cause the OPRM to be Enabled. The OPRM trip functions will enable when the drive flow as measured by the APRM is reduced to LT 60% drive flow. If the OPRM enables then this is considered an entry into the OPRM Enabled Region and requires entry into ABN-CORE. Reducing core flow to LT 55% of rated flow may cause entry into the Area of Increased Awareness of the Power-to-Flow map.

4.1.1 IF RRC pump speed is lowering for one pump,
AND cannot be controlled,
THEN **STOP** the affected pump prior to exceeding the allowable mismatch in Attachment 7.2. ______

4.1.2 IF RRC flow is fluctuating,
THEN **PLACE** the RRC pump controllers in **MANUAL**,
AND **VERIFY** flow has stabilized, ______
OR **STOP** the uncontrolled pump. ______

4.1.3 IF RRC flow has risen,
AND RRC system flow control is restored,
THEN **REDUCE** RRC flow to the pre-transient value. ______

4.1.4 IF the OPRM Enables (APRM STP GE 24.6% and RRC Drive Flow LT 60% as specified in the COLR),
THEN **REFER** to ABN-CORE. ______

4.1.5 **REFER** to Technical Specification 3.4.1. ______

4.1.6 IF RRC flow must be changed to balance loop flows,
THEN **REFER** to the current power to flow map,
AND **ADJUST** RRC flow to match, ______
OR **DECLARE** the loop with the lower flow not in operation. ______

4.1.7 IF in single RRC loop operation,
THEN **REFER** to ABN-RRC-LOSS. ______

4.1.8 IF in two RRC loop operation
AND the Total Core Flow is LE 86 Mlb/hr
THEN **INSERT** control rods to reduce the Rod Line to LT 100% using the Fast Shutdown Sequence Section 1 Normal Power Reduction or per the SNE recommendations. ______

4.1.9 IF thermal power is GE 25%,
AND the CTP was reduced GT 10% from the pre-transient value
THEN **INITIATE** TSP-THERM-C101 within two hours of the transient. _____

4.1.10 WHEN reactor conditions are stable,
THEN **REQUEST** a core monitoring case to verify nodal powers are within preconditioning and thermal limits. _____

4.1.11 **INITIATE** a Condition Report to evaluate the situation per PPM 1.3.79. _____

4.2 Jet Pump Failure

CAUTION

A symptom of a failed jet pump is erroneously higher total core flow indication. Use caution when reducing core flow since this may result in inadvertent entry into an unstable area of Power vs Flow map (Region A) with degraded OPRM protection. Reducing Core Flow at a high rod line may cause a core instability to occur.

CAUTION

A failed Jet Pump Hold Down Beam will result in potential for more vibrations and loose parts that can damage fuel and other reactor internals. Actions to shutdown the plant and remove the affected loop from service should be expedited.

4.2.1 IF in two RRC Loop Operation
THEN **PERFORM** OSP-RRC-D701 to determine operability, _____
AND **REFER** to Technical Specification SR 3.4.2.1. _____

4.2.2 IF in single RRC Loop Operation
THEN **PERFORM** OSP-RRC-D702 to determine operability, _____
AND **REFER** to Technical Specification SR 3.4.2.1. _____

NOTE**:** The following instrumentation changes would be an indication of a jet pump hold down beam failure:

- A large step increase in a single Jet Pumps differential pressure, due to reverse flow through the jet pumps diffuser.
- A large reduction in the Jet Pump differential pressure of the adjacent jet pump on the raiser pipe, due to a loss of drive flow. (1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12, 13 & 14, 15 & 16, 17 & 18, 19 & 20)
- A step increase in the indicated RRC drive flow on the affected loop, due to the reduction in pressure drop from the ejected jet pump nozzle section.
- A step reduction in Core Thermal Power (CTP), due to the actual reduction in Core Flow.
- A step reduction in the Core Plate Dp indication.
- A step reduction in the flow of the other Jet Pumps on the affected loop, due to the reduction of drive flow pressure.
- In two loop operation, a step increase in the flow of the Jet Pumps on other RRC loop.
- In single loop operation the change in indication will depend on if the failure occurs on the operating loop or the idle loop.

4.2.3 **NOTIFY** Reactor Engineering for evaluation assistance. _____

4.2.4 IF a Jet Pump Hold Down Beam failure is confirmed,
THEN **PERFORM** the following:

a. **SCRAM the Reactor** per PPM 3.3.1. _____

b. **STOP** the affected RRC pump. _____

NOTE: If a Jet Pump sensing line fails then a single Jet Pumps differential pressure indication may significantly increase. The indicated total core flow indication may also increase, but there would not be a change in the core thermal power. And the affected RRC pumps drive flow would not change. The core plate Dp would also remain constant. The Jet Pump Operability surveillance OSP-RRC-D701(2) would indicate that criteria a) Indicated Recirculation Loop (Drive) Flow Within 10% of Established Recirc Loop (Drive) Flow is satisfied "YES". The failure of a Jet Pump sensing line is NOT a catastrophic failure that requires an immediate reactor scram.

NOTE: If a Jet Pump sensing line has failed then the indicated Core Flow may be erroneously higher than the actual value. The APRM indicated flow should not be impacted by a Jet Pump sensing line failure. Review the indicated Percent Core Flow and the APRM indicated flow for guidance during any power reductions.

NOTE: If a Jet Pump Dp transmitter has failed then a Work Request should be generated to recalibrate or replace the transmitter.

4.2.5 IF a Jet Sensing Line Failure is confirmed,
THEN **PERFORM** the following:

a. IF a reactor shutdown is required due to failing to satisfy Technical Specification 3.4.2,
THEN **PERFORM** the following:

1) Notify Reactor Engineering for assistance. _____

2) IF in two RRC loop operation
THEN **INSERT** control rods per the Fast Shutdown Sequence Section 1 Normal Power Reduction or per the SNE recommendations to perform a controlled shutdown. _____

3) IF in single RRC loop operation
THEN **INSERT** control rods as directed in ABN-RRC-LOSS. _____

4) Perform a controlled shutdown per PPM 3.2.1. _____

4.2.6 **INITIATE** a Condition Report to evaluate the situation per PPM 1.3.79. _____

4.3 Unplanned Feedwater Temperature Reduction

~~CAUTION~~

Operating with feedwater heaters out of service raises the possibility of thermal hydraulic oscillations in the AIA (see ABN-CORE).

~~CAUTION~~

The rate of power reduction should be limited to prevent tripping the main turbine and reactor feedwater pumps on RPV level 8 (+54.5").

~~NOTE~~: The limit of 6°F on feedwater temperature is not inclusive of temperature changes due to operator action following entry into the procedure. The 6°F change in inlet temperature is in reference to a single event that causes a change in inlet temperature of GE 6°F.

4.3.1 IF feedwater inlet temperature experiences an unplanned drop of GE 6°F,
OR a single number 5 or 6 Feed Water Heater trips,
THEN **PERFORM** the following:

~~a.~~ IF RRC flow is GT 74 Mlbm/hr,
THEN **REDUCE** reactor power with RRC flow to 74 Mlbm/hr core flow at 5% per minute.

b. IF in two RRC loop operation
THEN **INSERT** control rods to reduce the Rod Line to LT 100% using the Fast Shutdown Sequence Section 1 Normal Power Reduction or per the SNE recommendations. _____

c. IF in single RRC loop operation
THEN **INSERT** control rods as directed in ABN-RRC-LOSS. _____

d. IF in FFTR (Final Feedwater Temperature Reduction, PPM 3.1.11),
THEN **VERIFY CLOSED** the following:

- RFW-V-109 (RFW-HX-6A, 6B Bypass) H13-P840. _____
- COND-V-144 (COND-HX-5A, 5B Bypass) H13-P832. _____

e. IF thermal power is GE 25%,
THEN **INITIATE** TSP-THERM-C101 within two hours of the transient. _____

f. **REDUCE** reactor power per PPM 3.2.4 to stay within the acceptable feedwater temperature-to-power operating region of Attachment 7.1. _____

g. IF operating in the “Operation Prohibited” region of Attachment 7.1,
THEN **TAKE** action within 2 hours to restore feedwater temperature,
OR **REDUCE** reactor power to LT 25% RTP within the next 4 hours. _____

4.3.2 IF the unplanned feedwater temperature reduction occurs during Final Feedwater Temperature Reduction,
THEN **REFER** to LCS 1.1.6. _____

> **NOTE**: Rapid power reductions can introduce perturbations in the Feedwater Heaters.

4.3.3 WHEN the Plant has been stabilized,
THEN **EVALUATE** the status of the Feedwater Heaters and Extraction Steam. _____

4.3.4 IF a Condensate/Feedwater heater has tripped,
THEN **REFER** to ABN-FWH-HI/LEVEL TRIP, for heater recovery or isolation. _____

4.3.5 WHEN reactor conditions are stable,
THEN **REQUEST** a core monitoring case to verify nodal powers are within preconditioning and thermal limits. _____

4.3.6 **INITIATE** a Condition Report to evaluate the situation per PPM 1.3.79. _____

5.0 BASES

1.0 During the final feedwater temperature reduction performed in 1999, a 12°F temperature reduction resulted in a 2.5% power rise. Thus, a 5°F reduction in reactor inlet temperature will result in approximately a one percent reactor power change.

The magnitude of reactor power change caused RRC pump speed changes is dependent on factors such as initial rod line, initial pump speed, feedwater inlet temperature, fuel exposure, etc. Small changes in RRC pump speed can cause a noticeable change in reactor power.

Based on experiences at Columbia Generating Station, it is known that a resin intrusion results in a slight lowering of reactor power. This is believed to be caused by a “soap film” affect on the steam bubbles formed in the fuel region of the core. Since the steam bubbles tend to survive longer before collapsing, the amount of voids goes up. The rising void content results in lower reactor power. The power change from a resin intrusion is actually seen before a change in reactor water conductivity is observed.

NOTE This note documents the preferred methods for stopping the RRC pumps. Other methods can be used, such as opening CB-RPT-3A(B) or CB-RPT-4A(B), but these methods should be used as a backup to the preferred methods. The preferred methods open breakers on the supply side of the ASDs, thus providing protection for the ASD GTOs.

3.1 No matter what the cause, reactor power should be restored to within the licensed rated thermal power limit of 3544 mega-watts thermal when both the LEFM Feedwater flow meters are in the Check Plus Mode. If one or more LEFM feedwater flow meters are in Check Mode, restore reactor power to within the licensed rated thermal power limit of 3533 mega-watts thermal. If there is a complete loss of one or both LEFM Meter status indication, restore reactor power to within the licensed rated thermal power limit of 3486 mega-watts thermal. The easiest and most efficient way to do this is with RRC flow. Other immediate actions in this procedure may require that the RRC pumps be tripped or that RRC flow be reduced to a lower value than that required to maintain reactor power at less than or equal to 100% power. This step is not intended to limit the RRC flow reduction that may be required by other procedure steps.

3.2.1 Uncontrolled RRC flow rise will cause an uncontrolled reactor power rise. If RRC pump speed cannot be controlled, then stopping the pump is required to control reactor power. When RRC pump speed is lowering, it is acceptable to allow the speed to continue to lower since this is a transient that is easier for the plant to respond to than the transient associated with an RRC pump trip. The decision to allow an uncontrolled lowering of RRC pump speed to continue, verses tripping the pump, is one that should be made based on plant conditions.

3.2.2 If RRC pump speed is rising and control cannot be regained, fuel thermal limits can be challenged. Therefore, the reactor is scrammed in anticipation of tripping both RRC pumps.

If RRC pump speed cannot be controlled in automatic or manual, then the RRC pumps are stopped to limit potential RRC pump and jet pump damage due to cavitation. ABN-RRC-LOSS is entered to respond to the loss of all RRC.

3.2.3 If RRC pump speed has increased or decreased for one pump such that the ratio of the pump speeds is GT 2 to 1 then stop the affected pump. Provides direction to take immediate action to prevent operation within the OPERATION PROHIBITED region of the Two Loop Recirculation Pump Speed Mismatch Operating Limitations Curve Attachment 7.2.

NOTE This note provides a list of procedures that may be applicable for conditions that can lead to a change in reactor power. This list is helpful in identifying the appropriate procedure that provides detailed instructions for dealing with the condition that is causing the change in reactor power.

CAUTION The OPRM Enabled Region starts at ~64% decreasing core flow. The Area of Increased Awareness (AIA) starts at ~55% core flow at ~110% rod line. The AIA is curved area ~5% core flow higher that the Region A area. Maintaining total core flow at GT 64% provides margin to potential core instabilities. {P-77715}

4.1.1 When RRC pumps operate outside the allowable mismatch it causes instabilities and vibrations in the jet pumps this precludes the unnecessary plant equipment stresses.

4.1.2 If RRC pump speed is fluctuating, then one or both RRC pumps controllers are taken to manual. If fluctuations continue, then the uncontrolled RRC pump is stopped in an attempt to gain control of RRC flow.

4.1.3 If control of RRC flow is restored, either through automatic control system restoration or by placing the control system in manual, then RRC flow should be reduced to the pre-transient flow value to restore the core to pre-transient conditions. Depending on the initial reactor power, RRC flow, and rod line, a rising RRC flow transient can lead to high power peaking. Restoration of core flow to pre-transient conditions can limit the potential for fuel failure.

4.1.4 The OPRM Enabled Region setpoint is specified in the COLR and is depicted on the Power to Flow map as GT 24.6% CTP and LT 60% WT. The actual OPRM Enabled Region is based on the APRM indicated flow, which is based on the drive flow.

4.1.5 Technical Specification 3.4.1 provides requirements for RRC loop operation and loop flow mismatch. These requirements should be reviewed and the appropriate actions taken.

4.1.6 Failure of a single RRC pump controller can lead to an unacceptable RRC loop flow imbalance. Technical Specification 3.4.1 requires that the flow imbalance be corrected within 2 hours or that the loop with the lower flow be declared “not in operation.” Depending upon the power to flow conditions, adjusting the RRC flow may result in entering the OPRM Enabled Region of the power to flow map. In these cases the loop with the lower flow should be declared not in operation and a plan to restore flow balance developed in conjunction with reactor engineering.

4.1.7 ABN-RRC-LOSS provides direction for single a loss of an RRC pump.

4.1.8 To reduce the potential for a MFLCPR violation following a large core flow reductions control rods are inserted to reduce the rod line to less than 100%.

4.1.9 Thermal limits should be evaluated following an unplanned CTP reduction greater than 10%.

4.1.10 A transient that is associated with a RRC flow change can significantly affect fuel conditions. Therefore, preconditioning and thermal limits should be reviewed to ensure limits are met.

4.2 Jet Pump failure may be indicated by the following indications: Reference SIL 330

- Sudden reduction in Reactor Power.
- Sudden rise in RRC Loop Flow.
- Sudden reduction in Core dp.
- Sudden reduction in differential pressure on the jet pump sharing the riser with the defective jet pump.
- Sudden change in Core Flow
- Total jet pump flow and core flow differential GT allowable.
- Individual jet pump indication not within the allowable deviation.

The structural failure of a jet pump could cause significant degradation in the ability of the jet pumps to allow re-flooding to two-thirds core height during a LOCA.

CAUTION A loss of reactor feedwater heating causes the core to become more bottom peaked. This results in the core power being more concentrated toward the bottom, creating higher power-to-flow conditions in these areas of the core. Historically, power oscillation events have occurred when the core was operating with relatively high power-to-flow conditions. Operation with one of the feedwater heaters out of service was considered a contributing cause for the 1992 core oscillation event at Columbia Generating Station.

CAUTION A rapid power reduction with RRC flow will result in a rise in indicated reactor level due to rising level in the downcomer region. The reactor power reduction rate should be limited to maintain reactor level below +54.5".

4.3.1 A reduction of feedwater inlet temperature results in a rise in reactor power, along with a rise in local power within the core. Thermal limits and fuel pre-conditioning limits can be challenged by this power rise. Power levels achieved by RRC flow LE 74 Mlbm/hr provide margin to the pre-conditioning limits and provide margin to the rated thermal power limit. A lower limit of 74 Mlbm/hr total core flow is set to provide margin to the Area of Increased Awareness and the OPRM Enabled Regions on the power-to-flow map. {P-77715}, {P-10356}

A rise in reactor power due to a feedwater temperature reduction, followed by an RRC flow reduction, can result in the core operating on a higher rod line. Inserting control rods to maintain LE the MELLLA boundary will maintain the core within the licensed limits. {P-10356}

Restoring 5 and 6 feedwater heaters to service increases safety margin on Attachment 7.1, Feedwater Temperature vs. Reactor Power.

4.3.2 Attachment 7.1, Feedwater Temperature vs Power, is a graph of the analyzed operating area for Columbia Generating Station. Operations should be maintained within the Normal Operating Region, or FWHOOS region, to ensure accidents or transients that may occur are bounded by the operating limits established in the COLR.

Operation in the FFTR/Coastdown Region, or FWHOOS Region, of Attachment 7.1 is unlimited if the feedwater temperature reduction is LT 35°F from the rated feedwater temperature (i.e. 422°F-35°F at rated power). Operation with GT 35°F from the rated feedwater temperature was conservatively considered for 14 weeks per year over the life of the plant, cumulative. {6.1}

Operation in the Operation Prohibited Region of Attachment 7.1 has not been analyzed, so operability is not assured. Feedwater heating should be restored or reactor power reduced to less than 25% RTP. The completion time is chosen to be consistent with required actions of LCO 3.2.2, Minimum Critical Power Ratio.

For Final Feedwater Temperature Reduction, LCS 1.1.6 places additional restrictions on allowable feedwater temperature. Operations should be maintained within the FFTR/Coastdown Region of Attachment 7.1.

4.3.3 Rapid power reductions may cause heaters to trip/isolate.

4.3.4 ABN-FWH-HI/LEVEL TRIP provides directions and limitations for placing a feedwater heater back in service. This procedure also provides directions for isolating a feedwater heater if it will not be returned to service.

4.3.5 A transient such as that associated with a reduction of feedwater temperature followed by a manual RRC flow reduction can significantly affect fuel conditions. Therefore, preconditioning and thermal limits should be reviewed to ensure limits are met. {P-10356}

6.0 REFERENCES

6.1	TM 2171, Design and Licensing Basis for Operation With Feedwater Heater Out of Service	{6.1}
6.2	NCRA 292-0993-07, Core Oscillations	{P-77715}
6.3	OER 81095B, Feedwater Heater Loss at Full Power	{P-10356}
6.4	OER 82122T, Stability Guidance Corrective Action	{P-103326}
6.5	OER 81095B, Feedwater Heater Loss at Full Power	{P-102339}

6.6 NUREG 1022, Event Reporting Guidelines

6.7 FSAR Chapter 15, Section 15.1 and 15.5.1

6.8 ABN-RRC-LOSS, Loss of Reactor Recirculation Flow

6.9 SOP-DG3-SHUTDOWN, High Pressure Core Spray Diesel Generator Shutdown

6.10 PPM 3.2.1, Normal Plant Shutdown

6.11 PPM 3.2.4, Fast Power Reduction

6.12 PPM 3.1.11, Final Feedwater Temperature Reduction

6.13 PPM 3.3.1, Reactor Scram

6.14 ABN-CORE, Unplanned Core Operating Conditions

6.15 ABN-RRC-LOSS, Loss Of Reactor Recirculation Flow

6.16 M530, Flow Diagram Nuclear Boiler Recirculation System

6.17 License Control Specifications 1.1.6

6.18 Technical Specifications 3.3.5.1, 3.4.1, 3.4.11, 3.5.1

6.19 10CFR50.72, Title 10 Code of Federal Regulations

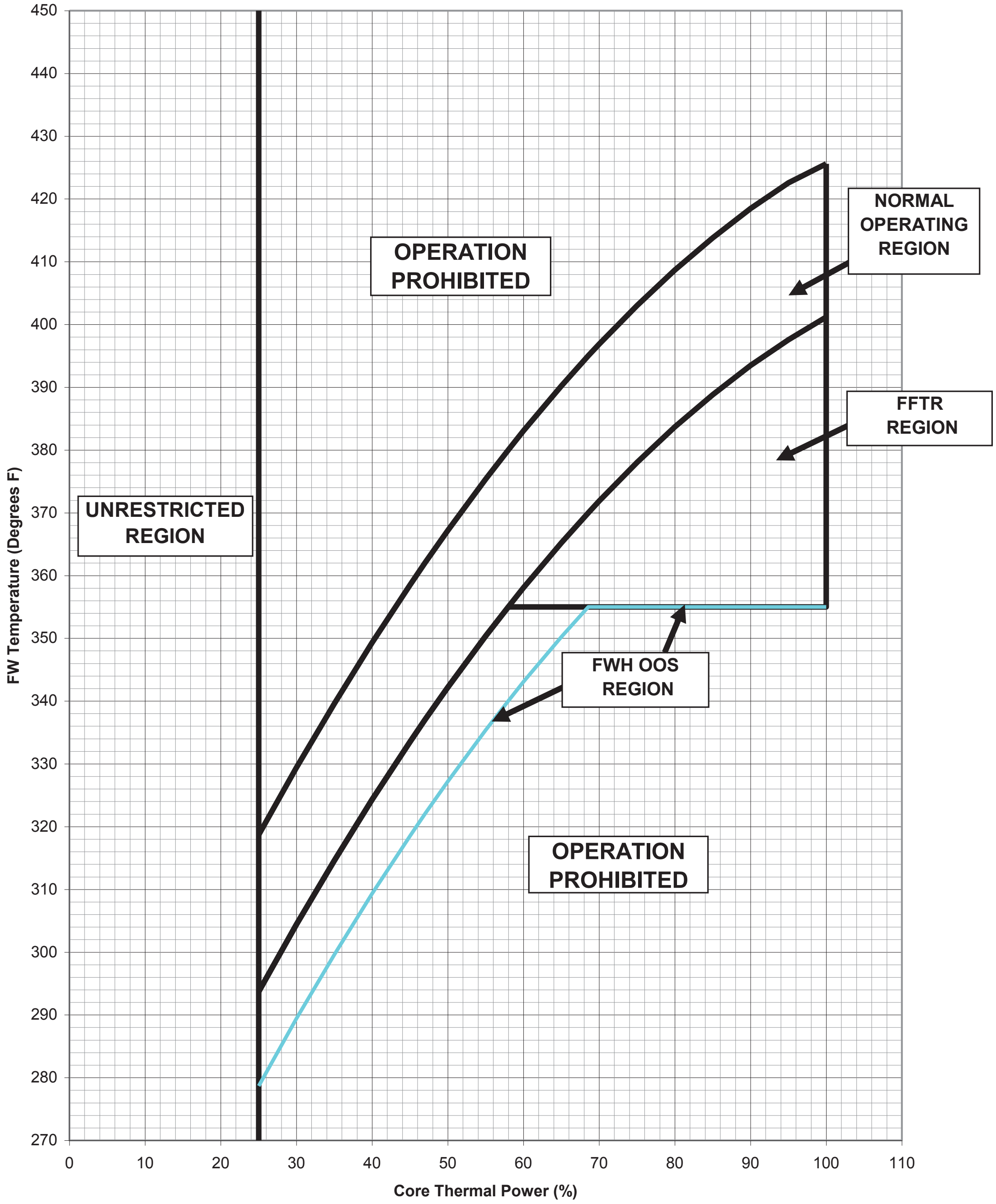
6.20 Core Operating Limits Report (COLR).

7.0 ATTACHMENTS

7.1 Feedwater Temperature Versus Reactor Power

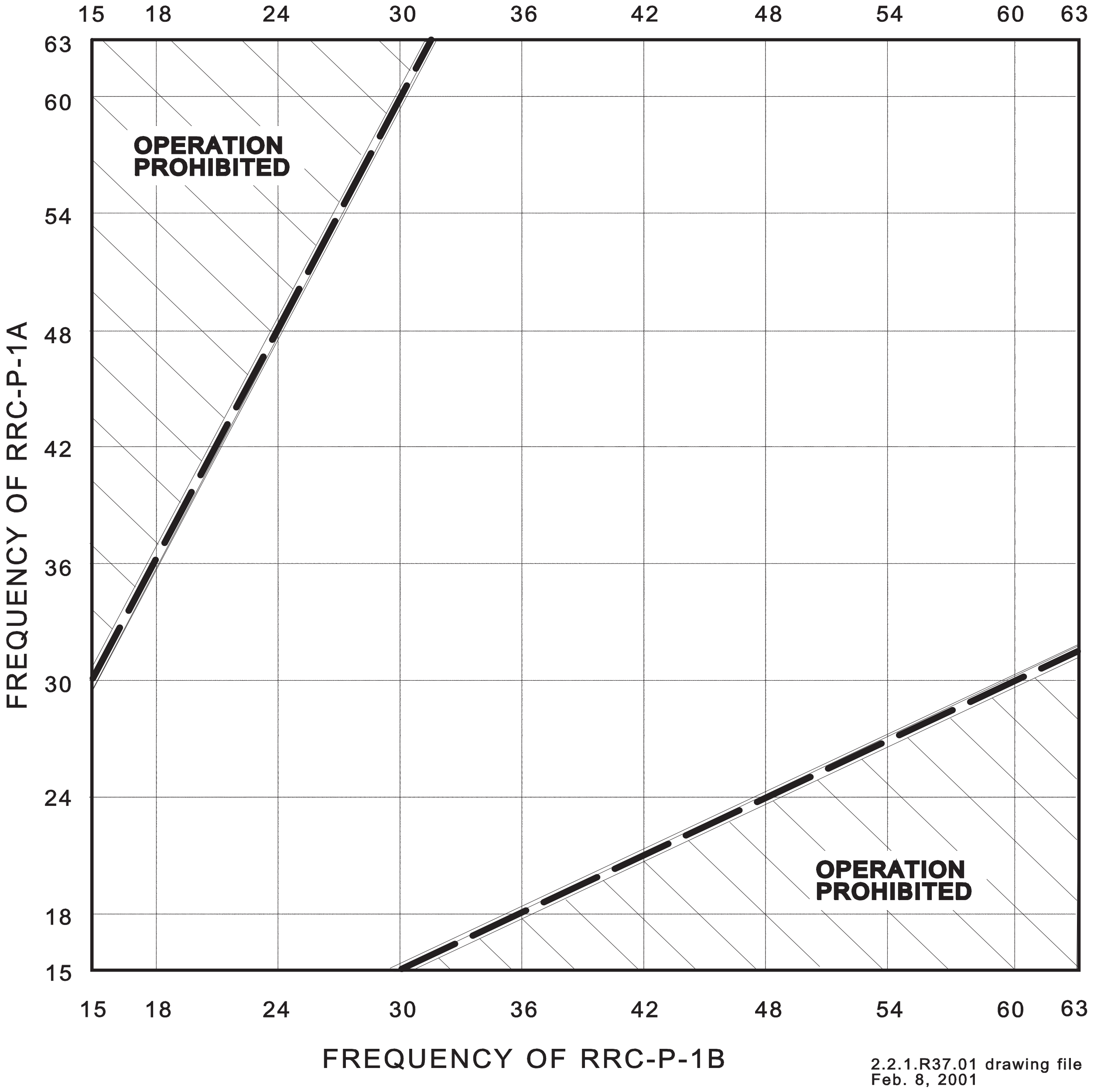
7.2 Two loop recirculation pump speed mismatch operating limitations

FEEDWATER TEMPERATURE VERSUS REACTOR POWER



END

TWO LOOP RECIRCULATION PUMP SPEED MISMATCH OPERATING LIMITATIONS



END

4.10 End-of-Cycle Transition to All-Rods-Out

Near the End-of-Cycle (EOC) the control rod density will begin to decrease. This decrease starts as frequent minor power rod adjustments being needed to maintain full power. As the core approaches the end of full power life, the control rod density will have to decrease to zero. The CMR does not normally include all of the rod adjustments which will be needed to reach an All-Rods-Out (ARO) condition. As such Reactor Engineering will need to plan additional downpowers during this time. These additional downpowers may occur in between the last two planned sequences exchanges and may become as frequent as once per week for the last two months of the cycle. The number of downpowers that are needed will depend on the rate at which reactivity is decreasing and the difficulty of withdrawing control rods. As the control rod density decreases, the margin to the MFLCPR and MFLPD can become very small, to the point of preventing full power operation. The control rod density should be decreased in regular steps, for example a pattern of 12 rods, down to 8 rods, then down to 6 rods, then down to 4 rods, then down to a single rod and then to all rods out. Caution: Do not attempt to go from 4 rods in to ARO unless there is projected to be a significant amount of MFLCPR margin, more than 6% in the ARO condition.

4.11 FFTR Operation

After reaching an All Rods Out condition operation will continue at full power until the core flow reaches the maximum value obtainable. Then the plant will begin to coast down at a rate of approximately 0.4% per day. A downpower should be planned for this point to enter into the first stage of Final Feedwater Temperature Reduction (FFTR). Each stage of FFTR should be entered after the CTP has decreased approximately 1%. The first stage of FFTR is the opening of the bypass around the #6 feedwater heaters. This will result in a rodline increase of about 2.5%. The second stage of FFTR is the opening of the bypass around the #5 feedwater heaters. This will result in a rodline increase of about 2%. Both stages of FFTR combined will maintain full power operation for approximately 11 days. The following figures (1 & 2) show the change in the feedwater temperature and the effect on CTP for each stage of FFTR.

Figure 1 - The First Stage of FFTR

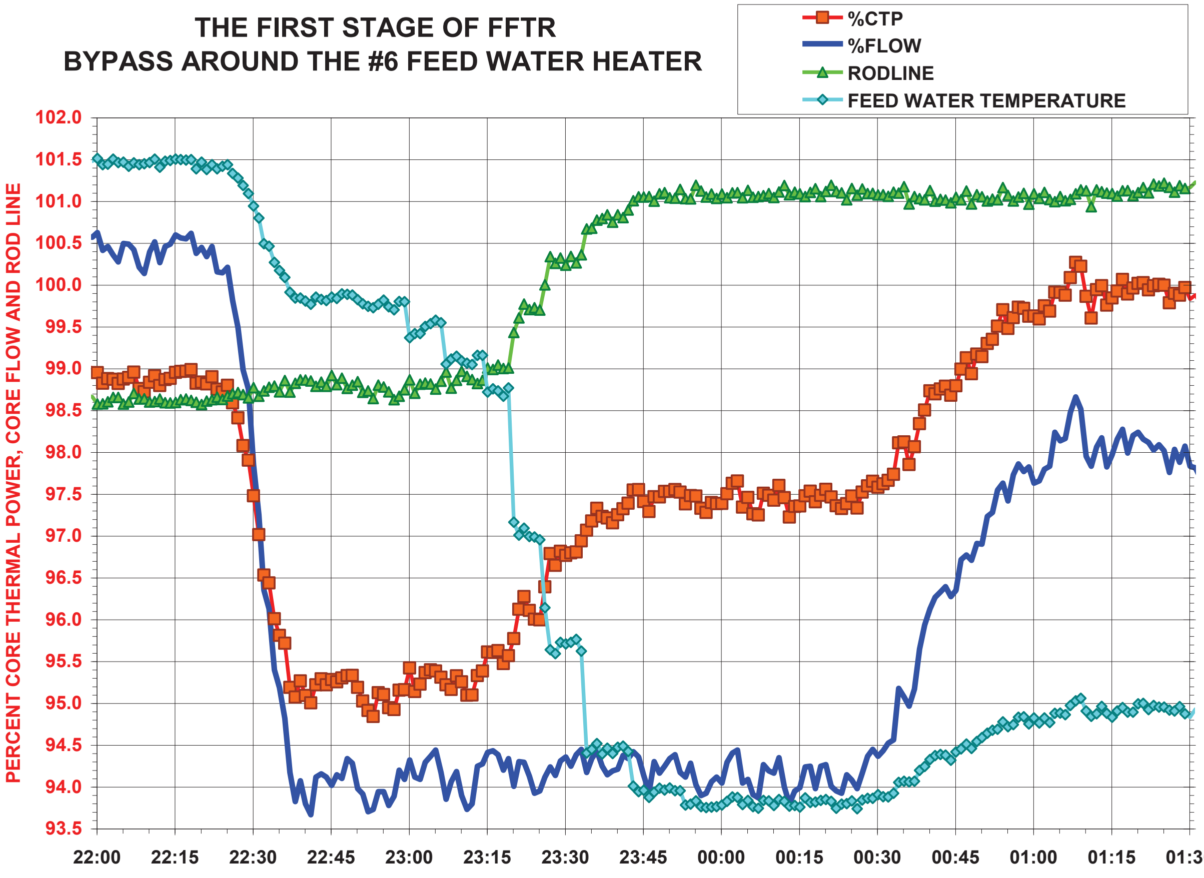
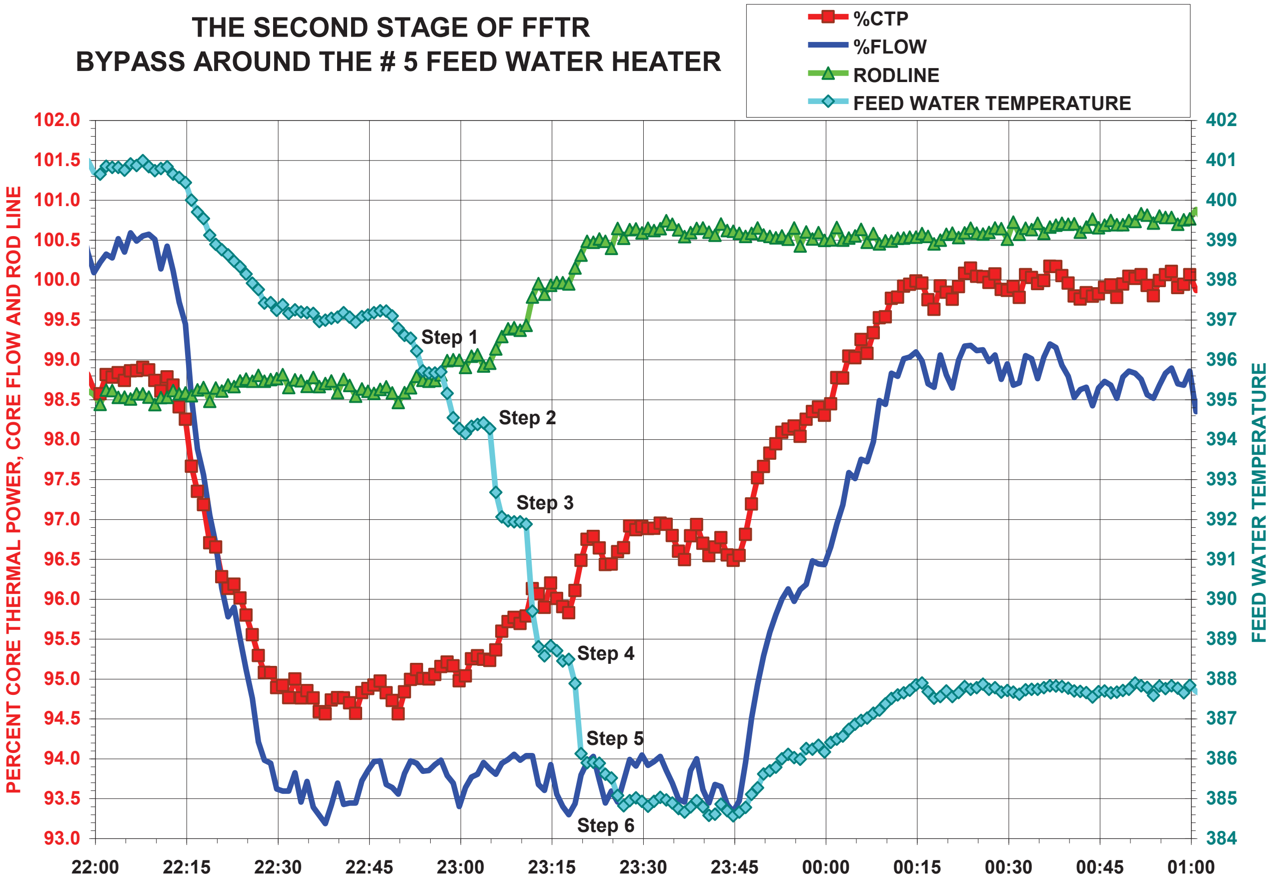
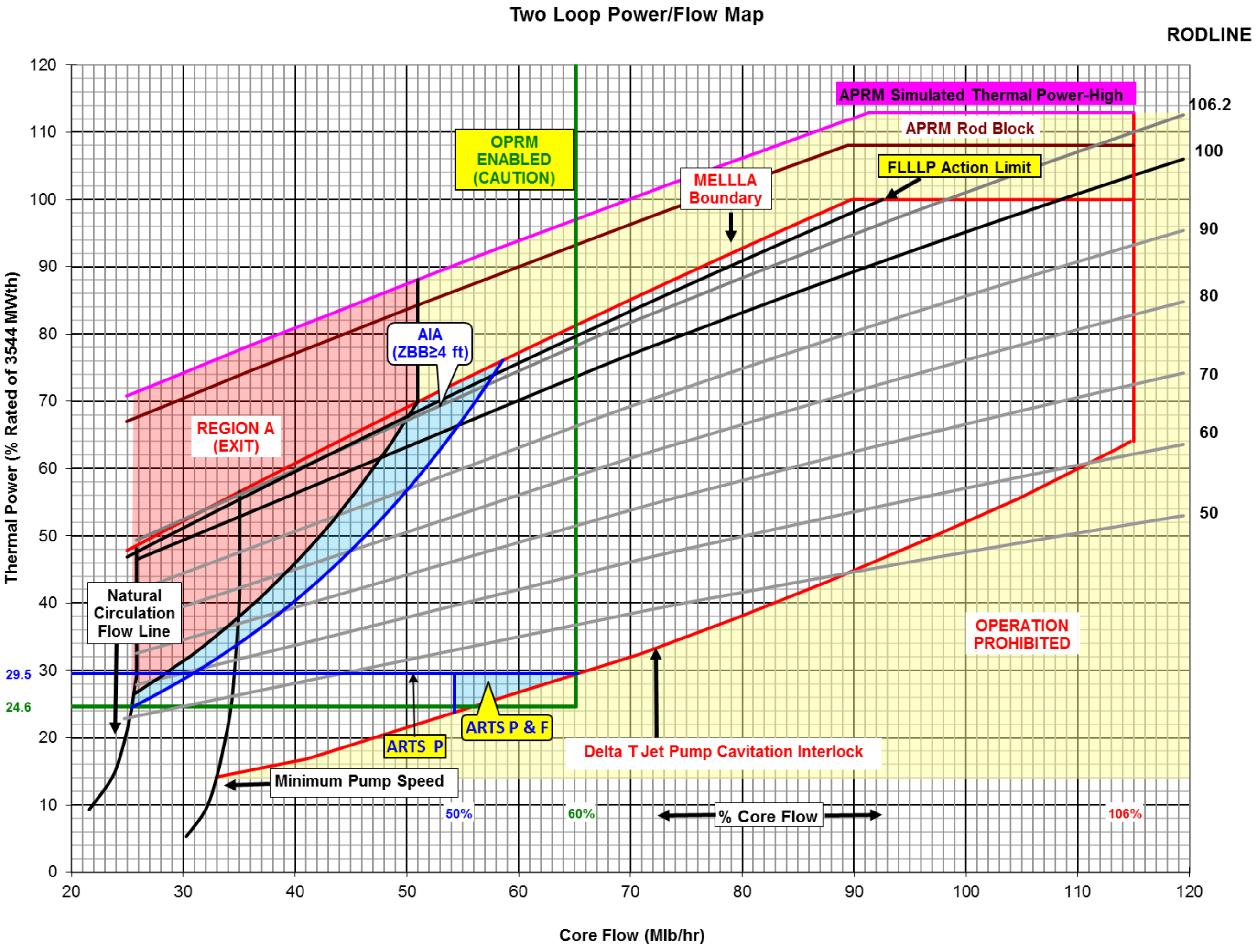


Figure 2 - The Second Stage of FFTR



TWO LOOP POWER/FLOW MAP



END

Attachment 7.2, Two Loop Power/Flow Map

ILC-25 A-6 (SRO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM A-6 (SRO)

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______

SIMULATOR GUIDE PQD CODE ______ Rev. No. ______

JPM PQD CODE ______ Rev. No. ______

EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 11/28/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines that Fire Hose Station (FP-HS-RB22) is Inoperable IAW LCS 1.10.3 Condition A. Completes PPM 1.3.10B (Attachment 9.1) critical steps as shown on JPM Answer Key.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☐ **SRO** ☑

Task Number and Title: SRO-0158 Approve fire impairment checklist

K/A Importance Factors: RO: 4.3 **SRO:** 4.4

K/A Number: 2.1.23

K/A Statement: Ability to perform general or normal operating procedures during any plant condition.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.1 – Conduct of Operations

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 12)**
    - Student JPM Answer Sheet **(Page 13)**
    - LCS 1.10.3 **(JPM A-6 ILC-25 Ref 1.PDF)**
    - PPM 1.3.10B **(JPM A-6 ILC-25 Ref 2.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
LCS	126	N/A
PPM 1.3.10B	017	001

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the Candidate.

Initial Conditions:

- You are the Production SRO with the plant operating at 100% power.
- Tom Mandalorian, the Fire Protection Engineer, reports to you that FP-HS-RB22, Stairwell A6 (441') hose cabinet isolation valve has stem/disk separation.

Initiating Cue:

- As the Production SRO, evaluate LCS 1.10.3 (Essential Fire Hose Stations) and associated Bases, to determine OPERABILITY status of the hose station.
- Specify on the Student JPM Answer Sheet the following:
    - OPERABILITY status of FP-HS-RB22 and the LCS 1.10.3 Condition(s) entered (if any).
    - Administrative actions required per LCS 1.10.3 (if any).
- Return Student JPM Answer Sheet to Examiner when complete.

START TIME:___________

Examiner Note: **Provide the candidate with:**

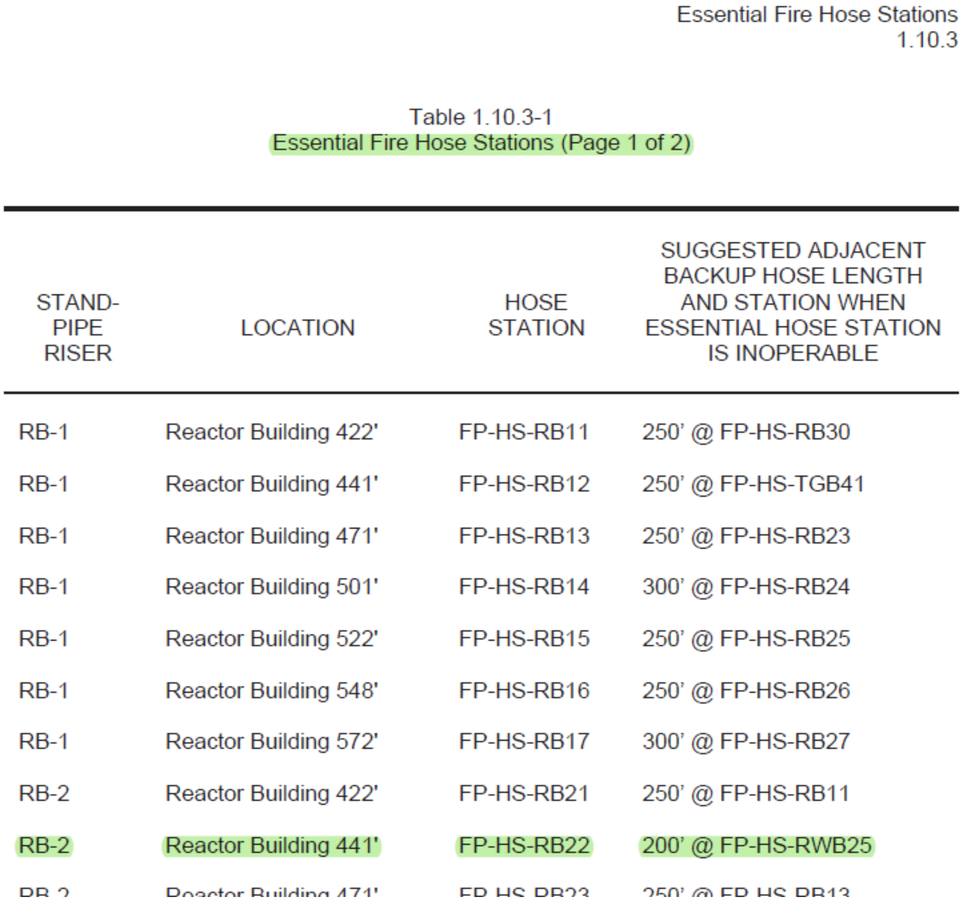
- **Student JPM Information Sheet**
- **Student JPM Answer Sheet**
- **JPM Student Reference #1 (LCS 1.10.3 and Bases)**

Examiner Note: **The following 2 steps come directly from LCS 1.10.3 and Bases.**

STEP / STANDARD	**SAT / UNSAT**

Step 1:

Evaluates LCS 1.10.3, Essential Fire Hose Stations, and bases to determine if it is applicable to FP-HS-RB22:



Essential Fire Hose Stations
1.10.3

Table 1.10.3-1
Essential Fire Hose Stations (Page 1 of 2)

STAND-PIPE RISER	LOCATION	HOSE STATION	SUGGESTED ADJACENT BACKUP HOSE LENGTH AND STATION WHEN ESSENTIAL HOSE STATION IS INOPERABLE
RB-1	Reactor Building 422'	FP-HS-RB11	250' @ FP-HS-RB30
RB-1	Reactor Building 441'	FP-HS-RB12	250' @ FP-HS-TGB41
RB-1	Reactor Building 471'	FP-HS-RB13	250' @ FP-HS-RB23
RB-1	Reactor Building 501'	FP-HS-RB14	300' @ FP-HS-RB24
RB-1	Reactor Building 522'	FP-HS-RB15	250' @ FP-HS-RB25
RB-1	Reactor Building 548'	FP-HS-RB16	250' @ FP-HS-RB26
RB-1	Reactor Building 572'	FP-HS-RB17	300' @ FP-HS-RB27
RB-2	Reactor Building 422'	FP-HS-RB21	250' @ FP-HS-RB11
RB-2	Reactor Building 441'	FP-HS-RB22	200' @ FP-HS-RWB25
RB-2	Reactor Building 471'	FP-HS-RB23	250' @ FP-HS-RB13

Standard:

- Refers to Table 1.10.3-1 and notes that FP-HS-RB22 is an essential fire hose station.

____SAT

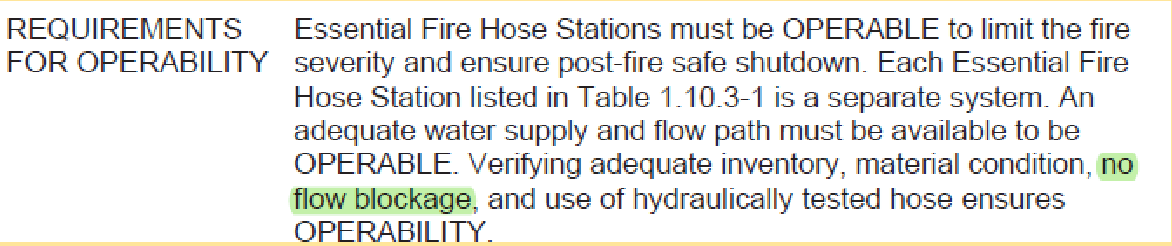
____UNSAT

____N/A

STEP / STANDARD | **SAT / UNSAT**

Step 2:

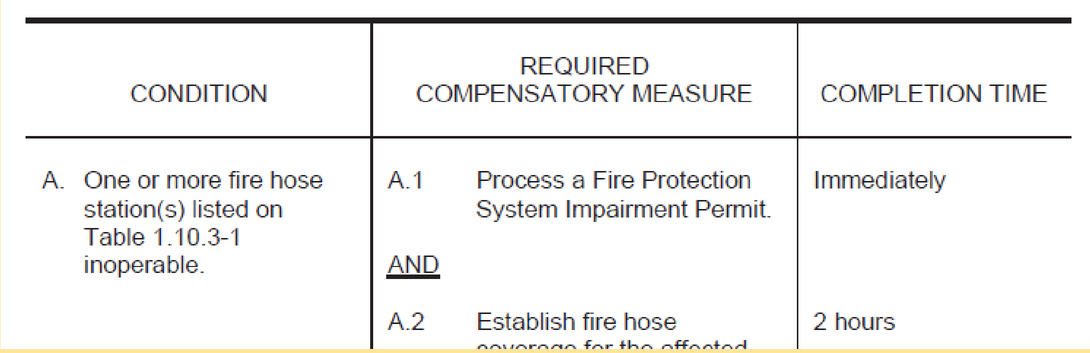
Evaluates LCS 1.10.3, Essential Fire Hose Stations, and Bases to determine OPERABILITY of FP-HS-RB22:



REQUIREMENTS FOR OPERABILITY	Essential Fire Hose Stations must be OPERABLE to limit the fire severity and ensure post-fire safe shutdown. Each Essential Fire Hose Station listed in Table 1.10.3-1 is a separate system. An adequate water supply and flow path must be available to be OPERABLE. Verifying adequate inventory, material condition, no flow blockage, and use of hydraulically tested hose ensures OPERABILITY.

Standard:

- **(Non-critical)** Refers to Requirements for OPERABILITY in Bases and notes that "No Flow Blockage" is required for the hose station to be OPERABLE. Hose cabinet isolation valve stem/disk separation constitutes "flow blockage" and determines it is inoperable.
- Refers to associated Conditions and Required Compensatory Measures and determines Condition A must be entered.



CONDITION	REQUIRED COMPENSATORY MEASURE	COMPLETION TIME
A. One or more fire hose station(s) listed on Table 1.10.3-1 inoperable.	A.1 Process a Fire Protection System Impairment Permit.	Immediately
	AND	
	A.2 Establish fire hose coverage for the affected	2 hours

- Specifies on Student Answer Key that FP-HS-RB22 is Inoperable, and that Condition A was entered.

CRITICAL STEP

____SAT

____UNSAT

____N/A

Examiner Cue: **After Candidate determines that a FPSI is required per Required Comp Measure A.1 above:**

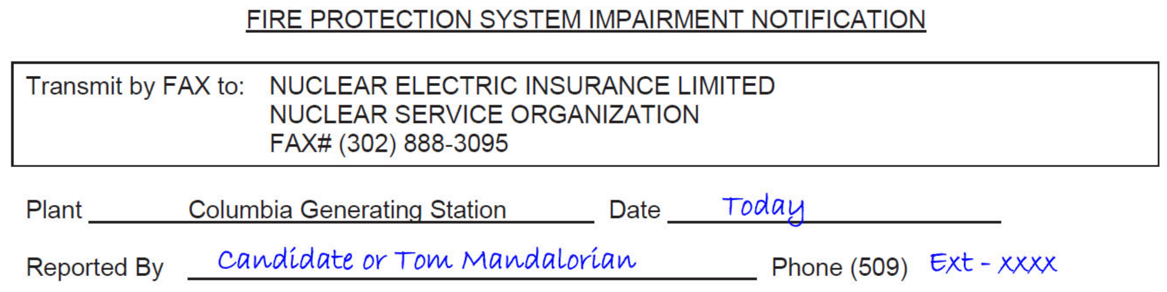
- **Give Candidate JPM Student Reference #2 (PPM 1.3.10B)**
- **State: "Use Attachment 9.1 for the impairment."**

STEP / STANDARD	SAT / UNSAT

Examiner Note: **The following steps come directly from Attachment 9.1 of PPM 1.3.10B.**

Step 3:

On Attachment 9.1 (Fire Protection System Impairment Notification), completes “Reported By” and “Date” blocks:



FIRE PROTECTION SYSTEM IMPAIRMENT NOTIFICATION

Transmit by FAX to: NUCLEAR ELECTRIC INSURANCE LIMITED
NUCLEAR SERVICE ORGANIZATION
FAX# (302) 888-3095

Plant Columbia Generating Station Date Today

Reported By Candidate or Tom Mandalorian Phone (509) Ext - xxxx

Standard:

- Fills in today’s date.
- Fills in “reported by” by inserting their name in the block (may also use “Tom Mandalorian” as the person reported by as that is the individual that completed the surveillance).

____SAT

____UNSAT

____N/A

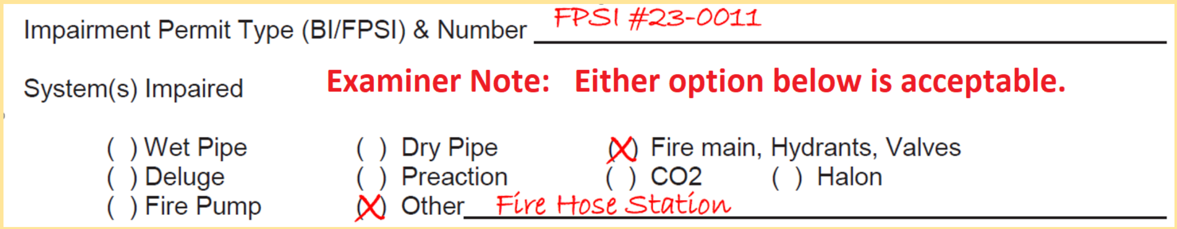
Examiner Cue: **When Candidate attempts to fill in the Impairment Type and Number below, provide the following information:**

“The last Fire Protection System impairment number used was

FPSI #23-0010.”

Step 4:

On Attachment 9.1, completes “Impairment Type and Number” and “Systems Impaired” blocks:



Impairment Permit Type (BI/FPSI) & Number FPSI #23-0011

System(s) Impaired

Examiner Note: Either option below is acceptable.

☐ Wet Pipe ☐ Dry Pipe ☒ Fire main, Hydrants, Valves
☐ Deluge ☐ Preaction ☐ CO2 ☐ Halon
☐ Fire Pump ☒ Other Fire Hose Station

Standard:

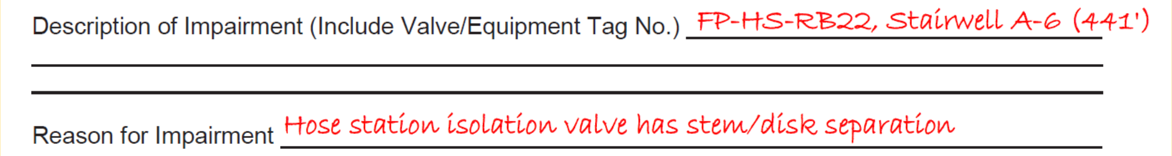
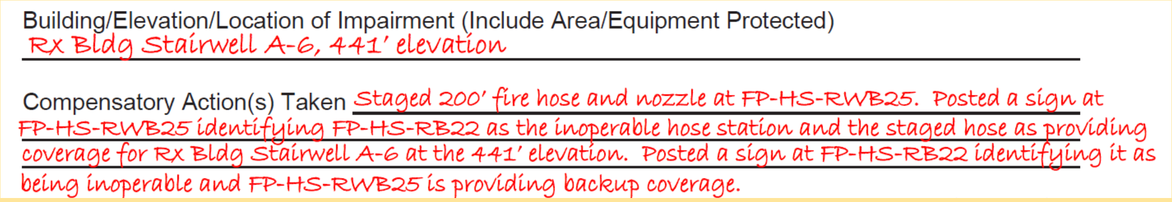
- Fills in the next number in sequence for the impairment type (**FPSI #23-0011**).
- For the Systems Impaired, marks either the **Fire main, Hydrants, Valves ( )** **<u>OR</u>** the **Other ( )** and adds words to the effect of **“Fire Hose Station.”**

CRITICAL STEP

____SAT

____UNSAT

____N/A

STEP / STANDARD	SAT / UNSAT
Step 5: On Attachment 9.1, completes "Description of Impairment" and "Reason for Impairment" blocks:  Description of Impairment (Include Valve/Equipment Tag No.) FP-HS-RB22, Stairwell A-6 (441') Reason for Impairment Hose station isolation valve has stem/disk separation Standard: - Fills in Description of Impairment with the hose station description with words to the effect of **"FP-HS-RB22, Stairwell A-6 (441')"**. - Fills in reason for impairment with words to the effect of **"Hose station isolation valve has stem/disk separation."**	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 6: On Attachment 9.1, completes "Building Elevation…" and "Compensatory Actions" blocks:  Building/Elevation/Location of Impairment (Include Area/Equipment Protected) Rx Bldg Stairwell A-6, 441' elevation Compensatory Action(s) Taken Staged 200' fire hose and nozzle at FP-HS-RWB25. Posted a sign at FP-HS-RWB25 identifying FP-HS-RB22 as the inoperable hose station and the staged hose as providing coverage for Rx Bldg Stairwell A-6 at the 441' elevation. Posted a sign at FP-HS-RB22 identifying it as being inoperable and FP-HS-RWB25 is providing backup coverage. Standard: - Fills in building location / elevation / location with words to the effect of **"Rx Bldg Stairwell A-6, 441' elevation."** - **(Non-critical)** Reviews Section 3.1 of PPM 1.3.10B, LCS 1.10.3, and Table 1.10.3-1 to determine Compensatory Actions. - Fills in Compensatory Actions with words to the effect of **"Staged 200' fire hose and nozzle at FP-HS-RWB25. Posted a sign at FP-HS-RWB25 identifying FP-HS-RB22 as the Inoperable hose station and the staged hose as providing coverage for Rx Bldg Stairwell A-6 at the 441' elevation. Posted a sign at FP-HS-RB22 identifying it as being inoperable and FP-HS-RWB25 is providing backup coverage."**	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 7: On Attachment 9.1, completes "Date Impairment Occurred" and "Date Expected Return to Service" Date Impairment Occurred: Today Date Expected Return to Service: Blank or Future Date Standard: - Fills in today's date for "Date Impairment Occurred". - Leaves "Date Expected Return to Service" blank or fills in some future date.	____SAT ____UNSAT ____N/A
Examiner Cue: Inform Candidate the JPM is Complete.	

STOP TIME: ____________

JPM ANSWER KEY (LCS 1.10.3 Assessment)
Critical Steps annotated in RED

LCS 1.10.3 Assessment:

Fire Hose Station FP-HS-RB22 is:

___ OPERABLE

_X_ INOPERABE (Enter Condition _A_)

Specify administrative actions required per LCS 1.10.3 for any LCS Conditions entered or state NONE:

Process a Fire Protection System Impairment (FPSI) Permit.

Examiner Note: The Candidate must also fill out the FPSI Notification form using Attachment 9.1 of PPM 1.10.3B (next page).

JPM ANSWER KEY (1.3.10B Attachment 9.1)

Critical Steps annotated in RED

Number: 1.3.10B	Use Category: INFORMATION	Major Rev: 017 Minor Rev: 001 Page: 24 of 30
Title: Active Fire System Operability and Impairment Control		

FIRE PROTECTION SYSTEM IMPAIRMENT NOTIFICATION

Transmit by FAX to: NUCLEAR ELECTRIC INSURANCE LIMITED
NUCLEAR SERVICE ORGANIZATION
FAX# (302) 888-3095

Plant Columbia Generating Station Date Today

Reported By Candidate or Tom Mandalorian Phone (509) Ext - xxxx

Impairment Permit Type (BI/FPSI) & Number FPSI #23-0011.

System(s) Impaired **Examiner Note: Either option below is acceptable.**

( ) Wet Pipe ( ) Dry Pipe (X) Fire main, Hydrants, Valves
( ) Deluge ( ) Preaction ( ) CO2 ( ) Halon
( ) Fire Pump (X) Other Fire Hose Station.

Description of Impairment (Include Valve/Equipment Tag No.) FP-HS-RB22, Stairwell A-6 (441')

Reason for Impairment Hose station isolation valve has stem/disk separation

Building/Elevation/Location of Impairment (Include Area/Equipment Protected)
Rx Bldg Stairwell A-6, 441' elevation

Compensatory Action(s) Taken Staged 200' fire hose and nozzle at FP-HS-RWB25. Posted a sign at FP-HS-RWB25 identifying FP-HS-RB22 as the inoperable hose station and the staged hose as providing coverage for Rx Bldg Stairwell A-6 at the 441' elevation. Posted a sign at FP-HS-RB22 identifying it as being inoperable and FP-HS-RWB25 is providing backup coverage.

Date Impairment Occurred: Today Date Expected Return to Service: Blank or Future Date

(Forward completed form to Fire Marshal; In-box located in SSS office)

Actual Date Returned to Service: ______

Closure Notification By: ______ Date ______

Essential Fire Detection and Suppression Zones

END

Attachment 9.1, Fire Protection System Impairment Notification

RESULTS OF JPM ILC-25 JPM A-6 (SRO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Determines that Fire Hose Station (FP-HS-RB22) is Inoperable IAW LCS 1.10.3 Condition A. Completes PPM 1.3.10B (Attachment 9.1) critical steps as shown on JPM Answer Key.**

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

COMMENTS:

____

____

____

____

____

____

____

____

____

____

Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- You are the Production SRO with the plant operating at 100% power.

- Tom Mandalorian, the Fire Protection Engineer, reports to you that FP-HS-RB22, Stairwell A6 (441') hose cabinet isolation valve has stem/disk separation.

Initiating Cue:

- As the Production SRO, evaluate LCS 1.10.3 (Essential Fire Hose Stations) and associated Bases, to determine OPERABILITY status of the hose station.

- Specify on the Student JPM Answer Sheet the following:
  - OPERABILITY status of FP-HS-RB22 and the LCS 1.10.3 Condition(s) entered (if any).
  - Administrative actions required per LCS 1.10.3 for any LCS Conditions entered.

- Return Student JPM Answer Sheet to Examiner when complete.

STUDENT JPM ANSWER SHEET

LCS 1.10.3 Assessment:

Fire Hose Station FP-HS-RB22 is:

___ OPERABLE

___ INOPERABLE

IF INOPERABLE, specify the LCS Condition(s) entered: _______

Specify administrative actions required per LCS 1.10.3 for any LCS Conditions entered or state NONE:

____

1.10 FIRE PROTECTION

1.10.3 Essential Fire Hose Stations

RFO 1.10.3 The fire hose stations listed in Table 1.10.3-1 shall be OPERABLE.

APPLICABILITY: At all times when at least one Essential Fire Suppression Water Supply System (primary, secondary, or backup) is OPERABLE.

COMPENSATORY MEASURES

---NOTES---

1. The Table 1.10.3-1 suggested backup hose length and hose station is based on a single inoperable hose station. When more than one hose station is inoperable, alternative hose stations and hose lengths may be required to satisfy Required Compensatory Measure A.2.
2. For inoperable FP-HS-RB30, Required Compensatory Measure A.2 is not required when both FP-HS-RB11 and FP-HS-RB21 are operable.
3. When planned maintenance/surveillance activities create short-term inoperability, entry into associated Conditions and Required Compensatory Measures is not required provided the criteria specified in Bases are met.

CONDITION	REQUIRED COMPENSATORY MEASURE	COMPLETION TIME
A. One or more fire hose station(s) listed on Table 1.10.3-1 inoperable.	A.1 Process a Fire Protection System Impairment Permit. <u>AND</u> A.2 Establish fire hose coverage for the affected area by staging adequate fire hose and nozzle at adjacent OPERABLE fire hose station. <u>AND</u>	Immediately 2 hours

COMPENSATORY MEASURES

CONDITION	REQUIRED COMPENSATORY MEASURE	COMPLETION TIME
A. (continued).	A.3 Post a sign at the backup OPERABLE hose station to identify the inoperable hose station number; and a description of the plant area for which the staged hose is providing coverage. <u>AND</u> A.4 Post a sign on each inoperable hose station to identify it as being inoperable, and to identify the OPERABLE hose station providing the backup coverage.	2 hours 2 hours
B. Required Compensatory Measure and associated Completion Times of Condition A not met.	B.1 Initiate a Condition Report.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 1.10.3.1	Verify that all required equipment is located at each essential fire hose station listed in Table 1.10.3-1.	9 months
SR 1.10.3.2	Verify acceptable configuration and material condition of each essential fire hose station listed in Table 1.10.3-1. This includes: a. Hose inspection; and b. Hose coupling gasket inspection.	18 months
SR 1.10.3.3	Verify hose station valve operability for essential fire hose station listed in Table 1.10.3-1. This includes: a. Ensure no standpipe water blockage; and b. Replace hose with recently hydraulically tested hose.	5 years

Table 1.10.3-1
Essential Fire Hose Stations (Page 1 of 2)

STAND-PIPE RISER	LOCATION	HOSE STATION	SUGGESTED ADJACENT BACKUP HOSE LENGTH AND STATION WHEN ESSENTIAL HOSE STATION IS INOPERABLE
RB-1	Reactor Building 422'	FP-HS-RB11	250’ @ FP-HS-RB30
RB-1	Reactor Building 441'	FP-HS-RB12	250’ @ FP-HS-TGB41
RB-1	Reactor Building 471'	FP-HS-RB13	250’ @ FP-HS-RB23
RB-1	Reactor Building 501'	FP-HS-RB14	300’ @ FP-HS-RB24
RB-1	Reactor Building 522'	FP-HS-RB15	250’ @ FP-HS-RB25
RB-1	Reactor Building 548'	FP-HS-RB16	250’ @ FP-HS-RB26
RB-1	Reactor Building 572'	FP-HS-RB17	300’ @ FP-HS-RB27
RB-2	Reactor Building 422'	FP-HS-RB21	250’ @ FP-HS-RB11
RB-2	Reactor Building 441'	FP-HS-RB22	200’ @ FP-HS-RWB25
RB-2	Reactor Building 471'	FP-HS-RB23	250’ @ FP-HS-RB13
RB-2	Reactor Building 501'	FP-HS-RB24	350’ @ FP-HS-RB14
RB-2	Reactor Building 522'	FP-HS-RB25	250’ @ FP-HS-RB15
RB-2	Reactor Building 548'	FP-HS-RB26	300’ @ FP-HS-RB16
RB-2	Reactor Building 572'	FP-HS-RB27	250’ @ FP-HS-RB17
RB-2	Reactor Building 441'	FP-HS-RB29	200’ @ FP-HS-RWB25
TGB-4	Reactor Building 422’	FP-HS-RB30	0’ @ FP-HS-RB11 and 0’ @ FP-HS-RB21
TGB-4	Turbine Building 441'	FP-HS-TGB41	200' @ FP-HS-TGB37

Table 1.10.3-1
Essential Fire Hose Stations (Page 2 of 2)

STAND-PIPE RISER	LOCATION	HOSE STATION	SUGGESTED ADJACENT BACKUP HOSE LENGTH AND STATION WHEN ESSENTIAL HOSE STATION IS INOPERABLE
RWB-1	Radwaste Building 437'	FP-HS-RWB11	250' @ FP-HS-TGB34
RWB-1	Radwaste Building 467'	FP-HS-RWB13	250’ @ FP-HS-RWB29
RWB-1	Radwaste Building 487'	FP-HS-RWB14	250’ @ FP-HS-TGB36
RWB-1	Radwaste Building 507'	FP-HS-RWB15	250’ @ FP-HS-TGB36
RWB-1	Radwaste Building 525'	FP-HS-RWB16	250’ @ FP-HS-TGB36
DG-1	Diesel Building 441'	FP-HS-RWB25	350’ @ FP-HS-TGB41
RWB-1	Radwaste Building 467'	FP-HS-RWB26	250’ @ FP-HS-RWB29 or 250’ @ FP-HS-RWB13
RWB-2	Radwaste Building 487'	FP-HS-RWB28	250’ @ FP-HS-RWB23 or 250’ @ FP-HS-RWB14
RWB-2	Radwaste Building 467'	FP-HS-RWB29	250’ @ FP-HS-RWB26 or 250’ @ FP-HS-RWB13
RWB-1	Radwaste Building 501'	FP-HS-RWB31	250’ @ FP-HS-TGB36
RWB-1	Radwaste Building 525'	FP-HS-RWB33	250’ @ FP-HS-TGB36
DG-1	Diesel Building 441'	FP-HS-DG40	350’ @ FP-HS-TGB41
DG-1	Diesel Building 441'	FP-HS-DG41	350’ @ FP-HS-TGB41

B 1.10 FIRE PROTECTION

B 1.10.3 Essential Fire Hose Stations

BASES

BACKGROUND

Essential fire hose stations are those located in the reactor building stairwells, the radwaste building stairwells, the diesel generator building, and corridors between these buildings are listed in Table 1.10.3-1 of the LCS. Water is supplied to the fire hose stations from standpipes. See References 1, 2, and 3.

Fire hose stations are provided for manual fire fighting activities.

APPLICABLE SAFETY ANALYSES

Fire hose stations are provided to protect equipment required to ensure post fire safe shutdown capability.

REQUIREMENTS FOR OPERABILITY

Essential Fire Hose Stations must be OPERABLE to limit the fire severity and ensure post-fire safe shutdown. Each Essential Fire Hose Station listed in Table 1.10.3-1 is a separate system. An adequate water supply and flow path must be available to be OPERABLE. Verifying adequate inventory, material condition, no flow blockage, and use of hydraulically tested hose ensures OPERABILITY.

APPLICABILITY

The requirement to have essential fire hose stations OPERABLE at all times when at least one of the three available essential fire suppression water supply systems (primary, secondary, or backup), is OPERABLE, ensures the capability to fight fires to ensure post-fire safe shutdown in MODES 1, 2, and 3 and provide the necessary defense-in-depth during shutdown. If the entire LCS 1.10.1 Essential Fire Suppression Water Supply System is inoperable, water will not be available to the fire hose stations and LCS 1.10.3 is not applicable.

COMPENSATORY MEASURES

The Compensatory Measures are modified by a Note clarifying the Table 1.10.3-1 suggested backup hose length and hose station is based on a single inoperable hose station. When more than one hose station is inoperable, alternative hose stations and hose lengths may be required to satisfy Required Compensatory Measure A.2. Any nearby operable hose station can be the backup.

The Compensatory Measures are modified by a second Note identifying that Required Compensatory Measure A.2 is not required for inoperable FP-HS-RB30, when both FP-HS-RB-11 and FP-HS-RB21 are operable. FP-HS-RB11 and FP-HS-RB21 have adequate hose to reach the area of the reactor building covered by FP-HS-RB30.

BASES

COMPENSATORY MEASURES

The Compensatory Measures are modified by a third note identifying that entry into Conditions and Required Compensatory Measures is not required when the following criteria are met:

1. The SSC is impaired and restored during the performance of an approved surveillance, test, or maintenance task which specifically directs the impairment restoration; and

2. The SSC is continually attended (at least within line of sight); andThe SSC can be safely returned to an operable status prior to leaving the area in the event an evacuation is required; and

3. At least one person involved is continuous fire tour qualified (Qual Group FPAH).

A.1

With one or more essential fire hose station inoperable, immediate action must be initiated to restore the system to OPERABLE status. The preparation of a Fire Protection System Impairment Permit is required for administrative tracking of the impairment and helps ensure a Work Request is generated to restore operability.

A.2

With one or more essential fire hose station inoperable, equivalent manual fire fighting capability must be provided to reach the plant areas unprotected by the inoperable hose station. Equivalent manual fire fighting capability is provided by staging fire hose and a nozzle at an adjacent OPERABLE hose station that reaches the areas protected by the inoperable hose station. Table 1.10.3-1 lists the suggested backup hose station and the required hose length. To minimize hose twisting during uncoiling, the staged hose need not be connected to the gated wye valve. The 2 hour Completion Time is reasonable based on operating experience indicating there is a low potential of a fire that would jeopardize safe shutdown capability.

A.3

A sign must be posted at the OPERABLE hose station to minimize potential confusion in the event that manual fire fighting becomes necessary. The sign must identify the inoperable hose station number and a description of the plant area the staged hose is providing coverage. The 2 hour Completion Time is reasonable based on operating experience indicating there is a low potential of a fire that would jeopardize safe shutdown capability.

BASES

COMPENSATORY MEASURES (continued)

A.4

Signs must be posted at the inoperable hose station to minimize potential confusion in the event that manual fire fighting becomes necessary. The sign should identify which OPERABLE hose station have been set up to provide the backup coverage. The 2 hour Completion Time is reasonable based on operating experience indicating there is a low potential of a fire that would jeopardize safe shutdown capability.

B.1

Initiate a Condition Report to address why the SSC was not restored to functional status within the Completion Time and provide a plan for restoring the SSC to functional status. If not previously documented the Condition Report should also provide an accurate and concise description of the initial cause(s) for the non-functionality, the Required Compensatory Measure not met, an initial functionality assessment, and corrective actions taken and planned for restoring the SSC to functional status. The intent of this Required Compensatory Measure is to utilize the plant Corrective Action Program to assure prompt attention and adequate management oversight to minimize the additional time the SSC is non-functional. Condition Report category level recommendations should follow plant Corrective Action Program guidelines.

BASES

SURVEILLANCE REQUIREMENTS

SR 1.10.3.1

Periodically checking the inventory of each essential fire hose station ensures readiness for manual fire fighting service. The inventory includes:

- 150 feet of 1½ inch fire hose
- Hose nozzle with shutoff valve
- Single 2½ inch to two 1½ inch gated wye adaptor
- Hose station wrench
- Two spanner wrenches

An alternative method of inventory inspection is verifying the hose cabinet tamper seal is intact.

The 9 month Frequency is reasonable since these stations are normally sealed to prevent removal of items from the inventory and is consistent with operational experience and Reference 4.

SR 1.10.3.2

Verifying each hose station has the appropriate material condition of hoses and gaskets confirms readiness of the fire hose stations for service. This surveillance consists of:

- Remove all fire hose from rack and inspect for degradation.

- Inspect each fire hose coupling gasket for degradation.

The 18 month Frequency is consistent with operational experience.

SR 1.10.3.3

Verifying hose station operability further confirms readiness of the fire hose stations for service. This surveillance consists of:

- Partially open each essential hose station valve to verify the valve is OPERABLE and has no major flow blockage. Full flow is not required.

- Replace fire hoses with hoses hydraulically tested to a pressure of ≥ 225 psi which is based on a maximum system operating pressure of 175 psig plus 50 psig. The replacement hoses must have been hydraulically tested within 1 month of installation.

The 5 year Frequency is consistent with operational experience and Reference 4.

BASES

REFERENCES	1. FSAR Appendix F.2.5.3.
	2. NFPA 14-1974.
	3. M515-4 & -5, Flow Diagram – Fire Protection System.
	4. FPF 2.15 Item 1.

Verify Revision Information Prior To Use	Initials	
	Date	

Number: 1.3.10B	Use Category: INFORMATION	Major Rev: 017 Minor Rev: 001 Page: 1 of 30
Title: Active Fire System Operability and Impairment Control		

PLANT PROCEDURES MANUAL	PCN#: N/A
1.3.10B	Effective Date: 09/02/21

DESCRIPTION OF CHANGES

Justification (required for major revision)
AR 403631 corrects identified weaknesses in correctly completing the hourly fire tour. Also AR 403618.

Page(s)	Description (including summary, reason, initiating document, if applicable)
6, 9, 11,12	Sections 2.5.5, 2.6.4, 3.1.2, 3.2.1.b.2, 3.2.2.a.1: Further emphasized to not group multiple impaired items on one permit. (AR 403631-16)
6,11,12	Sections 2.5.6, 2.6.5, 3.2.1.b.1 (and new Note), 3.2.2.a.2: Added guidance to included room and door numbers in location field of permit. (AR 403631-5). Added reference to using FM892 drawings since they contain the room and door numbers. (AR 403631-11).
7,11,12	Section 2.7.6; 3.2.1.c 3.2.2.d: Added new guidance reviewing Fire Protection holds.
7	Section 2.8.4: Deleted since approver not always the person that closes permits.
7,8,12,13,14	Section 2.8.2, 2.91; 3.2.2 new Note, 3.2.3 Note, 3.2.3.a, 3.2.3.b, 3.3.2: Added clarification when Fire Marshal can approve a permit. Instead of just addressing designees in responsibilities section 2, Operations wanted designee clarifications in section 3.
8	Section 2.10.2: Added new step to clarify the Planner duties are delegated under the Work Supervisor.
9	Section 3.1.5.a.1: Corrected editorial spelling error. (AR 405555)
9	Section 3.1.3: Revised so reader would better understand the concept.
9, 12	Section 3.1.5.a.2, 3.2.2.c: Better address notifying Security for unplanned fire tour additions.
10	Section 3.1.5.d: Clarified text.
13	Section 3.2.3.c: Clarified that reviewing the appropriate comp measures is the primary task when approving a new permit.
13, 14	3.2.3.d, 3.3.2.b: Added guidance on tracking essential impairment in electronic software tracking (generic language non-dependent upon software vendor)
14	Section 3.3.1.a, 3.3.2.a: Based 2020 FP QA audit, clarified that essential FP systems need PMT and review of PMT results before closing a permit. (AR 403618)
15,16,17,	Section 4: Added references drawings to help identify locations for each category of FP equipment, not just suppression/detection in Attachment 9.2. This goes along with AR 403631-11 stating FM892 drawings should be used.
23, 25-30	Section 9.2 and Attachment 9.2: Added new Attachment 9.2 covering the essential fire suppression and detection zones and identifying how many impairment permits needed for each zone. Essential fire suppression and detection are the two main categories of active FP equipment where hourly fire tour is the comp measure. This will aid in LCS 1.10 compliance. (AR 403631-16) Did not include rev bars for new Attachment 9.2.
6,12	Minor 001: Sections 2.6.6, 3.2.2.a.3, and 3.2.2.c all incorrectly referenced section 4.3.3.2.e (due to Word hidden codes). Deleted and changed these sections to reference the correct section, which is the entire section 4.0. AR 424048.

TABLE OF CONTENTS

Page

1.0 PURPOSE/SCOPE

1.1 The purpose of this procedure is to establish a program for the control of impairments to active fire protection features and to establish the appropriate compensatory measures to be implemented when fire protection features are impaired. This procedure covers Fire Protection System Impairment (FPSI) Permits. See Sections 4.1 through 4.8 for the scope of "active" fire protection features. This procedure implements required Nuclear Fire Protection Program elements. {R-7.4}, {R-10261},

1.2 This procedure DOES NOT address impairments to passive fire protection features (e.g., doors, dampers, penetration seals). The plant barrier impairment process for passive fire barriers is contained in PPM 1.3.57 and LCS 1.10.5. {C-7.2}

1.3 The scope of this procedure applies to all active fire protection systems in Plant Areas, as defined in 6.11 of this procedure. For impairments to fire protection systems/components in Non-Plant Areas (see 6.8 & 6.11), see ISPM-10 and FPP 1.3.

1.4 Fire protection features have been designed and installed at Columbia Generating Station to mitigate the consequences of fires that may occur. Active fire protection features are installed to provide an early warning, protect property and equipment and to limit spread of fire to other plant areas. Essential fire protection equipment helps ensure the ability to achieve and maintain post-fire safe shutdown capability. Since most active fire protection features are to be maintained operable at all times, an effective program is required to control impairments to these features and provide compensatory measures when these features are impaired. This procedure contains the specific compensatory actions required when a non-essential active fire protection feature is impaired. The specific compensatory actions for impaired essential active fire protection systems are in LCS 1.10.

2.0 RESPONSIBILITIES

2.1 Operations Manager or Designee

2.1.1 Maintains adequate full-time Operations staff for implementation of the fire impairment permitting process.

2.1.2 Provides staffing of Continuous Fire Tours, when needed.

2.2 Maintenance Manager or Designee

2.2.1 Ensures expedient repair or replacement of damaged or degraded fire protection systems/components.

2.2.2 Provides staffing of Continuous Fire Tours, when needed.

2.3 Security Programs Manager or Designee

2.3.1 Maintains qualified staffing necessary to perform fire tour duties.

2.3.2 Ensures fire tours are performed in the correct plant locations and at the correct frequency, as defined by this procedure.

2.4 Fire Tour Personnel

2.4.1 Performs fire tours in the locations specified on the Fire Tour Log and at the correct frequency, as defined by this procedure.

2.4.2 During fire tours, ensures fire doors are fully closed. {C-7.3}

2.4.3 If entering radiological areas, obtains a brief from RP.

2.5 Originator

2.5.1 “Originator” is a signature block on the electronic FPSI Permit and is the person that initiates the FPSI Permit by completing the Originator Section of the FPSI Permit.

2.5.2 The Originator is anyone who completes the Originator sections of an FPSI, but is typically a Planner.

2.5.3 Reviews work activities to determine the need for an FPSI Permit.

2.5.4 The Originator should have sufficient knowledge of the work area and planned scope of work to provide complete and accurate data to assist in the Evaluators approval of the FPSI Permit.

To aid in the evaluation process, provides information on the FPSI Permit clearly indicating what is impaired, correct impairment location, estimated impairment duration, and whether it is associated with outage work.

2.5.5 Ensure multiple impaired items located in different plant areas are not grouped onto one FPSI permit.

2.5.6 References FM892-1 thru -5 drawings for room and door numbers, when preparing a FPSI Permit.

2.5.7 Notifies the Evaluator to review the draft FPSI Permit.

2.6 Evaluator

2.6.1 “Evaluator” is a signature block on the electronic FPSI Permit and is the person that completes the Evaluator section of the FPSI Permit.

2.6.2 The Evaluator is typically the Plant Fire Marshal (FM). In the absence of available Fire Marshal or designee, the Evaluator is the Production SRO (PSRO), Control Room Supervisor (CRS), or equivalent Operations position.

2.6.3 Evaluates FPSI Permits for impairments to Plant fire protection systems.

2.6.4 Verifies multiple impaired items located in different plant areas are not grouped onto one FPSI permit.

2.6.5 References FM892 -1 thru -5 drawings for room and door numbers, when verifying a FPSI Permit.

2.6.6 Determines appropriate compensatory actions per Section 4.0.

2.6.7 Makes notifications in accordance with Section 3.1.5 of this procedure. {C-7.1}

2.7 Fire Marshal or Designee {R-7.4}

2.7.1 The Fire Marshal designee is any Technical Services Fire Protection personnel.

2.7.2 Administrates the Plant Fire Protection System Impairment Program. Primary owner of the Plant Logging System (PLS) Fire Impairment software and requests enhancements as needed.

> NOTE: Review of SharePoint radiation maps (http://vsds.energy-northwest.com:8080/VSDS_Drill-Down_Viewer/) provides adequate knowledge of plant room radiation levels for planned future impairments. Rad Ops at x2245 has current plant room radiation levels.

2.7.3 Approves additional high radiation area (HRA) compensatory measures, such as:

a. The placement of video cameras in high radiation areas or contaminated areas (in lieu of the fire tour entering the room), or

b. The placement of Portable Detection Systems (PDS) for transition to from continuous to hourly tour or in high radiation areas or contaminated areas (in lieu of the fire tour entering the room), or

c. Clearly highlighting on the Fire Tour Log that the fire tour will need to briefly enter a high radiation or contaminated area.

1) Ensure that entering a high radiation or contaminated area will not exceed the hourly tour period limit. An additional second fire tour (by other than Security) may be warranted. Fire Marshal to coordinate.

2.7.4 Periodically audits adequate implementation of specified compensatory measures. {AR-7.19}

2.7.5 Periodically audits open FPSI Permits to ensure proper closure. Periodically runs a report of open FPSI Permits, forwards the list to the Work Supervisors to ensure accuracy.

2.7.6 Obtains the weekly report of Engineering and Fire Protection holds and begins approval of FPSI Permits by T-8.

2.7.7 Terminates any work which does not meet the applicable requirements of this procedure. {C-7.1}

2.7.8 Annually prints a copy of the Fire Protection System Impairment Index for closed permits. Forwards the index to Records. {AR-7.20}

2.8 Approver

2.8.1 "Approval for Work" is a signature block on the electronic FPSI Permit. Signing this block signifies the FPSI Permit has been opened and work can commence.

2.8.2 The Approver is typically the Production SRO (PSRO) or designee. The Approver can also be the Fire Marshal or designee, but this is typically where: 1) there is no change to the fire tour log, 2) no impairment tag is being placed in the plant, and 3) is nonessential where no electronic software tracking permit needed.

2.8.3 Prints the approved FPSI Permit for the Work Supervisor.

2.9 PSRO or Designee

2.9.1 The PSRO designee is the Control Room Supervisor (CRS), or equivalent Operations position. The PSRO can also delegate FPSI Permit approval to the Fire Marshal or designee for non-essential systems only.

2.9.2 Updates the FPP 1.7 Fire Tour Log Sheet, as required. Contacts the Security Fire Tour for changes.

2.9.3 Where an impaired system/detection is LCS 1.10 essential and access to the room is in a high radiation or contaminated areas, one of the HRA compensatory measures of section 2.7.3 apply. Approval to open the FPSI Permit should include verifying current radiation levels at Rad Ops x2245. Ensure any section 2.7.3 HRA compensatory measures are communicated to Security and stated in the Fire Tour Log text. {AR 7.24}

2.10 Work Supervisor

2.10.1 Individual directly responsible for field work order activities craft supervision and permits.

2.10.2 Delegates the preparation of planned FPSI Permits, to Planners.

2.10.3 Responsible for obtaining approval of the pending FPSI Permit.

2.10.4 Responsible for implementing the compensatory measures identified on the FPSI Permit including staffing for continuous fire tour, except hourly fire tour.

2.10.5 Signs the Closure Origination block on the electronic FPSI Permit signifying the work is complete, the impairment no longer exists, and permit removed from plant.

2.10.6 Periodically reviews report of open FPSI Permits to ensure awareness of permits and to validate ownership of permits.

2.11 General Employees

NOTE: An emergency lighting battery unit (EBU) that is flashing red is impaired.

Notifies the Fire Marshal or designee of observed degradations to fire protection equipment. If Fire Marshal or designee does not answer, notify the PSRO or designee.

3.0 PROCEDURE

3.1 General Fire Protection System Impairment Requirements

3.1.1 The Fire Marshal or designee is the evaluator for planned FPSI Permits. If the Fire Marshal or designee is not onsite, the PSRO may evaluate FPSI permits.

3.1.2 Where a fire protection system/component covers more than one area, a separate FPSI Permit should be issued for EACH area. See Attachment 9.2 for fire detection/suppression zones that cover more than one area and require more than one FPSI. {C-7.3}

3.1.3 The permit evaluator should ensure appropriate compensatory actions are instituted for impaired fire systems, equipment, and components in accordance with section 4.0. This should include actions for any effects on associated fire protection features. Example: Inoperable essential fire door in area of new inoperable essential detection would require prompt transition to continuous fire tour. Users of this procedure need to be aware of LCS 1.10 guidance.

> NOTE: Exception to 3.1.4b and 3.1.4c for life safety (1-1/2 hour) emergency battery lighting units (EBU), which are subject to Step 4.6.2. Where an inoperable EBU is discovered, it may remain unattended for up to eight hours before an FPSI Permit is required.

3.1.4 An FPSI Permit is NOT required when ALL of the following conditions can be met:

a. The fire protection feature may be impaired and restored during the performance of an approved surveillance, test or maintenance task which specifically directs the impairment restoration; AND

b. The impaired fire protection feature is continually attended (within line of sight); AND

c. The impaired fire protection feature can be safely returned to an operable status PRIOR to leaving the area in the event an evacuation is required.

d. At least one person is continuous fire tour qualified (Qual Group FPAH).

3.1.5 Notifications for Fire Protection System Impairments

a. For unplanned impairments, notify:

1) Fire Marshal or Fire Protection Engineer (if on site). If not available, notify the PSRO or designee.

2) Security, if new hourly fire tour location(s) required.

b. For impairments to LCS 1.10 Essential fire protection systems or components, the PSRO should notify the Shift Manager (SM) or Control Room Supervisor (CRS).

NOTE: To notify NEIL, complete Attachment 9.1 and fax to (302) 888-3095, or complete the on-line NEIL Fire Protection System Impairment reporting form at www.myneil.com.

c. Fire Protection Engineering will notify Nuclear Electric Insurance Limited (NEIL) if:

- Impairment exceeds 90 days; and
- Impairment involves a fire suppression system, fire pump, fire main, or water supply.

d. Notify the Fire Brigade Leader of the more significant impairments, by checking “Yes” to “Fire Brigade Leader Notified” box on the FPSI including:

- Impaired essential fire protection systems.
- Degraded essential fire protection systems at the evaluator’s discretion.
- Impaired non-essential systems at the evaluator’s discretion. {AR-7.23}

3.2 Guidelines for Initiating Fire Protection System Impairment (FPSI) Permits

> NOTE: FPSI Permits are located on the LAN Plant Logging System (PLS) under "Fire Protection/Barrier Permits." Permits can be originated and saved in "draft" status for future approval. When ready for approval, contact the Fire Marshal or designee (or PSRO or designee if Fire Marshal is not onsite).

> NOTE: When the initiating or tracking document changes, the FPSI Permit should be updated with the new open WR's, WO's, AR's, EC's, or PDC's.

> NOTE: The Building, Elevation, and Location fields of the FPSI Permit generate the Hourly Fire Tour Log. Inaccurate FPSI Permit information can result in missed fire tours and LCS 1.10 noncompliance.

3.2.1 Work Supervisor or Designee, for planned impairments (see 6.10):

a. Reviews the planned impairment site to determine any potential fire hazards and safety concerns associated with impairing the fire protection system/component.

b. Prepares draft FPSI based on the planned scope of work.

1) The electronic logging system FPSI Permit must include the following:
   - Building (e.g. RB, TB, RW)
   - Elevation
   - "Location" field must contain Room number and access Door number (where door number is applicable)

   Reference FM892-1 thru -5 drawings to accurately enter the physical location of the impaired item, room number, and access door number. See Section 4.0 for more guidance on fire equipment locations.

2) Ensure multiple impaired items located in different plant areas are not grouped onto one FPSI Permit. Some impaired fire detection and suppression zones can cover more than one area and require different FPSI Permits. See Attachment 9.2 for a list of essential fire detection and suppression zones that if inoperable, require more than one FPSI permit, for hourly fire tour to be performed properly.

c. Notifies Fire Marshal that the permit is ready for review by entering a Fire Protection (FP) hold on the applicable work order task(s).

d. Discusses with the Fire Marshal any fire prevention or safety concerns associated with the planned impairment.

e. Implements the compensatory measures specified on the permit, except hourly fire tours.

f. Posts the FPSI tag at the impaired system or component.

  1) For impaired sprinkler systems, the tag should be hung at the sprinkler riser.

  2) For impaired fire detection zones or systems, the impairment tag should be hung at the fire alarm control panel where the impairment originates (may be a local FP panel or MCR FCP).

3.2.2 Fire Marshal or Designee, for planned impairments (see 6.10):

NOTE: The PSRO performs these actions in the absence of the Fire Marshal.

NOTE: New impairments should trigger a review of existing impairments to assure previous compensatory measures taken remain adequate.

a. Performs Evaluator review of FPSI Permit.

  1) Validates the physical location of the impaired item is accurate with Building, Elevation and Location fields completed. Validates the Location field includes Room number and access door number.

  2) Ensures Originator has not grouped essential impaired items of different areas on one FPSI Permit. See Attachment 9.2 for a list of Essential fire detection and suppression zones that if inoperable, require more than one FPSI permit. Multiple nonessential items like 1.5 hour emergency light discharge testing can be grouped on one FPSI Permit.

  3) Determines the appropriate compensatory measures in accordance with Section 4.0 and records all required compensatory actions on the FPSI permit.

b. Makes notifications per Step 3.1.5. If NEIL is notified, maintain a copy of the report for closure per 3.3.2c. Enter NEIL Incident ID number on FPSI.

c. If Section 4.0 requires a fire tour be established promptly, contacts Security to add affected area to the FPP 1.7 Fire Tour Log.

d. Verifies whether an Asset Suite Fire Marshal hold exists and clears the hold.

3.2.3 PSRO or designee:

> NOTE: When onsite, the Fire Marshal may perform this section (except approval of FPSI Permits for LCS 1.10 essential systems).

> NOTE: New impairments should trigger a review of existing impairments to assure previous compensatory measures taken remain adequate.

a. IF originating unplanned impairments in the absence of a Planner or Fire Marshal,
THEN initiate a FPSI Permit per section 3.2.1.

b. IF evaluating unplanned impairments in the absence of the Fire Marshal,
THEN independently review the FPSI Permit per section 3.2.2.

c. Reviews to ensure section 4.0 compensatory measures are satisfied and approves the FPSI permit.

d. Creates the FPSI tag, verifies the permit has the correct Work Supervisor name on the permit, and provides it to the Work Supervisor for posting. Creates the electronic software Tracking Sheet for essential FPSI Permits.

e. Initiates (or ensures others initiate) the appropriate work actions to restore the fire protection feature to operable status.

f. Ensures current plant conditions allow fire tour to access the area. Current radiological conditions should be met.

3.3 Guidelines for Clearing Fire Protection System Impairments

3.3.1 When the impaired fire protection system/component is restored/reworked, the FPSI Permit Worker or Work Supervisor:

a. IF essential LCS 1.10 scoped permits which affected operability (not degraded) THEN,:

- Verify satisfactory completion of applicable Post Maintenance Testing (PMT) surveillance.
- Provide to PSRO for review.

b. Ensures all work equipment, supplies, and debris have been removed from the area.

NOTE: Operations removes FPSI tags associated with clearance orders.

c. Removes the FPSI tag when the system/component is restored,

d. Contacts the Fire Marshal or designee (if on site) for permit closure. If the Fire Marshal or designee are not on site, contact the PSRO or designee.

3.3.2 The Fire Marshal or designee or PSRO or designee (for essential FPSI Permits) performs the following:

a. Reviews the FPSI Permit Closure screen and approves the closure of the FPSI Permit. For essential LCS 1.10 scope, this first includes reviewing PMT surveillance data (usually partial surveillance) meets criteria.

b. Closes the electronic software Tracking Sheet for essential FPSI Permits.

NOTE: Fire Marshal will notify NEIL of impairment closures.

c. Makes notifications of the impairment closure, commensurate with the initial notification made per Section 3.1.5.

d. Removes/discontinues compensatory measures associated with the impairment, if applicable.

e. Updates the FPP 1.7 Fire Tour Log sheet, if required.

4.0 OPERABILITY REQUIREMENTS AND COMPENSATORY ACTIONS

The operability and compensatory actions for essential fire protection systems is located in LCS 1.10. The operability and compensatory actions for non-essential fire protection systems is located in this procedure. The following steps list the operability requirements and associated compensatory actions for all active fire protection features.

$ 4.1 Essential Fire Protection Water Supply System {7.6}

4.1.1 Follow the operability and compensatory measures specified in LCS 1.10.1.

4.1.2 Reference M515-1, M515-4, M515-5, and M932-1 drawings for locations.

4.2 Sprinkler Suppression

$ 4.2.1 Sprinkler Suppression Operability Requirements {7.6}

Follow the operability and compensatory measures specified in LCS 1.10.2.

4.2.2 Non-Essential Sprinkler Suppression Operability Requirements

Non-essential sprinkler suppression systems (all plant wet-pipe sprinkler, preaction and deluge systems not listed in LCS Table 1-10.2-1) equipment shall be operable at all times. See the following surveillances for operability criteria: PPM's 15.1.1, 15.1.14, 15.1.15, 15.1.16, 15.1.17, 15.1.18, 15.1.19, 15.1.20, 15.1.23, 15.2.4, 15.2.16, 15.2.23, 15.2.37, 15.3.7, 15.3.12, 15.3.13, 15.3.14, and 15.3.15.

4.2.3 Non-Essential Sprinkler Suppression Compensatory Actions

With one or more of the non-essential sprinkler suppression systems inoperable, issue an FPSI Permit and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.2.4 Reference M515-2 and FM892-7 through FM892-11 drawings for locations.

4.3 Fire Hose Stations

$ 4.3.1 Essential Fire Hose Station Equipment Operability Requirements {7.6}

Follow the operability and compensatory measures specified in LCS 1.10.3.

4.3.2 Non-Essential Hose Station Operability Requirements

Non-essential hose stations (all plant hose stations not listed in LCS Table 1-10.3-1) equipment shall be operable at all times. See the following surveillances for operability criteria: PPM's 15.1.8, 15.1.18, 15.1.19, 15.3.2, 15.3.7, and 15.3.15.

4.3.3 Non-Essential Fire Hose Station Compensatory Actions

With one or more of the non-essential fire hose stations inoperable, issue an FPSI permit and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.3.4 Reference FM892-7 through FM892-11 drawings for location.

4.4 Fire Hydrants and Hydrant Hose Equipment

$ 4.4.1 Essential Fire Hydrant and Hydrant Hose Equipment Operability Requirements {7.6}

Follow the operability and compensatory measures specified in LCS 1.10.4.

4.4.2 Non-Essential Hydrant Operability Requirements

Non-essential hydrants (all plant hydrants not listed in LCS Table 1-10.4-1) shall be operable at all times. See the following surveillances for operability criteria: PPM's 15.1.10, 15.1.12, 15.1.18, 15.1.19, and 15.3.1.

4.4.3 Non-Essential Fire Hydrant Compensatory Actions

With one or more of the non-essential fire hydrants inoperable, issue an FPSI permit and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.4.4 Reference M515-1 and M932-1 drawings for locations.

4.5 Fire Detection Instrumentation

> NOTE: Portable Detection Systems (PDS) are available to be installed per PPM 15.2.38, for long-duration impairments. See Section 4.11 for further guidance on PDS.

$ 4.5.1 Essential Fire Detection Operability Requirements {7.6}

Follow the operability and compensatory measures specified in LCS 1.10.6.

4.5.2 Non-Essential Fire Detection Operability Requirements

Non-essential fire detection (all plant detector/zones not listed in LCS Table 1-10.6-1) shall be operable at all times. See the following surveillances for operability criteria: PPM's 15.2.2, 15.2.3, 15.2.4, 15.2.6, 15.2.13, 15.2.14, 15.2.16, 15.2.17, 15.2.22, 15.2.23, 15.2.25, 15.2.29, 15.2.30, 15.2.34, 15.2.36, 15.2.37, 15.2.46, 15.2.47, and 15.2.48.

4.5.3 Non-Essential Fire Detection Compensatory Actions

With one or more of the non-essential fire detectors inoperable, issue an FPSI permit and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.5.4 Reference 217-00,84 and EWD-62E series drawings for locations.

4.6 Lighting Systems

$ 4.6.1 Essential Lighting System Operability and Compensatory Actions {7.6}

Follow the operability and compensatory measures specified in LCS 1.10.7.

4.6.2 Non-Essential Lighting Operability Requirements

Non-essential lighting should be operable at all times. See PPM 10.25.156 for operability criteria.

4.6.3 Non-Essential Lighting Compensatory Actions

For impairments to non-essential lighting systems (1-1/2 hour EBU for life safety/station blackout), issue an FPSI permit (see 3.1.4) and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.6.4 Reference FM892-12 through FM892-14 drawings for locations (essential only).

4.7 Essential Communication System {7.6}

$ 4.7.1 Follow the operability and compensatory measures specified in LCS 1.10.8.

4.7.2 Reference FM892-12 through FM892-14 drawings for reference.

4.8 All Other Non-Essential Active Fire Protection Systems

4.8.1 Non-Essential Fire System Operability Requirements

Non-essential fire systems (Halon systems, dry-chemical system, foam carts, portable fire extinguishers) should be operable at all times. CO2 system should be operable in Mode 1/2/3. See the following surveillances for operability criteria:

MCR Halon systems: PPM’s 15.2.33, 15.2.36, 15.3.6 (see FM892-3)
CO2 system: PPM 15.2.27, OSP-INST-H101 (see M515-3, FM892-7, FM892-9)
Dry-chemical system: PPM 15.3.16 (see FM892-7)
Foam carts: PPM 15.1.22 (see FM892-7, FM892-9)
Portable fire extinguishers: PPM’s 15.1.22, 15.1.28 (see Pre-Fire Plans)
Smoke removal fans: PPM 15.1.27 (see Pre-Fire Plans)
B5b Phase 1 hose: PPM 15.3.1 (see TM-2160 Building 82)

4.8.2 Non-Essential Fire System Compensatory Actions

For impairments to all other Non-essential active Fire Protection features, issue an FPSI permit (see 3.1.4) and evaluate the potential impact of the impairment and implement appropriate compensatory actions as discussed in Section 4.9.

4.9 Appropriate Compensatory Measures

> NOTE: The Section 4.9 and 4.10 info is also referenced in PPM 1.3.57 for impaired fire barriers.

Determining "appropriate compensatory measures" involves knowledge of the following:

- The function(s) of the impairment system/component
- Level of inoperability (will impaired item still perform, or partially perform, its intended function)
- Plant area(s) affected by the impairment. Is it in a FP Vital (see 6.2) with post-fire safe shutdown systems?
- Fire hazards of the area including: a) whether area has significant combustibles (fixed or transient); and b) whether ignition source work is planned or ongoing in the area
- Ease of fire brigade access
- Availability of other operable backup suppression systems

With the above factors in mind, the following is a listing of possible appropriate compensatory measures which could be implemented:

- Follow the same compensatory measures specified for similar essential fire protection systems/components
- Implement an hourly or continuous Fire Tour
- Limit storage of transient combustibles in the area
- Limit any ignition source work in the area
- Temporarily protect breached fire rated assembly or electrical separation barrier with refractory ceramic fiber, Siltemp, etc.
- Station backup equipment such as: portable extinguishers, fire hose, portable detection, hand-held emergency lighting units or exhaust fans

- With the MCR continuously manned, any incipient smoke would be observed by control room personnel; thus, MCR personnel can be credited as performing Fire Tour

- Simply track the impairment by completing a FPSI or Barrier Impairment Permit

4.10 Video Systems

4.10.1 Where an hourly or continuous fire tour is required to enter a high radiation or contaminated area; a video camera system may be installed for observance by the Fire Tour, in-lieu of room entry.

4.10.2 The use of video cameras must be approved by the Fire Marshal or designee. The following is a listing of the limitations imposed on the use of video systems in-lieu of physical area inspection:

- A sufficient number of video cameras must be established to adequately observe for the outbreak of fire. Determine whether a video camera should be placed on both sides of an inoperable fire barrier. Where only one camera is used, place the camera on the side of the barrier with the highest combustible loading or potential for fire.

- The level of illumination should be adequate to provide a clear view of the area on the video monitor.

- The video system should provide sufficient resolution to be able to observe the presence of fire; however, the ability to observe small quantities of smoke is not expected.

4.11 Portable Detection System (PDS)

4.11.1 The PDS can be used to provide fire detection in all plant areas, provided a phone jack is nearby. For inoperable essential detection for Pre-Action 66 or fire rated assemblies that would normally require continuous fire tour, the installation of a PDS that adequately restores fire detection in the area, allows transition to hourly fire tour.

4.11.2 The PDS consists of a portable fire alarm panel and fire detectors which can be placed where no fixed fire protection exists or to compensate for inoperable fire detection. When a fire is detected, the PDS sends a recorded message via phone line to pre-programmed phone numbers. PPM 15.2.38 applies to the installation and maintenance of the PDS.

4.11.3 Because the PDS relies upon an operable telephone line to transmit the fire alarm message, fire tours are implemented to check the status of the PDS panel for trouble conditions (e.g., disconnected telephone line), per FPP-1.7.

5.0 DOCUMENTATION

5.1 The Fire Marshal will periodically print and submit an index of the closed permits to Records, (DIC 1730.3). {AR-7.20}

5.2 Maintain the applicable records in accordance with the appropriate record procedure(s).

6.0 DEFINITIONS

6.1 Degraded - Fire protection related equipment which is still capable of performing its intended design function, but has aspects that are non-conforming. Examples include: 1) scaffold blocking a small portion of the sprinkler system; 2) removed ceiling tiles in suspended ceiling which could lower response time of nearby fire detectors/sprinklers; 3) minor NFPA code deviations.

6.2 FP Vital Areas - The subset of "Plant Areas" which contain post-fire safe shutdown equipment. Impairments in these areas may warrant more rigorous compensatory measures in Section 4.9. Includes the following areas:

6.2.1 Reactor Building (excluding HPCS Pump Room, enclosed stairwells, elevator shafts, and 606')

6.2.2 Diesel Generator Building and Rooms D-113 and D-104

6.2.3 Radwaste and Control Building Areas:
a. 525' Level
b. Main Control Room 501'
c. Cable Spreading Room 484′
d. Cable Chase in Radwaste Building 467' to 525'
e. Vital Island 467'
  - RPS Rooms
  - Battery Rooms
  - Battery Charger Rooms
  - Switchgear Rooms
  - Remote Shutdown Room
  - Corridor C205

f. 437' Room C106

6.2.4 Standby Service Water Pump House 1A

6.2.5 Standby Service Water Pump House 1B

6.2.6 TG/RB/RW/DG Corridor 441'

6.3 Fire Protection System Impairment - The process of formally declaring a fire protection system/component degraded or inoperable.

6.4 Fire Protection System Impairment (FPSI) Permit - A form used to administratively control the impairment and compensatory actions of fire protection systems/ components in accordance with regulatory commitments. The fire protection system impairment process helps ensure Operations is aware of fire system capability and helps raise management attention for a more timely resolution.

6.5 Fire Tour - The performance of periodic tours observing areas affected by impaired fire protection features for fire, fire conditions (smoke, heat, light), and fire hazards.

6.5.1 Continuous Fire Tour - See LCS definitions.

6.5.2 Hourly Fire Tour - The performance of a tour of the impaired component area is required within an hourly tour period. The intent is to complete the tour log once each hourly tour period (but not necessarily within 60 minutes).

6.6 Impaired: A fire system that is either degraded or inoperable. Which category the impairment falls into is recorded on page 1 of the FPSI permit.

6.7 Inoperable - Fire protection related equipment which is incapable of performing its intended design function.

6.8 Non-Plant Areas - Includes all ENW facilities, except those identified as Plant Areas. Includes all other Energy Northwest facilities, such as Energy Northwest Office Complex (Richland), Industrial Development Complex (WNP-1/4), Grays Harbor (WNP-3/5), Packwood, and Nine Canyon Wind Turbine Project.

6.9 Originator - Anyone who completes the Originator sections of FPSI Permit. Typically the Work Planner or Work Supervisor for planned impairments.

6.10 Planned Impairment - Planned impairments are actions taken to intentionally affect the operability of a system/component as a result of planned work. Examples are: isolating a sprinkler system, removing smoke detectors, placing a fire pump controller in Manual position, scaffolding blocking sprinklers or fire detectors, etc.

6.11 Plant Areas - Includes the following buildings/structures/roofs/including 10 feet from exterior non-fire rated walls: Reactor, Radwaste, Diesel Generator, Turbine Generator, Adjustable Speed Drive, Standby Service Water Pump Houses, Diesel Fuel Polishing, Transformer Yard, Transformer Yard Open Phase Detection System (OPDS) buildings, Water Filtration (Flocculator), Pumphouse #2, Hydrogen Gas Bottle Storage, Bladder Tank, Circulating Water Pump House, Cooling Tower Electrical Buildings, TMU Pumphouse, HSSF, ISFSI Facility, ISFSI Electrical Building, and DG-4 when in the Protected Area. Non-Plant suppression/detection systems that alarm in the main control room are considered Plant systems. {R-7.5}

6.12 Portable Detection System (PDS) - A temporary fire detection and alarm notification system that may be utilized as a compensatory measure. See Section 4.11.

6.13 Unplanned Impairment - Unplanned impairments are unintentional problems discovered, not as a result of planned work. Examples are discovery of a fire alarm panel in trouble (which cannot be cleared), fire protection water pipe break, CO_2 system found below minimum level, etc.

7.0 REFERENCES

Source References

7.1 NRC Inspection Report 86-25, dated 12/29/86, Item 86-25-15, Response Letters, dated 1/28/87, and Letter GO2-88-111, dated 5/6/88; Letter GO2-90-0079, dated 4/19/90

7.2 GO2-94-284, LER 94-021

7.3 NRC Inspection Report 93-18, Item 93-18-04, dated 7/23/93

7.4 FSAR Appendix F

7.5 ENW-CGS-FHA-02, Columbia Generating Station Independent Spent Fuel Storage Installation Fire Hazards Analysis

7.6 Licensee Controlled Specification 1.10, Fire Protection

7.7 10 CFR 50, Appendix R

7.8 BTP APCSB 9.5-1 Appendix A

7.9 SWP-FPP-01, Nuclear Fire Protection Program

7.10 Nuclear Electric Insurance Limited (NEIL) Members' Manual

7.11 National Fire Protection Association (NFPA) Standards

7.12 Fire Protection Engineering Evaluation, FPF 3.16, Item 1, Fire Protection Compensatory Measures

7.13 PERA 299-0522-01

7.14 Fire Protection Engineering Evaluation, FPF 3.22, Item 2, Thermo-Lag Resolution - Impact of Changes to Fire Area PFSS Divisions.

7.15 PER 299-2680 (SELF PTL 165071)

7.16 PER 200-0610 (SELF PTL 168694)

7.17 BDC 95-0029-0A, PFSS Communication and Lighting Upgrade

7.18 Calculation NE-02-85-19, Calculation for Post Fire Safe Shutdown PFSS Analysis

7.19 PER 204-0663-06 (SELF PTL 218305)

7.20 SELF PTL 222055

7.21 PERA 203-0304-01

7.22 AR 9964, Remove Hydrant Hose Hoses

7.23 AR SELF 100973, SELF-FPF 3.6 ITEM 31-172176

7.24 AR 384338, Station Personnel Failed to Implement Compensatory Measure

User References

7.25 PPM 1.3.1, Operating Policies, Programs, and Practices

7.26 SWP-MAI-01, Work Management

7.27 PPM 1.3.10, Plant Fire Protection Program Implementation

7.28 SWP-CAP-01, Corrective Action Program

7.29 PPM 1.3.57, Barrier Impairment

7.30 PPM 15.2.38, Portable Detection System Installation Testing and Operations

7.31 Industrial Safety Program Manual, Chapter 10, Fire Protection and Life Safety

7.32 FPP 1.7, Fire Tour Implementation

7.33 FPP 1.3, Permit Controls for Non-Plant Fire Protection Systems Impairments and Ignition Sources

7.34 PLS Fire Protection/Barrier Permitting General User Instruction Guide

7.35 FM892 Series Drawings, Sheets 1-5 Fire Barriers, Sheet 6 Zones of Limited Combustibles, Sheets 7-11 Suppression Systems, Sheets 12-14 PFSS Lighting & Communications

8.0 FORMS

The Fire Protection System Impairment (FPSI) Permit is an electronic form available on the LAN Plant Logging System (PLS).

9.0 ATTACHMENTS

9.1 Fire Protection System Impairment Notification Form

9.2 Essential Fire Detection and Suppression Zones

FIRE PROTECTION SYSTEM IMPAIRMENT NOTIFICATION

Transmit by FAX to: NUCLEAR ELECTRIC INSURANCE LIMITED
NUCLEAR SERVICE ORGANIZATION
FAX# (302) 888-3095

Plant Columbia Generating Station Date ____________________

Reported By ______________________________ Phone (509)

Impairment Permit Type (BI/FPSI) & Number ______________________________

System(s) Impaired

( ) Wet Pipe
( ) Deluge
( ) Fire Pump
( ) Dry Pipe
( ) Preaction
( ) Other______________________________
( ) Fire main, Hydrants, Valves
( ) CO2
( ) Halon

Description of Impairment (Include Valve/Equipment Tag No.) ______________________________
____
____

Reason for Impairment ______________________________
____

Building/Elevation/Location of Impairment (Include Area/Equipment Protected)
____

Compensatory Action(s) Taken ______________________________
____
____

Date Impairment Occurred: __________ Date Expected Return to Service: ____________________

(Forward completed form to Fire Marshal; In-box located in SSS office)

____

Actual Date Returned to Service: ______________________________

Closure Notification By: ______________________________ Date ____________________

Essential Fire Detection and Suppression Zones

END

Essential Fire Detection and Suppression Zones

LCS 1.10 lists the essential fire suppression and detection zones. If inoperable, the compensatory measure is hourly fire tour. This table clarifies which would require more than one FPSI for the hourly fire tour log to include all the required tour locations. For each system listed below, the number of rows for that system or zone indicates the number of FPSIs required to cover the whole protected area.

ESSENTIAL FP SYSTEM	**ROOM NAME**	**BUILDING & ELEVATION**	**FPSI LOCATION FIELD REQUIRED INFO**		**COMMENTS**
			ROOM	**DOOR Note 4**	
Preaction 66 or Detection Zone 66	441' Corridors (Both N-S and E-W Corridor) & 441' Old Laundry	DG 441'	C121 D104 D113	None None D109	Corridors & Laundry room can be done on one FPSI. See Note 1.
	467' Cable Chase	RW 467'	C212	R207 or C223	See Note 1.
	501' Cable Chase See comment for 525' Cable Chase	RW 501'	C422	C418	501' and 525' can be done on one FPSI, but must look up through 525' grating. See Note 1.
Preaction 79 or Detection Zone 79	DG-1 Generator Room	DG 441'	D107	D105 and D115	Not in DG switchgear room.
	DG-1 Day Tank Room	DG 441'	D108	D106	
Preaction 81 or Detection Zone 81	DG-2 Generator Room	DG 441'	D110	D104 and D117	Not in DG switchgear room.
	DG-2 Day Tank Room	DG 441'	D111	D103	
Detection Zone 13	422' CRD Pump Room Auxiliary Condensate Pump Room	RB 422'	R10 R9	R12 or R10/10A R7/R7A would not be typical.	These two adjoining rooms can be done on one FPSI. Door R12 would be typical path to access.
	441' Vehicle Airlock (Railroad Bay) Room	RB 441'	R105	R103 or R106	Door R103 typical.
	422' & 444' RHR A Pump Room	RB 422'	R6/R116	R4 or R6/R6A	Fire tour must enter room and look up through 444' grating. Climbing ladder not required.
	422' & 444' RHR B Pump Room	RB 422'	R7/R115	R7/R7A or R6/R6A	Fire tour must enter room and look up through 444' grating. Climbing ladder not required.

ESSENTIAL FP SYSTEM	ROOM NAME	BUILDING & ELEVATION	FPSI LOCATION FIELD REQUIRED INFO		COMMENTS
			ROOM	DOOR Note 4	
	422' & 444' RHR C Pump Room	RB 422'	R14/R113	R13 or R9/R9A	Fire tour must enter room and look up through 444' grating. Climbing ladder not required.
	422' & 444' RCIC Pump Room	RB 422'	R15/R112	R5 or R9/R9A	Fire tour must enter room and look up through 444' grating. Climbing ladder not required.
	422' & 444' LPCS Pump Room	RB 422'	R12/R114	R8 or R11/R11A	Fire tour must enter room and look up through 444' grating. Climbing ladder not required.
Detection Zone 14	General Area (all the way around)	RB 471'	R206	Numerous	FPSI Location could just say "All Quadrants"
	MCC Room	RB 471'	R212	R211 or R212	Door R213 not access.
Detection Zone 15	General Area Rooms	RB 501'	R305	Numerous	FPSI Location could just say "All Accessible Quadrants"
	CRD Rebuild Room	RB 501'	R309	R311	High Rad, Contaminated, doors unlocked, no windows. PDS or video.
	TIP Drive Room	RB 501'	R320	R315	
Detection Zone 16	General Area (all the way around)	RB 522'	R404	Numerous	FPSI Location could just say "All Quadrants"
	Division 1 MCC Room	RB 522'	R411	R410 or R411	Door R412 not access.
	Division 2 MCC Room	RB 522'	R410	R408	Door R413 not access.
	RHR Valve Room	RB 522'	R405	R407	High Rad Area
Detection Zone 17	General Areas (given different room numbers at this elevation)	RB 548'	R504/R508/R513	Numerous	FPSI Location could just say "All Quadrants"
	Fuel Pool HX room A and Pump Room	RB 548'	R506	R516	High Rad Area
	RHR Heat Exchanger Rooms 1A	RB 548'	R507	R506	High Rad Area
	RHR Heat Exchanger Rooms 1B	RB 548'	R505	R504	High Rad Area, may also be contaminated.
Detection Zone 18	General Area	RB 572'	604/R607/R608	Numerous	FPSI Location could just say "All Accessible Quadrants"
	RHR HX-1A Room	RB 572'	R606	R612	High Rad Area

ESSENTIAL FP SYSTEM	**ROOM NAME**	**BUILDING & ELEVATION**	**FPSI LOCATION FIELD REQUIRED INFO**		**COMMENTS**
			ROOM	**DOOR Note 4**	
	RHR HX-1B Room	RB 572’	R605	R613	High Rad Area, may also be contaminated.
	Division 2 H2 Recombiner Control Rm	RB 572’	R612	R607	
Detection Zone 20 Detectors 20-1 through 20-11 only	NW accessible portion only	RW 437’	C106	C103 & C109	Door when coming from normal direction.
Detection Zone 22 WMA-SMD-53A, duct detector 22-11.	Switchgear Room 2	RW 467’	C206	C214 or C242	
	RPS Electrical Equipment Room 2	RW 467’	C213	C222	
	Electrical Equipment Room 2	RW 467’	C224	C238	
	Central Corridor & Vestibule	RW 467’	C205 C237	C241 or C223 C204 or C241	Door C213 normally locked.
	Battery Room 2	RW 467’	C215	C217 or C243	
Detection Zone 23 WMA-SMD-53B, duct detector 23-15	Remote Shutdown Room	RW 467’	C207	C240 or C239	
	Switchgear Room 1	RW 467’	C208	C216 or C239	
	Electrical Equipment Room 1	RW 467’	C216	C221	
	RPS Electrical Equipment Room 1	RW 467’	C211	C220 or C237	
	Electrical Access and Security Room	RW 467’	C239 C209	C218 and C245	Look through grated door C245 into room C209.
	Battery Room 1	RW 467’	C210	C219 or C237	
Detection Zone 24 Detectors 24-4 and 24-5 only.	*South Cable Chase*	RW 467’	*C230*	C228	
	PASS Room	RW 487’	C344	C322 or R210	These detectors also protect adjoining lower 467' Room C230.
Detection Zone 25	Cable Spreading Room	RW 484’	C304	C302 or C313	

ESSENTIAL FP SYSTEM	ROOM NAME	BUILDING & ELEVATION	FPSI LOCATION FIELD REQUIRED INFO		COMMENTS
			ROOM	DOOR Note 4	
Includes duct detectors WMA-SMD-52A or WMA-SMD-52B, depending on what WMA-52 fan is in operation.	Remote Shutdown Room	RW 467’	C207	C240 or C239	
	Cable Chase	RW 467’	C212	R207 or C223	
	501’ Cable Chase See comment for 525’ Cable Chase	RW 501’	C422	C418	501’ and 525’ can be done on one FPSI, but must look up through 525’ grating.
Detection Zone 28	Chiller Area	RW 525’	C502	C502	
	Communications	RW 525’	C503	C505	Need SM approval to enter
	Div 1 HVAC Equipment Room	RW 525’	C507	C507 or C509	
	Div 2 HVAC Equipment Room	RW 525’	C508	C508 or C505	
	I&C Rad Instrument Shop	RW 525’	C510	C511	Normally locked
Detection Zone 35	Electrical Equipment Room 1A - Standby Service Water Pump House	SWPH 1A	G100	G101	Equipment Door Not Listed
Detection Zone 36	Electrical Equipment Room 1B - Standby Service Water Pump House	SWPH 1B	G200	G201	Equipment Door Not Listed
Detection Zone 38	DG-1A Generator and Switchgear Room	DG 441’	D107 D115	D105 & D115 D105	Walk through switchgear area to get to generator area.
	DG-1A Day Tank Room	DG 441’	D108	D106	
Detection Zone 39	DG-1B Generator and Switchgear Room	DG 441’	D110 D116	D104 & D117 D104	Walk through switchgear area to get to generator area.
	DG-1B Day Tank Room	DG 441’	D111	D103	
Detection Zone 40	HPCS Generator and HPCS Switchgear	DG 441’	D100 D114	D107 D107	Walk through switchgear area to get to generator area.
	DG-1A Fuel Transfer Pump Room	DG 441’	D101	D111	
	DG-1B Fuel Transfer Pump Room	DG 441’	D102	D110	
	455’Sprinkler Valve	DG 441’	D206	D208 or	Door D208 is normal path.

ESSENTIAL FP SYSTEM	ROOM NAME	BUILDING & ELEVATION	FPSI LOCATION FIELD REQUIRED INFO		COMMENTS
			ROOM	DOOR Note 4	
	Room			D203 or D204	
	455’ HPCS Muffler Room	DG 441’	D207A	D205	At HPCS generator mezzanine NE corner. Narrow path.
Detection Zone 65	Cable Spreading Room	RW 484’	C304	C302 or C313	
Detection Zone 80	DG-2 Fuel Transfer Pump Room	DG 441’	D102	D107 & D110	
Detection Zone 82	DG-1 Fuel Transfer Pump Room	DG 441’	D101	D107 & D111	
Vesda Detection Zone ISD/1	Switchgear Room 2	RW 467’	C206	C214 or C242	Note 3.
	RPS Electrical Equipment Room 2	RW 467’	C213	C222	
	Electrical Equipment Room 2	RW 467’	C224	C238	
	Central Corridor & Vestibule	RW 467’	C205 C237	C241 or C223 C204 or C241	Door C213 normally locked.
Vesda Detection Zone ISD/2	Battery Room 2	RW 467’	C215	C217 or C243	Note 3.
Vesda Detection Zone ISD/3	Remote Shutdown Room	RW 467’	C207	C240 or C239	Note 3.
	Switchgear Room 1	RW 467’	C208	C216 or C239	
	Electrical Equipment Room 1	RW 467’	C216	C221	
	RPS Electrical Equipment Room 1	RW 467’	C211	C220 or C237	
	Electrical Access and Security Room	RW 467’	C239 C209	C218 and C245	Look through grated door C245 into room C209.
Vesda Detection Zone ISD/4	Battery Room 1	RW 467’	C210	C219 or C237	Note 3.

Note 1: The plant areas of Preaction 66 and detection Zone 66 contain one-hr Darmatt and if either are inoperable, LCS requires continuous fire tour. These same rows could be used for the FPSI Permits associated with continuous fire tour. However, if P66 is flooded, the inoperable Zone 66 would be hourly fire tour.

Note 2: Table does not include essential Detection Zone 26, 51, or PGCC Ionization Detection Zones (U679-U690, U800, U840, U891-U894) since in the MCR and does not require Security hourly fire tour.

Note 3: For Vesda zones, this table has not identified the subzone for each sampling tube. See LCS Table 1.10.6-1 for scope of each subzone sensing tube.

Note 4: Where door column says “Numerous”, enter the info stated in the Comments Column. Where the door column says “None”, enter the full room name.

ILC-25 A-7 (SRO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM A-7 (SRO)

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______

SIMULATOR GUIDE PQD CODE ______ Rev. No. ______

JPM PQD CODE ______ Rev. No. ______

EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 11/29/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Determines that SLC is Inoperable per step #48 of OSP-INST-H101 by graphing SLC Temperature (64°F) vs. SLC Tank Concentration (14.3%) as being in the "Unacceptable Operation" region on Attachment 9.6.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☐ **SRO** ☑

Task Number and Title: SRO-0163 Review results of surveillance tests.

K/A Importance Factors: RO: N/A **SRO:** 4.7

K/A Number: 2.2.45

K/A Statement: Ability to determine or interpret technical specifications with action statements of greater than 1 hour (SRO Only).

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.2 – Equipment Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - Student JPM Information Sheet **(Page 9)**
  - Student JPM Answer Sheet **(Page 10)**
  - OSP-INST-H101 **(JPM A-7 ILC-25 Ref 1.PDF)**
  - CSP-SLC-M101 **(JPM A-7 ILC-25 Ref 2.PDF)**
  - LCO 3.1.7 & Bases **(JPM A-7 ILC-25 Ref 3.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:

- Clear ruler
- Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
OSP-INST-H101	097	001
CSP-SLC-M101	014	002
Tech Specs	267	N/A
Tech Specs Bases	129	N/A

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

Initial Conditions:

- The plant is operating at 100% power.
- Chemistry added water to the SLC tank 4 hours ago and has 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:

- Complete SLC portion of OSP-INST-H101 by evaluating CSP-SLC-M101 and TS LCO 3.1.7 to determine OPERABILITY of SLC.
- Complete the Student JPM Answer Sheet indicating SLC OPERABILITY determination status and justification.

START TIME:___________

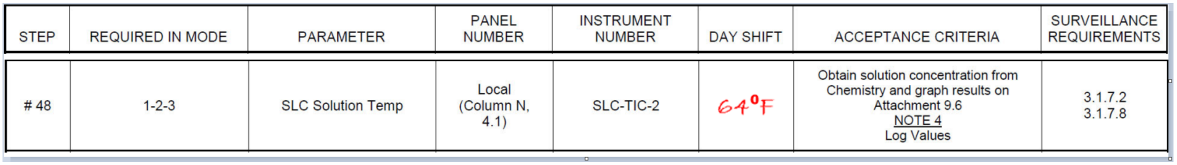
Examiner Note: **Provide candidate with the following:**

- **Student JPM Information Sheet**
- **Student JPM Answer Sheet**
- **Student Reference #1 (marked-up pages of OSP-INST-H101)**
- **Student Reference #2 (marked-up pages of CSP-SLC-M101)**
- **Student Reference #3 (TS LCO 3.1.7 and Bases)**

STEP / STANDARD	SAT / UNSAT

Step 1:

Performs Step #48 of OSP-INST-H101: Records SLC Solution Temp.



STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 48	1-2-3	SLC Solution Temp	Local (Column N, 4.1)	SLC-TIC-2	64°F	Obtain solution concentration from Chemistry and graph results on Attachment 9.6 NOTE 4 Log Values	3.1.7.2 3.1.7.8

Standard:

- Records SLC Solution Temp from initial conditions for SLC-TIC-2.

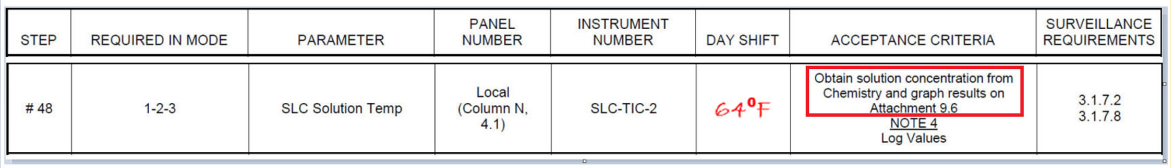
____SAT

____UNSAT

____N/A

Step 2:

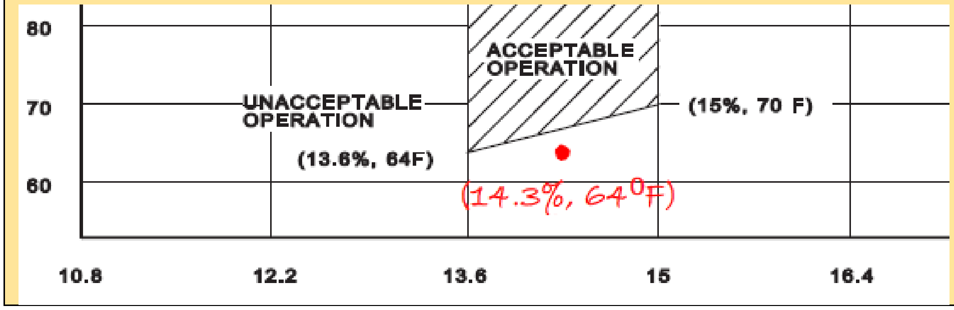
Performs Step #48 of OSP-INST-H101: Obtains solution concentration from Chemistry and graphs results on Att. 9.6.



STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 48	1-2-3	SLC Solution Temp	Local (Column N, 4.1)	SLC-TIC-2	64°F	Obtain solution concentration from Chemistry and graph results on Attachment 9.6 NOTE 4 Log Values	3.1.7.2 3.1.7.8

Standard:

- Reviews completed Attachments 9.1 and 9.2 of CSP-SLC-M101 and finds the concentration of the solution is 14.3%.
- Graphs the results on Attachment 9.6 of OSP-INST-H101.



CRITICAL STEP

____SAT

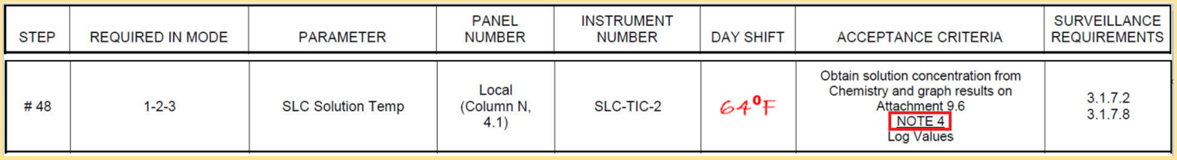
____UNSAT

____N/A

STEP / STANDARD | **SAT / UNSAT**

Step 3:

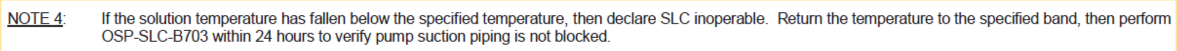
Performs Step #48 of OSP-INST-H101: Refers to Note 4.



STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 48	1-2-3	SLC Solution Temp	Local (Column N, 4.1)	SLC-TIC-2	64°F	Obtain solution concentration from Chemistry and graph results on Attachment 9.6 NOTE 4 Log Values	3.1.7.2 3.1.7.8

Standard:

- Reviews Note 4.



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.

- Declares SLC inoperable because the solution temperature has fallen below the specified temperature.

CRITICAL STEP

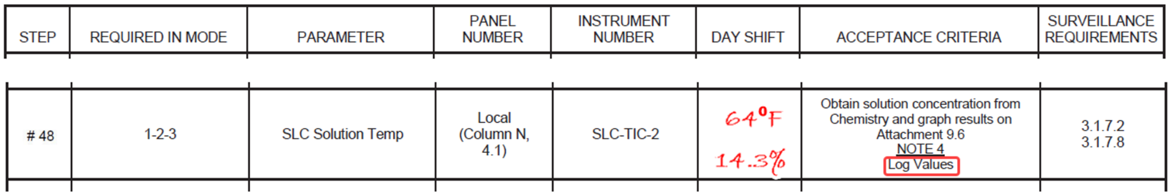
____SAT

____UNSAT

____N/A

Step 4:

Perform Step #48 of OSP-INST-H101: Logs solution concentration value.



STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 48	1-2-3	SLC Solution Temp	Local (Column N, 4.1)	SLC-TIC-2	64°F 14.3%	Obtain solution concentration from Chemistry and graph results on Attachment 9.6 NOTE 4 Log Values	3.1.7.2 3.1.7.8

Standard:

- Logs solution concentration.
- Completes Student JPM Answer Sheet.

____SAT

____UNSAT

____N/A

Examiner Cue: Inform the candidate that the JPM is Complete.

STOP TIME: ___________

JPM ANSWER KEY
(COMPLETED)

The SLC system is:

___ OPERABLE

X INOPERABLE

Justification:

Words to the effect of: SLC is inoperable because the solution temperature has fallen below the specified temperature.

RESULTS OF JPM ILC-25 JPM A-7 (SRO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Determines that SLC is Inoperable per step #48 of OSP-INST-H101 by graphing SLC Temperature (64°F) vs. SLC Tank Concentration (14.3%) as being in the "Unacceptable Operation" region on Attachment 9.6.**

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

COMMENTS:

____

____

____

____

____

____

____

____

____

____

Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- The plant is operating at 100% power.
- Chemistry added water to the SLC tank 4 hours ago and has 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:

- Complete SLC portion of OSP-INST-H101 by evaluating CSP-SLC-M101 and TS LCO 3.1.7 to determine OPERABILITY of SLC.
- Complete the Student JPM Answer Sheet indicating SLC OPERABILITY determination status and justification.

STUDENT JPM ANSWER SHEET

The SLC system is:

___ OPERABLE

___ INOPERABLE

Justification:

____

____

____

____

____

____

STEP	REQUIRED IN MODE	PARAMETER	PANEL NUMBER	INSTRUMENT NUMBER	DAY SHIFT	ACCEPTANCE CRITERIA	SURVEILLANCE REQUIREMENTS
# 45	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
# 46	1-2-3	SGT Operating Hours	SGT-FU-1A	Elapse Time Meter		LT 720 hours operating time. NOTE 3 Log Values	3.6.4.3.2
			SGT-FU-1B	Elapse Time Meter	157.2		
# 47	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		
# 48	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
# 49	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
# 50	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.

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.

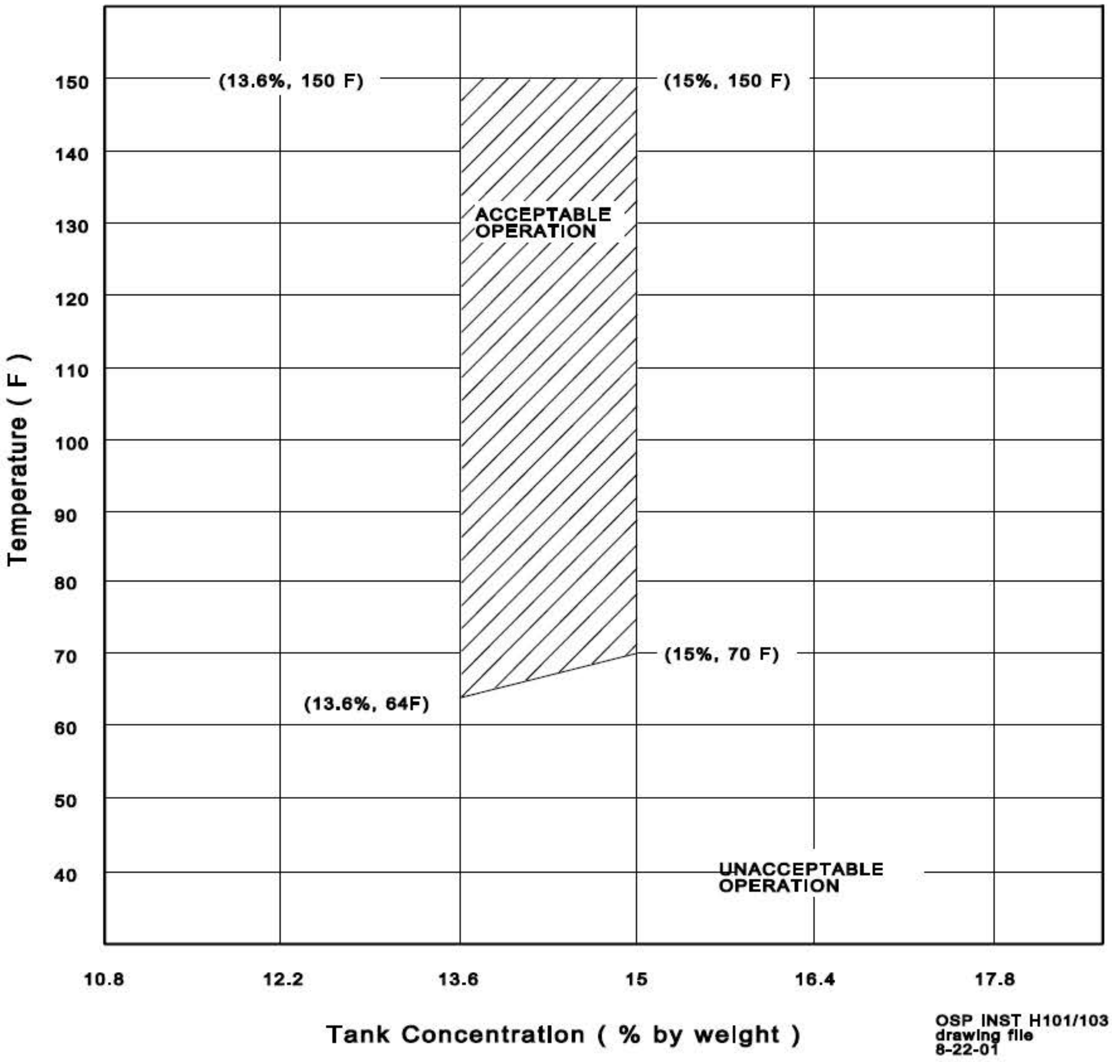
NOTE 5: Once within 24 hours after solution temperature is restored within the limits of TS Figure 3.1.7-1. Otherwise, N/A.

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. {AS-2.41}

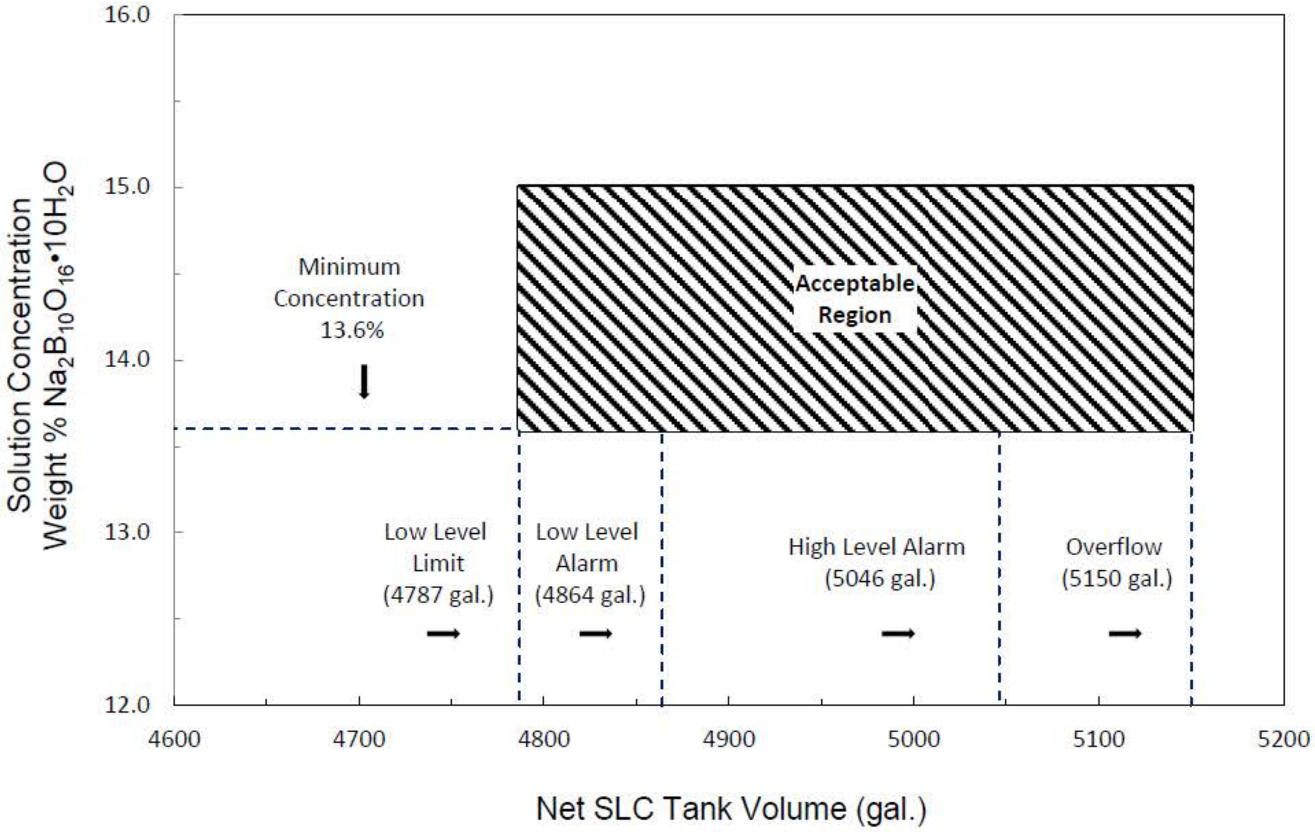
SODIUM PENTABORATE SOLUTION TEMPERATURE - SR 3.1.7.2



OSP INST H101/103
drawing file
8-22-01

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

SAMPLING THE STANDBY LIQUID CONTROL TANK FOR SODIUM PENTABORATE DECAHYDRATE

Reason for Sample: (Mark appropriate box)

☐ Once per 31 days
☒ Within 24 hours following Water Addition
☐ Within 24 hours following Boron Addition
☐ Within 24 hours after solution temperature is restored within the limits of TS 3.1.7, Figure 3.1.7 1

Sample Date/Time 1/13/23 / 0801 Chem Tech Tim Berry / Tim Berry

Standby Liquid Control Tank Level TDAS (X077) (N/A if not available): 4900 gal

Standby Liquid Control Tank Level Local (N/A if not available): 4900 gal

Analytical Result: 14.3 weight % $Na_2B_{10}O_{16}$ 10 H_2O

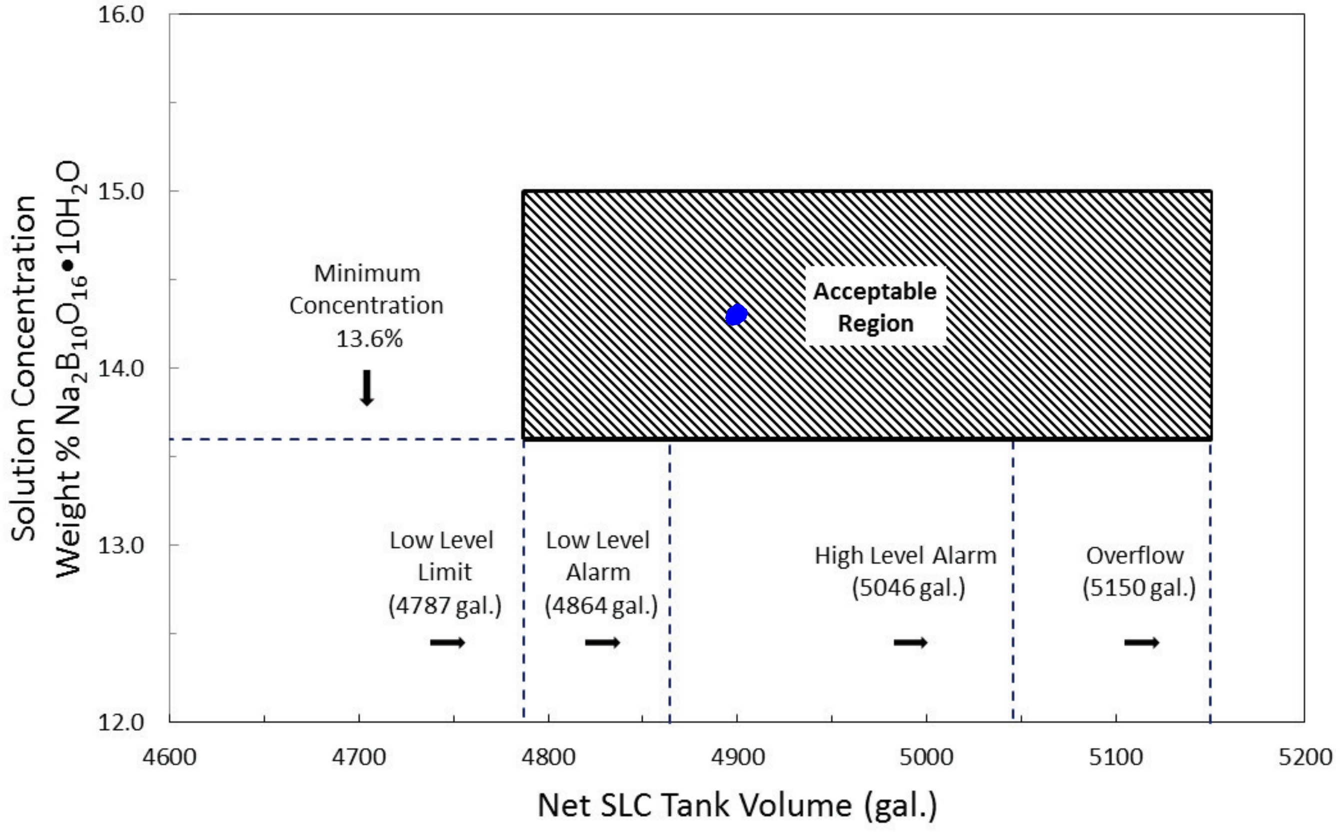
Concentration within Acceptable Region on Attachment 9.2?

☒ Yes ☐ No (Retest Required)

Completed by: Tim Berry / Tim Berry 1/13/23 / 0850
Chem Technician Date/Time

END

STANDBY LIQUID CONTROL (SLC) TANK VOLUME vs. SOLUTION CONCENTRATION REQUIREMENTS AND IDENTIFICATION OF THE ACCEPTABLE REGION



END

Attachment 9.2, Standby Liquid Control (SLC) Tank, Volume vs. Solution Concentration Requirements and Identification of the Acceptable Region

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Standby Liquid Control (SLC) System

LCO 3.1.7 Two SLC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SLC subsystem inoperable.	A.1 Restore SLC subsystem to OPERABLE status.	7 days
B. Two SLC subsystems inoperable.	B.1 Restore one SLC subsystem to OPERABLE status.	8 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. <u>AND</u> C.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Verify available volume of sodium pentaborate solution is ≥ 4587 gallons.	In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-1.	In accordance with the Surveillance Frequency Control Program
SR 3.1.7.3	Verify continuity of explosive charge.	In accordance with the Surveillance Frequency Control Program
SR 3.1.7.4	Verify the concentration of boron in solution is within the limits of Figure 3.1.7-1.	In accordance with the Surveillance Frequency Control Program <u>AND</u> Once within 24 hours after water or boron is added to solution <u>AND</u> Once within 24 hours after solution temperature is restored within the limits of Figure 3.1.7-1
SR 3.1.7.5	Verify each SLC subsystem manual and power operated valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.6	Verify each pump develops a flow rate ≥ 41.2 gpm at a discharge pressure ≥ 1220 psig.	In accordance with the INSERVICE TESTING PROGRAM
SR 3.1.7.7	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	In accordance with the Surveillance Frequency Control Program
SR 3.1.7.8	Verify all heat traced piping between storage tank and pump suction valve is unblocked.	In accordance with the Surveillance Frequency Control Program <u>AND</u> Once within 24 hours after solution temperature is restored within the limits of Figure 3.1.7-1
SR 3.1.7.9	Verify sodium pentaborate enrichment is ≥ 44.0 atom percent B-10.	Prior to addition to SLC Tank

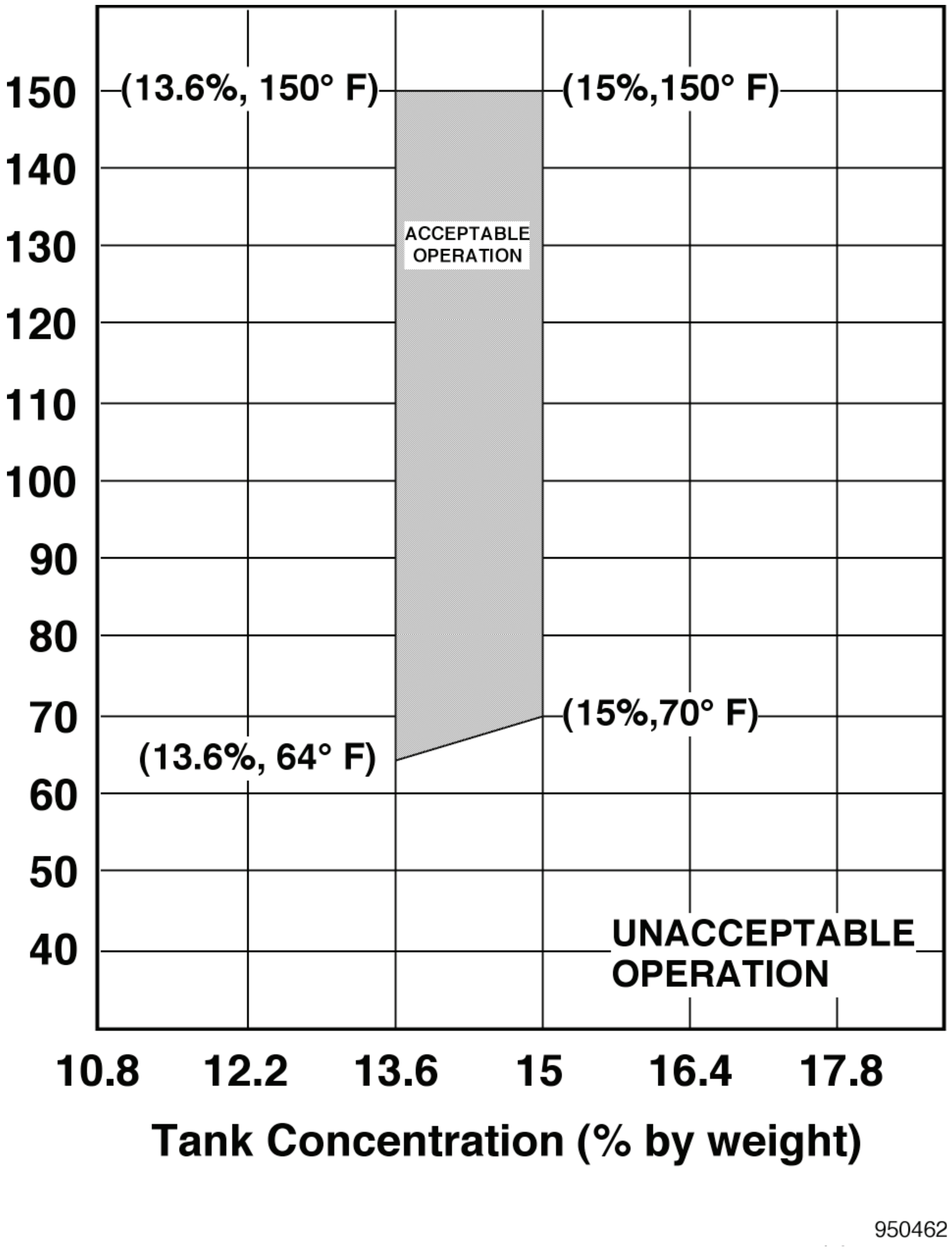


Figure 3.1.7-1 (page 1 of 1)
Sodium Pentaborate Solution Temperature/Concentration Requirements

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.7 Standby Liquid Control (SLC) System

BASES

BACKGROUND

The SLC System is designed to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive xenon free state without taking credit for control rod movement. The SLC System satisfies the requirements of 10 CFR 50.62 (Ref. 1) on anticipated transient without scram (ATWS).

The SLC System is also used to maintain suppression pool pH at or above 7 following a loss of coolant accident (LOCA) involving significant fission product releases. Maintaining suppression pool pH levels at or above 7 following an accident ensures that iodine will be retained in the suppression pool water (Ref. 4).

The SLC System consists of a boron solution storage tank, two positive displacement pumps, two explosive valves, which are provided in parallel for redundancy, and associated piping and valves used to transfer borated water from the storage tank to the reactor pressure vessel (RPV). The borated solution is discharged through the high pressure core spray system sparger.

APPLICABLE SAFETY ANALYSES

The SLC System is manually initiated from the main control room, as directed by the emergency operating procedures, if the operator believes the reactor cannot be shut down, or kept shut down, with the control rods. The SLC System is used in the event that not enough control rods can be inserted to accomplish shutdown and cooldown in the normal manner. The SLC System injects borated water into the reactor core to compensate for all of the various reactivity effects that could occur during plant operation. To meet this objective, it is necessary to inject, using one SLC pump, a quantity of boron equivalent in Boron-10 to a concentration of 780 ppm of natural boron in the reactor core, including recirculation loops, at 70°F and normal reactor water level.

To allow for potential leakage and imperfect mixing in the reactor system, an additional amount of boron equal to 25% of the amount cited above is added (Ref. 2). The volume limit in SR 3.1.7.1 and the temperature versus concentration limits in Figure 3.1.7-1 are calculated such that the required concentration is achieved accounting for dilution in the RPV with normal water level and including the water volume in the residual heat removal shutdown cooling piping and in the recirculation loop piping.This quantity of borated solution is the amount that is above the pump suction shutoff level in the boron solution storage tank. No credit is taken for the portion of the tank volume that cannot be injected.

APPLICABLE SAFETY ANALYSES (continued)

Following a LOCA, offsite doses from the accident will remain within 10 CFR 50.67, "Accident Source Term," limits (Ref. 5) provided sufficient iodine activity is retained in the suppression pool. Credit for iodine deposition in the suppression pool is allowed (Ref. 4) as long as suppression pool pH is maintained at or above 7. Alternative Source Term analyses credit the use of the SLC System for maintaining the pH of the suppression pool at or above 7.

The SLC System satisfies Criteria 3 and 4 of Reference 3.

LCO

The OPERABILITY of the SLC System provides backup capability for reactivity control, independent of normal reactivity control provisions provided by the control rods. Additionally, an OPERABLE SLC System has the ability to inject boron under post LOCA conditions to maintain the suppression pool pH above 7. The OPERABILITY of the SLC System is based on the conditions of the borated solution in the storage tank and the availability of a flow path to the RPV, including the OPERABILITY of the pumps and valves. Two SLC subsystems are required to be OPERABLE, each containing an OPERABLE pump, an explosive valve and associated piping, valves, and instruments and controls to ensure an OPERABLE flow path.

APPLICABILITY

In MODES 1 and 2, shutdown capability is required. In MODES 3 and 4, control rods are not able to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate controls to ensure the reactor remains subcritical. In MODE 5, only a single control rod can be withdrawn from a core cell containing fuel assemblies. Demonstration of adequate SDM (LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") ensures that the reactor will not become critical. Therefore, the SLC System is not required to perform its ATWS function during MODES 3, 4, or 5.

In MODES 1, 2, and 3, the SLC System must be OPERABLE to ensure that offsite doses remain within 10 CFR 50.67 (Ref. 5) limits following a LOCA involving significant fission product releases. The SLC System is used to maintain suppression pool pH at or above 7 following a LOCA to ensure that iodine will be retained in the suppression pool water (Ref. 4).

ACTIONS

A.1

If one SLC System subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this condition, the remaining OPERABLE subsystem is adequate to perform the original licensing basis shutdown function. However, the overall reliability is reduced because a single failure in the remaining OPERABLE subsystem

BASES

ACTIONS (continued)

could result in reduced SLC System shutdown capability. The 7 day Completion Time is based on the availability of an OPERABLE subsystem capable of performing the original licensing basis SLC System function and the low probability of a Design Basis Accident (DBA) or severe transient occurring concurrent with the failure of the Control Rod Drive System to shut down the plant.

B.1

If both SLC subsystems are inoperable, at least one subsystem must be restored to OPERABLE status within 8 hours. The allowed Completion Time of 8 hours is considered acceptable, given the low probability of a DBA or transient occurring concurrent with the failure of the control rods to shut down the reactor.

C.1 and C.2

If any Required Action and associated Completion Time is not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1 and SR 3.1.7.2

SR 3.1.7.1 and SR 3.1.7.2 verify certain characteristics of the SLC System (e.g., the volume and temperature of the borated solution in the storage tank), thereby ensuring the SLC System OPERABILITY without disturbing normal plant operation. These Surveillances ensure the proper borated solution and temperature are maintained. Maintaining a minimum specified borated solution temperature is important in ensuring that the boron remains in solution and does not precipitate out in the storage tank. The Surveillance Frequencies are controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.7.3 and SR 3.1.7.5

SR 3.1.7.3 verifies the continuity of the explosive charges in the injection valves to ensure proper operation will occur if required. Other administrative controls, such as those that limit the shelf life of the explosive charges, must be followed. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.1.7.5 verifies each valve in the system is in its correct position, but does not apply to the squib (i.e., explosive) valves. Verifying the correct alignment for manual and power operated valves in the SLC System flow path ensures that the proper flow paths will exist for system operation. A valve is also allowed to be in the nonaccident position, provided it can be aligned to the accident position from the control room, or locally by a dedicated operator at the valve control. This is acceptable since the SLC System is a manually initiated system. This Surveillance does not apply to valves that are locked, sealed, or otherwise secured in position, since they were verified to be in the correct position prior to locking, sealing, or securing. This verification of valve alignment does not apply to valves that cannot be inadvertently misaligned, such as check valves. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct positions. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.1.7.4

This Surveillance requires an examination of the sodium pentaborate solution by using chemical analysis to ensure the proper concentration of boron (measured in weight % sodium pentaborate decahydrate) exists in the storage tank. SR 3.1.7.4 must be performed anytime boron or water is added to the storage tank solution to establish that the boron solution concentration is within the specified limits. This Surveillance must be performed anytime the temperature is restored to within the limits of Figure 3.1.7-1, to ensure no significant boron precipitation occurred. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.7.6

Demonstrating each SLC System pump develops a flow rate ≥ 41.2 gpm at a discharge pressure ≥ 1220 psig ensures that pump performance has not degraded during the fuel cycle. This minimum pump flow rate requirement ensures that, when combined with the sodium pentaborate solution concentration requirements, the rate of negative reactivity insertion from the SLC System will adequately compensate for the positive reactivity effects encountered during power reduction, cooldown of the moderator, and xenon decay. This test confirms one point on the pump design curve, and is indicative of overall performance. Such inservice tests confirm component OPERABILITY and detect incipient failures by indicating abnormal performance. The Frequency of this Surveillance is in accordance with the INSERVICE TESTING PROGRAM.

SR 3.1.7.7 and SR 3.1.7.8

These Surveillances ensure that there is a functioning flow path from the boron solution storage tank to the RPV, including the firing of an explosive valve. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of that batch successfully fired. The Surveillance may be performed in separate steps to prevent injecting boron into the RPV. An acceptable method for verifying flow from the pump to the RPV is to pump demineralized water from a test tank through one SLC subsystem and into the RPV. The Surveillance Frequency for SR 3.1.7.7 is controlled under the Surveillance Frequency Control Program.

Demonstrating that all heat traced piping between the boron solution storage tank and the suction valve to the injection pumps is unblocked ensures that there is a functioning flow path for injecting the sodium pentaborate solution. An acceptable method for verifying that the suction piping up to the suction valve is unblocked is to pump from the storage tank to the test tank. Upon completion of this verification, the pump suction piping must be drained and flushed with demineralized water since the suction piping between the pump suction valve and pump suction is not heat traced. The Surveillance Frequency for SR 3.1.7.8 is controlled under the Surveillance Frequency Control Program.

ILC-25 A-8 (SRO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM A-8 (SRO)

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE		Rev. No.	
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Kyle Christianson / Dave Crawford DATE: 11/23/22

REVISED BY: DATE:

TECHNICAL REVIEW BY: DATE:

INSTRUCTIONAL REVIEW BY: DATE:

APPROVED BY: DATE:

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Places a mark in the "Not Approved" block on the student answer sheet and includes a justification that indicates the total residual hydrogen (TRH) levels exceed National Pollutant Discharge Elimination System (NPDES) permit allowed levels.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☐ **SRO** ☑

Task Number and Title: SRO-0091 Approve radioactive waste discharge/release permits.

K/A Importance Factors: **RO:** 2.0 **SRO:** 3.8

K/A Number: 2.3.6

K/A Statement: Ability to approve liquid or gaseous release permits.

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.3 – Radiation Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 9)**
    - Student JPM Answer Sheet **(Page 10)**
    - PPM 12.2.9 **(JPM A-8 ILC-25 Ref 1.PDF)**
    - SOP-CW-OPS **(JPM A-8 ILC-25 Ref 2.PDF)**
    - NDPES Permit No. WA002515-1 **(JPM A-8 ILC-25 Ref 3.PDF)**

Special Setup Instructions:
None.

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 12.2.9	045	001
SOP-CW-OPS	030	N/A
NPDES Permit No. WA002515-1	N/A	N/A

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

In JPM Exam Room:

Mark the time that the JPM is given to the candidate.

Initial Conditions:

- Columbia is operating at 85% power.
- Vendor personnel are repairing and recalibrating the continuous Halogenation/Dehalogenation system. The system will not be available for several days.
- Batch Halogenation has been completed.
- Preparations are underway to perform a blowdown from the Circulating Water system to the Columbia River.

Initiating Cue:

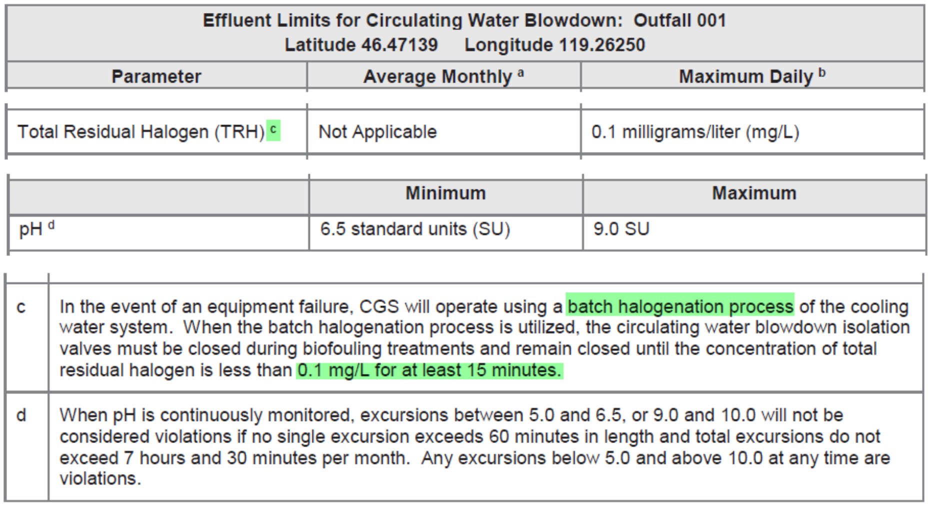
- You are requested to approve the blowdown.
- Review completed paperwork and perform the steps designated for Shift Manager/Control Room Supervisor in PPM 12.2.9.
- Indicate on the Student JPM Answer Sheet whether you would approve or would not approve the blowdown.
- Justify your decision.
- Return Student JPM Answer Sheet to Examiner when complete.

START TIME:___________

STEP / STANDARD	SAT / UNSAT
Examiner Note: **Provide the candidate with the following:** • **Student JPM Information Sheet** • **Student JPM Answer Sheet** • **Student Reference #1 (marked-up pages of PPM 12.2.9)** • **Student Reference #2 (marked-up pages of SOP-CW-OPS)** • **Student Reference #3 (NDPES Permit excerpt)**	
Examiner Note: **JPM Step 1 may be performed after JPM Steps 2 and 3.**	

Step 1:

Reviews NDPES Permit Discharge Limits.



Effluent Limits for Circulating Water Blowdown: Outfall 001
Latitude 46.47139 Longitude 119.26250

Parameter	Average Monthly [a]	Maximum Daily [b]
Total Residual Halogen (TRH) [c]	Not Applicable	0.1 milligrams/liter (mg/L)

	Minimum	Maximum
pH [d]	6.5 standard units (SU)	9.0 SU

c	In the event of an equipment failure, CGS will operate using a batch halogenation process of the cooling water system. When the batch halogenation process is utilized, the circulating water blowdown isolation valves must be closed during biofouling treatments and remain closed until the concentration of total residual halogen is less than 0.1 mg/L for at least 15 minutes.
d	When pH is continuously monitored, excursions between 5.0 and 6.5, or 9.0 and 10.0 will not be considered violations if no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 at any time are violations.

Standard:

- Notes TRH limit is < 0.1 mg/L for at least 15 min.
- Notes pH limit is between 6.5 and 9.0.

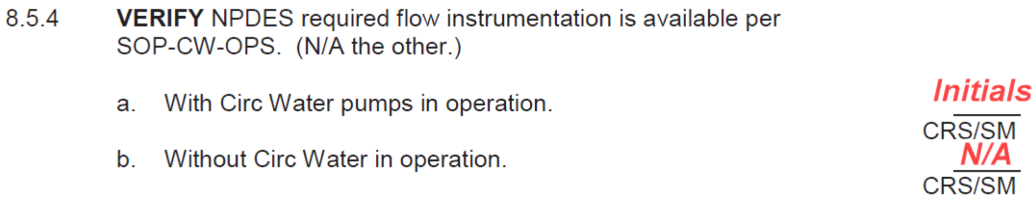
____SAT

____UNSAT

____N/A

Step 2:

Performs step 8.5.4 of PPM 12.2.9.



8.5.4 **VERIFY** NPDES required flow instrumentation is available per SOP-CW-OPS. (N/A the other.)

a. With Circ Water pumps in operation. *Initials* ______ CRS/SM

b. Without Circ Water in operation. *N/A* ______ CRS/SM

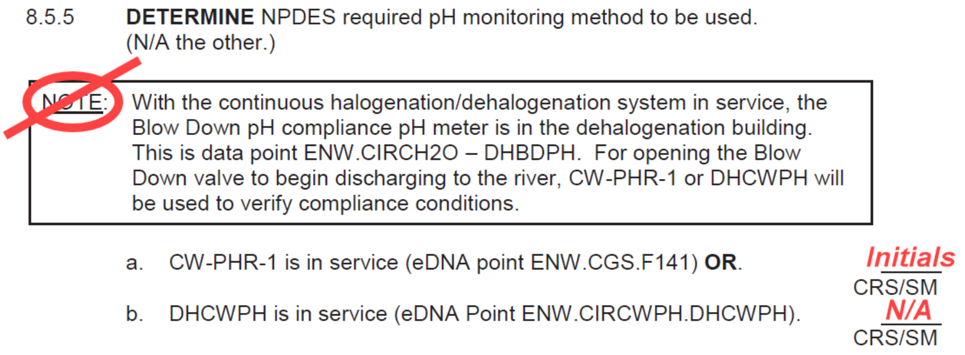
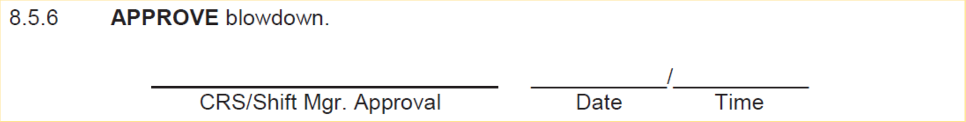
Standard:

- Reviews completed SOP-CW-OPS and notes CBD-FR-10 is available.
- Initials 8.5.4.a and N/A's 8.5.4.b.

____SAT

____UNSAT

____N/A

STEP / STANDARD	**SAT / UNSAT**
Step 3: Performs step 8.5.5 of PPM 12.2.9.  8.5.5 **DETERMINE** NPDES required pH monitoring method to be used. (N/A the other.) ~~NOTE:~~ With the continuous halogenation/dehalogenation system in service, the Blow Down pH compliance pH meter is in the dehalogenation building. This is data point ENW.CIRCH2O – DHBDPH. For opening the Blow Down valve to begin discharging to the river, CW-PHR-1 or DHCWPH will be used to verify compliance conditions. a. CW-PHR-1 is in service (eDNA point ENW.CGS.F141) **OR**. *Initials* CRS/SM b. DHCWPH is in service (eDNA Point ENW.CIRCWPH.DHCWPH). *N/A* CRS/SM Standard: • Reads note and place keeps. • Notes per initial conditions that continuous Halogenation/Dehalogenation system will not be available for several days and DECL-AIT-03 (eDNA pt ENW.CIRCH2O.DHBDPH) is not available. • Reviews completed SOP-CW-OPS and notes CW-PHR-1 will be used for pH monitoring. • Initials 8.5.5.a and N/A's 8.5.5.b.	____SAT ____UNSAT ____N/A
Step 4: Performs step 8.5.6 of PPM 12.2.9.  8.5.6 **APPROVE** blowdown. ______________ CRS/Shift Mgr. Approval ________/________ Date Time Standard: • Reviews completed step 8.4.4 of PPM 12.2.9 and notes that TRH samples are not LE 0.1 ppm (1 ppm ~ 1 mg/L). • **(Non-critical)** Reviews completed step 8.4.6 and notes the Chemistry Technician has made an error verifying TRH is LE 0.1 ppm for two samples GE 15 minutes apart. • **(Non-critical)** Reviews completed step 8.4.7 and notes the Chemistry Technician has improperly verified that blowdown from Circulating Water to Columbia River meets NPDES Permit limits. • Does **NOT** sign step 8.5.6. • Completes Student JPM Answer Sheet by checking "Not Approved" and includes a justification that indicates the TRH levels exceed NPDES permit allowed levels.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: **Inform the candidate that the JPM is complete.**	

STOP TIME: ___________

JPM ANSWER KEY
(COMPLETED)

The blowdown is:

___ Approved

_X_ Not approved

Justification:

Words to the effect of: The TRH levels are above the NDPES Permit allowed levels.

RESULTS OF JPM ILC-25 JPM A-8 (SRO)

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: **Places a mark in the "Not Approved" block on the student answer sheet and includes a justification that indicates the total residual hydrogen (TRH) levels exceed National Pollutant Discharge Elimination System (NPDES) permit allowed levels.**

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

COMMENTS:

____

____

____

____

____

____

____

____

____

____

Examiner Signature: ______________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is operating at 85% power.
- Vendor personnel are repairing and recalibrating the continuous Halogenation/Dehalogenation system. The system will not be available for several days.
- Batch halogenation has been completed.
- Preparations are underway to perform a blowdown from the Circulating Water system to the Columbia River.

Initiating Cue:

- You are requested to approve the blowdown.
- Review completed paperwork and perform the steps designated for Shift Manager/Control Room Supervisor in PPM 12.2.9.
- Indicate on the Student JPM Answer Sheet whether you would approve or not approve the blowdown. Justify your decision.
- Return Student JPM Answer Sheet to Examiner when complete.

STUDENT JPM ANSWER SHEET

The blowdown is:

___ Approved

___ Not Approved

Justification:

____

____

____

____

____

8.4 Sampling and Verification of NPDES Permit Limits for Blowdown

8.4.1 WHEN the CW System is in operation,
THEN **TAKE** grab samples of CW at the condenser outlet or other representative sample point such as PS-P-1 or dehal skid DECL-BV-25: TB

8.4.2 IF CW is secured,
THEN **PERFORM** the following:

> **NOTE:** The most representative samples possible should be obtained for blowdown approval.

a. IF the TSW pumps are to be used for blowdown,
THEN **OBTAIN** TSW samples for blowdown approval. N/A TB

b. IF portable pumps are to be used for blowdown,
THEN **SAMPLE** the water into which the pumps have been previously placed for blowdown approval. N/A TB

8.4.3 **ANALYZE** samples for the following:

a. TRH colorimeter method using Hach Colorimeter as directed by CI 10.8, Chlorine (Total, Free and Combined) Colorimetric and Amperiometric Method until two consecutive samples taken GTE 15 minutes apart are LE 0.1 ppm TRH,
AND **RECORD** results in Step 8.4.4 as the concentration decreases. TB

b. pH as directed by CI-10.20
AND **RECORD** pH for each TRH reading that is LE 0.1 ppm in Step 8.4.4. TB

NOTE: The current CW-PHR-1 reading is available from computer via signal F141 on PPRCS or the dehalogenation CW pH can be used at eDNA point ENW.CIRCH2O - DHCWPH.

NOTE: TRH values LE 0.1 ppm should be recorded as <0.1 ppm

8.4.4 **RECORD** the following information:

Date: Today Chemistry Technician: Tim Berry

Time	TRH (ppm)	CW-PHR-1 pH Or DHCWPH (Required)	Lab pH
10:03	0.14	7.1	7.0
10:29	0.15	7.2	7.1
10:57	0.15	7.1	6.9
11:24	0.16	7.0	7.1

8.4.5 **VERIFY** CW pH is between 6.5 and 9.0. TB

8.4.6 **VERIFY** TRH is LE 0.1 ppm for two samples GE 15 minutes apart. TB

8.4.7 **VERIFICATION** that blowdown from Circulating Water to Columbia River meets NPDES Permit limits:

Tim Berry
Chemistry Technician

Today / 12:10
Date / Time

8.4.8 **DETERMINE** recommended blowdown rate using Attachment 10.1. TB

8.4.9 **RECORD** recommended blowdown rate: 900 gpm TB

8.5 Approval For Blowdown

> NOTE: If adjustment to blowdown rate is required for reasons other than control of cycles, the rate may be set by the Shift Manager after approval for blowdown is done. This may add to chemical expenses.

8.5.1 **VERIFY** the following conditions are met: (Control Room Operator)

a. Circulating water blowdown radiation monitor (CBD-RIS-608) is available to isolate blowdown if an alarm condition exists. KB

b. If CBD-RIS-608 is inoperable, blowdown may be established if TSW-RIS-5 is operable. KB

c. If TSW-RIS-5 is inoperable, blowdown may be established if compensatory actions for TSW-RIS-5 are established in accordance with ODCM Table 6.1.1-1. KB

> NOTE: Upon loss of power to the monitor, CBD-LCV-1 will close.

Ken Barbour
Control Room Operator

Today / 12:29
Date / Time

> NOTE: If approval for blowdown is given using Section 8.5, approval remains in effect until the next halogenation is initiated. This allows for starting and stopping of blowdown, provided that instrumentation required for blowdown is operational or the required grab samples for pH are taken.
>
> NOTE: Opening the blowdown valve enables the operation of a composite water sampler in the TMU pump house at the river via a signal from CBD-FE-1B. CBD-FE-1B has a maximum range of 4000 gpm.

8.5.2 IF blowdown is to be initiated or modified without opening the blowdown valve (CBD-LCV-1) OR if blowdown is initiated at >4000 gpm, THEN **NOTIFY** Radiological Environmental Monitoring Program (REMP) personnel or Chemistry Management concerning PROPORTIONAL verses TIMED function for samplers CBD-SR-1(2). KB N/A

8.5.3 IF the blowdown is to be done using portable pumps (for example to lower the basin level for maintenance work), THEN **VERIFY** that in-line flow and pH instrumentation has been placed in service before. KB N/A

a. **NOTIFY** Radiological Environmental Monitoring Program (REMP) personnel or Chemistry Management concerning PROPORTIONAL verses TIMED function for samplers CBD-SR-1(2). KB N/A

8.5.4 **VERIFY** NPDES required flow instrumentation is available per SOP-CW-OPS. (N/A the other.)

a. With Circ Water pumps in operation. _____ CRS/SM

b. Without Circ Water in operation. _____ CRS/SM

8.5.5 **DETERMINE** NPDES required pH monitoring method to be used. (N/A the other.)

> NOTE: With the continuous halogenation/dehalogenation system in service, the Blow Down pH compliance pH meter is in the dehalogenation building. This is data point ENW.CIRCH2O – DHBDPH. For opening the Blow Down valve to begin discharging to the river, CW-PHR-1 or DHCWPH will be used to verify compliance conditions.

a. CW-PHR-1 is in service (eDNA point ENW.CGS.F141) **OR**. _____ CRS/SM

b. DHCWPH is in service (eDNA Point ENW.CIRCWPH.DHCWPH). _____ CRS/SM

8.5.6 **APPROVE** blowdown.

______________________________ ____________/____________
CRS/Shift Mgr. Approval Date Time

8.5.7 **RECORD** the following.

- Time Blowdown Initiated _________
- Blowdown Flow _________gpm

8.5.8 **ROUTE** completed form to Chemistry Laboratory _____ OPS

8.5.9 **ROUTE** to Administrative Files _____ CHEM

9.0 DOCUMENTATION

Maintain the completed attachments generated by this procedure in the permanent plant file in accordance with the appropriate record procedure(s).

10.0 ATTACHMENTS

10.1 Circulating Water and TSW Halogenation

5.7 Circulating Water System Blowdown

CAUTION

Do not alter pH alarm settings from the required position when blowdown is anticipated.

NOTE While in Mode 1, 2, or 3, blowdown shall not be performed using a submersible pump as this method violates the FSAR requirement that a Hi-Hi Rad Trip of CBD-RIS-608 (Blowdown Rad Monitor) automatically stops blowdown. {R-2.3}, {R-2.4}

NOTE When sampling CW pH locally, verify samples are taken from a bay which contains one operating CW or TSW pump.

NOTE If Plant conditions require an extended change in blowdown flow rate, a reevaluation of the Scale Inhibitor/Dispersant addition rate may be needed.

NOTE Blowdown pH continuous compliance monitoring for the NPDES Permit uses pH meter, DECL-AIT-03 (eDNA pt ENW.CIRCH2O.DHBDPH) located in the dehalogenation skid. Both CW-PHR-1 and ENW.CIRCH2O.DHBDPH can be used as the continuous blow down pH monitor as backup. These monitors cannot be used for blowdown pH compliance unless the total residual halogens (TRH) is below 0.1 mg/L confirmed using PPM 12.2.9 by Chemistry.

NOTE If CW-PHR-1 becomes inoperable or is known to be in error, every reasonable attempt should be made to return CW-PHR-1 to service. CW-PHR-1 is used to control acid addition and CW pH. It is not the normal/primary NPDES Permit blow down compliance pH monitor. There is a second CW pH monitor set up in the dehalogenation trailer (eDNA pt ENW.CIRCH2O.DHCWPH). It does not control acid addition but can be used to continuously monitor CW pH when CW-PHR-1 is out of service. The method for monitoring pH should be noted on the Outside Tour log.

5.7.1 IF Halogenation was performed,
AND the continuous Halogenation/Dehalogenation process is NOT being placed in service,
AND the Plant is in Mode 1, 2, or 3,
THEN **VERIFY** one of the following has been completed up to initiating blowdown: (Mark procedure not used as N/A)

- PPM 12.2.9 KB
- PPM 12.2.9A N/A KB
- PPM 12.2.11 N/A KB

NOTE Key switch CL-RMS-BP/1 (Dehalogenation Blow down Valve Bypass) (E-IR-17) (key 90) defeats all blowdown valve automatic shutdown features from the dehalogenation skid. When in bypass, the blowdown valve can be opened and closed no matter what condition or active alarms present on the Dehalogenation Skid. Normal position for this key is in AUTO. The key should not be placed into bypass if continuous halogenation is in progress. Alarms will still annunciate while in bypass.

5.7.2 **VERIFY** CL-RMS-BP/1 (Dehalogenation Blowdown Valve Bypass) in **AUTO**. KB

5.7.3 **PERFORM** one of the following:

a. **VERIFY** CBD-FR-10 is operable per the INOP/LCO log. KB

NOTE CGS NPDES permit requires Circulating Water blowdown flow records to be reported monthly to the WA Department of Ecology and to be retained for six years per the WA State Common Records Retention schedule.

b. IF CBD-FR-10 is inoperable,
THEN **PERFORM** the following: {P-2.16}

1) **INITIATE** a temporary log for tracking by one of the following:

- Electronic logging system N/A KB
- Attachment 6.8, Blowdown Flow Monitor Out of Service Log Sheet. N/A KB

2) **INITIATE** a Caution clearance on CBD-LCV-1 (H13-P840), CBD-V-1, and CBD-V-2 stating "CBD-FR-10 is inoperable". N/A KB

5.7.4 **VERIFY** the following NPDES monitoring instruments or approved alternate instruments/methods are in service prior to initiating blowdown. (Mark method not used as N/A.)

NOTE CW-PHR-1 is to be used only if DECL-AIT-03 is out of service and upon direction by Chemistry.

Primary Instruments

- DECL-AIT-03 (eDNA pt ENW.CIRCH2O.DHBDPH) N/A KB
- CW-PHR-1 (pH recorder) (CW-PNL-1) KB
- CBD-FR-10 (CW Blowdown Flow) (H13-P840) KB

Approved Alternate Instrument/Method

- Grab Samples every 8 hours for pH N/A KB
- CBD-FI-1A (CBD Flow) (H13-P840) N/A KB

NPDES Permit Excerpt
Pg 1 of 2

Special Conditions

S1. Discharge limits

S1.A. Process wastewater discharges

All discharges and activities authorized by this permit must be consistent with the terms and conditions of this permit.

The discharge of any of the following pollutants more frequently than, or at a level in excess of that identified and authorized by this permit violates the terms and conditions of this permit.

There shall be no discharge of wastewater of radioactive materials in excess of the limitations on radioactive effluents established by the Nuclear Regulatory Commission in the facility operation license and in 10 CFR Parts 20 and 50.

Beginning on the effective date of this permit, the Permittee is authorized to discharge circulating cooling water blowdown, service water system blowdown, and radioactive wastewater treatment system effluent, to the Columbia River at the permitted location subject to complying with the following limits:

Effluent Limits for Circulating Water Blowdown: Outfall 001 Latitude 46.47139 Longitude 119.26250		
Parameter	**Average Monthly [a]**	**Maximum Daily [b]**
Flow	5.6 million gallons/day (mgd)	9.4 (mgd)
Total Residual Halogen (TRH) [c]	Not Applicable	0.1 milligrams/liter (mg/L)
Chromium (Total)	8.2 µg/L	16.4 µg/L
Zinc (Total)	53 µg/L	107 µg/L
Polychlorinated biphenyl compounds (PCBs)	No discharge	No discharge
The 126 priority pollutants (40 CFR 423 Appendix A) contained in chemicals added for cooling tower maintenance, except chromium and zinc	No detectable amount	No detectable amount
	Minimum	**Maximum**
pH [d]	6.5 standard units (SU)	9.0 SU
The effluent limit for acute toxicity is: No acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC). The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the acute mixing zone, defined in Section 1.B of this permit. The ACEC equals 11% effluent. See S13 for more information.		

NPDES Permit Excerpt
Pg 2 of 2

Effluent Limits for Circulating Water Blowdown: Outfall 001 Latitude 46.47139 Longitude 119.26250	
a	Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured.
b	Maximum daily effluent limit is the highest allowable daily discharge. The daily discharge is the average discharge of a pollutant measured during a calendar day. This does not apply to pH or temperature.
c	In the event of an equipment failure, CGS will operate using a batch halogenation process of the cooling water system. When the batch halogenation process is utilized, the circulating water blowdown isolation valves must be closed during biofouling treatments and remain closed until the concentration of total residual halogen is less than 0.1 mg/L for at least 15 minutes.
d	When pH is continuously monitored, excursions between 5.0 and 6.5, or 9.0 and 10.0 will not be considered violations if no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 at any time are violations.

S1.B. Mixing zone authorization

Mixing zone for Outfall 001

The paragraphs below define the maximum boundaries of the mixing zones.

Chronic mixing zone

The width of the chronic mixing zone is limited to a distance of 175 feet (53 meters). The length of the chronic mixing zone extends 100 feet (30 meters) upstream and 308 feet (94 meters) downstream of the outfall. The mixing zone extends from the discharge port to the top of the water surface. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The width of the acute mixing zone is limited to a distance of 18 feet (5 meters) in any horizontal direction from the outfall. The length of the acute mixing zone extends 10 feet (3 meters) upstream and 31 feet (9 meters) downstream of the outfall. The mixing zone extends from the discharge port to the top of the water surface. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	9
Chronic Aquatic Life Criteria	93
Human Health Criteria - Carcinogen	93
Human Health Criteria - Non-carcinogen	93

ENERGY NORTHWEST

ILC-25 A-9 (SRO)

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM A-9 (SRO)

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE Rev. No.
SIMULATOR GUIDE PQD CODE Rev. No.
JPM PQD CODE Rev. No.
EXAM PQD CODE Rev. No.

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 11/29/22

REVISED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Classifies the event as an ALERT based on RA1.1 - Dose assessment using actual meteorology indicates doses GT 10 mrem TEDE at or beyond the SITE BOUNDARY.**

Alternate Path: ☐ **Time Critical (TC):** ☑ **TC Time:** 15 Minutes

Validation Time: 10 Minutes

Task Applicability: **RO** ☐ **SRO** ☑

Task Number and Title: SRO-1618 Perform Administrative Functions Necessary to Execute Emergency Operating Procedures, Abnormal Operating Procedures, and the Site Emergency Plan.

K/A Importance Factors: **RO:** N/A **SRO:** 4.6

K/A Number: 2.4.41

K/A Statement: Knowledge of the emergency action level thresholds and classifications (SRO Only)

Evaluation Type: **In-Plant** ☐ **Simulator** ☐

Control Room ☐ **Admin** ☑

Administrative Topic: 2.4 – Emergency Procedures/Plan

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - Student JPM Information Sheet **(Page 9)**
  - Student JPM Initiating Cue Sheet **(Page 10)**
  - Student JPM Answer Sheet **(Page 11)**
  - ATTACHMENT 1 (DOSE PROJECTION) **(Pages 12 through 14)**
  - PPM 13.1.1 (CLASSIFYING THE EMERGENCY **Hardcopy EAL Matrix**)
  - PPM 13.1.1A (CLASSIFYING THE EMERGENCY – TECH BASES **Binder**)
- How to initiate a Time Critical JPM:

1) Hand the student the Student JPM Information Sheet.
2) Read the Initial Conditions (ONLY) to the student.
3) Ensure the student understands the Initial Conditions and answer any questions.
4) Hand the student the Student JPM Initiating Cue Sheet. Read the initiating cue.
5) Immediately after reading the cue, make the statement:
“This is a time critical JPM, and your time starts now.”
6) Immediately record the start time once you complete reading the cue.

Special Setup Instructions:
None.

Tools or Equipment:
Ruler, Magnifying glass

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 13.1.1	049	002
PPM 13.1.1A	034	002

Administration Location:
Admin – Exam Security Posted room.

STUDENT JPM BRIEF

Initial Conditions:

- An event has occurred which caused a leak in the Spent Fuel Pool (SFP).

STOP HERE AND ASK IF ANY QUESTIONS BEFORE PROCEEDING.

AFTER QUESTIONS, HAND INITIATING CUE PAGE AND OTHER NECESSARY MATERIALS TO THE CANDIDATE, READ THE CUE AND THEN RECORD START TIME.

Initiating Cue:

- The SM directs you to classify the emergency based on the completed detailed Dose Assessment.
- When finished, complete the Student JPM answer Sheet and hand the sheet to your examiner.
- This is a time critical JPM, and your time starts now.

START TIME:___________

Examiner Note:

Provide candidate with the following:

- **Student JPM Information Sheet**

After reading the Initial Conditions and clarifying any questions then provide the following:

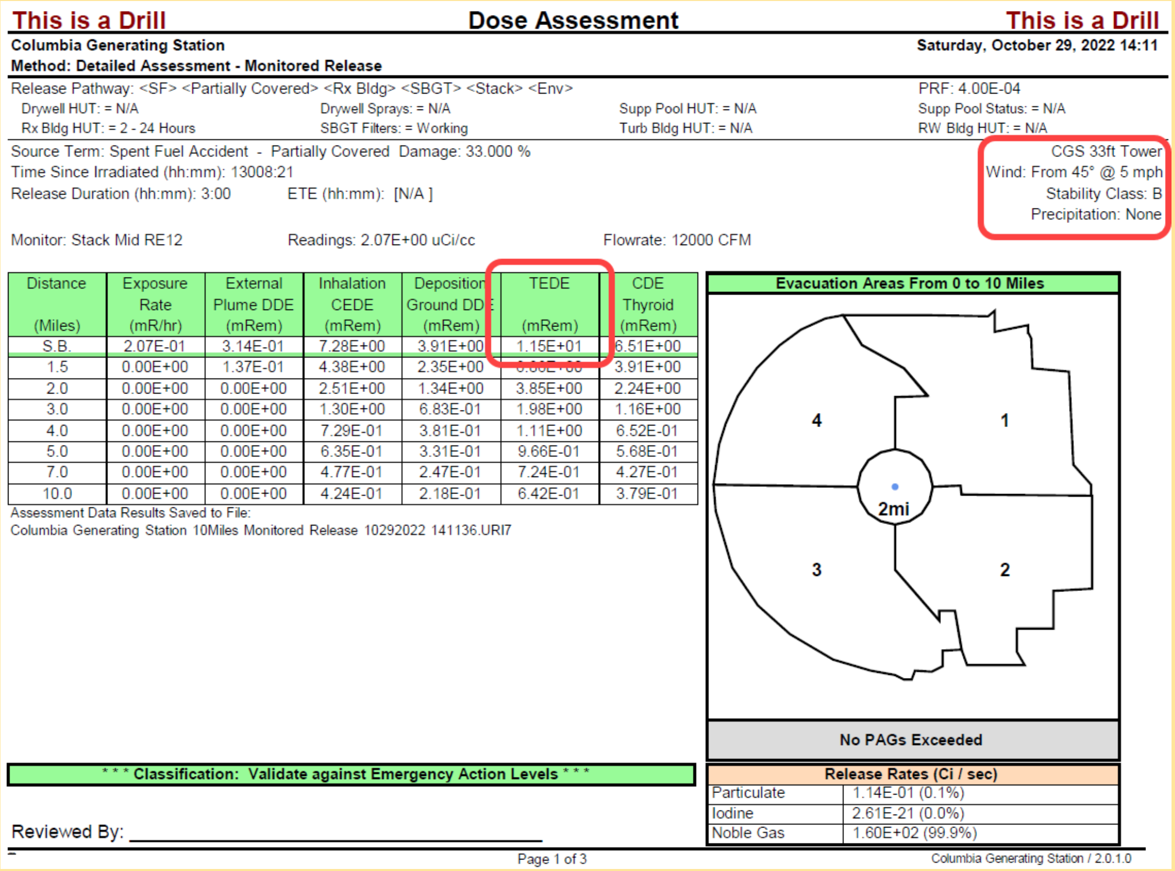
- **Student JPM Initiating Cue Sheet**
- **Attachment 1 (Dose Assessment)**
- **PPM 13.1.1 (Classifying the Emergency - EAL Matrix CHART)**
- **PPM 13.1.1A (Classifying the Emergency Tech Bases)**

Read the Initiating Cue and record START TIME (top of page).

STEP / STANDARD	SAT / UNSAT

Step 1:

Reviews completed dose assessment report.



This is a Drill **Dose Assessment** **This is a Drill**

Columbia Generating Station **Saturday, October 29, 2022 14:11**

Method: Detailed Assessment - Monitored Release

Release Pathway: <SF> <Partially Covered> <Rx Bldg> <SBGT> <Stack> <Env> PRF: 4.00E-04

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

Rx Bldg HUT: = 2 - 24 Hours SBGT Filters: = Working Turb Bldg HUT: = N/A RW Bldg HUT: = N/A

Source Term: Spent Fuel Accident - Partially Covered Damage: 33.000 %

Time Since Irradiated (hh:mm): 13008:21

Release Duration (hh:mm): 3:00 ETE (hh:mm): [N/A]

CGS 33ft Tower
Wind: From 45° @ 5 mph
Stability Class: B
Precipitation: None

Monitor: Stack Mid RE12 Readings: 2.07E+00 uCi/cc Flowrate: 12000 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.	2.07E-01	3.14E-01	7.28E+00	3.91E+00	1.15E+01	6.51E+00
1.5	0.00E+00	1.37E-01	4.38E+00	2.35E+00	[illegible]	3.91E+00
2.0	0.00E+00	0.00E+00	2.51E+00	1.34E+00	3.85E+00	2.24E+00
3.0	0.00E+00	0.00E+00	1.30E+00	6.83E-01	1.98E+00	1.16E+00
4.0	0.00E+00	0.00E+00	7.29E-01	3.81E-01	1.11E+00	6.52E-01
5.0	0.00E+00	0.00E+00	6.35E-01	3.31E-01	9.66E-01	5.68E-01
7.0	0.00E+00	0.00E+00	4.77E-01	2.47E-01	7.24E-01	4.27E-01
10.0	0.00E+00	0.00E+00	4.24E-01	2.18E-01	6.42E-01	3.79E-01

Assessment Data Results Saved to File:
Columbia Generating Station 10Miles Monitored Release 10292022 141136.URI7

Evacuation Areas From 0 to 10 Miles

No PAGs Exceeded

*** * * Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.14E-01 (0.1%)
Iodine	2.61E-21 (0.0%)
Noble Gas	1.60E+02 (99.9%)

Reviewed By: ____________________________________

Page 1 of 3 Columbia Generating Station / 2.0.1.0

Standard:

- Notes the completed dose assessment uses actual meteorology and indicates doses GT 10 mrem TEDE at the SITE BOUNDARY.

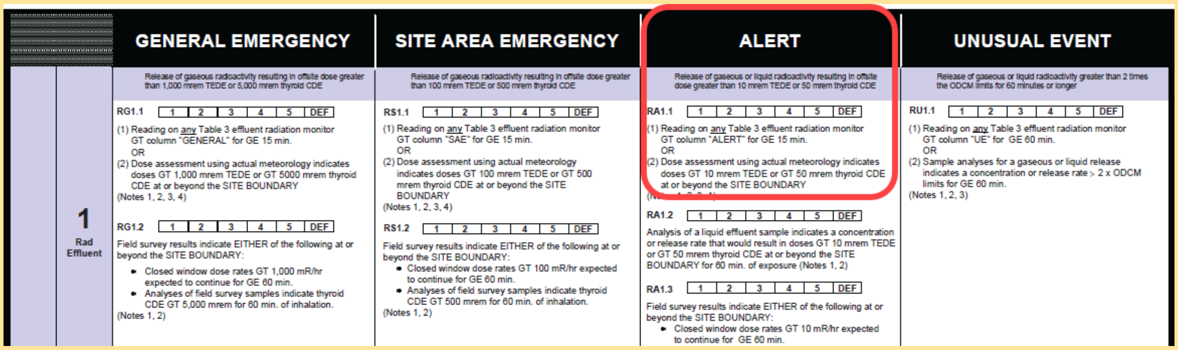
CRITICAL STEP

____SAT

____UNSAT

____N/A

STEP / STANDARD	SAT / UNSAT
Step 2: Reviews PPM 13.1.1.	CRITICAL STEP ____SAT ____UNSAT ____N/A



	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE	Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer
1 Rad Effluent	RG1.1 1 | 2 | 3 | 4 | 5 | DEF (1) Reading on any Table 3 effluent radiation monitor GT column "GENERAL" for GE 15 min. OR (2) Dose assessment using actual meteorology indicates doses GT 1,000 mrem TEDE or GT 5000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 1, 2, 3, 4)	RS1.1 1 | 2 | 3 | 4 | 5 | DEF (1) Reading on any Table 3 effluent radiation monitor GT column "SAE" for GE 15 min. OR (2) Dose assessment using actual meteorology indicates doses GT 100 mrem TEDE or GT 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 1, 2, 3, 4)	RA1.1 1 | 2 | 3 | 4 | 5 | DEF (1) Reading on any Table 3 effluent radiation monitor GT column "ALERT" for GE 15 min. OR (2) Dose assessment using actual meteorology indicates doses GT 10 mrem TEDE or GT 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (N[illegible])	RU1.1 1 | 2 | 3 | 4 | 5 | DEF (1) Reading on any Table 3 effluent radiation monitor GT column "UE" for GE 60 min. OR (2) Sample analyses for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for GE 60 min. (Notes 1, 2, 3)
	RG1.2 1 | 2 | 3 | 4 | 5 | DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates GT 1,000 mR/hr expected to continue for GE 60 min. • Analyses of field survey samples indicate thyroid CDE GT 5,000 mrem for 60 min. of inhalation. (Notes 1, 2)	RS1.2 1 | 2 | 3 | 4 | 5 | DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates GT 100 mR/hr expected to continue for GE 60 min. • Analyses of field survey samples indicate thyroid CDE GT 500 mrem for 60 min. of inhalation. (Notes 1, 2)	RA1.2 1 | 2 | 3 | 4 | 5 | DEF Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses GT 10 mrem TEDE or GT 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)	
			RA1.3 1 | 2 | 3 | 4 | 5 | DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates GT 10 mR/hr expected to continue for GE 60 min.	

Standard:

- Notes that an ALERT exists because a dose assessment using actual meteorology indicates doses GT 10 mrem TEDE at or beyond the SITE BOUNDARY.
- **(Non-critical)** Uses Bases to support decision.
- Completes Student JPM Answer Sheet.

Examiner Cue: Inform the Candidate that the JPM is Complete.

STOP TIME: ___________

JPM ANSWER SHEET

(COMPLETED)

EAL Classification (Include Classification Level and specific EAL):

ALERT (RA1.1)

Basis for Classification:

Words to the effect of: Based on RA1.1 - a dose assessment using actual meteorology indicates doses GT 10 mrem TEDE at or beyond the SITE BOUNDARY.

RESULTS OF JPM ILC-25 JPM A-9 (SRO)

Examinee (Print): ____

Examiner (Print): ____

Task Standard: Classifies the event as an ALERT based on RA1.1 - Dose assessment using actual meteorology indicates doses GT 10 mrem TEDE at or beyond the SITE BOUNDARY.

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

<u>COMMENTS:</u>

____

____

____

____

____

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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- An event has occurred which caused a leak in the Spent Fuel Pool (SFP).

STUDENT JPM INITIATING CUE SHEET

Initiating Cue:

- The SM directs you to classify the emergency based on the completed detailed Dose Assessment.
- When finished, complete the Student JPM answer sheet and hand the sheet to your examiner.
- This is a time critical JPM, and your time starts now.

STUDENT JPM ANSWER SHEET

EAL Classification (Include Classification Level and specific EAL):

____

Basis for Classification:

____

____

____

____

____

Attachment 1 – Dose Assessment

This is a Drill **Dose Assessment** **This is a Drill**

Columbia Generating Station **Saturday, October 29, 2022 14:11**

Method: Detailed Assessment - Monitored Release

Release Pathway: <SF> <Partially Covered> <Rx Bldg> <SBGT> <Stack> <Env> PRF: 4.00E-04

Drywell HUT: = N/A	Drywell Sprays: = N/A	Supp Pool HUT: = N/A	Supp Pool Status: = N/A
Rx Bldg HUT: = 2 - 24 Hours	SBGT Filters: = Working	Turb Bldg HUT: = N/A	RW Bldg HUT: = N/A

Source Term: Spent Fuel Accident - Partially Covered Damage: 33.000 %

Time Since Irradiated (hh:mm): 13008:21

Release Duration (hh:mm): 3:00 ETE (hh:mm): [N/A]

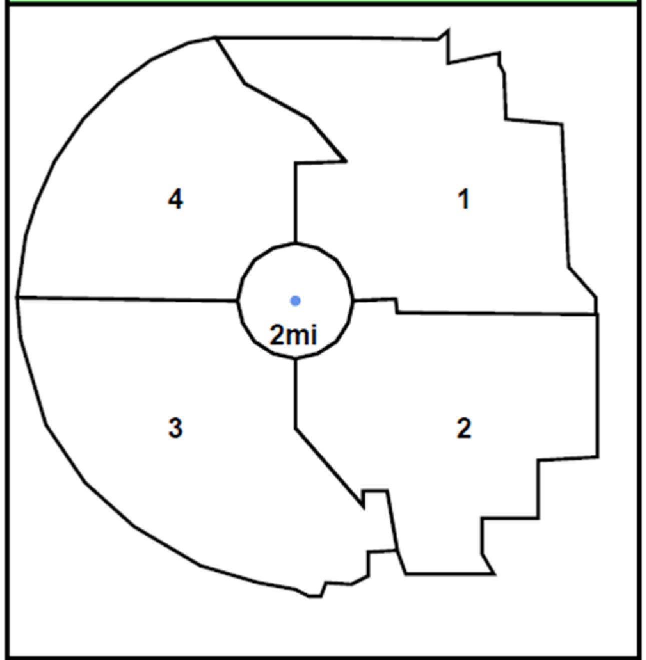
CGS 33ft Tower
Wind: From 45° @ 5 mph
Stability Class: B
Precipitation: None

Monitor: Stack Mid RE12 Readings: 2.07E+00 uCi/cc Flowrate: 12000 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.	2.07E-01	3.14E-01	7.28E+00	3.91E+00	1.15E+01	6.51E+00
1.5	0.00E+00	1.37E-01	4.38E+00	2.35E+00	6.86E+00	3.91E+00
2.0	0.00E+00	0.00E+00	2.51E+00	1.34E+00	3.85E+00	2.24E+00
3.0	0.00E+00	0.00E+00	1.30E+00	6.83E-01	1.98E+00	1.16E+00
4.0	0.00E+00	0.00E+00	7.29E-01	3.81E-01	1.11E+00	6.52E-01
5.0	0.00E+00	0.00E+00	6.35E-01	3.31E-01	9.66E-01	5.68E-01
7.0	0.00E+00	0.00E+00	4.77E-01	2.47E-01	7.24E-01	4.27E-01
10.0	0.00E+00	0.00E+00	4.24E-01	2.18E-01	6.42E-01	3.79E-01

Assessment Data Results Saved to File:
Columbia Generating Station 10Miles Monitored Release 10292022 141136.URI7

Evacuation Areas From 0 to 10 Miles



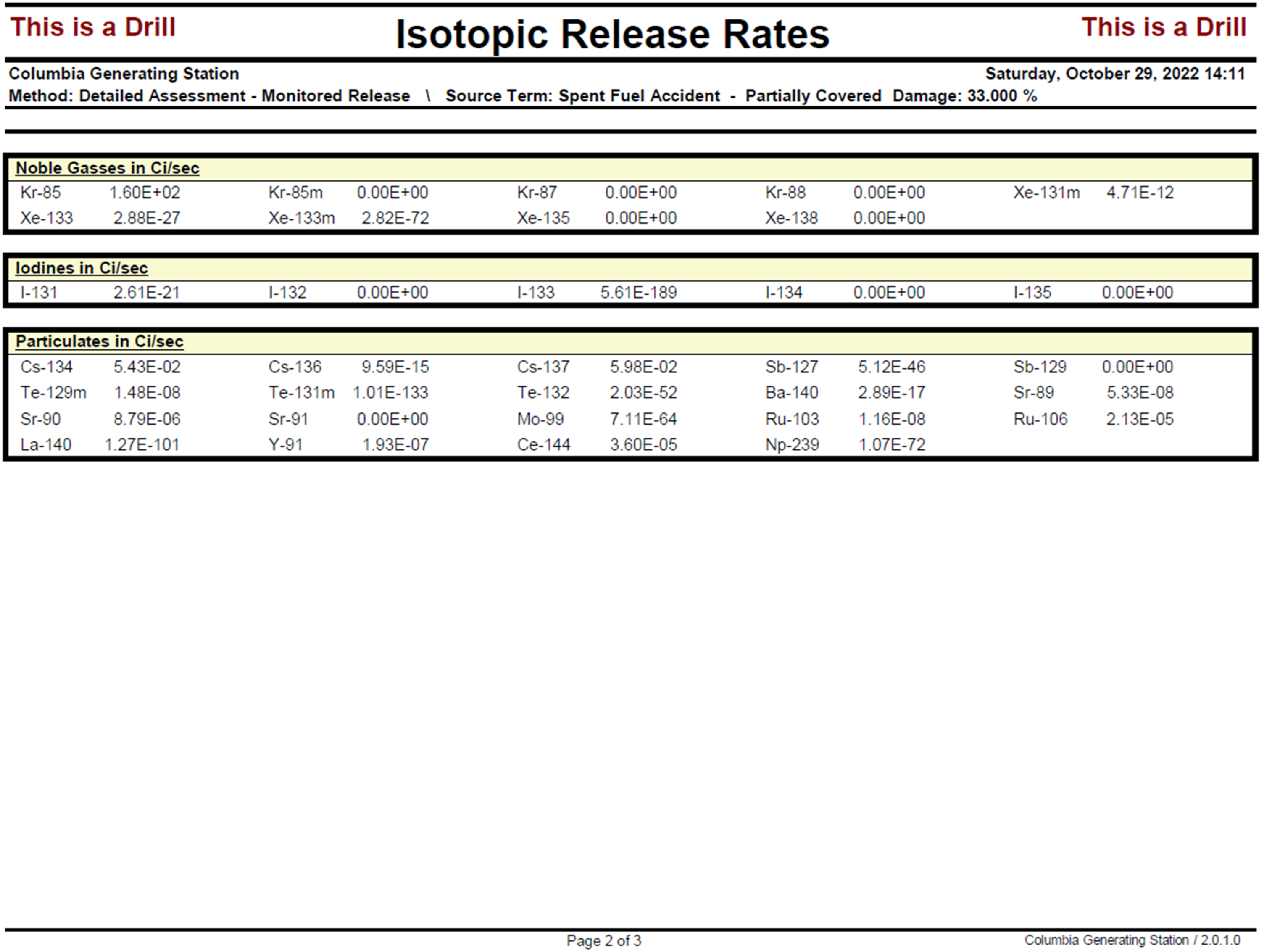
No PAGs Exceeded

*** * * Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.14E-01 (0.1%)
Iodine	2.61E-21 (0.0%)
Noble Gas	1.60E+02 (99.9%)

Reviewed By: ______________________________

Attachment 1 – Dose Assessment



This is a Drill **This is a Drill**

Isotopic Release Rates

Columbia Generating Station **Saturday, October 29, 2022 14:11**

Method: Detailed Assessment - Monitored Release \ Source Term: Spent Fuel Accident - Partially Covered Damage: 33.000 %

Noble Gasses in Ci/sec

Kr-85	1.60E+02	Kr-85m	0.00E+00	Kr-87	0.00E+00	Kr-88	0.00E+00	Xe-131m	4.71E-12
Xe-133	2.88E-27	Xe-133m	2.82E-72	Xe-135	0.00E+00	Xe-138	0.00E+00		

Iodines in Ci/sec

I-131	2.61E-21	I-132	0.00E+00	I-133	5.61E-189	I-134	0.00E+00	I-135	0.00E+00

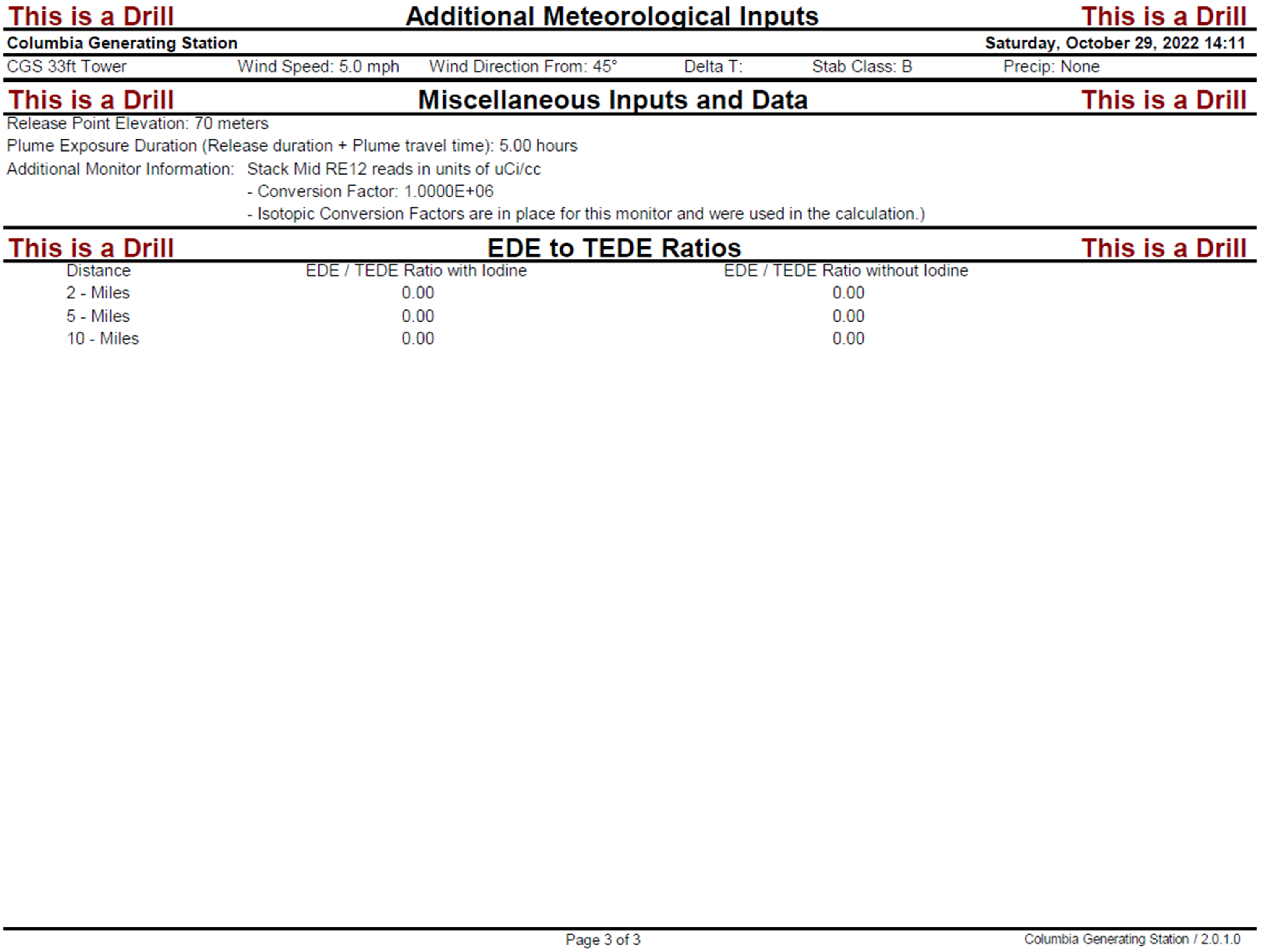
Particulates in Ci/sec

Cs-134	5.43E-02	Cs-136	9.59E-15	Cs-137	5.98E-02	Sb-127	5.12E-46	Sb-129	0.00E+00
Te-129m	1.48E-08	Te-131m	1.01E-133	Te-132	2.03E-52	Ba-140	2.89E-17	Sr-89	5.33E-08
Sr-90	8.79E-06	Sr-91	0.00E+00	Mo-99	7.11E-64	Ru-103	1.16E-08	Ru-106	2.13E-05
La-140	1.27E-101	Y-91	1.93E-07	Ce-144	3.60E-05	Np-239	1.07E-72		

Page 2 of 3

Columbia Generating Station / 2.0.1.0

Attachment 1 – Dose Assessment



This is a Drill **Additional Meteorological Inputs** This is a Drill

Columbia Generating Station **Saturday, October 29, 2022 14:11**

CGS 33ft Tower Wind Speed: 5.0 mph Wind Direction From: 45° Delta T: Stab Class: B Precip: None

This is a Drill **Miscellaneous Inputs and Data** This is a Drill

Release Point Elevation: 70 meters

Plume Exposure Duration (Release duration + Plume travel time): 5.00 hours

Additional Monitor Information: Stack Mid RE12 reads in units of uCi/cc
- Conversion Factor: 1.0000E+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	0.00	0.00
5 - Miles	0.00	0.00
10 - Miles	0.00	0.00

Page 3 of 3 Columbia Generating Station / 2.0.1.0

ENERGY NORTHWEST

ILC-25 P-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM P-1

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ____ Rev. No. ____
SIMULATOR GUIDE PQD CODE ____ Rev. No. ____
JPM PQD CODE ____ Rev. No. ____
EXAM PQD CODE ____ Rev. No. ____

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Jeff Lux / Dave Crawford DATE 12/02/22

REVISED BY ____ DATE ____

TECHNICAL REVIEW BY ____ DATE ____

INSTRUCTIONAL REVIEW BY ____ DATE ____

APPROVED BY ____ DATE ____
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Recognizes low pressure coming from CIA-PCV-1. Adjusts CIA-PCV-1 in the correct direction to restore MSIV/SRV Header pressure to 105 psig.**

Alternate Path: ☑ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 20 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-1246 Respond to a CIA system failure.

K/A Importance Factors: **RO:** 3.9 **SRO:** 3.8

K/A Number: 300000 A2.03

K/A Statement: Ability to (a) predict the impacts of the following on the instrument air system and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Low Instrument air pressure.

Evaluation Type: **In-Plant** ☑ **Simulator** ☐

Control Room ☐ **Admin** ☐

Safety Function: 8 – Plant Service Systems

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.

- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):

    - Student JPM Information Sheet **(Page 15)**
    - Student Handout #1 **(JPM P-1 ILC-25 Ref 1.PDF)**
    - Student Handout #2 **(JPM P-1 ILC-25 Ref 2.PDF)**

Special Setup Instructions:

- Contact the Shift Manager prior to administration of JPM.
- Verify Operations protected areas will not interfere with JPM administration.

Tools or Equipment:

- No actual tools are required (all actions will be simulated).

Safety Items:

- Normal In Plant PPE (Hard Hat, Safety Glasses, Gloves, Hearing Protection).

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 4.850.A5	030	001
SOP-CIA-OPS	006	N/A

In-Plant Location:

- RB-522’

STUDENT JPM BRIEF

In Plant:

- I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you.
- When you complete the task successfully, the objective for this job performance measure will be satisfied.
- When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).
- NO manipulations will be performed, all actions will be SIMULATED.

Initial Conditions:

- CGS is in Mode 4 following a refueling outage.
- Maintenance was performed on CIA-PCV-1 during the refueling outage.
- CIA was placed in service previous shift. CIA-V-728 is **OPEN** with normal Containment Nitrogen supply to Containment Instrument Air.
- Current CIA Main Header Pressure is 185 psig and stable (CIA-PI-20 / MCR)
- ADS Accumulator HDR A pressure is 185 psig and stable (CIA-PI-21A / MCR)
- ADS Accumulator HDR B pressure is 185 psig and stable (CIA-PI-21B / MCR)
- Annunciator 4.840.A5 5-3 CIA HEADER PRESS LOW is in ALARM.

Initiating Cue:

You have been directed by the CRS to complete actions of Annunciator 4.840.A5 5-3:

- Validate CIA HEADER PRESS LOW ALARM by checking CIA-PI-29 in R-522 J8/6.9. (CIA PI-29 is located high on the wall to the left of H22-P004 on Reactor Building 522' Northwest side.)
- Perform actions of SOP-CIA-OPS.

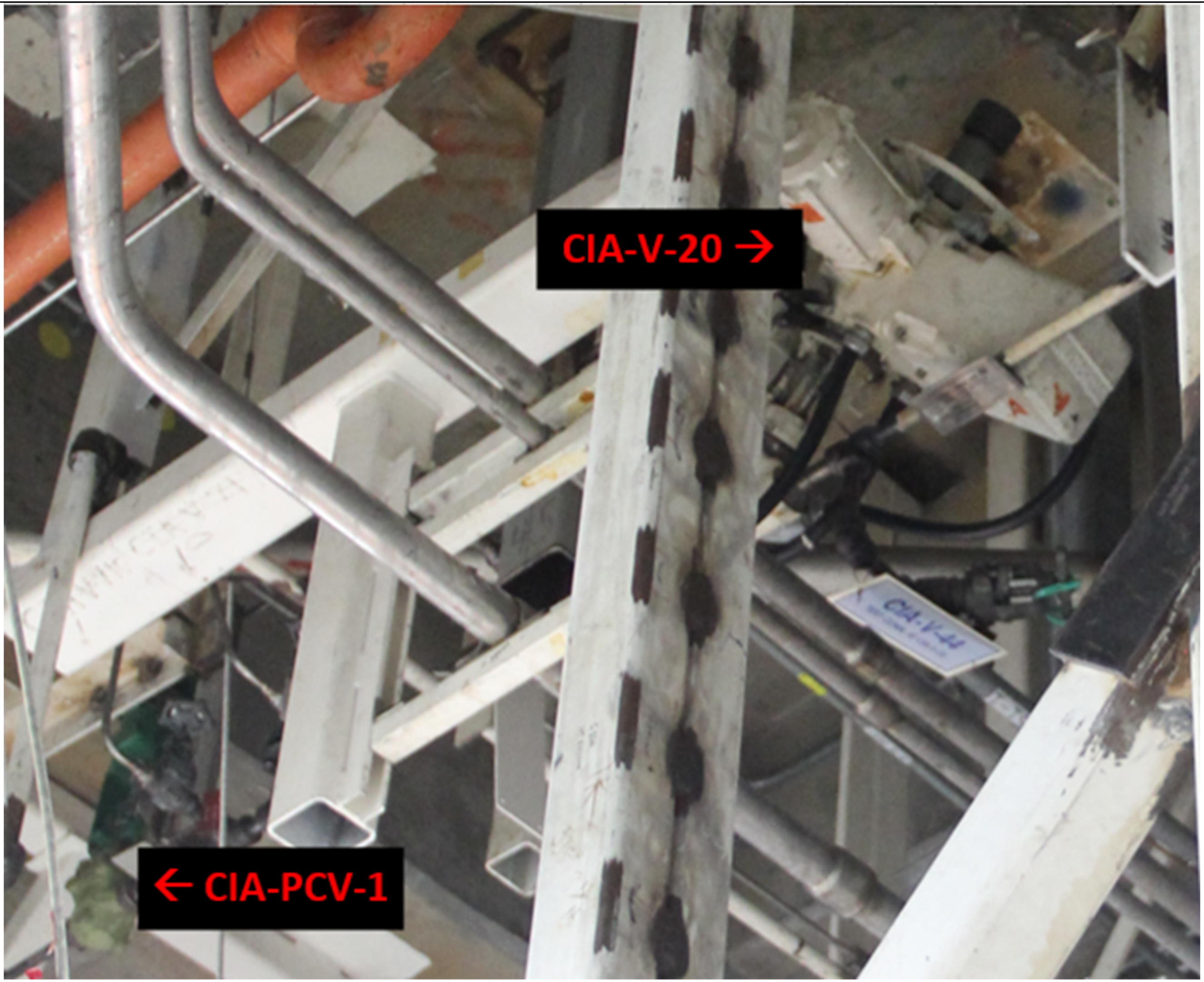
START TIME:___________

Examiner Note:	**Provide candidate with the following:** - **Student JPM Information Sheet** - **Student Handout #1 (ARP, SOP-CIA-OPS, Location Aids)**

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: CIA-PI-29 is located high on the wall to the left of H22-P004 on Reactor Building 522' Northwest side. (Pictured below)  	
When the student views CIA-PI-29 pre-adjustment: **Examiner Cue: Provide Picture Cue #1 (page 13)**	

Examiner Note: **All Steps below are directly from SOP-CIA-OPS Section 5.2 exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	
STEP / STANDARD	**SAT / UNSAT**
Step 1: 5.2 Low MSIV/SRV Header Pressure (95 psig) NOTE This condition may be expected to occur for short periods of time during high system flow rates (GT 12 SCFM). NOTE In the event that CN and CAS are both unavailable and SA is used as the only alternative to supply CIA, PPM 10.27.89 checks for dew point and hydrocarbons while SA is being used and immediately after the CIA is realigned with its normal supply to ensure no moisture enters the CIA system. {P-52961} Standard: • Reads and circle slash's Notes. Neither note is applicable to this evolution.	___SAT ___UNSAT ___N/A
Step 2: 5.2.1 WHEN Service Air is the only alternative supply for CIA, THEN **PERFORM** PPM 10.27.89 while SA is being used and immediately after CIA is realigned with its normal supply. **N/A** Standard: • Determines (from initial conditions) that CIA is being supplied from its normal source (Containment Nitrogen). Marks Step N/A.	___SAT ___UNSAT ___N/A
Step 3: 5.2.2 **VERIFY** CIA-V-728 **OPEN**. (Manual Nitrogen System Crosstie) **Initials** Standard: • Determines (from initial conditions) that CIA-V-728 is open.	___SAT ___UNSAT ___N/A
Examiner Note: **The following Step is ALTERNATE PATH.**	
Alt Path Step 4: 5.2.3 IF CIA-PCV-1 not controlling at approximately 105 psig, THEN **ADJUST** CIA-PCV-1 per Section 5.4 ____ Standard: • Notes from Picture Cue #1 that CIA pressure is currently 90 psig. • If/when the candidate determines need to adjust CIA-PCV-1 per section 5.4 of SOP-CIA-OPS: **Examiner Cue: Provide Student Handout #2 and state, "Make adjustments as required per SOP-CIA-OPS".**	**CRITICAL STEP** ___SAT ___UNSAT ___N/A

STEP / STANDARD	SAT / UNSAT
Examiner Note: **If the candidate requests to look at the M Drawing for CIA-PCV-1.** **Examiner Cue: “You have what you need.”** **Examiner Reference:** **CIA-PCV-1 is in the overhead above the HPU skid Reactor Building 522’ Northwest side.**  	



Examiner Note: **All Steps below are directly from SOP-CIA-OPS Section 5.4 (Student Handout #2)**

Step 5:

NOTE CIA-PCV-1 is a direct-acting, spring-return-to-open, nitrogen-to-close pressure control valve. Increasing spring compression increases downstream pressure, and decreasing spring compression decreases downstream pressure.

NOTE Adjustments should be made in small increments of ½ turn or less.

Standard:

- Reads and circle slash's Notes. Both Notes are of importance since they help to adjust valve in the correct direction and to ensure adjustments are made in small increments.

___SAT

___UNSAT

___N/A

Examiner Note: CIA-PCV-1 is located approx. 20 feet in the overhead on Reactor Building 522' Northwest side.

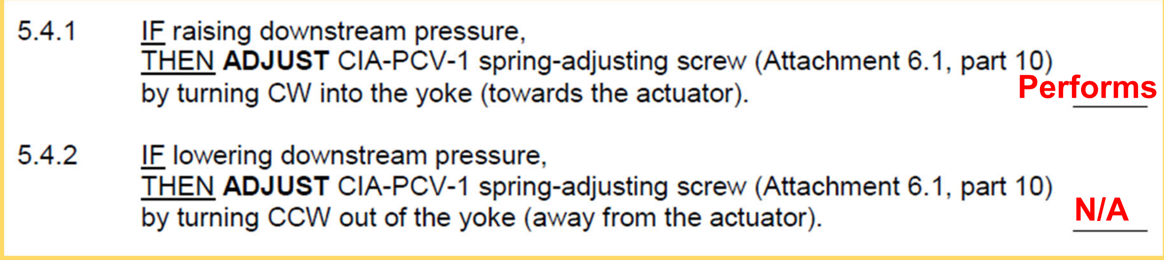
It is not the intent for the candidate to climb scaffolding or use a man lift to reach this valve. Once the valve has been located and the candidate indicates use of a manlift to reach the valve:

Examiner Cue: "You have a man lift on location."

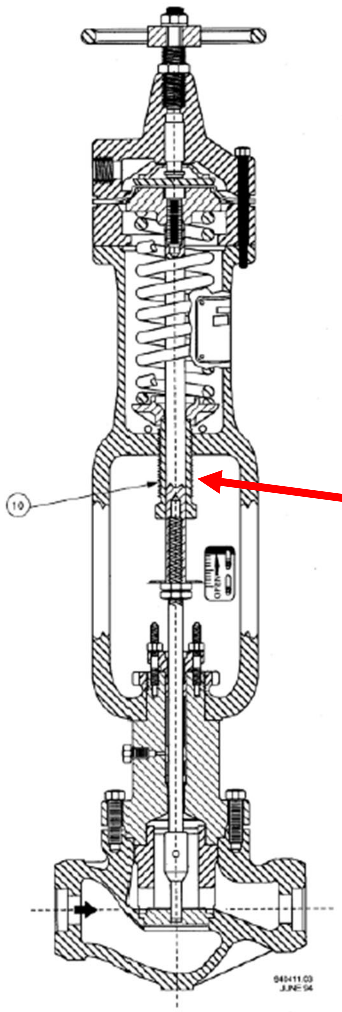
It is not the intent of this JPM to determine the candidate's ability to retrieve a wrench from the tool crib. If the candidate refers to obtaining tools:

Examiner Cue: "You have all the simulated tools on hand that are required to perform this task"

Operator actions can be explained using Attachment 6.1 which can be performed in a low dose waiting area (Reactor Building 522' northwest corner near the stairwell.)

STEP / STANDARD	SAT / UNSAT
Step 6: If the candidate views CIA-PI-29 again: **Examiner Cue: PROVIDE the candidate with Picture Cue #1 (page 13)**  5.4.1 IF raising downstream pressure, THEN **ADJUST** CIA-PCV-1 spring-adjusting screw (Attachment 6.1, part 10) by turning CW into the yoke (towards the actuator). **Performs** 5.4.2 IF lowering downstream pressure, THEN **ADJUST** CIA-PCV-1 spring-adjusting screw (Attachment 6.1, part 10) by turning CCW out of the yoke (away from the actuator). **N/A** **JPM STEP CONTINUED ON NEXT PAGE**	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

CIA-PCV-1



References Attachment 6.1 (Part 10 Identified) to correctly adjust CIA-PCV-1

Standard:

- Performs step 5.4.1 and **adjusts the spring adjusting screw (part 10) in the clockwise direction INTO the yoke.** → turning the adjusting screw **clockwise as viewed from looking up at the yoke** while adjusting.

  (The Note before the step makes this easy to understand from the standpoint of Increasing spring compression increases downstream pressure.)

If the candidate attempts to operate handwheel:

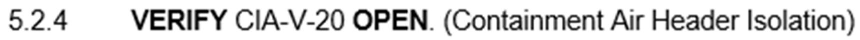
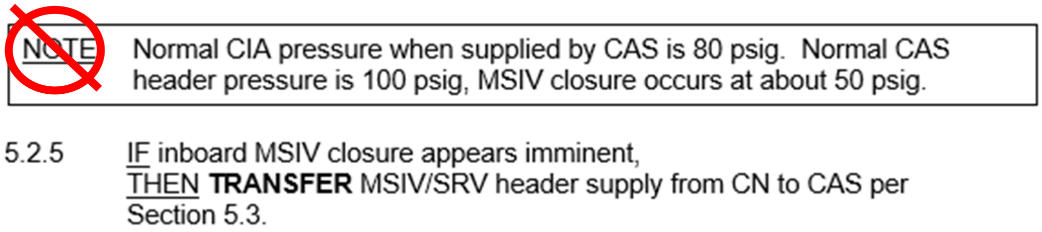
Examiner Cue: State "Handwheel does not turn."

- Mark's step 5.4.2 as N/A.

If the candidate views CIA-PI-29 after making the CORRECT adjustment:

Examiner Cue: PROVIDE the candidate with Picture Cue #2 (page 14)

Examiner Note: **There is NOT a picture cue for making the wrong adjustment. If the candidate adjusts CIA-PCV-1 in the wrong direction, the JPM is complete and annotated as a JPM failure.**

STEP / STANDARD	**SAT / UNSAT**
Step 7:  5.2.3 IF CIA-PCV-1 not controlling at approximately 105 psig, THEN **ADJUST** CIA-PCV-1 per Section 5.4 **Initials** Standard: - Signs for completion of the step following correct adjustment of CIA-PCV-1.	___SAT ___UNSAT ___N/A
Step 8:  5.2.4 **VERIFY** CIA-V-20 **OPEN**. (Containment Air Header Isolation) **Initials** If the candidate contacts the Main Control room for CIA-V-20 position. **Examiner Cue: “CIA-V-20 indicates open.”** Standard: - Contacts the control room. Signs (or Circles) the step as completed.	___SAT ___UNSAT ___N/A
Step 9:  NOTE Normal CIA pressure when supplied by CAS is 80 psig. Normal CAS header pressure is 100 psig, MSIV closure occurs at about 50 psig. 5.2.5 IF inboard MSIV closure appears imminent, THEN **TRANSFER** MSIV/SRV header supply from CN to CAS per Section 5.3. **N/A** Standard: - Circle-slash’s note which does not apply to the current plant status. - Marks step 5.2.5 as N/A.	___SAT ___UNSAT ___N/A
Examiner Cue: Inform the candidate that the JPM is Complete.	

STOP TIME: ___________

RESULTS OF JPM

ILC-25 JPM P-1

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: Recognizes low pressure coming from CIA-PCV-1. Adjusts CIA-PCV-1 in the correct direction to restore MSIV/SRV Header pressure to 105 psig.

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

COMMENTS:

Examiner Signature: ______________________ **Date:** __________

Picture Cue #1

Picture Cue #2

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- CGS is in Mode 4 following a refueling outage.
- Maintenance was performed on CIA-PCV-1 during the refueling outage.
- CIA was placed in service previous shift. CIA-V-728 is **OPEN** with normal Containment Nitrogen supply to Containment Instrument Air.
- Current CIA Main Header Pressure is 185 psig and stable (CIA-PI-20 / MCR)
- ADS Accumulator HDR A pressure is 185 psig and stable (CIA-PI-21A / MCR)
- ADS Accumulator HDR B pressure is 185 psig and stable (CIA-PI-21B / MCR)
- Annunciator 4.840.A5 5-3 CIA HEADER PRESS LOW is in ALARM.

Initiating Cue:

You have been directed by the CRS to complete actions of Annunciator 4.840.A5 5-3:

- Validate CIA HEADER PRESS LOW ALARM by checking CIA-PI-29 in R-522 J8/6.9. (CIA-PI-29 is located high on the wall to the left of H22-P004 on Reactor Building 522’ Northwest side.)
- Perform actions of SOP-CIA-OPS.

Student Handout #1

JPM P-1 ILC-25

(Give to student in the beginning as directed by JPM)

5-3 CONTAINMENT INSTRUMENT AIR HEADER PRESSURE LOW

5-3 WINDOW	SOURCE	AUTOMATIC ACTIONS
CIA HEADER PRESS LOW	CIA-PS-29 (95 psig)	None

CAUTION

MSIV closure will occur at approximately 80 psig.

CAUTION

If CIA Main Header pressure degrades further, loss of SRV Solenoid C control from H13-P601 may occur.

NOTE: A sustained flowrate of GE 12 SCFM will drop Containment Nitrogen Header pressure to the alarm setpoint, and indicates a leak exists.

NOTE: If Containment Nitrogen Header pressure is normal (CIA-PI-20) and local Containment Nitrogen Header Pressure (CIA-PI-29) is low, Drywell leakage is indicated.

NOTE: Normal Containment Nitrogen Header pressure is 110 psig and CN-FIT-3 normal flow is approximately 1.1 SCFM.

1. **CHECK** CIA-PI-20 (Nitrogen Supply Header Pressure) (180 to 190 psig normal).
2. **MONITOR** CN-FIT-3 (RB 471 near SW elevator) (Nitrogen Supply Header Flow).
3. **REFER** to ABN-CIA, Containment Instrument Air System Failure.
4. **REFER** to SOP-CIA-OPS, Containment Instrument Air System Operation.

NOTE: CIA-PS-29 and CIA-PI-29 sense pressure provided to the inboard MSIVs and SRV "C" solenoids. It senses a lower pressure (and thus more accurate) than CIA-PI-20.

5. IF time permits,
   THEN **CHECK** CIA main header pressure at CIA-PI-29 (Common Header Pressure) (RB 541).

REFERENCES: M556
M783
EWD-24E-012

Verify Revision Information Prior To Use	Initials	JDL
	Date	Today

Number: SOP-CIA-OPS	Use Category: CONTINUOUS	Major Rev: 006 Minor Rev: N/A Page: 1 of 24
Title: Containment Instrument Air System Operation		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-CIA-OPS	Effective Date: 10/21/21

JDL – Jeffrey Delux

1.0 PURPOSE

Provide detailed instructions for operating the Containment Instrument Air System.

2.0 REFERENCES

2.1 MDR 291-0464, Water in the CIA System {P-52961}

2.2 PER 291-0916, Isolated Nitrogen Bottle {P-91129}

2.3 PER 292-0174, CN and CIA Setpoints {P-91431}

2.4 PER 292-1142, Minimum Number of Nitrogen Bottles {P-92396}

2.5 PER 293-1425, Missing Hold Down Bolts {P-95218}

2.6 PER 295-305, Nitrogen Bottle Pressure {P-113882}

2.7 PERA 296-0507-03, CIA Programmer Inadvertent Step Advance {P-133881}

2.8 M556, Containment Instrument Air System

2.9 M783, Containment Nitrogen System

2.10 M510, Control and Service Air System

2.11 System 24.0, Electrical Wiring Diagrams

2.12 CIA-PROG-1A and B Instruction Manual, CVI 58-00,42

2.13 ISPM-2, Compressed Gases and Welding/Cutting

2.14 ISPM 3, Confined Space Entry

2.15 ISPM-15, Material Handling

2.16 SOP-CIA-START, Containment Instrument Air System Startup

3.0 PREREQUISITES

3.1 **VERIFY** Containment Instrument Air System in operation. JDL

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Ensure adequate ventilation if any CIA System nitrogen leak or release occurs.

4.2 Opening Door R106 during adverse weather conditions may affect CIA bottle pressures and possibly affect the operability of the CIA System. Ensure CIA bottle pressures remain between 2200 and 3000 psig when Door R106 is open.

4.3 Low CIA System nitrogen pressure will result in closure of Inboard MSIVs at approximately 50-80 psig.

4.4 Nitrogen is an inert gas and will displace oxygen. Prior to entering any confined, irregular-shaped, or low work area, use oxygen monitoring equipment to assure 19.5% or greater oxygen content, as required by ISPM 3, Confined Space Entry.

4.5 Compressed Gas cylinders shall be handled in accordance with ISPM-2, Compressed Gases and Welding/Cutting.

4.6 When using the large cart to handle N2 Bottles (GT 200 lbs), then use Form #26603 “ENW Material Handling Safety Plan Checklist” per ISPM-15, Material Handling.

5.2 Low MSIV/SRV Header Pressure (95 psig)

NOTE: This condition may be expected to occur for short periods of time during high system flow rates (GT 12 SCFM).

NOTE: In the event that CN and CAS are both unavailable and SA is used as the only alternative to supply CIA, PPM 10.27.89 checks for dew point and hydrocarbons while SA is being used and immediately after the CIA is realigned with its normal supply to ensure no moisture enters the CIA system. {P-52961}

5.2.1 WHEN Service Air is the only alternative supply for CIA,
THEN **PERFORM** PPM 10.27.89 while SA is being used
and immediately after CIA is realigned with its normal supply. _____

5.2.2 **VERIFY** CIA-V-728 **OPEN**. (Manual Nitrogen System Crosstie) _____

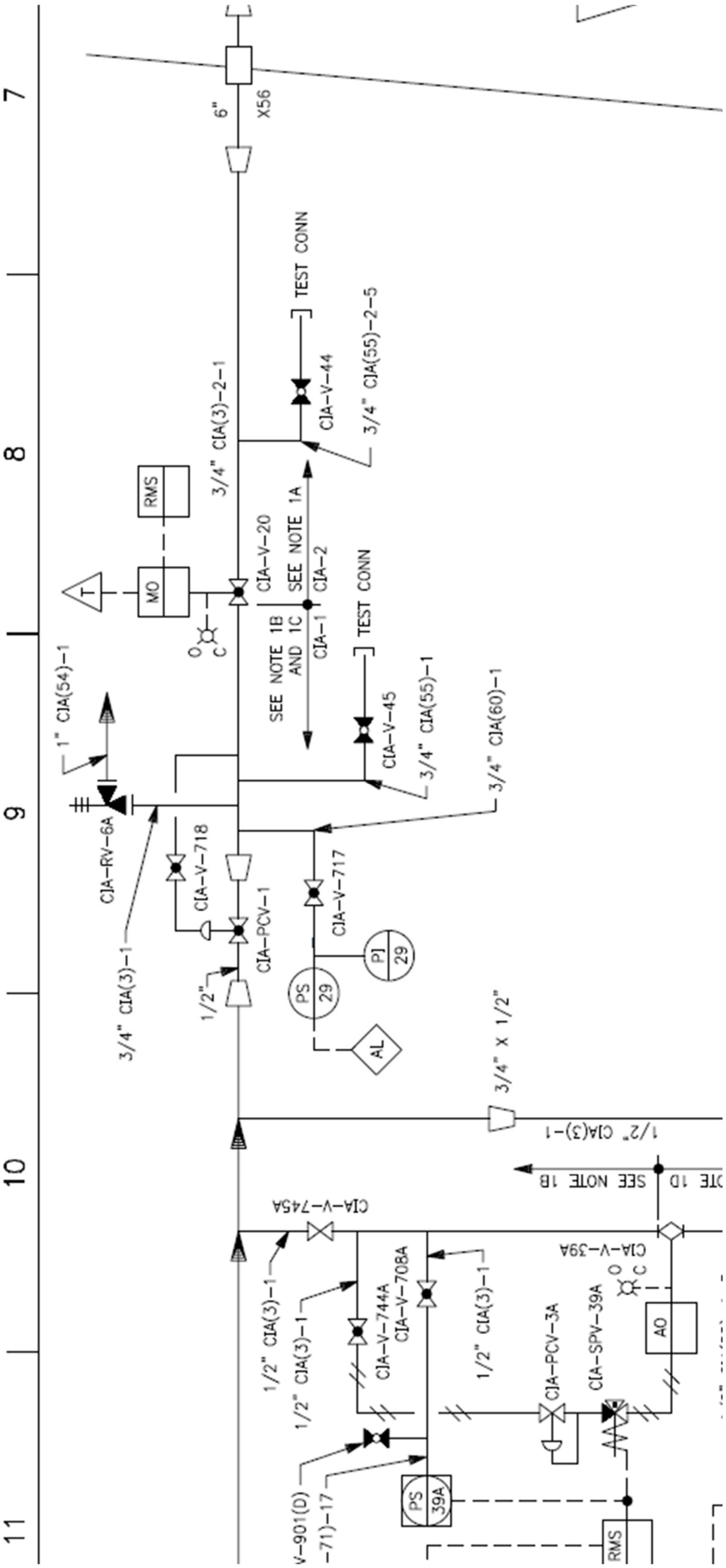
5.2.3 IF CIA-PCV-1 not controlling at approximately 105 psig,
THEN **ADJUST** CIA-PCV-1 per Section 5.4 _____

5.2.4 **VERIFY** CIA-V-20 **OPEN**. (Containment Air Header Isolation) _____

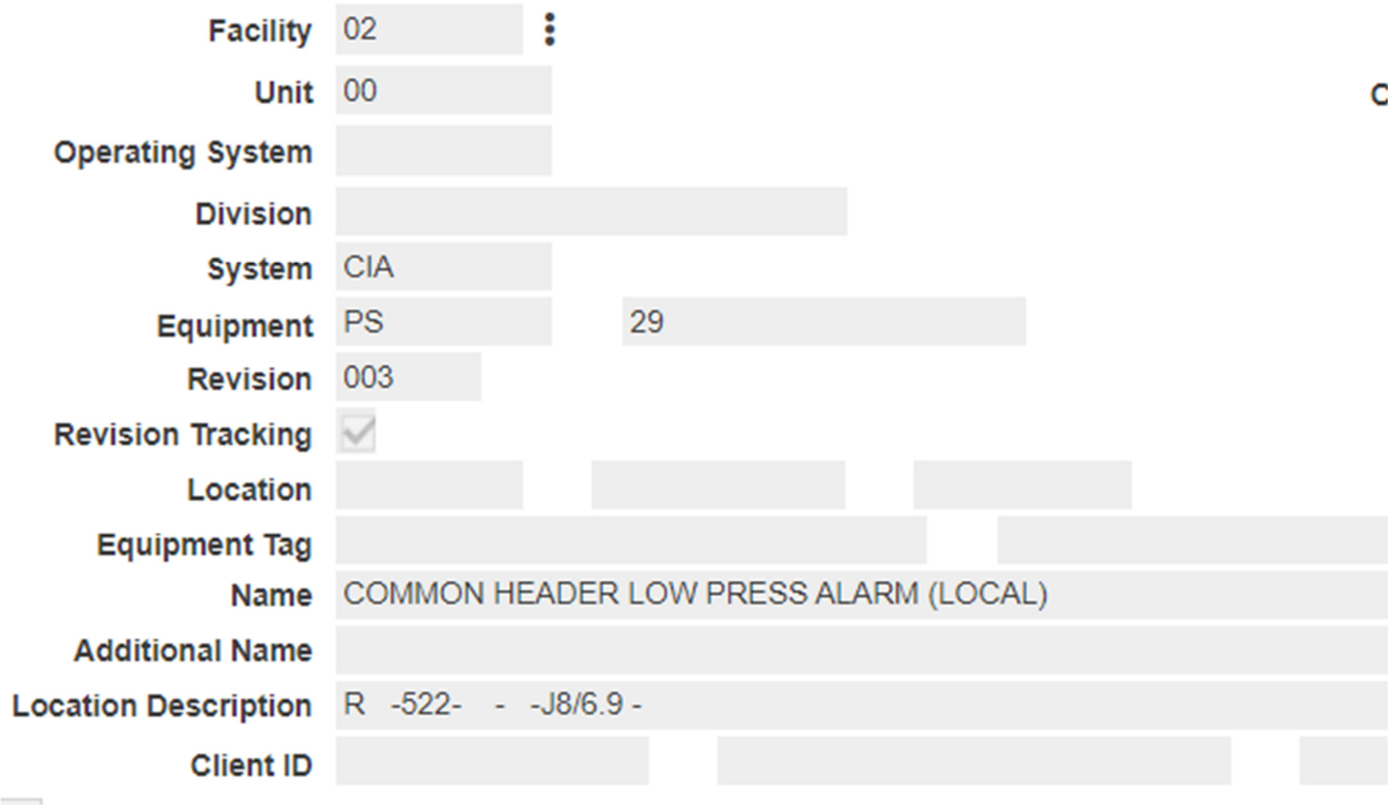
NOTE: Normal CIA pressure when supplied by CAS is 80 psig. Normal CAS header pressure is 100 psig, MSIV closure occurs at about 50 psig.

5.2.5 IF inboard MSIV closure appears imminent,
THEN **TRANSFER** MSIV/SRV header supply from CN to CAS per
Section 5.3. _____

Applicable portion of M556-1



Applicable Asset Suite and Plant Maps (Pg 1 of 3)



Facility 02

Unit 00

Operating System

Division

System CIA

Equipment PS 29

Revision 003

Revision Tracking ☑

Location

Equipment Tag

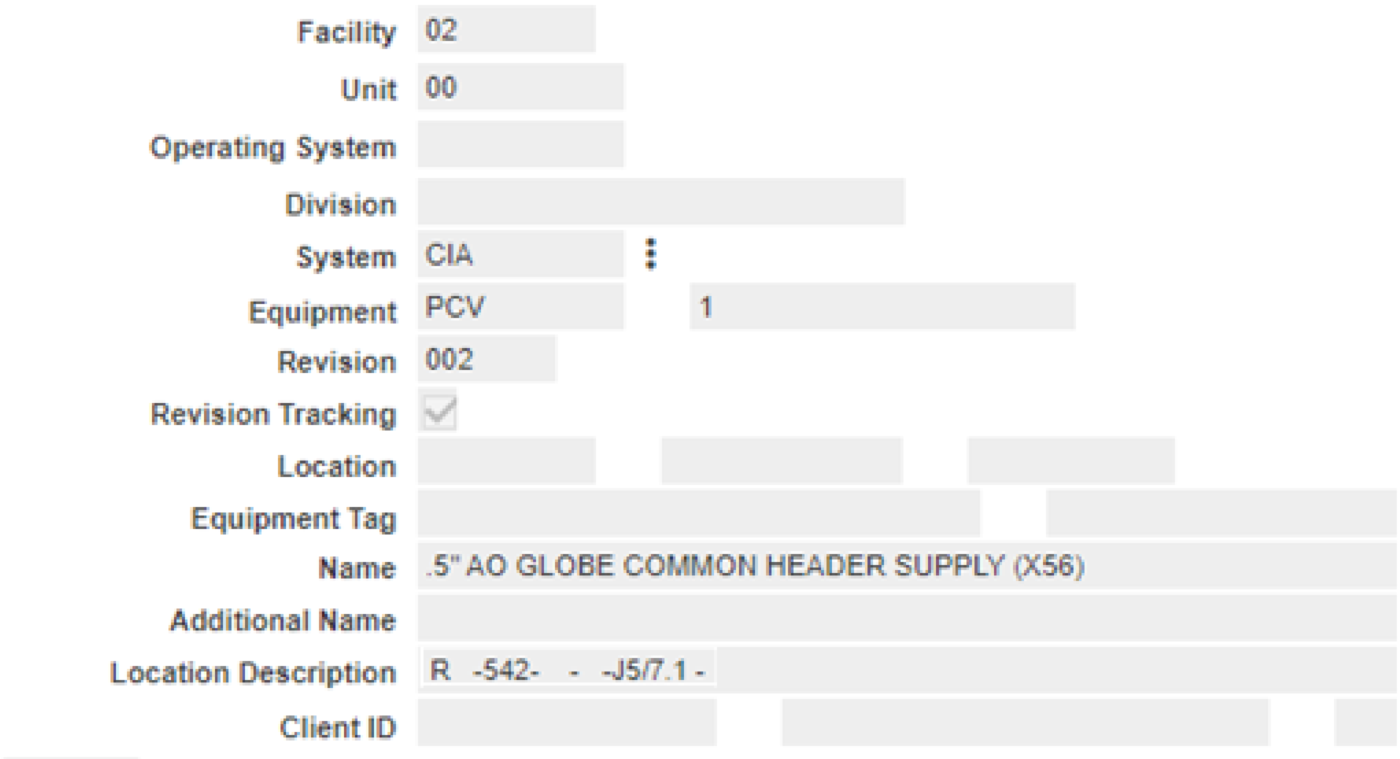
Name COMMON HEADER LOW PRESS ALARM (LOCAL)

Additional Name

Location Description R -522- - -J8/6.9 -

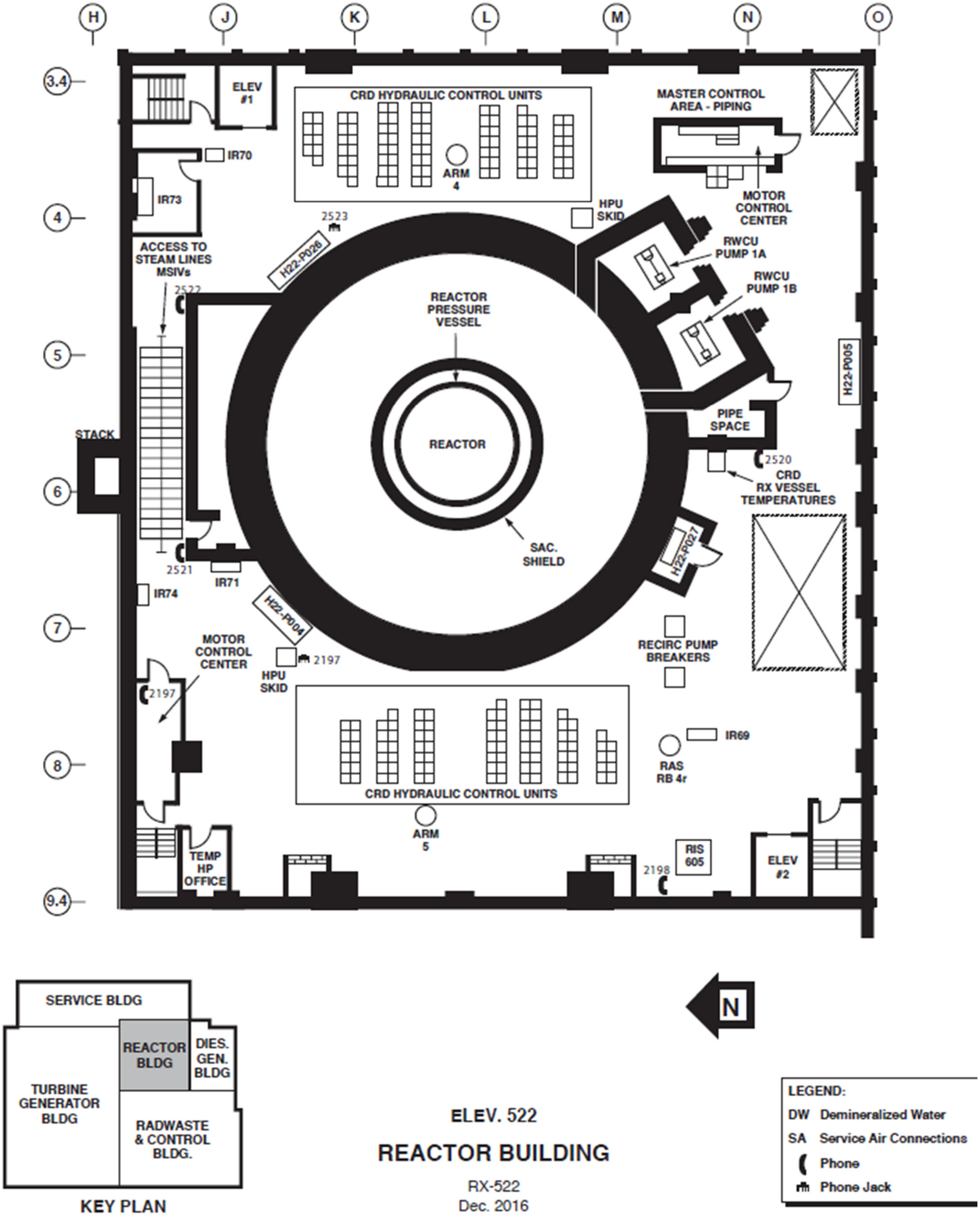
Client ID

Applicable Asset Suite and Plant Maps (Pg 2 of 3)



Facility 02
Unit 00
Operating System
Division
System CIA
Equipment PCV 1
Revision 002
Revision Tracking ☑
Location
Equipment Tag
Name .5" AO GLOBE COMMON HEADER SUPPLY (X56)
Additional Name
Location Description R -542- - -J5/7.1 -
Client ID

Applicable Asset Suite and Plant Maps (Pg 3 of 3)



Student Handout #2

JPM P-1 ILC-25

(Give to student when directed by JPM)

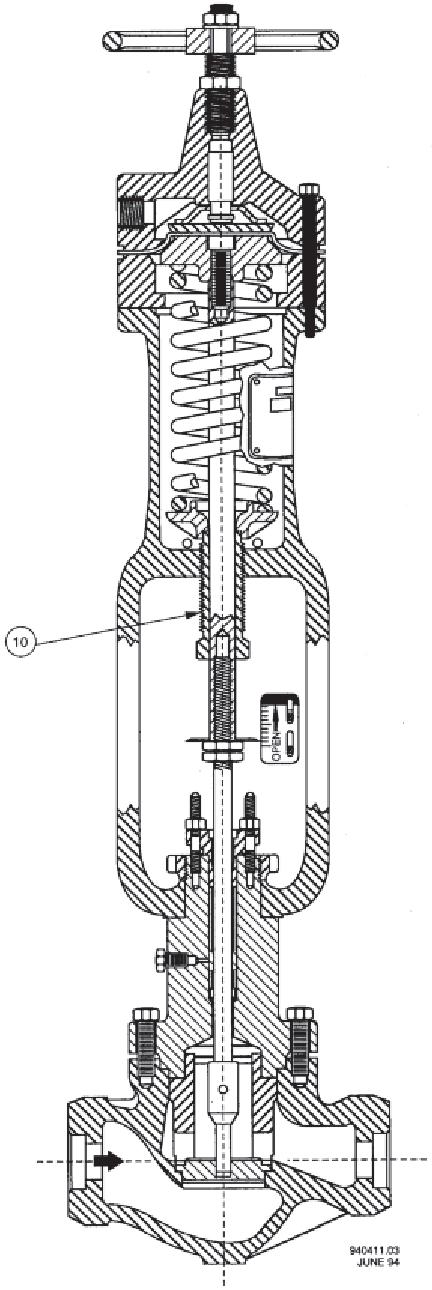
5.4 Adjusting CIA-PCV-1

> NOTE: CIA-PCV-1 is a direct-acting, spring-return-to-open, nitrogen-to-close pressure control valve. Increasing spring compression increases downstream pressure, and decreasing spring compression decreases downstream pressure.
>
> NOTE: Adjustments should be made in small increments of ½ turn or less.

5.4.1 IF raising downstream pressure,
THEN **ADJUST** CIA-PCV-1 spring-adjusting screw (Attachment 6.1, part 10) by turning CW into the yoke (towards the actuator). _____

5.4.2 IF lowering downstream pressure,
THEN **ADJUST** CIA-PCV-1 spring-adjusting screw (Attachment 6.1, part 10) by turning CCW out of the yoke (away from the actuator). _____

CIA-PCV-1



CVI 42A-00-237
CVI 42A-00-183

END

ENERGY NORTHWEST

ILC-25 P-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM P-2

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE		Rev. No.	
EXAM PQD CODE		Rev. No.	

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Jeff Lux / Dave Crawford DATE 12/03/22

REVISED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Places charger E-C1-1A in service per SOP-ELEC-125V-START (Section 5.2) with output voltage on E-VM-C1/1A/V301 (VM Ind) GE 129.5 and LE 131.5 VDC.**

Alternate Path: ☑ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0067 Respond to 125V DC Distribution system failure (Div. 1,2 or 3)

K/A Importance Factors: **RO:** 3.5 **SRO:** 3.2

K/A Number: 263000 A2.01

K/A Statement: Ability to (a) predict the impacts of the following on the DC electrical distribution and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Grounds / Faults

Evaluation Type: **In-Plant** ☑ **Simulator** ☐

Control Room ☐ **Admin** ☐

Safety Function: 6 – Electrical

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 15)**
    - Student Reference #1 **(JPM P-2 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- Contact the Shift Manager prior to administration of JPM.
- Verify Operations protected areas will not interfere with JPM administration.

Tools or Equipment:

- No actual tools are required (all actions will be simulated).

Safety Items:

- Normal In Plant PPE (Hard Hat, Safety Glasses, Gloves, Hearing Protection).

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-ELEC-125V-START	009	002

In-Plant Location:

- RW-467’

STUDENT JPM BRIEF

In Plant: (Brief only required before first In-Plant JPM for student)

- I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you.
- When you complete the task successfully, the objective for this job performance measure will be satisfied.
- When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).
- NO manipulations will be performed, all actions will be SIMULATED.

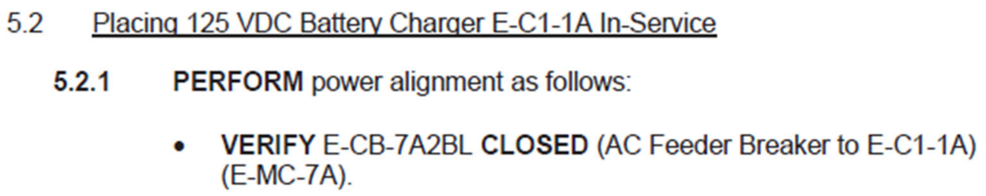
Initial Conditions:

- CGS is at 100% power.
- A fuse failure has occurred on E-C1-1B (Division 1 Battery Charger 1B).
- E-B1-1 (Division 1 125 VDC Battery) remains in service.
- Battery Voltage has remained GT 110 VDC for the duration of the Battery Charger outage.

Initiating Cue:

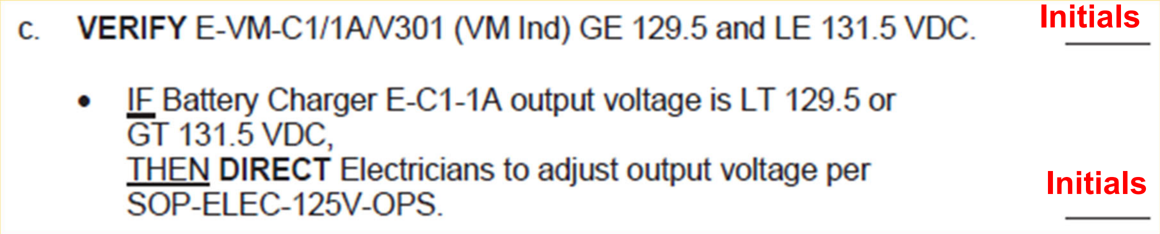
- You have been directed to place Battery Charger E-C1-1A (Division 1 Battery Charger 1A) in service per SOP-ELEC-125V-START Section 5.2.
- After the battery charger is in service, a different operator will perform step 5.2.6 to demonstrate battery Operability.

START TIME:___________

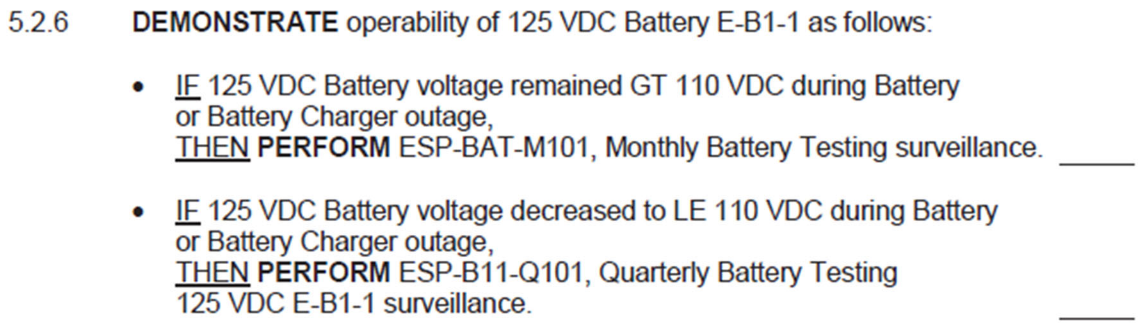
STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Provide candidate with the following:** - **Student JPM Information Sheet** - **Student Reference #1 (marked-up pages of SOP-ELEC-125V-START)**	
Examiner Note: **All Steps below are directly from SOP-ELEC-125V-START exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	
Step 1:  5.2 Placing 125 VDC Battery Charger E-C1-1A In-Service **5.2.1** **PERFORM** power alignment as follows: - **VERIFY** E-CB-7A2BL **CLOSED** (AC Feeder Breaker to E-C1-1A) (E-MC-7A). **Initials** ___	
Examiner Note: **E-CB-7A2BL and E-CB-7A2BR are in the same cubicle behind an access door.**	
Access Door Closed:  	**Access Door Opened:** 
Examiner Cue: **When the candidate identifies the need to open the door: Provide Attachment 1 to the candidate.**	
Standard: - Verifies breaker is in the "ON" position.	___SAT ___UNSAT ___N/A

STEP / STANDARD	SAT / UNSAT
Step 2: NOTE: Temporary power may be aligned during an E-SM-7/E-SL-73 bus outage. SOP-ELEC-TEMPPOWER-DIV1 provides power to charger E-C1-1A by routing temporary power from TLC-1, disconnect 1 to E-CB-7A/2BL. • IF temporary power lined up to Battery Charger E-C1-1A, THEN **VERIFY** Disconnect 1 **CLOSED** (TLC-1). **N/A** Standard: • Per Initial Conditions the plant is at 100% power. Temporary power is not installed. N/A's this step.	____SAT ____UNSAT ____N/A
Step 3: 5.2.2 **VERIFY** E-DISC-DPS11/2A **ON** (Supply from E-PNL-C1/1) (E-DP-S1/1). **Initials**  **After the candidate locates the correct breaker:** **If the breaker is already "ON" (as shown at left):** **EXAMINER CUE: "The breaker is as indicated."** **Otherwise:** **EXAMINER CUE: Indicate (with a pen) that the breaker handle is currently in the "right" position** (As indicated in the picture) Standard: • Verifies breaker is in the "ON" position.	____SAT ____UNSAT ____N/A

STEP / STANDARD	SAT / UNSAT
Step 4: 5.2.3 **PLACE** E-CB-C1/1A to **ON** (DC Input Breaker from E-C1-1A) (E-PNL-C1/1). **Initials** _____  **After the candidate locates the correct breaker:** **If the breaker is already "OFF" (as shown at left):** **EXAMINER CUE: "The breaker is as indicated."** **Otherwise:** **EXAMINER CUE: Indicate (with a pen) that the breaker handle is currently in the "down" position** Standard: - Simulates placing the breaker "up" to the "ON" position.	CRITICAL STEP ___SAT ___UNSAT ___N/A
Step 5: 5.2.4 **PERFORM** the following (Battery Charger E-C1-1A): a. **PLACE** E-CB-C1/1A/1 to **ON** (AC Input Breaker). **Initials** _____  **After the candidate locates the correct breaker:** **If the breaker is already "ON" (as shown at left):** **EXAMINER CUE: Indicate (with a pen) that the breaker handle is currently in the "down" position** **Otherwise:** **EXAMINER CUE: "The breaker is as indicated."** Standard: - Simulates placing the breaker "up" to the "ON" position.	CRITICAL STEP ___SAT ___UNSAT ___N/A
Step 6: b. **VERIFY** AC POWER FAILURE Pilot Light extinguished. **Initials** _____ **EXAMINER CUE**: After the candidate locates the light, indicate (verbally) "Indicating Light is extinguished." Standard: - Verifies pilot light extinguished.	___SAT ___UNSAT ___N/A

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Multiple cues for this step.**	
Examiner Note: **The following Step is ALTERNATE PATH.**	
Alt Path Step 7:  c. **VERIFY** E-VM-C1/1A/V301 (VM Ind) GE 129.5 and LE 131.5 VDC. **Initials** ____ • IF Battery Charger E-C1-1A output voltage is LT 129.5 or GT 131.5 VDC, THEN **DIRECT** Electricians to adjust output voltage per SOP-ELEC-125V-OPS. **Initials** ____ **EXAMINER CUE**: After the candidate locates E-VM-C1/1A/V301, provide **Picture Cue #1** (this shows voltage low at 125 V) Standard: • Checks voltage indicator and notes it is NOT in the required band. • Contacts the control room to direct electricians to adjust the output voltage. **EXAMINER CUE**: If the candidate calls the main control room for electricians to adjust output voltage: "Electricians are in route." **EXAMINER CUE**: **AFTER** the candidate calls for electricians: "For the purpose of time compression, it is 30 minutes later, and the electricians have finished their adjustment." **EXAMINER CUE**: After the candidate (again) locates E-VM-C1/1A/V301, provide **Picture Cue #2** (this shows voltage normal at 130 V) **(Non-critical)**	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**
Step 8: d. **PLACE** E-CB-C1/1A/2 to **ON** (DC Output Breaker). **Initials** ____  **After the candidate locates the correct breaker:** **If the breaker is already "ON" (as shown at left):** **EXAMINER CUE: Indicate (with a pen) that the breaker handle is currently in the "down" position** **Otherwise:** **EXAMINER CUE: "The breaker is as indicated."** Standard: • Simulates placing the breaker "up" to the "ON" position.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Step 9: 5.2.5 **VERIFY** H13-P800.C1-9.2, 125 VDC CHARGER C1-1A/1B TROUBLE alarm clears. **Initials** ____ **EXAMINER CUE**: After the candidate contacts the main control room for the status of annunciator H13-P800.C1 9-2 trouble alarm: "Charger C1-1A/B TROUBLE alarm is clear in the main control room." Standard: • Contacts the main control room to verify that the charger trouble alarm has cleared and initials step following verbal confirmation.	___SAT ___UNSAT ___N/A

STEP / STANDARD	**SAT / UNSAT**
Step 10:  5.2.6 **DEMONSTRATE** operability of 125 VDC Battery E-B1-1 as follows: • IF 125 VDC Battery voltage remained GT 110 VDC during Battery or Battery Charger outage, THEN **PERFORM** ESP-BAT-M101, Monthly Battery Testing surveillance. _____ • IF 125 VDC Battery voltage decreased to LE 110 VDC during Battery or Battery Charger outage, THEN **PERFORM** ESP-B11-Q101, Quarterly Battery Testing 125 VDC E-B1-1 surveillance. _____ Standard: • Recognizes per the initial conditions this step is to be performed by a different operator.	____SAT ____UNSAT ____N/A
Examiner Cue: Inform the candidate that the JPM is Complete.	

STOP TIME: ___________

RESULTS OF JPM ILC-25 JPM P-2

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: **Places charger E-C1-1A in service per SOP-ELEC-125V-START (Section 5.2) with output voltage on E-VM-C1/1A/V301 (VM Ind) GE 129.5 and LE 131.5 VDC.**

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

COMMENTS:

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____

Examiner Signature: ______________________ **Date:** __________

Picture Cue #1

Picture Cue #2

ATTACHMENT 1

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- CGS is at 100% power.
- A fuse failure has occurred on E-C1-1B (Division 1 Battery Charger 1B).
- E-B1-1 (Division 1 125 VDC Battery) remains in service.
- Battery Voltage has remained GT 110 VDC for the duration of the Battery Charger outage.

Initiating Cue:

- You have been directed to place Battery Charger E-C1-1A (Division 1 Battery Charger 1A) in service per SOP-ELEC-125V-START Section 5.2.
- After the battery charger is in service, a different operator will perform step 5.2.6 to demonstrate battery Operability.

Verify Revision Information Prior To Use	Initials	JDL
	Date	Today

Number: SOP-ELEC-125V-START	Use Category: CONTINUOUS	Major Rev: 009 Minor Rev: 002 Page: 1 of 40
Title: 125 VDC System Start		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-ELEC-125V-START	Effective Date: 07/22/21

JDL – Jeffrey Delux

1.0 PURPOSE

Provide instructions for startup of Division 1, Division 2, Division 3, and BOP 125 VDC Distribution Systems.

2.0 REFERENCES

2.1 PER 203-4245, Placing E-C1-2A in EQUALIZE Following Battery Surveillance Resulted in Current and Voltage Fluctuations in Excess of 200 Amps and 15 Volts.

2.2 PER 205-0594, Battery Charger E-C1-2B Failed to Supply Power to Division 2, 125 Volt Bus.

2.3 PER 293-0078, Battery Operability After-Short Term Charger Failure {P-92775}

2.4 IER-L2-12-27 Reactor Scram and Loss of Off-Site Power. {AR-266464}

2.5 AED-CAL-2.05.07 Calculation for Plant Batteries Hydrogen Release

2.6 Technical Specifications 3.8.4, DC Sources - Operating

2.7 Technical Specifications 3.8.5, DC Sources - Shutdown

2.8 ABN-ELEC-125VDC, Plant 125 VDC Distribution System Failure

2.9 ABN-ELEC-125VDC, Plant BOP, Div 1, 2 and 3 125 VDC Distribution System Failures

2.10 EWD-50E-0025

2.11 EWD-50E-0027

2.12 EWD-50E-0029

2.13 EWD-50E-0030

2.14 E505, DC One Line Diagram

2.15 E503, Sh 6, Auxiliary One Line Diagram

2.16 E508, Sh 2

2.17 CVI 51B-00, 8

2.18 CVI 02A62-03, 11

2.19 CVI 02E22-07,54,1,2

2.20 942-00, 10, Schematic 200 AMP Charger 480VAC 3 PHASE 60HZ 125VDC

3.0 PREREQUISITES

3.1 IF performing startup of 125 VDC Div 1,
THEN **VERIFY** the following:

- Applicable portion of SOP-ELEC-DC-LU complete for 125 VDC Div 1 JDL
- Normal or Alternate ventilation is operating for 125 VDC Div 1 Battery Room JDL
- 125 VDC DIV 1 Bus S1-1 Battery Bus ready to energize JDL

3.2 IF performing startup of 125 VDC Div 2,
THEN **VERIFY** the following:

- Applicable portion of SOP-ELEC-DC-LU complete for 125 VDC Div 2 N/A
- Normal or Alternate ventilation is operating for 125 VDC Div 2 Battery Room N/A
- 125 VDC DIV 2 Bus S1-2 Battery Bus ready to energize N/A

3.3 IF performing startup of 125 VDC BOP,
THEN **VERIFY** the following:

- Applicable portion of SOP-ELEC-DC-LU complete for 125 VDC BOP N/A
- HVAC operable and in operation for 125 VDC BOP Battery Room N/A
- 125 VDC BOP Bus S1-7 Battery Bus ready to energize N/A

3.4 IF performing startup of 125 VDC HPCS,
THEN **VERIFY** the following:

- Applicable portion of SOP-ELEC-DC-LU complete for 125 VDC HPCS System N/A
- HVAC operable and in operation for 125 VDC HPCS Battery Room N/A
- 125 VDC HPCS Bus S1 Battery Bus ready to energize N/A

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The applicable Technical Specifications should be reviewed prior to removing safety related battery or battery charger from service.

4.2 A demonstration of HPCS Battery operability is required following any charger failure or shutdown (TS 3.8.4).

4.3 HPCS Battery Charger (HPCS-C1-1) will not function properly without a battery or load attached to its output. Without a battery or load bank, the charger will not provide rated output current.

4.4 Lethal voltages are present in this system on exposed terminals; take appropriate Safety Precautions in accordance with ISPM 20.

5.2 Placing 125 VDC Battery Charger E-C1-1A In-Service

5.2.1 **PERFORM** power alignment as follows:

- **VERIFY** E-CB-7A2BL **CLOSED** (AC Feeder Breaker to E-C1-1A) (E-MC-7A). _____

NOTE: Temporary power may be aligned during an E-SM-7/E-SL-73 bus outage. SOP-ELEC-TEMPPOWER-DIV1 provides power to charger E-C1-1A by routing temporary power from TLC-1, disconnect 1 to E-CB-7A/2BL.

- IF temporary power lined up to Battery Charger E-C1-1A,
  THEN **VERIFY** Disconnect 1 **CLOSED** (TLC-1). _____

5.2.2 **VERIFY** E-DISC-DPS11/2A **ON** (Supply from E-PNL-C1/1) (E-DP-S1/1). _____

5.2.3 **PLACE** E-CB-C1/1A to **ON** (DC Input Breaker from E-C1-1A) (E-PNL-C1/1). _____

5.2.4 **PERFORM** the following (Battery Charger E-C1-1A):

a. **PLACE** E-CB-C1/1A/1 to **ON** (AC Input Breaker). _____

b. **VERIFY** AC POWER FAILURE Pilot Light extinguished. _____

c. **VERIFY** E-VM-C1/1A/V301 (VM Ind) GE 129.5 and LE 131.5 VDC. _____

- IF Battery Charger E-C1-1A output voltage is LT 129.5 or GT 131.5 VDC,
  THEN **DIRECT** Electricians to adjust output voltage per SOP-ELEC-125V-OPS. _____

d. **PLACE** E-CB-C1/1A/2 to **ON** (DC Output Breaker). _____

5.2.5 **VERIFY** H13-P800.C1-9.2, 125 VDC CHARGER C1-1A/1B TROUBLE alarm clears. _____

5.2.6 **DEMONSTRATE** operability of 125 VDC Battery E-B1-1 as follows:

- IF 125 VDC Battery voltage remained GT 110 VDC during Battery or Battery Charger outage,
  THEN **PERFORM** ESP-BAT-M101, Monthly Battery Testing surveillance. _____
- IF 125 VDC Battery voltage decreased to LE 110 VDC during Battery or Battery Charger outage,
  THEN **PERFORM** ESP-B11-Q101, Quarterly Battery Testing 125 VDC E-B1-1 surveillance. _____

5.2.7 IF Battery Charger E-C1-1A is required to be operable,
THEN **ENTER** Battery Charger E-C1-1A operable in electronic logging system.

______
CRS

5.2.8 IF Battery Charger E-C1-1A is required to be operable,
THEN **ENTER** Battery Charger E-C1-1A available in electronic logging system.

______
CRS

5.2.9 **INDPENDENTLY VERIFY** the following breakers to **ON**:

- E-CB-C1/1A (DC Input Breaker from E-C1-1A) ______
- E-CB-C1/1A/1 (AC Input Breaker) ______
- E-CB-C1/1A/2 (DC Output Breaker). ______

ENERGY NORTHWEST

ILC-25 P-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM P-3

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ________ Rev. No. ________
SIMULATOR GUIDE PQD CODE ________ Rev. No. ________
JPM PQD CODE ________ Rev. No. ________
EXAM PQD CODE ________ Rev. No. ________

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Jeff Lux / Dave Crawford DATE 12/03/22

REVISED BY ________ DATE ________

TECHNICAL REVIEW BY ________ DATE ________

INSTRUCTIONAL REVIEW BY ________ DATE ________

APPROVED BY ________ DATE ________
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Remote Shutdown Panel Activation has been completed within 10 minutes of Shift Manager directing a reactor scram. (Starting from just outside of the Main Control Room exit door)**

Alternate Path: ☐ **Time Critical (TC):** ☑ **TC Time:** 10 Minutes

OI-69 (Time Critical Operator Actions): TC03 & TC04

Validation Time: 9 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-1057 Perform all actions for a Control Room evacuation.

K/A Importance Factors: **RO:** 4.2 **SRO:** 4.3

K/A Number: 295016 AA1.07

K/A Statement: Ability to operate and/or monitor the following as they apply to Control Room Abandonment: Control room/local control transfer mechanisms

Evaluation Type: **In-Plant** ☑ **Simulator** ☐

Control Room ☐ **Admin** ☐

Safety Function: 7 – Instrumentation

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.

- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):

    - Student JPM Information Sheet **(Page 10)**
    - Student JPM Initiating Cue Sheet **(Page 11)**
    - Student Reference #1 **(JPM P-3 ILC-25 Ref 1.PDF)**

- How to initiate a Time Critical JPM:

    1) Hand the student the Student JPM Information Sheet.
    2) Read the Initial Conditions (ONLY) to the student.
    3) Ensure the student understands the Initial Conditions and answer any questions.
    4) Hand the student the Student JPM Initiating Cue Sheet. Read the initiating cue.
    5) Immediately after reading the cue, make the statement:
        "This is a time critical JPM, and your time starts now."
    6) Immediately record the start time once you complete reading the cue.

Special Setup Instructions:

- Contact the Shift Manager prior to administration of JPM.
- Verify Operations protected areas will not interfere with JPM administration.
- JPM Begins just outside of the exit door from the Main Control Room.

Tools or Equipment:

- No actual tools are required (all actions will be simulated).

Safety Items:

- Normal In Plant PPE (Hard Hat, Safety Glasses, Gloves, Hearing Protection).

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
ABN-CR-EVAC	046	N/A

In-Plant Location:

- RW-467' (The JPM BEGINS just outside of the exit from the Main Control Room)

STUDENT JPM BRIEF

In Plant: (Brief only required before first In-Plant JPM for student)

- I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you.
- When you complete the task successfully, the objective for this job performance measure will be satisfied.
- When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).
- NO manipulations will be performed, all actions will be SIMULATED.

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.

STOP HERE AND ASK IF ANY QUESTIONS BEFORE PROCEEDING.

AFTER QUESTIONS, HAND INITIATING CUE SHEET TO THE CANDIDATE, READ THE CUE, PROVIDE REFERENCE, AND THEN RECORD START TIME.

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.**

(Provide candidate with a copy of ABN-CR-EVAC attachment 7.2)

START TIME:___________

Examiner Note:

Provide candidate with the following:

- **Student JPM <u>Information</u> Sheet**

After reading the Initial Conditions and clarifying any questions then provide the following:

- **Student JPM <u>Initiating</u> Cue Sheet**

Read the Initiating Cue then provide:

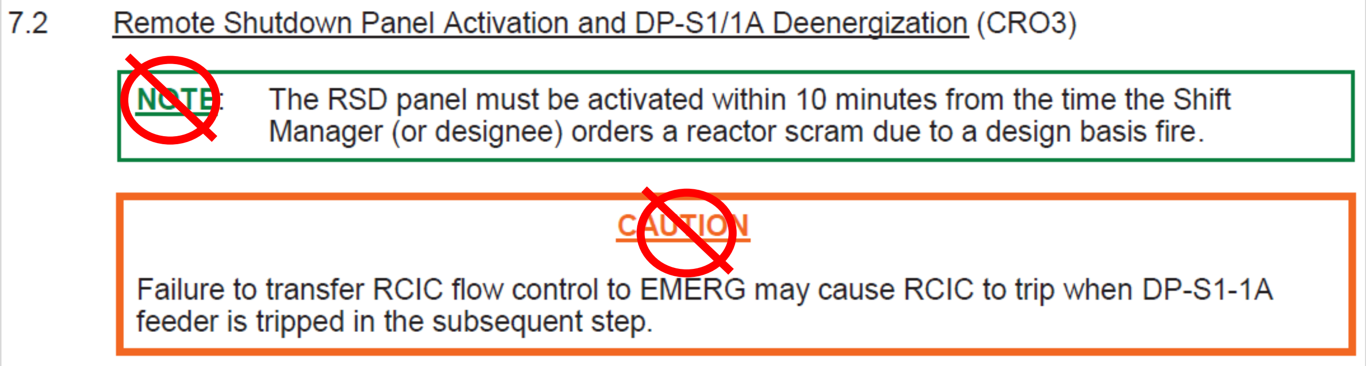
- **Student Reference #1 (ABN-CR-EVAC [Att. 7.2])**
- **Record START TIME (top of page)**

Examiner Note: All Steps below are directly from ABN-CR-EVAC (Attachment 2) exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.

All Switches will be found in the "Normal" position

If the candidate requests current switch position prior to making a switch manipulation:

Examiner Cue: "A indicated."

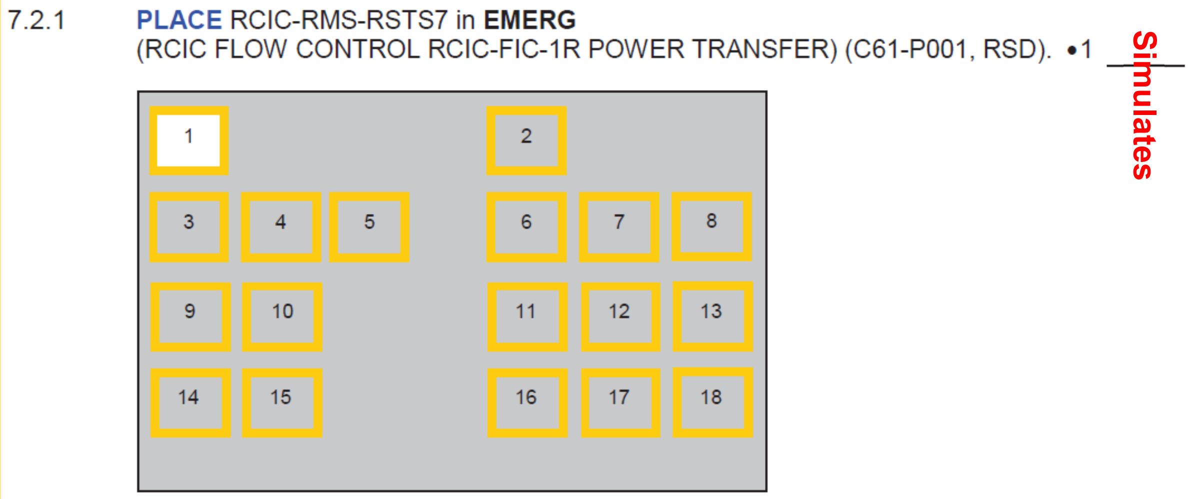
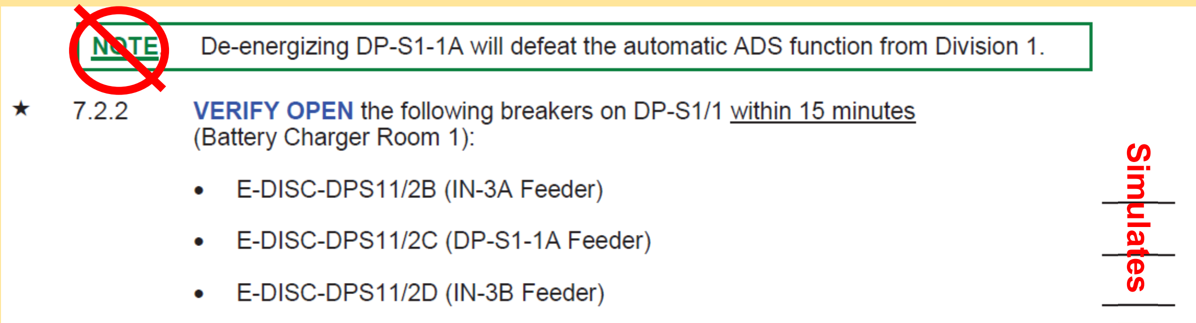


7.2 Remote Shutdown Panel Activation and DP-S1/1A Deenergization (CRO3)

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.

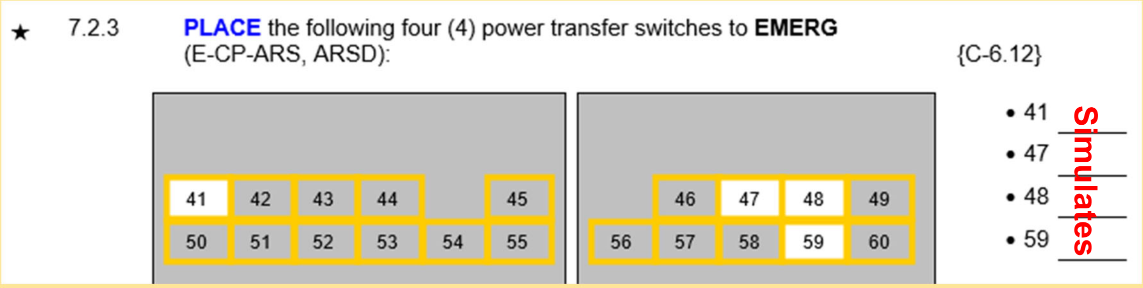
CAUTION

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

STEP / STANDARD	SAT / UNSAT
Step 1:  7.2.1 **PLACE** RCIC-RMS-RSTS7 in **EMERG** (RCIC FLOW CONTROL RCIC-FIC-1R POWER TRANSFER) (C61-P001, RSD). •1 ____ Simulates Standard: • On **RSD** Panel, simulates placing listed power transfer switch to **EMERG**.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Note: Each breaker below will be found in the "ON" position.	
Step 2:  ~~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) ____ Simulates Standard: 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)	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	SAT / UNSAT
Examiner Note: Each switch below will be found with the arrow pointing to "NORMAL".	

Step 3:



★ 7.2.3 **PLACE** the following four (4) power transfer switches to **EMERG** (E-CP-ARS, ARSD): {C-6.12}

- 41 ___
- 47 ___
- 48 ___
- 59 ___

Simulates

Standard:

- On **ARSD** Panel, simulates placing listed power transfer switches to **EMERG**.

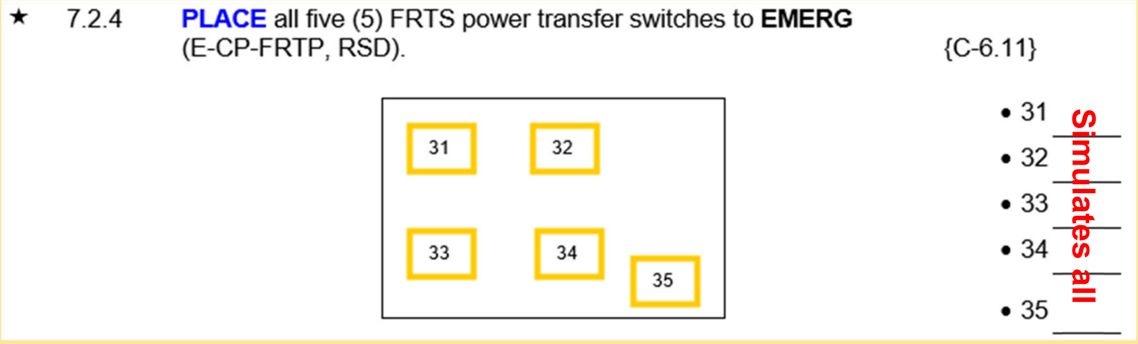
CRITICAL STEP

___SAT

___UNSAT

___N/A

Step 4:



★ 7.2.4 **PLACE** all five (5) FRTS power transfer switches to **EMERG** (E-CP-FRTP, RSD). {C-6.11}

- 31 ___
- 32 ___
- 33 ___
- 34 ___
- 35 ___

Simulates all

Standard:

- On **RSD** Panel, simulates placing listed power transfer switches to **EMERG**.

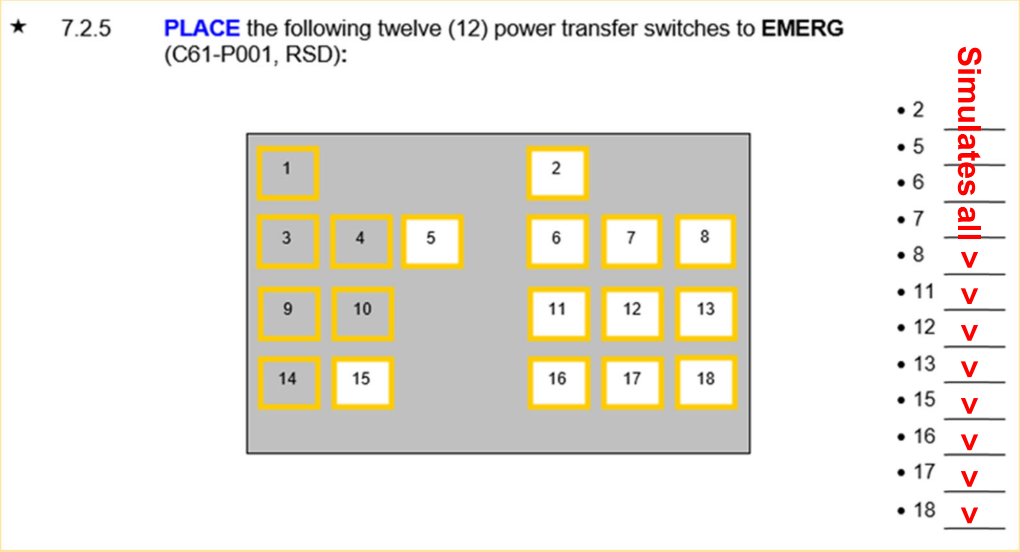
CRITICAL STEP

___SAT

___UNSAT

___N/A

Step 5:



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

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

Simulates all

Standard:

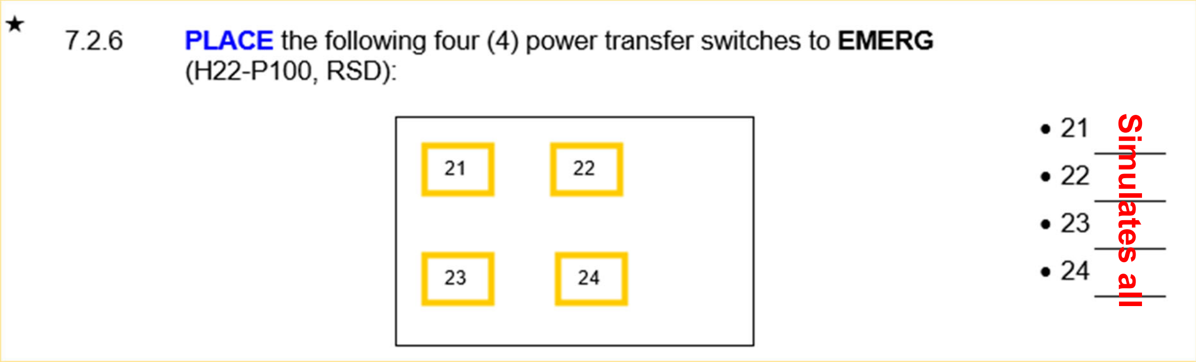
- On **RSD** Panel, simulates placing listed power transfer switches to **EMERG**.

CRITICAL STEP

___SAT

___UNSAT

___N/A

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: Each switch below will be found with the arrow pointing to "NORMAL".	
Step 6:  ★ 7.2.6 **PLACE** the following four (4) power transfer switches to **EMERG** (H22-P100, RSD): 21 22 23 24 • 21 ___ • 22 ___ • 23 ___ • 24 ___ Simulates all Standard: • On **RSD** Panel, simulates placing listed power transfer switches to **EMERG**.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 7: 7.2.7 **NOTIFY** the CRS that Attachment 7.2 is complete. **Initials** _____ Standard: Informs CRS attachment 7.2 is complete.	___SAT ___UNSAT ___N/A
Examiner Cue: Inform the candidate that the JPM is Complete.	

STOP TIME: ___________

RESULTS OF JPM

ILC-25 JPM P-3

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: **Remote Shutdown Panel Activation has been completed within 10 minutes of Shift Manager directing a reactor scram. (Starting from just outside of the Main Control Room exit door)**

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

COMMENTS:

____

Examiner Signature: ______________________________ **Date:** ______________

STUDENT JPM INFORMATION SHEET

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.

STUDENT JPM INITIATING CUE SHEET

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.**

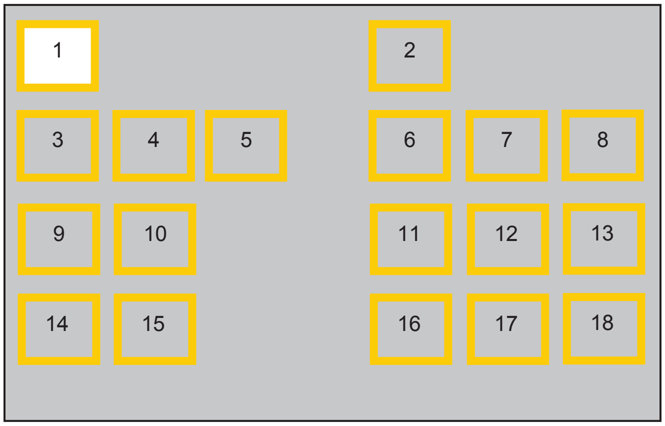
7.2 <u>Remote Shutdown Panel Activation and DP-S1/1A Deenergization</u> (CRO3)

<u>NOTE</u>: 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.

<u>CAUTION</u>

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 ______

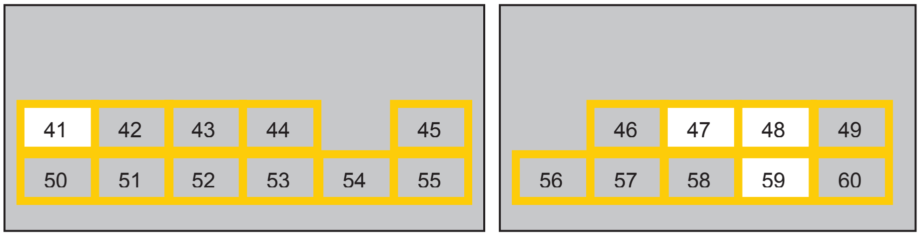


<u>NOTE</u>: De-energizing DP-S1-1A will defeat the automatic ADS function from Division 1.

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

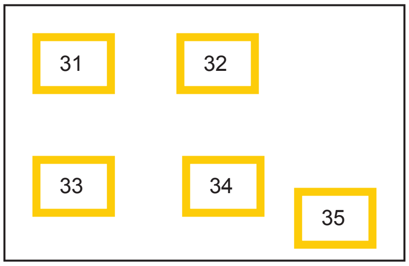
- E-DISC-DPS11/2B (IN-3A Feeder) ______
- E-DISC-DPS11/2C (DP-S1-1A Feeder) ______
- E-DISC-DPS11/2D (IN-3B Feeder) ______

★ 7.2.3 **PLACE** the following four (4) power transfer switches to **EMERG**
(E-CP-ARS, ARSD): {6.12}



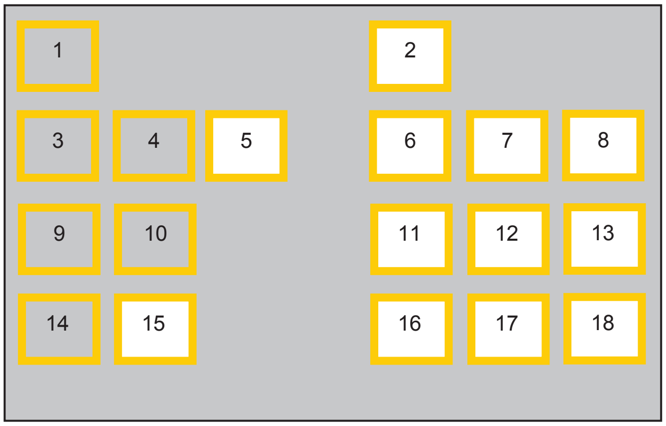
- 41 ______
- 47 ______
- 48 ______
- 59 ______

★ 7.2.4 **PLACE** all five (5) FRTS power transfer switches to **EMERG** (E-CP-FRTP, RSD). {6.11}



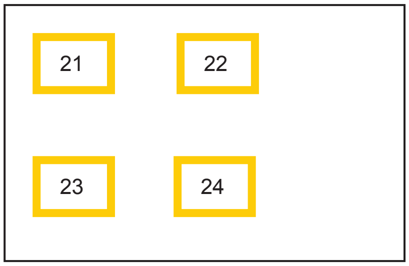
- 31 ____
- 32 ____
- 33 ____
- 34 ____
- 35 ____

★ 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

ILC-25 S-1

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-1

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______
SIMULATOR GUIDE PQD CODE ______ Rev. No. ______
JPM PQD CODE ______ Rev. No. ______
EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/03/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Starts SLC System A and SLC System B. Records initial tank level (4800 to 5000 gal) and flowrate (50 to 54 gpm). Recognizes RWCU-V-4 did not close automatically and closes valve manually. Reports SLC is partially injecting.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0245: Inject SLC into reactor vessel.

K/A Importance Factors: **RO:** 4.4 **SRO:** 4.1

K/A Number: 211000 A2.09

K/A Statement: Ability to (a) predict the impacts of the following on the Standby Liquid Control System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Automatic or manual initiation failure

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 1 – Reactivity Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 9)**
    - Student Reference #1 **(JPM S-1 ILC-25 Ref 1.PDF)**
    - Student Reference #2 **(JPM S-1 ILC-25 Ref 2.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (next page).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 5.5.25	007	N/A
SOP-SLC-INJECTION-QC	004	2

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-193**. IC places the plant in a post-scram condition: • RFW pumps are tripped. • HPCS and RCIC are unavailable. • Reactor pressure is too high for CBP injection. • Reactor water level is outside the +13” to +54” band. • LPCS-P-1 will not auto-start. • LPCS-V-5 will not auto-open. • RWCU-V-4 will not auto-close. • SLC-P-1A will have reduced flow (69%). Load Schedule File: **No Schedule File is needed.** Acknowledge all annunciators on front panels. Turn off all annunciators for panels that will not be monitored by the candidate(s) during the performance of this JPM. **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner (RPV level and pressure will continue to degrade as soon as the simulator is taken to RUN).**

STUDENT JPM BRIEF

In Simulator: (Brief only required before first simulator JPM for student)

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

For this JPM all actions and monitoring will be performed from the Control Room FRONT panels. NO back panel actions, or monitoring will be required.

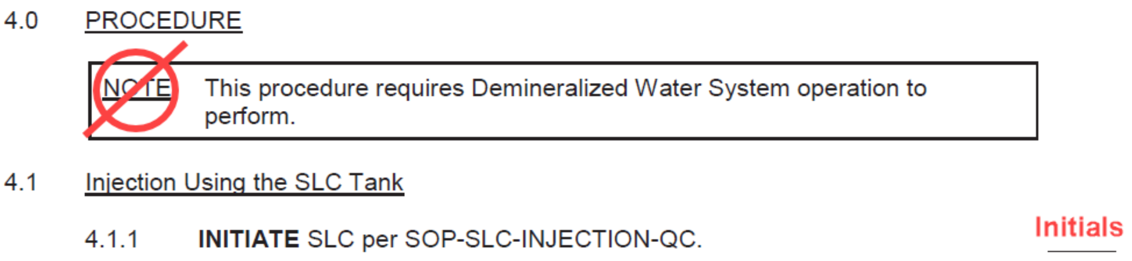
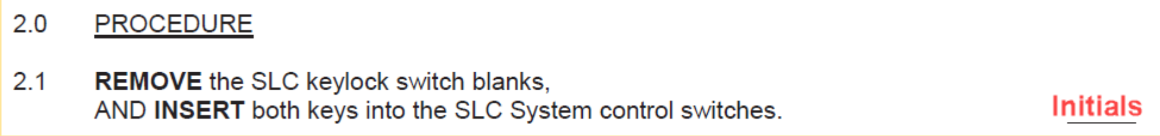
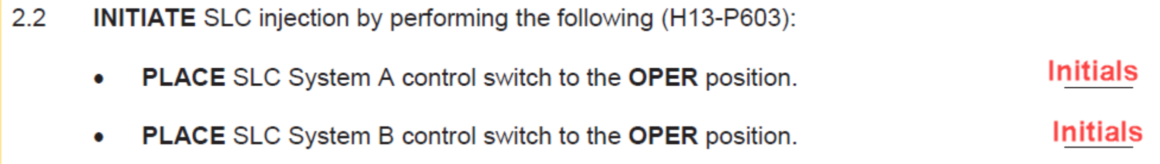
Initial Conditions:

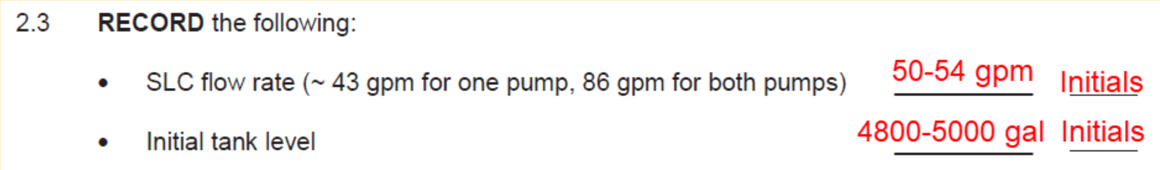
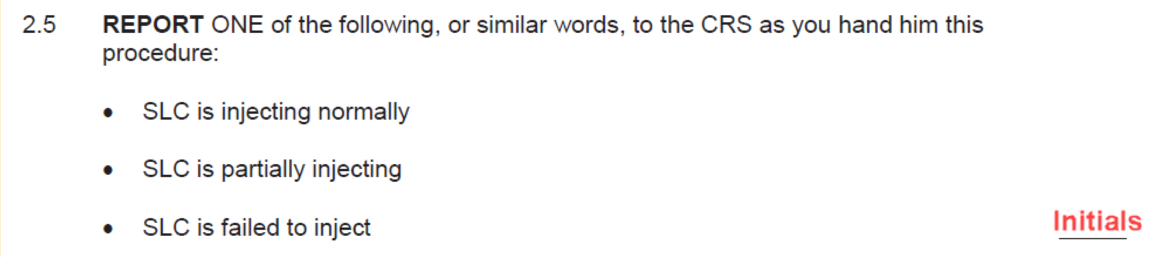
- Loss of both feed pumps caused a reactor scram.
- HPCS-P-1 tripped due to overcurrent.
- RCIC-V-1 has failed in the closed position.
- PPM 5.1.1 (RPV Control) has been entered.

Initiating Cue:

- Per the Level Leg of PPM 5.1.1 (RPV Control), the CRS has directed you to restore RPV level using the SLC boron tank per PPM 5.5.25 due to loss of all other high-pressure injection sources.
- Inform the CRS when all actions for SLC initiation have been completed.

START TIME:___________

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Provide candidate with the following:** • **Student JPM Information Sheet** • **Student Reference #1 (PPM 5.5.25)**	
Examiner Note: **All Steps below are directly from PPM 5.5.25 exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	
Step 1:  4.0 PROCEDURE ~~NOTE~~ This procedure requires Demineralized Water System operation to perform. 4.1 Injection Using the SLC Tank 4.1.1 **INITIATE** SLC per SOP-SLC-INJECTION-QC. Initials ____ Standard: • Recognizes SOP-SLC-INJECTION-QC procedural guidance is needed and requests a copy.	___SAT ___UNSAT ___N/A
Examiner Note: **When requested, provide candidate with Student Reference #2 (SOP-SLC-INJECTION-QC).**	
Examiner Note: **All Steps below are directly from SOP-SLC-INJECTION-QC exactly as written.**	
Step 2:  2.0 PROCEDURE 2.1 **REMOVE** the SLC keylock switch blanks, AND **INSERT** both keys into the SLC System control switches. Initials ____ Standard: • Removes the SLC keylock switch blanks and inserts both keys into the SLC System control switches.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Step 3:  2.2 **INITIATE** SLC injection by performing the following (H13-P603): • **PLACE** SLC System A control switch to the **OPER** position. Initials ____ • **PLACE** SLC System B control switch to the **OPER** position. Initials ____ Standard: • Places both switches to the **OPER** position.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A

STEP / STANDARD	**SAT / UNSAT**
Step 4:  2.3 **RECORD** the following: • SLC flow rate (~ 43 gpm for one pump, 86 gpm for both pumps) 50-54 gpm Initials • Initial tank level 4800-5000 gal Initials Standard: • Recognizes both SLC pumps are operating but at reduced flow. • Records 50 - 54 gpm. • Records initial SLC tank level of 4800 - 5000 gallons.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Note: **DO NOT ALLOW PLANT ANNOUNCEMENTS TO BE MADE**	
If candidate contacts field operator to investigate SLC: **Examiner Cue: "Investigate SLC for reduced flow."**	
Step 5:  2.4 **VERIFY** RWCU-V-4 **CLOSED**. Initials Standard: • Recognizes RWCU-V-4 failed to automatically close. • Closes RWCU-V-4 by placing control switch to **CLOSE**.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 6:  2.5 **REPORT** ONE of the following, or similar words, to the CRS as you hand him this procedure: • SLC is injecting normally • SLC is partially injecting • SLC is failed to inject Initials Standard: Informs the CRS: • SLC is **partially injecting**. • **(Non Critical)** RWCU-V-4 failed to auto-close and had to be manually closed.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: Inform the candidate that the JPM is complete.	

STOP TIME: ____________

ILC-25 JPM S-1

RESULTS OF JPM

Examinee (Print): ______________________________

Examiner (Print): ______________________________

Task Standard: **Starts SLC System A and SLC System B. Records initial tank level (4800 to 5000 gal) and flowrate (50 to 54 gpm). Recognizes RWCU-V-4 did not close automatically and closes valve manually. Reports SLC is partially injecting.**

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

COMMENTS:

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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Loss of both feed pumps caused a reactor scram.
- HPCS-P-1 tripped due to overcurrent.
- RCIC-V-1 has failed in the closed position.
- PPM 5.1.1 (RPV Control) has been entered.

- Per the Level Leg of PPM 5.1.1 (RPV Control), the CRS has directed you to restore RPV level using the SLC boron tank per PPM 5.5.25 due to loss of all other high-pressure injection sources.
- Inform the CRS when all actions for SLC initiation have been completed.

Verify Revision Information Prior To Use	Initials	
	Date	

Number: 5.5.25	Use Category: CONTINUOUS	Major Rev: 007 Minor Rev: N/A Page: 1 of 5
Title: Alternate Injection Using The SLC System		

PLANT PROCEDURES MANUAL	PCN#: N/A
5.5.25	Effective Date: 01/07/21

DESCRIPTION OF CHANGES

Justification (required)
See below

Page(s)	**Description (including summary, reason, initiating document, if applicable)**
4	Added new note and step to refill SLC tank using FP if demin water is not available (AR-401004)

1.0 PURPOSE

Provide the direction to use the SLC Tank or the SLC Test Tank as an alternate RPV injection source during emergencies.

2.0 REQUIRED EQUIPMENT

Demineralized Water System available

3.0 PRECAUTIONS AND LIMITATIONS

Use caution when filling the SLC Tank or the SLC Test Tank with demin water so that the tanks are not overflowed.

4.0 PROCEDURE

NOTE: This procedure requires Demineralized Water System operation to perform.

4.1 Injection Using the SLC Tank

4.1.1 **INITIATE** SLC per SOP-SLC-INJECTION-QC. _____

4.1.2 **UNLOCK** and **OPEN** SLC-V-10 (DW Addition To SLC Storage Tank) as necessary to maintain level between the SLC Tank High/Low alarm setpoints (4,864 to 5,046 gallons). _____

4.1.3 WHEN injection is no longer required,
THEN **CLOSE** and **LOCK** SLC-V-10. _____

4.1.4 **STOP** the SLC Pumps per SOP-SLC-INJECTION. _____

4.2 Injection Using The SLC Test Tank

4.2.1 **VERIFY** SLC-V-1A and SLC-V-1B are **CLOSED**. _____

4.2.2 **OPEN** the following disconnects for SLC-V-1A and SLC-V-1B:

- SLC-42-7B7D (SLC-V-1A) _____
- SLC-42-8B9A (SLC-V-1B) _____

4.2.3 **UNLOCK** and **OPEN** SLC-V-31 (SLC Test Tank Outlet). _____

4.2.4 **UNLOCK** and **OPEN** SLC-V-14 (DW Addition to SLC Pump Suction) to fill the SLC Test Tank to the top of the sight glass. _____

4.2.5 **START** SLC-P-1A(B) by placing the SLC System A(B) keylock control switch(es) to the **OPER** position. ______

4.2.6 **MONITOR** SLC Test Tank level. ______

> NOTE: Loss of power to E-TRS-S, E-MC-1C or E-MC-5BA will render demineralized water makeup to SLC unavailable.

4.2.7 IF needed to ensure adequate core cooling,
AND demineralized water is UNAVAILABLE,
THEN **RE-FILL** the SLC Test Tank using Fire Protection (FP) water from adjacent hose stations as necessary. ______

4.2.8 WHEN SLC Test Tank level approaches the bottom of the sight glass
THEN **PERFORM** the following as necessary to control injection flowrate and SLC Test Tank level:

a. **STOP** SLC-P-1A(B) by placing the SLC System A(B) keylock control switch(es) in the **OFF** position. ______

b. **ALLOW** the SLC Test Tank to refill to the top of the sightglass. ______

c. IF required for additional injection,
THEN **RESTART** SLC-P-1A(B) by placing the SLC System A(B) keylock control switch(es) in the **OPER** position. ______

4.2.9 WHEN injection is no longer required,
THEN **PERFORM** the following:

a. **PLACE** the SLC System A(B) keylock control switch(es) in the **OFF** position. ______

b. **CLOSE** and **LOCK** SLC-V-14 (DW Addition to SLC Pump Suction). ______

c. **CLOSE** and **LOCK** SLC-V-31 (SLC Test Tank Outlet). ______

d. **CLOSE** the following disconnects for SLC-V-1A and SLC-V-1B:

- SLC-42-7B7D (SLC-V-1A) ______
- SLC-42-8B9A (SLC-V-1B) ______

5.0 REFERENCES

5.1 M522

5.2 SOP-SLC-INJECTION, SLC RPV Injection

5.3 SOP-SLC-INJECTION-QC, SLC RPV Injection – Quick Card

5.4 PPM 5.1.1, RPV Control

5.5 PPM 5.1.4, RPV Flooding

6.0 ATTACHMENTS

None

2.0 PROCEDURE

2.1 **REMOVE** the SLC keylock switch blanks,
AND **INSERT** both keys into the SLC System control switches. _____

2.2 **INITIATE** SLC injection by performing the following (H13-P603):

- **PLACE** SLC System A control switch to the **OPER** position. _____
- **PLACE** SLC System B control switch to the **OPER** position. _____

2.3 **RECORD** the following:

- SLC flow rate (~ 43 gpm for one pump, 86 gpm for both pumps) ___________ _____
- Initial tank level ___________ _____

2.4 **VERIFY** RWCU-V-4 **CLOSED**. _____

2.5 **REPORT** ONE of the following, or similar words, to the CRS as you hand him this procedure:

- SLC is injecting normally
- SLC is partially injecting
- SLC is failed to inject _____

ENERGY NORTHWEST

ILC-25 S-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-2

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______

SIMULATOR GUIDE PQD CODE ______ Rev. No. ______

JPM PQD CODE ______ Rev. No. ______

EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Manually starts LPCS-P-1 upon failure to automatically start. Manually bypasses low-pressure permissive logic by placing LPCS-RMS-S20 in TEST. Manually throttles open LPCS-V-5 to raise RPV water level.**

Alternate Path: ☑ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0234: Manually initiate low pressure core spray (LPCS) for RPV injection.

K/A Importance Factors: **RO:** 4.2 **SRO:** 4.2

K/A Number: 209001 A4.05

K/A Statement: Ability to manually operate and/or monitor in the control room: Manual initiation controls

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 2 – Reactor Water Inventory Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - ○ Student JPM Information Sheet **(Page 9)**
  - ○ Student Reference #1 **(JPM S-2 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (next page).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-LPCS-INJECTION-QC	002	N/A

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-192**. IC places the plant in a post scram condition: • RFPs, CBPs, and CPs have been stopped due to flooding. • HPCS and RCIC are unavailable. • Reactor water level is outside the -50” to +54” band. • SM-8 is locked out. • Loss of control power for RHR-P-2A. • ECCS injection valves are throttleable. • LPCS-P-1 will not auto-start. • LPCS-V-5 will not auto-open. • LPCS-V-5 will not throttle open until LPCS-RMS-S20 placed in TEST. Load Schedule File: **No Schedule File is needed.** Acknowledge all annunciators on front panels. Turn off all annunciators for panels that will not be monitored by the candidate(s) during the performance of this JPM. **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner (RPV level and pressure will continue to degrade as soon as the simulator is taken to RUN).**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

Initial Conditions:

- A manual reactor scram has been performed due to uncontrolled flooding from the Condensate system.
- All Reactor Feed Pumps, Condensate Booster Pumps, and Condensate Pumps have been secured.
- HPCS-P-1 tripped due to overcurrent.
- RCIC-V-1 has failed in the closed position.
- SM-8 has locked out due to an overcurrent ground.
- RHR “A” is unavailable due to loss of control power for RHR-P-2A.
- ED has been performed on low reactor water level.
- PPM 5.5.1 (Overriding ECCS Valve Logic to allow Throttling RPV Injection) has been completed.

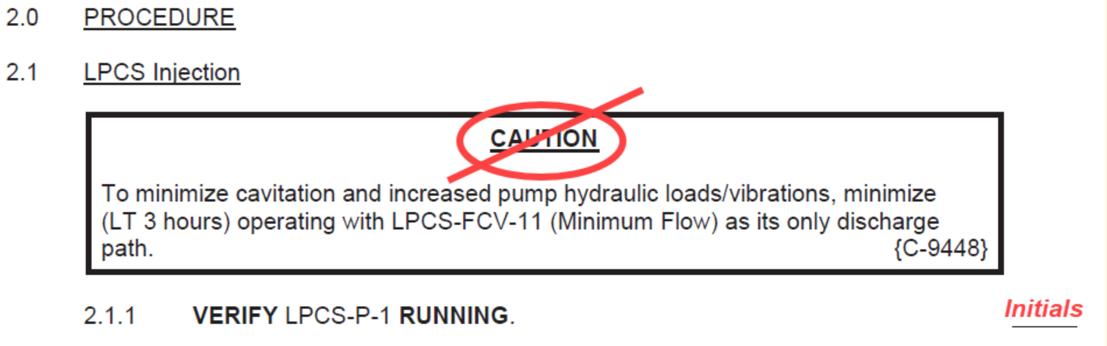
Initiating Cue:

- Per the Level Leg of PPM 5.1.1 (RPV Control), the CRS has directed you to restore RPV water level to -50” to +54” using LPCS per SOP-LPCS-INJECTION-QC.

START TIME:___________

STEP / STANDARD		**SAT / UNSAT**
Examiner Note:	**Provide candidate with the following:** - **Student JPM Information Sheet** - **Student Reference #1 (SOP-LPCS-INJECTION-QC)**	
Examiner Note:	**All Steps below are directly from SOP-LPCS-INJECTION-QC exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	
Examiner Note:	**Under existing plant conditions, LPCS-P-1 should have previously started automatically but failed to do so. Manual action is required.**	

Step 1:



2.0 PROCEDURE

2.1 LPCS Injection

CAUTION

To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with LPCS-FCV-11 (Minimum Flow) as its only discharge path. {C-9448}

2.1.1 **VERIFY** LPCS-P-1 **RUNNING**. *Initials* ____

Standard:

Recognizes LPCS-P-1 is not running. May "Arm and Depress" which will be unsuccessful. **Places control switch in START.** Verifies: **(Non-critical below)**

- LPCS-P-1 starts (Red light ON, Green light OFF)
- LPCS-FCV-11 opens (Red light ON, Green light OFF)
- SW-SYS-A running (Red light ON, Green light OFF for SW-P-1A, SW-V-2A, and SW-V-12A)
- LPCS-P-1 current peaks and then stabilizes at lower value.
- SW flow between 6900 and 7600 gpm.

CRITICAL STEP

____SAT

____UNSAT

____N/A

If candidate contacts CRS to report manual start of LPCS-P-1:

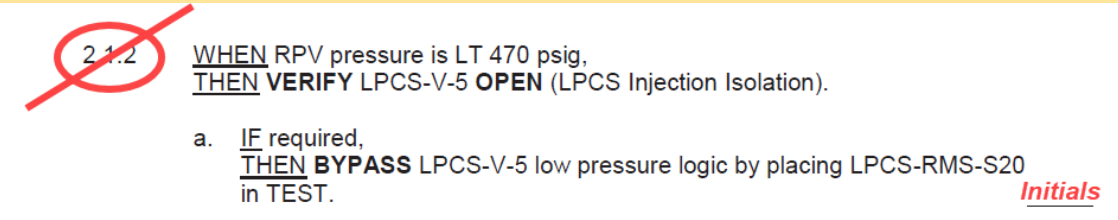
Examiner Cue: Acknowledge "LPCS-P-1 has been manually started."

Examiner Note: **The following Step is ALTERNATE PATH.**

Examiner Note: **Under existing plant conditions, LPCS-V-5 should have previously opened automatically but failed to do so. Manual action is required.**

STEP / STANDARD	**SAT / UNSAT**

Alt Path Step 2:



2.1.2 WHEN RPV pressure is LT 470 psig,
THEN **VERIFY** LPCS-V-5 **OPEN** (LPCS Injection Isolation).

a. IF required,
THEN **BYPASS** LPCS-V-5 low pressure logic by placing LPCS-RMS-S20 in TEST.
Initials

Standard:

- **(Non critical)** Places LPCS-V-5 control switch in OPEN (will **NOT** open).
- **(Non critical)** Recognizes annunciator P601.A3 3-3 (LPCS INJECTION VLV OPEN PERMISSIVE) is NOT in alarm
- Bypasses the low pressure permissive logic:
    - Retrieves **Key 103** from MCR key box.
    - Places **LPCS-RMS-S20** in **TEST**.

CRITICAL STEP

___SAT

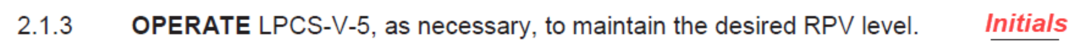
___UNSAT

___N/A

The candidate should refer to the label plate for switch LPCS-RMS-S20 to get the key number.

Examiner Cue: If candidate requests Key # or Key Log, state "You have all the information you need."

Step 3:



2.1.3 **OPERATE** LPCS-V-5, as necessary, to maintain the desired RPV level. *Initials*

Standard:

Throttles LPCS-V-5 open to raise RPV water level:

- Places control switch for **LPCS-V-5** to **OPEN**.
- **(Non-critical)** Verifies Red light ON, Green light ON. (If LPCS-V-5 is fully opened then indications will change to Red light ON, Green light OFF)
- Verifies RPV level is **RISING**.
- **(Non-critical)** Verifies LPCS-P-1 Current and Flow increase.

CRITICAL STEP

___SAT

___UNSAT

___N/A

Examiner Note: **It is not necessary for candidate to return RPV level -50" to +54". The candidate must demonstrate ability to increase level with LPCS.**

Examiner Cue: **Inform the candidate that the JPM is complete.**

STOP TIME: ____________

ILC-25 JPM S-2

RESULTS OF JPM

Examinee (Print): ____________________

Examiner (Print): ____________________

Task Standard: **Manually starts LPCS-P-1 upon failure to automatically start. Manually bypasses low-pressure permissive logic by placing LPCS-RMS-S20 in TEST. Manually throttles open LPCS-V-5 to raise RPV water level.**

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

COMMENTS:

Examiner Signature: ____________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- A manual reactor scram has been performed due to uncontrolled flooding from the Condensate system.
- All Reactor Feed Pumps, Condensate Booster Pumps, and Condensate Pumps have been secured.
- HPCS-P-1 tripped due to overcurrent.
- RCIC-V-1 has failed in the closed position.
- SM-8 has locked out due to an overcurrent ground.
- RHR "A" is unavailable due to loss of control power for RHR-P-2A.
- ED has been performed on low reactor water level.
- PPM 5.5.1 (Overriding ECCS Valve Logic to allow Throttling RPV Injection) has been completed.

Initiating Cue:

- Per the Level Leg of PPM 5.1.1 (RPV Control), the CRS has directed you to restore RPV water level to -50" to +54" using LPCS per SOP-LPCS-INJECTION-QC.

2.0 PROCEDURE

2.1 LPCS Injection

> **CAUTION**
>
> To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with LPCS-FCV-11 (Minimum Flow) as its only discharge path. {C-9448}

2.1.1 **VERIFY** LPCS-P-1 **RUNNING**. _____

2.1.2 WHEN RPV pressure is LT 470 psig,
THEN **VERIFY** LPCS-V-5 **OPEN** (LPCS Injection Isolation).

a. IF required,
THEN **BYPASS** LPCS-V-5 low pressure logic by placing LPCS-RMS-S20 in TEST. _____

2.1.3 **OPERATE** LPCS-V-5, as necessary, to maintain the desired RPV level. _____

ENERGY NORTHWEST

ILC-25 S-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-3

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______

SIMULATOR GUIDE PQD CODE ______ Rev. No. ______

JPM PQD CODE ______ Rev. No. ______

EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Obtains valid CTP using PPC Option L4. Adjusts APRM-4 gain until Projected Flux % is within 1.5% of recorded CTP with new value ACCEPTED per TSP-APRM-C301 (Attachment 7.3).**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-1292: Adjust gains on the APRMs

K/A Importance Factors: **RO:** 3.7 **SRO:** 3.7

K/A Number: 215005 A1.07

K/A Statement: Ability to predict and/or monitor changes in parameters associated with operation of the Average Power Range Monitor/Local Power Range Monitor System, including: APRM (gain adjustment factor)

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 7 – Instrumentation

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.

- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):

    - Student JPM Information Sheet **(Page 15)**
    - Student Reference #1 **(JPM S-3 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- Ensure ALL PPC computers are set to the OVERVIEW screen.
- Verify hardcopy of L4 screen can be printed from STA/IA computer (PDIS-MON-STA/B).
- Verify exam security-approved paper is loaded into back printer.
- Verify no previous L4 printouts remain in printer tray.
- See Simulator Operator Instructions (next page).

Tools or Equipment:

- Calculator

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
PPM 3.1.2	093	N/A
TSP-APRM-C301	014	N/A

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-189**. Reactor in startup. Bypass valve approximate positions: • BPV-1 – 30% Open • BPV-2 – 30% Open • BPV-3 – 30% Open • BPV-4 – 30% Open APRMs (approximate): • APRM-1 – 10.7% Power • APRM-2 – 10.9% Power • APRM-3 – 10.4% Power • APRM-4 – 7.4% Power Load Schedule File: **No schedule file is needed.** **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner.**

STUDENT BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

Initial Conditions:

- Columbia is in a startup following a refueling outage.
- APRM readings are GT power level readings extrapolated from Bypass Valve position.
- The DASIE Data Diode computer at H13-P610 is unavailable.

Initiating Cue:

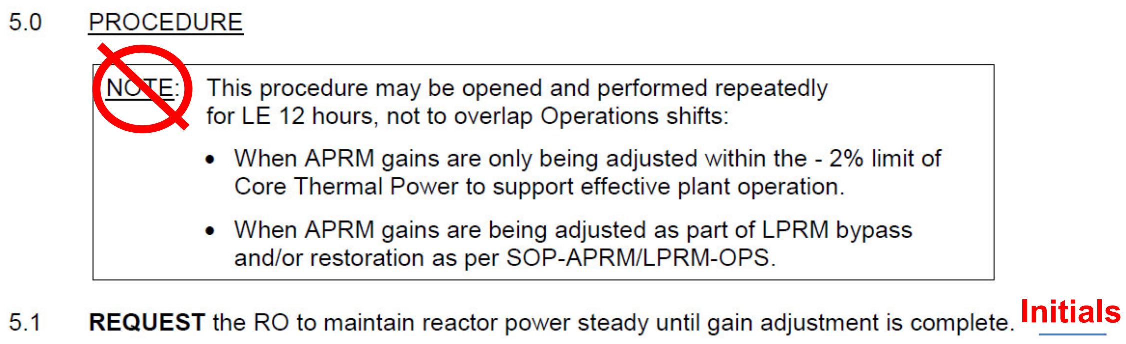
- The CRS directs you to adjust APRM-4 gain per Attachment 7.3 of TSP-APRM-C301:
  - Utilize PPC Option L4 to display and **printout** a valid PERCENT RATED CTP.
    - Use PERCENT RATED CTP on printout to complete step 7.3.1.
  - Take APRM-4 to BYPASS when directed by TSP-APRM-C301.
  - Adjust DESIRED APRM GAIN until PROJECTED FLUX % is within **1.5%** of recorded CTP (see step 7.3.5).
  - The password to adjust APRM-4 gain is “1234”.

- Inform the CRS when APRM-4 gain has been adjusted.

START TIME:___________

STEP / STANDARD		SAT / UNSAT
Examiner Note:	**Provide candidate with the following:** - **Student JPM Information Sheet** - **Student Reference #1 (Marked up copy of TSP-APRM-C301)**	
Examiner Note:	**All Steps below are directly from TSP-APRM-C301 exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	

Step 1:



5.0 PROCEDURE

NOTE: This procedure may be opened and performed repeatedly for LE 12 hours, not to overlap Operations shifts:

- When APRM gains are only being adjusted within the - 2% limit of Core Thermal Power to support effective plant operation.
- When APRM gains are being adjusted as part of LPRM bypass and/or restoration as per SOP-APRM/LPRM-OPS.

5.1 **REQUEST** the RO to maintain reactor power steady until gain adjustment is complete. **Initials** ____

Standard:

- Reads NOTE and place keeps.
- Requests RO maintain reactor power steady until the gain adjustment is complete.

____SAT

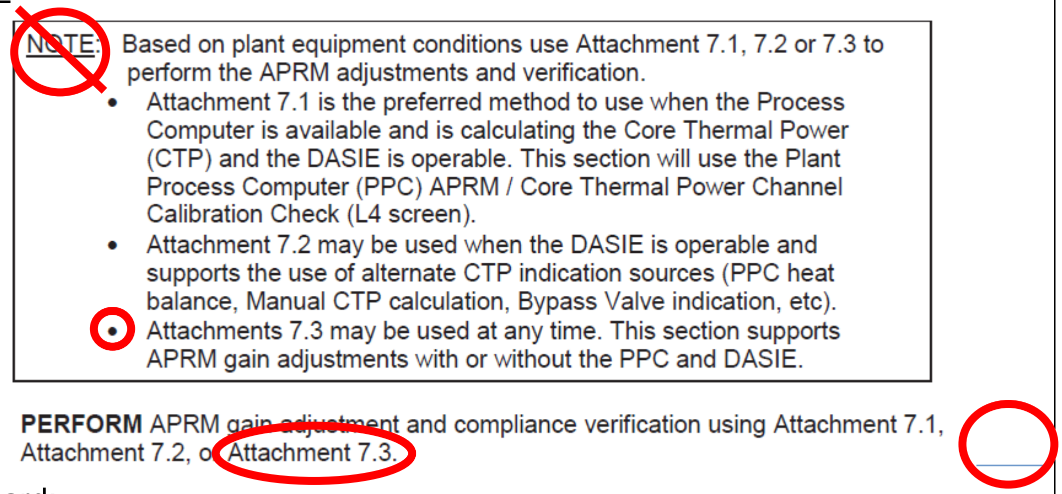
____UNSAT

____N/A

If candidate requests RO maintain reactor power steady:

Examiner Cue: Acknowledge request as CRO1.

Step 2:



NOTE: Based on plant equipment conditions use Attachment 7.1, 7.2 or 7.3 to perform the APRM adjustments and verification.

- Attachment 7.1 is the preferred method to use when the Process Computer is available and is calculating the Core Thermal Power (CTP) and the DASIE is operable. This section will use the Plant Process Computer (PPC) APRM / Core Thermal Power Channel Calibration Check (L4 screen).
- Attachment 7.2 may be used when the DASIE is operable and supports the use of alternate CTP indication sources (PPC heat balance, Manual CTP calculation, Bypass Valve indication, etc).
- Attachments 7.3 may be used at any time. This section supports APRM gain adjustments with or without the PPC and DASIE.

5.2 **PERFORM** APRM ~~gain adjustment~~ and compliance verification using Attachment 7.1, Attachment 7.2, or Attachment 7.3. ____

Standard:

- Reads NOTE and place keeps.
- Performs APRM gain adjustment per TSP-APRM-C301 Attachment 7.3.

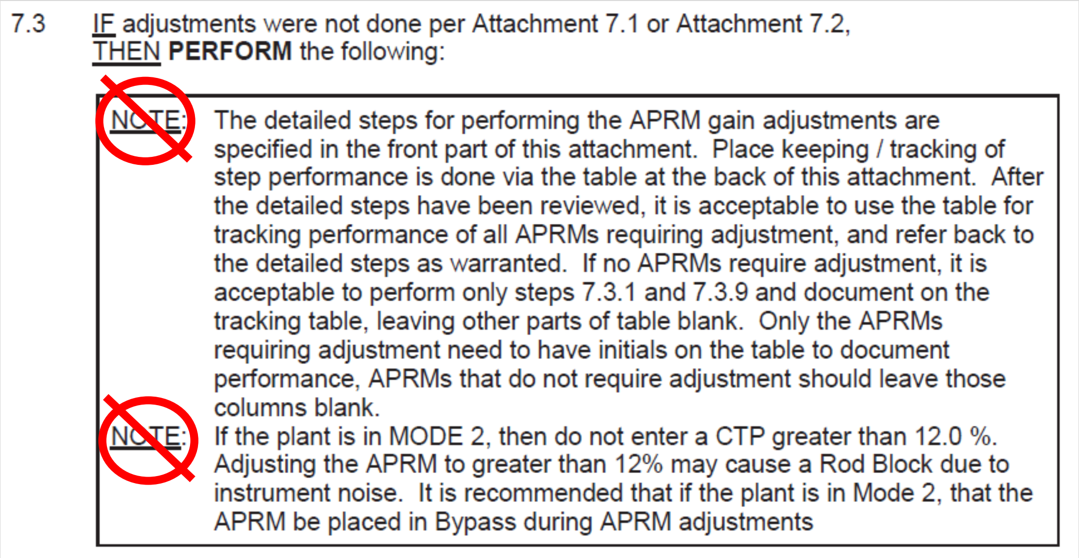
____SAT

____UNSAT

____N/A

Examiner Note: **Page 11 gives an example of a filled-out data table for APRM-4. The candidate will fill out the data table during performance of the APRM-4 gain adjustment procedure.**

STEP / STANDARD | **SAT / UNSAT**



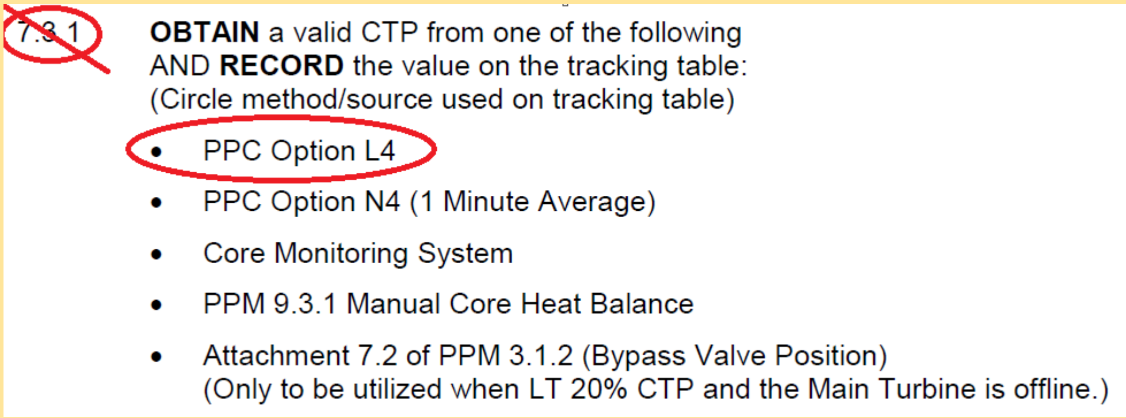
7.3 IF adjustments were not done per Attachment 7.1 or Attachment 7.2, THEN **PERFORM** the following:

NOTE: The detailed steps for performing the APRM gain adjustments are specified in the front part of this attachment. Place keeping / tracking of step performance is done via the table at the back of this attachment. After the detailed steps have been reviewed, it is acceptable to use the table for tracking performance of all APRMs requiring adjustment, and refer back to the detailed steps as warranted. If no APRMs require adjustment, it is acceptable to perform only steps 7.3.1 and 7.3.9 and document on the tracking table, leaving other parts of table blank. Only the APRMs requiring adjustment need to have initials on the table to document performance, APRMs that do not require adjustment should leave those columns blank.

NOTE: If the plant is in MODE 2, then do not enter a CTP greater than 12.0 %. Adjusting the APRM to greater than 12% may cause a Rod Block due to instrument noise. It is recommended that if the plant is in Mode 2, that the APRM be placed in Bypass during APRM adjustments

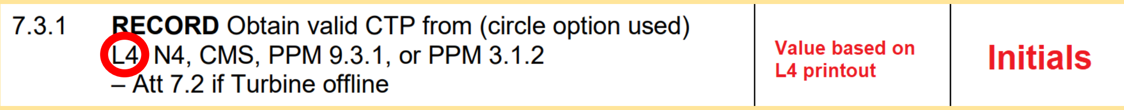
Examiner Note: **Attachment 7.2 referenced in last bullet and tracking table below is a procedural error. Should be Attachment 7.1.**

Step 3:



7.3.1 **OBTAIN** a valid CTP from one of the following AND **RECORD** the value on the tracking table: (Circle method/source used on tracking table)

- [✓ PPC Option L4]
- PPC Option N4 (1 Minute Average)
- Core Monitoring System
- PPM 9.3.1 Manual Core Heat Balance
- Attachment 7.2 of PPM 3.1.2 (Bypass Valve Position)
  (Only to be utilized when LT 20% CTP and the Main Turbine is offline.)



7.3.1 **RECORD** Obtain valid CTP from (circle option used) [✓ L4] N4, CMS, PPM 9.3.1, or PPM 3.1.2 – Att 7.2 if Turbine offline	**Value based on L4 printout**	**Initials**

Standard:

- **(Non critical)** Reads notes and place keeps.
- **Records CTP from L4 printout** on Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

CRITICAL STEP

____SAT

____UNSAT

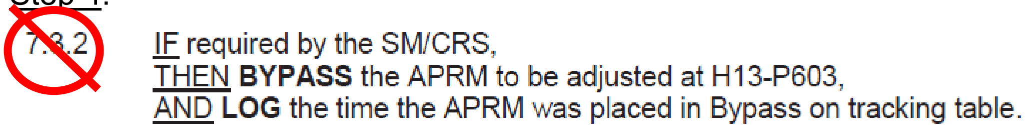
____N/A

If candidate requests Attachment 7.2 of PPM 3.1.2:

Examiner Cue: "You have all the information you need."

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>

Step 4:



~~7.3.2~~ IF required by the SM/CRS,
THEN **BYPASS** the APRM to be adjusted at H13-P603,
AND **LOG** the time the APRM was placed in Bypass on tracking table.

Standard:

- Bypasses APRM-4 on P603.
- Logs time on Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

</td><td>

____SAT

____UNSAT

____N/A

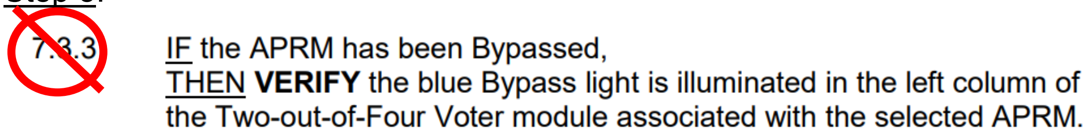
</td></tr>
<tr><td colspan="2">

If candidate request CRS concurrence to bypass APRM-4:

Examiner Cue: "I concur with bypassing APRM-4."

</td></tr>
<tr><td>

Step 5:



~~7.3.3~~ IF the APRM has been Bypassed,
THEN **VERIFY** the blue Bypass light is illuminated in the left column of the Two-out-of-Four Voter module associated with the selected APRM.

Standard:

- Verifies Two-out-of-Four Voter module associated with APRM-4 has blue Bypass light lit.
- Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

</td><td>

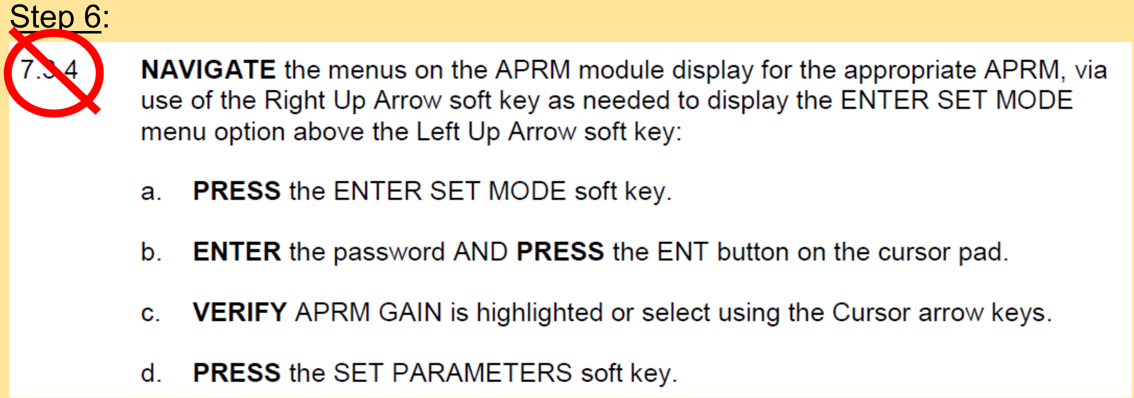
____SAT

____UNSAT

____N/A

</td></tr>
<tr><td>

Step 6:



~~7.3.4~~ **NAVIGATE** the menus on the APRM module display for the appropriate APRM, via use of the Right Up Arrow soft key as needed to display the ENTER SET MODE menu option above the Left Up Arrow soft key:

a. **PRESS** the ENTER SET MODE soft key.

b. **ENTER** the password AND **PRESS** the ENT button on the cursor pad.

c. **VERIFY** APRM GAIN is highlighted or select using the Cursor arrow keys.

d. **PRESS** the SET PARAMETERS soft key.

Standard:

- Performs Step 7.3.4 and sub-steps for APRM-4.
- **(Non critical)** Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

</td><td>

CRITICAL STEP

____SAT

____UNSAT

____N/A

</td></tr>
</table>

STEP / STANDARD **SAT / UNSAT**

~~NOTE~~: The PROJECTED FLUX has a noise band of ±4%. The value is acceptable if it cycling within this band and GE than -4% of CTP recorded on step 7.3.1.

~~NOTE~~: The PROJECTED AGAF value displayed on the screen will provide an indication of the percent change the APRM will make.

~~NOTE~~: It may require several iterations of the following steps to get the APRM STP adjusted to the desired value.

Examiner Note: **The Initiating Cue specified that the gain adjustment (per step 7.3.5 below) is to be performed such that PROJECTED FLUX % is within 1.5% of recorded CTP. This still meets the procedure step requirement per first NOTE above.**

Examiner Note: **Gain adjustment below may be performed 1 of 2 ways (either way is acceptable):**

- **By <u>incrementally</u> changing the APRM drawer DESIRED APRM GAIN value (using arrow cursor keys) until PROJECTED FLUX % is within 1.5% of recorded CTP. – OR –**
- **By setting the APRM drawer DESIRED APRM GAIN to the "DESIRED APRM GAIN" shown on the L4 printout (2nd column on the right). This automatically puts the PROJECTED FLUX % to be within 1.5% of recorded CTP.**

<u>Step 7</u>:

7.3.5 **ADJUST** the DESIRED APRM GAIN, using the arrow cursor keys, until the PROJECTED FLUX % is at the desired value

<u>Standard</u>:

- **(Non Critical)** Reads NOTES and place keeps.
- Adjusts DESIRED APRM GAIN until **PROJECTED FLUX % is within 1.5% of recorded CTP**. See Examiner Notes above.
- **(Non Critical)** Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

CRITICAL STEP

____SAT

____UNSAT

____N/A

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Procedure step 7.3.6 directs a Peer Check while the tracking table for step 7.3.6 refers to a Peer Review. Either may be performed.**	
Step 8: 7.3.6 **PERFORM** a peer check on the PROJECTED FLUX % to ensure it is acceptable. Standard: • Requests Peer Check or Peer Review of the PROJECTED FLUX %. • Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.	____SAT ____UNSAT ____N/A
If candidate requests Peer Check or Peer Review: **Examiner Cue: "Peer Check (Peer Review) performed."**	
NOTE: Execution of the next step will cause the APRM readings to step change to the PROJECTED FLUX % value.	
Step 9: 7.3.7 **PRESS** the ACCEPT soft key to apply the desired APRM gain adjustment. Standard: • Presses ACCEPT. • **(Non critical)** Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 10: 7.3.8 **PERFORM** the following to exit PRNM OPER-SET PARAMETERS INDEX menu: a. **PRESS** the EXIT soft key, to exit the SET PARAMETERS screen. b. **PRESS** the EXIT SET MODE soft key. c. **PRESS** the YES soft key on the ARE YOU SURE screen. Standard: • Exits the PRNM OPER-SET PARAMETERS INDEX menu. • Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.	____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**
NOTE: The APRM STP (Simulated Thermal Power) is a six second average of the APRM Instantaneous Flux. The STP is very stable with a noise band of ±0.5%. If the CTP is greater than or equal to 25% the APRM will meet the Tech Spec operable requirement if the STP value is GE than -2% of the CTP recorded on step 7.3.1. If the CTP is less than 25% the following step may be marked NA.	
Step 11: **May perform below step but not required per NOTE above.** # 7.3.9 **REVIEW** the STP (%) indicated on the APRM BARGRAPHS display to ensure it is within the acceptance band. Standard: • Either performs step (reviews STP% on APRM BARGRAPHS) or marks step N/A.	____SAT ____UNSAT ____N/A
Examiner Note: **If step 7.3.5 earlier was performed as directed by Initiating Cue, then step 7.3.10 below will be marked N/A. Otherwise, candidate will have to return to step 7.3.4 and follow through to make another gain adjustment to "get closer" to the desired value (within 1.5% of CTP). The below step will again be evaluated, etc. See third procedure NOTE at top of page 9.**	
Step 12: 7.3.10 IF the APRM STP is not GE than -2% of the CTP recorded on step 7.3.1, THEN **RETURN** to step 7.3.4. Standard: • Compares APRM STP to previous CTP recorded. N/A's step if within 2% of CTP recorded. Otherwise, returns to step 7.3.4 for another adjustment.	____SAT ____UNSAT ____N/A
Step 13: 7.3.11 **VERIFY** ALL VOTER trips and trip memories are cleared. (No red trip lights on the Voter Chassis). a. IF ALL VOTER trips and trip memories are not cleared, THEN **PRESS** the TRIP MEMORY RESET pushbutton on all four TWO-OUT-OF-FOUR Logic Modules to clear the trip memory. Standard: • Verifies all VOTER trips and trip memories are cleared. • Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.	____SAT ____UNSAT ____N/A

STEP / STANDARD | **SAT / UNSAT**

NOTE: APRM trip and alarms are indicated by the word TRIP, ALARM or LPRM on the top of the APRM module display. Some indications may not reset due to plant conditions (e.g. LPRM downscale alarms).

Step 14:

7.3.12 **VERIFY** ALL APRM trip indications on the APRM module display are clear.

a. IF ALL APRM trip indications on the APRM module display are not clear, THEN **PERFORM** the following:

1) **PRESS** the TRIP STATUS soft key.

2) **REVIEW** the trip and alarm indications.

3) **PRESS** the RESET MEMORY soft key.

4) **PRESS** the EXIT soft key to return to the APRM BARGRAPH Display.

5) **NOTIFY** the CRS of trips or alarms that cannot be reset.

6) **RESET** Trip and alarm indications on the ODA displays at H13-P603.

Standard:

- Verifies all APRM trip indications on the APRM module display are clear.
- Verifies all APRM trip indications on the ODA displays clear at H13-P603.
- Initials Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

____SAT

____UNSAT

____N/A

Step 15:

7.3.13 IF the APRM was Bypassed,
AND the APRM is ready to be returned to Operate,
THEN **UNBYPASS** the APRM at H13-P603,
AND **LOG** the time the APRM was restored to service on the tracking table.

Standard:

- Un-bypasses APRM-4 on P603.
- Logs time on Att. 7.3 (APRM/Power Surveillance Data Sheet) for APRM-4.

____SAT

____UNSAT

____N/A

If candidate request CRS concurrence to un-bypass APRM-4:

Examiner Cue: "I concur with un-bypassing APRM-4."

Examiner Cue: Inform the candidate that the JPM is complete.

STOP TIME: ____________

Completed Tracking Table Example

Number: TSP-APRM-C301	Use Category: CONTINUOUS	Major Rev: 014 Minor Rev: N/A Page: 19 of 19
Title: APRM and Core Thermal Power Channel Calibration Check		

Action		Value	Initials
7.3.1	**RECORD** Obtain valid CTP from (circle option used) [✓ L4] N4, CMS, PPM 9.3.1, or PPM 3.1.2 – Att 7.2 if Turbine offline	As recorded	KR

Action		APRM 4	APRM 2	APRM 3	APRM 1
7.3.2	If required, **BYPASS** APRM, **LOG** time	Time			
7.3.3	If bypassed, **VERIFY** bypassed at H13-P608	KR			
7.3.4	On selected APRM, navigate to and: a. **PRESS** ENTER SET MODE soft key b. **ENTER** password, **PRESS** ENT c. **VERIFY** APRM GAIN highlighted d. **PRESS** SET PARAMTERS soft key	KR			
7.3.5	**ADJUST** DESIRED APRM GAIN until PROJECTED FLUX % is GE than -4% of 7.3.1 CTP	KR			
7.3.6	Peer **REVIEW** confirms projected flux is GE -4%	KR			
7.3.7	**PRESS** ACCEPT soft key	KR			
7.3.8	Exit PRNM OPER-SET menu by: a. **PRESS** EXIT soft key b. **PRESS** EXIT SET MODE soft key c. **PRESS** YES soft key at ARE YOU SURE?	KR			
# 7.3.9	**REVIEW** STP (%) is GE -2% of 7.3.1 CTP	True or repeats gain adj			
7.3.11	**VERIFY** all VOTER trips/memories cleared	KR			
7.3.12	**VERIFY** all APRM trip indications cleared	KR			
7.3.13	**UNBYPASS** APRM, if warranted,	KR			
	Log time APRM restored to service if bypassed	Now			

END

RESULTS OF JPM ILC-25 JPM S-3

Examinee (Print): ____

Examiner (Print): ____

Task Standard: Obtains valid CTP using PPC Option L4. Adjusts APRM-4 gain until Projected Flux % is within 1.5% of recorded CTP with new value ACCEPTED per TSP-APRM-C301 (Attachment 7.3).

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

COMMENTS:

____

____

____

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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia is in a startup following a refueling outage.
- APRM readings are GT power level readings extrapolated from Bypass Valve position.
- The DASIE Data Diode computer at H13-P610 is unavailable.

Initiating Cue:

- The CRS directs you to adjust APRM-4 gain per Attachment 7.3 of TSP-APRM-C301:
  - Utilize PPC Option L4 to display and **printout** a valid PERCENT RATED CTP.
    - Use PERCENT RATED CTP on printout to complete step 7.3.1.
  - Take APRM-4 to BYPASS when directed by TSP-APRM-C301.
  - Adjust DESIRED APRM GAIN until PROJECTED FLUX % is within **1.5%** of recorded CTP (see step 7.3.5).
  - The password to adjust APRM-4 gain is “1234”.

- Inform the CRS when APRM-4 gain has been adjusted.

Verify Revision Information Prior To Use	Initials	KR
	Date	Today

Number: TSP-APRM-C301	Use Category: CONTINUOUS	Major Rev: 014 Minor Rev: N/A Page: 1 of 19
Title: APRM and Core Thermal Power Channel Calibration Check		

PLANT PROCEDURES MANUAL	PCN#: N/A
TSP-APRM-C301	Effective Date: 11/29/22

Performed By

Print Name	Initials	Print Name	Initials
Ken Rolandson	KR		

Test Satisfactory ☐ Yes ☐ No CR Initiated ☐ Yes ☐ No WR Initiated ☐ Yes ☐ No

If Yes, CR Number: ____________ If Yes, WR Number: ____________

CRS/Shift Manager Review ______________________ Date ________ Time ________
Print Name /Sign Name

Assigned Reviewer ______________________ Date ________
Print Name / Sign Name

Comments ______________________

DESCRIPTION OF CHANGES

Justification (required)
See below.

Page(s)	Description (including summary, reason, initiating document, if applicable)
3	Added missing reference and clarified notes related to management expectation for gain adjustment.
5	Deleted note- creates confusion. (AR-436169)
7, 10, 13, 17, 18	Reformatted steps to align with SWP-PRO-03.
Throughout	Revised references in French brackets to short form (no rev bar).

1.0 PURPOSE

1.1 This procedure verifies that the calculated thermal power does not exceed the average power range monitor (APRM) channel by greater than 2% while operating at GE 25% Rated Thermal Power (RTP). This satisfies Technical Specification SR 3.3.1.1.2 requirement, weekly channel calibration check, for the following Table 3.3.1.1-1 Functions:

- Simulated Thermal Power High, Item 2b
- Neutron Flux High, Item 2c

> NOTE: Management Expectation for gain adjustment:
>
> - During steady state operation, when an APRM gain is GT ± 0.5% of Rated Core Thermal Power.
> - During transient operation, APRM gain adjustments may be delayed up to the Technical Specification tolerance of GE than -2% of the calculated thermal power.

1.2 This procedure may be performed as needed below 25% Rated Thermal Power (RTP) to adjust APRMs.

1.3 This procedure is applicable in Mode 1 whenever Core Thermal Power (CTP) is GE 25% RTP. Completion of this procedure is required within 12 hours after reaching or exceeding 25% RTP, and every seven days thereafter.

2.0 REFERENCES

2.1 OER 91017B, Power Steady State for APRM Calibration

2.2 AR-232929, (OER) INPO OE32751 - All average power range monitors (APRM)

2.3 SWP-RXE-01, Reactivity Management Program

2.4 Technical Specification Section 3.3.1.1 (SR 3.3.1.1.2)

2.5 APRM User Manual, Power Range NMS, 26A7865, Rev. 8

2.6 DASie User Manual, C3-ilex, Part # 1003690019, Rev. V

2.7 SOP-COMPUTER-OPS, Plant Process Computer (PPC)

2.8 TSP-THERM-C101, Power Distribution Limits

2.9 PPM 9.3.1, Manual Core Heat Balance

3.0 PRECAUTIONS AND LIMITATIONS

3.1 The PRNM system does not require the APRM to be placed in Bypass to access the APRM gain adjustments menu or to adjust the APRM gain. When the performer presses the "ACCEPT" key on the menu the APRM will step change to the new value. If the new APRM flux or STP value is above the trip set point then a Vote will be generated. In MODE 2 the margin to the APRM Trip set point is significantly smaller and the change in gain can be large. When the plant is in MODE 2 the APRM should be bypassed during adjustment.

3.2 While in bypass, an APRM is inoperable.

3.3 It is possible to inadvertently cause all of the APRMs to become Tech Spec inoperable by adjusting them to an invalid Core Thermal Power. If the Core Thermal Power is in error by 2% or more then adjusting the APRMs to the invalid reading could render the APRMs Tech Spec inoperable when operating at or above 25% CTP. Other plants have caused the APRMs to become inoperable by adjusting them based on an invalid Core Thermal Power calculation. Consider the following when adjusting the APRM gains by more than 2% and especially if adjusting 3 or more APRMs by the same large adjustments: {AR-2.2}

3.3.1 Do all of the APRMs require an adjustment? Adjusting all of the APRMs has increased risk exposure to a Core Thermal Power calculation error.

3.3.2 Are the adjustments to the APRMs all in the same direction and of similar magnitude? Typical APRM adjustments are random, not uniform in the same direction.

3.3.3 Are the adjustments unexpected? APRM adjustments are almost always related to some control rod adjustment.

3.3.4 Has the Core Thermal Power been validated by an alternate indication? PPM 9.3.1 and TSP-THERM-C101 each include methods to validate the Core Thermal Power indication using Main Steam Line flow and Turbine First Stage Pressure. PPM 9.3.1 includes additional information to assist in validating the Core Thermal Power input data.

3.3.5 If the Core Thermal Power is in question but the specific cause cannot be quickly determined, then consider adjusting only two APRMs to compliance. This will allow the plant to exit LCO 3.3.1.1 Action C and provide additional time to further investigate and confirm that the Core Thermal Power is correct before adjusting the remaining APRMs. Immediately inform the CRS and SM that a prompt investigation of the Core Thermal Power is required.

3.3.6 If the Core Thermal Power is confirmed to be invalid or degraded by 2% or more, resulting in the appearance that the APRMs are out of compliance, then declare the Core Thermal Power Invalid and exit LCO 3.3.1.1 until a valid Core Thermal Power can be calculated.

3.4 Refer to LCO 3.3.1.1 and applicable action conditions of that specification if it is determined that there are GE 2 APRMs that are out of compliance LT than 2% of calculated CTP.

4.0 ACCEPTANCE CRITERIA

4.1 This surveillance is satisfactorily completed when all steps preceded by a # or $ have been initialed, all other steps have either been initialed or properly documented, and the CRS/Shift Manager has reviewed and signed the cover sheet.

5.0 PROCEDURE

NOTE: This procedure may be opened and performed repeatedly for LE 12 hours, not to overlap Operations shifts:

- When APRM gains are only being adjusted within the - 2% limit of Core Thermal Power to support effective plant operation.
- When APRM gains are being adjusted as part of LPRM bypass and/or restoration as per SOP-APRM/LPRM-OPS.

5.1 **REQUEST** the RO to maintain reactor power steady until gain adjustment is complete. ______

NOTE: Based on plant equipment conditions use Attachment 7.1, 7.2 or 7.3 to perform the APRM adjustments and verification.

- Attachment 7.1 is the preferred method to use when the Process Computer is available and is calculating the Core Thermal Power (CTP) and the DASIE is operable. This section will use the Plant Process Computer (PPC) APRM / Core Thermal Power Channel Calibration Check (L4 screen).
- Attachment 7.2 may be used when the DASIE is operable and supports the use of alternate CTP indication sources (PPC heat balance, Manual CTP calculation, Bypass Valve indication, etc).
- Attachments 7.3 may be used at any time. This section supports APRM gain adjustments with or without the PPC and DASIE.

5.2 **PERFORM** APRM gain adjustment and compliance verification using Attachment 7.1, Attachment 7.2, or Attachment 7.3. ______

6.0 DOCUMENTATION

6.1 Discard unused Attachments. Only the completed tracking tables, and any related documentation such as a printed final L4 printout needs to be retained along with the cover sheet.

6.2 Attached completed PPC L4 printout, when used.

6.3 Retain this surveillance as a permanent plant record in accordance with the Plant Administrative Procedures.

7.0 ATTACHMENTS

7.1 APRM Gain Adjustment using PPC L4 Desired Gain Method

7.2 APRM Gain Adjustment using CTP Download Method

7.3 APRM Gain Adjustment using Manual Method

APRM Gain Adjustment using Manual Method

7.3 IF adjustments were not done per Attachment 7.1 or Attachment 7.2,
THEN **PERFORM** the following:

> NOTE: The detailed steps for performing the APRM gain adjustments are specified in the front part of this attachment. Place keeping / tracking of step performance is done via the table at the back of this attachment. After the detailed steps have been reviewed, it is acceptable to use the table for tracking performance of all APRMs requiring adjustment, and refer back to the detailed steps as warranted. If no APRMs require adjustment, it is acceptable to perform only steps 7.3.1 and 7.3.9 and document on the tracking table, leaving other parts of table blank. Only the APRMs requiring adjustment need to have initials on the table to document performance, APRMs that do not require adjustment should leave those columns blank.
>
> NOTE: If the plant is in MODE 2, then do not enter a CTP greater than 12.0 %. Adjusting the APRM to greater than 12% may cause a Rod Block due to instrument noise. It is recommended that if the plant is in Mode 2, that the APRM be placed in Bypass during APRM adjustments

7.3.1 **OBTAIN** a valid CTP from one of the following
AND **RECORD** the value on the tracking table:
(Circle method/source used on tracking table)

- PPC Option L4
- PPC Option N4 (1 Minute Average)
- Core Monitoring System
- PPM 9.3.1 Manual Core Heat Balance
- Attachment 7.2 of PPM 3.1.2 (Bypass Valve Position)
  (Only to be utilized when LT 20% CTP and the Main Turbine is offline.)

7.3.2 IF required by the SM/CRS,
THEN **BYPASS** the APRM to be adjusted at H13-P603,
AND **LOG** the time the APRM was placed in Bypass on tracking table.

7.3.3 IF the APRM has been Bypassed,
THEN **VERIFY** the blue Bypass light is illuminated in the left column of the Two-out-of-Four Voter module associated with the selected APRM.

7.3.4 **NAVIGATE** the menus on the APRM module display for the appropriate APRM, via use of the Right Up Arrow soft key as needed to display the ENTER SET MODE menu option above the Left Up Arrow soft key:

a. **PRESS** the ENTER SET MODE soft key.

b. **ENTER** the password AND **PRESS** the ENT button on the cursor pad.

c. **VERIFY** APRM GAIN is highlighted or select using the Cursor arrow keys.

d. **PRESS** the SET PARAMETERS soft key.

NOTE: The PROJECTED FLUX has a noise band of ±4%. The value is acceptable if it cycling within this band and GE than -4% of CTP recorded on step 7.3.1.

NOTE: The PROJECTED AGAF value displayed on the screen will provide an indication of the percent change the APRM will make.

NOTE: It may require several iterations of the following steps to get the APRM STP adjusted to the desired value.

7.3.5 **ADJUST** the DESIRED APRM GAIN, using the arrow cursor keys, until the PROJECTED FLUX % is at the desired value

7.3.6 **PERFORM** a peer check on the PROJECTED FLUX % to ensure it is acceptable. |

NOTE: Execution of the next step will cause the APRM readings to step change to the PROJECTED FLUX % value.

7.3.7 **PRESS** the ACCEPT soft key to apply the desired APRM gain adjustment.

7.3.8 **PERFORM** the following to exit PRNM OPER-SET PARAMETERS INDEX menu: |

a. **PRESS** the EXIT soft key, to exit the SET PARAMETERS screen.

b. **PRESS** the EXIT SET MODE soft key.

c. **PRESS** the YES soft key on the ARE YOU SURE screen.

> NOTE: The APRM STP (Simulated Thermal Power) is a six second average of the APRM Instantaneous Flux. The STP is very stable with a noise band of ±0.5%. If the CTP is greater than or equal to 25% the APRM will meet the Tech Spec operable requirement if the STP value is GE than -2% of the CTP recorded on step 7.3.1. If the CTP is less than 25% the following step may be marked NA.

7.3.9 **REVIEW** the STP (%) indicated on the APRM BARGRAPHS display to ensure it is within the acceptance band.

7.3.10 IF the APRM STP is not GE than -2% of the CTP recorded on step 7.3.1,
THEN **RETURN** to step 7.3.4.

7.3.11 **VERIFY** ALL VOTER trips and trip memories are cleared.
(No red trip lights on the Voter Chassis).

a. IF ALL VOTER trips and trip memories are not cleared,
THEN **PRESS** the TRIP MEMORY RESET pushbutton on all four TWO-OUT-OF-FOUR Logic Modules to clear the trip memory.

> NOTE: APRM trip and alarms are indicated by the word TRIP, ALARM or LPRM on the top of the APRM module display. Some indications may not reset due to plant conditions (e.g. LPRM downscale alarms).

7.3.12 **VERIFY** ALL APRM trip indications on the APRM module display are clear.

a. IF ALL APRM trip indications on the APRM module display are not clear**,**
THEN **PERFORM** the following:

1) **PRESS** the TRIP STATUS soft key.

2) **REVIEW** the trip and alarm indications.

3) **PRESS** the RESET MEMORY soft key.

4) **PRESS** the EXIT soft key to return to the APRM BARGRAPH Display.

5) **NOTIFY** the CRS of trips or alarms that cannot be reset.

6) **RESET** Trip and alarm indications on the ODA displays at H13-P603.

7.3.13 IF the APRM was Bypassed,
AND the APRM is ready to be returned to Operate,
THEN **UNBYPASS** the APRM at H13-P603,
AND **LOG** the time the APRM was restored to service on the tracking table.

Action	Value	Initials
7.3.1 **RECORD** Obtain valid CTP from (circle option used) L4, N4, CMS, PPM 9.3.1, or PPM 3.1.2 – Att 7.2 if Turbine offline		

Action	APRM 4	APRM 2	APRM 3	APRM 1
7.3.2 If required, **BYPASS** APRM, **LOG** time				
7.3.3 If bypassed, **VERIFY** bypassed at H13-P608				
7.3.4 On selected APRM, navigate to and: a. **PRESS** ENTER SET MODE soft key b. **ENTER** password, **PRESS** ENT c. **VERIFY** APRM GAIN highlighted d. **PRESS** SET PARAMTERS soft key				
7.3.5 **ADJUST** DESIRED APRM GAIN until PROJECTED FLUX % is GE than -4% of 7.3.1 CTP				
7.3.6 Peer **REVIEW** confirms projected flux is GE -4%				
7.3.7 **PRESS** ACCEPT soft key				
7.3.8 Exit PRNM OPER-SET menu by: a. **PRESS** EXIT soft key b. **PRESS** EXIT SET MODE soft key c. **PRESS** YES soft key at ARE YOU SURE?				
# 7.3.9 **REVIEW** STP (%) is GE -2% of 7.3.1 CTP				
7.3.11 **VERIFY** all VOTER trips/memories cleared				
7.3.12 **VERIFY** all APRM trip indications cleared				
7.3.13 **UNBYPASS** APRM, if warranted,				
Log time APRM restored to service if bypassed				

END

ENERGY NORTHWEST

ILC-25 S-4

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-4

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______
SIMULATOR GUIDE PQD CODE ______ Rev. No. ______
JPM PQD CODE ______ Rev. No. ______
EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______
Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Recognizes inability to lower RPV pressure with DEH in automatic. Takes manual control of Bypass Valves to lower RPV pressure to a band of 500 to 600 psig using DEH.**

Alternate Path: ☑ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0348 Operate DEH in Auto.

K/A Importance Factors: RO: 4.2 **SRO:** 4.2

K/A Number: 241000 A4.06

K/A Statement: Ability to manually operate and/or monitor in the control room: Bypass valves

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 3 – Reactor Pressure Control

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - Student JPM Information Sheet **(Page 11)**
  - Student Reference #1 **(JPM S-4 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- Ensure DEH screens are on **Main Display (Top)** and **Valve Status Display (Bottom)** for each candidate prior to starting JPM.
- See Simulator Operator Instructions (next page).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-DEH-QC	006	002
OI-15	037	N/A
PPM 1.3.1	137	N/A

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **194**. IC has the reactor scrammed with RPV pressure approximately 960 psig. Malfunction MAL-DEH017C, which fails the Press Ramp GO Button, and malfunction MAL-DEH017D, which fails ability to use TP Manual, are inserted by the schedule file. Load Schedule File: **JPM S-4 ILC-25.sch** **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner (RPV level and pressure will continue to degrade as soon as the simulator is taken to RUN).**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct” (OR "That's Incorrect", if applicable).

Initial Conditions:

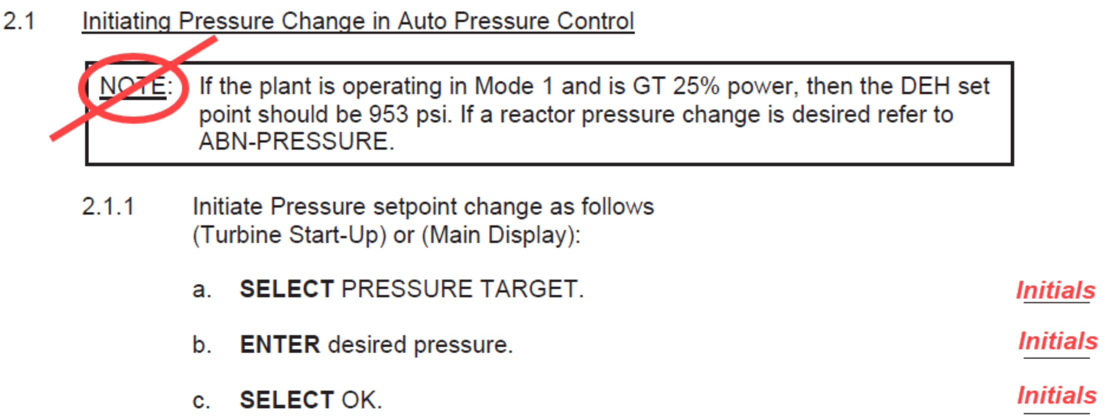
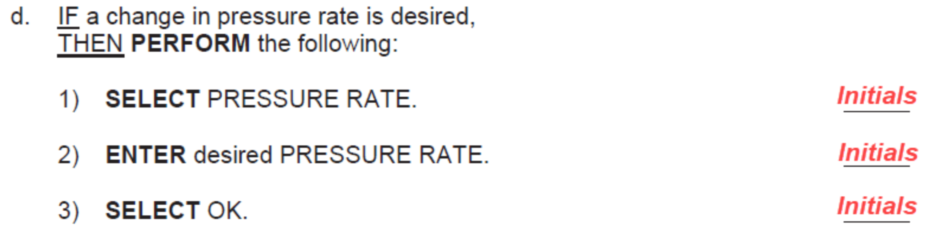
- Columbia was operating at full power when a manual scram was required.
- Reactor Pressure is approximately 960 psig.
- RFPs, HPCS, and RCIC are unavailable.

Initiating Cue:

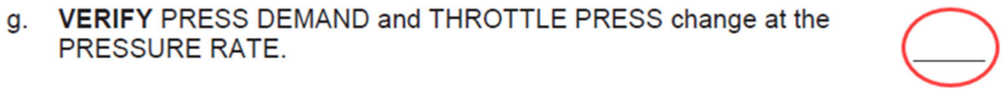
- The CRS directs you to lower RPV pressure to 550 psig at the rate of 100 psig per minute with DEH in automatic per SOP-DEH-QC.
- Inform the CRS when RPV pressure reaches 550 psig.

ILC-25 Simulator S-4

START TIME:___________

STEP / STANDARD		**SAT / UNSAT**
Examiner Note:	**Provide candidate with the following:** • **Student JPM Information Sheet** • **Student Reference #1 (SOP-DEH-QC)**	
Examiner Note:	**All Steps below are directly from SOP-DEH-QC exactly as written. Initialing and circle/slashing is an expectation but does not constitute a failure if not performed.**	
Step 1:  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 953 psi. If a reactor pressure change is desired refer to ABN-PRESSURE. 2.1.1 Initiate Pressure setpoint change as follows (Turbine Start-Up) or (Main Display): a. **SELECT** PRESSURE TARGET. *Initials* b. **ENTER** desired pressure. *Initials* c. **SELECT** OK. *Initials* Standard: • Reads NOTE and place keeps. • Selects PRESSURE TARGET and enters 550. Selects OK.		____SAT ____UNSAT ____N/A
Step 2:  d. IF a change in pressure rate is desired, THEN **PERFORM** the following: 1) **SELECT** PRESSURE RATE. *Initials* 2) **ENTER** desired PRESSURE RATE. *Initials* 3) **SELECT** OK. *Initials* Standard: • Selects PRESSURE RATE and enters 100. Selects OK.		____SAT ____UNSAT ____N/A
Step 3:  e. **SELECT** GO. *Initials* f. **SELECT** YES. *Initials* Standard: • Selects GO. • Selects YES		____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**
Step 4:	



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

Standard:

- Observes no change in Pressure Demand or Bypass Valve position.
- Observes green Hold light is still illuminated.
- Informs the CRS.

____SAT

____UNSAT

____N/A

Examiner Note:

PPM 1.3.1 allows the candidate to take manual control from automatic control whenever, in the candidate's judgement, it is causing degraded system response or unsafe plant operation. The candidate may take Bypass Valve Control to Manual without the use of the SOP-DEH-QC.

The remaining steps are directly from SOP-DEH-QC.

Per OI-15, the Standardized Pressure Band when Bypass Valves are only available in manual is 500 to 600 psig.

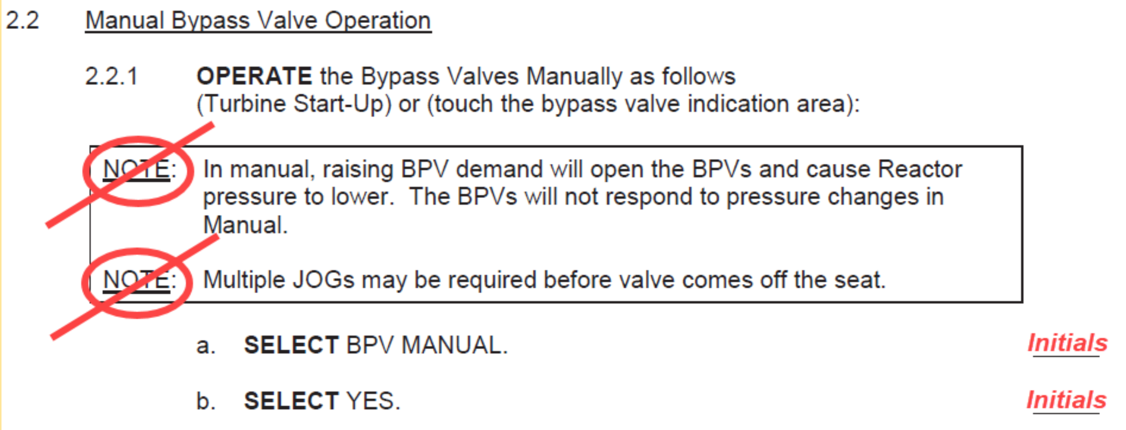
When the candidate informs the CRS of the fault:

Examiner Cue: "Take actions to lower RPV pressure to a band of 500 to 600 psig with DEH.

Examiner Note:

This step begins the Alternate Path. Due to automatic pressure reduction unavailable, the candidate will take manual action to reduce pressure. TP (Throttle Pressure) Manual will not be available (faulted).

Alt Path Step 5:



2.2 Manual Bypass Valve Operation

2.2.1 **OPERATE** the Bypass Valves Manually as follows (Turbine Start-Up) or (touch the bypass valve indication area):

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.

NOTE: Multiple JOGs may be required before valve comes off the seat.

a. **SELECT** BPV MANUAL. *Initials*

b. **SELECT** YES. *Initials*

Standard:

- **(Non critical)** Reads NOTEs and place keeps.
- Selects BPV MANUAL.
- Selects YES.

CRITICAL STEP

____SAT

____UNSAT

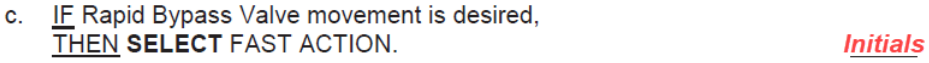
____N/A

STEP / STANDARD | **SAT / UNSAT**

Examiner Note: **Selecting FAST ACTION or NOT selecting FAST ACTION in the next step are both satisfactory. The only bearing this action has on the JPM is rate of pressure reduction and the ability to demonstrate a controlled pressure reduction. The candidate may select and deselect this button as needed.**

STEP / STANDARD | **SAT / UNSAT**

Alt Path Step 6:



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

Standard:

- May or may not select FAST ACTION.

____SAT

____UNSAT

____N/A

Examiner Note: **The candidate will initially need to open the Bypass Valves to begin pressure reduction. As the pressure approaches the band of 500 to 600 psig, the candidate will need to close the Bypass Valves to slow the pressure reduction. The candidate may select and deselect these buttons as needed to perform the controlled pressure reduction .**

Alt Path Step 7:

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

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

Standard:

- Selects BPV RAISE (since pressure reduction is desired).

CRITICAL STEP

____SAT

____UNSAT

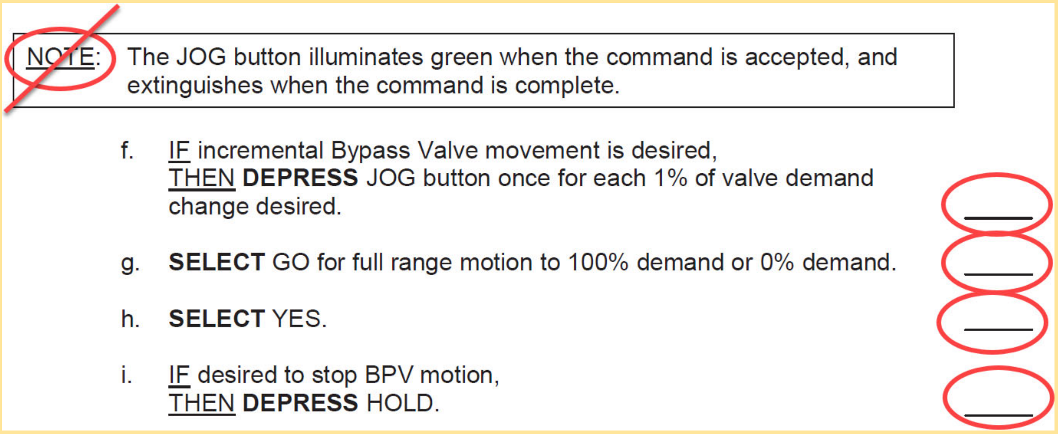
____N/A

Examiner Note: **The candidate may choose any combination of the following steps in Alt Path Step 8 to reduce pressure so long as controlled pressure reduction is demonstrated. For instance, the candidate may choose:**

- **to lower pressure by pressing JOG as needed -OR-**
- **to lower pressure by pressing GO to start BPV motion and pressing HOLD to stop BPV motion.**

Lowering below 403 psig or using SRVs to lower pressure is unsatisfactory.

Alt Path Step 8:



~~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. _____

Standard:

- **(Non-critical)** Reads NOTE and place keeps.
- Depresses JOG once for each desired incremental pressure reduction. **OR**
- Depresses GO to start BPV motion and depresses HOLD to stop BPV motion.
- Stops pressure reduction when RPV pressure is in 500 to 600 psig band.

CRITICAL STEP

____SAT

____UNSAT

____N/A

Examiner Cue: **Inform the candidate that the JPM is complete.**

STOP TIME: ___________

RESULTS OF JPM

ILC-25 JPM S-4

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Recognizes inability to lower RPV pressure with DEH in automatic. Takes manual control of Bypass Valves to lower RPV pressure to a band of 500 to 600 psig using DEH.**

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

COMMENTS:

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____
____
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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- Columbia was operating at full power when a manual scram was required.
- Reactor Pressure is approximately 960 psig.
- RFPs, HPCS, and RCIC are unavailable.

Initiating Cue:

- The CRS directs you to lower RPV pressure to 550 psig at the rate of 100 psig per minute with DEH in automatic per SOP-DEH-QC.
- Inform the CRS when RPV pressure reaches 550 psig.

Verify Revision Information Prior To Use	Initials	
	Date	

Number: SOP-DEH-QC	Use Category: CONTINUOUS	Major Rev: 006 Minor Rev: 002 Page: 1 of 6
Title: Main Turbine DEH Operations Quick Card		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-DEH-QC	Effective Date: 03/07/19

DESCRIPTION OF CHANGES

Justification (required for major revision)
Implement EC-14942, Measurement Uncertainty Recapture

Page(s)	Description (including summary, reason, initiating document, if applicable)
4	Changed DEH setpoint from 960 to 953
5	MR001 editorial, added new note (AR-362343)
4,5,6	MR002 editorial, clarified steps 2.1.1, 2.2.1, 2.3.1 (AR-342220)

1.0 PURPOSE

Provide instructions for controlling Reactor Pressure by performing pressure setpoint changes in DEH.

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 953 psi. If a reactor pressure change is desired refer to ABN-PRESSURE.

2.1.1 Initiate Pressure setpoint change as follows (Turbine Start-Up) 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) or (touch the bypass valve indication area):

> <u>NOTE</u>: 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.
>
> <u>NOTE</u>: Multiple JOGs may be required before valve comes off the seat.

a. **SELECT** BPV MANUAL. _____

b. **SELECT** YES. _____

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

d. <u>IF</u> opening Bypass Valves,
<u>THEN</u> **SELECT** BPV RAISE. _____

e. <u>IF</u> closing Bypass Valves,
<u>THEN</u> **SELECT** BPV LOWER. _____

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

f. <u>IF</u> incremental Bypass Valve movement is desired,
<u>THEN</u> **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. <u>IF</u> desired to stop BPV motion,
<u>THEN</u> **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) or (Main Display)

> 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. _____

ENERGY NORTHWEST

ILC-25 S-5

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-5

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE Rev. No.

SIMULATOR GUIDE PQD CODE Rev. No.

JPM PQD CODE Rev. No.

EXAM PQD CODE Rev. No.

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Upon starting SGT Train B per SOP-CN-CONT-VENT (step 5.1.7.b), recognizes SGT-V-5B2 failed to open and manually opens valve before a low-flow trip of fan SGT-FN-1B2 occurs. Manually opens SGT-V-1B, CEP-V-1B, and CEP-V-2B to establish the vent path. Observes Drywell pressure lowering.**

Alternate Path: ☑ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 15 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0287 Purge and de-inert containment with standby gas treatment (SGT).

K/A Importance Factors: **RO:** 4.4 **SRO:** 4.3

K/A Number: 223001 A2.07

K/A Statement: Ability to (a) predict the impacts of the following on the Primary Containment System and Auxiliaries and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: High drywell pressure

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 5 – Containment Integrity

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
  - Student JPM Information Sheet **(Page 17)**
  - Student Reference #1 **(JPM S-5 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (bottom of page).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-CN-CONT-VENT	027	001

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC - 188.** IC places the plant at 100% power with a slightly elevated Drywell pressure. Load Schedule File: **JPM S-5 ILC-25.sch** **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner.**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

For this JPM, all actions and monitoring will be performed from Control Room Back panels. Monitoring of any front panel indications is not required.

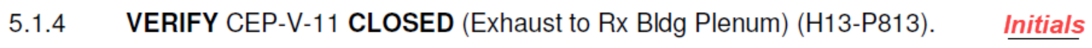
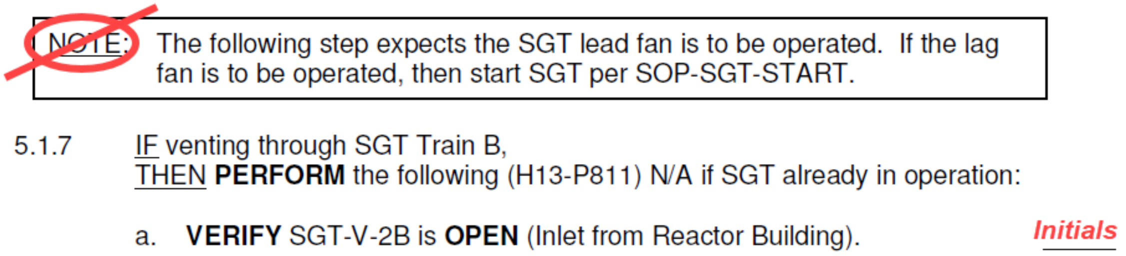
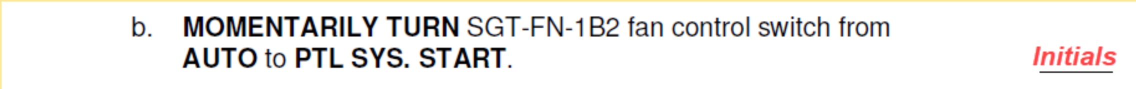
Initial Conditions:

- CGS is operating at 100% Power with NO equipment out of service.
- Due to changing barometric conditions, Drywell pressure is slightly elevated (as indicated) and up slow.
- Wetwell pressure is less than Drywell pressure as expected.
- Per SOP-CN-CONT-VENT:
    - All Prerequisites are met.
    - All Precautions and Limitations have been reviewed.
    - All applicable steps up to step 5.1.4 have been completed.

Initiating Cue:

- The CRS has directed you to vent the Drywell to LT 0.5 psig as indicated on P813 CMS-PI-7 per SOP-CN-CONT-VENT beginning on step 5.1.4.
- Use SGT Train B and its Lead Fan to vent the Drywell.

START TIME:___________

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Provide candidate with the following:** • **Student JPM Information Sheet** • **Student Reference #1 (marked-up pages of SOP-CN-CONT-VENT)**	
Examiner Note: **All the following steps are directly from SOP-CN-CONT-VENT exactly as written. ALL manipulations are from H13-P813 for the venting steps and H13-P811 for the start of SGT B Train.**	
Step 1:  5.1.4 **VERIFY** CEP-V-11 **CLOSED** (Exhaust to Rx Bldg Plenum) (H13-P813). *Initials* Standard: • Verifies Green lamp ON and Red lamp OFF for CEP-V-11 on H13-P813.	____SAT ____UNSAT ____N/A
Step 2:  ~~NOTE:~~ The following step expects the SGT lead fan is to be operated. If the lag fan is to be operated, then start SGT per SOP-SGT-START. 5.1.7 IF venting through SGT Train B, THEN **PERFORM** the following (H13-P811) N/A if SGT already in operation: a. **VERIFY** SGT-V-2B is **OPEN** (Inlet from Reactor Building). *Initials* Standard: • Reads NOTE and place keeps. • Verifies Red lamp ON and Green lamp OFF for SGT-V-2B.	____SAT ____UNSAT ____N/A
Step 3:  b. **MOMENTARILY TURN** SGT-FN-1B2 fan control switch from **AUTO** to **PTL SYS. START**. *Initials* Standard: • **(Non critical)** Verbalizes expected response of "Main Heaters energize, SGT-V-5B2 automatically opens, and SGT-FN-1B2 starts within 10 seconds." • Momentarily places SGT-FN-1B2 Control Switch from **AUTO** to **PTL SYS.START** and releases back to **AUTO**	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**

Examiner Note: **The following step is Alternate Path.**

On step 5.1.7c (bullet 2), SGT-V-5B2 fails to auto open.

Operator action is required to manually open SGT-V-5B2.

Promptly opening SGT-V-5B2 is required to prevent the lead fan and heater low flow trip (LE 750 cfm). This trip has a 15 sec time delay upon initial start of the fan and is immediate on subsequent low flow conditions. If tripped, the following will occur:

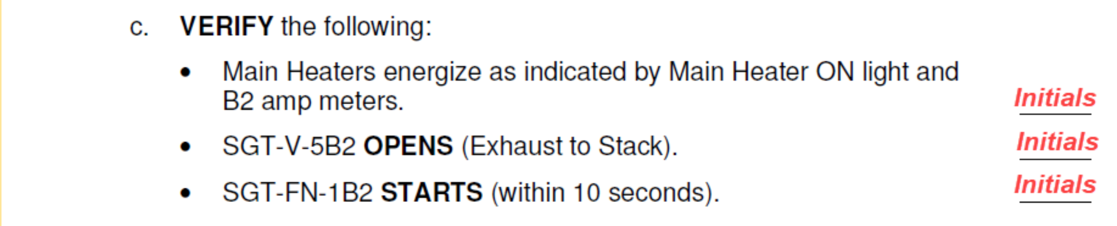
- **SGT-FN-1B2 stops.**
- **SGT-EHC-1B2 deenergizes.**
- **SGT-V-3B1 closes. (Fan Inlet)**
- **SGT-V-5B1 opens (Exhaust to Stack).**
- **SGT-EHC-1B1 energizes as indicated by the Main Heater B1 amp meter.**
- **SGT-FN-1B1 starts within 10 seconds after Main Heaters energize.**

The following 811.K2 Annunciator Panel alarms may occur:

- **2-3 HEPA B-1 OUTLET HEATER TEMPERATURE HIGH**
- **2-6 HEPA B-2 INLET HEATER TEMPERATURE HIGH**
- **3-1 STANDBY GAS TREATMENT FAN B-2 FLOW LOW**
- **4-1 STANDBY GAS TREATMENT FAN B-1 FLOW LOW**
- **4-4 CHARCOAL FILTER B-1 HEATER TEMPERATURE HIGH**

Examiner Note: **To satisfy Critical Step below, SGT-V-5B2 must be manually opened before causing a trip of SGT-FN-1B2 on low flow.**

Alt Path Step 4:



c. **VERIFY** the following:

- Main Heaters energize as indicated by Main Heater ON light and B2 amp meters. *Initials*
- SGT-V-5B2 **OPENS** (Exhaust to Stack). *Initials*
- SGT-FN-1B2 **STARTS** (within 10 seconds). *Initials*

Standard:

- **(Non-critical)** Verifies Main Heaters energize.
- Notes that SGT-V-5B2 fails to auto open and **manually opens SGT-V-5B2** by turning the switch clockwise (spring returns to auto).
- **(Non-critical)** Verifies the auto start of SGT-FN-1B2.

CRITICAL STEP

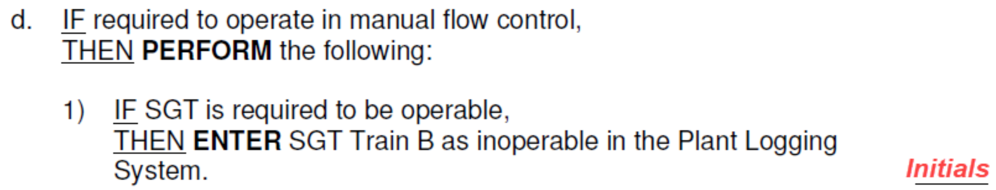
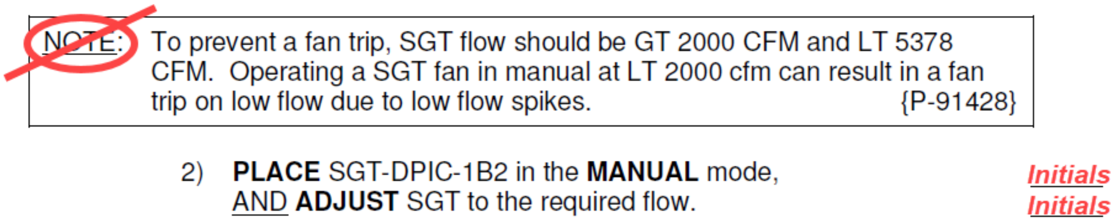
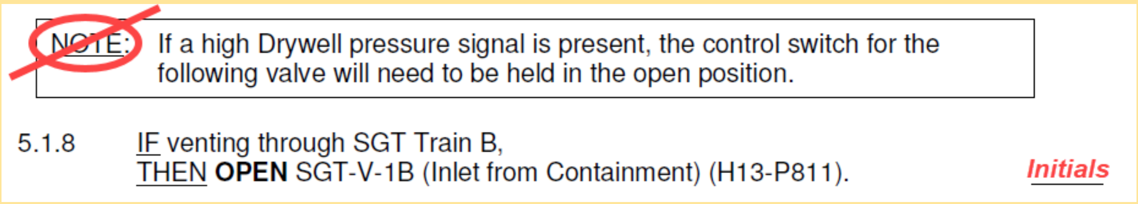
____SAT

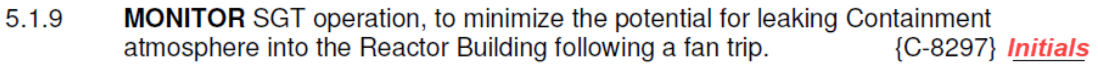
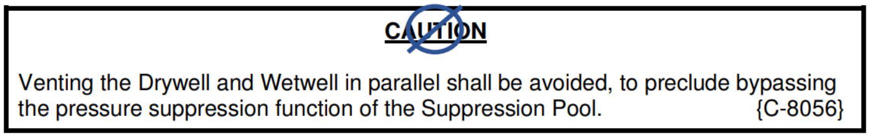
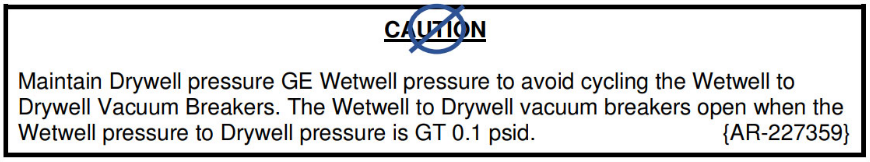
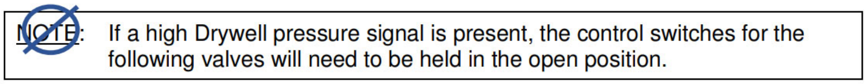
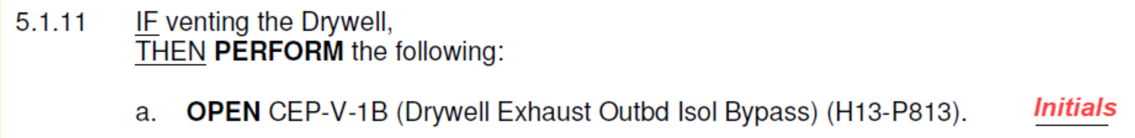
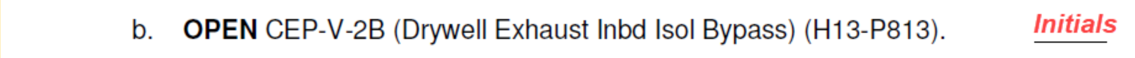
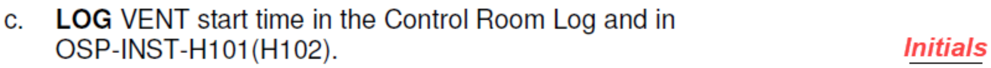
____UNSAT

____N/A

If candidate contacts CRS to report manually opening of SGT-V-5B2:

Examiner Cue: Acknowledge the report.

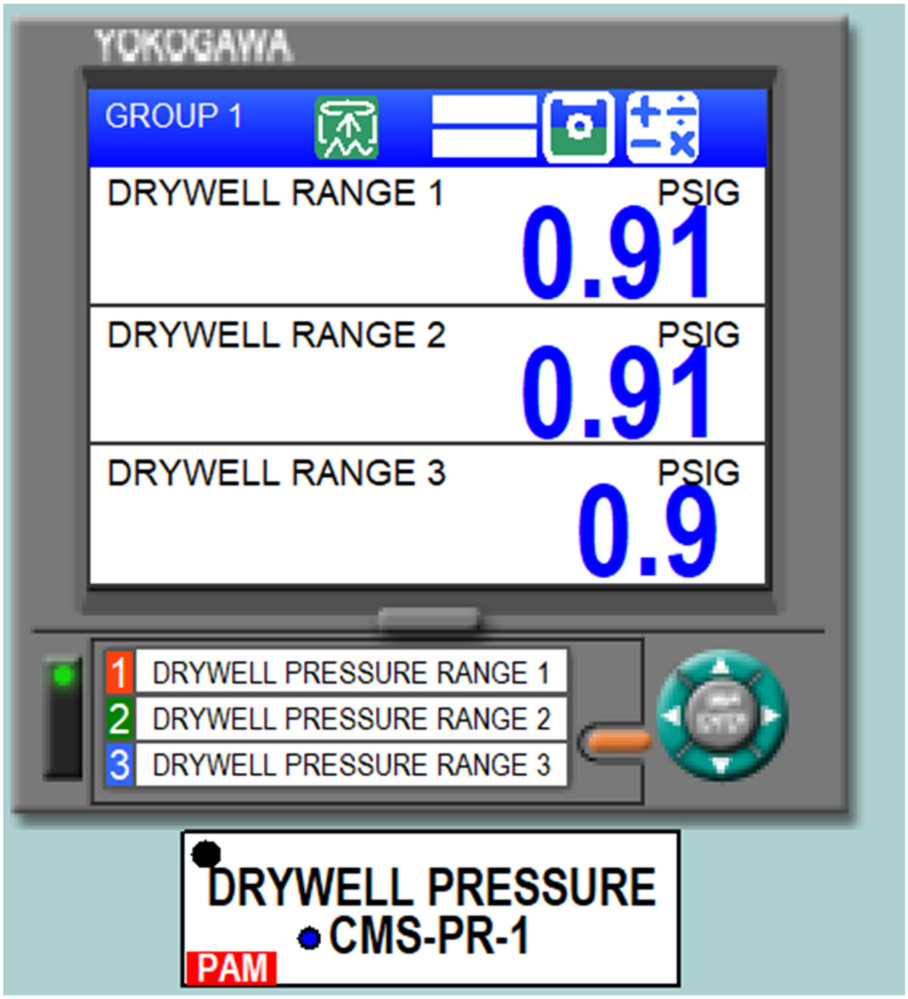
STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **P & L 4.18 states that maximum SGT flow is limited to 5378 cfm. If SGT Train B flow is above this value when running and does not appear to be lowering, the candidate MAY take manual control as specified below. This action INOPs the SGT Train.**	
Step 5:  d. IF required to operate in manual flow control, THEN **PERFORM** the following: 1) IF SGT is required to be operable, THEN **ENTER** SGT Train B as inoperable in the Plant Logging System. *Initials* Standard: • Notifies CRS of the requirement to enter SGT Train B as Inoperable in the Plant Logging System.	____SAT ____UNSAT ____N/A
If candidate contacts CRS to enter SGT Train B as Inoperable: **Examiner Cue: State, "SGT Train B has been entered as Inoperable in the Plant Logging System."**	
Step 6:  ~~NOTE:~~ To prevent a fan trip, SGT flow should be GT 2000 CFM and LT 5378 CFM. Operating a SGT fan in manual at LT 2000 cfm can result in a fan trip on low flow due to low flow spikes. {P-91428} 2) **PLACE** SGT-DPIC-1B2 in the **MANUAL** mode, AND **ADJUST** SGT to the required flow. *Initials* *Initials* Standard: • Reads NOTE and place keeps. • May go to MANUAL based on SGT flow indications.	____SAT ____UNSAT ____N/A
If candidate contacts CRS to report placing SGT-DPIC-1B2 in MANUAL and adjusting flow: **Examiner Cue: Acknowledge the report.**	
Step 7:  ~~NOTE:~~ If a high Drywell pressure signal is present, the control switch for the following valve will need to be held in the open position. 5.1.8 IF venting through SGT Train B, THEN **OPEN** SGT-V-1B (Inlet from Containment) (H13-P811). *Initials* Standard: • **(Non-critical)** Reads NOTE and place keeps. • Places the control switch for SGT-V-1B to **OPEN**. • **(Non-critical)** Verifies Red lamp ON and Green lamp OFF.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**
Step 8:  5.1.9 **MONITOR** SGT operation, to minimize the potential for leaking Containment atmosphere into the Reactor Building following a fan trip. {C-8297} *Initials* Standard: • Monitors operation of SGT.	____SAT ____UNSAT ____N/A
 **CAUTION** Venting the Drywell and Wetwell in parallel shall be avoided, to preclude bypassing the pressure suppression function of the Suppression Pool. {C-8056}  **CAUTION** Maintain Drywell pressure GE Wetwell pressure to avoid cycling the Wetwell to Drywell Vacuum Breakers. The Wetwell to Drywell vacuum breakers open when the Wetwell pressure to Drywell pressure is GT 0.1 psid. {AR-227359}  NOTE: If a high Drywell pressure signal is present, the control switches for the following valves will need to be held in the open position.	____SAT ____UNSAT ____N/A
Step 9:  5.1.11 IF venting the Drywell, THEN **PERFORM** the following: a. **OPEN** CEP-V-1B (Drywell Exhaust Outbd Isol Bypass) (H13-P813). *Initials* Standard: • **(Non-critical)** Reads NOTEs and place keeps. • Places control switch for CEP-V-1B to **OPEN**. • **(Non-critical)** Verifies Red lamp ON and Green lamp OFF.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 10:  b. **OPEN** CEP-V-2B (Drywell Exhaust Inbd Isol Bypass) (H13-P813). *Initials* Standard: • Places control switch for CEP-V-2B to **OPEN**. • **(Non-critical)** Verifies Red lamp ON and Green lamp OFF.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 11:  c. **LOG** VENT start time in the Control Room Log and in OSP-INST-H101(H102). *Initials* Standard: • Informs the CRS to log the vent start time.	____SAT ____UNSAT ____N/A
If candidate contacts CRS to log the vent start time: **Examiner Cue: State, "The vent start time has been logged."**	

STEP / STANDARD	SAT / UNSAT
Step 12: ~~NOTE~~: For normal Reactor operations, avoid cycling the Reactor Building to Wetwell Vacuum Breakers by maintaining the Drywell pressure between ~0.25 to 0.75 psig. {P-90135} d. IF venting to LT 1" wg to support deinerting/inerting, THEN at approximately 0.25 psig, **OPEN** IR-V-IR67/V38 (CMS-PI-9 Isolation) (RB 548, M8/5.7). N/A e. IF venting following ILRT/BLRT, THEN at approximately 0.25 psig, **PERFORM** Section 5.4, Containment Ventilating with RB HVAC. N/A Standard: • Per initial conditions, this is NOT being performed to support inerting and it is not following ILRT/BLRT. Steps 5.1.11.d and 5.1.11.e (above) have been annotated not applicable and no action is required.	____SAT ____UNSAT _X_N/A
Step 13: f. WHEN the Drywell is approximately 0.25 psig OR desired pressure is achieved, THEN **SECURE** Drywell vent as follows: 1) **CLOSE** CEP-V-1B. _____ 2) **RETURN** CEP-V-1B control switch to **NORMAL**. _____ 3) **CLOSE** CEP-V-2B. _____ 4) **RETURN** CEP-V-2B control switch to **NORMAL**. _____ Standard: • Continues to monitor Drywell pressure at CMS-PI-7. • May attempt to go to the front panels (H13-P601) for digital indication of Drywell pressure at CMS-PR-1 or -2 **OR** may ask for this indication.	____SAT ____UNSAT ____N/A
Examiner Cue: (Step 13)	**If the candidate attempts to go to the front panels or requests front panel indication, provide the candidate with the appropriate cue sheet below based on the indications seen at CMS-PI-7 (next 6 pages).**
Examiner Note:	**This task does not require the candidate to lower drywell pressure all the way to LT 0.5 psig. The task standard is considered met when venting is occurring, and Drywell pressure is lowering.**
Examiner Cue:	**Inform the candidate that the JPM is complete.**

STOP TIME: ___________

EXAMINER CUES FROM FRONT PANEL INDICATIONS
(IF REQUESTED)



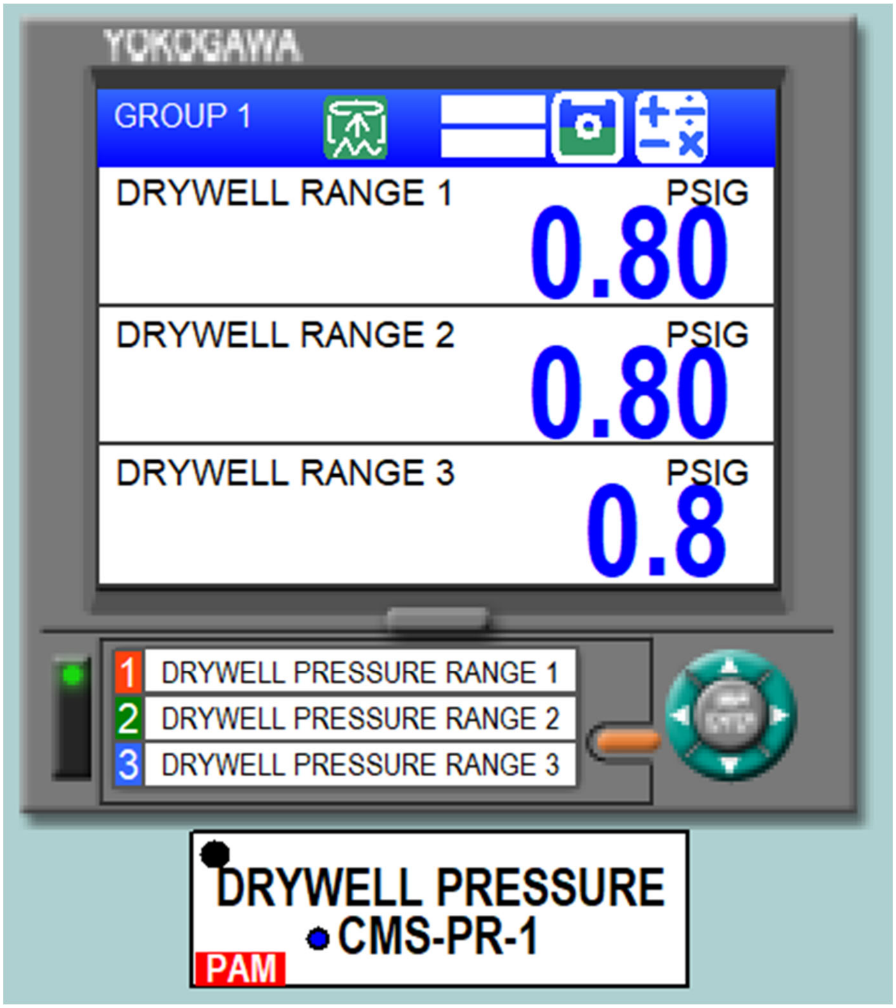
DRYWELL RANGE 1 PSIG 0.91

DRYWELL RANGE 2 PSIG 0.91

DRYWELL RANGE 3 PSIG 0.9

1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3

DRYWELL PRESSURE
CMS-PR-1
PAM



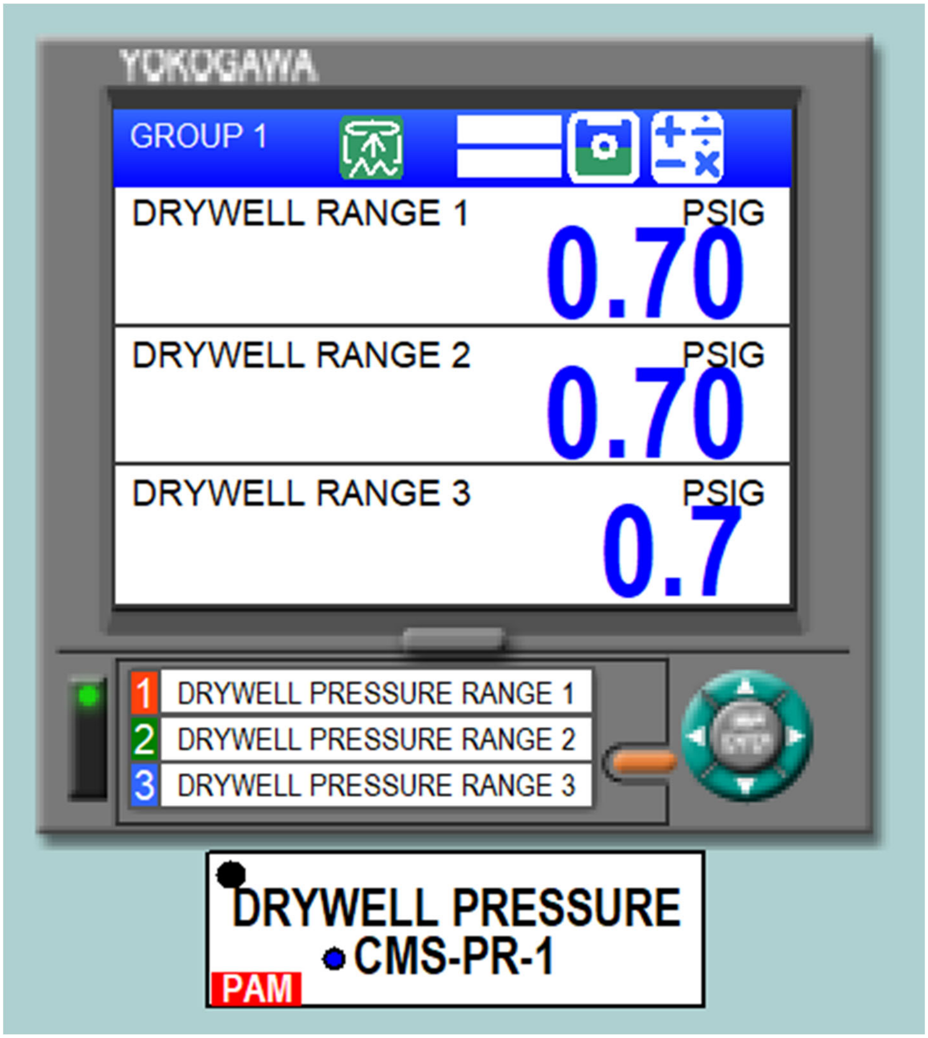
DRYWELL RANGE 1 PSIG 0.80

DRYWELL RANGE 2 PSIG 0.80

DRYWELL RANGE 3 PSIG 0.8

1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3

DRYWELL PRESSURE
CMS-PR-1
PAM

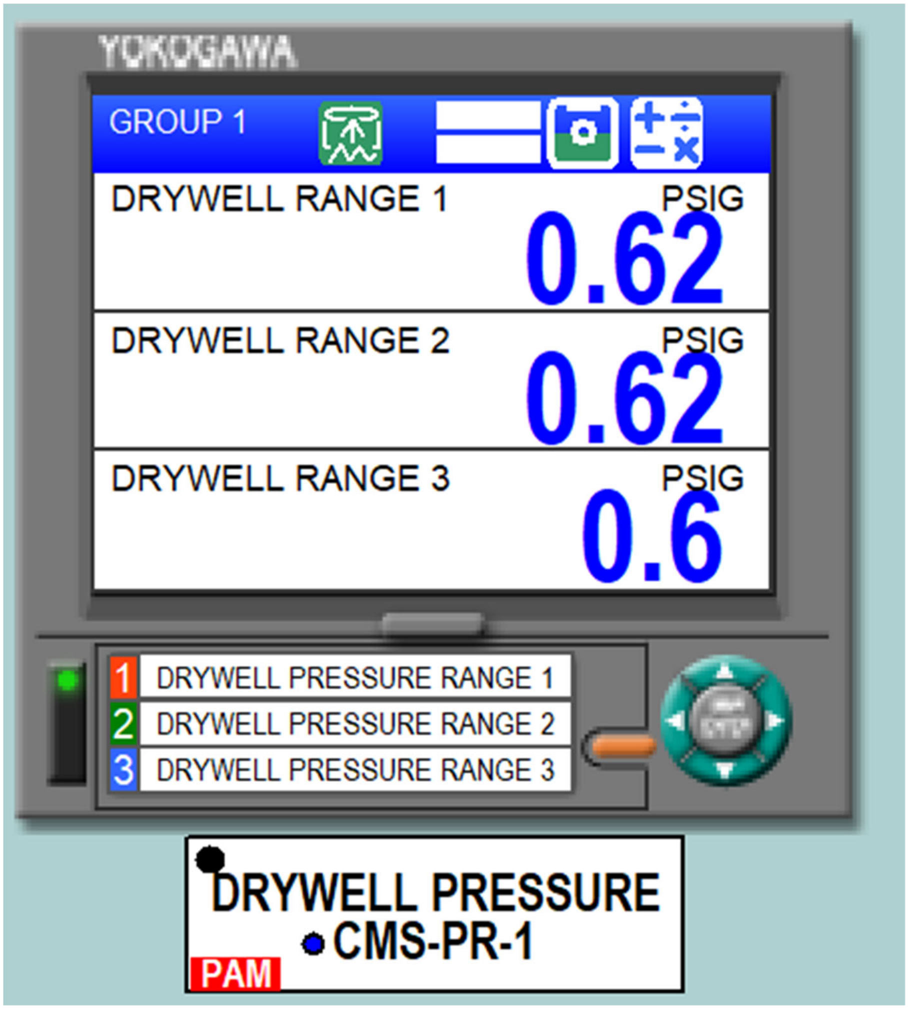


DRYWELL RANGE 1 PSIG 0.70

DRYWELL RANGE 2 PSIG 0.70

DRYWELL RANGE 3 PSIG 0.7

1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3



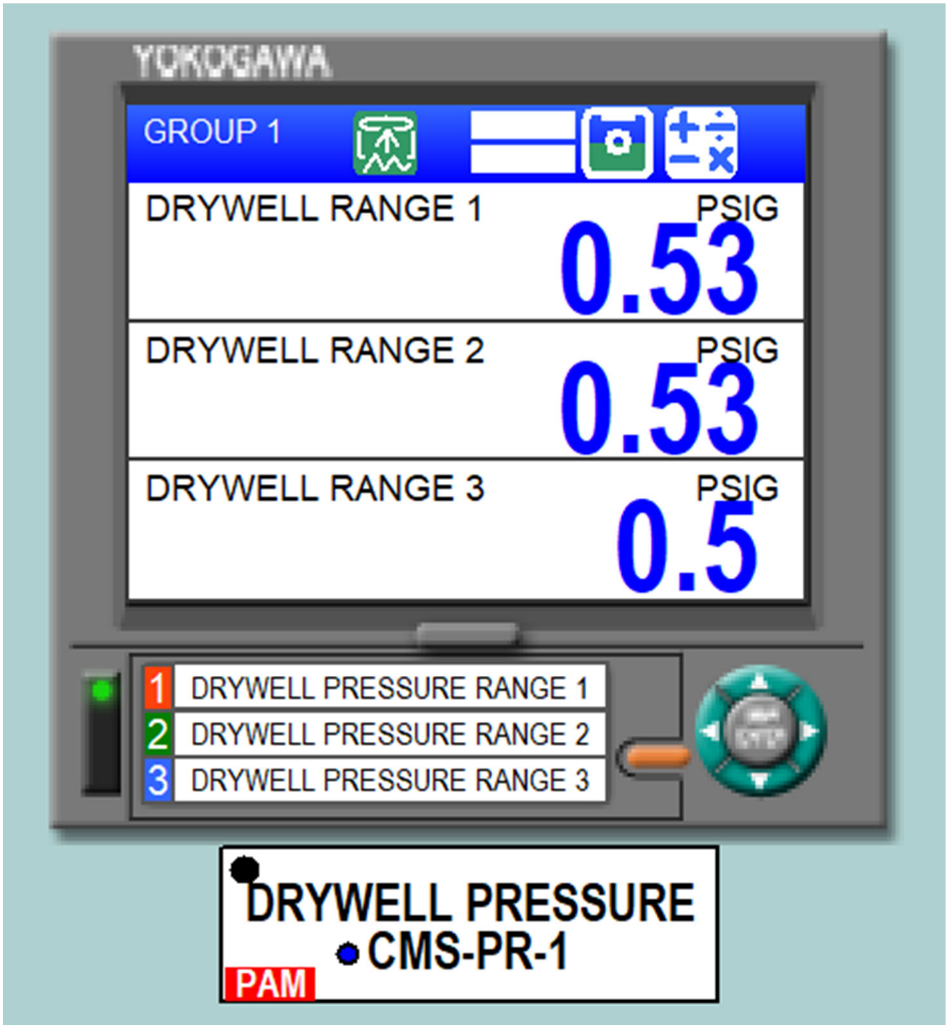
DRYWELL RANGE 1 PSIG 0.62

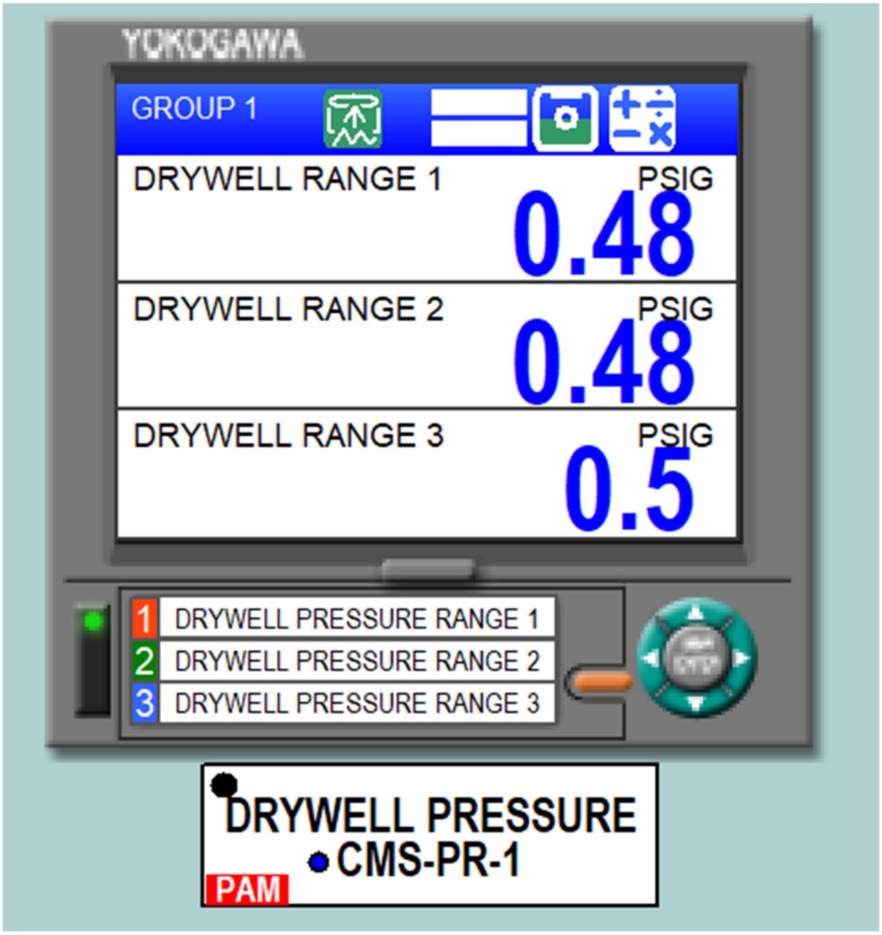
DRYWELL RANGE 2 PSIG 0.62

DRYWELL RANGE 3 PSIG 0.6

1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3

DRYWELL PRESSURE
CMS-PR-1


YOKOGAWA
GROUP 1
DRYWELL RANGE 1
PSIG
0.53
DRYWELL RANGE 2
PSIG
0.53
DRYWELL RANGE 3
PSIG
0.5
1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3
DRYWELL PRESSURE
CMS-PR-1
PAM



DRYWELL RANGE 1 PSIG 0.48

DRYWELL RANGE 2 PSIG 0.48

DRYWELL RANGE 3 PSIG 0.5

1 DRYWELL PRESSURE RANGE 1
2 DRYWELL PRESSURE RANGE 2
3 DRYWELL PRESSURE RANGE 3

DRYWELL PRESSURE
CMS-PR-1
PAM

RESULTS OF JPM ILC-25 S-5

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Upon starting SGT Train B per SOP-CN-CONT-VENT (step 5.1.7.b), recognizes SGT-V-5B2 failed to open and manually opens valve before a low-flow trip of fan SGT-FN-1B2 occurs. Manually opens SGT-V-1B, CEP-V-1B, and CEP-V-2B to establish the vent path. Observes Drywell pressure lowering.**

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

COMMENTS:

____
____
____
____
____
____
____
____
____
____
____
____
____
____
____
____

Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- CGS is operating at 100% Power with NO equipment out of service.
- Due to changing barometric conditions, Drywell pressure is slightly elevated (as indicated) and up slow.
- Wetwell pressure is less than Drywell pressure as expected.
- Per SOP-CN-CONT-VENT:
    - All Prerequisites are met.
    - All Precautions and Limitations have been reviewed.
    - All applicable steps up to step 5.1.4 have been completed.

Initiating Cue:

- The CRS has directed you to vent the Drywell to LT 0.5 psig as indicated on P813 CMS-PI-7 per SOP-CN-CONT-VENT <u>beginning on step 5.1.4</u>.

- Use SGT Train B and its Lead Fan to vent the Drywell.

Verify Revision Information Prior To Use	Initials	SR
	Date	Today

Number: SOP-CN-CONT-VENT	Use Category: CONTINUOUS	Major Rev: 027 Minor Rev: 001 Page: 1 of 35
Title: Containment Vent, Deinert, Purge, and Ventilating		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-CN-CONT-VENT	Effective Date: 06/11/18

Steve Rogers SR

DESCRIPTION OF CHANGES

Justification (required)
Incorporate changes for implementation of EC-11288, Replace Stack Monitor

Page(s)	**Description (including summary, reason, initiating document, if applicable)**
6, 8, 15, 24	Modified P&L 4.11, and Steps 5.1.1d, 5.2.4, and 5.3.6 to change EPN for low range rad monitor from PRM-RE-1A to PRM-RE-11 to match EPN designation for new VF Stack Monitor
11-12	MR-001, Editorial, Swapped steps 5.1.10 and 5.1.11. Both are conditional and the current practice of venting the WW before the DW but having the steps in the procedure reversed was error likely. (AR 374146)

TABLE OF CONTENTS

Page

1.0 PURPOSE

Provide instructions for Containment vent, deinert, purge, and ventilating.

2.0 REFERENCES

2.1 NUREG 0737 II.E.4.2.G, Maintain Vent and Purge Valves Closed {R-5078}

2.2 GO2-92-120, Bypass Leakage {C-8056}

2.3 LER 85-058, SGT Trip and Untreated Release {C-8297}

2.4 PER 290-0928, Drywell/Wetwell Design Basis Analysis {P-90135}

2.5 PER 292-0171, SGT Flow Limiters Set to High {P-91428}

2.6 PER 295-0919, Operational Vacuum Breakers {P-116998}

2.7 PER 299-1009, Fire Protection System and Barrier Impairment Permits {P-158665}

2.8 AR-338551, SGT-FN-1B1 auto start minutes after SGT-FN-1B2 shutdown. {AR-338551}

2.9 M543, Reactor Building Primary Containment Cooling and Purging System

2.10 M544, Standby Gas Treatment Reactor Building

2.11 M545, Heating, Ventilating and Air Conditioning Reactor Building

2.12 M783, Primary Containment Nitrogen Inerting System

2.13 CI-15.2, Daily Monitor Data

2.14 ISPM-20 Electrical Arc Protection Work Practices and PPE Requirements

2.15 OSP-CVB/IST-M701, Vacuum Breaker Operability

2.16 OSP-INST-H101 and OSP-INST-H102, Shift and Daily Instrument Checks

2.17 SOP-CIA-OPS, Containment Instrument Air System Operations

2.18 SOP-CN-CONT-INERTING, Containment Inerting

2.19 SOP-CRA-OPS, Primary Containment Cooling System Operation

2.20 SOP-ENTRY-DRYWELL, Personnel Entry Into Drywell

2.21 SOP-ENTRY-WETWELL, Personnel Entry into Wetwell

2.22 SOP-SGT-STBY, Standby Gas Treatment Standby

2.23 SOP-SGT-START, Standby Gas Treatment Start

2.24 SOP-SGT-SHUTDOWN, Standby Gas Treatment Shutdown

2.25 SOP-TIP-OPS, TIP System Operations

2.26 PPM 12.2.2, Sampling System Components Locations and Valve Line Up

2.27 PPM 12.5.8, Gaseous Effluent Discharge Sampling

2.28 PPM 16.11.3, Primary Containment Purge Sampling and Analysis

2.29 SWP-MAI-02, Plant Material Condition Inspection Program

3.0 PREREQUISITES

3.1 **VERIFY** Primary Containment Venting, Deinerting, Purging, and Ventilating Valve Lineup, SOP-CN-CONT-VENT-LU, has been completed, as determined by the CRS/designee. SR

3.2 **VERIFY** Containment atmosphere analysis is available. SR

3.3 **VERIFY** Containment Radiation Monitoring System Leak and LOCA Monitoring Equipment is available. SR

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The 90 hour limitation for venting or purging Primary Containment through the 24" and 30" CSP/CEP valves in Modes 1, 2, or 3 has been removed from Technical Specification. However, due to LOCA concerns, the practice of limiting the amount of time in this condition shall be minimized and monitored by logging the time in the Control Room Log. {R-5078}

4.2 In Modes 1, 2, or 3, Primary Containment shall not be routinely vented or purged through the 24 and 30-inch CSP/CEP valves {R-5078}

4.3 In Modes 1, 2, or 3, only one 24" CSP and one 30" CEP line will be open at any one time. (FSAR 6.2.1.1.8.2)

4.4 In Modes 1, 2, or 3, when VENTING or PURGING, the first 24 hours is through a functional SGT Train with the other Operable. (ODCM 6.2.2.6)

4.5 In Mode 4 and deinerting, the first 24 hours is through one or two functional SGT Trains. (ODCM 6.2.2.6)

4.6 In Modes 1, 2, or 3, or when deinerting, when not using SGT, after the first 24 hours of any VENTING or PURGING, the Primary Containment Vent and Purge System is used. (ODCM 6.2.2.6)

4.7 Alignment for VENTING or PURGING through Standby Gas Treatment or the Primary Containment Vent and Purge System shall be verified within 4 hours prior to the start of, and at least once per 12 hours during VENTING or PURGING. (ODCM 6.2.2.6)

4.8 In Modes 1, 2, or 3, use only one of the SGT trains when VENTING or PURGING.

4.9 Primary Containment sampling and analysis is not required for a Primary Containment VENT when the VENT path is through SGT, via the two-inch bypass line, with Containment noble gas monitoring LT the alarm setpoint. (ODCM 6.2.2.1)

4.10 Sample and analysis is required 8 hours prior to each PURGE, regardless of flowpath. (ODCM 6.2.2.1)

4.11 If the RB Elevated Release Low Range Radiation Monitor (PRM-RE-11) is Inoperable, then Primary Containment noble gas, iodine, and particulate grab sample and analysis shall be completed at least once per 12 hours during VENT and PURGE. (ODCM 6.2.2.1)

4.12 To avoid a Drywell high pressure trip during a normal startup, due to air or gas expansion, and control air leakage, the Drywell pressure should be reduced as required by venting the system through the 2-inch CEP valves.

4.13 Initial personnel entry into Containment is governed by SOP-ENTRY-DRYWELL and SOP-ENTRY-WETWELL.

4.14 The Containment Vent and Purge system shall not be used to control Containment temperature or humidity during Reactor operation. (FSAR 6.2.1.1.8.2)

4.15 Changes in barometric pressure may cause indicated Drywell pressure to change, a barometric pressure rise of 0.2" Hg will cause indicated Drywell pressure to drop by 0.1 psig.

4.16 For normal Reactor operations, avoid cycling Reactor Building to Wetwell Vacuum Breakers by maintaining Drywell pressure between ~0.25 to 0.75 psig. {P-90135}

4.17 Allowing the Wetwell to Drywell Vacuum Breakers to cycle may cause unnecessary contamination of the Drywell.

4.18 Due to calibration correction factor, maximum SGT flow is 5378 cfm. {P-91428}

4.19 Venting Containment may affect Suppression Pool level indication.

4.20 Prior to attempting to open CSP-V-7, 8 or 10, ensure the piping space between it and its companion upstream butterfly valve is depressurized. {P-116998}

4.21 Drywell particulate concentration and noble gas concentration is expected to decrease during drywell purging if identified and unidentified leakage remains constant. The magnitude of the noble gas and particulate concentration decrease is dependent on several factors including purge rate, initial identified and unidentified leak rates, radionuclide equilibrium levels, and mixture of short lived and long lived isotopes. Purging may also decrease FDR measured unidentified leak rate due to purging removing moist air. Analysis has shown that under all conditions up to and including the maximum purge rate of 10,500 cfm, the drywell particulate concentration will at least double within one hour to the alarm setpoint even if unidentified leakage were to increase by one gpm concurrent with the start of drywell purging. RCS pressure boundary leakage should be closely monitored during purging to account for the impact on measured parameters.

4.22 If paint fumes, chemical fumes, or combustion products are drawn into an SGT unit, an evaluation by Technical shall be performed (normally within 24 hours) to determine whether a carbon sample and bypass test is required. This does not require declaring SGT inoperable. Operability is determined by the evaluation results.

5.0 PROCEDURE

5.1 Drywell and/or Wetwell Venting

5.1.1 **RECORD** the following in OSP-INST-H101(H102).

> NOTE: Primary Containment sampling and analysis is not required for a Primary Containment VENT when the VENT path is through SGT via the two-inch bypass line and when Containment noble gas monitoring is LT the alarm setpoint. (ODCM 6.2.2.1)
>
> NOTE: Primary Containment sampling and analysis takes approximately 2 hours and must be completed within 8 hours prior to VENT.

a. IF Primary Containment sampling and analysis is required, THEN **COMPLETE** analysis within 8 hours prior to each VENT and PURGE, per PPM 16.11.3. (ODCM 6.2.2.1) N/A SR

> NOTE: ODCM 6.2.2.6 requirements do apply to depressurization following BLRT.

b. **VERIFY** one of the following prior to VENTING or PURGING and when deinerting. N/A the other two substeps. N/A during depressurization following ILRT. (ODCM 6.2.2.6)

- In Modes 1, 2, or 3, the first 24 hours is through a functional SGT Train with the other Operable. SR
- In Mode 4 and deinerting, the first 24 hours is through one or two functional SGT Trains. N/A SR
- In Modes 1, 2, and 3 or when deinerting, when not using SGT, after the first 24 hours of any VENTING or PURGING, the Primary Containment Vent and Purge System is used. N/A SR

c. In Modes 1, 2, and 3 or when deinerting, within 4 hours prior to start and once per 12 hours, **VERIFY** Containment is aligned for VENTING or PURGING through SGT or the Primary Containment Vent and Purge System. N/A during depressurization following ILRT. (ODCM S.R. 6.2.2.6.1) SR

d. IF PRM-RE-11 (RB Elevated Release Low Range Radiation Monitor) is Inoperable,
THEN **COMPLETE** the Primary Containment noble gas, iodine, and particulate grab sample and analysis at least once per 12 hours during VENT or PURGE. (ODCM 6.2.2.1) N/A SR

5.1.2 IF both CMS-RIS-12A Channel 1 and CMS-RIS-12B Channel 1 are not functional,
THEN **PERFORM** the following:

- **NOTIFY** Chemistry to perform PPM 16.11.3 (Primary Containment Sampling and Analysis). N/A SR
- **N/A** Step 5.1.3. N/A SR

5.1.3 **VERIFY** the following for CMS-RIS-12A Channel 1 and CMS-RIS-12B Channel 1 at PRM-RR-1 and PRM-RR-2 (Bd-Rad-22 and Bd-Rad-23).

- At least one is functional. SR
- Activity levels have not increased GT 15 percent in the last hour. SR
- Activity levels have been LT the alarm setpoint for the last hour. SR

5.1.4 **VERIFY** CEP-V-11 **CLOSED** (Exhaust to Rx Bldg Plenum) (H13-P813). ____

NOTE: The following step expects the SGT lead fan is to be operated. If the lag fan is to be operated, then start SGT per SOP-SGT-START.

5.1.5 IF venting through SGT Train A,
THEN **PERFORM** the following (H13-P827) N/A if SGT already in operation:

a. **VERIFY** SGT-V-2A is **OPEN** (Inlet from Reactor Building). N/A SR

b. **MOMENTARILY TURN** SGT-FN-1A1 fan control switch from **AUTO** to **PTL SYS. START**. ____

c. **VERIFY** the following:

- Main Heaters energize as indicated by Main Heater ON light and A1 amp meter. ____
- SGT-V-5A1 **OPENS** (Exhaust to Stack). ____
- SGT-FN-1A1 **STARTS** (within 10 seconds). ____

d. IF required to operate in manual flow control,
THEN **PERFORM** the following:

1) IF SGT is required to be operable,
THEN **ENTER** SGT Train A as inoperable in the Plant Logging System. ____

NOTE: To prevent a fan trip, SGT flow should be GT 2000 CFM and LT 5378 CFM. Operating a SGT fan in manual at LT 2000 cfm can result in a fan trip on low flow due to low flow spikes. {P-91428}

2) **PLACE** SGT-DPIC-1A1 in the **MANUAL** mode,
AND **ADJUST** SGT to the required flow. N/A SR

> NOTE: If a high Drywell pressure signal is present, the control switch for the following valve will need to be held in the open position.

5.1.6 IF venting through SGT Train A,
THEN **OPEN** SGT-V-1A (Inlet from Containment) (H13-P827). N/A SR

> NOTE: The following step expects the SGT lead fan is to be operated. If the lag fan is to be operated, then start SGT per SOP-SGT-START.

5.1.7 IF venting through SGT Train B,
THEN **PERFORM** the following (H13-P811) N/A if SGT already in operation:

a. **VERIFY** SGT-V-2B is **OPEN** (Inlet from Reactor Building). _____

b. **MOMENTARILY TURN** SGT-FN-1B2 fan control switch from **AUTO** to **PTL SYS. START**. _____

c. **VERIFY** the following:

- Main Heaters energize as indicated by Main Heater ON light and B2 amp meters. _____
- SGT-V-5B2 **OPENS** (Exhaust to Stack). _____
- SGT-FN-1B2 **STARTS** (within 10 seconds). _____

d. IF required to operate in manual flow control,
THEN **PERFORM** the following:

1) IF SGT is required to be operable,
THEN **ENTER** SGT Train B as inoperable in the Plant Logging System. _____

> NOTE: To prevent a fan trip, SGT flow should be GT 2000 CFM and LT 5378 CFM. Operating a SGT fan in manual at LT 2000 cfm can result in a fan trip on low flow due to low flow spikes. {P-91428}

2) **PLACE** SGT-DPIC-1B2 in the **MANUAL** mode, _____
AND **ADJUST** SGT to the required flow. _____

> NOTE: If a high Drywell pressure signal is present, the control switch for the following valve will need to be held in the open position.

5.1.8 IF venting through SGT Train B,
THEN **OPEN** SGT-V-1B (Inlet from Containment) (H13-P811). _____

5.1.9 **MONITOR** SGT operation, to minimize the potential for leaking Containment atmosphere into the Reactor Building following a fan trip. {C-8297} _____

CAUTION

Venting the Drywell and Wetwell in parallel shall be avoided, to preclude bypassing the pressure suppression function of the Suppression Pool. {C-8056}

CAUTION

Maintain Drywell pressure GE Wetwell pressure to avoid cycling the Wetwell to Drywell Vacuum Breakers. The Wetwell to Drywell vacuum breakers open when the Wetwell pressure to Drywell pressure is GT 0.1 psid. {AR-227359}

NOTE: If a high Drywell pressure signal is present, the control switches for the following valves will need to be held in the open position.

5.1.10 IF Wetwell pressure is GT Drywell pressure,
OR Wetwell venting is desired,
THEN **PERFORM** the following:

a. **OPEN** CEP-V-3B (Wetwell Exhaust Outbd Isol Bypass)(H13-P813). N/A SR

b. **OPEN** CEP-V-4B (Wetwell Exhaust Inbd Isol Bypass)(H13-P813). _____

c. **LOG** VENT start time in the Control Room Log and in OSP-INST-H101(H102). _____

d. WHEN the Wetwell is approximately 0.5 psig,
OR desired pressure is achieved,
THEN **SECURE** Wetwell vent as follows:

1) **CLOSE** CEP-V-3B. _____

2) **RETURN** CEP-V-3B control switch to **NORMAL**. _____

3) **CLOSE** CEP-V-4B. _____

4) **RETURN** CEP-V-4B control switch to **NORMAL**. _____

e. **LOG** VENT stop time in the Control Room Log and in OSP-INST-H101(H102). N/A SR

5.1.11 IF venting the Drywell,
THEN **PERFORM** the following:

a. **OPEN** CEP-V-1B (Drywell Exhaust Outbd Isol Bypass) (H13-P813). ______

b. **OPEN** CEP-V-2B (Drywell Exhaust Inbd Isol Bypass) (H13-P813). ______

c. **LOG** VENT start time in the Control Room Log and in OSP-INST-H101(H102). ______

> NOTE: For normal Reactor operations, avoid cycling the Reactor Building to Wetwell Vacuum Breakers by maintaining the Drywell pressure between ~0.25 to 0.75 psig. {P-90135}

d. IF venting to LT 1" wg to support deinerting/inerting,
THEN at approximately 0.25 psig, **OPEN** IR-V-IR67/V38 (CMS-PI-9 Isolation) (RB 548, M8/5.7). N/A JR

e. IF venting following ILRT/BLRT,
THEN at approximately 0.25 psig, **PERFORM** Section 5.4, Containment Ventilating with RB HVAC. N/A JR

f. WHEN the Drywell is approximately 0.25 psig
OR desired pressure is achieved,
THEN **SECURE** Drywell vent as follows:

1) **CLOSE** CEP-V-1B. ______

2) **RETURN** CEP-V-1B control switch to **NORMAL**. ______

3) **CLOSE** CEP-V-2B. ______

4) **RETURN** CEP-V-2B control switch to **NORMAL**. ______

g. **LOG** VENT stop time in the Control Room Log and in OSP-INST-H101(H102). ______

5.1.12 IF further venting is required,
THEN **REPEAT** the previous two steps as necessary. ______

5.1.13 **CLOSE** SGT-V-1A(1B). ______

5.1.14 **OPERATE** SGT approximately five minutes longer, to purge nitrogen or airborne contamination. ______

5.1.15 IF venting for deinerting, inerting or purging,
THEN **MAINTAIN** SGT in operation. ______

ILC-25 S-6

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-6

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ______ Rev. No. ______

SIMULATOR GUIDE PQD CODE ______ Rev. No. ______

JPM PQD CODE ______ Rev. No. ______

EXAM PQD CODE ______ Rev. No. ______

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY ______ DATE ______

TECHNICAL REVIEW BY ______ DATE ______

INSTRUCTIONAL REVIEW BY ______ DATE ______

APPROVED BY ______ DATE ______

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Restores RCC to service following an NS4 isolation by taking RCC pumps to PTL, resetting isolation logic, closing load shed breakers, closing RRC pump cooling water supply valves, starting first RCC pump, throttling open RRC pump cooling water supply valves, starting a second RCC pump, opening RCC-V-6, and placing third RCC pump in AUTO.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0054 Recover from RPV low water level or high drywell pressure FAZ signal.

K/A Importance Factors: **RO:** 4.2 **SRO:** 3.7

K/A Number: 400000 A2.11

K/A Statement: Ability to (a) predict the impacts of the following on the Component Cooling Water System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations: Loss of cooling to reactor recirculation pump.

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 8 - Plant Service Systems

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (<u>when directed by the JPM</u>):
  - Student JPM Information Sheet **(Page 13)**
  - Student Reference #1 **(JPM S-6 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (next page).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
ABN-FAZ	021	N/A
SOP-ELEC-BKR-OPS-QC	000	N/A

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-190**. IC places the plant in a post scram condition: • Plant is scrammed. • NS4 Group 2 - 7 isolations have occurred. • Drywell pressure is stable at 1.1 psig. • RPV level is stable at 30”. Load Schedule File: **No Schedule File is needed.** Acknowledge all annunciators on front panels. Turn off all annunciators for panels that will not be monitored by the candidate(s) during the performance of this JPM set. **DO NOT TAKE THE SIMULATOR TO RUN until cued by examiner.**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

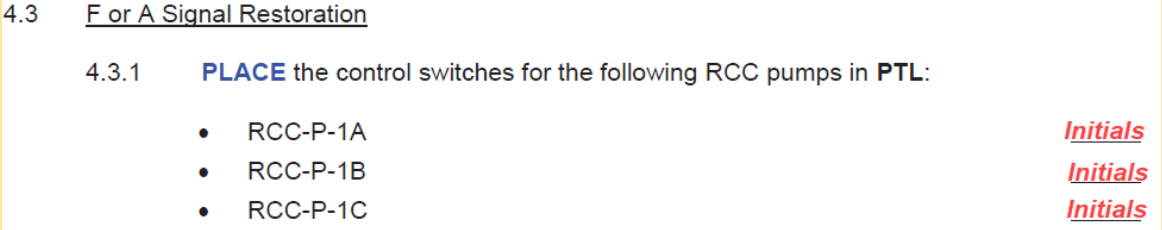
Initial Conditions:

- An automatic reactor scram and NS4 Group 2 - 7 isolations have occurred.
- PPM 5.1.1 (RPV Control) and ABN-FAZ have been entered to mitigate the event and stabilize the plant.
- Drywell Pressure and RPV Level have stabilized.
- The F and A signals no longer exist.
- Shift Manager's permission has been received to reset NS4 logic and restore isolated systems.
- The RCC system remained full during the isolation.
- OPS2 is standing by to perform actions in the field.

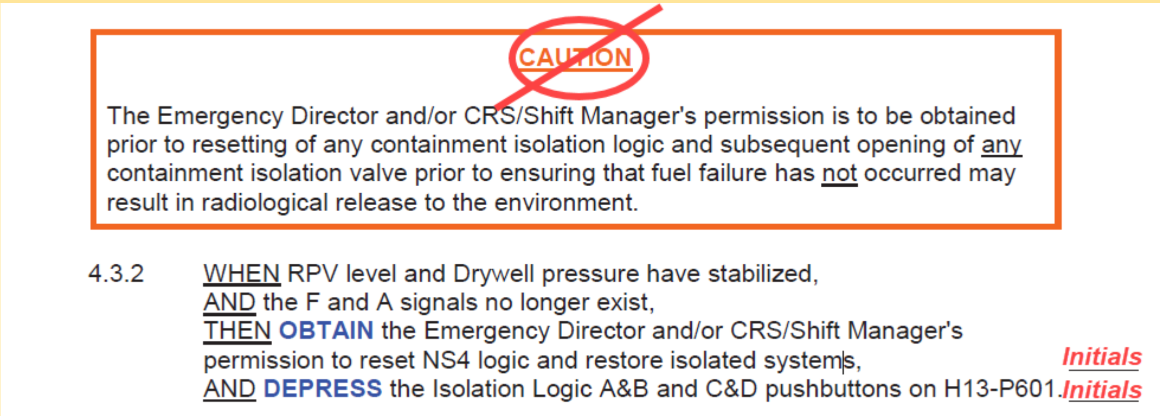
Initiating Cue:

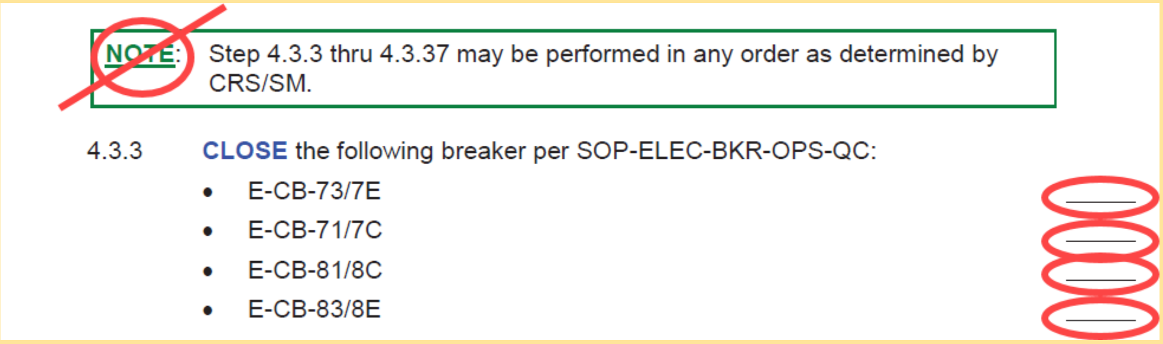
- The CRS has directed you to restore RCC to service per steps 4.3.1 through 4.3.4 of ABN-FAZ.
- Inform the CRS when all actions for RCC restoration have been completed.

START TIME:___________

STEP / STANDARD	SAT / UNSAT
Examiner Note: **Provide the candidate with the student information card (last page of this write-up) and a copy of ABN-FAZ.**	
Examiner Note: **Provide candidate with the following:** • **Student JPM Information Sheet** • **Student Reference #1 (Pages of ABN-FAZ)**	
Examiner Note: **This JPM requires the candidate to go to several panels, both front and back, to be successful. The panel numbers and Attachment 1 (MCR Panel Map) are provided for the Examiner ONLY.**	
Examiner Note: **All Steps below are directly from ABN-FAZ exactly as written. Initialing steps and Circle/Slashing notes are expected but not required for satisfactory completion of steps.**	
Step 1:  4.3 F or A Signal Restoration 4.3.1 **PLACE** the control switches for the following RCC pumps in **PTL**: • RCC-P-1A *Initials* • RCC-P-1B *Initials* • RCC-P-1C *Initials* Standard: Places control switches in PTL (H13-P820): • RCC-P-1A • RCC-P-1B • RCC-P-1C	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**

Step 2:

~~CAUTION~~
The Emergency Director and/or CRS/Shift Manager's permission is to be obtained prior to resetting of any containment isolation logic and subsequent opening of any containment isolation valve prior to ensuring that fuel failure has not occurred may result in radiological release to the environment.
4.3.2 WHEN RPV level and Drywell pressure have stabilized,
AND the F and A signals no longer exist,
THEN **OBTAIN** the Emergency Director and/or CRS/Shift Manager's permission to reset NS4 logic and restore isolated systems, *Initials*
AND **DEPRESS** the Isolation Logic A&B and C&D pushbuttons on H13-P601. *Initials*
Standard:
• **(Non-critical)** Reads CAUTION and place keeps.
• **(Non-critical)** Recognizes from initial conditions that:
  • RPV level and Drywell pressure have stabilized.
  • The F and A signals no longer exist.
  • The Shift Manager's permission has been received to reset NS4 logic and restore isolated systems.
• Depresses the Isolation Logic A&B and C&D pushbuttons (H13-P601).
	CRITICAL STEP
	____SAT
	____UNSAT
	____N/A

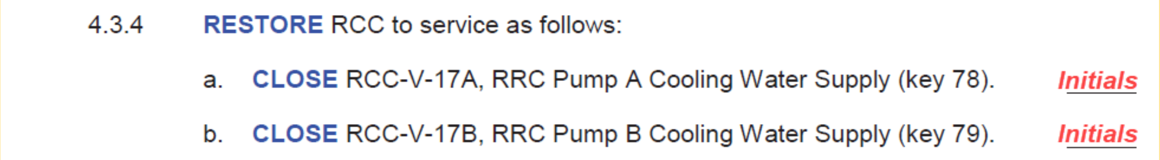
Step 3:

~~NOTE~~: Step 4.3.3 thru 4.3.37 may be performed in any order as determined by CRS/SM.
4.3.3 **CLOSE** the following breaker per SOP-ELEC-BKR-OPS-QC:
• E-CB-73/7E ____
• E-CB-71/7C ____
• E-CB-81/8C ____
• E-CB-83/8E ____
Standard:
• **(Non-critical)** Reads NOTE and place keeps.
Examiner Note: SOP-ELEC-BKR-OPS-QC is not provided – not needed for JPM.
• Contacts OPS2 to close the following breakers per SOP-ELEC-BKR-OPS-QC:
  1. E-CB-73/7E
  2. E-CB-71/7C
  3. E-CB-81/8C
  4. E-CB-83/8E
• **(Non-critical)** Circles steps for OPS2 to initial later.
	CRITICAL STEP
	____SAT
	____UNSAT
	____N/A

Examiner Cue: • **When student directs closing the breakers, activate "E-CB-71/7C and 73/7E" and "E-CB-81/8C and 83/8E" in "Local Action Trigger Files" on "Navigation and Links" page.** • **Respond as OPS2: "All breakers have been closed."**	

Examiner Note: **The control switches for RCC-V-17A and 17B are throttleable and must be held in CLOSE until valve stroke complete. RCC-V-17A and 17B are also throttleable in the OPEN direction.**

STEP / STANDARD	**SAT / UNSAT**

Step 4:



4.3.4 **RESTORE** RCC to service as follows:

a. **CLOSE** RCC-V-17A, RRC Pump A Cooling Water Supply (key 78). *Initials*

b. **CLOSE** RCC-V-17B, RRC Pump B Cooling Water Supply (key 79). *Initials*

Standard:

- Retrieves Keys 78 and 79 from MCR key box.
- Closes valves RCC-V-17A and 17B (H13-P614).

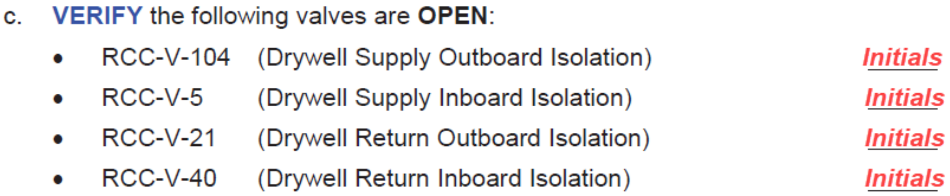
CRITICAL STEP

___SAT

___UNSAT

___N/A

Step 5:



c. **VERIFY** the following valves are **OPEN**:

- RCC-V-104 (Drywell Supply Outboard Isolation) *Initials*
- RCC-V-5 (Drywell Supply Inboard Isolation) *Initials*
- RCC-V-21 (Drywell Return Outboard Isolation) *Initials*
- RCC-V-40 (Drywell Return Inboard Isolation) *Initials*

Standard:

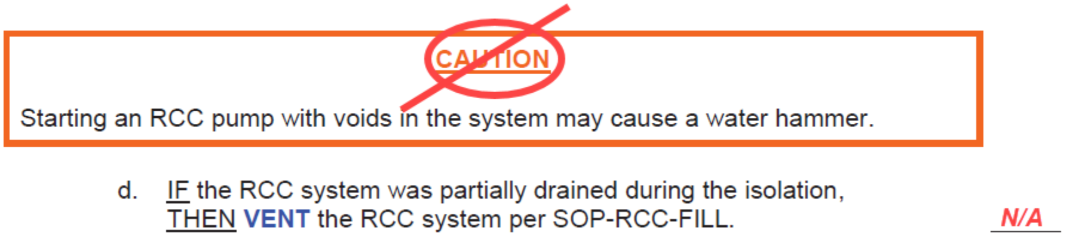
- Verifies valves are open (H13-P825).

___SAT

___UNSAT

___N/A

Step 6:



~~CAUTION~~

Starting an RCC pump with voids in the system may cause a water hammer.

d. IF the RCC system was partially drained during the isolation, THEN **VENT** the RCC system per SOP-RCC-FILL. *N/A*

Standard:

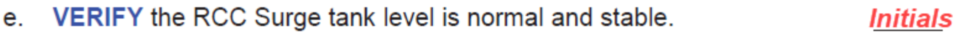
- Reads CAUTION and place keeps.
- Recognizes from initial conditions that the RCC system remained full during the isolation and marks step "N/A."

___SAT

___UNSAT

___N/A

Step 7:



e. **VERIFY** the RCC Surge tank level is normal and stable. *Initials*

Standard:

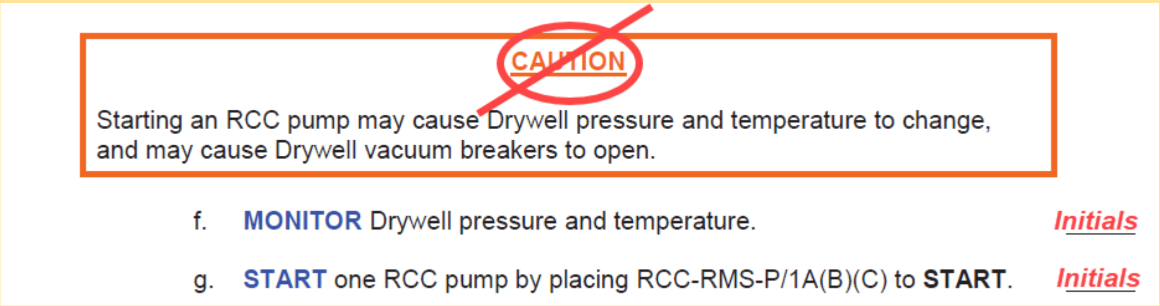
- Verifies RCC Surge tank level is normal and stable (~1.135' to ~2.75') (H13-P825).

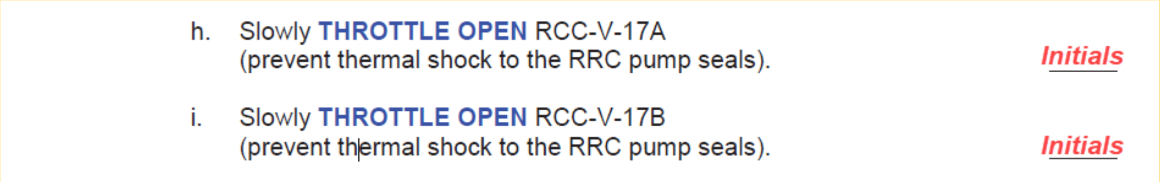
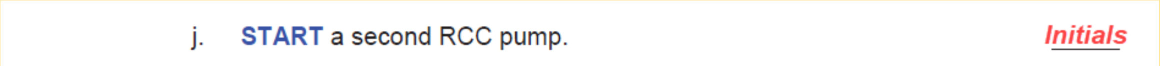
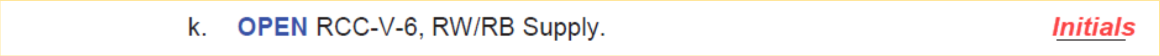
___SAT

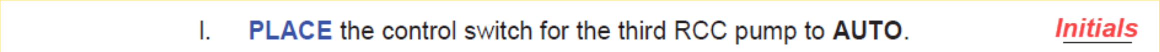
___UNSAT

___N/A

STEP / STANDARD	SAT / UNSAT

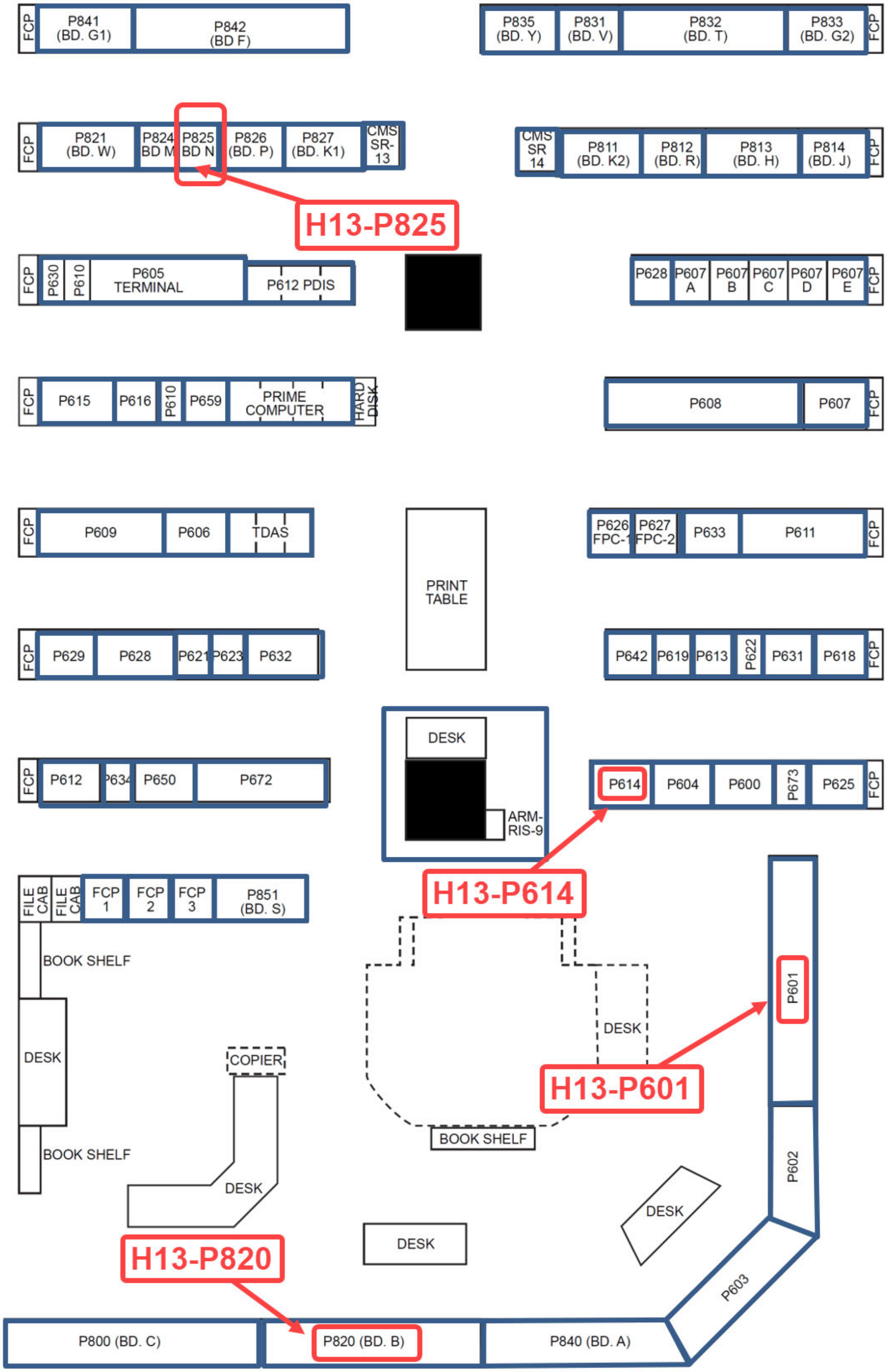
Step 8:

~~CAUTION~~
Starting an RCC pump may cause Drywell pressure and temperature to change, and may cause Drywell vacuum breakers to open.
f. **MONITOR** Drywell pressure and temperature. *Initials*
g. **START** one RCC pump by placing RCC-RMS-P/1A(B)(C) to **START**. *Initials*
Standard:
• **(Non-critical)** Reads CAUTION and place keeps.
• **(Non-critical)** Monitors Drywell pressure and temperature (H13-P601).
  • CMS-PR-1 and CMS-PR-2.
  • CMS-TR-5 and CMS-TR-6.
  • CMS-TI-5
• Starts one RCC pump (H13-P820).
	CRITICAL STEP
	____SAT
	____UNSAT
	____N/A

Step 9:  h. Slowly **THROTTLE OPEN** RCC-V-17A (prevent thermal shock to the RRC pump seals). *Initials* i. Slowly **THROTTLE OPEN** RCC-V-17B (prevent thermal shock to the RRC pump seals). *Initials* Standard: • Throttles open RCC-V-17A and RCC-V-17B (H13-P614).	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 10:  j. **START** a second RCC pump. *Initials* Standard: • Starts a second RCC pump (H13-P820).	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 11:  k. **OPEN** RCC-V-6, RW/RB Supply. *Initials* Standard: • Opens RCC-V-6 (H13-P825).	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	**SAT / UNSAT**
Step 12:  I. **PLACE** the control switch for the third RCC pump to **AUTO**. *Initials* Standard: - Places third RCC pump in **AUTO** (H13-P820).	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: **Inform the candidate that the JPM is complete.**	

STOP TIME: ___________

Attachment 1 – MCR Panel Map



RESULTS OF JPM ILC-25 JPM S-6

Examinee (Print): ____

Examiner (Print): ____

Task Standard: **Restores RCC to service following an NS4 isolation by taking RCC pumps to PTL, resetting isolation logic, closing load shed breakers, closing RRC pump cooling water supply valves, starting first RCC pump, throttling open RRC pump cooling water supply valves, starting a second RCC pump, opening RCC-V-6, and placing third RCC pump in AUTO.**

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

COMMENTS:

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Examiner Signature: ______________________________ **Date:** ____________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- An automatic reactor scram and NS4 Group 2 - 7 isolations have occurred.
- PPM 5.1.1 (RPV Control) and ABN-FAZ have been entered to mitigate the event and stabilize the plant.
- Drywell Pressure and RPV Level have stabilized.
- The F and A signals no longer exist.
- Shift Manager's permission has been received to reset NS4 logic and restore isolated systems.
- The RCC system remained full during the isolation.
- OPS2 is standing by to perform actions in the field.

- The CRS has directed you to restore RCC to service per steps 4.3.1 through 4.3.4 of ABN-FAZ.
- Inform the CRS when all actions for RCC restoration have been completed.

4.3 F or A Signal Restoration

4.3.1 **PLACE** the control switches for the following RCC pumps in **PTL**:

- RCC-P-1A ______
- RCC-P-1B ______
- RCC-P-1C ______

CAUTION

The Emergency Director and/or CRS/Shift Manager's permission is to be obtained prior to resetting of any containment isolation logic and subsequent opening of any containment isolation valve prior to ensuring that fuel failure has not occurred may result in radiological release to the environment.

4.3.2 WHEN RPV level and Drywell pressure have stabilized,
AND the F and A signals no longer exist,
THEN **OBTAIN** the Emergency Director and/or CRS/Shift Manager's permission to reset NS4 logic and restore isolated systems, ______
AND **DEPRESS** the Isolation Logic A&B and C&D pushbuttons on H13-P601. ______

NOTE: Step 4.3.3 thru 4.3.37 may be performed in any order as determined by CRS/SM.

4.3.3 **CLOSE** the following breaker per SOP-ELEC-BKR-OPS-QC:

- E-CB-73/7E ______
- E-CB-71/7C ______
- E-CB-81/8C ______
- E-CB-83/8E ______

4.3.4 **RESTORE** RCC to service as follows:

a. **CLOSE** RCC-V-17A, RRC Pump A Cooling Water Supply (key 78). ______

b. **CLOSE** RCC-V-17B, RRC Pump B Cooling Water Supply (key 79). ______

c. **VERIFY** the following valves are **OPEN**:

- RCC-V-104 (Drywell Supply Outboard Isolation) ______
- RCC-V-5 (Drywell Supply Inboard Isolation) ______
- RCC-V-21 (Drywell Return Outboard Isolation) ______
- RCC-V-40 (Drywell Return Inboard Isolation) ______

CAUTION

Starting an RCC pump with voids in the system may cause a water hammer.

d. IF the RCC system was partially drained during the isolation, THEN **VENT** the RCC system per SOP-RCC-FILL. ______

e. **VERIFY** the RCC Surge tank level is normal and stable. ______

CAUTION

Starting an RCC pump may cause Drywell pressure and temperature to change, and may cause Drywell vacuum breakers to open.

f. **MONITOR** Drywell pressure and temperature. ______

g. **START** one RCC pump by placing RCC-RMS-P/1A(B)(C) to **START**. ______

h. Slowly **THROTTLE OPEN** RCC-V-17A (prevent thermal shock to the RRC pump seals). ______

i. Slowly **THROTTLE OPEN** RCC-V-17B (prevent thermal shock to the RRC pump seals). ______

j. **START** a second RCC pump. ______

k. **OPEN** RCC-V-6, RW/RB Supply. ______

l. **PLACE** the control switch for the third RCC pump to **AUTO**. ______

4.3.5 **RESTORE** RWCU System to service per SOP-RWCU-START. ______

4.3.6 **OPEN** the following sump isolation valves, at H13-P632, to un-isolate Reactor to Radwaste Building isolation valves:

- FDR-V-221 (FD-R-1/2 Sumps Pump Discharge Isol) ______
- FDR-V-219 (FD-R-3/4 Sumps Pump Discharge Isol) ______
- EDR-V-394 (ED-R-5 Sumps Pump Discharge Isol) ______
- FDR-V-222 (FD-R-1/2 Sumps Pump Discharge Isol) ______
- FDR-V-220 (FD-R-3/4 Sumps Pump Discharge Isol) ______
- EDR-V-395 (Sump EDR-SUMP-R5 Pump Discharge Isolation) ______

4.3.7 **VERIFY** EDR-CONV-37, for EDR-FT-37, is energized by observing an active display panel on EDR-CONV-37 at EDR-TB-R541 (RB 422). {C-6.4} ______

ENERGY NORTHWEST

ILC-25 S-7

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE JOB PERFORMANCE MEASURE

LESSON TITLE ILC-25 JPM S-7

LESSON LENGTH 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE ____ Rev. No. ____

SIMULATOR GUIDE PQD CODE ____ Rev. No. ____

JPM PQD CODE ____ Rev. No. ____

EXAM PQD CODE ____ Rev. No. ____

DIVISION TITLE Nuclear Training

DEPARTMENT Operations Training

PREPARED BY Kyle Christianson / Dave Crawford DATE 12/04/22

REVISED BY ____ DATE ____

TECHNICAL REVIEW BY ____ DATE ____

INSTRUCTIONAL REVIEW BY ____ DATE ____

APPROVED BY ____ DATE ____

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Transfers SM-1 from TR-S to TR-N1 by aligning sync switch and closing E-CB-N1/1, then by placing E-CB-S1 to TRIP, and then returning E-CB-N1/1 sync switch to OFF per SOP-ELEC-4160V-OPS (Section 5.1).**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: RO-0413 Transfer 4160V buses from TR-S to TR-N.

K/A Importance Factors: **RO:** 3.9 **SRO:** 3.9

K/A Number: 262001 A4.04

K/A Statement: Ability to manually operate and/or monitor in the control room: Synchronizing of AC sources

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 6 – Electrical

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 9)**
    - Student Reference #1 **(JPM S-7 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (see below).

Tools or Equipment:
None.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-ELEC-4160V-OPS	021	001

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-191**. IC places the plant in a 100% line-up. CR/HVAC is being provided by Train A. SM-1 is powered by TR-S. Acknowledge all annunciators on front panels. Turn off all annunciators for panels that will not be monitored by the candidate(s) during the performance of this JPM set. This JPM is a front panel JPM and is set-up to be performed with JPM S-8 ILC-25, a back panel JPM. Ignore any back panel alarms. Load Schedule File: **Load Schedule File JPM S-8 ILC-25.**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

For this JPM all actions and monitoring will be performed from Control Room FRONT panels. Monitoring of any back panel indications is not required.

Initial Conditions:

- CGS is at 100% power.
- SM-1 is powered by TR-S.

Initiating Cue:

The CRS has directed you to perform Section 5.1 of SOP-ELEC-4160V-OPS to transfer SM-1 to TR-N1 from TR-S.

- All prerequisites have been completed.
- All Precautions and Limitations have been reviewed.

ILC-25 Simulator S-7

START TIME:___________

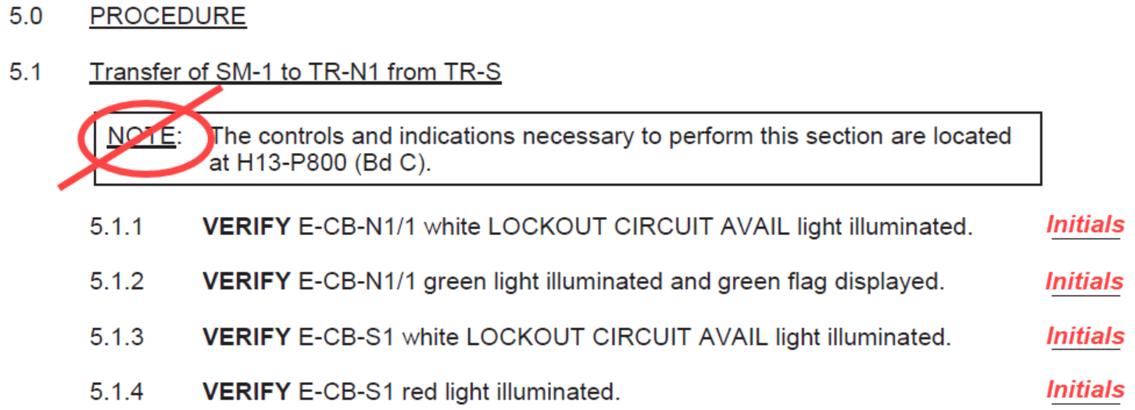
STEP / STANDARD	SAT / UNSAT

Examiner Note: **Provide candidate with the following:**

- **Student JPM Information Sheet**
- **Student Reference #1 (marked-up pages of SOP-ELEC-4160V-OPS)**

Examiner Note: **All Steps below are directly from SOP-ELEC-4160V-OPS exactly as written. Initialing steps and Circle/Slashing notes are expected but not required for satisfactory completion of steps.**

Step 1:



5.0 PROCEDURE

5.1 Transfer of SM-1 to TR-N1 from TR-S

NOTE: The controls and indications necessary to perform this section are located at H13-P800 (Bd C).

5.1.1 **VERIFY** E-CB-N1/1 white LOCKOUT CIRCUIT AVAIL light illuminated. *Initials*

5.1.2 **VERIFY** E-CB-N1/1 green light illuminated and green flag displayed. *Initials*

5.1.3 **VERIFY** E-CB-S1 white LOCKOUT CIRCUIT AVAIL light illuminated. *Initials*

5.1.4 **VERIFY** E-CB-S1 red light illuminated. *Initials*

Standard:

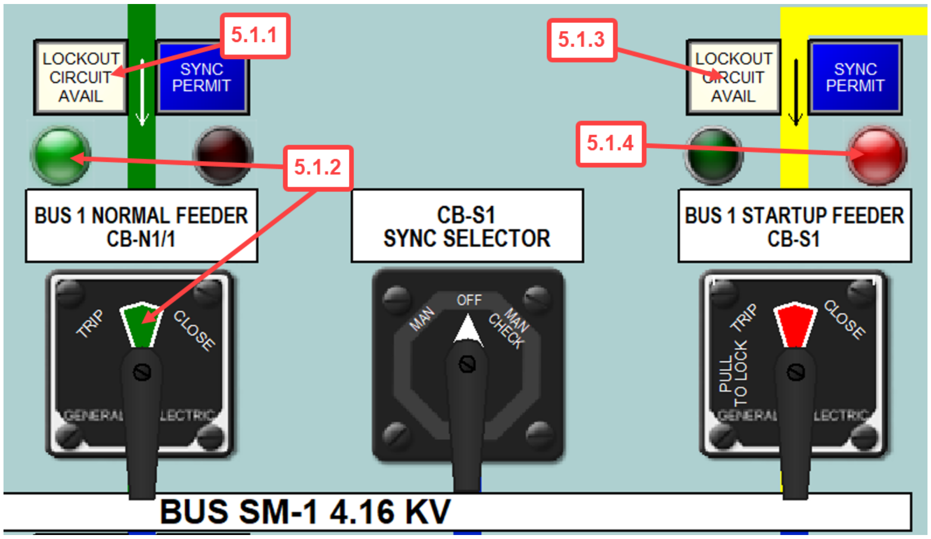
Verifies:

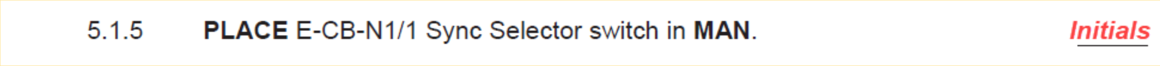
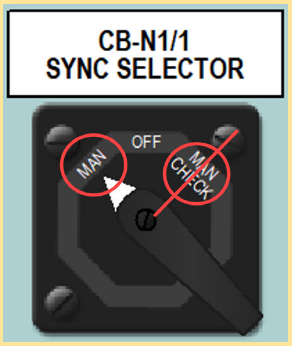
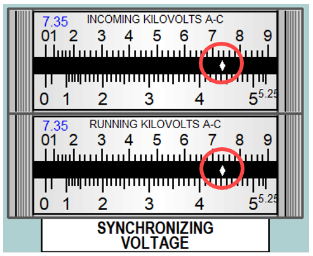
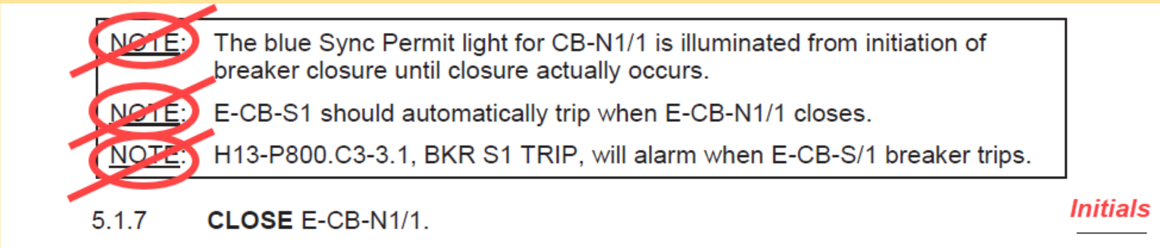
- E-CB-N1/1 white LOCKOUT CIRCUIT AVAIL light illuminated.
- E-CB-N1/1 green light illuminated, and green flag displayed.
- E-CB-S1 white LOCKOUT CIRCUIT AVAIL light illuminated.
- E-CB-S1 red light illuminated.

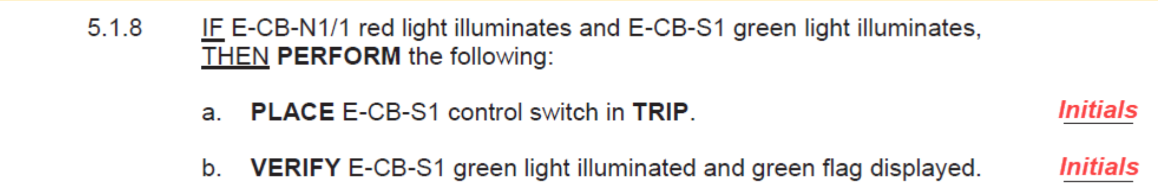
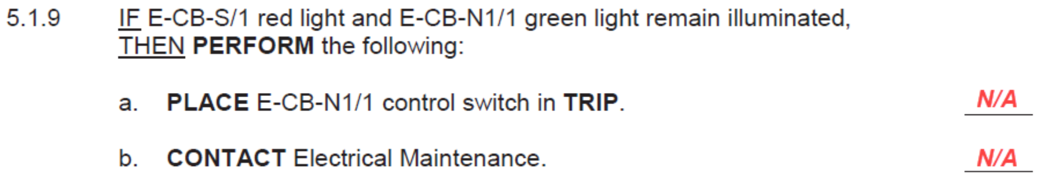
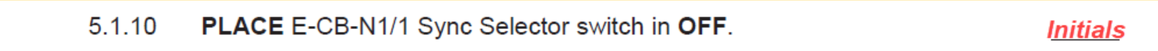
____SAT

____UNSAT

____N/A



STEP / STANDARD	**SAT / UNSAT**
Step 2:  5.1.5 **PLACE** E-CB-N1/1 Sync Selector switch in **MAN**. *Initials* Standard: - Places E-CB-N1/1 Sync Selector switch in MAN and **NOT** MAN CHECK.  	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Note: **The Synchronizing Voltage meter is located on the vertical section above the SM-3 desk section.**	
Step 3: 5.1.6 **VERIFY** voltage present on both incoming and running buses (not required to be matched). *Initials* Standard: - Verifies voltage on both incoming and running buses.  	____SAT ____UNSAT ____N/A
Step 4:  NOTE: The blue Sync Permit light for CB-N1/1 is illuminated from initiation of breaker closure until closure actually occurs. NOTE: E-CB-S1 should automatically trip when E-CB-N1/1 closes. NOTE: H13-P800.C3-3.1, BKR S1 TRIP, will alarm when E-CB-S/1 breaker trips. 5.1.7 **CLOSE** E-CB-N1/1. *Initials* Standard: - **(Non-critical)** Reads NOTES and place keeps. - Closes E-CB-N1/1.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A

STEP / STANDARD	SAT / UNSAT
Step 5:  5.1.8 IF E-CB-N1/1 red light illuminates and E-CB-S1 green light illuminates, THEN **PERFORM** the following: a. **PLACE** E-CB-S1 control switch in **TRIP**. *Initials* b. **VERIFY** E-CB-S1 green light illuminated and green flag displayed. *Initials* Standard: • **(Non-critical)** Recognizes that E-CB-N1/1 red light illuminates and E-CB-S1 green light illuminates. • Places E-CB-S1 control switch in **TRIP**. • **(Non-critical)** Verifies E-CB-S1 green light illuminates and green flag displayed.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Step 6:  5.1.9 IF E-CB-S/1 red light and E-CB-N1/1 green light remain illuminated, THEN **PERFORM** the following: a. **PLACE** E-CB-N1/1 control switch in **TRIP**. *N/A* b. **CONTACT** Electrical Maintenance. *N/A* Standard: • Recognizes that E-CB-N1/1 red light is illuminated and E-CB-S1 green light is illuminated. This step is not applicable. • Marks steps “N/A.”	____SAT ____UNSAT ____N/A
Step 7:  5.1.10 **PLACE** E-CB-N1/1 Sync Selector switch in **OFF**. *Initials* Standard: Places E-CB-N1/1 Sync Selector switch in **OFF**.	**CRITICAL STEP** ____SAT ____UNSAT ____N/A
Examiner Cue: Inform the candidate that the JPM is complete.	

STOP TIME: ____________

RESULTS OF JPM ILC-25 JPM S-7

Examinee (Print): ____________________

Examiner (Print): ____________________

Task Standard: **Transfers SM-1 from TR-S to TR-N1 by aligning sync switch and closing E-CB-N1/1, then by placing E-CB-S1 to TRIP, and then returning E-CB-N1/1 sync switch to OFF per SOP-ELEC-4160V-OPS (Section 5.1).**

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

COMMENTS:

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Examiner Signature: ____________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- CGS is at 100% power.
- SM-1 is powered by TR-S.

The CRS has directed you to perform Section 5.1 of SOP-ELEC-4160V-OPS to transfer SM-1 to TR-N1 from TR-S.

- All prerequisites have been completed.
- All Precautions and Limitations have been reviewed.

Verify Revision Information Prior To Use	Initials	MB
	Date	Today

Number: SOP-ELEC-4160V-OPS	Use Category: CONTINUOUS	Major Rev: 021 Minor Rev: 001 Page: 1 of 49
Title: 4160 Volt AC Electrical Power Distribution System Operation		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-ELEC-4160V-OPS	Effective Date: 09/02/21

Mark Bankston MB

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below

Page(s)	Description (including summary, reason, initiating document, if applicable)
4, 5	Added new reference and Precaution / Limitation. (AR-419955)
Throughout	Updated all references to current format per SWP-PRO-02. (no rev bars)
17,19	MR001 editorial, added specific EPNs for clarity (AR-339729)

TABLE OF CONTENTS

1.0 PURPOSE

Provide instructions for operating the 4160 Volt AC Electrical Power Distribution System.

2.0 REFERENCES

2.1 GO2-89-062, Station Blackout

2.2 Calculation E/I-02-87-07, Load Flow and Voltage Analysis for the Plant Main Buses in AC Distribution Systems

2.3 P-231685, TR-B Rev Power Relay Activation

2.4 AR-273122, Startup Power Inoperability (Night Order 1413)

2.5 AR-289309, Potential losses of RPS when transferring E-SM-7, 8 and E-SH-6, and minimizing the time when E-SM-7 and E-SM-8 are powered from the same offsite source.

2.6 AR-419955, Changes to Ashe Station Service Utilization Load Affecting AC Power Analysis

2.7 CVI 47A-00,131/47A-00,155, 4160V Switchgear,

2.8 E517 Sheets 1-17, 4160V Switchgear Elementary Diagrams

2.9 E502, Sheets. 1-4, Main One Line Diagram

2.10 E510-1, Auxiliary Plant Distribution Synchronizing Diagram

2.11 E512, Sheets. 1-2, Protective Relaying Elementary Diagrams

2.12 E842-2, E843-3, Pumphouses

2.13 E1000, River Pump House

2.14 E504, Vital AC One Line Diagram

2.15 SOP-ELEC-125V-START, 125 VDC Distribution System Start

2.16 SOP-ELEC-BKR-OPS, A.C. Electrical Breaker Racking

2.17 SOP-ELEC-ISFSI-OPS, ISFSI Automatic Transfer Switch and 120 VAC UPS Operations

2.18 SOP-HVAC/DG-START, Diesel Generator and Cable Cooling HVAC Start

2.19 SOP-DG1-SHUTDOWN, Emergency Diesel Generator (Div 1) Shutdown

2.20 SOP-DG1-STBY, Emergency Diesel Generator (Div 1) Standby Lineup

2.21 SOP-DG2-SHUTDOWN, Emergency Diesel Generator (Div 2) Shutdown

2.22 SOP-DG2-STBY, Emergency Diesel Generator (Div 2) Standby Lineup

2.23 SOP-DG3-SHUTDOWN, High Pressure Core Spray Diesel Generator Shutdown

2.24 SOP-DG3-STBY, High Pressure Core Spray Diesel Generator Standby Lineup

2.25 SOP-ELEC-480V-OPS, 480 Volt AC Electrical Power Distribution System Operation

3.0 PREREQUISITES

3.1 **VERIFY** Startup Transformer TR-S is operable, with adequate cooling accessories in service to support operation under load. MB

3.2 **VERIFY** Backup Transformer TR-B is operable, with adequate cooling accessories in service to support operation under load. MB

3.3 **VERIFY** 125V DC distribution system is in service as per SOP-ELEC-125V-START. MB

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Notify Munro Control Center dispatcher of plant conditions and request priority on restoration, if any offsite power is lost.

4.2 Should any breaker trip occur, lockout relays or relay targets are not to be reset without first determining the cause of the trip.

4.3 All breakers should be racked in and ready to close unless they are out of service for maintenance.

4.4 Breakers required to be isolated are to be racked out and properly tagged.

4.5 Transformers are not to remain in parallel any longer than absolutely necessary.

4.6 The MANUAL sync position should not be used when synchronizing a generator to a bus.

4.7 While on the Startup Transformer (TR-S), limit the load on TR-S X-winding (H13-P800) to LE 28.66 MVA [2.4kA]). (Reference E/I-02-87-07) {E-2.2}

4.8 Transferring SH-6 with RPS being powered from the alternate source may result in a loss of RPS due to relay timing. {AR-2.5}

4.9 Due to the potential to lose both E-SM-7 and E-SM-8, minimize the time both buses are powered from the same offsite source. Ensure the OCC and/or WWM are aware of the need to minimize the time. {AR-2.5}

4.10 Refer to PPM 1.3.76 for the alignment of the Backup Transformer to SM-7 or SM-8 under all conditions. (With the exception of aligning TRB to SM-7/8 to support schedule diesel surveillances.)

4.11 During plant operation, Ashe station service load is limited to LE 360 kVA [50 amps] for each individual CGS 4.16kV feeder circuit supply in service (i.e., SM-1 CGS feeder #1 from E-CB-1/500S or SM-3 CGS feeder #2 from E-CB-3/500S shown on E502-1) including unplanned 4.16kV feeder circuit loss contingency, exigent unavailability or planned maintenance that would involve BPA Ashe auxiliary load transfers to align with CGS single feeder operation. (Reference E/I-02-87-07). {AR-2.6}

5.0 PROCEDURE

5.1 Transfer of SM-1 to TR-N1 from TR-S

> NOTE: The controls and indications necessary to perform this section are located at H13-P800 (Bd C).

5.1.1 **VERIFY** E-CB-N1/1 white LOCKOUT CIRCUIT AVAIL light illuminated. _____

5.1.2 **VERIFY** E-CB-N1/1 green light illuminated and green flag displayed. _____

5.1.3 **VERIFY** E-CB-S1 white LOCKOUT CIRCUIT AVAIL light illuminated. _____

5.1.4 **VERIFY** E-CB-S1 red light illuminated. _____

5.1.5 **PLACE** E-CB-N1/1 Sync Selector switch in **MAN**. _____

5.1.6 **VERIFY** voltage present on both incoming and running buses (not required to be matched). _____

> NOTE: The blue Sync Permit light for CB-N1/1 is illuminated from initiation of breaker closure until closure actually occurs.
>
> NOTE: E-CB-S1 should automatically trip when E-CB-N1/1 closes.
>
> NOTE: H13-P800.C3-3.1, BKR S1 TRIP, will alarm when E-CB-S/1 breaker trips.

5.1.7 **CLOSE** E-CB-N1/1. _____

5.1.8 IF E-CB-N1/1 red light illuminates and E-CB-S1 green light illuminates, THEN **PERFORM** the following:

- a. **PLACE** E-CB-S1 control switch in **TRIP**. _____
- b. **VERIFY** E-CB-S1 green light illuminated and green flag displayed. _____

5.1.9 IF E-CB-S/1 red light and E-CB-N1/1 green light remain illuminated, THEN **PERFORM** the following:

- a. **PLACE** E-CB-N1/1 control switch in **TRIP**. _____
- b. **CONTACT** Electrical Maintenance. _____

5.1.10 **PLACE** E-CB-N1/1 Sync Selector switch in **OFF**. _____

ILC-25 S-8

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: INITIAL LICENSED OPERATOR TRAINING

COURSE TITLE: JOB PERFORMANCE MEASURE

LESSON TITLE: ILC-25 JPM S-8

LESSON LENGTH: 0.4 HRS

INSTRUCTIONAL MATERIALS INCLUDED

LESSON PLAN PQD CODE		Rev. No.	
SIMULATOR GUIDE PQD CODE		Rev. No.	
JPM PQD CODE		Rev. No.	
EXAM PQD CODE		Rev. No.	

DIVISION TITLE: Nuclear Training

DEPARTMENT: Operations Training

PREPARED BY: Kyle Christianson / Dave Crawford DATE: 12/05/22

REVISED BY: DATE:

TECHNICAL REVIEW BY: DATE:

INSTRUCTIONAL REVIEW BY: DATE:

APPROVED BY: DATE:

Operations Training Manager

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

MAJOR REVISION RECORD

Major Rev Number	Description of Revision	Affected Pages

MINOR REVISION RECORD

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

TASK STANDARD: **Places both trains of Control Room ventilation in the Manual Pressurization Mode by closing WOA-V-51C & 52C, disabling WMA-AD-51A1 & 51B1, and starting WMA-FN-54A & 54B IAW SOP-HVAC/CR-OPS.**

Alternate Path: ☐ **Time Critical (TC):** ☐ **TC Time:** N/A

Validation Time: 10 Minutes

Task Applicability: RO ☑ SRO ☑

Task Number and Title: CR-HVAC-03 Describe the following major flow path for the Control Room HVAC System: Pressurization Mode

K/A Importance Factors: **RO:** 3.8 **SRO:** 3.8

K/A Number: 290003 A4.01

K/A Statement: Ability to manually operate and/or monitor in the control room: Initiate/reset system

Evaluation Type: **In-Plant** ☐ **Simulator** ☑

Control Room ☐ **Admin** ☐

Safety Function: 9 – Radioactive Release

JPM SETUP

JPM Special Instructions:

- Verify current procedure(s) against JPM. Revise JPM if any steps have been changed.
- Verify ONLY CLEAN COPIES of the following STUDENT MATERIALS are passed out to the students (when directed by the JPM):
    - Student JPM Information Sheet **(Page 16)**
    - Student Reference #1 **(JPM S-8 ILC-25 Ref 1.PDF)**

Special Setup Instructions:

- See Simulator Operator Instructions (see below).

Tools or Equipment:

- Have magnifying glass available in event candidate cannot read Attachment 2 or 3.

Safety Items:
None.

Procedure Reference(s):

Procedure	Major Revision	Minor Revision
SOP-HVAC/CR-OPS	030	N/A
PPM 1.3.29	091	N/A

Location:
Simulator

Simulator Operator Instructions	Reset the Simulator to **IC-191**. IC places the plant in a 100% line-up. CR/HVAC is being provided by Train A. SM-1 is powered by TR-S. Acknowledge all annunciators on front panels. Turn off all annunciators for panels that will not be monitored by the candidate(s) during the performance of this JPM set. This JPM is a back panel JPM and is set-up to be performed with JPM S-7 ILC-25, a front panel JPM. Ignore any front panel alarms. Load Schedule File: **Load Schedule File JPM S-8 ILC-25.**

STUDENT JPM BRIEF

In Simulator:

I will explain the initial conditions and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. When your task is given, you will repeat the task and I will acknowledge "That's Correct" (OR "That's Incorrect", if applicable).

For this JPM all actions and monitoring will be performed from Control Room BACK panels. Monitoring of any front panel indications is not required.

Initial Conditions:

- CGS is at 100% power.
- CR/HVAC ventilation Train A is in service.
- SM-1 is being powered by TR-S.
- Steps 5.12.1 and 5.12.2 of SOP-HVAC/CR-OPS were completed by the prior shift.
- OPS2 has already verified that WOA V-51A, WOA-V-52A, WOA-V-51B, and WOA-V-52B are all LOCKED OPEN.
- OPS1 and OPS2 are standing by to perform further actions in the field.

Initiating Cue:

The CRS has directed you to place BOTH trains of control room ventilation in the Manual Pressurization Mode of operation per SOP-HVAC/CR-OPS, Section 5.12.

- All Prerequisites have been completed.
- All Precautions and Limitations have been reviewed.
- Steps 5.12.1 and 5.12.2 are complete.

Inform the CRS when task is complete.

START TIME:___________

STEP / STANDARD	**SAT / UNSAT**
Examiner Note: **Provide candidate with the following:** • **Student JPM Information Sheet** • **Student Reference #1 (marked-up pages SOP-HVAC/CR-OPS)**	
Examiner Note: **All Steps below are directly from SOP-HVAC/CR-OPS exactly as written. Initialing steps and Circle/Slashing notes are expected but not required for satisfactory completion of steps.**	
Step 1: 5.12.3 IF starting Control Room Ventilation Train A in Pressurization Mode, THEN **PERFORM** the following: Standard: • Control Room Ventilation Train A is being placed in Pressurization Mode. Performs this step.	___SAT ___UNSAT ___N/A
Examiner Note: **All indications are located at H13-P826.**	
Step 2: a. **VERIFY** WMA-FN-51A running (Recirc Fan). ***Initials*** Standard: • Verifies WMA-FN-51A is running by noting red Light **ON** and green Light **OFF**.	___SAT ___UNSAT ___N/A

STEP / STANDARD | **SAT / UNSAT**

Step 3:

b. **VERIFY** the following intake pathways **LOCKED OPEN** (RW 525):

- 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** _____

Standard:

- Recognizes from initial conditions that OPS2 has already verified valves **LOCKED OPEN.**
- Circles steps for OPS2 to initial later.

___SAT

___UNSAT

___N/A

Examiner Cue:

- **If candidate requests to review Locked Valve Checklist, provide Attachment 1 for review.**
- **If candidate contacts OPS2 or OPS1 for field verification, report: "WOA-V-51A, WOA-V-52A, WOA-V-51B, and WOA-V-52B are all LOCKED OPEN."**

Examiner Note: **The switches for WOA-V-51C and WOA-V-52C spring return to auto from OPEN only.**

Step 4:

c. **CLOSE** the following:

- WOA-V-51C (Outside Air Intake) *Initials*
- WOA-V-52C (Outside Air Intake) *Initials*

Standard:

- Places WOA-RMS-V/51C, control switch for Normal Supply Plenum Outboard Isolation WOA-V-51C, in **CLOSE**. Observes Green Light **ON** and Red Light **OFF**.
- Places WOA-RMS-V/52C, control switch for Normal Supply Plenum Inboard Isolation WOA-V-52C, in **CLOSE**. Observes Green Light **ON** and Red Light **OFF**.

CRITICAL STEP

___SAT

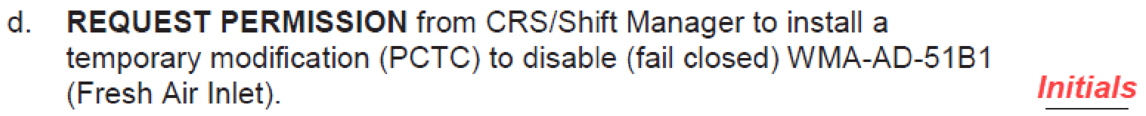
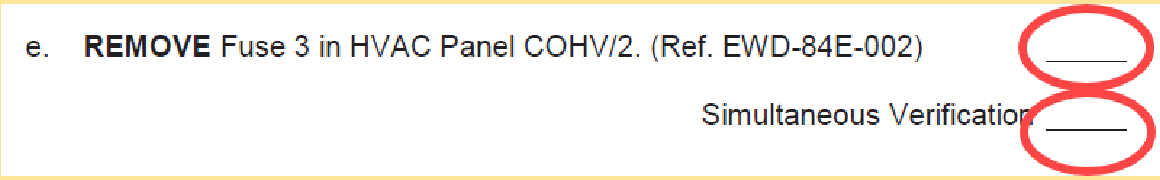
___UNSAT

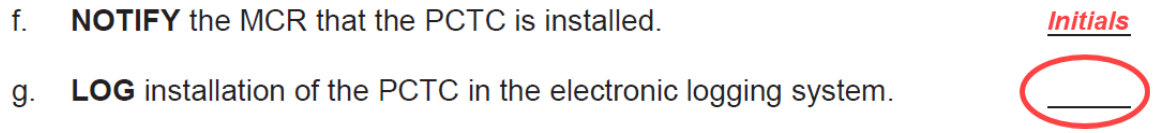
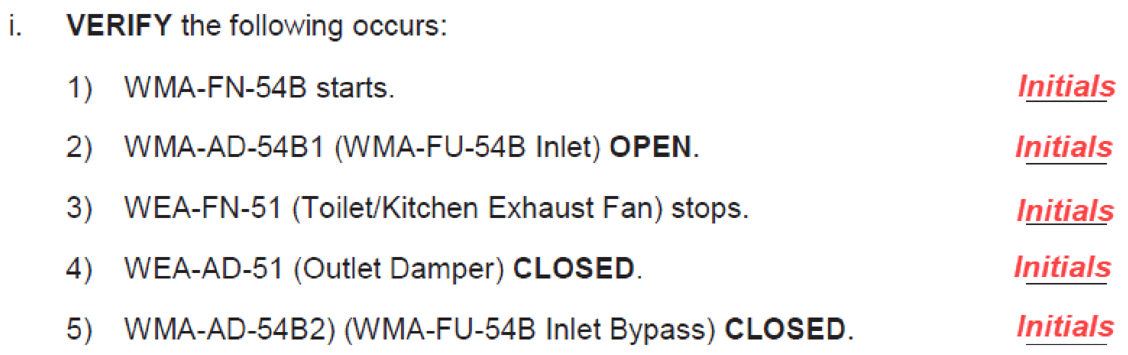
___N/A

STEP / STANDARD	**SAT / UNSAT**
Step 5: d. **REQUEST PERMISSION** from CRS/Shift Manager to install a temporary modification (PCTC) to disable (fail closed) WMA-AD-51A1 (Fresh Air Inlet). *Initials* ____ Standard: • Formally requests permission to install a temporary modification.	___SAT ___UNSAT ___N/A
Examiner Cue: **When candidate requests permission, respond as CRS/SM: "You have permission to install a temporary modification to disable WMA-AD-51A1."**	
Examiner Note: **The following step will require coordination between the candidate, OPS2 (Performer), and OPS1 (Simultaneous Verification) to complete actions in the field (removing Fuse 3 from HVAC Panel COHV/1).**	
Step 6: e. **REMOVE** Fuse 3 in HVAC Panel COHV/1 (Ref: EWD-84E-001). ______ Simultaneous Verification ______ Standard: • Directs field operators to remove Fuse 3 in HVAC Panel COHV/1 and waits for report from field that fuse removal is complete. • **(Non-Critical)** Circles steps for OPS1 and OPS2 to initial later.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Examiner Cue: • **If candidate requests to review EWD-84E-001, provide Attachment 2 for review.** • **When candidate directs removal of Fuse 3, <u>activate Trigger 1</u>.** • **Respond as OPS1: "Fuse 3 in HVAC Panel COHV/1 has been removed using Simultaneous Verification."**	
Examiner Note: **Activating Trigger 1 will cause a loss of control power to WMA-AD-51A1 and the following will occur:** • **WMA-AD-51A1 will fail CLOSED.** • **WMA-AD-51A1 Control Switch Red light OFF and Green light OFF.** • **P826-P1 10-2 Annunciator will ALARM.** • **P826 WMA-AD-51A1 BISI will ALARM.**	

STEP / STANDARD	**SAT / UNSAT**
Step 7: f. **NOTIFY** the MCR that the PCTC is installed. *Initials* g. **LOG** installation of the PCTC in the electronic logging system. ______ Standard: • Verifies the PCTC has been installed (i.e., Fuse 3 has been removed) by observing Outside Air Supply Damper WMA-AD-51A1 Green Light **OFF** and Red Light **OFF.** • Notifies the MCR that the PCTC is installed. • Informs MCR to log installation of the PCTC. • Circles step to have it initialed later.	___SAT ___UNSAT ___N/A
Examiner Cue: • **When notified that the PCTC is installed, acknowledge the report.** • **When informed to Log the PCTC, respond as CRS: "Another operator will log the temporary installation."**	
Examiner Note: **When WMA-FN-54A is started, P826-P1 5-3 Annunciator will alarm momentarily, then clear.**	
Step 8: h. **PLACE** WMA-FN-54A control switch in **ON** (Emergency Filter Unit Fan). *Initials* Standard: • Turns WMA-RMS-FN/54A, control switch for WMA-FN-54A, clockwise to **ON**.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Step 9: i. **VERIFY** the following: 1) WMA-FN-54A starts. *Initials* 2) WMA-AD-54A1 (Inlet WMA-FU-54A) **OPEN**. *Initials* 3) WEA-FN-51 (Toilet/Kitchen Exhaust Fan) stops. *Initials* 4) WEA-AD-51 (Outlet Damper) **CLOSED**. *Initials* 5) WMA-AD-54A2 (WMA-FU-54A Inlet Bypass) **CLOSED**. *Initials* Standard: • Verifies expected responses.	___SAT ___UNSAT ___N/A

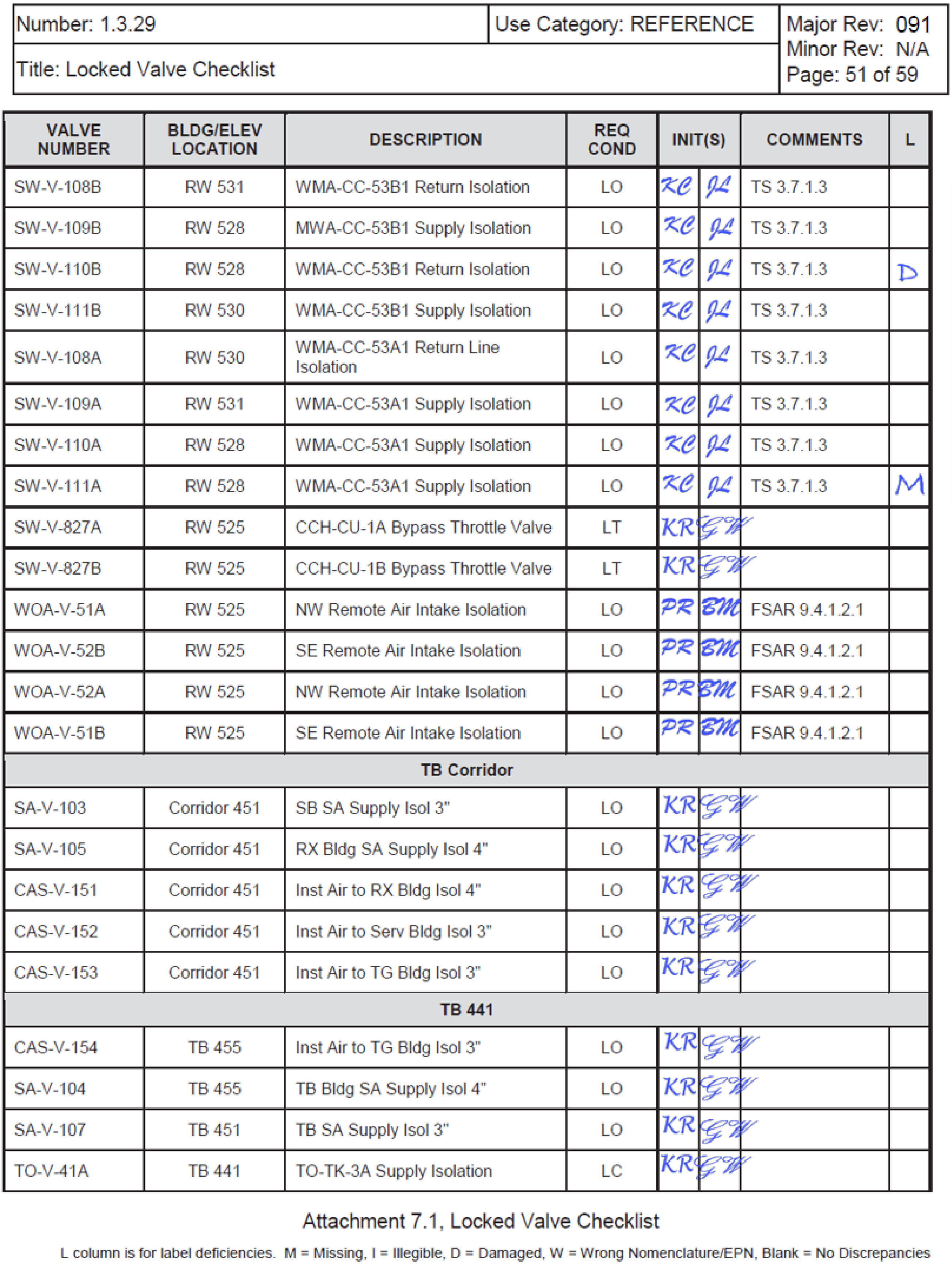
STEP / STANDARD	**SAT / UNSAT**
Step 10: 5.12.4 IF starting Control Room Ventilation Train B in Pressurization Mode, THEN **PERFORM** the following: Standard: • Control Room Ventilation Train B is being placed in Pressurization Mode. Performs this step.	___SAT ___UNSAT ___N/A
Step 11: a. **VERIFY** WMA-FN-51B running (Recirc Fan). *Initials* Standard: • **(Non critical)** Notes WMA-FN-51B is not running. • Places WMA-FN-51B control switch to **ON**. • **(Non critical)** Verifies WMA-FN-51B is running (Red Light **ON** and Green Light **OFF**)	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
If candidate contacts CRS to report manual start of WMA-FN-51B: **Examiner Cue: Acknowledge the report.**	
Step 12: b. **VERIFY** the following intake pathways **LOCKED OPEN** (RW 525): • Remote Intake Number 1 (NW Isol): • WOA-V-51A (Remote Air Intake No. 1) **LOCKED OPEN** *N/A* • WOA-V-52A (Remote Air Intake No. 1) **LOCKED OPEN** *N/A* • Remote Intake Number 2 (SE Isol): • WOA-V-51B (Remote Air Intake No. 2) **LOCKED OPEN** *N/A* • WOA-V-52B (Remote Air Intake No. 2) **LOCKED OPEN** *N/A* Standard: • Steps completed earlier for Train A. Marks steps N/A.	___SAT ___UNSAT ___N/A
Step 13: c. **CLOSE** the following: • WOA-V-51C (Outside Air Intake) *N/A* • WOA-V-52C (Outside Air Intake) *N/A* Standard: • Steps completed earlier for Train A. Marks steps “N/A.”	___SAT ___UNSAT ___N/A

STEP / STANDARD	SAT / UNSAT
Step 14:  d. **REQUEST PERMISSION** from CRS/Shift Manager to install a temporary modification (PCTC) to disable (fail closed) WMA-AD-51B1 (Fresh Air Inlet). *Initials* ______ Standard: • Formally requests permission to install a temporary modification.	___SAT ___UNSAT ___N/A
Examiner Cue: **When candidate requests permission, respond as CRS/SM: “You have permission to install a temporary modification to disable WMA-AD-51B1.”**	
Examiner Note: **The following step will require coordination between the candidate, OPS2 (Performer), and OPS1 (Simultaneous Verification) to complete actions in the field (removing Fuse 3 from HVAC Panel COHV/2).**	
Step 6:  e. **REMOVE** Fuse 3 in HVAC Panel COHV/2. (Ref. EWD-84E-002) ______ Simultaneous Verification ______ Standard: • Directs field operators to remove Fuse 3 in HVAC Panel COHV/2 and waits for report from field that fuse removal is complete. • **(Non-Critical)** Circles steps for OPS1 and OPS2 to initial later.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Examiner Cue: • **If candidate requests to review EWD-84E-002, provide Attachment 3 for review.** • **When candidate directs removal of Fuse 3, <u>activate Trigger 2</u>.** • **Respond as OPS1: “Fuse 3 in HVAC Panel COHV/2 has been removed using Simultaneous Verification.”**	
Examiner Note: **Activating Trigger 2 will cause a loss of control power to WMA-AD-51B1 and the following will occur:** • **WMA-AD-51B1 will fail CLOSED.** • **WMA-AD-51B1 Control Switch Red light OFF and Green light OFF.** • **P826-P2 10-2 Annunciator will ALARM.** • **P826 WMA-AD-51B1 BISI will ALARM.**	

STEP / STANDARD	**SAT / UNSAT**
Step 7:  f. **NOTIFY** the MCR that the PCTC is installed. Initials g. **LOG** installation of the PCTC in the electronic logging system. ______ Standard: • Verifies the PCTC has been installed (i.e., Fuse 3 has been removed) by observing Outside Air Supply Damper WMA-AD-51B1 Green Light **OFF** and Red Light **OFF.** • Notifies the MCR that the PCTC is installed. • Informs MCR to log installation of the PCTC. • Circles step to have it initialed later.	___SAT ___UNSAT ___N/A
Examiner Cue: • **When notified that the PCTC is installed, acknowledge the report.”** • **When informed to Log the PCTC, respond as CRS: “Another operator will log the installation.”**	
Examiner Note: **When WMA-FN-54B is started, P826-P2 5-3 Annunciator will alarm momentarily, then clear.**	
Step 8:  h. **PLACE** WMA-FN-54B control switch in **ON** (Emergency Filter Unit Fan). Initials Standard: • Turns WMA-RMS-FN/54B, control switch for WMA-FN-54B, clockwise to **ON**.	**CRITICAL STEP** ___SAT ___UNSAT ___N/A
Step 9:  i. **VERIFY** the following occurs: 1) WMA-FN-54B starts. Initials 2) WMA-AD-54B1 (WMA-FU-54B Inlet) **OPEN**. Initials 3) WEA-FN-51 (Toilet/Kitchen Exhaust Fan) stops. Initials 4) WEA-AD-51 (Outlet Damper) **CLOSED**. Initials 5) WMA-AD-54B2) (WMA-FU-54B Inlet Bypass) **CLOSED**. Initials Standard: • Verifies expected responses.	___SAT ___UNSAT ___N/A
Examiner Cue: **Inform the candidate that the JPM is Complete.**	

STOP TIME: ___________

Attachment 1 – Locked Valve Checklist



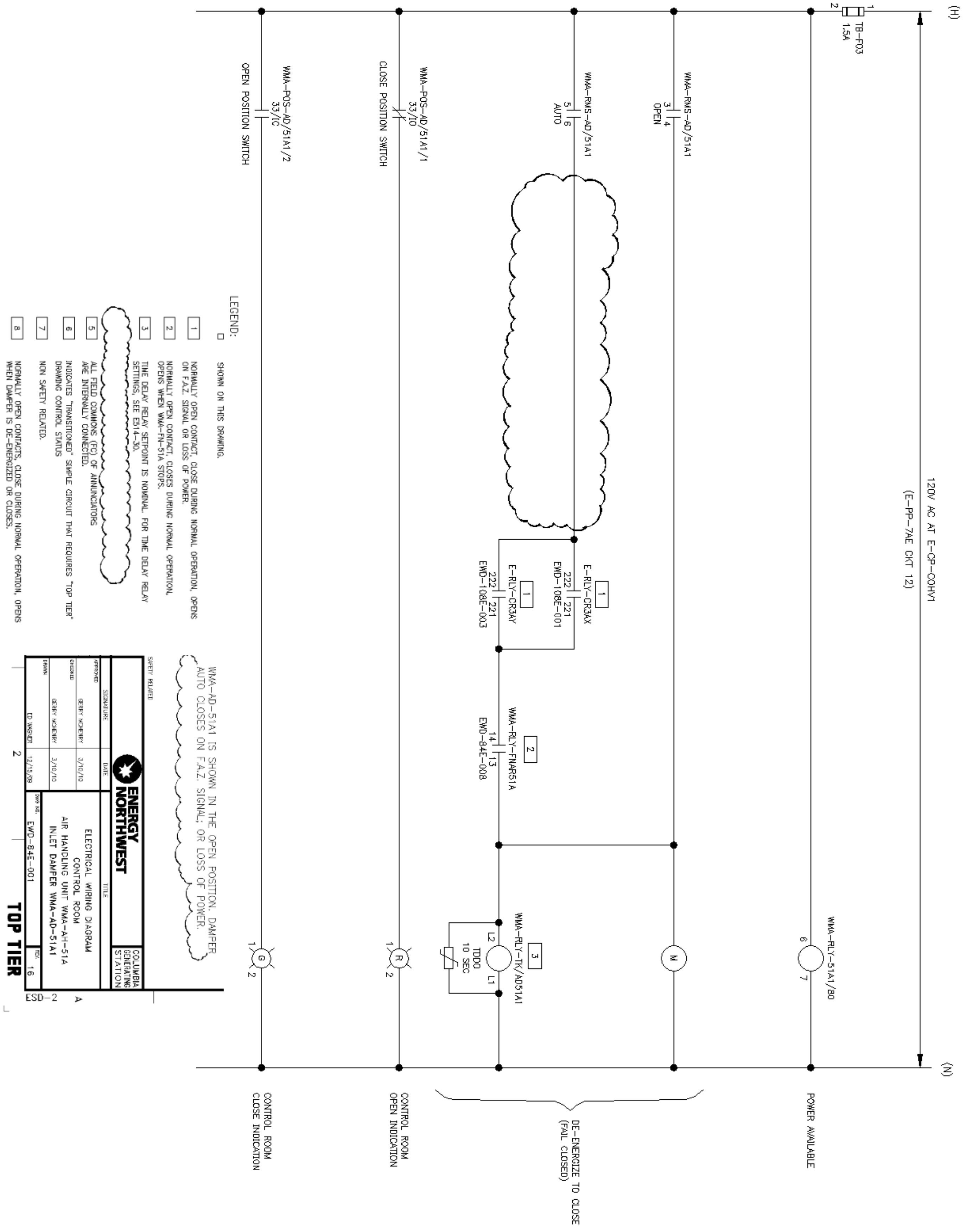
Number: 1.3.29	Use Category: REFERENCE	Major Rev: 091 Minor Rev: N/A Page: 51 of 59
Title: Locked Valve Checklist		

VALVE NUMBER	BLDG/ELEV LOCATION	DESCRIPTION	REQ COND	INIT(S)		COMMENTS	L
SW-V-108B	RW 531	WMA-CC-53B1 Return Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-109B	RW 528	MWA-CC-53B1 Supply Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-110B	RW 528	WMA-CC-53B1 Return Isolation	LO	KC	JL	TS 3.7.1.3	D
SW-V-111B	RW 530	WMA-CC-53B1 Supply Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-108A	RW 530	WMA-CC-53A1 Return Line Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-109A	RW 531	WMA-CC-53A1 Supply Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-110A	RW 528	WMA-CC-53A1 Supply Isolation	LO	KC	JL	TS 3.7.1.3	
SW-V-111A	RW 528	WMA-CC-53A1 Supply Isolation	LO	KC	JL	TS 3.7.1.3	M
SW-V-827A	RW 525	CCH-CU-1A Bypass Throttle Valve	LT	KR	GW		
SW-V-827B	RW 525	CCH-CU-1B Bypass Throttle Valve	LT	KR	GW		
WOA-V-51A	RW 525	NW Remote Air Intake Isolation	LO	PR	BM	FSAR 9.4.1.2.1	
WOA-V-52B	RW 525	SE Remote Air Intake Isolation	LO	PR	BM	FSAR 9.4.1.2.1	
WOA-V-52A	RW 525	NW Remote Air Intake Isolation	LO	PR	BM	FSAR 9.4.1.2.1	
WOA-V-51B	RW 525	SE Remote Air Intake Isolation	LO	PR	BM	FSAR 9.4.1.2.1	
TB Corridor							
SA-V-103	Corridor 451	SB SA Supply Isol 3"	LO	KR	GW		
SA-V-105	Corridor 451	RX Bldg SA Supply Isol 4"	LO	KR	GW		
CAS-V-151	Corridor 451	Inst Air to RX Bldg Isol 4"	LO	KR	GW		
CAS-V-152	Corridor 451	Inst Air to Serv Bldg Isol 3"	LO	KR	GW		
CAS-V-153	Corridor 451	Inst Air to TG Bldg Isol 3"	LO	KR	GW		
TB 441							
CAS-V-154	TB 455	Inst Air to TG Bldg Isol 3"	LO	KR	GW		
SA-V-104	TB 455	TB Bldg SA Supply Isol 4"	LO	KR	GW		
SA-V-107	TB 451	TB SA Supply Isol 3"	LO	KR	GW		
TO-V-41A	TB 441	TO-TK-3A Supply Isolation	LC	KR	GW		

Attachment 7.1, Locked Valve Checklist

L column is for label deficiencies. M = Missing, I = Illegible, D = Damaged, W = Wrong Nomenclature/EPN, Blank = No Discrepancies

Attachment 2 – EWD-84E-001 Excerpt



LEGEND:

□ SHOWN ON THIS DRAWING.

1 NORMALLY OPEN CONTACT, CLOSE DURING NORMAL OPERATION, OPENS ON F.A.Z. SIGNAL OR LOSS OF POWER.

2 NORMALLY OPEN CONTACT, CLOSES DURING NORMAL OPERATION, OPENS WHEN WMA-FN-51A STOPS.

3 TIME DELAY RELAY SETPOINT IS NOMINAL. FOR TIME DELAY RELAY SETTINGS, SEE E514-30.

5 ALL FIELD COMMONS (FC) OF ANNUNCIATORS ARE INTERNALLY CONNECTED.

6 INDICATES "TRANSITIONED" SIMPLE CIRCUIT THAT REQUIRES "TOP TIER" DRAWING CONTROL STATUS

7 NON SAFETY RELATED.

8 NORMALLY OPEN CONTACTS, CLOSE DURING NORMAL OPERATION, OPENS WHEN DAMPER IS DE-ENERGIZED OR CLOSES.

WMA-AD-51A1 IS SHOWN IN THE OPEN POSITION. DAMPER AUTO CLOSES ON F.A.Z. SIGNAL; OR LOSS OF POWER.

SAFETY RELATED

	SIGNATURE	DATE
APPROVED	GERRY MCHENRY	3/10/10
CHECKED	GERRY MCHENRY	3/10/10
DRAWN	ED WAGNER	12/15/09

ENERGY NORTHWEST
COLUMBIA GENERATING STATION

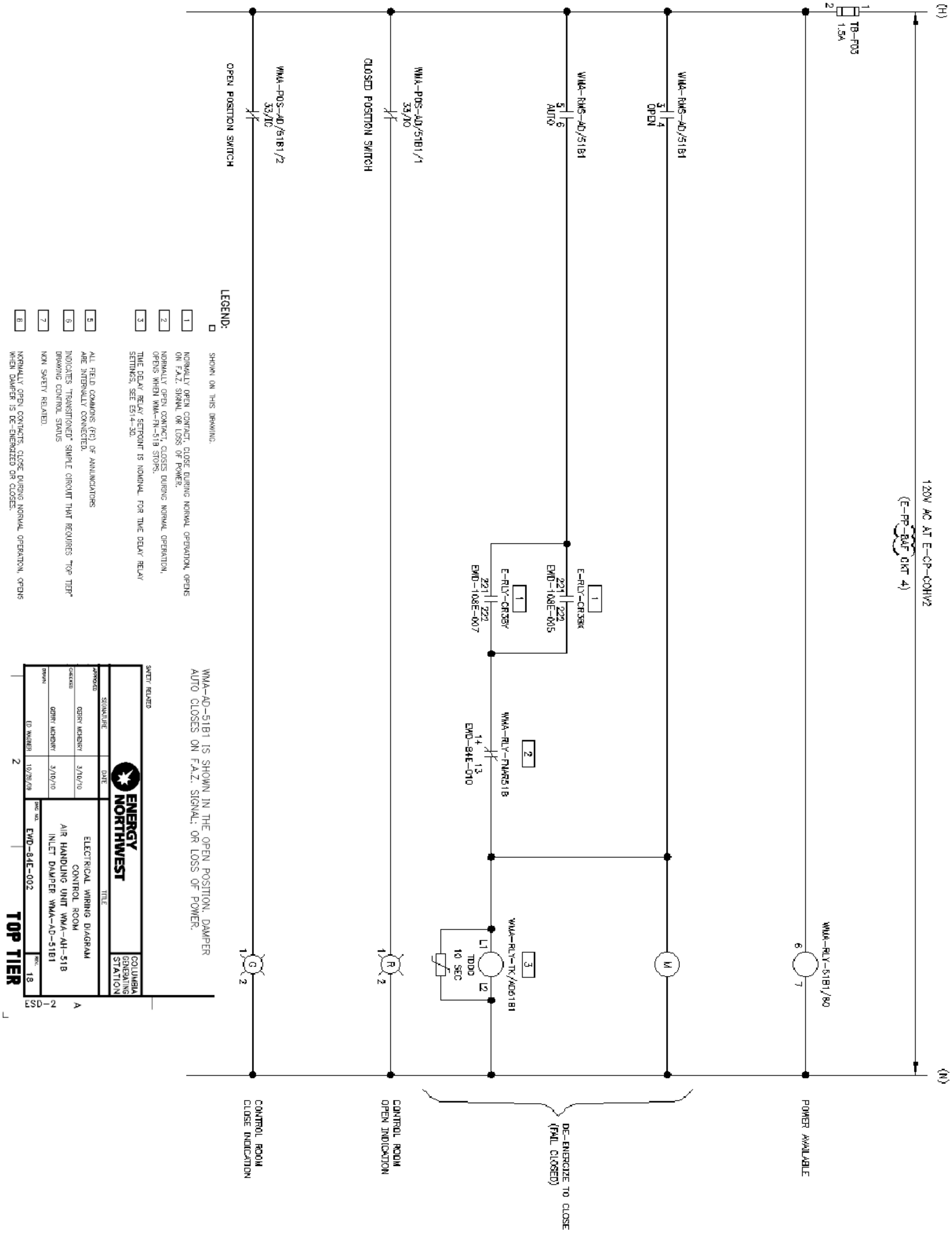
TITLE
ELECTRICAL WIRING DIAGRAM
CONTROL ROOM
AIR HANDLING UNIT WMA-AH-51A
INLET DAMPER WMA-AD-51A1

DWG NO. EWD-84E-001
REV. 16

TOP TIER

ESD-2
2
A

Attachment 3 – EWD-84E-002 Excerpt



RESULTS OF JPM ILC-25 S-8

Examinee (Print): ______________________________________

Examiner (Print): ______________________________________

Task Standard: **Places both trains of Control Room ventilation in the Manual Pressurization Mode by closing WOA-V-51C & 52C, disabling WMA-AD-51A1 & 51B1, and starting WMA-FN-54A & 54B IAW SOP-HVAC/CR-OPS.**

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

COMMENTS:

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Examiner Signature: ______________________ **Date:** __________

STUDENT JPM INFORMATION SHEET

Initial Conditions:

- CGS is at 100% power.
- CR/HVAC ventilation Train A is in service.
- SM-1 is being powered by TR-S.
- Steps 5.12.1 and 5.12.2 of SOP-HVAC/CR-OPS were completed by the prior shift.
- OPS2 has already verified that WOA V-51A, WOA-V-52A, WOA-V-51B, and WOA-V-52B are all LOCKED OPEN.
- OPS1 and OPS2 are standing by to perform further actions in the field.

Initiating Cue:

The CRS has directed you to place BOTH trains of control room ventilation in the Manual Pressurization Mode of operation per SOP-HVAC/CR-OPS, Section 5.12.

- All Prerequisites have been completed.
- All Precautions and Limitations have been reviewed.
- Steps 5.12.1 and 5.12.2 are complete.

Inform the CRS when task is complete.

Verify Revision Information Prior To Use	Initials	DP
	Date	Today

Number: SOP-HVAC/CR-OPS	Use Category: CONTINUOUS	Major Rev: 030 Minor Rev: N/A Page: 1 of 52
Title: Control, Cable, and Critical Switchgear Rooms HVAC Operation		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-HVAC/CR-OPS	Effective Date: 07/28/22

Dan Presland DP

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	Description (including summary, reason, initiating document, if applicable)
7	Revised Precaution and Limitation to include WMA-CC-51B1. (AR 433075)
12, 17	Added Note and revised Note for ladder location.
17	Revised step to conditional for fire in Fire Area RC-13. (AR 433075)
17	Added Note. (AR 433075)

TABLE OF CONTENTS

PAGE

1.0 PURPOSE

Provide instructions for operating the Control Room, Cable Spreading Room, and Critical Switchgear Rooms HVAC Systems.

2.0 REFERENCES

2.1 FSAR 9.4.1, Main Control Room Temperature Control

2.2 PER 296-0671, Possible Hazardous Material Release

2.3 PERA 201-0115-01, WCH-CR-51A Trip on Low Temperature

2.4 CR-AI 2-04-02215, Managing Risk per PPM 1.5.14

2.5 AR-195495, Valve Misposition Event, During Performance of OSP-CCH/IST-M701, SW-V-822A was incorrectly verified OPEN.

2.6 AR-280119, Calc ME-02-14-01, Main Control Room Cooling Analysis

2.7 Technical Specifications 3.7.3, Control Room Emergency Filtration (CREF) System

2.8 CVI 339-00,5, York Technical Manual

2.9 E503-11

2.10 E519, Sheets 17, 18, 19, 29, and 32

2.11 M548, HVAC for Control and Switchgear Room - Radwaste Building

2.12 M775, Emergency Chilled Water Piping System

2.13 NOV 94-12, Procedural Deficiencies

2.14 ABN-FIRE, Fire

2.15 ABN-HAZMAT, Hazardous Materials Spills/Releases

2.16 ABN-RAD-CR, Control Room HVAC High Radiation

2.17 OSP-SW-M101, Standby Service Water Loop A Valve Position Verification

2.18 OSP-SW-M102, Standby Service Water Loop B Valve Position Verification

2.19 SOP-SW-FILL, Standby Service Water Fill

2.20 SOP-SW-SHUTDOWN, Standby Service Water System Shutdown

2.21 SOP-SW-START, Standby Service Water System Start

2.22 SOP-ELEC-480V-OPS, 480 Volt and Below AC Electrical Power Distribution System Operations

2.23 SOP-HVAC/CR-START, Control, Cable, and Critical Switchgear Rooms HVAC Startup

2.24 SOP-CCH-START-QC, Emergency Chill Water Start Quick Card (CCH-CR-1A(B))

2.25 Calculation NE-02-85-19, section 3.d, Operator Actions

2.26 FPF 4.1 Item 2, Normal Shutdown Manual Action Feasibility Review

3.0 PREREQUISITES

3.1 **VERIFY** Radwaste Chilled Water System available and aligned to supply the cooling coils for the Control, Cable, and Critical Switchgear Room Air Handling Units, as required. DP

3.2 **VERIFY** Standby Service Water System available and aligned, as required. DP

3.3 **VERIFY** Plant Service Water System available. DP

3.4 **VERIFY** Control and Service Air System available to supply the air-operated control valves for the chilled water supply to the Cable Room Air Handling Unit. DP

3.5 **VERIFY** Plant Potable Water System available to supply makeup water to the Air Handling Unit Loop Seals and Emergency Chillers. DP

3.6 **VERIFY** Fire Protection System available for the Control Room Emergency Filters. DP

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The area temperature limits of LCS 1.7.1 shall be met.

4.2 Technical Specification 3.7.3 requires two CREF subsystems to be operable in Mode 1, 2, or 3.

4.3 Main Control Room temperature is normally maintained 72 - 78°F by radwaste chillers during normal operations (RW Chillers operating, SW not operating) (FSAR 9.4.1.1.a).

- Maximum allowable Control Room temperature is 78°F, based on Station Blackout criteria (LCS 1.7.1.1 Bases).
- Minimum allowable Control Room temperature is 40°F (FSAR Table 3.11-1).
- Control Room temperature may be LT 72°F when Service Water is operating (especially in winter time), due to the design of the Control Room ventilation system. {2.1}

4.4 When CCH-CR-1A/1B, emergency chiller, is non-functional, then LCO 3.7.4 must be entered for the associated Control Room AC subsystem, unless it can be demonstrated that SW can maintain control room temperatures less than 85°F. {2.6}

Analysis ME-02-14-01 determined that SW is capable of maintaining LE 85°F Control Room temperatures, if the following compensatory measures are in place:

- Maintain spray pond temperature less than 60°F.
- Initiate spray mode at 60°F SW pond temperature; and splash mode at 55°F SW pond temperature. This maintains pond temperatures and inventory adequate assuming a loss of TMU.
- If sustained wind speed exceeds 15 mph, and TMU makeup is not available, orient SW into splash mode and consult with Engineering.

4.5 The Control Room temperature may exceed 78°F during the process of placing the Emergency Chiller in service. This condition can occur if the Emergency Chiller shuts down on “low chilled water temperature” due to low load conditions, such as cold SW temperature or during conditions where low outside temperatures exist. This condition is expected and normal as long as the Emergency Chiller can be restarted and control the cooling load prior to the Control Room temperature reaching 85°F. {2.1}

4.6 CCH-CR-1A/B should be run for GE 24 hours for proper oil level check.

4.7 If the only cooling water supply to the Control Room Ventilation System is Standby Service Water, and the temperature of the Main Control Room approaches 95°F, turn off the normal Control Room lighting to reduce the system heat load.

4.8 To verify proper operation of purge valves, WOA-RMS-V/51A and WOA-RMS-V/52B should remain in the AUTO position.

4.9 If oil heaters are de-energized during a shutdown period, they should be energized for 12 hours prior to starting the chiller to prevent foaming. The 12-hour energization may be waived if the chiller has had all oil removed and recharged with new oil. The oil heaters may be de-energized for periods of LE 1 hour.

4.10 When WMA-FN-54A(B) is started, 4.826.P1(P2).5-3(5.2) (EMERG FLTR 54A(B) ΔP HIGH/LOW) will alarm momentarily, then clear. If the alarm does not clear, the unit heaters will not energize, and WMA-FN-54A(B) will be inoperable.

4.11 If Standby Service Water temperature is cold (LT 35°F) and is aligned directly to WMA-CC-51A1(51B1), then avoid running SW-P-1A, WCH-CR-51A(B), and WMA-FN-51A at the same time. This alignment may cause WCH-CR-51A(B) to trip on low chill water temperature and/or low refrigerant temperature. {2.3}

4.12 WEA-FN-51 (Toilet/Kitchen Exhaust Fan) will not auto start if either WMA-FN-54A or WMA-FN-54B are running. If both trains of Control Room HVAC are aligned to pressurization mode, expect WEA-FN-51 to start when the second WMA-FN-54A(B is secured.)

4.13 When directed by ABN-FIRE for a fire in Fire Area RC-13, Section 5.4, Aligning WMA-CC-51A1 for Standby Service Water Cooling, or Section 5.6, Aligning WMA-CC-51B1 for Standby Service Water Cooling, must be completed within 3.1 hours of the start of the fire. During a fire in Fire Area RC-13, simultaneous and independent verifications are not required.

5.12 Initiating Control Room HVAC Manual Pressurization Mode

5.12.1 IF starting both trains of Control Room ventilation,
THEN **VERIFY** both Remote Air Intakes are unisolated. DP

∅ NOTE: Unless otherwise indicated, all control switches and annunciators are located on H13-P826.

∅ NOTE: Both trains of Control Room ventilation may be placed in manual pressurization mode at the same time, as determined by the CRS/Shift Manager, or as directed by ABN-FIRE.

5.12.2 IF time permits,
THEN **VERIFY** no paint, chemical fumes, or combustion products near the remote air intakes. DP

5.12.3 IF starting Control Room Ventilation Train A in Pressurization Mode,
THEN **PERFORM** the following:

a. **VERIFY** WMA-FN-51A running (Recirc Fan). _____

b. **VERIFY** the following intake pathways **LOCKED OPEN** (RW 525):

- 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** _____

c. **CLOSE** the following:

- WOA-V-51C (Outside Air Intake) _____
- WOA-V-52C (Outside Air Intake) _____

d. **REQUEST PERMISSION** from CRS/Shift Manager to install a temporary modification (PCTC) to disable (fail closed) WMA-AD-51A1 (Fresh Air Inlet). _____

e. **REMOVE** Fuse 3 in HVAC Panel COHV/1 (Ref: EWD-84E-001). _____

Simultaneous Verification _____

f. **NOTIFY** the MCR that the PCTC is installed. _____

g. **LOG** installation of the PCTC in the electronic logging system. _____

h. **PLACE** WMA-FN-54A control switch in **ON** (Emergency Filter Unit Fan). _____

i. **VERIFY** the following:

1) WMA-FN-54A starts. _____

2) WMA-AD-54A1 (Inlet WMA-FU-54A) **OPEN**. _____

3) WEA-FN-51 (Toilet/Kitchen Exhaust Fan) stops. _____

4) WEA-AD-51 (Outlet Damper) **CLOSED**. _____

5) WMA-AD-54A2 (WMA-FU-54A Inlet Bypass) **CLOSED**. _____

5.12.4 IF starting Control Room Ventilation Train B in Pressurization Mode, THEN **PERFORM** the following:

a. **VERIFY** WMA-FN-51B running (Recirc Fan). _____

b. **VERIFY** the following intake pathways **LOCKED OPEN** (RW 525):

- 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** _____

c. **CLOSE** the following:

- WOA-V-51C (Outside Air Intake) _____
- WOA-V-52C (Outside Air Intake) _____

d. **REQUEST PERMISSION** from CRS/Shift Manager to install a temporary modification (PCTC) to disable (fail closed) WMA-AD-51B1 (Fresh Air Inlet). _____

e. **REMOVE** Fuse 3 in HVAC Panel COHV/2. (Ref. EWD-84E-002) _____

Simultaneous Verification _____

f. **NOTIFY** the MCR that the PCTC is installed. _____

g. **LOG** installation of the PCTC in the electronic logging system. _____

h. **PLACE** WMA-FN-54B control switch in **ON** (Emergency Filter Unit Fan). _____

i. **VERIFY** the following occurs:

   1) WMA-FN-54B starts. _____

   2) WMA-AD-54B1 (WMA-FU-54B Inlet) **OPEN**. _____

   3) WEA-FN-51 (Toilet/Kitchen Exhaust Fan) stops. _____

   4) WEA-AD-51 (Outlet Damper) **CLOSED**. _____

   5) WMA-AD-54B2) (WMA-FU-54B Inlet Bypass) **CLOSED**. _____

INSTRUCTIONAL COVER SHEET – ILC 25 SC-1

PROGRAM TITLE OPERATIONS REQUALIFICATION TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE Main Turbine vibrations scram / LOCA

LENGTH OF LESSON 1 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code N/A Rev. No.

Simulator Guide PQD Code Rev. No.

JPM PQD Code N/A Rev. No.

Exam PQD Code N/A Rev. No.

DIVISION TITLE Nuclear Training – NRC EXAM

DEPARTMENT Operations Training Exam Group

PREPARED BY Jeff Lux DATE

REVISED BY N/A DATE

VALIDATED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE

Operations Training Manager

MAJOR REVISION RECORD

MINOR REVISION RECORD

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

Review / Validation Comments and Resolution

Date	Comment	Resolution
07/16/22	No definitive operator action for event 3 BOP	Changed event 3 from loss of Benton line to 115Kv Open Phase with E-CB-TR-B Fail to auto trip.
09/21/22	Validation – Crew ascended power to greater than 1092MW, performed GV optimizations and then continued power ascension.	Added examiner note page 7.
09/21/22	Bad cue for RHR-V-17A.	Cue simplified page 11
09/21/22	Missed PC TS for Event 2	Added 3.6.1.3 to TS call

SCENARIO OUTLINE

Facility: Columbia Generating Station

Scenario No.: 1

Op Test No.:

Examiners: ______________________

____

____

Operators: ______________________

____

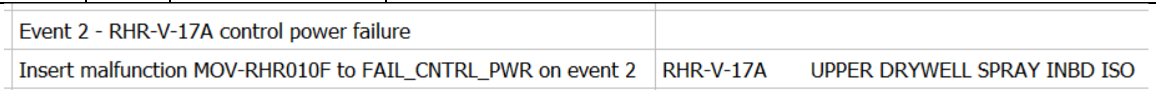
____

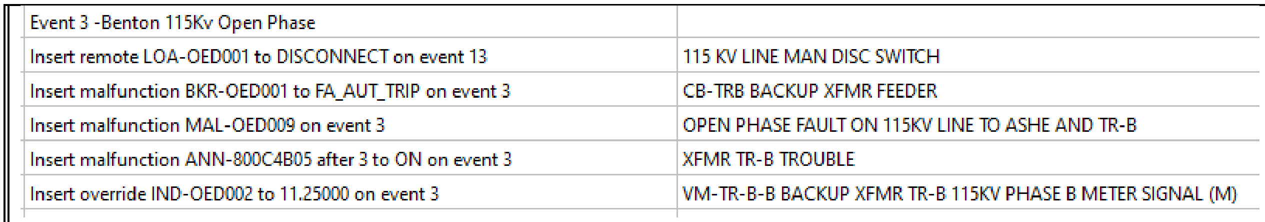
Initial Conditions:	Columbia is operating at 90% power. Power ascension was in progress previous shift following a Reactor Feedwater Heater recovery. Bus Duct Cooling Fan B is tagged OOS for motor bearing inspection.
Turnover:	Following turnover, you have been directed to raise reactor power to 100% at 1% per minute per PPM 3.2.6 power maneuvering section 5.4. Sufficient margin to fuel-preconditioning limits per PPM 9.3.18 has been verified. and place DEH into GV optimization per SOP-MT-GV/OPTIMIZATION section 5.1.

Critical Tasks:

CT-1	With an increasing vibration in the Main Turbine bearings, scram the reactor and trip the Main turbine / Main Generator prior to reaching GE 18 mils (requirement to open the Main Condenser vacuum breakers)
CT-2	Initiate WW sprays using RHR-B prior to wetwell pressure exceeding 12# per PPM 5.2.1 Primary Containment Control.
CT-3	Manually restore power to SM-8 by closing DG-2 output breaker with 10 minutes of loss of power to SM-8. (restores SW flow to DG-2 and allows for operation of RHR-SYS-B for containment sprays)

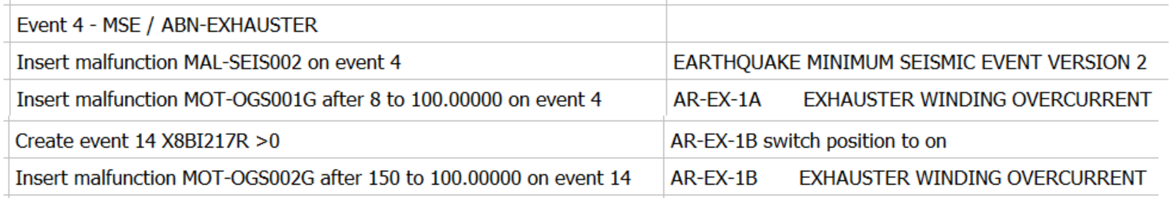
NOTE: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	**Trig.**	**Event Type***	**Scenario Summary / Event Description**
1	-	N (ALL)	ATC raises reactor power with flow using Reactor Recirculation flow to 100%. BOP Operator places the MT is GV optimization mode per SOP-MT-GV/OPTIMIZATION (section 5.1) after MG exceeds 1092 Megawatts.
 Event 1 - Power Ascention - No Malfunctions			
2	2	TS (CRS)	RHR-V-17A will experience loss of power. The CRS will declare LCO 3.5.1 Condition A (ECCS – Operating) and LCO 3.6.1.5 Condition A (RHR Drywell Spray). Both with a 7-day completion time to restore RHR to operable status. RHR-SYS-A loses drywell spray function capability.
 Event 2 - RHR-V-17A control power failure Insert malfunction MOV-RHR010F to FAIL_CNTRL_PWR on event 2 RHR-V-17A UPPER DRYWELL SPRAY INBD ISO			
3	3	TS (CRS) C (BOP)	An electrical fault result's in 115Kv (TR-B) line open phase. E-CB-TRB fails to auto open. The CRS will enter ABN-ELEC-GRID and take actions per section 4.4. CRS will evaluate and declare LCO 3.8.1 Condition A.



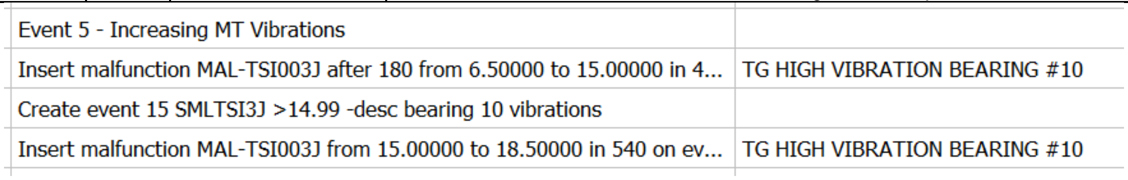
Event 3 -Benton 115Kv Open Phase	
Insert remote LOA-OED001 to DISCONNECT on event 13	115 KV LINE MAN DISC SWITCH
Insert malfunction BKR-OED001 to FA_AUT_TRIP on event 3	CB-TRB BACKUP XFMR FEEDER
Insert malfunction MAL-OED009 on event 3	OPEN PHASE FAULT ON 115KV LINE TO ASHE AND TR-B
Insert malfunction ANN-800C4B05 after 3 to ON on event 3	XFMR TR-B TROUBLE
Insert override IND-OED002 to 11.25000 on event 3	VM-TR-B-B BACKUP XFMR TR-B 115KV PHASE B METER SIGNAL (M)

4	4	C (CRS / BOP)	A Minimum Seismic Earthquake occurs. AR-EX-1A trips. The CRS enters ABN-EXHAUSTER to manually start AR-EX-1B (BOP). 2 Minutes after AR-EX-1B is started it also trips, the crew will monitor for turbine vibrations per ABN-EXHAUSTER.



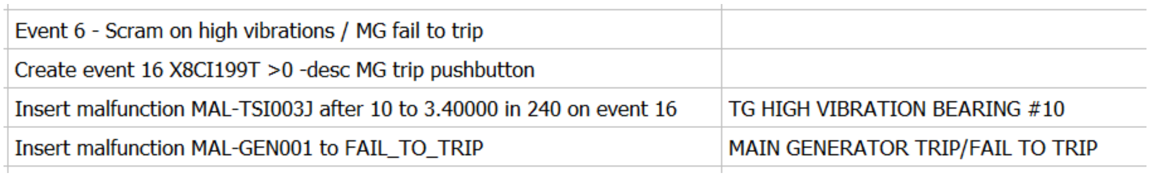
Event 4 - MSE / ABN-EXHAUSTER	
Insert malfunction MAL-SEIS002 on event 4	EARTHQUAKE MINIMUM SEISMIC EVENT VERSION 2
Insert malfunction MOT-OGS001G after 8 to 100.00000 on event 4	AR-EX-1A EXHAUSTER WINDING OVERCURRENT
Create event 14 X8BI217R >0	AR-EX-1B switch position to on
Insert malfunction MOT-OGS002G after 150 to 100.00000 on event 14	AR-EX-1B EXHAUSTER WINDING OVERCURRENT

5	5	R (CRS / ATC)	The crew monitors turbine vibrations increasing. The CRS takes actions per the annunciator response to reduce turbine loading to reduce turbine vibrations. ATC will reduce power as directed by the CRS. Turbine vibrations will continue to increase following the down power.



Event 5 - Increasing MT Vibrations	
Insert malfunction MAL-TSI003J after 180 from 6.50000 to 15.00000 in 4...	TG HIGH VIBRATION BEARING #10
Create event 15 SMLTSI3J >14.99 -desc bearing 10 vibrations	
Insert malfunction MAL-TSI003J from 15.00000 to 18.50000 in 540 on ev...	TG HIGH VIBRATION BEARING #10

6	-	M (ALL)	As Main turbine vibrations continue to increase, the CRS will direct a manual reactor scram and trip of the turbine **(CT-1).** (Pre-inserted malfunction) The Main Generator will fail to automatically trip following the reactor scram. BOP will manually trip the Main Generator and monitor vibrations decreasing.

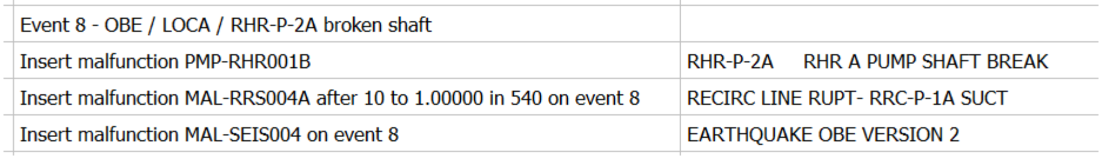


Event 6 - Scram on high vibrations / MG fail to trip	
Create event 16 X8CI199T >0 -desc MG trip pushbutton	
Insert malfunction MAL-TSI003J after 10 to 3.40000 in 240 on event 16	TG HIGH VIBRATION BEARING #10
Insert malfunction MAL-GEN001 to FAIL_TO_TRIP	MAIN GENERATOR TRIP/FAIL TO TRIP

7	-	I (ATC)	Following the Reactor Scram, ATC will line up on the startup flow control valves per SOP-RFW-FCV-QC. The startup flow control valves will not respond to the startup flow controller, ATC will have to control RFP speed and throttle RFW-V-109 as necessary to control Reactor Water level. ATC can also optionally use RCIC for additional level control.

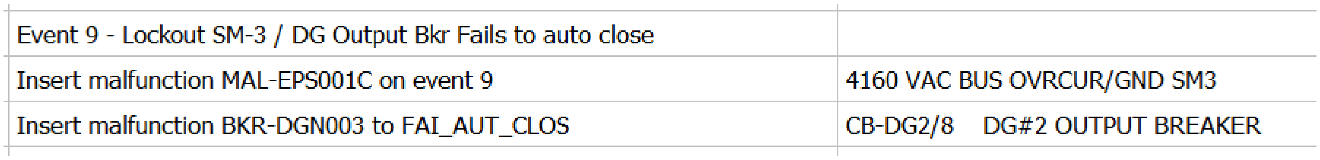
Event 7 - Startup Flow control valves Fail as is	
Insert malfunction AOV-CFW029F to FAIL_AS_IS	RFW-FCV-10B FW FCV-B STARTUP VLV TO REACTOR
Insert malfunction AOV-CFW028F to FAIL_AS_IS	RFW-FCV-10A FW FCV-A STARTUP VLV TO REACTOR

8	8	C (ALL)	OBE / LOCA. A recirculation line leak develops. The CRS will take actions per PPM 5.2.1 and spray the Wetwell when containment pressure reaches 2 psig. **(CT-2)** ATC will adjust level control strategy based on level decreasing due to the recirculation line leak. RHR-P-2A will experience a broken shaft making it unavailable for sprays.



Event 8 - OBE / LOCA / RHR-P-2A broken shaft	
Insert malfunction PMP-RHR001B	RHR-P-2A RHR A PUMP SHAFT BREAK
Insert malfunction MAL-RRS004A after 10 to 1.00000 in 540 on event 8	RECIRC LINE RUPT- RRC-P-1A SUCT
Insert malfunction MAL-SEIS004 on event 8	EARTHQUAKE OBE VERSION 2

9	9	I (CRS / BOP) MC (BOP)	Shortly after the earthquake a ground will develop and cause a lock out on SM-3. The B-8 Breaker is unavailable. DG-2 Output breaker fails to automatically close resulting in SM-8 losing power. **(CT-3)**. The CRS and BOP will take actions to restore power to SM-8 by manually closing the DG-2 output breaker. This action will be required to restore RHR-P-2B which will allow for Drywell sprays. (RHR Sys A malfunctions preclude its ability to perform this function) After SM-8 is restored the Crew will spray the Drywell using RHR-B and stabilize level in the normal operating band of +13 to +54 inches.



Event 9 - Lockout SM-3 / DG Output Bkr Fails to auto close	
Insert malfunction MAL-EPS001C on event 9	4160 VAC BUS OVRCUR/GND SM3
Insert malfunction BKR-DGN003 to FAI_AUT_CLOS	CB-DG2/8 DG#2 OUTPUT BREAKER

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

Target Quantitative Attributes	**Actual**	**Description**
Events after EOP entry (1-2)	**3**	Startup flow control valve failure / LOCA / SM-3 Lockout – DG2 output breaker FAC
Abnormal events (2-4)	**3**	ABN-ELEC-GRID / ABN-EARTHQUAKE / ABN-EXHAUSTER
Major transients (1-2)	**1**	MT Vibration Scram
EOPs entered/requiring substantive actions (1-2)	**2**	PPM 5.1.1 RPV Control / PPM 5.2.1 Primary Containment Control
Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	**0**	
Pre-identified Critical tasks (≥ 2)	**3**	See Critical Task Sheets

TERMINATION CRITERIA:
This scenario will be terminated when the reactor water level is stable -50 to +54 inches. Wetwell sprays have been initiated and SM-8 Power has been restored from DG-2.

EVENT 1: Raise Power with Flow / Place MT is Governor Valve Optimization

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
		After crew assumes the shift **Crew commences power ascension per turn over sheet – No Malfunctions** **Results in: Reactivity Manipulation / BOP GV Optimization** **Examiner Note: All procedure steps are cut and pastes directly from the applicable procedure, all RED mark up's denote the expected operator procedure mark up as the steps are completed.**
1.	**CRS**	Directs performance of power ascension per crew turnover using SOP-RRC-FLOW/QC at 1% per minute.
2.	**ATC**	Performs SOP-RRC-FLOW/QC raising power 1% per minute as directed by the CRS. 2.1 Reactor Power Change with RRC Flow Controllers in Auto 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 2.1.1 IF desired to control RRC flow using the Master Controller within the constraints of fuel preconditioning, THEN [✓ **RAISE**]/**LOWER** RRC flow using RRC-M/A-R675 (Master Control) as necessary. Performs 2.1.2 **VERIFY** total core flow is LT 105%. Performs 2.1.3 **VERIFY** RRC loop A and B is LT 57.5 Mlb/hr. Performs 2.1.4 **NOTIFY** the CRS when the change in Reactor power is complete. Performs
3.	**CRS**	Monitors power ascention, when Generator output is GE 1092MWe and reactivity manipulation is complete, directs BOP to perform SOP-MT-GV/OPTIMIZATION.

EVENT 1: Raise Power with Flow / Place MT is Governor Valve Optimization

OPERATOR ACTIVITIES

Examiner Note: Crew may do the full power acsention and then place DEH in GV optimization OR crew may stop the power ascention once greater than 1092MW, perform GV optimization and then continue power ascention. Crew should not do power ascention and GV optimization at the same time, both manipulations are reactivity manipulations.

STEP #	Position	CREW RESPONSE
4.	**BOP**	Performs SOP-MT-GV/OPTIMIZATION as directed by the CRS. 3.0 PREREQUISITES 3.1 **VERIFY** Generator output GE 1092 MWe prior to GV Optimization. Performs ____ NOTE: The following step may require slightly GT 1092 MWe. 3.2 **VERIFY** Optimize Valve Mode OKAY to SELECT light illuminated. Performs ____
5.	**BOP**	4.0 PRECAUTIONS AND LIMITATIONS 4.1 Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open. 4.2 The Main Turbine automatically comes out of Governor Valve Optimization when Generator Output drops below 1058 MWe.
6.	**BOP**	5.1 Governor Valve Optimization NOTE: The Governor Valve Optimization Mode enhances Generator Output at maximum reactor power. Generator output must be GE 1092 MWe prior to GV Optimization. **CAUTION** Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open.

EVENT 1: Raise Power with Flow / Place MT is Governor Valve Optimization

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
7.	**BOP**	5.1.1 **VERIFY** the following: ~~NOTE~~: Substitutions or data source changes on the N4 screen for the primary computer (normally TDAS) should be performed on the backup computer at the same time. It is important for maintaining accurate CTP reporting in the backup system to ensure that all calculations are matching between both systems. • IF TDAS or PPC points B031 and/or B032 are inoperable, THEN **VERIFY** appropriate substitute values are entered for RRC pump electric power. N/A No points are inoperable (None Listed in initial conditions) • DEH in Turbine Follow Reactor mode. Performs • Reactor Pressure and Reactor Power stable. Performs
8.	**BOP**	5.1.2 **ENTER** Governor Valve Optimization as follows: {P-105020} ~~NOTE~~: GV Optimization involves substantially throttling closed GV-4 then using GV-1, throttled to approximately 55% open, to control RPV pressure. Both valves still move to control reactor pressure. a. **VERIFY** LOAD TARGET is set at 1370 MW (Main Display, Load Control Display) Performs b. IF VPL DEMAND is not at 100%, THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display): 1) **SELECT** VPL TARGET. Performs 2) **ENTER** 100%. Performs 3) **SELECT** OK. Performs

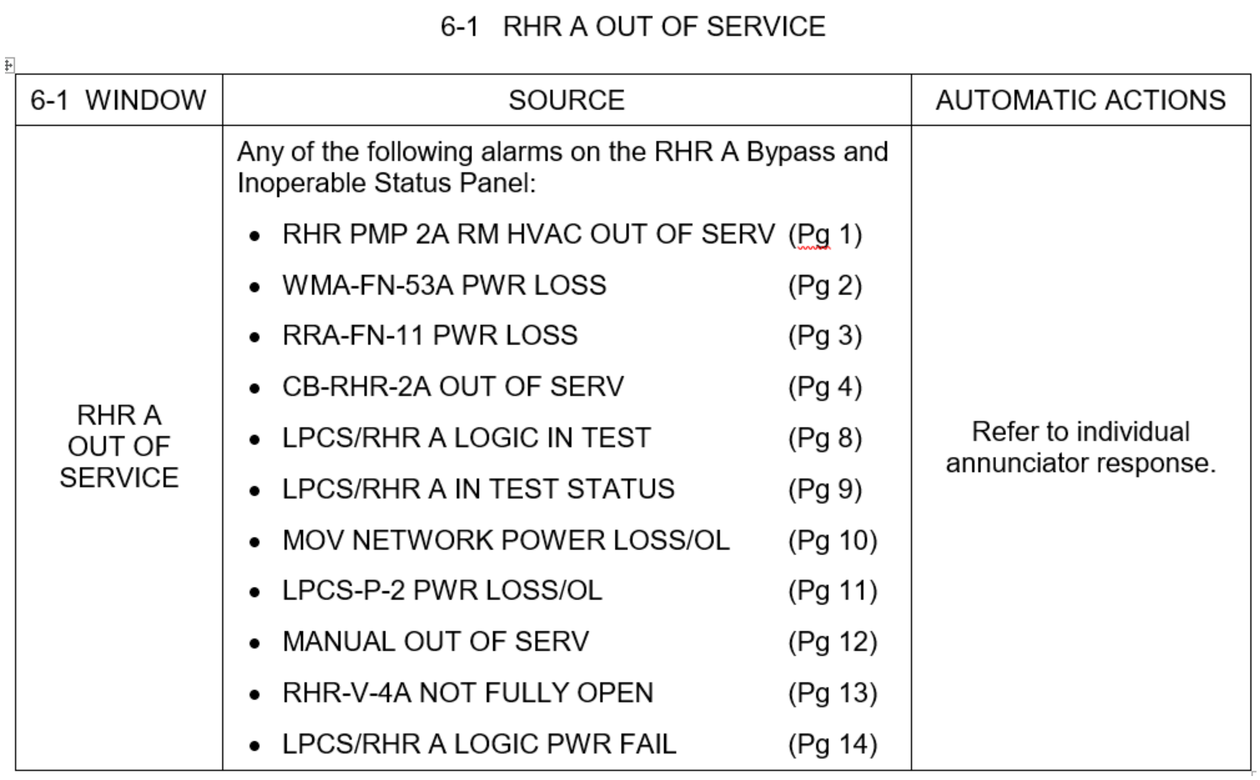
EVENT 1: Raise Power with Flow / Place MT is Governor Valve Optimization

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
9.	**BOP**	4) **SELECT** GO. _____ 5) **SELECT** YES. _____ 6) **VERIFY** GO ILLUMINATED. _____ 7) **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____ c. **VERIFY** Optimize Valve Mode OKAY TO SELECT light illuminated. _____ d. **SELECT** OPTIMIZED VALVE MODE. _____ e. **SELECT** YES. _____ f. **VERIFY** GV-1 moves to approximately 50-55% as GV-4 throttles. _____ Performs all steps
10.	**BOP**	~~NOTE~~: VPL DEMAND is set 10% GT GV DEMAND or 95%, whichever is greater, to allow the Turbine Bypass Valves to open sooner if there is a GV failure. ~~NOTE~~: The Governor valves will not stay in Optimize if LT 90% VPL.
11.	**BOP**	g. **SET** VPL DEMAND approximately 10% above GV DEMAND or 95%, whichever is greater, as follows: 1) **SELECT** VPL TARGET. _____ 2) **ENTER** value that is approximately 10% above GV DEMAND or 95%, whichever is greater. _____ 3) **SELECT** OK. _____ 4) **SELECT** GO. _____ 5) **SELECT** YES. _____ 6) **VERIFY** GO illuminated. _____ h. **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____ i. **VERIFY** final VPL DEMAND indicates VPL TARGET value. _____ Performs all steps

EVENT 2: RHR-V-17 MOV Network Power Loss

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
		when directed: **INSERT TRIGGER 2: RHR-V-17A Power Loss** **Results in: CRS TS Call / loss of RHR function.**
12.	**RO**	Responds to 4.601.A4 6-1 RHR A OUT OF SERVICE and RHR BISI MOV Network power loss.



6-1 RHR A OUT OF SERVICE

6-1 WINDOW	SOURCE	AUTOMATIC ACTIONS
RHR A OUT OF SERVICE	Any of the following alarms on the RHR A Bypass and Inoperable Status Panel: • RHR PMP 2A RM HVAC OUT OF SERV (Pg 1) • WMA-FN-53A PWR LOSS (Pg 2) • RRA-FN-11 PWR LOSS (Pg 3) • CB-RHR-2A OUT OF SERV (Pg 4) • LPCS/RHR A LOGIC IN TEST (Pg 8) • LPCS/RHR A IN TEST STATUS (Pg 9) • MOV NETWORK POWER LOSS/OL (Pg 10) • LPCS-P-2 PWR LOSS/OL (Pg 11) • MANUAL OUT OF SERV (Pg 12) • RHR-V-4A NOT FULLY OPEN (Pg 13) • LPCS/RHR A LOGIC PWR FAIL (Pg 14)	Refer to individual annunciator response.

EVENT 2: RHR-V-17 MOV Network Power Loss

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
13.	RO	

WINDOW	SOURCE	AUTOMATIC ACTIONS
MOV NETWORK PWR LOSS/OL	Loss of Power, Control Power, or Overload Trip on one of the following MOVs: MOVs powered from E-MC-7BA: • RHR-42-7BA3A (RHR-V-6A) • RHR-42-7BA3B (RHR-V-4A) • RHR-42-7BA4D (RHR-V-24A) • RHR-42-7BA5A (RHR-V-42A) • RHR-42-7BA5C (RHR-V-27A) • RHR-42-7BA7B (RHR-FCV-64A) MOVs powered from E-MC-7BB: • RHR-42-7BB5A (RHR-V-48A) • RHR-42-7BB5B (RHR-V-3A) • RHR-42-7BB5C (RHR-V-74A) • RHR-42-7BB5D (RHR-V-73A) • RHR-42-7BB7A (RHR-V-68A) • RHR-42-7BB7B (RHR-V-17A) • RHR-42-7BB7C (RHR-V-16A)	None

Based on indicating lights out for RHR-V-17A, determines loss is to RHR-V-17A and reports to CRS.

🚫 1. **CHECK** the status of the applicable breaker, overloads, and/or control power fuses.

Determines loss of RHR-V-17A

🚫 2. IF in Mode 1, 2, or 3,
THEN **REFER** to Technical Specifications 3.4.9, 3.5.1, 3.6.1.5, 3.6.2.3 and 3.6.1.3.

Refers to CRS

3. IF in Mode 4 or 5,
THEN **REFER** to Technical Specifications 3.4.10, 3.5.2, 3.9.8, and 3.9.9.

4. **REFER** to Licensee Controlled Specification 1.8.11.

STEP #	Position	CREW RESPONSE
14.	RO	Directs field operator to investigate RHR-V-17A Breaker

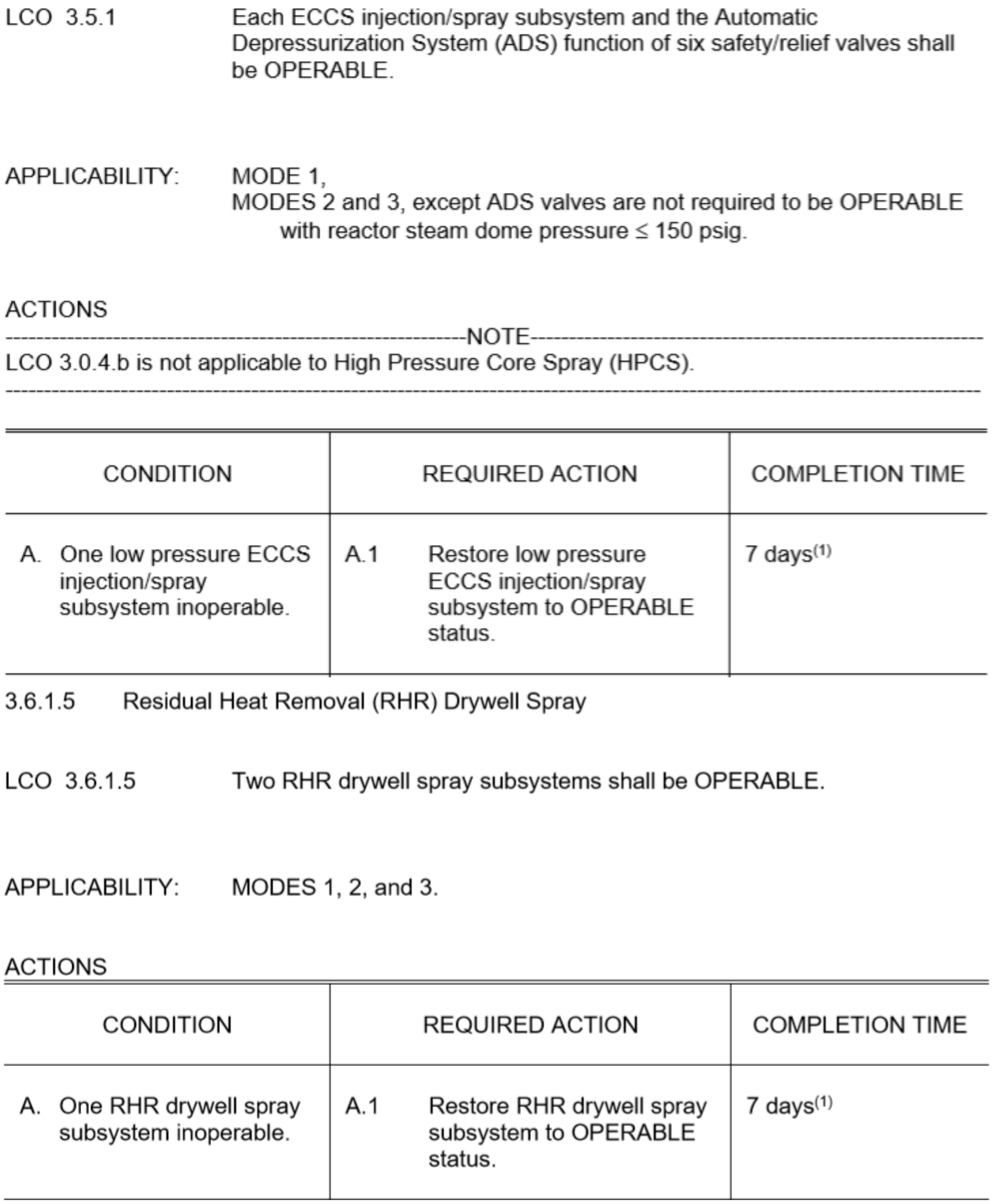
If contacted as field operator to investigate MC-7BB cubicle 7B (RHR-V-17A) Wait 2 minutes and ROLE-PLAY

“Feeder breaker for RHR-V-17A is closed.”

EVENT 2: RHR-V-17 MOV Network Power Loss

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
15.	CRS	**Technical Specification Action Statement:** Evaluates and Declares 3.5.1 Condition “A” / 3.6.1.5 Condition “A” / 3.6.1.3 Condition “A”



LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of six safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ 150 psig.

ACTIONS

--NOTE--

LCO 3.0.4.b is not applicable to High Pressure Core Spray (HPCS).

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1	Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days(1)

3.6.1.5 Residual Heat Removal (RHR) Drywell Spray

LCO 3.6.1.5 Two RHR drywell spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One RHR drywell spray subsystem inoperable.	A.1	Restore RHR drywell spray subsystem to OPERABLE status.	7 days(1)

EVENT 2: RHR-V-17 MOV Network Power Loss

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
16.	**CRS**	

3.6.1.3 Primary Containment Isolation Valves (PCIVs)

LCO 3.6.1.3 Each PCIV, except reactor building-to-suppression chamber vacuum breakers, shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

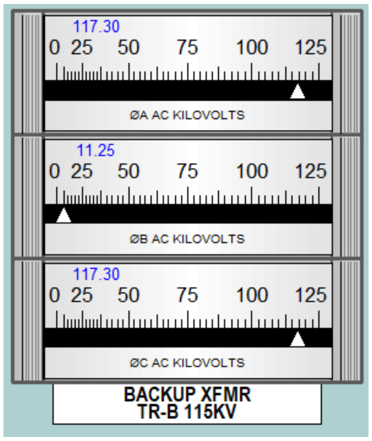
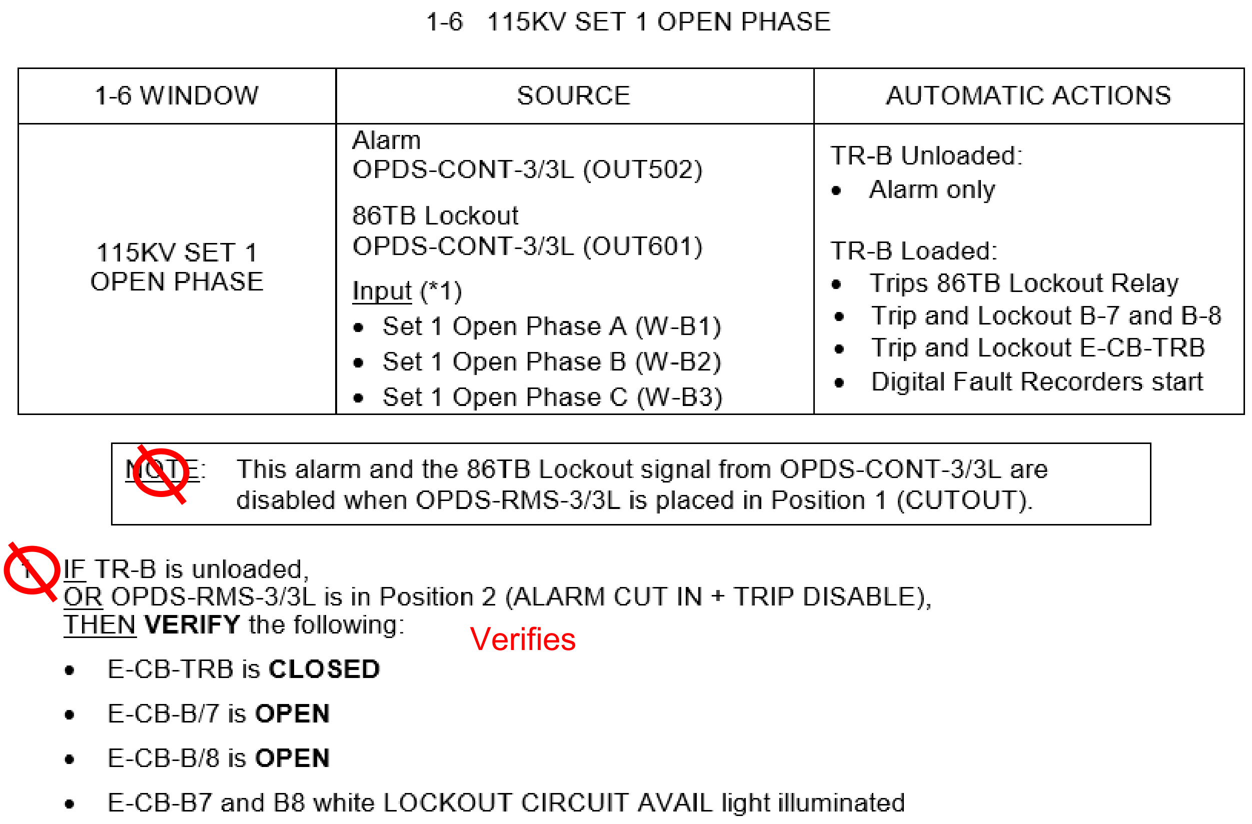
ACTIONS

---NOTES---

1. Penetration flow paths may be unisolated intermittently under administrative controls.
2. Separate Condition entry is allowed for each penetration flow path.
3. Enter applicable Conditions and Required Actions for systems made inoperable by PCIVs.
4. Enter applicable Conditions and Required Actions of LCO 3.6.1.1, "Primary Containment," when PCIV leakage results in exceeding overall containment leakage rate acceptance criteria.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ------------NOTE------------ Only applicable to penetration flow paths with two PCIVs. --------------------------------- One or more penetration flow paths with one PCIV inoperable for reasons other than Condition D.	A.1 Isolate the affected penetration flow path 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. <u>AND</u>	4 hours except for main steam line <u>AND</u> 8 hours for main steam line

<table>
<tr><th colspan="3">EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">Following CRS TS evaluation and call.
INSERT TRIGGER 3: 115Kv Open Phase.
Results in: ABN-ELEC-GRID</td></tr>
<tr><td>17.</td><td>BOP</td><td>Responds to
4.800.C4-2.5, XFMR TR-B TROUBLE
4.800.C3-1.6, 115KV SET 1 OPEN PHASE
4.800.C3-2.6, 115KV SET 2 OPEN PHASE
Verifies indications:
Phase B Voltage is lower than expected.

Informs CRS
 </td></tr>
<tr><td>18.</td><td>BOP</td><td>1-6 115KV SET 1 OPEN PHASE
<table>
<tr><th>1-6 WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr>
<tr><td>115KV SET 1
OPEN PHASE</td><td>Alarm
OPDS-CONT-3/3L (OUT502)
86TB Lockout
OPDS-CONT-3/3L (OUT601)
Input (*1)
• Set 1 Open Phase A (W-B1)
• Set 1 Open Phase B (W-B2)
• Set 1 Open Phase C (W-B3)</td><td>TR-B Unloaded:
• Alarm only
TR-B Loaded:
• Trips 86TB Lockout Relay
• Trip and Lockout B-7 and B-8
• Trip and Lockout E-CB-TRB
• Digital Fault Recorders start</td></tr>
</table>
NOTE: This alarm and the 86TB Lockout signal from OPDS-CONT-3/3L are disabled when OPDS-RMS-3/3L is placed in Position 1 (CUTOUT).

1. IF TR-B is unloaded,
OR OPDS-RMS-3/3L is in Position 2 (ALARM CUT IN + TRIP DISABLE),
THEN VERIFY the following: Verifies
• E-CB-TRB is CLOSED
• E-CB-B/7 is OPEN
• E-CB-B/8 is OPEN
• E-CB-B7 and B8 white LOCKOUT CIRCUIT AVAIL light illuminated</td></tr>
</table>

EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.

STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
19.	**BOP**	~~2.~~ IF TR-B was loaded, AND OPDS-RMS-3/3L is in Position 3 (ALARM CUT IN + TRIP ENABLE), THEN **VERIFY** the following automatic actions have occured: • E-CB-TRB tripped and locked out • E-CB-B/7 tripped and locked out • E-CB-B/8 tripped and locked out • E-DFR-1B (Fault Recording Oscillograph) started • IF SM-7 and/or SM-8 were energized from TR-B, THEN **VERIFY** SM-7 and/or SM-8 are re-energized from DG-1 and/or DG-2, as applicable. N/A – TR-B was NOT loaded and TR-B is not tripped or locked out. ~~3.~~ IF any automatic actions have NOT occurred, AND TR-B was loaded, AND OPDS-RMS-3/3L is in Position 3 (ALARM CUT IN + TRIP ENABLE), THEN **PERFORM** the incomplete automatic actions. ~~4.~~ IF TR-B tripped and locked out, THEN **REFER** to ABN-ELEC-GRID. Steps are not applicable to current plant conditions.
20.	**BOP**	5. IF one phase of TR-B is lost, THEN **ENTER** ABN-ELEC-GRID. Indications of loss of B Phase of TR-B 6. **REFER** to Technical Specifications 3.8.1 and 3.8.2. Informs CRS
21.	**CRS**	Enters ABN-ELEC-GRID and may refer to ABN-TRANSFORMER Per ABN-ELEC-GRID Entry Conditions 1.4 A loss of one phase on E-TR-B as determined by the following: • H13-800.C4-2.5, XFMR TR-B TROUBLE (due to loss of one phase) • H13-800.C3-1.6, 115KV SET 1 OPEN PHASE (due to loss of one phase) • H13-800.C3-2.6, 115KV SET 2 OPEN PHASE (due to loss of one phase) • Low voltage on one or more phases • Plant loads tripping on overcurrent • Plant loads unable to be started • E-CB-TRB trips and locks out (86TB).

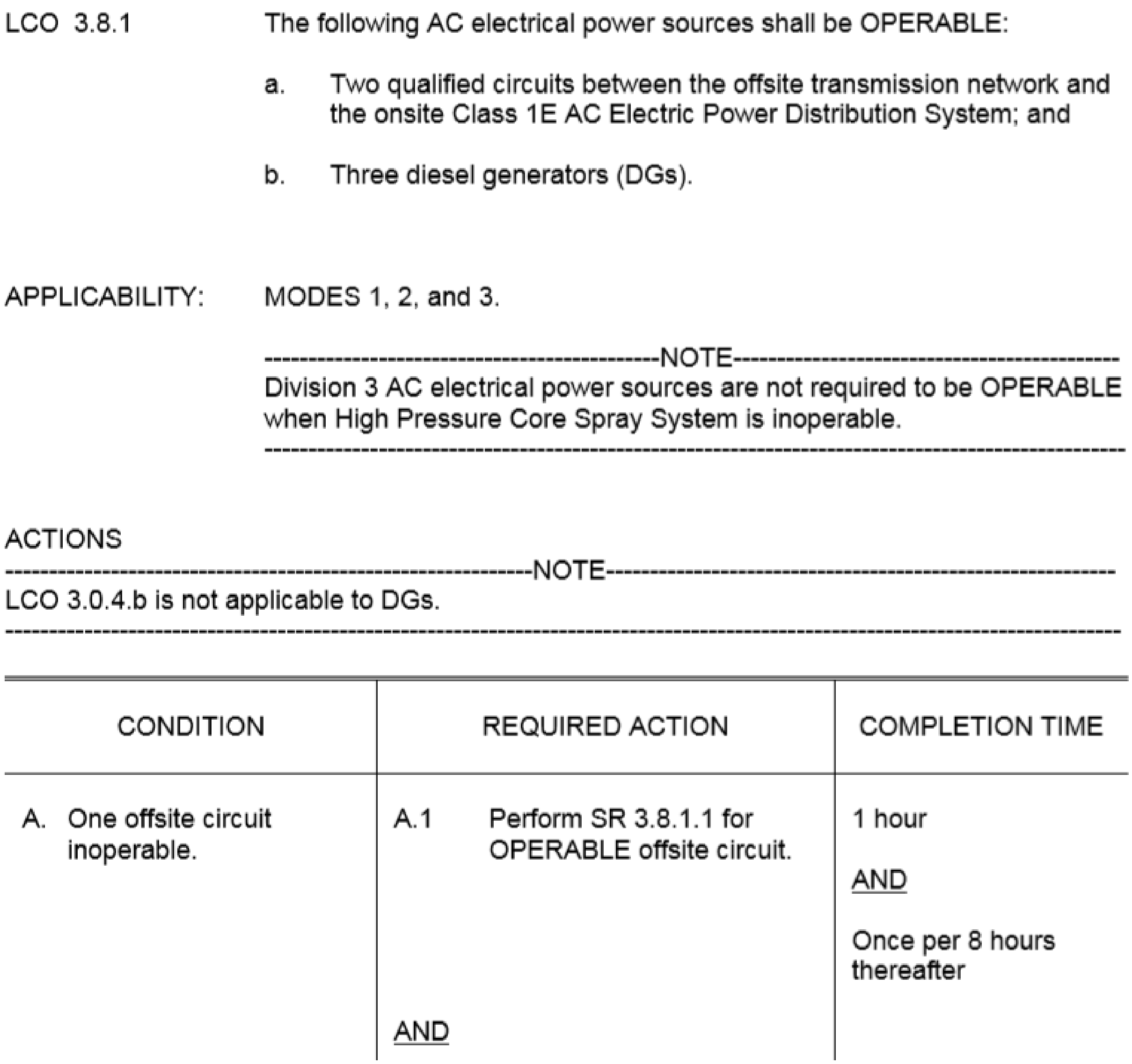
EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.

STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
22.	**BOP**	May refer to ABN-ELEC-GRID If the operator notes that E-CB-TRB should have automatically tripped on E-TR-B Open phase per ABN-ELEC-GRID, BOP may inform CRS and Manually open E-CB-TRB prior to direction given in ABN-ELEC-GRID section 4.4 2.0 AUTOMATIC ACTIONS • E-TR-S Supply Breaker trips and locks out (86TS) on E-TR-S Open Phase. • E-CB-TRB trips and locks out (86TB) on E-TR-B Open Phase
23.	**CRS**	Directs actions of ABN-ELEC-GRID section 4.4
24.	**BOP**	4.0 SUBSEQUENT OPERATOR ACTIONS NOTE: During a degraded grid condition, it may take several minutes to get through to Dittmer. {AR-6.3} NOTE: Maintain a questioning attitude when communicating with BPA to ensure the grid issue, BPA's course of actions, and the impact on CGS are understood. {AR-6.4} NOTE: The SM/CRS should approve all troubleshooting activities initiated by BPA. {AR-6.4}
25.	**BOP**	4.4 IF Loss of one phase on E-TR-B, THEN **PERFORM** the following: Indications of loss of B Phase of TR-B 4.4.1 **CHECK** Backup Transformer phase voltages on H13-P800. ____ 4.4.2 IF E-CB-B/7 OR E-CB-B/8 is closed, THEN **VERIFY** E-CB-TRB opens. N/A
26.	**BOP**	4.4.3 **VERIFY** the following breakers **OPEN**: • E-CB-TRB Performs • E-CB-B/7 Verifies • E-CB-B/8 Verifies

<table>
<tr><th colspan="3">EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>27.</td><td>BOP</td><td>4.4.4 VERIFY the following breakers CLOSED:
• E-CB-7/DG1 Verifies
• E-CB-8/DG2 Verifies
4.4.5 REFER ABN-TRANSFORMER, Abnormal Transformer Operation. Refers to
4.4.6 IF in Mode 1, 2, or 3,
THEN REFER to Technical Specification 3.8.1. Informs CRS</td></tr>
<tr><td colspan="3">If contacted as Field Operator to investigate TR-B Wait 3 Minutes</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“E-CB-TRB is - <i>report current position</i>- with no other abnormal indications”</td></tr>
<tr><td colspan="3">If contacted as BPA
BOOTH OPERATOR RESPOND WITH THE FOLLOWING AFTER CREW HAS TAKEN ALL ACTIONS ABOVE OF ABN-ELEC-GRID</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“We have an open phase alarm on the Benton line to Columbia, we are opening the disconnect from the Benton switching station to perform further investigations”
INSERT TRIGGER 13 and</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“The disconnect from Benton to Columbia Generating Station is open”</td></tr>
<tr><td>28.</td><td>BOP</td><td>Acknowledges FP-P-110 Diesel Running and
4.800.C4 8-5 115KV LINE UNDERVOLTAGE</td></tr>
</table>

EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
29.	CRS	**Technical Specification Action Statement:** Evaluates and declares 3.8.1 Condition "A"



LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electric Power Distribution System; and

b. Three diesel generators (DGs).

APPLICABILITY: MODES 1, 2, and 3.

--NOTE--
Division 3 AC electrical power sources are not required to be OPERABLE when High Pressure Core Spray System is inoperable.

ACTIONS

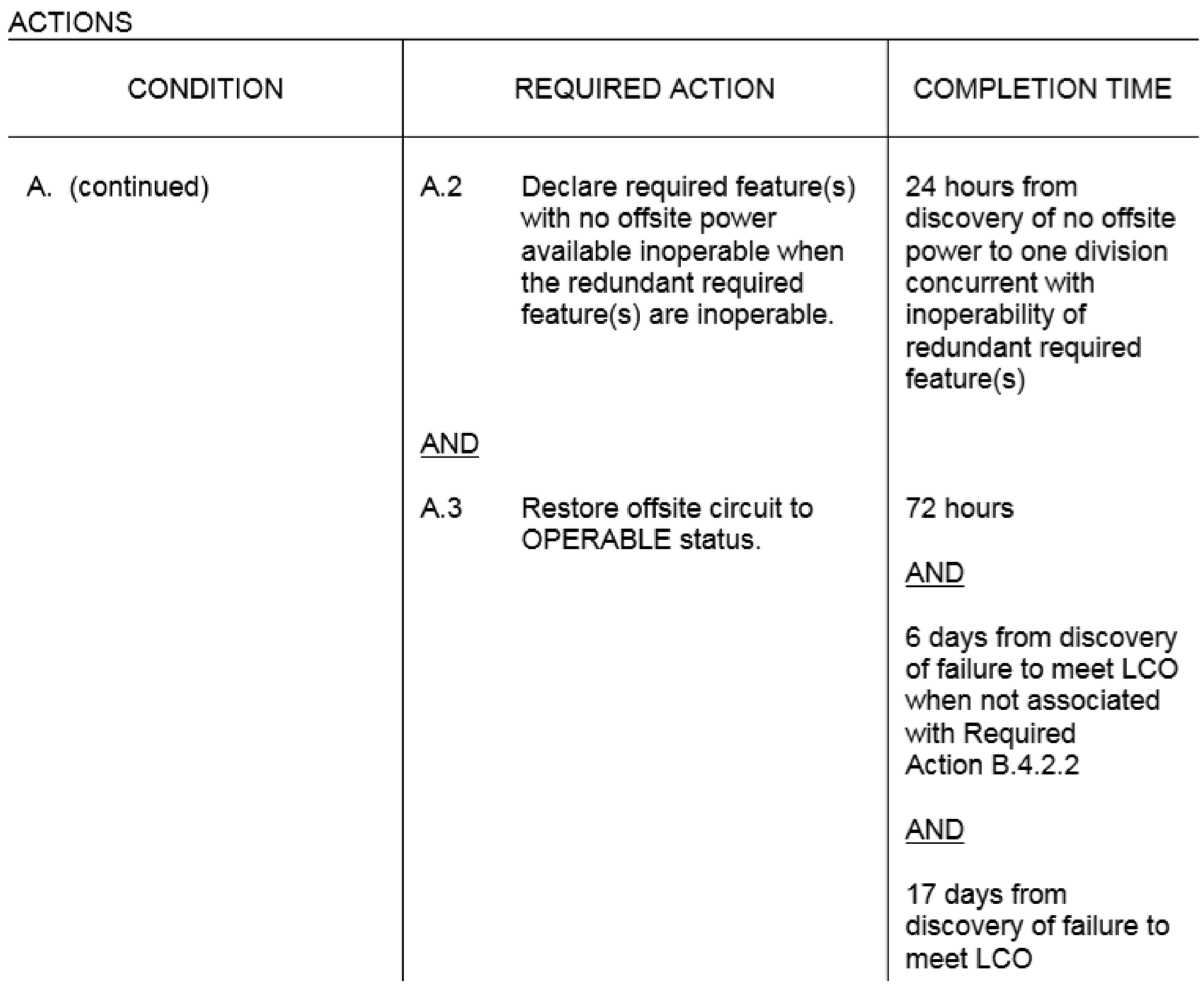
--NOTE--
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One offsite circuit inoperable.	A.1 Perform SR 3.8.1.1 for OPERABLE offsite circuit. <u>AND</u>	1 hour <u>AND</u> Once per 8 hours thereafter

EVENT 3: 115Kv Open phase / CB-TR-B fails to auto trip.

OPERATOR ACTIVITIES

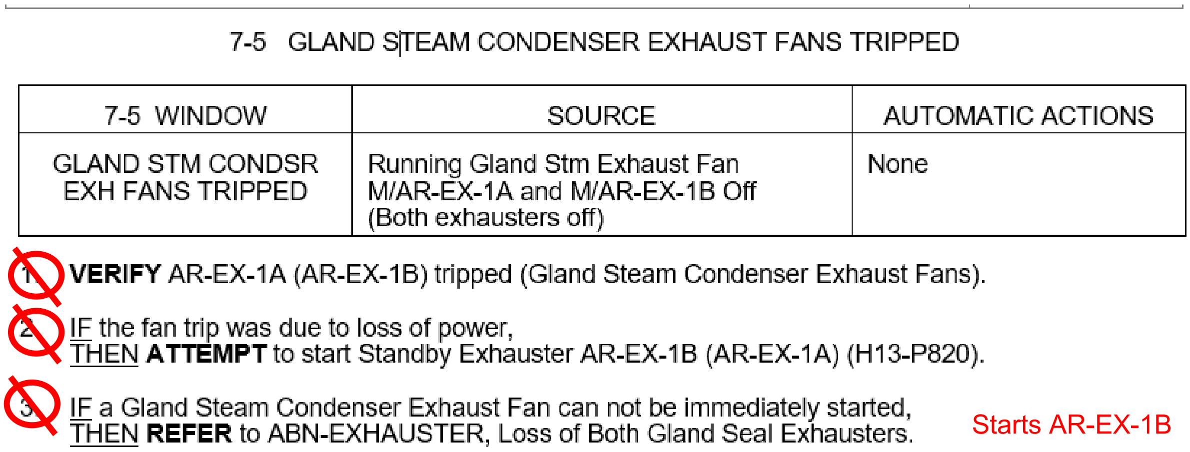
STEP #	Position	CREW RESPONSE
30.		ACTIONS



ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2	Declare required feature(s) with no offsite power available inoperable when the redundant required feature(s) are inoperable.	24 hours from discovery of no offsite power to one division concurrent with inoperability of redundant required feature(s)
	<u>AND</u>		
	A.3	Restore offsite circuit to OPERABLE status.	72 hours <u>AND</u> 6 days from discovery of failure to meet LCO when not associated with Required Action B.4.2.2 <u>AND</u> 17 days from discovery of failure to meet LCO

EVENT 4: MSE Earthquake and loss of both AR exhausters

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">After CRS makes TS call for trigger 3 or when directed;
INSERT TRIGGER 4: MSE / AR-EX-1A Trips
Results in: ABN-EXHAUSTER</td></tr>
<tr><td>31.</td><td>RO</td><td>Responds to:
4.851.S1 2-5 MINIMUM SEISMIC EARTHQUAKE EXCEEDED
4.820.B2 7-5 GLAND STM CONDSR EXH FANS TRIPPED
4.800.C3 6-4 BUS 31 GROUND</td></tr>
<tr><td>32.</td><td>RO</td><td>
7-5 GLAND STEAM CONDENSER EXHAUST FANS TRIPPED
<table>
<tr><th>7-5 WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr>
<tr><td>GLAND STM CONDSR EXH FANS TRIPPED</td><td>Running Gland Stm Exhaust Fan M/AR-EX-1A and M/AR-EX-1B Off (Both exhausters off)</td><td>None</td></tr>
</table>
1. VERIFY AR-EX-1A (AR-EX-1B) tripped (Gland Steam Condenser Exhaust Fans).
2. <u>IF</u> the fan trip was due to loss of power,
<u>THEN</u> ATTEMPT to start Standby Exhauster AR-EX-1B (AR-EX-1A) (H13-P820).
3. <u>IF</u> a Gland Steam Condenser Exhaust Fan can not be immediately started,
<u>THEN</u> REFER to ABN-EXHAUSTER, Loss of Both Gland Seal Exhausters.
Starts AR-EX-1B
May contact field operator to investigae AR-EX-1A/B Locally</td></tr>
<tr><td colspan="3">If contacted as Field Operator to inspect AR-EX-1A/B
WAIT 3 MINUTES (AFTER AR-EX-1B Trips 2 minutes after restart)
ROLE-PLAY
“Both AR-EX-1A and 1B are Not running.”</td></tr>
<tr><td>33.</td><td>CRS</td><td>ENTERS ABN-EARTHQUAKE and directs / performs actions</td></tr>
</table>

Performs

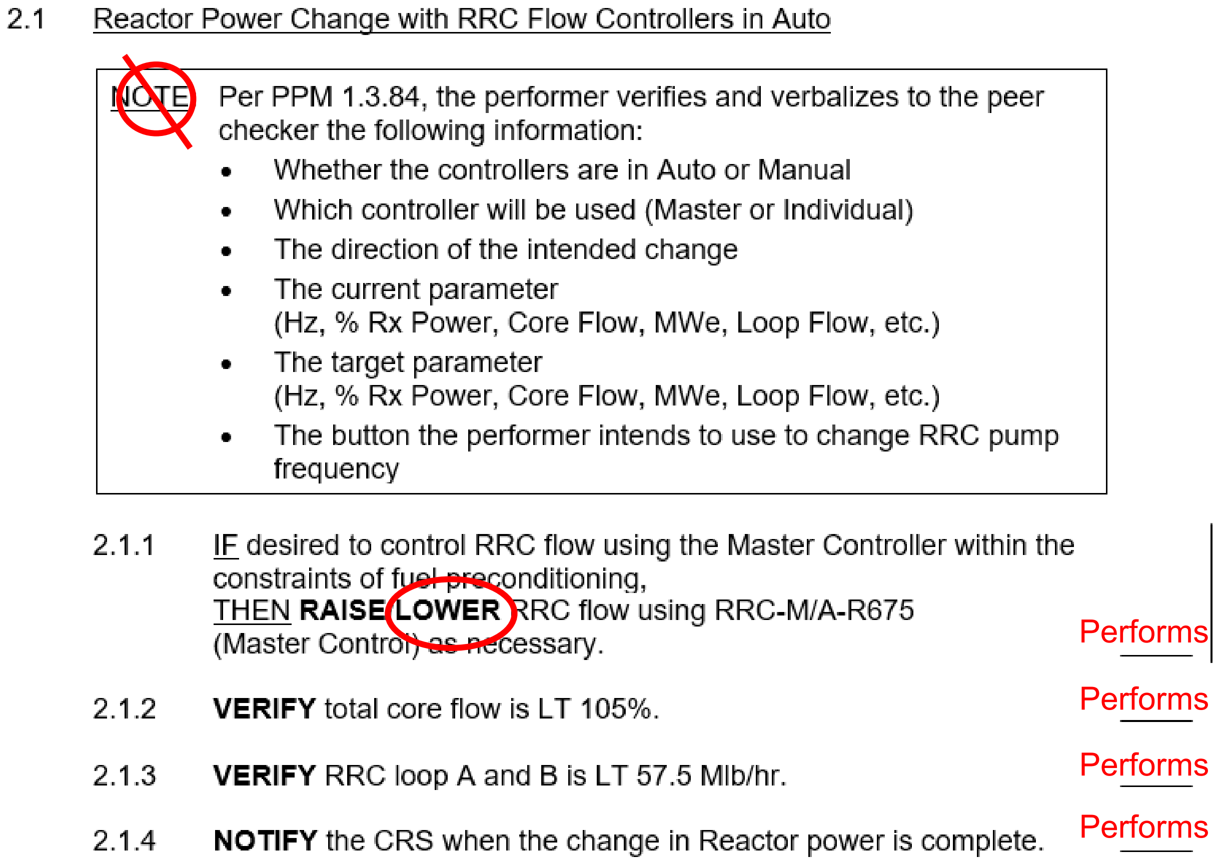
<table>
<tr><th colspan="3">EVENT 4: MSE Earthquake and loss of both AR exhausters</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>34.</td><td>RO</td><td>Performs actions of ABN-EARTHQUAKE
4.1 MAKE the following announcement:
"Attention all personnel, attention all personnel. Columbia Generating Station has experienced seismic activity. For personnel inside buildings, take cover under sturdy furniture, away from windows and heavy objects that could fall. Hold onto the sturdy furniture. Do not rush to the exits. For personnel outside, move to a clear area, away from buildings, light poles, and electrical wires. On-Shift personnel conduct a quick plant tour and report any evidence of fire, flooding, or plant damage." _____
4.7 DIRECT SAS to repeat the above announcement on the Alternate Security/Area Wide and Security radio channels. Performs _____</td></tr>
<tr><td colspan="3">If contacted as SAS Operator
ROLE-PLAY
“I understand, Repeat ABN-EARTHQUAKE announcement”</td></tr>
<tr><td>35.</td><td>RO</td><td>4.10 INSPECT the Spent Fuel Pool for damage. Contacts field operator {AR-6.7} _____</td></tr>
<tr><td colspan="3">If contacted as Field Operator to inspect the Spent Fuel Pool for damage
WAIT 3 MINUTES
ROLE-PLAY
“There is no visible damage to the Spent Fuel Pool”</td></tr>
<tr><td>36.</td><td>ATC</td><td>4.13 CHECK the neutron monitoring system for proper operation and changes. Monitors _____</td></tr>
<tr><td>37.</td><td>CRS</td><td>Per ABN-EARTHQUAKE
4.2 VERIFY adequate systems are available to safely shutdown and cool down the plant (e.g. SSW, SDC, DGs, Off-site power). {OE-6.9} _____
No safety systems were affected
4.3 <u>IF</u> the Plant cannot be safely shut down, <u>THEN</u> NOTIFY Plant Management to request relief from the NRC to not shut down until safe shutdown systems can be restored. {OE-6.9} N/A
Directs ATC and BOP to:
4.9 MONITOR Control Room instrumentation for evidence of increases in the following:
• Drywell leakage rates _____
• Drywell pressure _____
• Drywell gaseous or particulate activity _____
• Leak detection temperatures _____</td></tr>
</table>

EVENT 4: MSE Earthquake and loss of both AR exhausters

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
38.	**RO**	Acknowledges 4.820.B2 7-5 GLAND STM CONDSR EXH FANS TRIPPED comes back in after initially clearing. Notes indications of no Air Removal Exhauster running (AR-EX-1B Tripped a few minutes after the manual start) 4.800.C2 8-2 BUS 21 GROUND Informs CRS.
39.	**CRS**	Enters ABN-EXHAUSTER and directs BOP to monitor indications listed. 4.1 IF both Gland Seal Condenser Exhausters fail, AND one cannot immediately be restarted, THEN **MONITOR** the following: • Condenser back pressure _____ • Main Turbine seal areas (evaluating steam leakage) _____ • Main Turbine bearings _____ • Main Turbine slop drains _____ • Bypass valves _____ • Intercept/Reheat Stop valves _____ • Governor valves _____ • Throttle valves _____ • Feed Pump seals _____ • RFW pump turbines for water intrusion into the oil system _____ • Lube Oil Conditioner operation for more water being ejected _____ • Gland Exhaust Condenser pressure on SS-PI-3 _____ • Gland Exhaust Condenser operation (Water may be detected coming out of the gooseneck) _____ • Offgas flow _____ • Main Turbine vibrations _____ • Feed Pump Turbine vibrations _____ • Trap Station 31 and 32 levels _____ Monitors all indications listed. **EXAMINER NOTE: This leads to main turbine vibrations which is monitored above.**

<table>
<tr><th colspan="3">EVENT 5: Turbine Vibrations</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">When Directed
INSERT TRIGGER 5: Rising MT vibrations.
Results in: Power Reduction</td></tr>
<tr><td>40.</td><td>RO</td><td>
Responds to:
4.820.B1 7-6 TURB/GEN BRG VIB HIGH.
7-6 TURBINE/GENERATOR BEARING VIBRATION HIGH
<table>
<tr><th>7-6 WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr>
<tr><td>TURB/GEN BRG VIB HIGH</td><td>TG-MON-VBx (GE 7 mils)
x = Brg No</td><td>None</td></tr>
</table>
NOTE: This annunciator is not valid when Turbine Generator speed is LT 600 rpm.
NOTE: Turbine Generator vibration GT 15 mils can be displayed using the digital indication on the vibration monitoring panel.
1. CHECK Turbine Generator vibration on the DEH monitor (Menu, Turbine Monitoring).
Informs CRS Bearing 10 Vibrations are “Current Value” and “up Slow”
</td></tr>
<tr><td>41.</td><td>RO</td><td>
~~2.~~ IF this annunciator comes in during Turbine startup, THEN VERIFY Turbine speed is not at a critical or resonant speed per SOP-MT-START, Main Turbine Generator Start. N/A
~~3.~~ IF this annunciator comes in during Turbine power operation, THEN MONITOR Turbine vibration. Monitors
~~4.~~ CHECK Turbine oil temperatures and flows. Contacts Field Operator
~~5.~~ IF Turbine vibration exceeds 14 mils, THEN REDUCE Turbine Generator load. Informs CRS
6. IF Turbine vibration does not reduce, THEN TRIP the Turbine. REFER to SOP-MT-SHUTDOWN.
</td></tr>
</table>

EVENT 5: Turbine Vibrations

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
If contacted as Field Operator to check Turbine Oil temperature and flows **WAIT 4 MINUTES** **ROLE-PLAY** **“Turbine oil temperatures and flows indicate normal.”**		
42.	**CRS**	5. IF Turbine vibration exceeds 14 mils, THEN **REDUCE** Turbine Generator load. Sets a key parameter of 14 mils. When 14 mils is reached, directs a power reduction to attempt to lower turbine vibrations.
43.	**ATC**	Lower power as directed by CRS
44.	**ATC**	Lower power as directed by CRS 2.1 Reactor Power Change with RRC Flow Controllers in Auto ~~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 2.1.1 IF desired to control RRC flow using the Master Controller within the constraints of fuel preconditioning, THEN **RAISE** [✓ **LOWER**] RRC flow using RRC-M/A-R675 (Master Control) as necessary. Performs ____ 2.1.2 **VERIFY** total core flow is LT 105%. Performs ____ 2.1.3 **VERIFY** RRC loop A and B is LT 57.5 Mlb/hr. Performs ____ 2.1.4 **NOTIFY** the CRS when the change in Reactor power is complete. Performs ____
45.	**BOP**	Continues to monitor turbine vibrations.

<table>
<tr><th colspan="3">EVENT 6: MT Vibrations scram required / MG Fails to auto trip.</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">NO TRIGGER – PLANT CONDITIONS: Main Turbine vibrations continue to increase / MG Fails to auto trip following plant scram.
Results in: Reactor Scram / MT Trip</td></tr>
<tr><td>46.</td><td>RO</td><td>Informs CRS MT Vibrations are increasing slowly.</td></tr>
<tr><td>47.</td><td>CRS</td><td>6. IF Turbine vibration does not reduce, THEN TRIP the Turbine. REFER to SOP-MT-SHUTDOWN.
Performs a transient brief of intent to scram the reactor and trip the turbine on failure of turbine vibration reduction following down power.
Directs ATC to scram the reactor.</td></tr>
<tr><td colspan="3">Examiner note:
Manual Turbine / Generator trip is required, pre-inserted malfunction results in the main generator to fail to auto trip following scram. Vibes will continue to increase and could reach 18 mils if operator action is not taken, once the MG is manually tripped the Main Turbine Vibrations will decrease on bearing 10 with turbine coastdown.
DEH-MON Only indicates turbine vibration up to 15.9 mils. GE 16 mils Turbine Vibration must be monitored on TG-EF-1 point 10.</td></tr>
<tr><td>48.</td><td></td><td>CRITICAL TASK # 1
Time: ______________ Mode Switch is placed in shutdown AND the turbine in manually tripped.
Time: ______________ IF Turbine Vibration reached GE 18 mils
Examiner Note: The critical task is considered met if the reactor is scrammed and the turbine is tripped prior to reaching GE 18 mils.</td></tr>
</table>

EVENT 6: MT Vibrations scram required / MG Fails to auto trip.

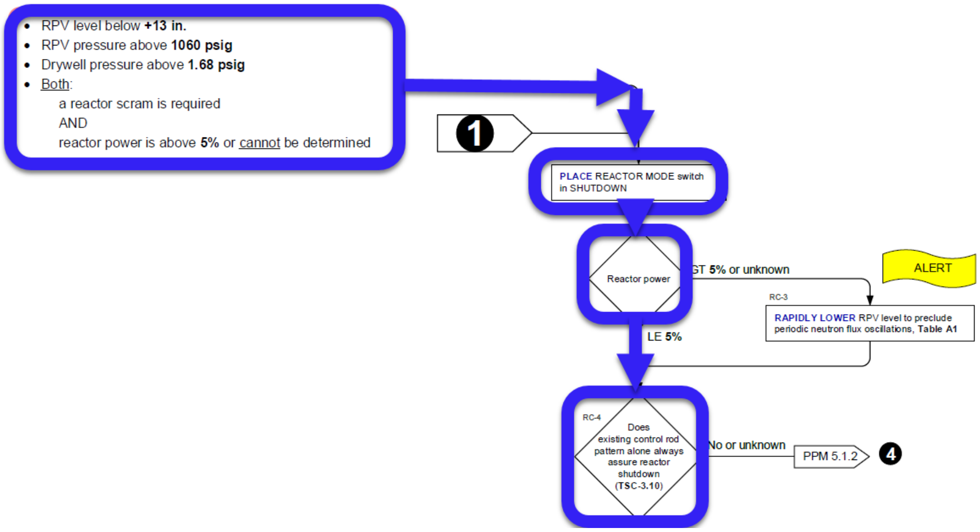
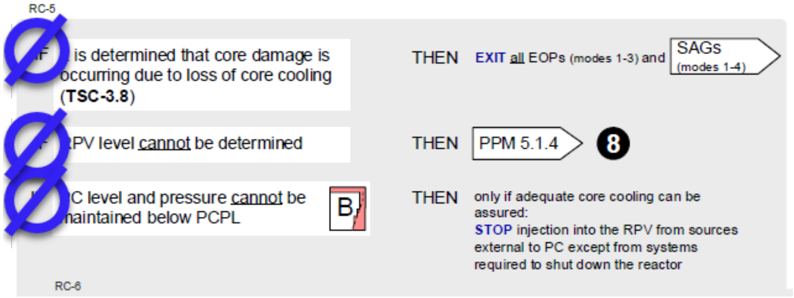
STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
49.	**ATC**	Performs Scram Immediate Actions 2.0 IMMEDIATE ACTIONS 2.1 **PLACE** the Reactor Mode Switch in **SHUTDOWN**. Performs 2H 2.2 **DEPRESS** the Manual Scram Pushbuttons. Performs 2.3 **REPORT** Reactor Power, Pressure, and Level to the CRS. Performs 2H 2.4 IF APRMs are not downscale, THEN **INITIATE** ARI. N/A 2.5 IF reactor power is GT 5%, THEN **PERFORM** the following: 2.5.1 **NOTIFY** CRS of initiating SLC. N/A 2.5.2 **INITIATE** SLC injection by performing the following (H13-P603): • **PLACE** SLC System A control switch to the **OPER** position. N/A • **PLACE** SLC System B control switch to the **OPER** position. N/A
50.	**ATC**	Performs Scram Subsequent Actions per PPM 3.3.1-QC
51.	**ATC**	3.1 Subsequent Actions - CRO1 3.1.1 **REPORT** control rod status (all rods in / not in) to CRS. Performs 3.1.2 IF in an ATWS GT 5% Reactor power, AND directed by the CRS, THEN **PERFORM** the following: a. IF Main Turbine is online, THEN **CLOSE** RCIC-V-1 to prevent Main Turbine Trip. N/A b. **STOP** and **PREVENT** injection with Condensate and Feed. N/A **CAUTION** Rapid Injection may cause fuel damage. LL is -65". c. **ESTABLISH** and **MAINTAIN** RPV level -140" to -80". N/A

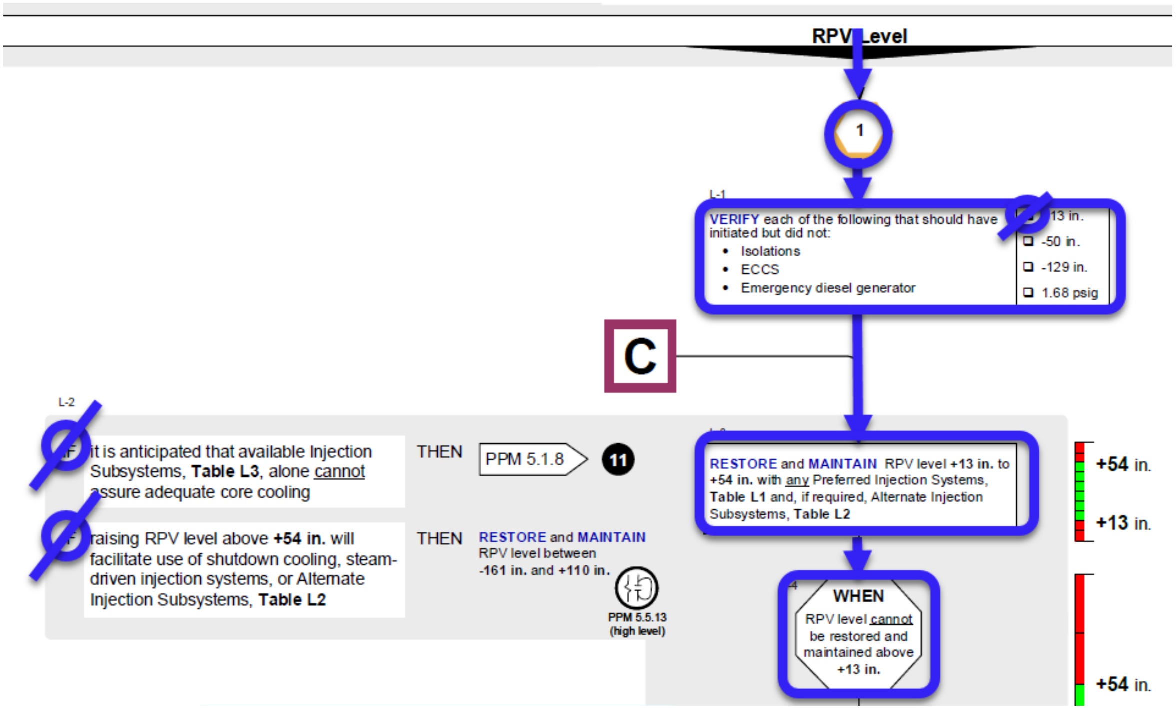
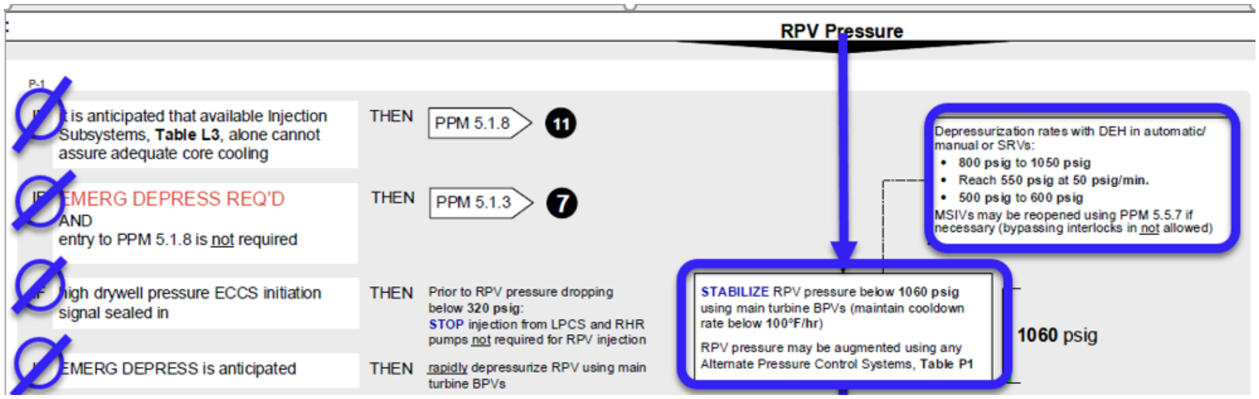
EVENT 6: MT Vibrations scram required / MG Fails to auto trip.

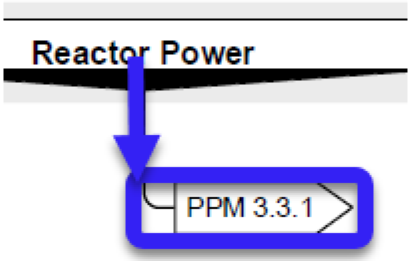
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
52.	**ATC**	3.1.3 IF NOT in an ATWS, THEN **PERFORM** the following: a. **RESTORE** and **MAINTAIN** Reactor water level +13" to +54". Performs b. **VERIFY** Reactor Recirculation pumps have runback to ~15 Hz. Performs NOTE: The preferred methods for stopping an RRC pump is by use of the STOP pushbuttons or by opening E-CB-RRA(B). 1) IF RRC pump(s) is uncontrolled, THEN **TRIP** affected RRC pump N/A AND **REFER** to ABN-RRC-LOSS. N/A 3.1.4 **INSERT** IRMs and SRMs. Performs
53.	**CRS**	Following scram report, directs BOP to manually trip MT and MG. Examiner Note: This is also directed by PP 3.3.1-QC Subsequent Actions – CRO2/3 3.2.2 WHEN Main Generator output is LT 50 MWE, THEN **PERFORM** the following: a. **VERIFY** Main Turbine trips. Performs 2H b. IF Main Turbine is NOT tripped, THEN **SIMULTANEOUSLY DEPRESS** both Emergency Trip pushbuttons (H13-P820). N/A c. IF Main Generator has NOT tripped, THEN **DEPRESS** Unit Emergency Trip pushbutton (H13-P800) OR **DEPRESS** Unit Overall Trip pushbutton (H13-P800). Performs d. **VERIFY** power transfers to TR-S. Performs
54.	**BOP**	Trips the MT and MG using the manual trip pushbuttons. Reports Main Turbine is coasting down and MT vibratios are down slow. Stabalize reactor pressure per PPM 3.3.1-QC 3.2.3 **STABILIZE** RPV Pressure 800 - 1050 psig, or as directed by the CRS. Performs

EVENT 6: MT Vibrations scram required / MG Fails to auto trip.

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
55.	**CRS**	Enters PPM 5.1.1 RPV Control  Simultaneously works through Level / Pressure / Power legs of PPM 5.1.1 RPV Control.
56.	**CRS**	Verifies overrides in section L-2 of PPM 5.1.1 RPV Control 

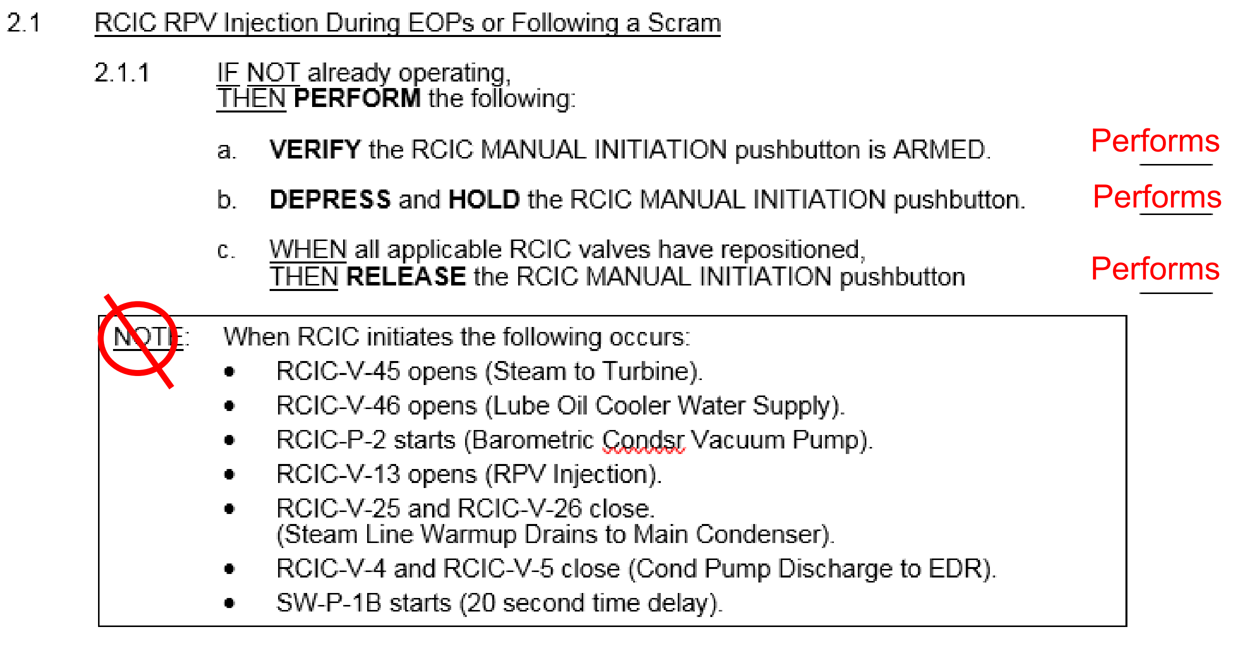
<table>
<tr><th colspan="3">EVENT 6: MT Vibrations scram required / MG Fails to auto trip.</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>57.</td><td>CRS</td><td>Directs BOP to verify +13” Actuations
Verifies overrides in section L-2 of PPM 5.1.1 RPV Control
Directs ATC to maintain RPV level +13” to +54” using Feed and Condensate.
Directs a pressure band of 800-1050psig with DEH in Automatic.

</td></tr>
<tr><td>58.</td><td>CRS</td><td>
</td></tr>
</table>

EVENT 6: MT Vibrations scram required / MG Fails to auto trip.		
STEP #		OPERATOR ACTIVITIES
	Position	CREW RESPONSE
59.	CRS	Directs ATC to perform PPM 3.3.1 Reactor Scram 

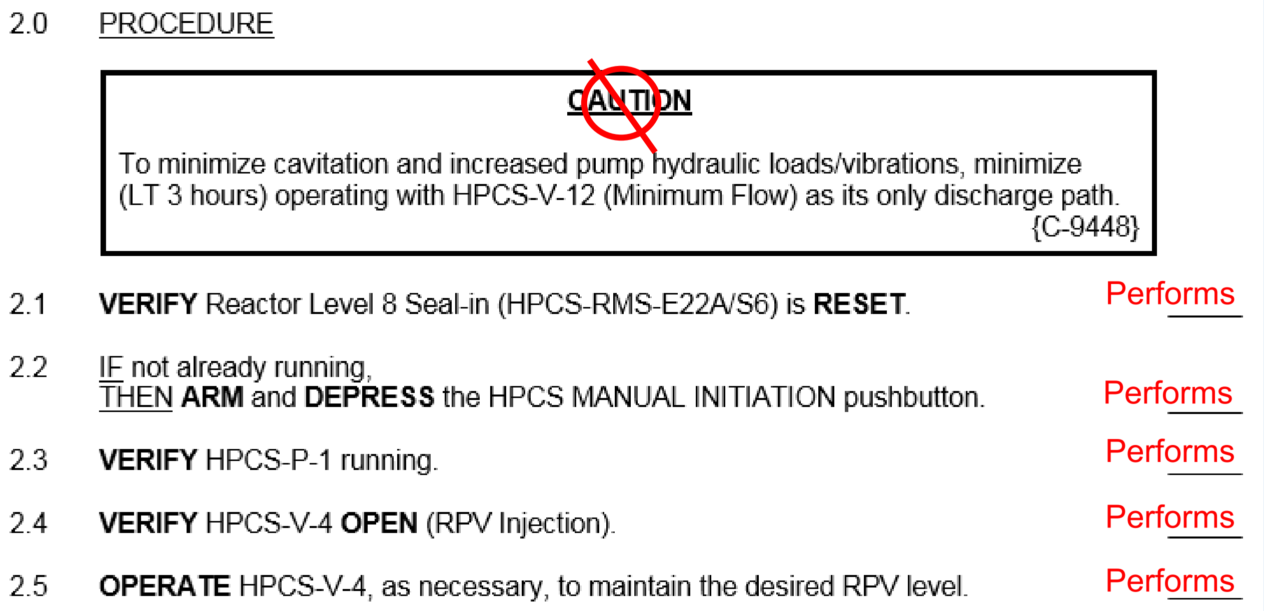
EVENT 7: Start Up Flow control valves fail as is.

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		PRE-INSERTED MALFUNCTION: Start up flow control valves fail as is. **Results in: Complications in level control for ATC.**
60.	**ATC**	Lines up Feed and Condensate to inject per SOP-RFW-FCV-QC 2.1 Transfer RPV Level Control to RFW-FCV-10A/B: 2H 2.1.1 **START CLOSING** RFW-V-112A and RFW-V-112B. Performs ____ 2.1.2 **START OPENING** RFW-V-118. Performs ____ 2.1.3 **VERIFY** RFW-V-109 is **CLOSED**. Performs ____ 2H 2.1.4 **VERIFY** RFW-V-117A and RFW-V-117B **OPEN**. Performs ____ 2.1.5 **VERIFY** RFW-LIC-620 is in **MANUAL** (V selected for Valve position demand with 0 output). Performs ____ 2.1.6 IF Reactor Feed Pump(s) (RFP) are operating, THEN **PERFORM** the following: a. IF non-ATWS, THEN **VERIFY** RFP(s) have ramped down in speed. Performs ____ b. **PLACE** RFW-P-1B in MDEM mode. Performs ____ c. **PLACE** RFW-P-1A in MDEM mode. Performs ____ d. **CONTROL** Turbine speed as required. Performs ____ e. IF desired, THEN **PLACE** RFW-FCV-2A(B) in **MANUAL**, AND **SLOWLY OPEN** to approximately 80%. Performs ____ Performs ____ **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 **VERIFY** RFW-V-112A and RFW-V-112B are **FULLY CLOSED**. Performs ____ 2.1.8 **VERIFY** RFW-V-118 is FULLY **OPEN**. Performs ____ 2.1.9 IF Reactor Feed Pump(s) (RFP) are operating, THEN **ADJUST** the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840). Performs ____ 2.1.10 **ADJUST** RFW-LIC-620 manual output to control RPV level. ____ 2.1.11 WHEN RPV level is approximately 36", THEN **PLACE** RFW-LIC-620 in **AUTOMATIC**. Notes that S/U Flow control valves fail to respond to RFW-LIC-620 ____ ATC Notes that RFW-LIC-620 will not be able to be placed in automatic due to Start Up Level Control Valve failure. ATC will use alternate method of level control by throttling RFW-V-109 and controlling RFW pump speed, or using RCIC and HPCS.

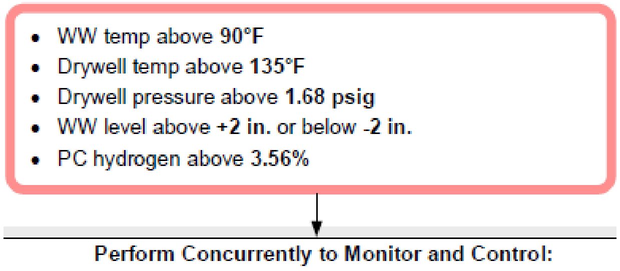
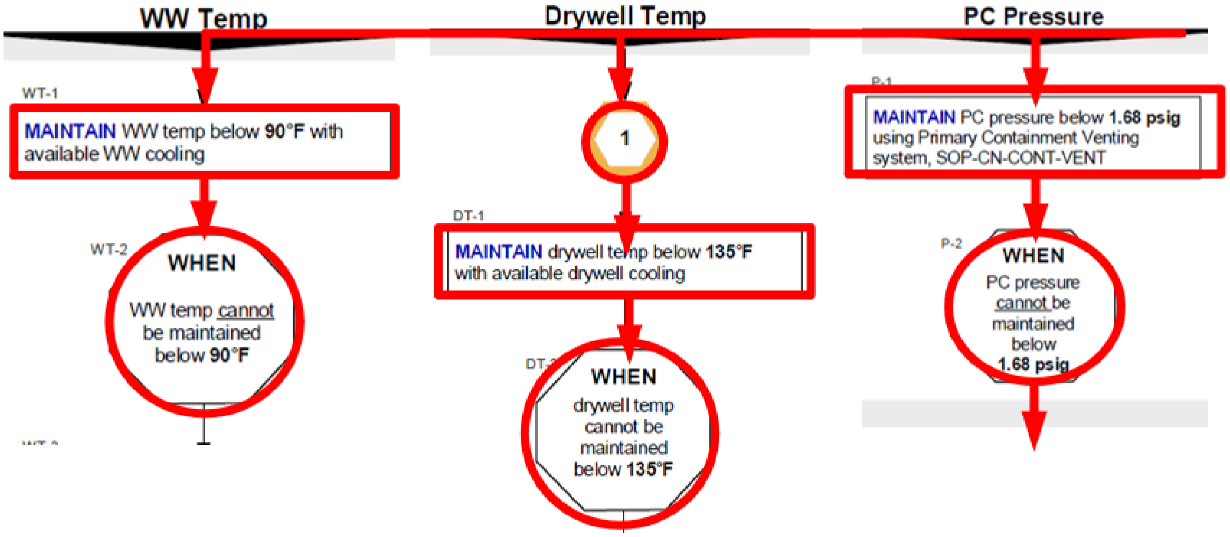
EVENT 7: Start Up Flow control valves fail as is.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
61.	**ATC**	**Examiner Note: Candidate may use RCIC or HPCS (or may use neither if they can control level with RFW pump speed and RFW-V-109). The candidate should be evaluated on controlling reactor water level regardless of the source chosen to do so.** MAY use RCIC for reactor water level control per SOP-RCIC-INJECTION-QC  2.1 RCIC RPV Injection During EOPs or Following a Scram 2.1.1 IF NOT already operating, THEN **PERFORM** the following: a. **VERIFY** the RCIC MANUAL INITIATION pushbutton is ARMED. Performs ____ b. **DEPRESS** and **HOLD** the RCIC MANUAL INITIATION pushbutton. Performs ____ c. WHEN all applicable RCIC valves have repositioned, THEN **RELEASE** the RCIC MANUAL INITIATION pushbutton Performs ____ NOTE: When RCIC initiates the following occurs: • RCIC-V-45 opens (Steam to Turbine). • RCIC-V-46 opens (Lube Oil Cooler Water Supply). • RCIC-P-2 starts (Barometric Condsr Vacuum Pump). • RCIC-V-13 opens (RPV Injection). • RCIC-V-25 and RCIC-V-26 close. (Steam Line Warmup Drains to Main Condenser). • RCIC-V-4 and RCIC-V-5 close (Cond Pump Discharge to EDR). • SW-P-1B starts (20 second time delay). May adjust the thumbwheel controller on RCIC-FIC-600 as needed to control level.

EVENT 7: Start Up Flow control valves fail as is.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
62.	**ATC**	MAY use HPCS for reactor water level control per SOP-HPCS-INJECTION-QC. **Examiner Note: It is unlikely that HPCS will be needed to maintain level with current plant conditions.**  2.0 PROCEDURE **CAUTION** To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with HPCS-V-12 (Minimum Flow) as its only discharge path. {C-9448} 2.1 **VERIFY** Reactor Level 8 Seal-in (HPCS-RMS-E22A/S6) is **RESET**. Performs 2.2 IF not already running, THEN **ARM** and **DEPRESS** the HPCS MANUAL INITIATION pushbutton. Performs 2.3 **VERIFY** HPCS-P-1 running. Performs 2.4 **VERIFY** HPCS-V-4 **OPEN** (RPV Injection). Performs 2.5 **OPERATE** HPCS-V-4, as necessary, to maintain the desired RPV level. Performs
63.	**ATC**	Informs CRS of Start Up Level Control Valve failure and gives CRS an update on injection source used to control level / current level and current trend.

EVENT 8: OBE / LOCA / RHR-P-2A Broken shaft

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		After the crew has stabilized the plant following the manual reactor scram. **INSERT TRIGGER 8: OBE and Reactor Recirculation line leak. RHR-P-2A Broken Shaft on auto-start.** **Results in: PPM 5.2.1 Primary containment control.**
64.	**BOP**	Reports rising containment pressure. 4.603.A7 5-3 DRYWELL PRESS HIGH/LOW ALERT 4.603.A7 6-4 DRYWELL PRESSURE HIGH TRIP 4.603.A8 5-3 DRYWELL PRESSURE HIGH TRIP Verifies DSIL Curve. Reports a leak in the drywell to the CRS.
65.	**ATC**	With Drywell pressure rising anticipates the autostart of HPCS, takes actions to secure HPCS and prevent a level 8 trip due to over feeding the RPV.
66.	**CRS**	Enters PPM 5.2.1 Primary Containment Control on High Drywell Pressure 
67.	**CRS**	Concurrently works through the legs of PPM 5.2.1 

EVENT 8: OBE / LOCA / RHR-P-2A Broken shaft		
STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
68.	**CRS**	Directs verifications of 1.68# actuations.
69.	**BOP**	Reports indications of a broken shaft on RHR-P-2A. AMPs and Flow are downscale with red pump indicating light illuminated. May direct field operator to investigate RHR-P-2A
If contacted as Field Operator to check RHR-P-2A **WAIT 3 MINUTES**		
ROLE-PLAY		
“RHR-P-2A has a broken shaft.”		
70.	**CRS**	Sets a key parameter for WW pressure 2# and Drywell temperature 285°F Directs RO to perform 1.68# Verifications per PPM 5.1.1 Directs pressure reduction per OI-15 and SOP-DEH-QC (Reduces pressure to 550# and 50# per minute)

EVENT 8: OBE / LOCA / RHR-P-2A Broken shaft

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
71.	**BOP**	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 953 psi. If a reactor pressure change is desired refer to ABN-PRESSURE. 2.1.1 Initiate Pressure setpoint change as follows (Turbine Start-Up) or (Main Display): a. **SELECT** PRESSURE TARGET. Performs b. **ENTER** desired pressure. 550# c. **SELECT** OK. Performs d. IF a change in pressure rate is desired, THEN **PERFORM** the following: 1) **SELECT** PRESSURE RATE. Performs 2) **ENTER** desired PRESSURE RATE. 50# 3) **SELECT** OK. Performs e. **SELECT** GO. Performs f. **SELECT** YES. Performs g. **VERIFY** PRESS DEMAND and THROTTLE PRESS change at the PRESSURE RATE. Performs

EVENT 8: OBE / LOCA / RHR-P-2A Broken shaft

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
72.	ATC	Adjusts level control strategy based on the LOCA and increased inventory loss. uses HPCS for reactor water level control per SOP-HPCS-INJECTION-QC/ 2.0 PROCEDURE **CAUTION** To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with HPCS-V-12 (Minimum Flow) as its only discharge path. {C-9448} 2.1 **VERIFY** Reactor Level 8 Seal-in (HPCS-RMS-E22A/S6) is **RESET**. Performs ____ 2.2 IF not already running, THEN **ARM** and **DEPRESS** the HPCS MANUAL INITIATION pushbutton. Performs ____ 2.3 **VERIFY** HPCS-P-1 running. Performs ____ 2.4 **VERIFY** HPCS-V-4 **OPEN** (RPV Injection). Performs ____ 2.5 **OPERATE** HPCS-V-4, as necessary, to maintain the desired RPV level. Performs ____ May also increase RCIC flow using RCIC Controller in automatic with the thumbwheel. May Increase RFW turbine speed or adjust RFW-V-109 if using RFW for level control.

Examiner Note: Allow the crew the opportunity to spray the wetwell using RHR-B prior to inserting trigger 9

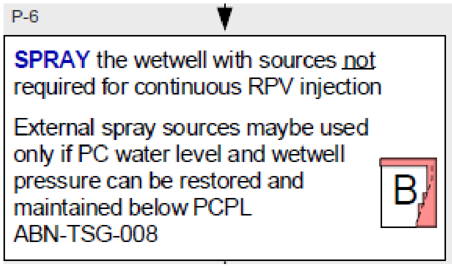
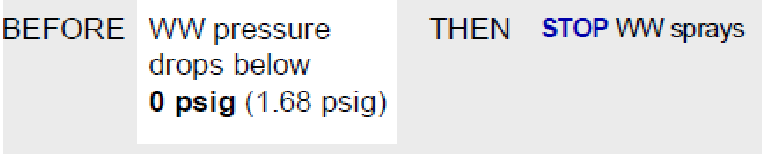
CRITICAL TASK # 2

Time: ______________ Wetwell Sprays commenced

Time: ______________ Wetwell Pressure exceeds 12#

Examiner Note: The critical task is considered met if Wetwell Sprays have commenced prior to Wetwell Pressure exceeding 12#.

EVENT 8: OBE / LOCA / RHR-P-2A Broken shaft

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
73.	**CRS**	Directs RO to mark Wetwell level in feet. Directs RO to Sprays the Wetwell using RHR-B  P-6 **SPRAY** the wetwell with sources not required for continuous RPV injection External spray sources maybe used only if PC water level and wetwell pressure can be restored and maintained below PCPL ABN-TSG-008 B
74.	**BOP**	Sprays the wetwell per SOP-RHR-SPRAY-WW-QC 2.1 Initiation of Wetwell Spray during EOPs 2.1.1 **VERIFY** RHR-P-2~~A~~(B) **RUNNING**. Performs 2.1.2 **VERIFY** RHR-V-42~~A~~(B) **CLOSED** (LPCI Injection). Performs **CAUTION** Operate Drywell sprays and Wetwell sprays on opposite loops if possible. DO NOT initiate multiple loops of containment sprays simultaneously. 2.1.3 **OPEN** RHR-V-27~~A~~(B) (Suppression Pool Spray). Performs
75.	**CRS**	Sets a key parameter of 1.68# WW pressure per PPM 5.2.1  BEFORE WW pressure drops below **0 psig** (1.68 psig) THEN **STOP** WW sprays Sets Key parameter of 12# in the Wetwell

<table>
<tr><th colspan="3">EVENT 9: Lockout SM-3</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">AFTER crew has initially sprayed the Wetwell using RHR-B
INSERT TRIGGER 9: Lockout on SM-3 (B-8 is not available)
Results in: Manual restoration of SM-8 and ability to use of containment sprays.</td></tr>
<tr><td colspan="3">CRITICAL TASK # 3
Time: _____________ SM-3 Lockout / SM-8 De-Energized and DG-2 running without SW.
Time: _____________ Power is restored to SM-8.
Examiner Note: The critical task is considered met if power is restored to SM-8 within 10 minutes of SM-8 being de-energized.</td></tr>
<tr><td>76.</td><td>**BOP**</td><td>Reports to CRS SM-8 De-Energized and SM-3 is locked out.
Reports DG-2 Output breaker failed to automatically close.
Takes actions to restore power to SM-8
Places CB-DG2/8 SYNC SLECTOR switch to MAN
Places CB-DG2/8 MODE SELECTOR switch to CONTROL RM
Places DIESEL GEN 2 OUTPUT CB-DG2/8 to CLOSE
Observes SM-8 is energized from DG-2 and SW-B is restarting.</td></tr>
<tr><td colspan="3">**Examiner Note: Restoring power to SM-8 results in automatically restoring WW sprays to service with RHR-B if they were in service prior to the power loss.**</td></tr>
<tr><td>77.</td><td>**BOP**</td><td>Verifies that restoration of SM-8 has resulted in restoration of RHR-B and Wetwell sprays.</td></tr>
</table>

TERMINATION CRITERIA

TERMINATION CUE:

This scenario will be terminated when the reactor water level is stable -50 to +54 inches. Wetwell sprays have been initiated and SM-8 Power has been restored from DG-2.

INFORM THE CREW NOT TO DISCUSS THE SCENARIO, NOT TO ERASE FLOWCHARTS OR NOTES, NOT TO PUT AWAY PROCEDURES. THE EVALUATORS WILL CAUCUS TO DETERMINE IF THERE ARE ANY FOLLOWUP QUESTIONS.

Assign someone (usually the booth operator) to remain with the crew on the floor.

SAVE INSIGHT FILE TO THE SECURE DRIVE BEFORE RESET AND CLEAR URI FILE WHEN DONE.

CRITICAL TASKS

CRITICAL TASK #1

Critical Task Statement:

With an increasing vibration in the Main Turbine bearings, scram the reactor and trip the Main turbine / Main Generator prior to reaching GE 18 mils (requirement to open the Main Condenser vacuum breakers)

Safety Significance:

Leaving the Main Turbine in service with severe vibrations could result in catastrophic damage to the main turbine. A Main Turbine trip at GT 29.5% reactor power results in a reactor scram on throttle valve position (95% open) (see FSAR Table 15.2.3). To limit the impact of the plant transient on a Main Turbine/Generator trip, a manual reactor scram is inserted before the Main Turbine trip.

Initiating Cue:

Increasing vibrations in the main turbine bearings requiring actions to trip the turbine per Annunciator response4.820.B1 7-6.

Measurable Performance Standard:

Reactor is manual scrammed prior to reaching GE 18 mils bearing vibration and

Main turbine / Main Generator has been manually tripped.

Performance Feedback:

Reactor is scrammed as indicated by the mode switch placed in shutdown. The main turbine is tripped as indicated by the main turbine coasting down from 1800 RPM.

CRITICAL TASK #2

Critical Task Statement:

Initiate Wetwell sprays before Wetwell pressure exceeds 12 psig.

Safety Significance:

The Wetwell Spray Initiation Pressure (WSIP) is defined to be the lowest Wetwell pressure which can occur when 95 % of the noncondensibles (nitrogen) in the drywell have been transferred to the Wetwell. The WSIP is used to preclude chugging: the cyclic condensation of steam at the downcomer openings of the drywell vents.

When a steam bubble collapses at the exit of the downcomers, the rush of water filling the void (some of it drawn up into the downcomer pipe) induces a severe stress at the junction of the downcomer and the drywell floor. Repeated occurrence of this stress can cause these joints to experience fatigue failure thereby creating a pathway to the Wetwell airspace which bypasses the Wetwell water. Subsequent steam discharges through the downcomers would directly pressurize the Wetwell rather than being discharged and condensed in the Wetwell water.

Initiating Cue:

Wetwell pressure above 2 psig as indicated on instruments CMS-PR-3 or CMS-PR-4.

Measurable Performance Standard:

The critical task is considered met if Wetwell Sprays have commenced prior to wetwell pressure exceeding 12# as indicated by CMS-PR-3 or CMS-PR-4. RHR pump is running with its associated wetwell spray valve indicates open.

Performance Feedback:

Wetwell sprays are initiated, as determined by slightly lowering wetwell pressure and closing of RHR min flow valve.

CRITICAL TASK #3

Critical Task Statement:

With the Emergency Diesel Generator is running without Service Water cooling, within 10 minutes, restore Service Water cooling flow to DG2 by Manually closing DG output breaker.

Safety Significances:

Service Water provides cooling for Diesel Generator Diesel Cooling Water System (DCW). The DCW high temperature trip of the Diesel Generator is bypassed on a LOCA signal. The reservoir tank (For DG1 and DG2) DCW volume provide adequate cooling for of ten minutes without Service Water (ME-02-94-42). DG3 does not have a reservoir tank.

If Service Water cannot be started within ten minutes of the start of the Diesel Generator, the Diesel Generator must be tripped to avoid potential damage caused by over-heating.

Under normal circumstances tripping the affected DG that is running without service water is considered an allowable option. Under the circumstances provided tripping the DG would result in SM-8 remaining de-energized.

SM-8 is required to be restored to provide power to RHR-P-2B. This allows for containment sprays (RHR-A is not available due to broken shaft). Manually closing the DG output breaker results in SW cooling restored to the diesel generator and repowers SM-8 to allow for containment sprays. Tripping DG-2 under these circumstance would preclude the ability to continue to use containment sprays to mitigate this event.

Initiating Cues:

DG 2 is running with a valid start signal and SW-P-1B is not providing cooling as a result of SM-8 de-energized. (DG-2 Output breaker failed to automatically close). SM-8 is required to allow for containment control per PPM 5.2.1 Primary Containment Control.

Performance Feedback:

DG-2 output breaker is manually closed. SM-8 is energized which restores service water flow to the diesel and allows operation of RHR sys B for containment sprays.

Simulator Set Up

☐ Unload simulator (between each scenario)

☐ Verify in ILC load

☐ Load correct S/D Sequence (if necessary)

☐ Reload simulator

☐ Reset to ILC Exam **IC 195** (reset, go to Run, reset again)

☐ Test EQ machine at correct volume for OBE event

☐ Load Schedule file **ILC-25 SC-1** from Exam drive

☐ Validate that there are no unexpected annunciators or parameters out of band

☐ Verify pump running magnets

☐ Verify normally removed keys REMOVED except for: NONE

☐ Flag the following: NONE

☐ Place clearance tag on: Bus Duct Cooling Fan B

☐ Protect the following: NONE

☐ Provide a copy of PPM 3.2.6 section 5.4 with 5.4.1 through 5.4.5 already complete. (ILC-25 SC-1 Candidate Ref 1)

☐ Provide a clean copy of SOP-MT-GV/OPTIMIZATION through section 5.1.

(ILC-25 SC-1 Candidate Ref 2)

EXAM SECURITY PROCEDURE VERIFICATION

Procedures

- PPM 3.3.1, Reactor Scram ☐ ☐
- PPM 5.1.1, RPV Control ☐
- PPM 5.2.1 Primary Containment Control ☐
- SOP-MT-GV/OPTIMIZATION ☐
- **ALL QUICK CARDS** ☐

ABNs

- ABN-ELEC-GRID ☐ ☐
- ABN-TRANSFORMER ☐ ☐
- ABN-EARTHQUAKE ☐ ☐
- ABN-EXHAUSTER ☐ ☐

Tech Specs

- 3.5.1 ☐ ☐ ☐
- 3.6.1.5 ☐ ☐ ☐
- 3.8.1 ☐ ☐ ☐

LCS, ODCM

- N/A

ARPs

- 4.601. A4 6-1 RHR A OUT OF SERVICE ☐
- 4.603.A7 5-3 DRYWELL PRESS HIGH/LOW ALERT ☐
- 4.603.A7 6-4 DRYWELL PRESSURE HIGH TRIP ☐
- 4.603.A8 5-3 DRYWELL PRESSURE HIGH TRIP ☐
- 4.800.C4-2.5, XFMR TR-B TROUBLE ☐
- 4.800.C3-1.6, 115KV SET 1 OPEN PHASE ☐
- 4.800.C3-2.6, 115KV SET 2 OPEN PHASE ☐
- 4.800.C4 4-5 TRANSFORMER TR-B UNDERVOLTAGE ☐
- 4.800.C4 8-5 115KV LINE UNDERVOLTAGE ☐
- 4.800.C3 6-4 BUS 31 GROUND ☐
- 4.820.B2 7-5 GLAND STM CONDSR EXH FANS TRIPPED ☐
- 4.820.B1 7-6 TURB/GEN BRG VIB HIGH. ☐
- 4.851.S1 2-5 MINIMUM SEISMIC EARTHQUAKE EXCEEDED ☐
- FCP-3 12-4 FP-P-110 DIESEL RUNNING ☐

CREW TURNOVER

Initial Conditions:

- Columbia is operating at 90% power.
- Bus Duct Cooling Fan B is tagged OOS for motor bearing inspection.

Shift Turnover:

- Following turnover, you have been directed to raise reactor power to 100% at 1% per minute per PPM 3.2.6 power maneuvering section 5.4. Sufficient margin to fuel-preconditioning limits per PPM 9.3.18 has been verified.

- Place DEH into GV optimization per SOP-MT-GV/OPTIMIZATION section 5.1. PPC Point B031 is Inoperable and substitute values have already been entered for RRC pump electric power (Step 5.1.1 bullet 1 of SOP-MT-GV/OPTIMIZATION)

- The Reactivity brief has been performed

Verify Revision Information Prior To Use	Initials	GS
	Date	Today

Number: 3.2.6

Use Category: CONTINUOUS

Major Rev: 021
Minor Rev: N/A
Page: 1 of 20

Title: Power Maneuvering

PLANT PROCEDURES MANUAL

PCN #:
N/A

3.2.6

Effective Date:
03/31/22

GS – Gojira Shi

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	**Description (including summary, reason, initiating document, if applicable)**
	This revision is administrative only. Rev 020.001 added a conditional to step 5.2.4 (AR-419182) that could impact dose received by personnel without routing the change through ALARA personnel for approval. This revision adds that review to the procedure review process per SWP-PRO-02. (AR-430764)

TABLE OF CONTENTS

1.0 PURPOSE

Provide operating instructions for maneuvering the plant between approximately 100% power and 25% power (300 MWe) to support planned evolutions.

2.0 REFERENCES

2.1 P-92247, NCR 292-0993, Core Oscillations

2.2 AR OER 82911, OER 89075, (GE SIL 502) DER Flow Limiter

2.3 AR CR 125969, PERA 202-0822, Feedwater Heaters Tripped

2.4 NFM 5-2, Nuclear Fuels Manual

2.5 PPM 1.3.76, Integrated Risk Management

2.6 PPM 1.3.84, Reactivity Management Control

2.7 SOP-CFD-OPS, Main Condensate Filter Demineralizer System Operations

2.8 SOP-CFD-SHUTDOWN, Main Condensate Filter Demineralizer System Shutdown

2.9 SOP-COND-OPS, Main Condensate System Operations

2.10 SOP-COND-SHUTDOWN, Main Condensate System Shutdown

2.11 SOP-COND-START, Main Condensate System Pump Startup

2.12 SOP-CW-OPS, Circulating Water and Cooling Towers System Operations

2.13 SOP-FWH-START, Extraction Steam and Heater Vents/Drains Startup

2.14 SOP-FWH-SHUTDOWN, Extraction Steam and Heater Vents/Drains System Shutdown

2.15 SOP-MSR-OPS, Main Turbine Moisture Separator Reheater Operations

2.16 SOP-MT-GV/OPTIMIZATION, Main Turbine Generator GV Optimization.

2.17 PPM 3.1.11, Final Feedwater Temperature Reduction

2.18 PPM 3.3.1, Reactor Scram

2.19 ABN-CORE, Unplanned Core Operating Conditions

2.20 OSP-CRD-M702, Control Rod Exercise

2.21 OSP-RWM-C402, Rod Worth Minimizer CFT Prior to Shutdown

2.22 TSP-APRM-C301, APRM and Core Thermal Power Channel Calibration Check

2.23 TSP-CRD-C101, CRD Scram Timing with Autoscram Timer

2.24 PPM 9.3.9, Control Rod Withdrawal Sequence Development and Control

2.25 PPM 9.3.12, Plant Power Maneuvering

2.26 PPM 9.3.16, RWM Control Rod Sequence Installation

2.27 PPM 16.11.2, Gas Grab Samples Following Shutdown Startup and Thermal Power Changes

2.28 AR CR 240219, Indication Reported on Jet Pump #17 Riser at Weld RS-9

2.29 AR OER 230496, (OER) GEH RICSIL-092, Single Loop Operations (SLO) at BWRs

2.30 COLR, 1.0, P3.S3, The Minimum Flow for Operation at Rated Power is 82.7% of Rated Flow; the Maximum Is 106%

3.0 PREREQUISITES

3.1 **EVALUATE** this power maneuver per the requirements of PPM 1.3.76. GS

3.2 **VERIFY** the CRS/Shift Manager has cleared the Control Room of all unnecessary personnel. GS

3.3 **VERIFY** all maintenance and operational activities, other than the reactor power maneuver, which could affect reactivity, have been stopped. GS

3.4 **VERIFY** the CRS/Shift Manager and Reactor Operator(s) have reviewed PPM 1.3.84 prior to control rod manipulation. GS

3.5 **VERIFY** the CRS/Shift Manager have reviewed and approved the Reactivity Control Plan, if applicable. GS

> NOTE: Per GE RICSIL 092, each RRC Loop is limited to 57.5 Mlb/hr. During automatic operation, RRC Loop A should be biased slightly GT RRC Loop B.

3.6 IF possible,
THEN **VERIFY** RRC Loop A is biased slightly GT RRC Loop B. GS

3.7 IF time allows,
THEN **ENSURE** the Unit Coordinator has provided the power profile to the BPA Hydro Desk (primary, 503-230-4374) or Real Time Duty Scheduler (backup, PGSD/Portland, 503-230-3931). GS

4.0 PRECAUTIONS AND LIMITATIONS

4.1 When operating in the Area of Increased Awareness (AIA), the Boiling Boundary should be GT 4.0 feet. Otherwise, initiate action to restore the boiling Boundary to GT 4.0 feet or exit the AIA within 4 hours by reducing CTP with control rods, or increasing core flow.

> NOTE: Substitutions or data source changes in the N4 screen for the primary computer (normally TDAS) should be performed on the backup computer at the same time. It is important for maintaining accurate CTP reporting in the backup system to ensure that all calculations are matching between both systems.

4.2 With Computer points B031 and/or B032 inoperable, ensure appropriate substitute values are entered. If RRC pump speed is LT 52.0 Hz, enter 0.08 MWe as RRC pump electrical power. If RRC pump speed is GE 52.0 Hz, enter 4.5 MWe as RRC pump electrical power.

4.3 A Level II qualified SNE should be in the Control Room providing technical direction for the following:

- All rod sets and rod sequence adjustments
- All startups, from initial rod pull to the point of adding heat
- All shallow rod adjustments above 25% thermal power, excluding those performed per OSP-CRD-W701, or those following the approved Fast Shutdown Sequence, or the approved pull sheet, or an approved set of standing orders, or an approved down power instruction, or an approved Reactivity Control Plan (RCP).

4.4 Do not make manual changes in recirculation flow concurrent with control rod withdrawals.

4.5 If only two booster pumps are available, power may be raised above 65% power provided the following parameters are satisfied:

- **MAINTAIN** Condensate Booster Pump suction pressure GE 80 psig on running pumps. (COND-PI-14AG(148G)(14CG)
- **MAINTAIN** Condensate Booster Motor amps LE 375 amps. (Monitor all 3 phases at switchgear and Control Room panels.)
- **MAINTAIN** Condensate Booster Motor stator winding temperature LE 275 °F. (Stator winding temperatures will take several minutes to peak following power change) Monitor the following computer points:

  COND-P-2A: W063, W066, W069, W072, W075, W078

  COND-P-2B: W064, W067, W070, W073, W076, W079

  COND-P-2C: W065, W068, W071, W074, W077, W080
- **MAINTAIN** Reactor Feedwater pump suction pressure GE 400 psig.
  Monitor COND-PI-28A (28B) (28AG) (28BG).

4.6 Power changes are to be performed within the limits of the Power/Flow Map.

4.6.1 The COLR provides operating limits for dual recirculation pump operations in the Maximum Extended Load Line Limit Analysis (MELLLA) domain. During single recirculation loop operations (SLO) the operational limits revert to the ELLLA domain (i.e., rod line LE 106.2%) {R-2.30}

<u>NOTE</u> Operations in relation to the MELLLA boundary may be ascertained by comparing the current plant conditions to the dual loop power / flow map. An alternate indication for determining proximity to the MELLLA boundary is the parameter Fraction Load Line Limiting Power (FLLLP). When FLLLP is less than or equal to 1.0 (similar to a fuel thermal limit) the plant is operating below the MELLLA boundary.

4.6.2 When the plant is in dual recirculation loop operations, do not exceed the MELLLA boundary. If the one minute thermal power average indicates that the plant is operating above the MELLLA boundary, or if FLLLP is GT 1.0, take action within 15 minutes to reduce the rod line to restore compliance with the MELLLA boundary.

4.6.3 During normal operations at steady state conditions, maintain the FLLLP to LE 0.98 to provide margin to the administrative limit on FLLLP of 0.99.

4.6.4 When the plant is in SLO, do not exceed the 106.2% rod line. If the one minute average rod line is found above 106.2%, take action within 15 minutes to reduce rod line to LT 106.2%. The SLO operation limit on RRC loop flow (averaged over an hour period) is 57.5 Mlb/hr for RRC Loop A Flow

4.6.5 If entering Single Loop operation due a tripped pump, then the flow limit specified above should be achieved within two hours per the directions specified in this procedure. If otherwise entering SLO, then reduce the respective Loop Flow prior to the pump trip to preclude exceeding the above limit(s). {AR-2.28}, {OE-2.29}

4.7 If one or more LEFM feedwater flow meters are not in Check Plus Mode (i.e., Check Mode on the Plant Overview screen), the plant shall be down powered to 3533 MWt, (which is about a 0.3% power reduction) within 72 hours of the LEFM switching. Refer to LCS 1.3.9

4.8 A complete loss of one or both LEFM Meter status indication, reduce reactor power level to 3486 MWt within 72 hours. The plant may return to 3544 MWt after LEFM functionality has been restored. Refer to LCS 1.3.9

4.9 A power change of GT 15% in one hour requires performance of PPM 16.11.2, if Offgas release rates are elevated. Notify Chemistry to evaluate the Offgas system release rate and perform PPM 16.11.2, if necessary.

4.10 Observe preconditioning limits when changing power.

4.11 Do not exceed 28% RTP, unless the requirements of an AIA Entry Reactivity Control Plan (RCP) have been met. Do not exceed 26.5% RTP with recirculation pumps at 15 HZ.

4.12 If during the performance of this procedure it becomes necessary to delay startup or regress, the previously completed steps should be reviewed to ensure appropriate system status prior to recommencing.

5.4 Power Ascension to 100%

5.4.1 **NOTIFY** Dittmer of intent to raise reactor power. (N/A if already notified.) GS

5.4.2 **VERIFY** Section 5.3 is complete. GS

5.4.3 WHEN Reactor Power is approximately 70%, and each 10% rise thereafter, THEN **RECORD** Reactor Power level and the normal level controller output for each in-service feedwater heater in the electronic logging system. GS

5.4.4 **CONTINUE** power ascension to rated conditions per PPM 9.3.12. GS

5.4.5 IF applicable,
THEN **LOG** the time when 75% power is obtained. GS

5.4.6 WHEN GE 900 MWe,
THEN **RESTORE** Group 1 and 2 Feedwater Heaters to service per SOP-FWH-START. (N/A if not removed.) GS

5.4.7 WHEN Generator output is GE 1092 MWe,
THEN **PLACE** the Main Turbine in Governor Valve Optimization per SOP-MT-GV/OPTIMIZATION. _____

5.4.8 **RECORD** the Reactor power level (APRM indication) at which this procedure is exited:

______________Rx Pwr _____

5.4.9 **NOTIFY** BPA of Reactor power level (APRM indication) at which this procedure is exited: _____

6.0 DOCUMENTATION

Maintain the completed procedure in the permanent plant file in accordance with the appropriate record procedure.

7.0 ATTACHMENTS

7.1 Feedwater Temperature Versus Reactor Power

Verify Revision Information Prior To Use	Initials	
	Date	

Number: SOP-MT-GV/OPTIMIZATION	Use Category: CONTINUOUS	Major Rev: 006 Minor Rev: 005 Page: 1 of 7
Title: Governor Valve Optimization		

PLANT PROCEDURES MANUAL	PCN#: 17-0027
SOP-MT-GV/OPTIMIZATION	Effective Date: 05/13/21

DESCRIPTION OF CHANGES

Justification (required for major revision)
Incorporated changes per action request recommendations

Page(s)	Description (including summary, reason, initiating document, if applicable)
6	Added note "The Governor valves will not stay in Optimize if LT 90% VPL." AR-249948
6	MR-001 – Enhancement – Modified steps 5.1.2g, 5.1.2g Note, and 5.1.2g.2 to remove "GE". 92% is sufficient to ensure GV stay in Optimize (AR-323470)
5, 6	MR-002, Editorial, Grammar changes to notes before 5.1.2.a and 5.1.2.g. AR-342443
6	MR-003, PCN-17-0027. Modified steps 5.1.2g, 5.1.2g Note, and 5.1.2g.2 to update the 92% to 95% due to the MUR project, this is sufficient to ensure GV stay in Optimize at the high power. AR-368315
5	MR-004, Editorial, Added PPC after TDAS for referenced inop. computer points (AR 382051)
5	MR-005: Added Note for entering substitute values. (AR 407807)

Number: SOP-MT-GV/OPTIMIZATION	Use Category: CONTINUOUS	Major Rev: 006 Minor Rev: 005 Page: 3 of 7
Title: Governor Valve Optimization		

TABLE OF CONTENTS

Page

1.0 PURPOSE

Provide directions for the entry into Governor Valve Optimization and sequential valve operation modes.

2.0 REFERENCES

2.1 SIL 502 (OER 89075C) Max Combined Flow Limiter Setting of 130% {P-105020}

2.2 TRICON OMM Manual

2.3 Wonder Ware Manual

3.0 PREREQUISITES

3.1 **VERIFY** Generator output GE 1092 MWe prior to GV Optimization. _____

NOTE: The following step may require slightly GT 1092 MWe.

3.2 **VERIFY** Optimize Valve Mode OKAY to SELECT light illuminated. _____

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open.

4.2 The Main Turbine automatically comes out of Governor Valve Optimization when Generator Output drops below 1058 MWe.

5.0 PROCEDURE

5.1 Governor Valve Optimization

NOTE: The Governor Valve Optimization Mode enhances Generator Output at maximum reactor power. Generator output must be GE 1092 MWe prior to GV Optimization.

CAUTION

Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open.

5.1.1 **VERIFY** the following:

NOTE: Substitutions or data source changes on the N4 screen for the primary computer (normally TDAS) should be performed on the backup computer at the same time. It is important for maintaining accurate CTP reporting in the backup system to ensure that all calculations are matching between both systems.

- IF TDAS or PPC points B031 and/or B032 are inoperable,
  THEN **VERIFY** appropriate substitute values are entered for RRC pump electric power. _____
- DEH in Turbine Follow Reactor mode. _____
- Reactor Pressure and Reactor Power stable. _____

5.1.2 **ENTER** Governor Valve Optimization as follows: {P-105020}

NOTE: GV Optimization involves substantially throttling closed GV-4 then using GV-1, throttled to approximately 55% open, to control RPV pressure. Both valves still move to control reactor pressure.

a. **VERIFY** LOAD TARGET is set at 1370 MW (Main Display, Load Control Display) _____

b. IF VPL DEMAND is not at 100%,
THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display):

  1) **SELECT** VPL TARGET. _____

  2) **ENTER** 100%. _____

  3) **SELECT** OK. _____

4) **SELECT** GO. _____

5) **SELECT** YES. _____

6) **VERIFY** GO ILLUMINATED. _____

7) **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

c. **VERIFY** Optimize Valve Mode OKAY TO SELECT light illuminated. _____

d. **SELECT** OPTIMIZED VALVE MODE. _____

e. **SELECT** YES. _____

f. **VERIFY** GV-1 moves to approximately 50-55% as GV-4 throttles. _____

<u>NOTE</u>: VPL DEMAND is set 10% GT GV DEMAND or 95%, whichever is greater, to allow the Turbine Bypass Valves to open sooner if there is a GV failure.

<u>NOTE</u>: The Governor valves will not stay in Optimize if LT 90% VPL.

g. **SET** VPL DEMAND approximately 10% above GV DEMAND or 95%, whichever is greater, as follows:

1) **SELECT** VPL TARGET. _____

2) **ENTER** value that is approximately 10% above GV DEMAND or 95%, whichever is greater. _____

3) **SELECT** OK. _____

4) **SELECT** GO. _____

5) **SELECT** YES. _____

6) **VERIFY** GO illuminated. _____

h. **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

i. **VERIFY** final VPL DEMAND indicates VPL TARGET value. _____

5.2 Enter Sequential Valve Operation {P-105020}

> NOTE: The Main Turbine automatically comes out of Governor Valve Optimization when Main Generator Load drops below 1058 MWe.

5.2.1 IF VPL DEMAND is not at 100%,
THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display):

a. **SELECT** VPL TARGET. _____

b. **ENTER** 100%. _____

c. **SELECT** OK. _____

d. **SELECT** GO. _____

e. **SELECT** YES. _____

f. **VERIFY** GO illuminated. _____

g. **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

5.2.2 **COMPLETE** entry into Sequential Valve Mode as follows:

a. **SELECT** SEQUENTIAL VALVE MODE. _____

b. **SELECT** YES. _____

c. **VERIFY** GV-1 and GV-4 move to their pre-optimization positions (approximately equal). _____

d. **VERIFY** SEQUENTIAL VALVE MODE is illuminated. _____

6.0 ATTACHMENTS

None

Reference: SWP-PRO-02

ENERGY NORTHWEST EDITORIAL – MINOR REVISION APPROVAL

Requested Effective Date

Type (Exact or N/A) N/A

Exact Requested Date N/A

General Information

Procedure Number: SOP-MT-GV/OPTIMIZATION

EC Number (for incorporation purposes): N/A

LDCN Number:

Procedure Hold Required (true/false) false

If true, individual to release the hold N/A

Originator: Bitner, Ian R.

Editorial Justification Addition of Note.

Approval

Sponsor (In accordance with Asset Suite) OR Responsible Approving Manager (Approving Authority)

11/05/21 3:05:46 -07:00

X

PEZZETTI, MICHAEL A. , Operation... cosign

If any manual approvals (hard copy signatures) are obtained then include printed name, signature, and date.

26991C

ENERGY NORTHWEST

SC-2

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS INITIAL TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE CAS Leak / Scram with Electric ATWS

LENGTH OF LESSON 1 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	N/A	Rev. No.	
Simulator Guide PQD Code		Rev. No.	
JPM PQD Code	N/A	Rev. No.	
Exam PQD Code	N/A	Rev. No.	

DIVISION TITLE Nuclear Training – NRC EXAM

DEPARTMENT Operations Training Exam Group

PREPARED BY Dave E. Crawford DATE

REVISED BY N/A DATE

VALIDATED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE

Operations Training Manager

MAJOR REVISION RECORD

MINOR REVISION RECORD

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

Review Comments and Resolution

Date	Comment	Resolution

SCENARIO OUTLINE

Facility: Columbia Generating Station

Scenario No.: 2

Op Test No.:

Examiners: ____________________

____

____

Operators: ____________________

____

____

Initial Conditions:	Columbia is operating at 100% power.
Turnover:	Following shift turnover, lower reactor power to 95% at 1% per minute using Reactor Recirculation flow per PPM 3.2.6 (Power Maneuvering) to support OSP-MS-Q702 (Bypass Valves Test). Perform OSP-MS-Q702 following the power reduction.

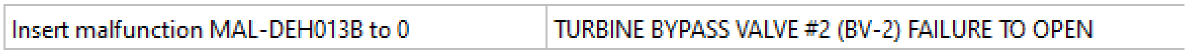
Critical Tasks:

CT-1	Stop and prevent injection into the RPV, with the exception of SLC, RCIC, and CRD, to establish an LL of -65 inches in an ATWS with GT 5% power within 10 minutes of receipt of the scram signal.
CT-2	With a reactor scram required and the reactor not shutdown, take actions (initiates SLC from MCR) to inject SLC per PPM 3.3.1 QC prior to commencing performance of PPM 5.5.11 Alternate Rod Insertions.
CT-3	**CONDITIONAL CRITICAL TASK**: During an ATWS condition, prior to automatic initiation of ADS [-129" + 105 seconds], inhibit ADS to prevent an uncontrolled RPV depressurization. If ADS would not auto-initiate based on plant conditions, then this CT will never materialize.

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.	Trig.	Event Type*	Scenario Summary / Event Description
1	-	C (BOP) R (ATC) R, TS (CRS)	Upon taking the shift, the BOP performs OSP-MS-Q702 (Bypass Valves Test). The ATC lowers power with RRC flow to facilitate performance of the test. During the test, BPV2 fails to open. The CRS evaluates TS and enters LCO 3.7.6 TSAS A.1 which requires satisfying the requirements of the LCO within 2 hours.

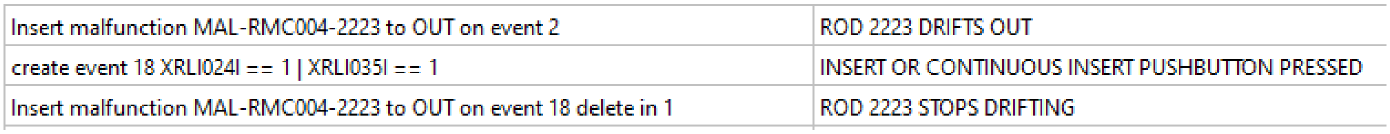
Event 1 – Power reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 fails to open.



Insert malfunction MAL-DEH013B to 0	TURBINE BYPASS VALVE #2 (BV-2) FAILURE TO OPEN

Event No.	Trig.	Event Type*	Scenario Summary / Event Description
2	2	C (ATC, CRS) TS (CRS)	Control rod 22-23 (initially at position 10) starts drifting out and continues to drift out until either the FULL OUT (position 48) is reached, or until manual action is initiated to fully insert the control rod. ATC (per ABN-ROD Immediate Action) will press and hold the INSERT or CONTINUOUS INSERT pushbutton to manually insert the affected rod until fully inserted. Control rod 22-23 will remain inserted after releasing the pushbutton. CRS evaluates TS and enters LCO 3.1.3 TSAS C.1 which requires fully inserting the inoperable control rod within 3 hours (which will be met) and TSAS C.2 which requires disarming the associated CRD within 4 hours.

Event 2 – Control rod 22-23 starts drifting out requiring manual action to fully insert. (ABN-ROD Immediate Action)

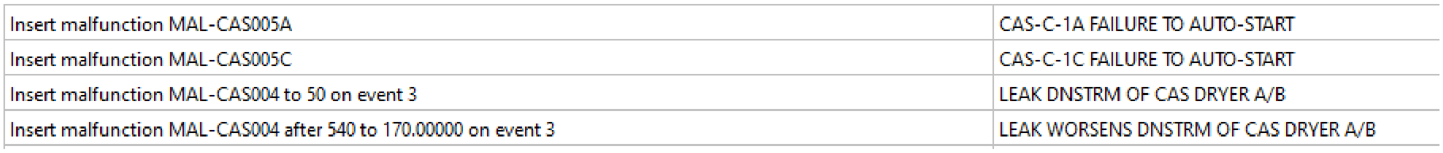


Insert malfunction MAL-RMC004-2223 to OUT on event 2	ROD 2223 DRIFTS OUT
create event 18 XRLI024I == 1 | XRLI035I == 1	INSERT OR CONTINUOUS INSERT PUSHBUTTON PRESSED
Insert malfunction MAL-RMC004-2223 to OUT on event 18 delete in 1	ROD 2223 STOPS DRIFTING

Event No.	Trig.	Event Type*	Scenario Summary / Event Description
3	3	C (ALL)	A leak develops in the CAS (Control and Service Air) system resulting in lowering CAS pressure. The CRS enters ABN-CAS. The standby CAS compressors fail to auto start and must be started manually (BOP). CAS header pressure initially rises following the manual start of the standby CAS compressors. The CAS leak will then grow in size causing CAS header pressure to again lower. The CRS directs manually opening

			the feedwater startup flow control valves (ATC) in anticipation of losing all air. The CRS will set a key parameter for CAS pressure which will result in manual scram actions.

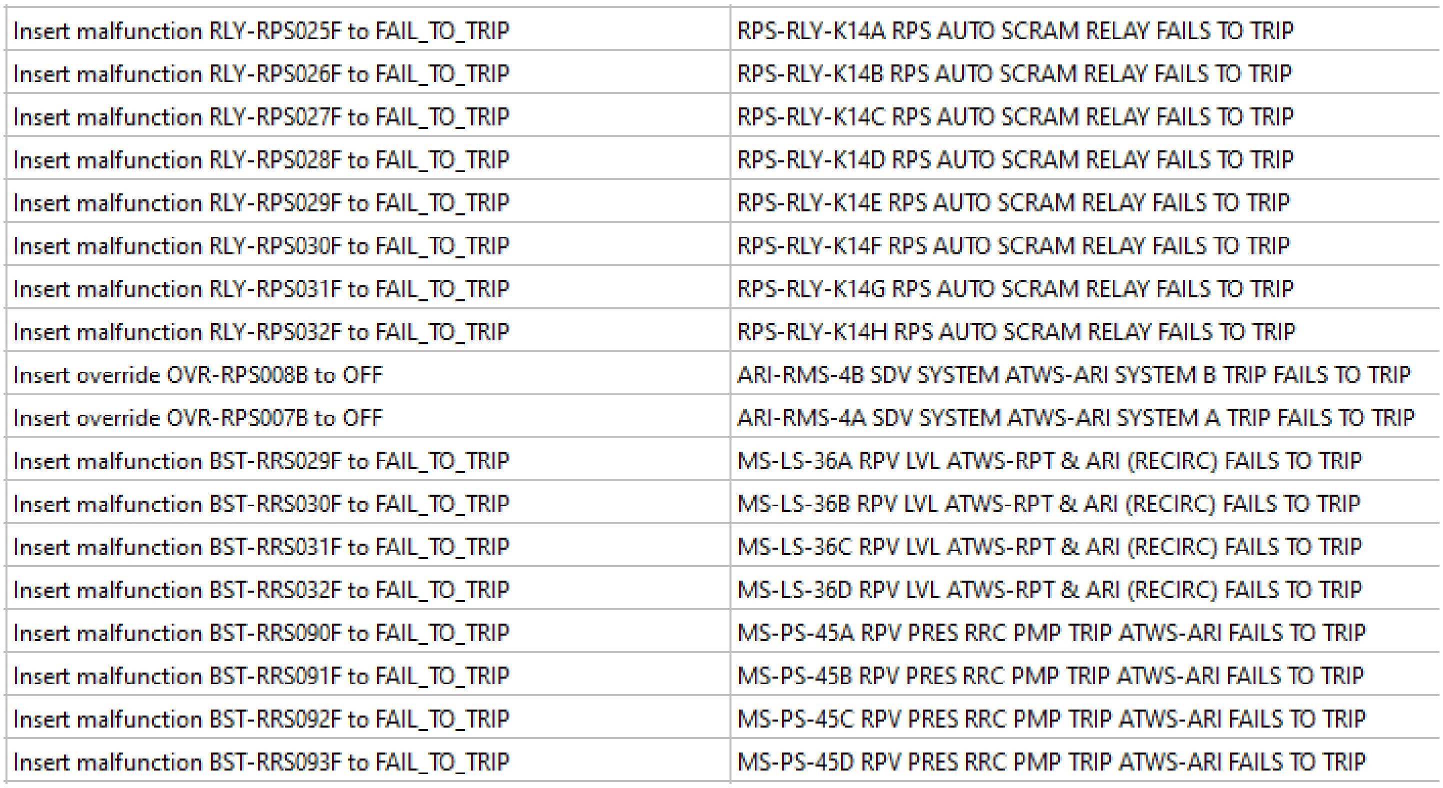
Event 3 – CAS (Control and Service Air) leak with failure of the Standby CAS compressors to auto-start. Both standby CAS compressors are manually started (BOP) but then cannot keep up as the air leak worsens. CRS directs manual opening of the feedwater startup flow control valves (ATC) in anticipation of losing all CAS air.



Insert malfunction MAL-CAS005A	CAS-C-1A FAILURE TO AUTO-START
Insert malfunction MAL-CAS005C	CAS-C-1C FAILURE TO AUTO-START
Insert malfunction MAL-CAS004 to 50 on event 3	LEAK DNSTRM OF CAS DRYER A/B
Insert malfunction MAL-CAS004 after 540 to 170.00000 on event 3	LEAK WORSENS DNSTRM OF CAS DRYER A/B

4	-	M (ALL)	Without any means to restore CAS header pressure, the CRS will direct a manual reactor scram. An electric ATWS occurs after the Reactor Mode Switch is placed in shutdown. Alternate Rod Insertion (ARI) will not be successful. The crew will respond IAW PPM 5.1.1 (RPV Control) and PPM 5.1.2 (RPV Control – ATWS). PPM 5.1.1 (Table A1) directs the following: Stop and prevent of injection into the RPV with the exception of CRD, SLC and RCIC **(CT-1)**; Inject boron with SLC **(CT-2)**; and Inhibit ADS **(CT-3 [Conditional])**. Removing the applicable RPS fuses per PPM 5.5.11 (Alternate Control Rod Insertions) inserts all control rods.

Event 4 – CAS leak grows in size requiring a manual reactor scram. An electric ATWS occurs after the Reactor Mode Switch is placed in shutdown. Removing the applicable RPS fuses per PPM 5.5.11 (Alternate Control Rod Insertions) inserts all control rods.



Insert malfunction RLY-RPS025F to FAIL_TO_TRIP	RPS-RLY-K14A RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS026F to FAIL_TO_TRIP	RPS-RLY-K14B RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS027F to FAIL_TO_TRIP	RPS-RLY-K14C RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS028F to FAIL_TO_TRIP	RPS-RLY-K14D RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS029F to FAIL_TO_TRIP	RPS-RLY-K14E RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS030F to FAIL_TO_TRIP	RPS-RLY-K14F RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS031F to FAIL_TO_TRIP	RPS-RLY-K14G RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert malfunction RLY-RPS032F to FAIL_TO_TRIP	RPS-RLY-K14H RPS AUTO SCRAM RELAY FAILS TO TRIP
Insert override OVR-RPS008B to OFF	ARI-RMS-4B SDV SYSTEM ATWS-ARI SYSTEM B TRIP FAILS TO TRIP
Insert override OVR-RPS007B to OFF	ARI-RMS-4A SDV SYSTEM ATWS-ARI SYSTEM A TRIP FAILS TO TRIP
Insert malfunction BST-RRS029F to FAIL_TO_TRIP	MS-LS-36A RPV LVL ATWS-RPT & ARI (RECIRC) FAILS TO TRIP
Insert malfunction BST-RRS030F to FAIL_TO_TRIP	MS-LS-36B RPV LVL ATWS-RPT & ARI (RECIRC) FAILS TO TRIP
Insert malfunction BST-RRS031F to FAIL_TO_TRIP	MS-LS-36C RPV LVL ATWS-RPT & ARI (RECIRC) FAILS TO TRIP
Insert malfunction BST-RRS032F to FAIL_TO_TRIP	MS-LS-36D RPV LVL ATWS-RPT & ARI (RECIRC) FAILS TO TRIP
Insert malfunction BST-RRS090F to FAIL_TO_TRIP	MS-PS-45A RPV PRES RRC PMP TRIP ATWS-ARI FAILS TO TRIP
Insert malfunction BST-RRS091F to FAIL_TO_TRIP	MS-PS-45B RPV PRES RRC PMP TRIP ATWS-ARI FAILS TO TRIP
Insert malfunction BST-RRS092F to FAIL_TO_TRIP	MS-PS-45C RPV PRES RRC PMP TRIP ATWS-ARI FAILS TO TRIP
Insert malfunction BST-RRS093F to FAIL_TO_TRIP	MS-PS-45D RPV PRES RRC PMP TRIP ATWS-ARI FAILS TO TRIP

5	-	C, MC (BOP)	When reactor water level lowers below -50" while intentionally lowering level under ATWS conditions, FDR-V-4 (Drywell Floor Drain Outboard Discharge PCIV) fails to auto close. BOP manually closes FDR-V-4.

Event 5 – FDR-V-4 fails to automatically close while intentionally lowering RPV level requiring manual operation (BOP).

Insert malfunction AOV-SCN013F to FAIL AUTO CLOSE	FDR-V-4 DW FLOOR DRN OUTBD ISOL FAILS TO AUTO CLOSE

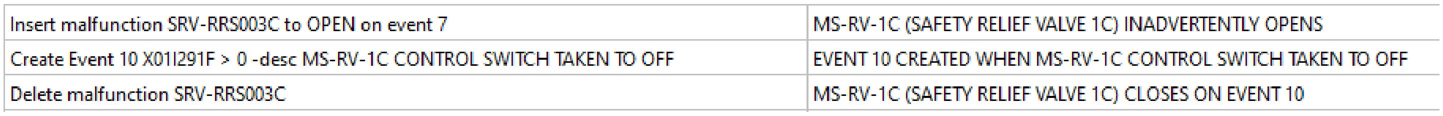
6	6	M (ALL)	After all rods are in (upon pulling RPS fuses) and the crew has transitioned to PPM 5.1.1 RPV Control, TR-S (Startup Transformer) experiences a lockout. DG-3 output breaker fails to auto close following the lockout and cannot be manually closed making HPCS unavailable. The loss of condensate and feedwater requires that RPV level control be shifted to RCIC.

Event 6 – TR-S lockout requires RPV level control be shifted from condensate and feedwater to RCIC (DG-3 breaker failure makes HPCS unavailable).

Insert malfunction BKR-DGN001 to FA_AS_IS	CB-4DG3 (DG-3 OUTPUT BREAKER) FAILS AS IS
Insert malfunction MAL-OED001 on event 6	TRANSFORMER LOCKOUT TR-S

7	7	C (CRS, BOP)	MS-RV-1C (Main Steam Relief Valve 1C) inadvertently opens causing an uncontrolled RPV pressure reduction. The CRS enters ABN-SRV and directs placing the control switch for MS-RV-1C to OFF (BOP).

Event 7 – MS-RV-1C inadvertently opens requiring its control switch to be taken to OFF (BOP) IAW ABN-SRV to close the valve.



Insert malfunction SRV-RRS003C to OPEN on event 7	MS-RV-1C (SAFETY RELIEF VALVE 1C) INADVERTENTLY OPENS
Create Event 10 X01I291F > 0 -desc MS-RV-1C CONTROL SWITCH TAKEN TO OFF	EVENT 10 CREATED WHEN MS-RV-1C CONTROL SWITCH TAKEN TO OFF
Delete malfunction SRV-RRS003C	MS-RV-1C (SAFETY RELIEF VALVE 1C) CLOSES ON EVENT 10

8	-	C, MC (ATC)	Due to the loss of feed and condensate, and with HPCS unavailable, ATC will use RCIC for RPV level control. When ATC restarts RCIC for level control, RCIC-V-13 fails to auto open. ATC manually opens RCIC-V-13 to restore RPV level to the directed band.

Event 8 – RCIC-V-13 (RCIC injection valve) fails to automatically open requiring manual operation (BOP).

Insert malfunction MOV-RCI005F to F_AUTO_OPEN	RCIC-V-13 RPV INJECTION VALVE FAILS TO AUTO OPEN

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

Target Quantitative Attributes	Actual	Description
Events after EOP entry (1-2)	**3**	TR-S Lockout / MS-RV-1C Inadvertently Opens / RCIC-V-13 Fails to Auto Open
Abnormal events (2-4)	**3**	ABN-ROD / ABN-CAS / ABN-SRV
Major transients (1-2)	**2**	Manual Scram with Electric ATWS / Startup Transformer (TR-S) Lockout
EOPs entered/requiring substantive actions (1-2)	**1**	PPM 5.1.1 (RPV Control)
Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	**1**	PPM 5.1.2 (RPV Control – ATWS)
Pre-identified Critical tasks (≥ 2)	**3****	See Critical Task Sheets. **CT-3 is a conditional critical task.

TERMINATION CRITERIA:

This scenario will be terminated (with concurrence from NRC Examiner) when all control rods are inserted, the transition back to PPM 5.1.1 (RPV Control) is complete, Main Steam Relief Valve 1C has been re-closed, and reactor water level is stable in the directed band using RCIC.

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">After crew assumes the shift (per Turnover):
Crew places Main Turbine Governor Valves into Sequential Valve mode and performs reactor power reduction per PPM 3.2.6, and then performs Bypass Valve testing per OSP-MS-Q702 – Bypass Valve #2 fails to open during testing
Results in: Entry into Governor Valve Sequential Valve Mode / Reactivity Manipulation / Bypass Valve Failure

EXAMINER NOTE: All procedure steps are cut and pastes directly from the applicable procedure. All RED mark ups denote the expected operator procedure mark up as the steps are completed. Non-applicable (N/A) steps to current plant conditions are not listed.

EXAMINER NOTE: The crew is provided (along with the Turnover) marked up copies of PPM 3.2.6, SOP-MT-GV/OPTIMIZATION, and OSP-MS-Q702 to support evolution.</td></tr>
<tr><td>1.</td><td>CRS</td><td>Refers to marked-up copy of PPM 3.2.6:

5.1.6 RECORD date and time downpower initiated: Today / Now Performs

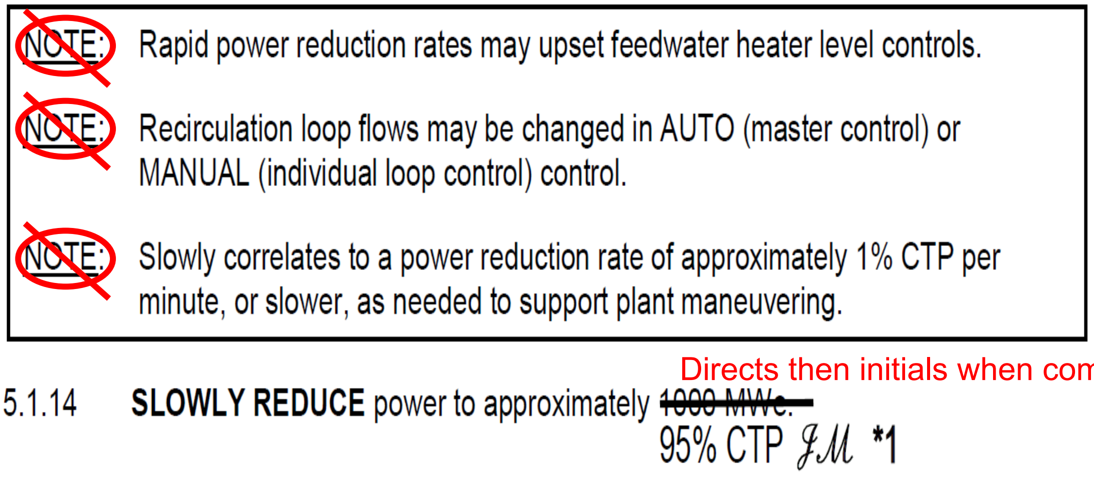
5.1.7 IF in Governor Valve Optimization, Directs then initials when complete
THEN ENTER Sequential Valve Operation per SOP-MT-GV/OPTIMIZATION. _____</td></tr>
<tr><td>2.</td><td>BOP</td><td>Refers to marked-up copy of SOP-MT-GV/OPTIMIZATION:

3.0 PREREQUISITES
3.1 VERIFY Generator output GE 1092 MWe prior to GV Optimization. Performs
~~NOTE~~: The following step may require slightly GT 1092 MWe.
3.2 VERIFY Optimize Valve Mode OKAY to SELECT light illuminated. Performs</td></tr>
</table>

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
3.	**BOP**	4.0 PRECAUTIONS AND LIMITATIONS ~~4.1~~ Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open. ~~4.2~~ The Main Turbine automatically comes out of Governor Valve Optimization when Generator Output drops below 1058 MWe.
4.	**BOP**	5.2 Enter Sequential Valve Operation {P-105020} ~~NOTE:~~ The Main Turbine automatically comes out of Governor Valve Optimization when Main Generator Load drops below 1058 MWe. 5.2.1 IF VPL DEMAND is not at 100%, THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display): a. **SELECT** VPL TARGET. ____ b. **ENTER** 100%. ____ c. **SELECT** OK. ____ d. **SELECT** GO. ____ e. **SELECT** YES. ____ f. **VERIFY** GO illuminated. ____ g. **VERIFY** VPL DEMAND ramps to VPL TARGET value. ____ Performs all steps 5.2.2 **COMPLETE** entry into Sequential Valve Mode as follows: a. **SELECT** SEQUENTIAL VALVE MODE. ____ b. **SELECT** YES. ____ c. **VERIFY** GV-1 and GV-4 move to their pre-optimization positions (approximately equal). ____ d. **VERIFY** SEQUENTIAL VALVE MODE is illuminated. ____
5.	**CRS**	Refers to marked-up copy of PPM 3.2.6: 5.1.9 **ASSIGN** an individual to track thermal power changes. Performs

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
EXAMINER NOTE: PPM 3.2.6 (step 5.1.14) below is modified (as permitted by procedure) to accommodate the smaller power reduction needed.		
6.	**CRS**	Directs reactor power reduced with Reactor Recirc flow at 1% per minute (per Turnover):  ~~NOTE:~~ Rapid power reduction rates may upset feedwater heater level controls. ~~NOTE:~~ Recirculation loop flows may be changed in AUTO (master control) or MANUAL (individual loop control) control. ~~NOTE:~~ Slowly correlates to a power reduction rate of approximately 1% CTP per minute, or slower, as needed to support plant maneuvering. Directs then initials when complete 5.1.14 **SLOWLY REDUCE** power to approximately ~~1000 MWe.~~ 95% CTP JM *1 ____

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">EXAMINER NOTE: Annunciator P820-B2 7-6 (GLAND SEAL STM PRESS LOW) may momentarily alarm following power reduction. BOP will refer to ARP but there will be no actionable steps to perform since gland seal pressure will recover.</td></tr>
<tr><td>7.</td><td>ATC</td><td>Performs SOP-RRC-FLOW-QC to lower reactor power at 1% per minute to ~95% as directed by the CRS.

2.1 Reactor Power Change with RRC Flow Controllers in Auto   Peer checker may not be used w/ only 2 CROs

~~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

2.1.1 IF desired to control RRC flow using the Master Controller within the constraints of fuel preconditioning, THEN RAISE/[✓ LOWER] RRC flow using RRC-M/A-R675 (Master Control) as necessary.   Performs

2.1.2 VERIFY total core flow is LT 105%.   Performs

2.1.3 VERIFY RRC loop A and B is LT 57.5 Mlb/hr.   Performs

2.1.4 NOTIFY the CRS when the change in Reactor power is complete.   Performs</td></tr>
<tr><td colspan="3">EXAMINER NOTE: The Prerequisites and Precautions & Limitations of OSP-MS-Q702 were previously pre-briefed and annotated. It is permissible for crew to directly start testing.</td></tr>
<tr><td>8.</td><td>CRS</td><td>Directs the performance of OSP-MS-Q702 (Bypass Valves Test).</td></tr>
</table>

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
9.	**BOP**	Verifies LEFMs in Check Plus Mode on PPC Overview screen and performs step: 7.0 PROCEDURE ~~NOTE:~~ The intent of the 75 MWth reduction is to ensure that reactor power does not exceed the allowed thermal power as the bypass valves are opened and closed. The allowe for the given LEFM status. 7.1 **VERIFY** Reactor power is at least 75 MWt below the current LEFM limit using PPM 3.2.1 or PPM 3.2.6 per one of the following: 7.1.1 IF LEFM Mode of Operation is in Check Plus Mode, THEN **VERIFY** Reactor power is LE 3469 MWt. Performs 7.1.2 IF LEFM Mode of Operation is in Check Mode, THEN **VERIFY** Reactor power is LE 3462 MWt. N/A 7.1.3 IF LEFM Mode of Operation is in a Failure Mode THEN **VERIFY** Reactor power is LE 3411 MWt. N/A
10.	**BOP**	Refers to Turnover information to verify below step complete: 7.2 **VERIFY** proper margin to Pre-Conditioned Status (PCS) exists per PPM 9.3.18. Verifies
EXAMINER NOTE: Marked-up copy of OSP-MS-Q702 "forces" the crew to perform the 1st option below (which is option usually used when performed in the plant).		
11.	**BOP**	7.5 **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). Performs • **THROTTE OPEN** COND-V-178 (Desuper Spray Bypass). N/A JM • **PLACE** COND-PIC-40 in **MANUAL** (TB 441, IR-9) to establish desuperheat spray at ~100 psig. N/A JM

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
EXAMINER NOTE: Test of Bypass Valve #1 (BV1) will be successful.		
EXAMINER NOTE: Crew may elect to use mouse instead of DEH touchscreen feature to perform DEH manipulations (mouse connected to USB port below DEH monitors).		
12.	**BOP**	7.6 **SELECT** BV on the SELECT VALVE panel (Menu, Valve Testing). Performs 7.7 **VERIFY** OK TO TEST BV VALVES is green. Performs 7.8 **PERFORM** the following to test BV1: ~~NOTE~~: Use indication on DEH Monitor panel for MWe. 7.8.1 **RECORD** MWe: Records MWe MWe, CLOSED Performs 7.8.2 **SELECT** TEST BV1. Performs
13.	**BOP**	~~NOTE~~: When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again. 7.8.3 **SELECT** TEST. _____ 7.8.4 **TOUCH** and **HOLD** OPEN BV1 button. _____ 7.8.5 WHEN BPV1 is fully open, THEN **RELEASE** OPEN BV1 button. _____ # 7.8.6 **VERIFY** BPV1 is **OPEN**. _____ 7.8.7 **RECORD** MWe: Records MWe MWe, OPEN _____ 7.8.8 **TOUCH** and **HOLD** CLOSE BV1 button. _____ 7.8.9 WHEN BPV1 is fully closed, THEN **RELEASE** CLOSE BV1 button. _____ # 7.8.10 **VERIFY** BPV1 is **CLOSED**. _____ 7.8.11 **RECORD** MWe: Records MWe MWe, CLOSED _____ 7.8.12 **SELECT** TEST BV1. _____ 7.8.13 **SELECT** EXIT TEST. _____ Performs all steps
14.	**CRS**	7.8.14 **VERIFY** Plant conditions have stabilized before continuing to the next step. Performs CRS

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: Test of Bypass Valve #2 (BV2) will NOT be successful (will NOT open).</td></tr>
<tr><td>15.</td><td>BOP</td><td>7.9 PERFORM the following to test BV2:
~~NOTE:~~ Use indication on DEH Monitor panel for MWe.
7.9.1 RECORD MWe: Records MWe MWe, CLOSED Performs
7.9.2 SELECT TEST BV2. Performs
~~NOTE:~~ When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again.
7.9.3 SELECT TEST. Performs
7.9.4 TOUCH and HOLD OPEN BV2 button. Performs but recognizes BV2 does not open - Reports this to CRS</td></tr>
<tr><td>16.</td><td>CRS</td><td>Upon report, recognizes that surveillance failed for BPV2 (failure of step 7.9.4 above makes pounded (#) step 7.9.6 unsat. Evaluates Tech Specs. (next page)</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: The CRS may direct securing the lineup for testing BV2. If so, the following steps (as a minimum) will be performed.</td></tr>
<tr><td>17.</td><td>BOP</td><td>7.9.12 SELECT TEST BV2. Performs
7.9.13 SELECT EXIT TEST. Performs</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: The CRS may elect to continue testing BV3 & BV4 OR skip these tests and proceed directly to steps below to restore pre-surveillance plant lineup. <u>If CRS elects to continue testing, or is asking for guidance</u>, PROVIDE CUE to the effect that BV3 & BV4 will not be tested at this time and to continue with steps 7.12 & 7.13 of OSP-MS-Q702.</td></tr>
<tr><td>18.</td><td>BOP</td><td>7.12 SECURE desuperheat spray by one or more of the following methods: (N/A method(s) not used)
• PLACE COND-PCV-40 (Desuper Spray Press Control) to NORM (AUTO). Performs
• CLOSE COND-V-178 (Desuper Spray Bypass). N/A JM
• PLACE COND-PIC-40 in AUTO (TB 441, IR-9). N/A JM
7.13 VERIFY Desuperheat Spray is secured (approximately 0 psig on COND-PI-40). Performs</td></tr>
</table>

EVENT 1: Power Reduction to support performance of OSP-MS-Q702 (Bypass Valves Test). Bypass Valve (BPV) 2 Fails to Open – Tech Spec Entry

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
19.	CRS	**Technical Specification Action Statement**

LCO 3.7.6 The Main Turbine Bypass System shall be OPERABLE. No longer operable per TSAS A.1 Bases

OR

LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for an inoperable Main Turbine Bypass System, as specified in the COLR, are made applicable. Limits not yet in effect

APPLICABILITY: THERMAL POWER ≥ 25% RTP. In the applicability

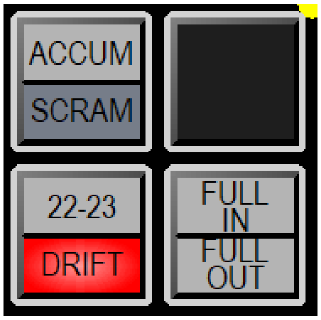
ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Requirements of the LCO not met.	A.1	Satisfy the requirements of the LCO.	2 hours
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to < 25% RTP.	4 hours

EXAMINER NOTE: If CRS directs performance of TSP-THERM-C101, the GCS simulator floor instructor will inform the CRS that the surveillance will be performed by another operator.

STEP #	Position	CREW RESPONSE
20.	CRS	May direct performance of TSP-THERM-C101 (Power Thermal Limits) with the intent to meet the requirements of the LCO (must complete within 2 hours).

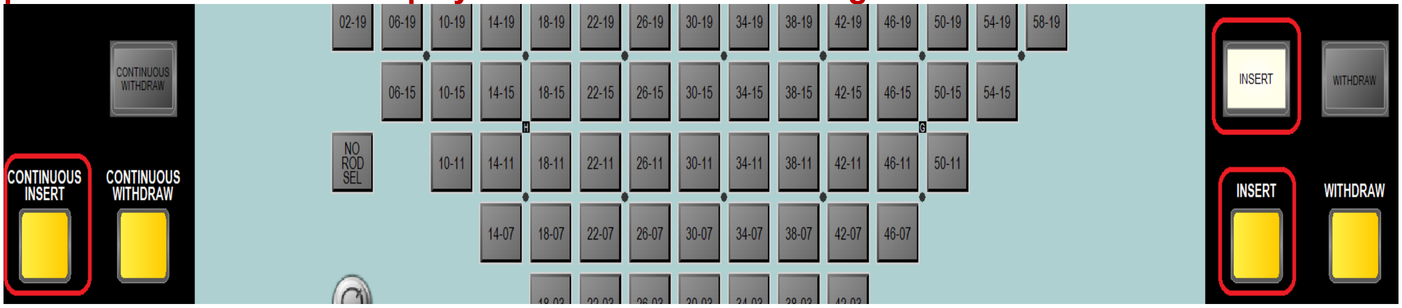
EVENT 2: Control Rod 22-23 Drifts Out– Tech Spec Entry

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		When directed: **INSERT TRIGGER 2: Control Rod 22-23 Drifts Out** **Results in: Control Rod 22-23 Fully Inserted / Tech Spec Entry**
		EXAMINER NOTE: The time between the start of the rod drift and when action is taken to insert the rod will determine the annunciators received. The ROD DRIFT annunciator will be the one initially received and acted upon. Other lower priority annunciators (ROD OUT BLOCK, RBM UPSCALE OR INOP, and various Offgas alarms) caused by the resultant power rise will be addressed as time permits and eventually clear after rod re-inserted.
		EXAMINER NOTE: ATC is trained to perform the next 4 steps automatically (without referring to ARP or ABN-ROD) to support any immediate actions required per ABN-ROD.
21.	**ATC**	Reports P603-A7 Drop 5-7 (ROD DRIFT) alarm and identifies the drifting rod by looking at the Full Core display (below) and/or Plant Process Computer:  
22.	**ATC**	Selects the drifting rod (22-23) using associated rod select pushbutton and reports the affected rod, its position, and direction of drift.  Once rod selected, the Four Rod display will show the rod at position 10 or greater and will continue to withdraw until next step is performed (or rod reaches FULL OUT [48])

EVENT 2: Control Rod 22-23 Drifts Out– Tech Spec Entry

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

EXAMINER NOTE: Evidence that a rod insertion signal was applied will come from the INSERT light illuminating when either the INSERT or CONTINUOUS INSERT buttons are pressed. The Four Rod display will show rod 22-23 being inserted to 00.



EXAMINER NOTE: Below action requires inserting rod to FULL IN if not already there.

EXAMINER NOTE: Rod is FULL IN when Four Rod display shows 00 (top right) and the green FULL IN light is lit on the Full Core display for the selected rod (22-23).

STEP #	Position	CREW RESPONSE
23.	**ATC**	Fully inserts control rod 22-23 (per ABN-ROD Immediate Action). 3.2 **VERIFY** the drifting or scrammed control rod(s) are full in. Performs
24.	**ATC**	Releases insert pushbutton and notes rod 22-23 remains at position 00 (FULL IN). 3.3 IF the control rod starts to drift back out when the insert signal is removed, THEN **PERFORM** the following: N/A – Rod did NOT drift back out 3.3.1 **APPLY** an insert signal. _____ 3.3.2 **ISOLATE** the control rod per step 4.1.2. _____
25.	**CRS**	Enters ABN-ROD, verifies Immediate Actions complete, then refers to Section 4.1 (Drifting or Scrammed Control Rod(s)).
26.	**ATC**	4.1.3 **RESET** Control Rod Drift annunciator using the ROD DRIFT RESET Pushbutton on H13-P603. {6.9} Performs

EVENT 2: Control Rod 22-23 Drifts Out– Tech Spec Entry

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
27.	CRS	4.1.5 **REQUEST** a core monitoring case to verify acceptable thermal limits and preconditioning. Performs 4.1.6 **NOTIFY** the SNE. Performs 4.1.9 WHEN the Plant is stabilized, THEN **REFER** to Technical Specification 3.1.3. Performs (see page 18)

If directed to perform a core monitoring case:

Wait 3 minutes and (as the floor instructor)

ROLE-PLAY

"Core monitoring case shows us within our core thermal and preconditioning limits."

EXAMINER NOTE: Generally, the BOP operator will reference ARPs for alarms affecting the ATC operator to minimize ATC distractions.

STEP #	Position	CREW RESPONSE
28.	BOP	Refers to ARP 4.603-A7 Drop 5-7 (ROD DRIFT): ~~1.~~ **VERIFY** correct control rod position. Performed previously (ATC) ~~2.~~ IF a control rod drift is verified, THEN **REFER** to ABN-ROD, Control Rod Faults. Performed previously (CRS) ~~3.~~ **RESET** the alarm. May have been performed previously (ATC)

EXAMINER NOTE: Both annunciators below (and various less important Offgas annunciators) may or may not come in based on how quickly the ATC performs their Immediate Actions.

STEP #	Position	CREW RESPONSE
29.	BOP	Refers to ARP 4.603.A8 Drop 3-5 (RBM UPSCALE OR INOP) (as applicable): ~~1.~~ **VERIFY** power level (H13-P603) Power rose while rod was drifting out and lowered following rod insertion (alarm cleared) ~~2.~~ IF an upscale trip is indicated due to an actual power increase, THEN **VERIFY** the control rod pattern is symmetrical. ABN-ROD addresses rod pattern

EVENT 2: Control Rod 22-23 Drifts Out– Tech Spec Entry

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
30.	**BOP**	Refers to ARP 4.603.A7 Drop 2-7 (ROD OUT BLOCK) (as applicable): 1. **STOP** control rod withdrawal. ABN-ROD specifies manual rod insertion 2. **INVESTIGATE** the cause of the Rod Out Block. Cause known – Rod drift 3. IF CRS directs, THEN **PERFORM** the following: a. **INITIATE** a MON run to verify the reactor is in compliance with the fuel thermal limits. Also directed by ABN-ROD
31.	**BOP**	May direct local investigation of HCU for rod 22-23.

If directed to investigate HCU for rod 22-23 (located in RB 522' West Side)

Wait 5 minutes and

ROLE-PLAY

"No abnormal indications or obvious problems found with HCU for rod 22-23."

EVENT 2: Control Rod 22-23 Drifts Out– Tech Spec Entry

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>32.</td><td>CRS</td><td>
Technical Specification Action Statement
LCO 3.1.3 Each control rod shall be OPERABLE. Rod 22-23 is not stuck but considered INOP for other reasons
APPLICABILITY: MODES 1 and 2. In the applicability
ACTIONS
---NOTE---
Separate Condition entry is allowed for each control rod.

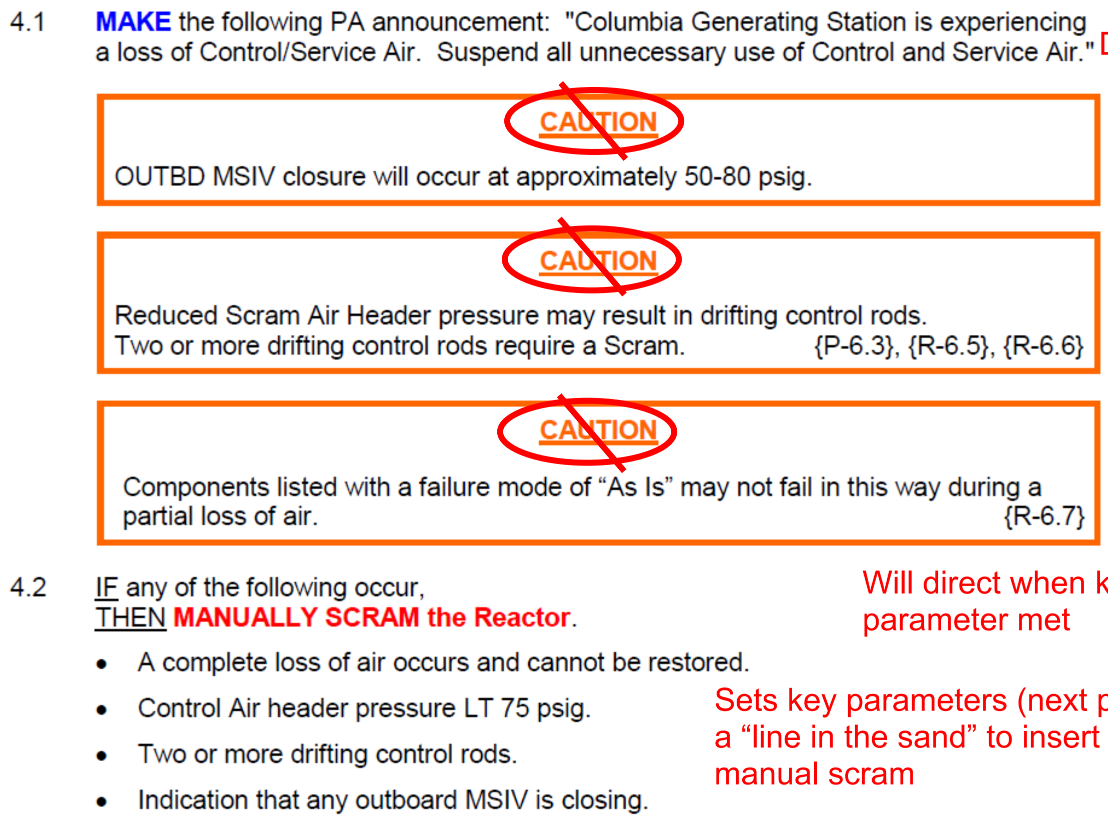
<table>
<tr><td>C. One or more control rods inoperable for reasons other than Condition A or B.</td><td>C.1 ---------------NOTE--------------
RWM may be bypassed as allowed by LCO 3.3.2.1, if required, to allow insertion of inoperable control rod and continued operation.

Fully insert inoperable control rod.
<u>AND</u>
C.2 Disarm the associated CRD.</td><td>3 hours
4 hours</td></tr>
</table>
</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: The first alarm for Event 3 (next page) does not occur for ~3 minutes after Trigger 3 is inserted. Consideration may be given to inserting Trigger 3 immediately after Tech Spec call to remove dead time.</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: HCU may be disarmed mechanically or electrically per LCO 3.1.3 C.2 Bases.</td></tr>
<tr><td>33.</td><td>CRS</td><td>Directs HCU for rod 22-23 be disarmed per SOP-CRD-HCU, step 5.10.4 (hydraulically) or step 5.10.5 (electrically) to meet Tech Spec requirement.</td></tr>
</table>

EVENT 3: CAS Leak w/ Standby CAS Compressors Failing to Auto Start – Leak Worsens

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		When directed: **INSERT TRIGGER 3: Unisolable CAS Air Leak** **Results in: Manual start of both standby CAS air compressors, manual opening of startup Flow Control Valves (RFW-FCV-10A & B), air leak growing larger**
		EXAMINER NOTE: Without operator action, the time between Trigger 3 being inserted and the first alarm at ~95 psig (CONTROL AIR HDR PRESS LOW) is ~3 min, 20 sec. **The air leak automatically gets worse 9 minutes after Trigger 3 inserted.**
		EXAMINER NOTE: The Standby CAS Air Compressors will FAIL to auto start when Control Air Pressure on CAS-PI-1 on P840 lowers below ~100 psig. The crew may manually start both standby air compressors if they notice pressure lowering below ~100 psig without compressor auto-starts occurring. This is permitted by PPM 1.3.1 (Operating Policies, Programs, and Practices), Step 4.6.6.
34.	**BOP**	Reports P840-A5 Drop 7-4 (CONTROL AIR HDR PRESS LOW) alarm and air pressure value and trend on CAS-PI-1 on P840 (down slow).
35.	**CRS**	Enters ABN-CAS.
36.	**BOP**	May inform CRS of starting standby CAS compressors if failure to auto-start is recognized (per PPM 1.3.1 guidance).
37.	**BOP**	Refers to ARP 4.840-A5 Drop 7-4 (CONTROL AIR HDR PRESS LOW): **~~CAUTION~~** MSIV closure will occur at approximately 80 psig. ~~NOTE~~: CAS-PCV-1 will open at 75 psig. ~~1.~~ **CHECK** CAS-PI-1 for low header pressure. ~~2.~~ **CHECK** SA-PI-1 for low header pressure. May have been previously reported ~~3.~~ **VERIFY** all air compressors are operating. May have been previously started ~~4.~~ **REFER** to ABN-CAS, Control Air System Failure. Refers CRS to ABN (if not entered) ~~5.~~ **CHECK** Air Dryer Skid A and Air Dryer Skid B for abnormal conditions and correct. Directs field operator to investigate (next page)

EVENT 3: CAS Leak w/ Standby CAS Compressors Failing to Auto Start – Leak Worsens

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">EXAMINER NOTE: CAS header pressure on CAS-PI-1 on P840 will gradually recover (rise) after all 3 CAS compressors are running. After this, the air leak will slowly get worse such that the air compressors can no longer keep up resulting in air pressure again lowering.</td></tr>
<tr><td>38.</td><td>BOP</td><td>Following the start of both standy CAS compressors, reports all 3 CAS compressors running. Includes CAS pressure and trend on CAS-PI-1 on P840 (up slow).</td></tr>
<tr><td colspan="3">1 minute AFTER all CAS Compressors are running
-OR-
If directed to investigate (whichever occurs first):
Wait 1 more minute and</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“I’m in Turbine Building 441’ East and hear what appears to be a large air leak. It seems to be coming from piping downstream of the CAS Air Dryers. I cannot determine the exact location. I’m leaving the area due to safety concerns.”</td></tr>
<tr><td>39.</td><td>CRS</td><td>From ABN-CAS:

4.1 MAKE the following PA announcement: "Columbia Generating Station is experiencing a loss of Control/Service Air. Suspend all unnecessary use of Control and Service Air." Directs ____
~~CAUTION~~
OUTBD MSIV closure will occur at approximately 50-80 psig.
~~CAUTION~~
Reduced Scram Air Header pressure may result in drifting control rods.
Two or more drifting control rods require a Scram. {P-6.3}, {R-6.5}, {R-6.6}
~~CAUTION~~
Components listed with a failure mode of “As Is” may not fail in this way during a partial loss of air. {R-6.7}
4.2 IF any of the following occur,
THEN MANUALLY SCRAM the Reactor.
• A complete loss of air occurs and cannot be restored.
• Control Air header pressure LT 75 psig.
• Two or more drifting control rods.
• Indication that any outboard MSIV is closing.
Will direct when key parameter met ____
Sets key parameters (next page) as a “line in the sand” to insert a manual scram</td></tr>
</table>

EVENT 3: CAS Leak w/ Standby CAS Compressors Failing to Auto Start – Leak Worsens

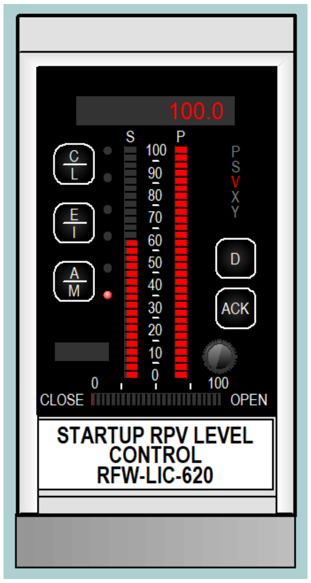
STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
40.	**CRS**	Sets key parameter for CAS header pressure for BOP.
41.	**CRS**	Sets key parameter to watch for control rod drift for ATC.

EXAMINER NOTE: CAS leak gets larger 9 minutes after the leak started.

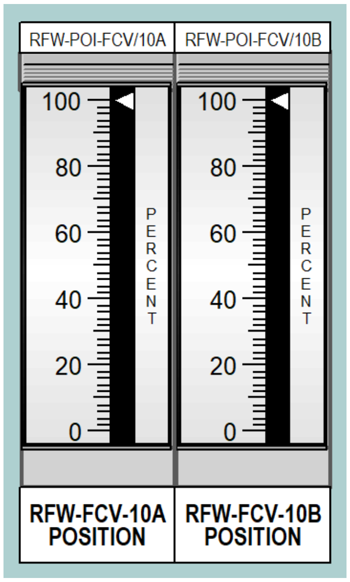
STEP #	Position	CREW RESPONSE
42.	**BOP**	Reports lowering CAS pressure with all 3 CAS compressors running.
43.	**CRS**	From ABN-CAS: 4.3 IF the loss of Control Air caused a Scram, THEN **REFER** to PPM 3.3.1. Should direct manual scram before MSIV closure
44.	**ATC**	From ABN-CAS (as directed): NOTE: The following step permits use of the Condensate Booster Pumps to feed the vessel following a scram if the Startup Flow Control Valves are not already controlling vessel level. 4.5 IF complete loss of air is apparent, Is apparent (based on BOP report) AND RFW-FCV-10A/10B (Startup RPV Level Control) are NOT open, THEN **PERFORM** the following before all air is lost: 4.5.1 **VERIFY** RFW-V-118 is closed (Main Startup Flow). Performs 4.5.2 **PLACE** RFW-LIC-620 in **MANUAL**, Performs AND **FULLY OPEN** RFW-FCV-10A/10B (Startup RPV Level Control). Performs

EXAMINER NOTE: Will see the following when RFW-FCV-10A & 10B are fully opened:

On P603 Right Side (Skirt)



On P603 Right Side (Vertical Section)



EVENT 3: CAS Leak w/ Standby CAS Compressors Failing to Auto Start – Leak Worsens

OPERATOR ACTIVITIES

EXAMINER NOTE: The below steps (bounded by 2 blue rows) may or may not be addressed based on when the CRS directs a manual reactor scram (no impact to scenario outcome).

STEP #	Position	CREW RESPONSE
45.	**BOP**	From ABN-CAS (as directed): 4.11 IF Control Air pressure is lower than Service Air pressure, (It will be) THEN **MANUALLY OPEN** SA-PCV-2 to supply Control Air from SA-C-1. Performs NOTE: Valve will auto close when Service air pressure reaches ~80 psig
46.	**BOP**	Refers to ARP 4.840-A5 Drop 6-4 (AIR RECEIVER PRESS LOW): 1. **CHECK** the following (locally): • CAS-PI-14AG • CAS-PI-14BG • CAS-PI-14CG Will not be able to check (in vicinity of air leak) ~~2.~~ IF this alarm is accompanied by CAS and SA header pressure alarms or lowering pressures, THEN **REFER** to ABN-CAS, Control Air Failure. Previously performed ~~3.~~ **MONITOR** CAS-PI-1 (H13-P840) for system pressure abnormalities. On-going 4. **DETERMINE** and **CORRECT** the cause of the alarm.

If directed to check local CAS pressures

AND

The air leak has NOT YET been reported:

Wait 1 minute and

ROLE-PLAY

"I'm in Turbine Building 441' East and hear what appears to be a large air leak. It seems to be coming from piping downstream of the CAS Air Dryers. I cannot determine the exact location and will leave the area due to safety concerns."

ELSE

ROLE-PLAY

"It is still unsafe to enter the area of the air leak. I cannot check CAS pressures."

EVENT 3: CAS Leak w/ Standby CAS Compressors Failing to Auto Start – Leak Worsens

STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
47.	**BOP**	Refers to ARP 4.840-A5 Drop 7-5 (SERVICE AIR HDR PRESS LOW): ~~1.~~ **CHECK** SA-PI-1 for low header pressure. Previously reported ~~2.~~ **START** the standby CAS air compressor, CAS-C-1A(B)(C) per SOP-CAS-OPS, Control and Service Air Operation. Previously performed ~~3.~~ IF header lowers to 80 psig, THEN **VERIFY CLOSED** SA-PCV-2. Performs (may have already auto closed) ~~4.~~ **REFER** to ABN-CAS, Control Air System Failure. Previously performed ~~5.~~ **NOTIFY** Health Physics of service air loss for breathing air. Performs
48.		Refers to ARP 4.840-A5 Drop 7-6 (SERVICE AIR HDR ISOLATED): ~~1.~~ **VERIFY CLOSED** SA-PCV-2. Previously performed ~~2.~~ **VERIFY** all air compressors are running. Previously performed ~~3.~~ **REFER** to ABN-CAS, Control Air System Failure. Previously performed ~~4.~~ **NOTIFY** Health Physics of service air loss for breathing air. Previously performed

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
NO TRIGGER – CRS Directs Manual Reactor Scram **Results in: Electric ATWS – All Rods Insert Upon Pulling RPS Fuses**		
EXAMINER NOTE: It is expected that the CRS (while remaining cognizant of Step 4.2 below) will direct a manual scram as soon as the established key parameter for CAS header pressure has been met, but no later than that specified below. Control rods will not drift nor MSIVs close during this time.		
49.	**CRS**	From ABN-CAS: 4.2 IF any of the following occur, THEN **MANUALLY SCRAM the Reactor**. Directs [✓ • A complete loss of air occurs and cannot be restored.] CRS judgement [✓ • Control Air header pressure LT 75 psig.] When condition met • Two or more drifting control rods. • Indication that any outboard MSIV is closing. Directs ATC to scram the reactor.
EXAMINER NOTE: Record time RMS placed in Shutdown (step 2.1 below). This time is used to evaluate if CT #1 met later. TIME RMS in SHUTDOWN: ________________		
50.	**ATC**	When directed to insert manual scram (performs actions of PPM 3.3.1 (Scram) QC): 2.0 IMMEDIATE ACTIONS 2.1 **PLACE** the Reactor Mode Switch in **SHUTDOWN**. Performs 2H 2.2 **DEPRESS** the Manual Scram Pushbuttons. Performs 2.3 **REPORT** Reactor Power, Pressure, and Level to the CRS. Performs 2H 2.4 IF APRMs are NOT downscale, THEN **INITIATE** ARI. Performs 2.5 IF Reactor power is GT 5%, THEN **PERFORM** the following: 2.5.1 **NOTIFY** CRS of initiating SLC. Performs 2.5.2 **INITIATE** SLC injection by performing the following (H13-P603): • **PLACE** SLC System A control switch to the **OPER** position. See steps next page • **PLACE** SLC System B control switch to the **OPER** position. See steps next page 3.1.1 **REPORT** control rod status (all rods in [✓ not in]) to CRS. Performs Reports EOP Entry on Failure To Scram with Power GT 5%.

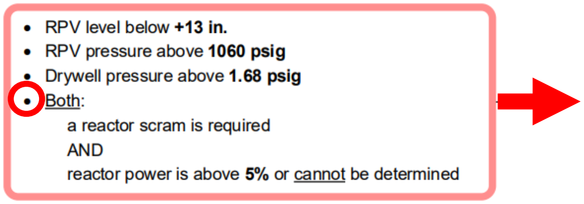
EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

EXAMINER NOTE: **ATC will initially perform steps 2.1 & 2.2 below as required by the above Scram Quick Card (supports Critical Task). Remaining steps may get deferred until after the Stop & Prevent of Feedwater has been accomplished (which becomes the priority).**

EXAMINER NOTE: **Record time steps 2.1 & 2.2 are completed below AND SLC flow is indicated on SLC-FI-1 (~86 gpm): ________________**

CRITICAL TASK #2

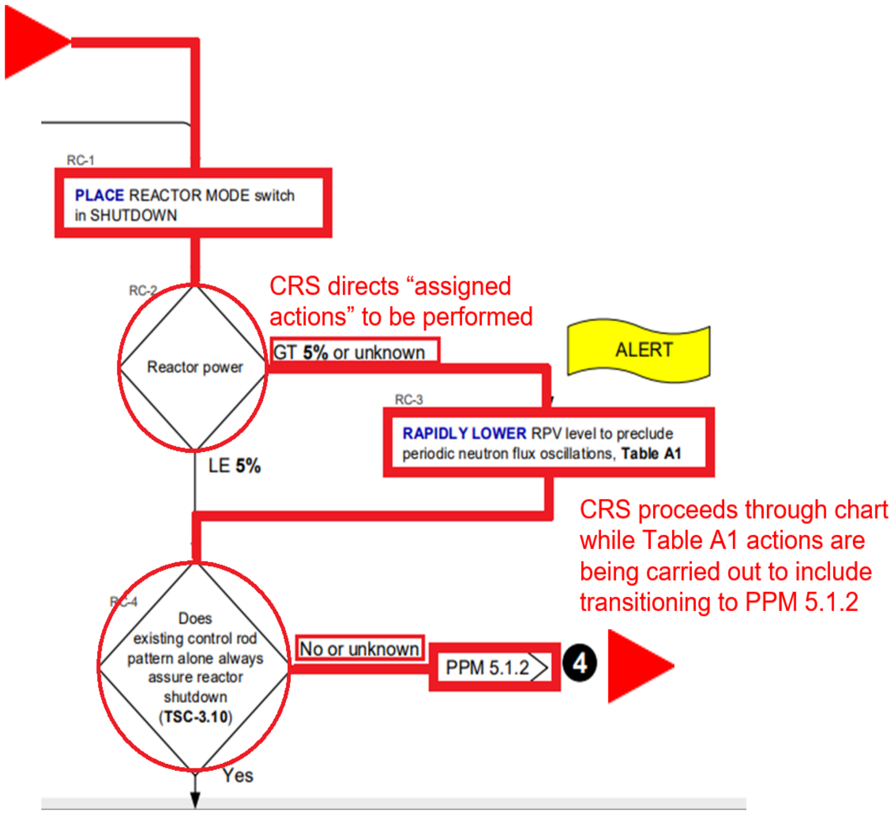
Critical Task Statement: **With a reactor scram required and the reactor not shutdown, take actions (initiates SLC from MCR) to inject SLC per PPM 3.3.1 QC prior to commencing performance of PPM 5.5.11 Alternate Rod Insertions.**

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
51.	ATC	Initiates SLC (from SOP-SLC-INJECTION-QC): 2.1 **REMOVE** the SLC keylock switch blanks, AND **INSERT** both keys into the SLC System control switches. _____ 2.2 **INITIATE** SLC injection by performing the following (H13-P603): • **PLACE** SLC System A control switch to the **OPER** position. _____ • **PLACE** SLC System B control switch to the **OPER** position. _____ Performs all steps 2.3 **RECORD** the following: • SLC flow rate (~ 43 gpm for one pump, 86 gpm for both pumps) Records GPM _____ • Initial tank level Records Level _____ 2.4 **VERIFY** RWCU-V-4 **CLOSED**. _____ 2.5 **REPORT** ONE of the following, or similar words, to the CRS as you hand him this procedure: • SLC is injecting normally • SLC is partially injecting • SLC is failed to inject _____
52.	CRS	Enters PPM 5.1.1 RPV Control:  • RPV level below **+13 in.** • RPV pressure above **1060 psig** • Drywell pressure above **1.68 psig** • Both: a reactor scram is required AND reactor power is above **5%** or cannot be determined

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

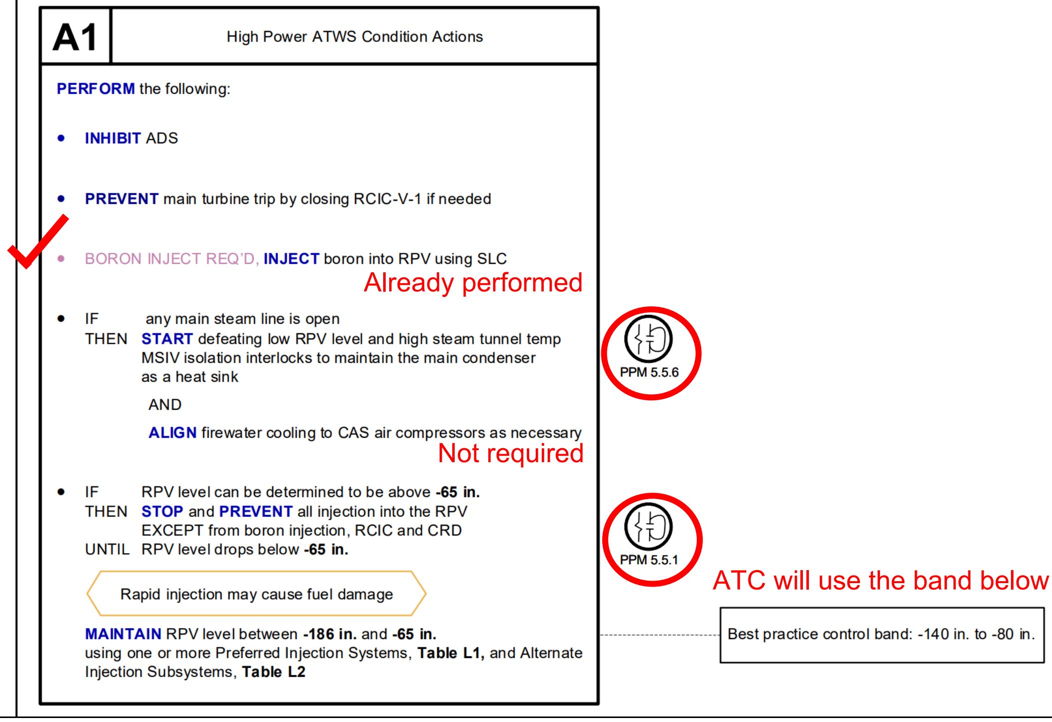
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

EXAMINER NOTE: During below step, CRS is going to direct the crew to "perform their assigned actions" per OI-15, track Table A1 as actions are completed, and transition from PPM 5.1.1 (RPV Control) to PPM 5.1.2 (RPV Control – ATWS). [See next page]

STEP #	Position	CREW RESPONSE
53.	**CRS**	PPM 5.1.1 RPV Control: 

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	CREW RESPONSE
		OPERATOR ACTIVITIES
54.	**CRS**	CRS tracks PPM 5.1.1 Table A1 actions as they are reported completed (steps following):



A1 High Power ATWS Condition Actions

PERFORM the following:

- **INHIBIT** ADS
- **PREVENT** main turbine trip by closing RCIC-V-1 if needed
- ✓ BORON INJECT REQ'D, **INJECT** boron into RPV using SLC
  Already performed
- IF any main steam line is open
  THEN **START** defeating low RPV level and high steam tunnel temp MSIV isolation interlocks to maintain the main condenser as a heat sink
  AND
  ALIGN firewater cooling to CAS air compressors as necessary
  Not required
- IF RPV level can be determined to be above **-65 in.**
  THEN **STOP** and **PREVENT** all injection into the RPV EXCEPT from boron injection, RCIC and CRD
  UNTIL RPV level drops below **-65 in.**

Rapid injection may cause fuel damage

MAINTAIN RPV level between **-186 in.** and **-65 in.** using one or more Preferred Injection Systems, **Table L1,** and Alternate Injection Subsystems, **Table L2**

ATC will use the band below

Best practice control band: -140 in. to -80 in.

EXAMINER NOTE: The BOP will perform the Table A1 back panel key manipulations concurrently with ATC actions. BOP actions listed first.

EXAMINER NOTE: The bulleted steps below are considered Transient Acts per OI-09 and do not require procedure in hand to perform.

55. **BOP**

From PPM 3.3.1 (Scram) QC) (cont):

3.2.1 IF in an ATWS GT 5% Reactor power,
AND directed by the CRS,
THEN **PERFORM** the following:

- **OVERRIDE** ECCS injection per PPM 5.5.1, starting with HPCS system. *Performs ______
- **OVERRIDE** MSIV isolations per PPM 5.5.6. *Performs ______

*Specific steps next page

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
EXAMINER NOTE: Below procedures are NOT required to be pulled from EOP locker per OI-09 for Transient Acts.		
56.	**BOP**	Table A1 actions (from PPM 5.5.1) Performs all steps HPCS • **OVERRIDE** HPCS-V-4 (HPCS RPV Injection Valve) automatic logic by removing the keylock blank, inserting the key, and placing HPCS-RMS-S25 in the **OVERRIDE** position (H13-P625). ____ LPCS • **OVERRIDE** LPCS-V-5 (LPCS RPV Injection Valve) automatic logic by removing the keylock blank, inserting the key, and placing LPCS-RMS-S21 in the **OVERRIDE** position (H13-P629). ____ RHR Loop A • **OVERRIDE** RHR-V-42A (RHR RPV Injection Valve) automatic logic by removing the keylock blank, inserting the key, and placing RHR-RMS-S105 in the **OVERRIDE** position (H13-P629). ____ RHR Loop B • **OVERRIDE** RHR-V-42B (RHR RPV Injection Valve) automatic logic by removing the keylock blank, inserting the key, and placing RHR-RMS-S106 in the **OVERRIDE** position (H13-P618). ____ RHR Loop C • **OVERRIDE** RHR-V-42C (RHR RPV Injection Valve) automatic logic by removing the keylock blank, inserting the key, and placing RHR-RMS-S107 in the **OVERRIDE** position (H13-P618) ____
57.	**BOP**	Table A1 actions (from PPM 5.5.6) Performs all steps • **BYPASS** the MSIV SYS A LOW RPV LVL / HI STM TUNNEL TEMP ISOLATIONS by removing the keylock blank, inserting the key, and placing MS-RMS-S84 in the **BYPASS** position (H13-P609). ____ • **BYPASS** the MSIV SYS B LOW RPV LVL / HI STM TUNNEL TEMP ISOLATIONS by removing the keylock blank, inserting the key, and placing MS-RMS-S85 in the **BYPASS** position (H13-P611). ____

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

EXAMINER NOTE: After ADS is Inhibited (step 3.2.1 below), the ATC will intentionally lower RPV water level to a band of -140 to -80 inches. Failure of the below Critical Task would only occur if ADS was NOT Inhibited and RPV water level was lowered below -129 inches for at least 105 seconds causing automatic ADS initiation (all 7 ADS SRVs open).

CRITICAL TASK #3 [CONDITIONAL]

Critical Task Statement: During an ATWS condition, prior to automatic initiation of ADS [-129" + 105 seconds], inhibit ADS to prevent an uncontrolled RPV depressurization. If ADS would not auto-initiate based on plant conditions, then this CT will never materialize.

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
58.	**BOP**	Table A1 actions (from PPM 3.3.1 (Scram) QC) (cont): 3.2.1 IF in an ATWS GT 5% Reactor power, AND directed by the CRS, THEN **PERFORM** the following: • INHIBIT ADS. Performs
59.	**ATC**	Table A1 actions (from PPM 3.3.1 (Scram) QC) (cont): 3.1.2 IF in an ATWS GT 5% Reactor power, AND directed by the CRS, THEN **PERFORM** the following: a. IF Main Turbine is online, THEN **CLOSE** RCIC-V-1 to prevent Main Turbine Trip. Performs b. **STOP** and **PREVENT** injection with Condensate and Feed. See next step
60.	**ATC**	From OI-15: STOP AND PREVENT ~~NOTE:~~ The following are the preferred methods to use in performing this direction and the order which the systems should be addressed. **FEEDWATER** (one of the following methods): Expect 1st method to be used although 2nd method permitted • Line up on startup flow control valves per SOP-RFW-FCV-QC and ensure either RFW-FCV-10A and B or RFW-V-118 is closed (preferred). Steps following • Reduce RFT speed to lower feed pump discharge pressure to less than RPV pressure. Consider tripping a RFT (only works with RPV pressure GT 700 psig). • Close RFW-V-65A and RFW-V-65B (least preferred). NOT expected to be used

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE

EXAMINER NOTE: Based on actions taken earlier per ABN-CAS (specifically, verifying RFW-V-118 closed and fully opening startup flow control valves (RFW-FCV-10A/B) due to loss of air), several steps of SOP-RFW-FCV-QC cannot be performed in sequence written. Step 2.1.12 per below QC does allow for RPV level control in this circumstance but comes after the below sequenced steps. ATC should get CRS concurrence on actions to take.

61. **ATC**

From SOP-RFW-FCV-QC:

2.1 Transfer RPV Level Control to RFW-FCV-10A/B:

2H 2.1.1 **START CLOSING** RFW-V-112A and RFW-V-112B. Performs

2.1.2 **START OPENING** RFW-V-118. Closed per ABN-CAS Not performed

2.1.3 **VERIFY** RFW-V-109 is **CLOSED**. Performs

2H 2.1.4 **VERIFY** RFW-V-117A and RFW-V-117B **OPEN**. Performs

2.1.5 **VERIFY** RFW-LIC-620 is in **MANUAL** (V selected for Valve position demand with 0 output). 100% output per ABN-CAS Not performed

62. **ATC**

From SOP-RFW-FCV-QC (cont):

2.1.6 IF Reactor Feed Pump(s) (RFP) are operating,
THEN **PERFORM** the following:

a. IF non-ATWS,
THEN **VERIFY** RFP(s) have ramped down in speed. N/A

b. **PLACE** RFW-P-1B in MDEM mode. Performs

c. **PLACE** RFW-P-1A in MDEM mode. Performs

d. **CONTROL** Turbine speed as required. (step 2.1.9 shows how) Performs

e. IF desired,
THEN **PLACE** RFW-FCV-2A(B) in **MANUAL**,
AND **SLOWLY OPEN** to approximately 80%. May perform (may leave in Auto) ____ ____

~~**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 **VERIFY** RFW-V-112A and RFW-V-112B are **FULLY CLOSED**. Performs

EXAMINER NOTE: Once step 2.1.7 above is complete, RPV level will start trending down. ATC is automatically going to establish an LL (Lowered Level) of -65" Wide Range and establish an RPV level band of -80" to -140".

EXAMINER NOTE: Record time RPV level lowered to -65" (LL): ________________

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE

CRITICAL TASK #1

Critical Task Statement: Stop and prevent injection into the RPV, with the exception of SLC, RCIC, and CRD, to establish an LL of -65 inches in an ATWS with GT 5% power within 10 minutes of receipt of the scram signal.

STEP #	Position	CREW RESPONSE
63.	ATC	From SOP-RFW-FCV-QC (cont): 2.1.8 **VERIFY** RFW-V-118 is FULLY **OPEN**. Closed per ABN-CAS — Not performed 2.1.9 IF Reactor Feed Pump(s) (RFP) are operating, THEN **ADJUST** the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840). — Not performed FCVs full open per ABN-CAS 2.1.10 **ADJUST** RFW-LIC-620 manual output to control RPV level. — Not performed Output at 100% per ABN-CAS 2.1.11 WHEN RPV level is approximately 36", THEN **PLACE** RFW-LIC-620 in **AUTOMATIC**. — N/A

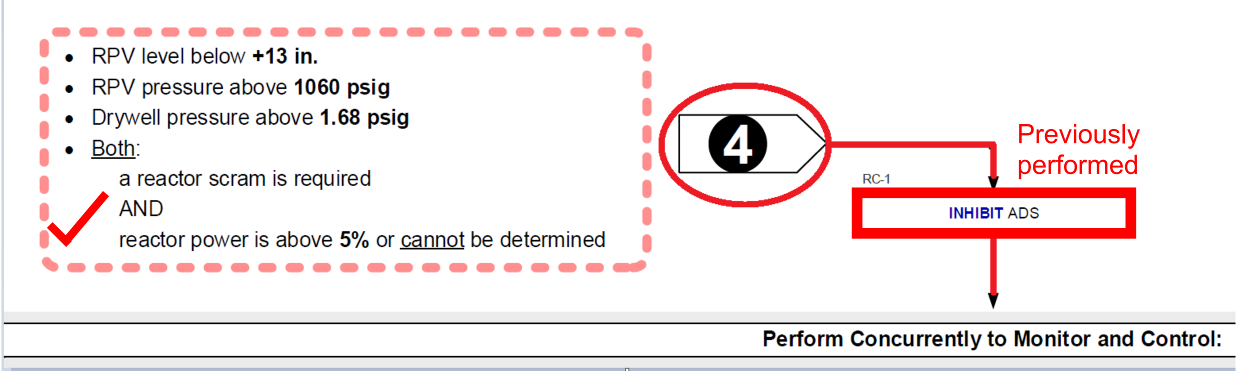
EXAMINER NOTE: With RFW-FCV-10A/B fully opened per ABN-CAS, below step allows for controlling RPV water level using feed system. CRS may decide to use HPCS system (instead of below step) to control level per PPM 5.1.2 (RPV Control – ATWS) Table L1.

STEP #	Position	CREW RESPONSE
64.	ATC	From SOP-RFW-FCV-QC (cont): 2.1.12 IF unable to control RPV level with RFW-FCV-10A/B, THEN **CONSIDER THROTTLING** RFW-V-109 or RFW-V-118 to control RPV level. — May perform

EXAMINER NOTE: With effectiveness of SLC causing a significant power reduction, RPV level may rise above LL value of -65 inches after injection recommenced. EOPs direct securing injection to restore level to desired band.

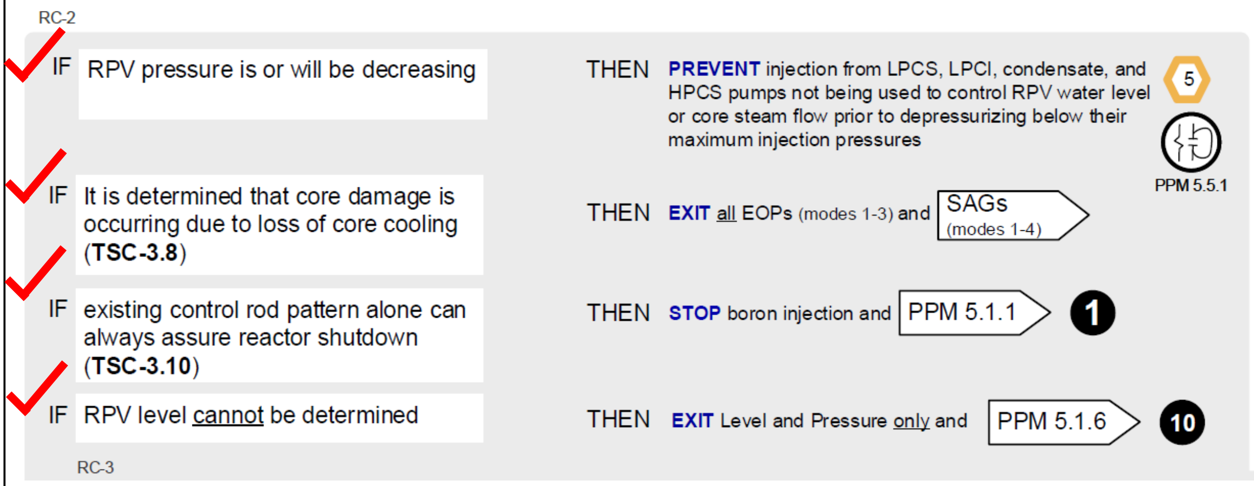
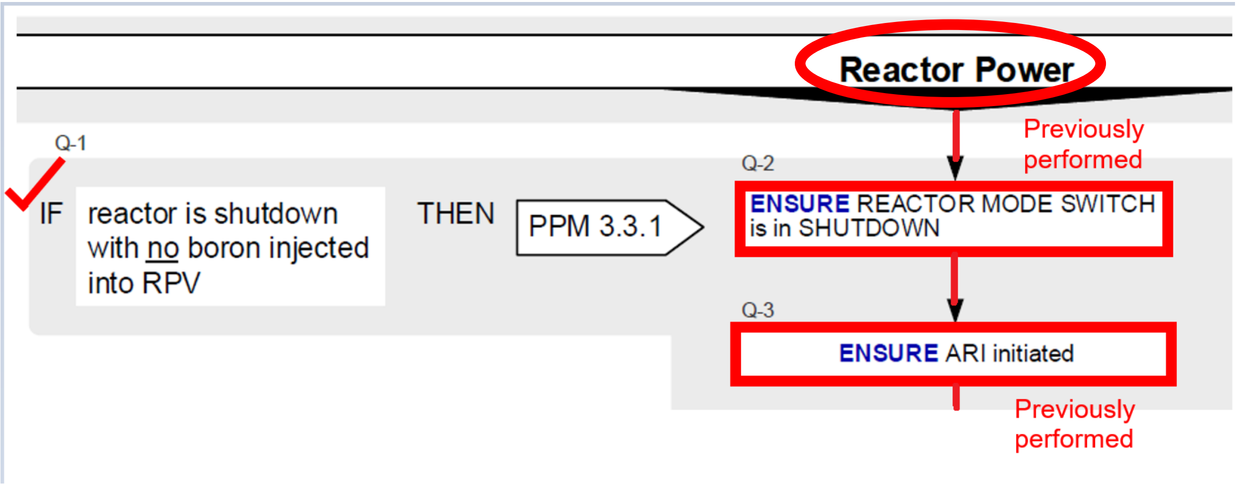
STEP #	Position	CREW RESPONSE
65.	ATC	Table A1 actions (from PPM 3.3.1 (Scram) QC) (cont): 3.1.2 IF in an ATWS GT 5% Reactor power, AND directed by the CRS, THEN **PERFORM** the following: **~~CAUTION~~** Rapid Injection may cause fuel damage. LL is -65". c. **ESTABLISH** and **MAINTAIN** RPV level -140" to -80". — Performs 3.1.4 **INSERT** IRMs and SRMs. — Performs

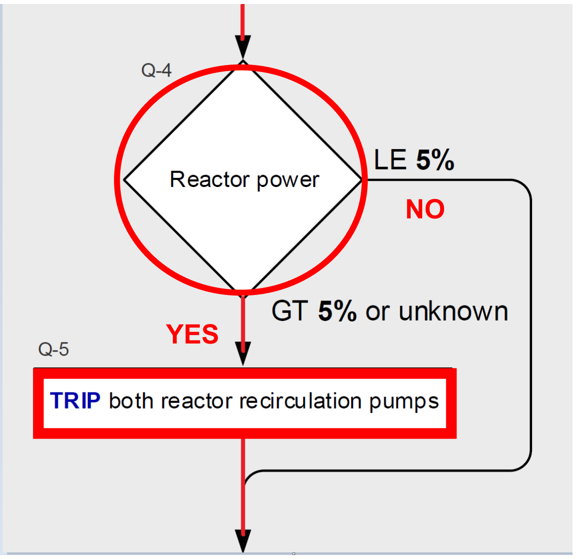
EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">EXAMINER NOTE: Step 3.2.2 below will not be performed until enough SLC has been injected to sufficiently reduce reactor power, all rods are inserted, the MSIVs close, or the Main Turbine trips .</td></tr>
<tr><td>66.</td><td>BOP</td><td>From PPM 3.3.1 (Scram) QC) (cont):
3.2.2 WHEN Main Generator output is LT 50 MWE,
THEN PERFORM the following:
a. VERIFY Main Turbine trips. Performs
2H b. IF Main Turbine is NOT tripped,
THEN SIMULTANEOUSLY DEPRESS both Emergency Trip pushbuttons (H13-P820). Trips automatically N/A
c. IF Main Generator has NOT tripped,
THEN DEPRESS Unit Emergency Trip pushbutton (H13-P800)
OR DEPRESS Unit Overall Trip pushbutton (H13-P800). N/A
d. VERIFY power transfers to TR-S. Performs
3.2.3 STABILIZE RPV Pressure 800 - 1050 psig, or as directed by the CRS. Performs</td></tr>
<tr><td>67.</td><td>CRS</td><td>Transitions to PPM 5.1.2 RPV Control - ATWS:

• RPV level below +13 in.
• RPV pressure above 1060 psig
• Drywell pressure above 1.68 psig
• Both:
a reactor scram is required
AND
reactor power is above 5% or cannot be determined

Previously performed
Perform Concurrently to Monitor and Control:</td></tr>
</table>

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
68.	CRS	Evaluates EOP overrides common to all PPM 5.1.2 Legs (none currently apply): 
69.	CRS	Enters PPM 5.1.2 Power Leg and evaluates EOP override (does not currently apply): 

<table>
<tr><th colspan="3">EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>70.</td><td>**CRS**</td><td>PPM 5.1.2 Power Leg (cont):
 </td></tr>
<tr><td colspan="3">**<u>EXAMINER NOTE</u>: Step Q-5 above may have already occurred automatically if RPV level has already been lowered below RPV Level 2 (-50 inches).**</td></tr>
<tr><td>71.</td><td>**ATC**</td><td>As directed, trips both RRC pumps by pressing the ASD LOOP A and ASD LOOP B STOP pushbuttons.</td></tr>
<tr><td colspan="3">**<u>EXAMINER NOTE</u>: Performing EOP step Q-5 above (before the ATC has had a chance to reduce level) may cause a level swell above ~54 inches resulting in a trip of both feed turbines and the Main Turbine. <u>If a trip occurs</u>, the level band will remain at -140 to -80 inches and the crew will then use one or more of the following options for RPV level control (once level lowers below +54 inches):**
• **Restart Reactor Feed Turbine (see page 35)**
• **Reduce pressure to 550 psig and feed with condensate booster pumps (see page 36)**
• **Inject with HPCS (see page 52)**
• **<u>ATC needs for credit</u> - Start RCIC (RCIC-V-13 fails to auto open) (see page 52)**</td></tr>
</table>

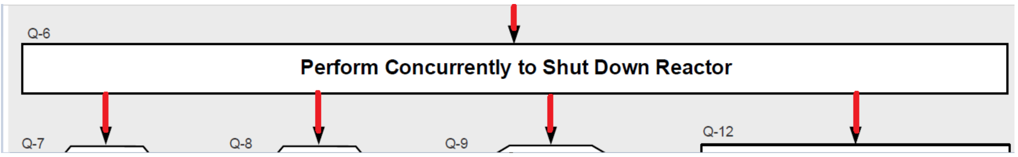
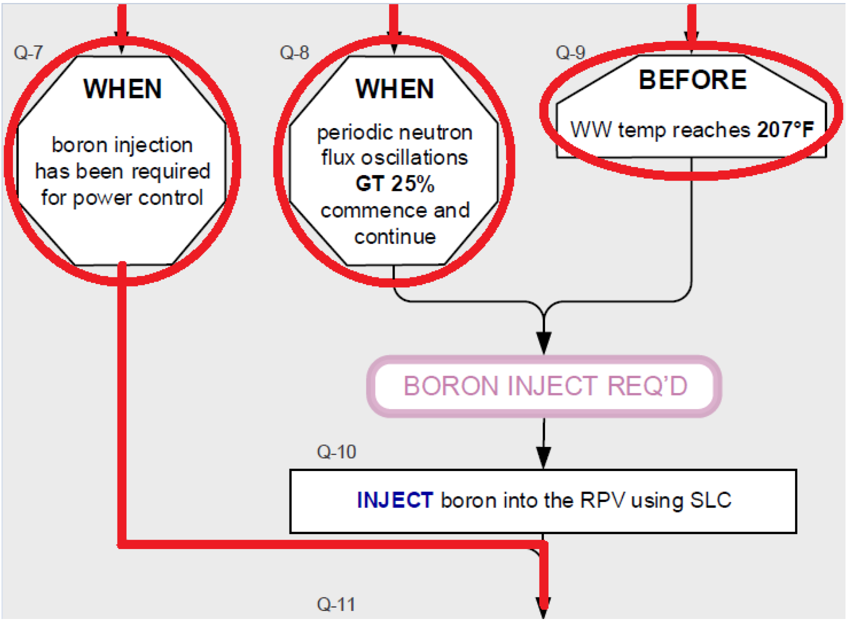
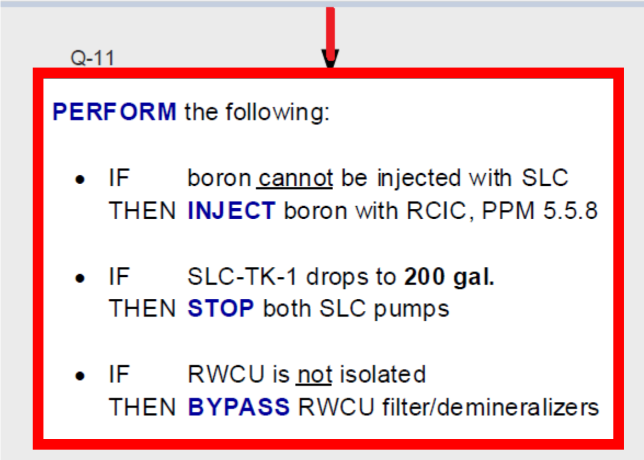
EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
EXAMINER NOTE: ATC will decide which feed pump (A or B) to re-start.		
72.	**ATC**	Restarting Reactor Feed Turbine per SOP-RFT-RESTART-QC ~~NOTE:~~ This procedure may be performed concurrently with SOP-RFW-FCV-QC Reactor Feed Pump A(B) Quick Restart 2.1.1 **VERIFY** MSIVs are **OPEN**. _____ 2.1.2 **VERIFY** at least two HIGH LEVEL SEAL INs are **RESET**. _____ 2.1.3 **VERIFY** RFW-P-1A(B) in MDVP mode at 0%. _____ 2.1.4 **PLACE** RFW-DT-1A(B) Emerg Trip/Reset switch to **RESET**. _____ 2.1.5 **VERIFY** RFW-P-1A(B) HP and LP stop valves indicate **FULL OPEN**. _____ 2.1.6 **PLACE** RFW-DT-1A(B) Emerg Trip/Reset to **NORMAL**. _____ 2.1.7 **VERIFY** RFW-V-112A and RFW-V-112B are **FULLY CLOSED** _____ Performs all steps ~~NOTE:~~ If the Main Turbine is tripped, the RFP Turbine will not roll until Main Steam is admitted at approximately 60% GV position. 2.1.8 **RAISE** restarted turbine speed as follows: • **RAISE** RFW-P-1A(B) GV position. _____ • **MONITOR** RFW-P-1A(B) speed as GV position increases. _____ 2.1.9 **TRANSFER** RFW-P-1A(B) to MDEM as soon as practical (GT 800 rpm) _____ 2.1.10 **VERIFY** Feedwater system lineup appropriate for plant conditions. _____ 2.1.11 **INDEPENDENTLY VERIFY** RFW-DT-1A(B) Emerg Trip/Reset in **NORMAL**. _____

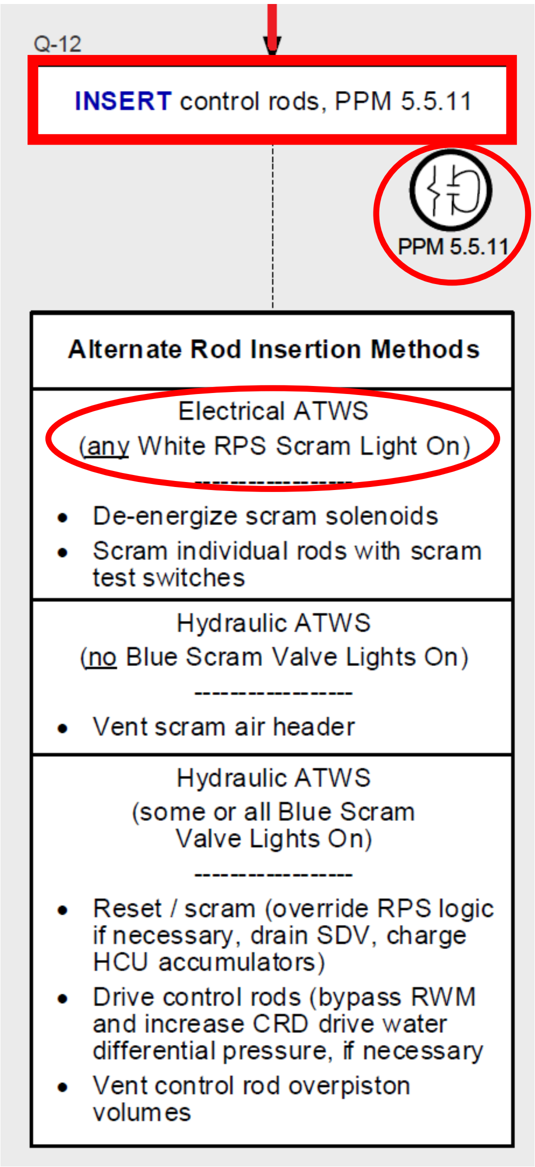
EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
73.	BOP	As directed, establishes new RPV pressure of 550 psig per SOP-DEH-QC: 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 953 psi. If a reactor pressure change is desired refer to ABN-PRESSURE. 2.1.1 Initiate Pressure setpoint change as follows (Turbine Start-Up) or (Main Display): a. **SELECT** PRESSURE TARGET. Performs b. **ENTER** desired pressure. 550 psig Performs c. **SELECT** OK. Performs 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. ____ These 3 sub-steps only performed if pressure rate not already at 50 psig/min e. **SELECT** GO. Performs f. **SELECT** YES. Performs g. **VERIFY** PRESS DEMAND and THROTTLE PRESS change at the PRESSURE RATE. Performs
74.	ATC	Per SOP-RFW-FCV-QC: 2.1.13 IF RFW-P-1A and RFW-P-1B are not in service, THEN **OPEN** COND-V-149. Performs This lines up for feeding with condensate booster pumps alone after above pressure reduction

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
75.	**CRS**	PPM 5.1.2 Power Leg (cont): 
76.	**CRS**	PPM 5.1.2 Power Leg (cont): 
77.	**CRS**	PPM 5.1.2 Power Leg (cont):  Q-11 **PERFORM** the following: - IF boron cannot be injected with SLC THEN **INJECT** boron with RCIC, PPM 5.5.8 - IF SLC-TK-1 drops to **200 gal.** THEN **STOP** both SLC pumps - IF RWCU is not isolated THEN **BYPASS** RWCU filter/demineralizers N/A – SLC Injecting N/A – Not reached during scenario N/A – RWCU isolated

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
78.	**CRS**	PPM 5.1.2 Power Leg (cont): CRS directs PPM 5.5.11 (Alternate Control Rod Insertions) for Electric ATWS  Q-12 **INSERT** control rods, PPM 5.5.11 PPM 5.5.11 **Alternate Rod Insertion Methods** Electrical ATWS (<u>any</u> White RPS Scram Light On) ----------------- • De-energize scram solenoids • Scram individual rods with scram test switches Hydraulic ATWS (<u>no</u> Blue Scram Valve Lights On) ----------------- • Vent scram air header Hydraulic ATWS (some or all Blue Scram Valve Lights On) ----------------- • Reset / scram (override RPS logic if necessary, drain SDV, charge HCU accumulators) • Drive control rods (bypass RWM and increase CRD drive water differential pressure, if necessary • Vent control rod overpiston volumes
79.	**BOP**	As directed, perfoms PPM 5.5.11 for Electric ATWS. Steps following

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

EXAMINER NOTE: In support of Critical Task #2, record time when PPM 5.5.11 commenced (see below).

When the operator has started place keeping in PPM 5.5.11 (Proceeding with the flow chart on page 5 of PPM 5.5.11) then the operator has "commenced performance".

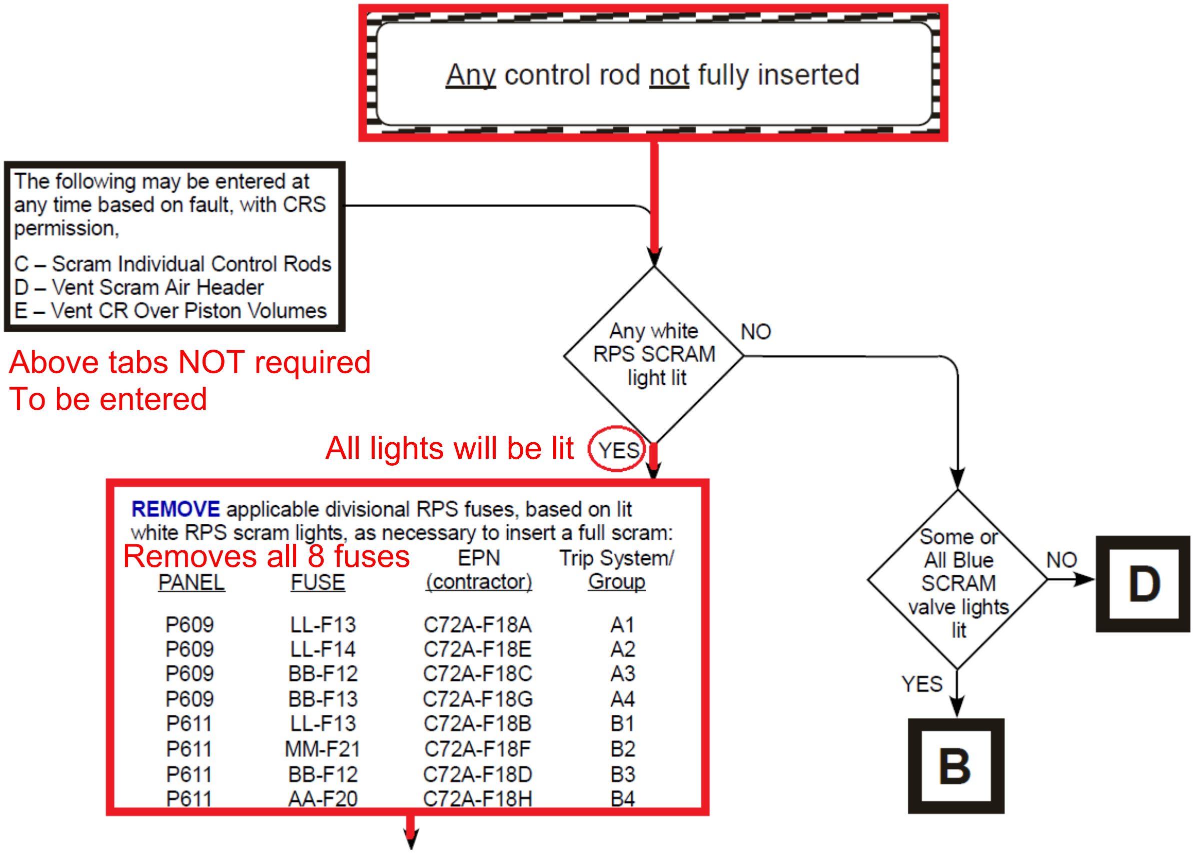
Time PPM 5.5.11 commenced: __________

EXAMINER NOTE: All 8 fuses below must be removed below for ALL control rods to insert. Each WHITE Scram Group Solenoid light de-energizes (as seen on P603) when its associated fuse is pulled. Removing all fuses de-energizes ALL 8 WHITE Scram Group Solenoid lights causing all rods to be inserted.

80.

BOP

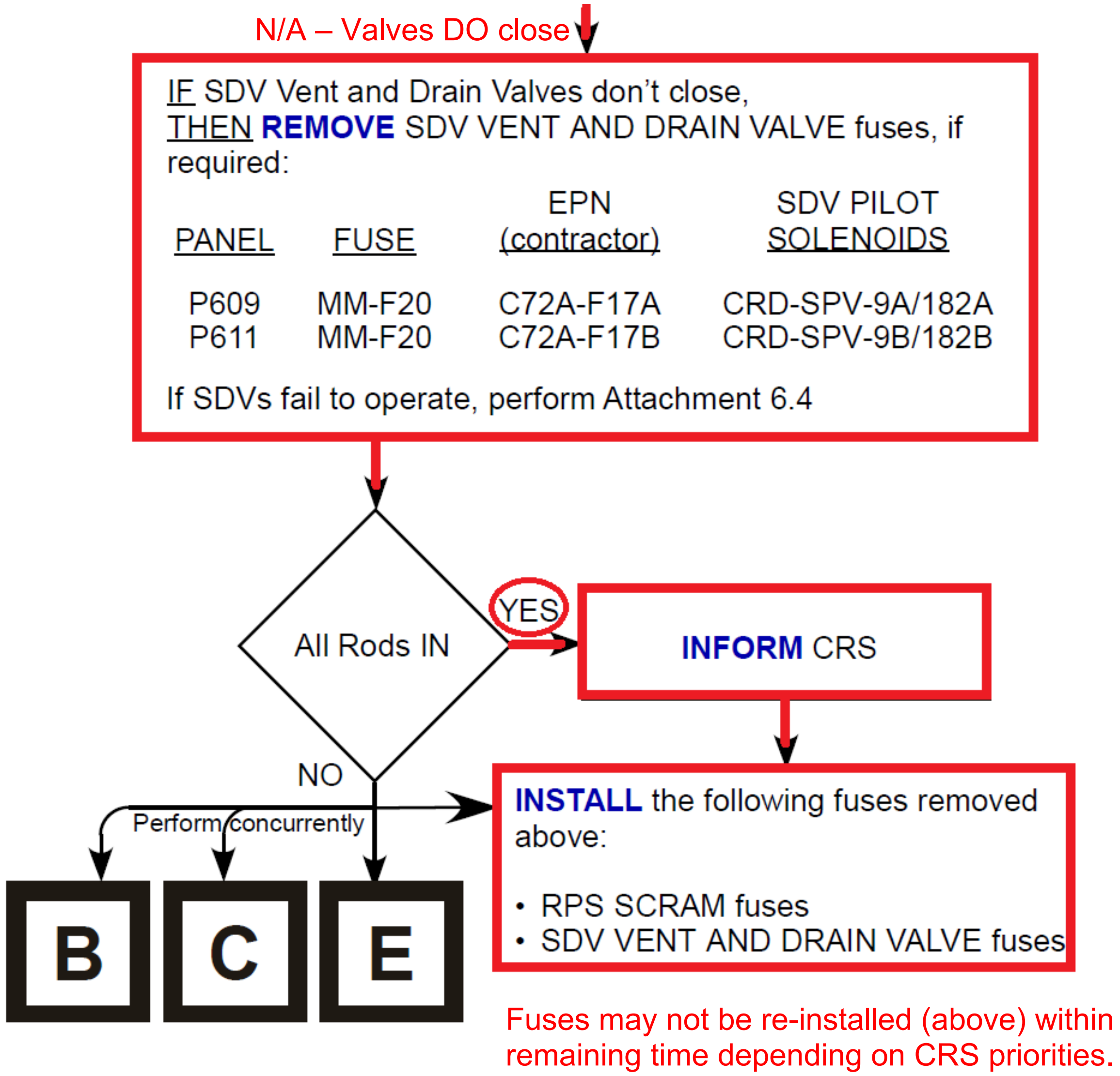
Refers to PPM 5.5.11 (page 5):



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

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
81.	**BOP**	PPM 5.5.11 (page 5) (cont):



N/A – Valves DO close

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

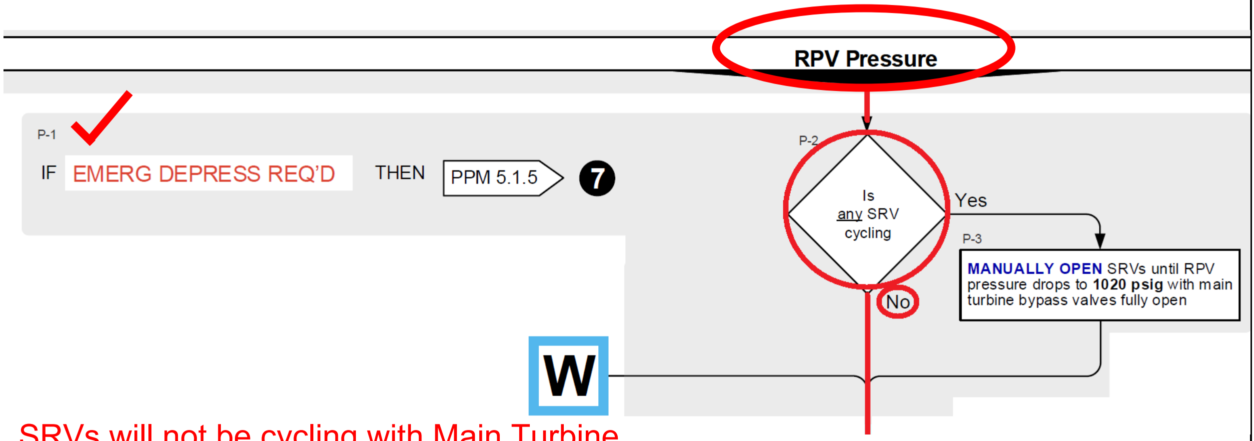
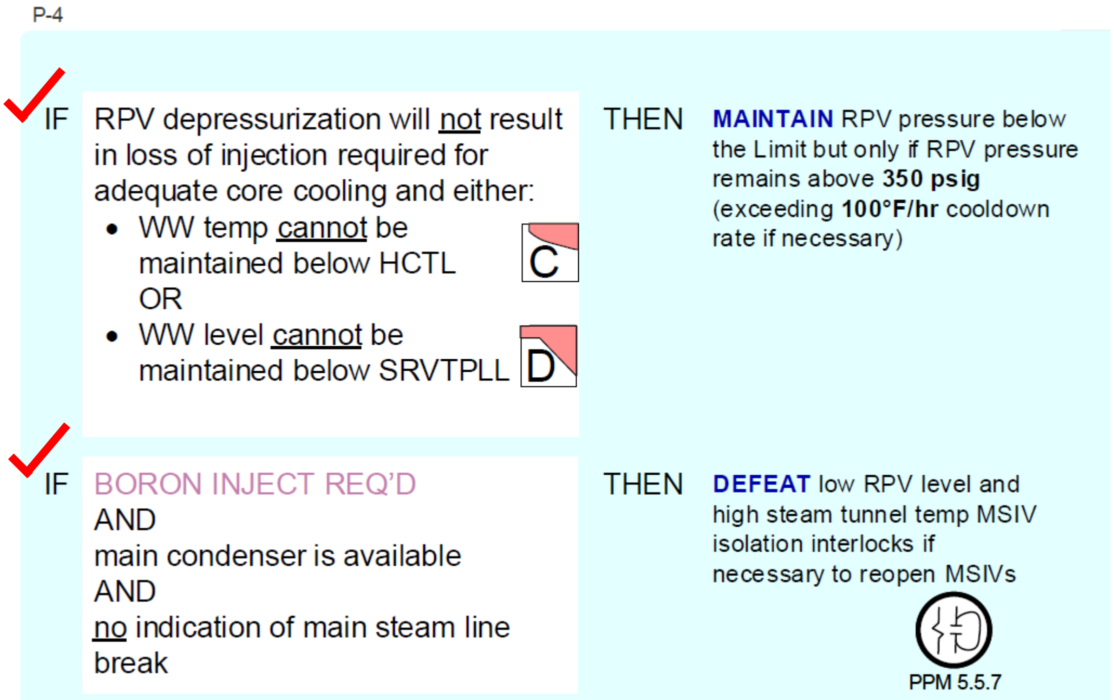
If SDVs fail to operate, perform Attachment 6.4

INSTALL the following fuses removed above:

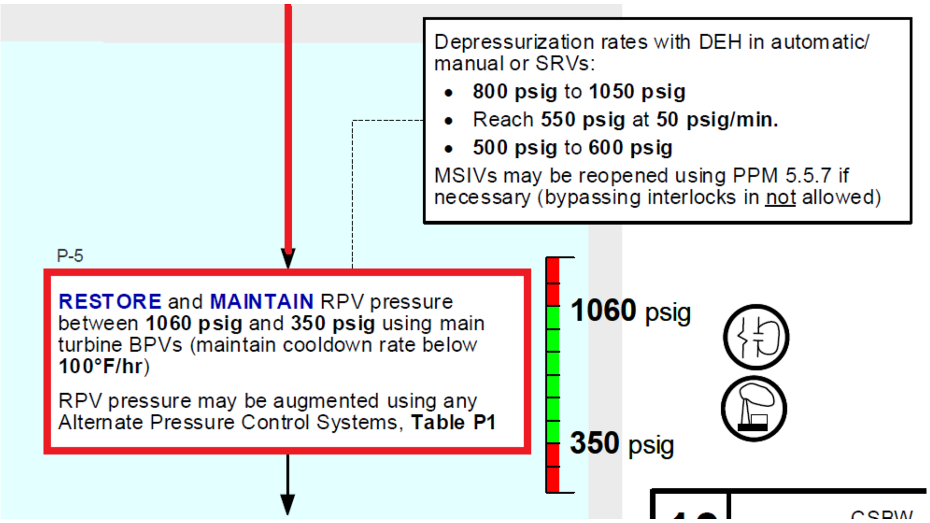
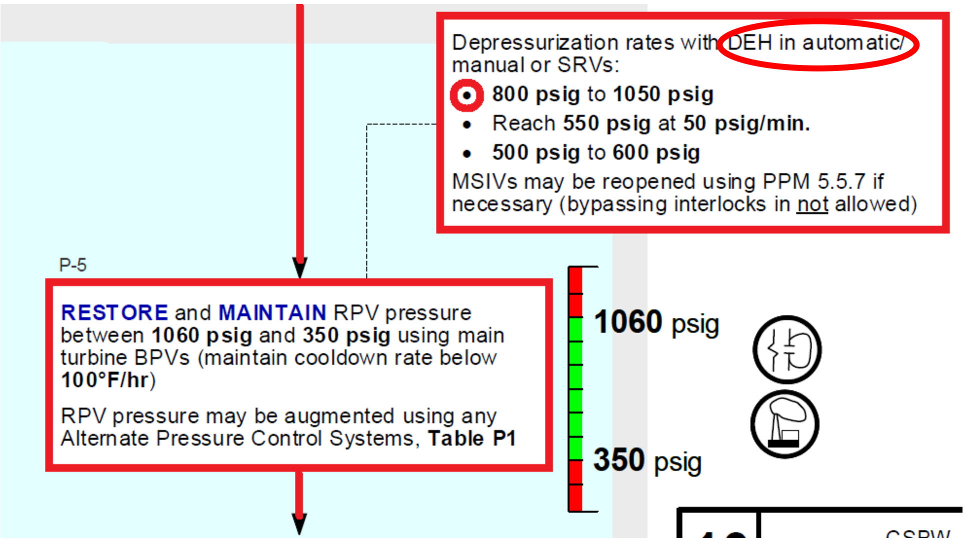
- RPS SCRAM fuses
- SDV VENT AND DRAIN VALVE fuses

Fuses may not be re-installed (above) within remaining time depending on CRS priorities.

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
82.	**CRS**	Enters PPM 5.1.2 Pressure Leg and evaluates EOP override (does not currently apply):  SRVs will not be cycling with Main Turbine initially remaining online
83.	**CRS**	PPM 5.1.2 Pressure Leg (cont): Evaluates EOP override (do not currently apply):  P-4 ✓ IF RPV depressurization will not result in loss of injection required for adequate core cooling and either: • WW temp cannot be maintained below HCTL C OR • WW level cannot be maintained below SRVTPLL D THEN **MAINTAIN** RPV pressure below the Limit but only if RPV pressure remains above **350 psig** (exceeding **100°F/hr** cooldown rate if necessary) ✓ IF BORON INJECT REQ'D AND main condenser is available AND no indication of main steam line break THEN **DEFEAT** low RPV level and high steam tunnel temp MSIV isolation interlocks if necessary to reopen MSIVs MSIVs will remain open while in PPM 5.1.2.

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: With the Main Turbine still online (and Bypass Valves closed) at this point with DEH in Auto, the CRS should delay issuing a new RPV pressure band until the Main Turbine trips. (see before and after Main Turbine trip below)</td></tr>
<tr><td>84.</td><td>CRS</td><td>PPM 5.1.2 Pressure Leg (cont):
EOP marked up to point of waiting on Main Turbine trip (see P-5 below).

Depressurization rates with DEH in automatic/ manual or SRVs:
- 800 psig to 1050 psig
- Reach 550 psig at 50 psig/min.
- 500 psig to 600 psig
MSIVs may be reopened using PPM 5.5.7 if necessary (bypassing interlocks in <u>not</u> allowed)
P-5
RESTORE and MAINTAIN RPV pressure between 1060 psig and 350 psig using main turbine BPVs (maintain cooldown rate below 100°F/hr)
RPV pressure may be augmented using any Alternate Pressure Control Systems, Table P1
 </td></tr>
<tr><td>85.</td><td>CRS</td><td>PPM 5.1.2 Pressure Leg (cont):
Directs RPV pressure band of 800 to 1050 psig with DEH in automatic (per OI-15).

Depressurization rates with DEH in automatic/ manual or SRVs:
- [✓ 800 psig to 1050 psig]
- Reach 550 psig at 50 psig/min.
- 500 psig to 600 psig
MSIVs may be reopened using PPM 5.5.7 if necessary (bypassing interlocks in <u>not</u> allowed)
P-5
RESTORE and MAINTAIN RPV pressure between 1060 psig and 350 psig using main turbine BPVs (maintain cooldown rate below 100°F/hr)
RPV pressure may be augmented using any Alternate Pressure Control Systems, Table P1
 </td></tr>
</table>

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

EXAMINER NOTE: Once directed to establish RPV pressure band from 800 to 1050 psig with DEH in Auto, and with the Main Turbine tripped, the BOP MAY adjust the DEH PRESSURE TARGET setpoint (on DEH display) to 800 psig as follows (to maximize Bypass Valve usage). Otherwise, no change will be made since DEH controlling in desired band.

86. **BOP**

As directed, establishes new RPV presure band per SOP-DEH-QC:

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 953 psi. If a reactor pressure change is desired refer to ABN-PRESSURE.

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

a. **SELECT** PRESSURE TARGET. Performs

b. **ENTER** desired pressure. 800 psig Performs

c. **SELECT** OK. Performs

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. _____

These 3 sub-steps only performed if pressure rate not already at 50 psig/min

e. **SELECT** GO. Performs

f. **SELECT** YES. Performs

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

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	CREW RESPONSE

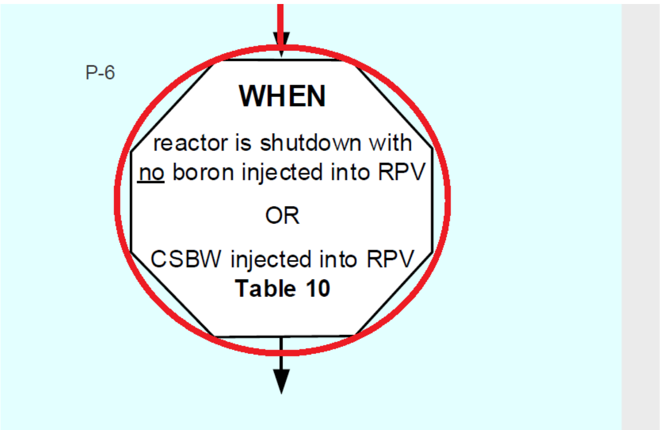
OPERATOR ACTIVITIES

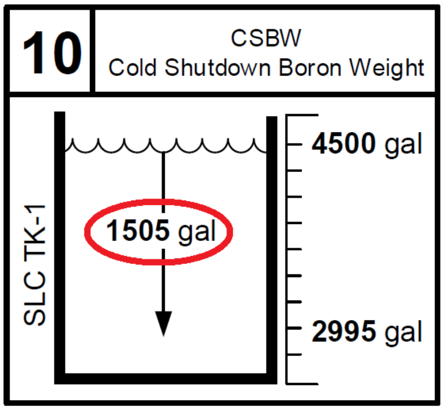
EXAMINER NOTE: Whether or not Cold Shutdown Boron Weight (CSBW) is achieved depends on the amount of time needed to insert all control rods (part of the transition after all rods are inserted includes securing SLC injection).

87. **CRS**

PPM 5.1.2 Pressure Leg (cont):

Issues key parameter for CSBW (Table 10 below) and waits for below condition to be met.



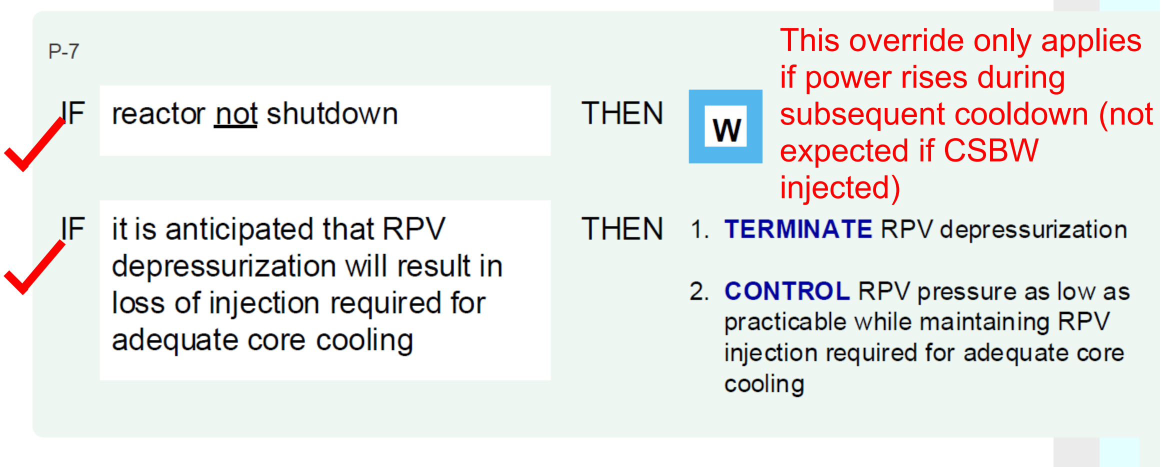


EXAMINER NOTE: Below assumes CSBW injected before proceeding on through flowchart.

88. **CRS**

PPM 5.1.2 Pressure Leg (cont):

Evaluates EOP overrides (do not currently apply):



P-7

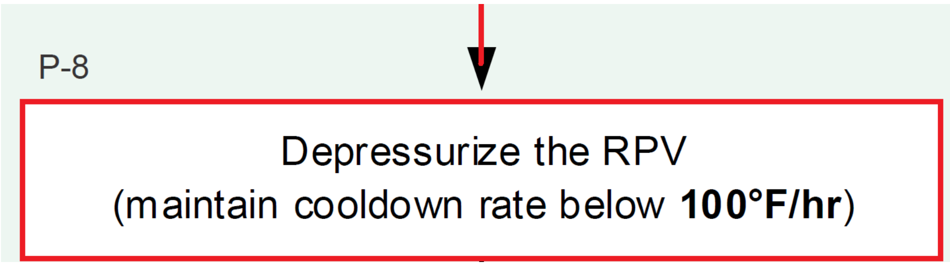
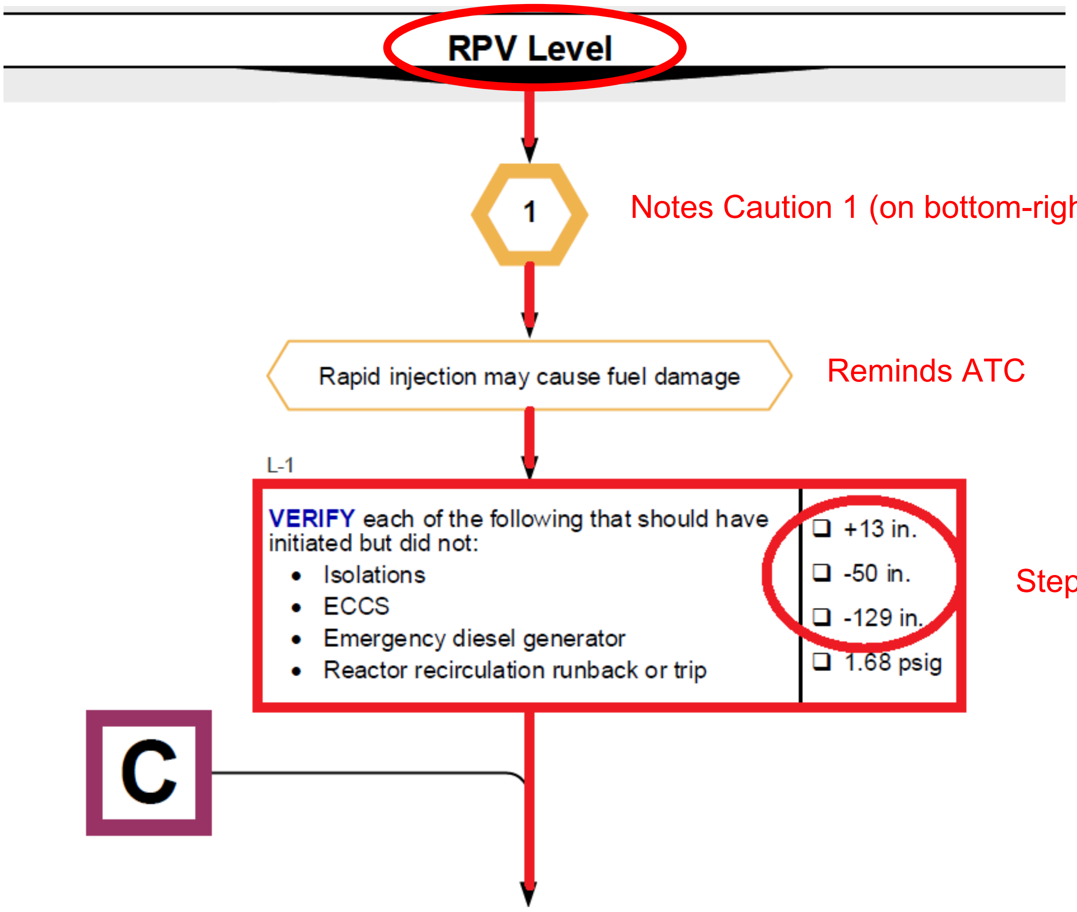
✓ IF reactor not shutdown THEN W

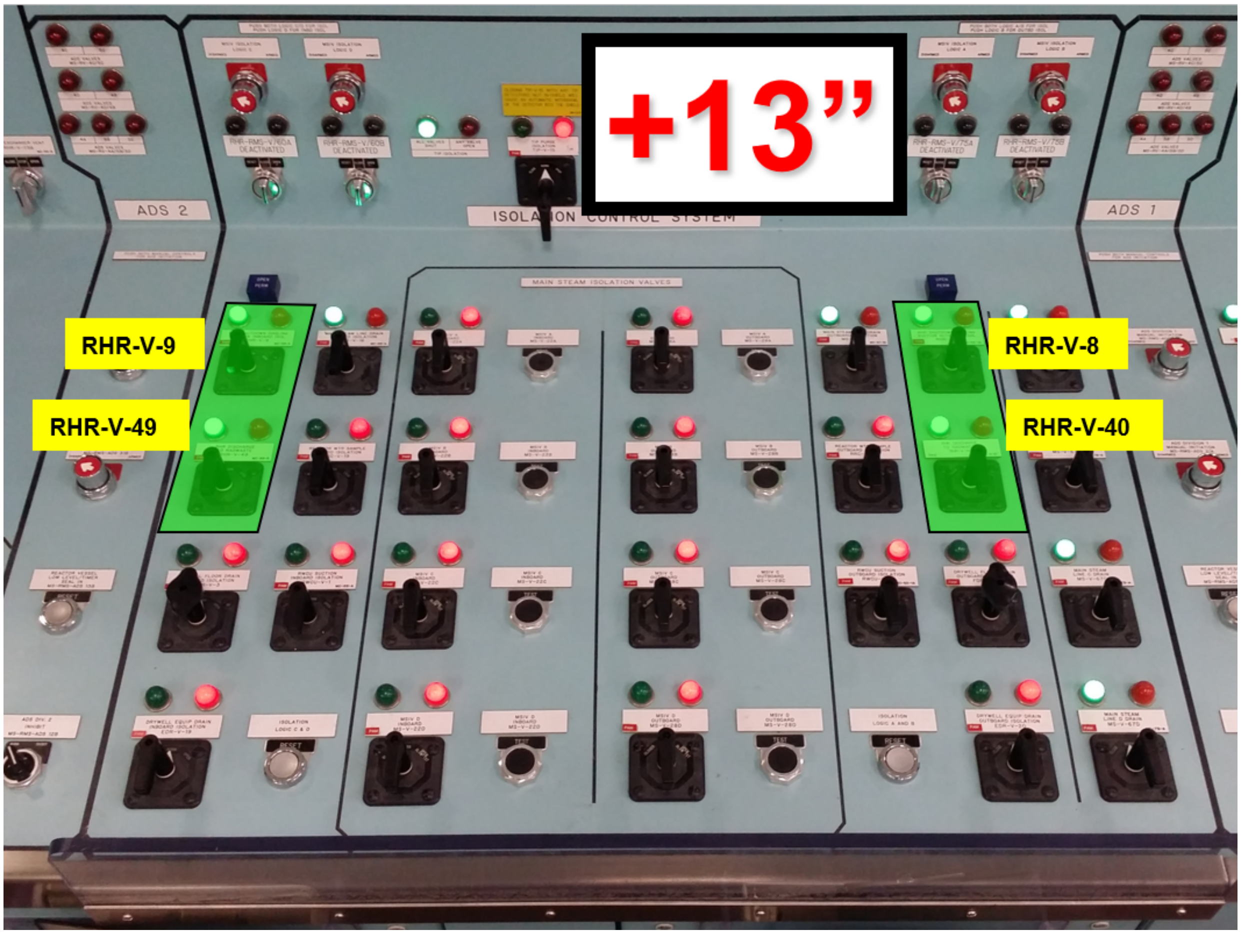
This override only applies if power rises during subsequent cooldown (not expected if CSBW injected)

✓ IF it is anticipated that RPV depressurization will result in loss of injection required for adequate core cooling THEN

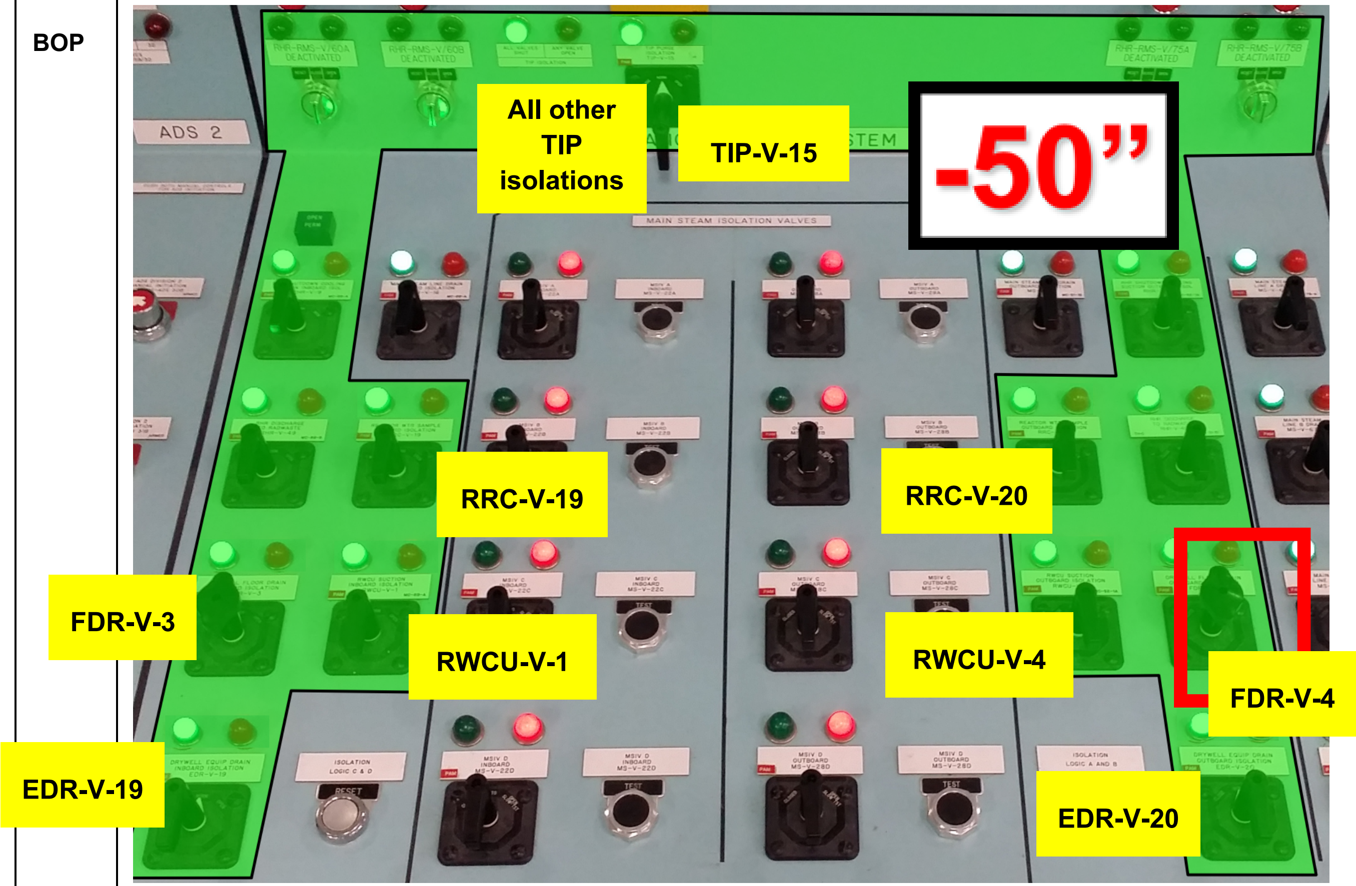
1. **TERMINATE** RPV depressurization
2. **CONTROL** RPV pressure as low as practicable while maintaining RPV injection required for adequate core cooling

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

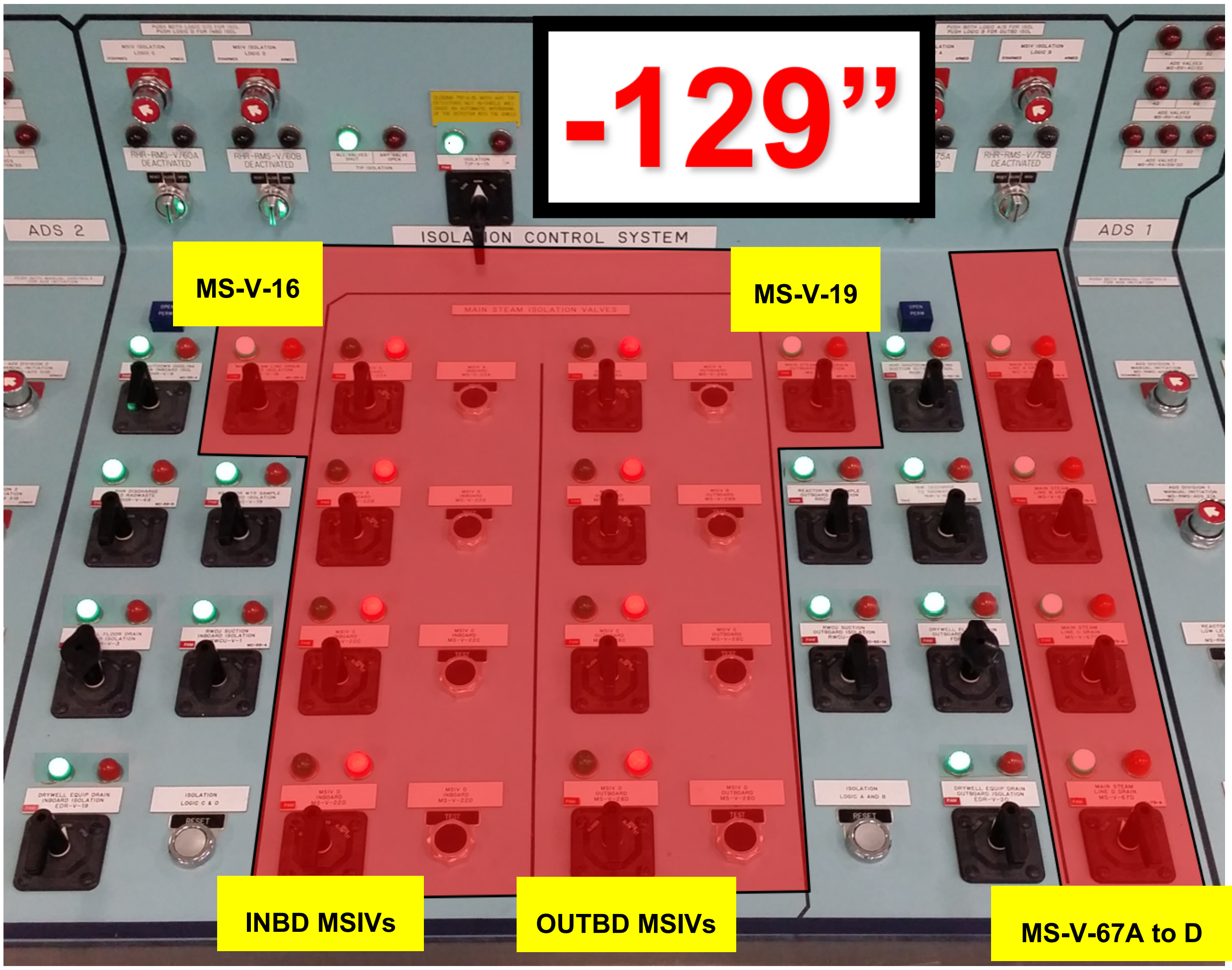
STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
EXAMINER NOTE: Although the next flowchart step, it is not expected (within scenario time allotted) for CRS to commence a cooldown per P-8 below.		
89.	**CRS**	PPM 5.1.2 Pressure Leg (cont): 
90.	**CRS**	Enters PPM 5.1.2 Level Leg: Directs BOP to verify isolations and actuations based on intentionally lowering level.  Notes Caution 1 (on bottom-right of chart) Reminds ATC Steps following

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS		
STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
EXAMINER NOTE: May also use GDS for valve verification.		
91.	BOP	Verifies RPV Level 3 (+13 in.) actuations: 

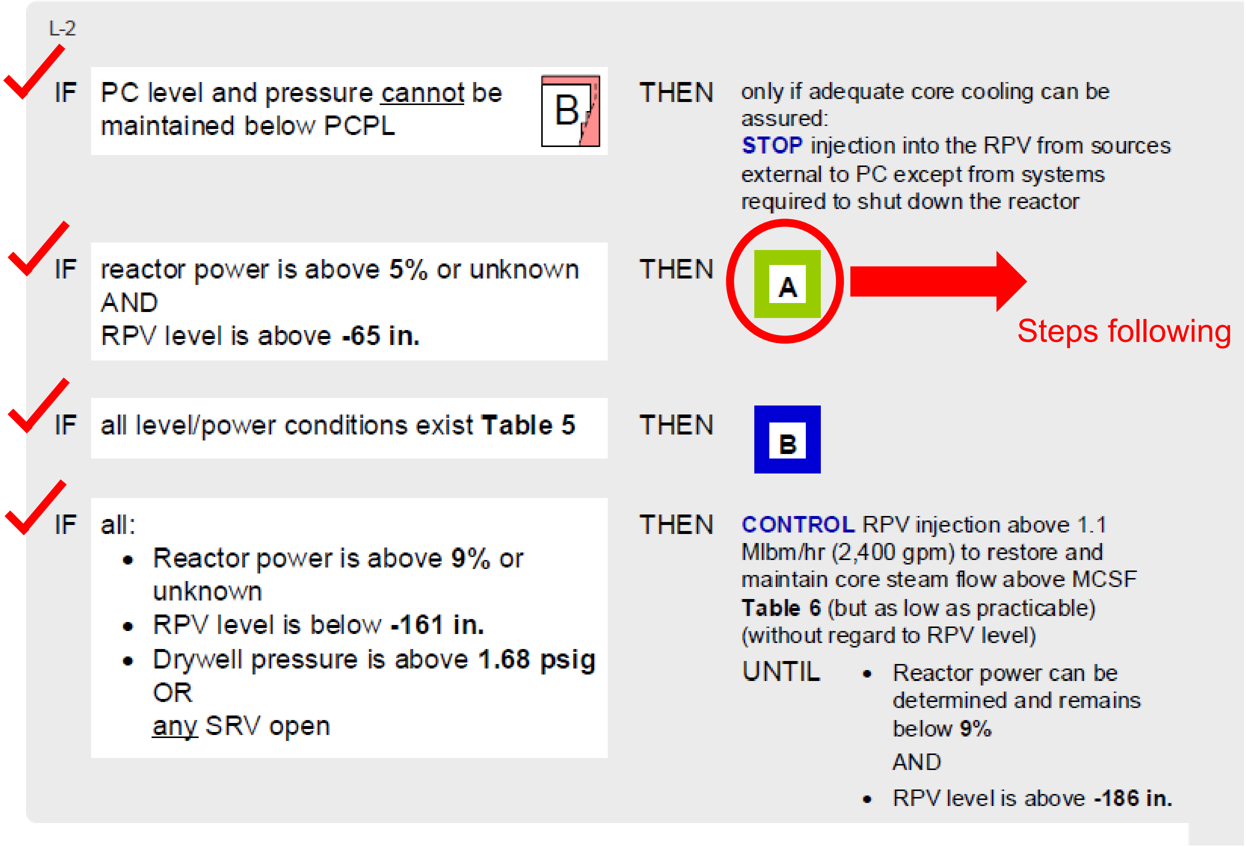
EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
EXAMINER NOTE: Additional valve isolations to verify at -50 inches. FDR-V-4 (red outline) fails to auto close and must be manually closed.		
92.	**BOP**	Verifies RPV Level 2 (-50 in.) actuations: 
93.	**BOP**	System status checks at RPV Level 2 (-50 in.): • HPCS-P-1starts • HPCS-P-2 starts • HPCS DG starts • RCIC starts (unless RCIC-V-1 still closed) • RRC Pumps Trip • CW Pumps B & C trip • RCC Pumps trip

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	CREW RESPONSE
		OPERATOR ACTIVITIES
EXAMINER NOTE: Additional valve isolations to verify at -129 inches. The inboard (INBD) and outboard (OUTBD) MSIVs remain open due to overriding closure per EOPs.		
94.	**BOP**	Verifies RPV Level 1 (-129 in.) actuations: 
95.	**BOP**	System status checks at RPV Level 1 (-129 in.): • LPCS-P-1 starts • RHR-P-2A starts • RHR-P-2B starts • RHR-P-2C starts • Div. 1 & 2 SW systems start

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
EXAMINER NOTE: If reactor power is still above 5% with RPV level above -65 inches when the CRS reaches the below EOP step, then it is expected that the 2nd override below would be exercised, otherwise skip next page.		
96.	**CRS**	PPM 5.1.2 Level Leg (cont): Evaluates EOP overrides (2nd may apply – See Examiner Note):



L-2

✓ IF PC level and pressure cannot be maintained below PCPL **B** THEN only if adequate core cooling can be assured: **STOP** injection into the RPV from sources external to PC except from systems required to shut down the reactor

✓ IF reactor power is above 5% or unknown AND RPV level is above **-65 in.** THEN **A**

Steps following

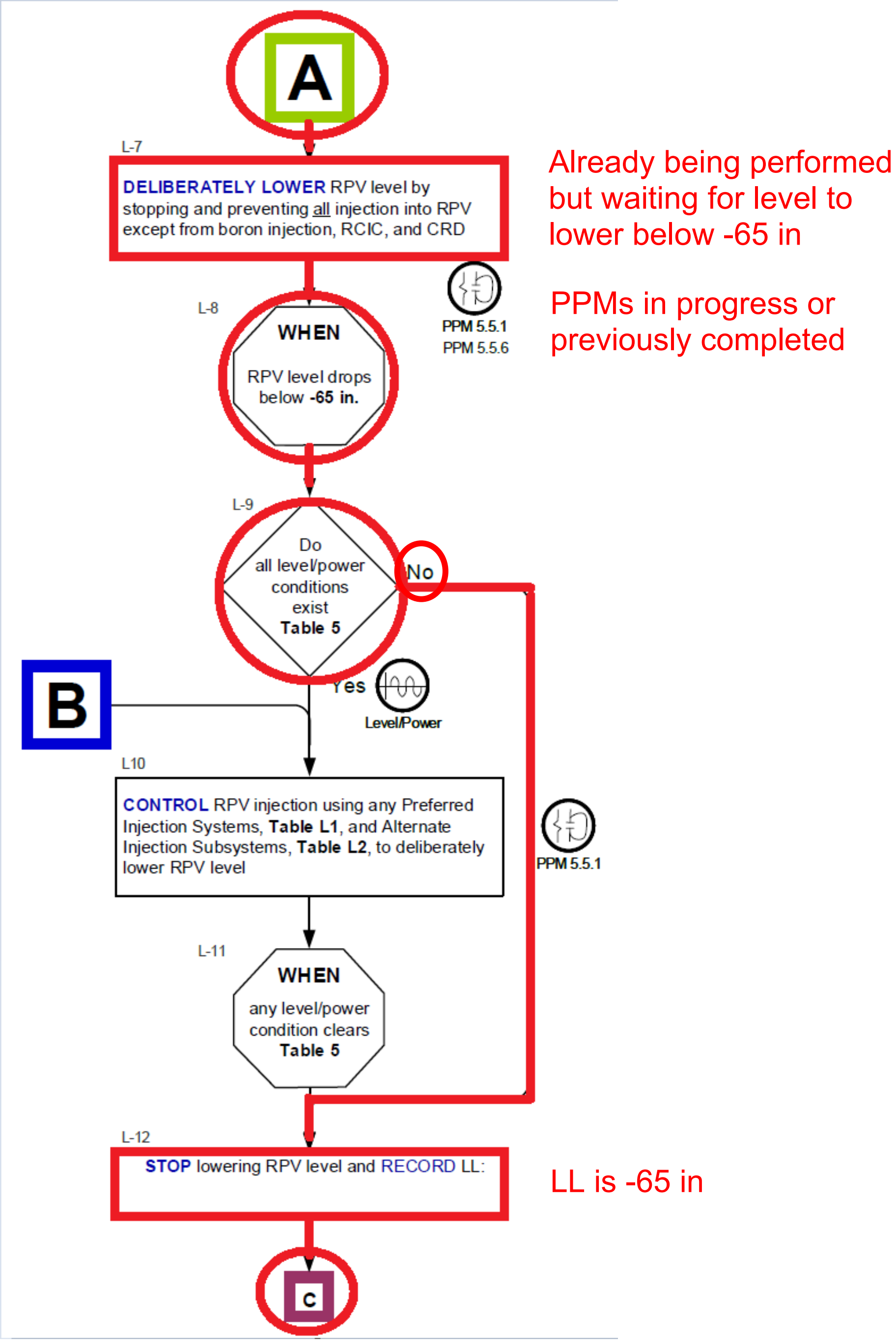
✓ IF all level/power conditions exist **Table 5** THEN **B**

✓ IF all:
- Reactor power is above **9%** or unknown
- RPV level is below **-161 in.**
- Drywell pressure is above **1.68 psig** OR any SRV open

THEN **CONTROL** RPV injection above 1.1 Mlbm/hr (2,400 gpm) to restore and maintain core steam flow above MCSF **Table 6** (but as low as practicable) (without regard to RPV level)

UNTIL
- Reactor power can be determined and remains below **9%** AND
- RPV level is above **-186 in.**

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE
97.	**CRS**	PPM 5.1.2 Level Leg (cont): Executes override (see previous page).  Already being performed but waiting for level to lower below -65 in PPMs in progress or previously completed LL is -65 in

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE

EXAMINER NOTE: The CRS has feedwater, HPCS, and (once the Main Turbine trips) RCIC available as the primary injection sources (per EOP Table L1).

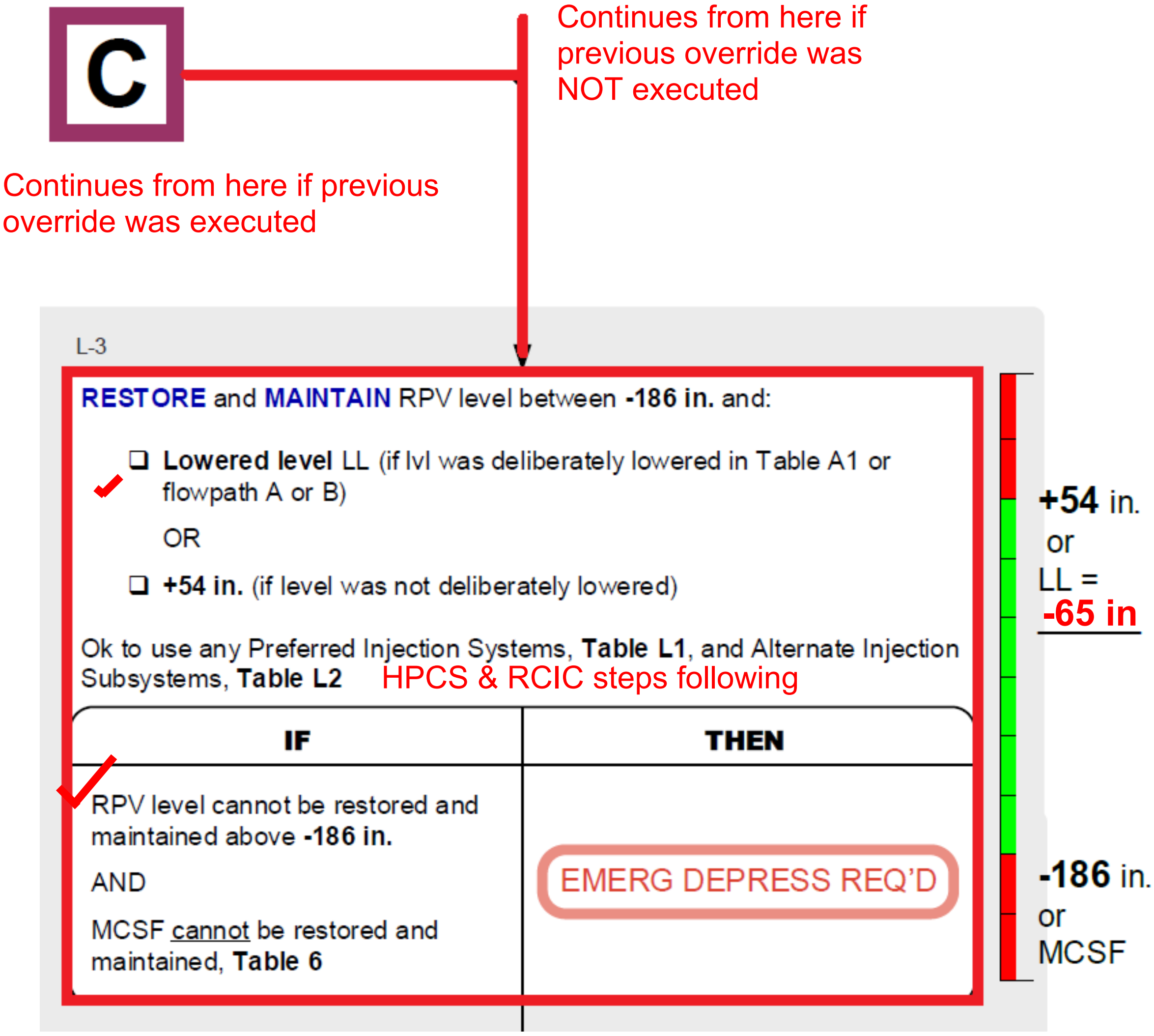
Ensure the ATC operator performs the RCIC steps (needed for scenario credit) if CRS decides to use RCIC (see next page [lower half]).

98.

CRS

PPM 5.1.2 Level Leg (cont):

Notes LL of -65 in and evaluates IF-THEN statement (not met).



Continues from here if previous override was NOT executed

Continues from here if previous override was executed

L-3

RESTORE and **MAINTAIN** RPV level between **-186 in.** and:

✓ ☐ **Lowered level** LL (if lvl was deliberately lowered in Table A1 or flowpath A or B)

OR

☐ **+54 in.** (if level was not deliberately lowered)

Ok to use any Preferred Injection Systems, **Table L1**, and Alternate Injection Subsystems, **Table L2** HPCS & RCIC steps following

IF	THEN
✓ RPV level cannot be restored and maintained above **-186 in.** AND MCSF cannot be restored and maintained, **Table 6**	EMERG DEPRESS REQ'D

+54 in.
or
LL =
-65 in

-186 in.
or
MCSF

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

OPERATOR ACTIVITIES

STEP #	Position	CREW RESPONSE

EXAMINER NOTE: Since PPM 5.5.1 (which throttles and prevents auto-opening of ECCS injection valves) was previously performed, steps 2.4 & 2.5 (below) requires manual opening of injection valve by holding switch to OPEN to establish an injection flowrate. Holding switch to CLOSE is required to fully close the valve.

99. **BOP**

When **HPCS** used for injection per SOP-HPCS-INJECTION-QC:

> **CAUTION**
>
> To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with HPCS-V-12 (Minimum Flow) as its only discharge path. {C-9448}

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. _____

Performs all steps

EXAMINER NOTE: ATC needs to operate RCIC for "credit". May have to prompt the CRS.

100. **ATC**

When **RCIC** used for injection per SOP-RCIC-INJECTION-QC:

Re-opens RCIC-V-1 (closed earlier) then performs the following:

2.1 RCIC RPV Injection During EOPs or Following a Scram

2.1.1 IF NOT already operating,
THEN **PERFORM** the following:

a. **VERIFY** the RCIC MANUAL INITIATION pushbutton is ARMED. _____

b. **DEPRESS** the RCIC MANUAL INITIATION pushbutton. _____

Performs all steps

> NOTE When RCIC initiates the following occurs:
> - RCIC-V-45 opens (Steam to Turbine).
> - RCIC-V-46 opens (Lube Oil Cooler Water Supply).
> - RCIC-P-2 starts (Barometric Condsr Vacuum Pump).
> - RCIC-V-13 opens (RPV Injection).
> - RCIC-V-25 and RCIC-V-26 close.
>   (Steam Line Warmup Drains to Main Condenser).
> - RCIC-V-4 and RCIC-V-5 close (Cond Pump Discharge to EDR).
> - SW-P-1B starts (20 second time delay).

Recognizes RCIC-V-13 failed to auto open and opens it (see Event 8 [page 65])

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

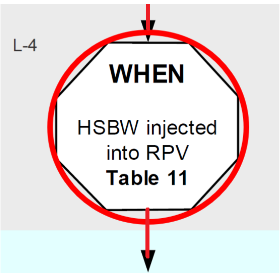
<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">

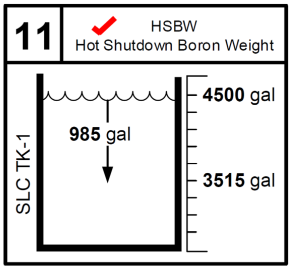
EXAMINER NOTE: **The CRS will be waiting for HSBW to be injected before proceeding to step L-5 below. If the crew can get all control rods inserted before HSBW has been injected and when the CRS transitions back to PPM 5.1.1, the below steps (and subsequent ATWS actions) will no longer apply.**

</td></tr>
<tr><td>101.</td><td>**CRS**</td><td>

PPM 5.1.2 Level Leg (cont):

Issues key parameter for HSBW

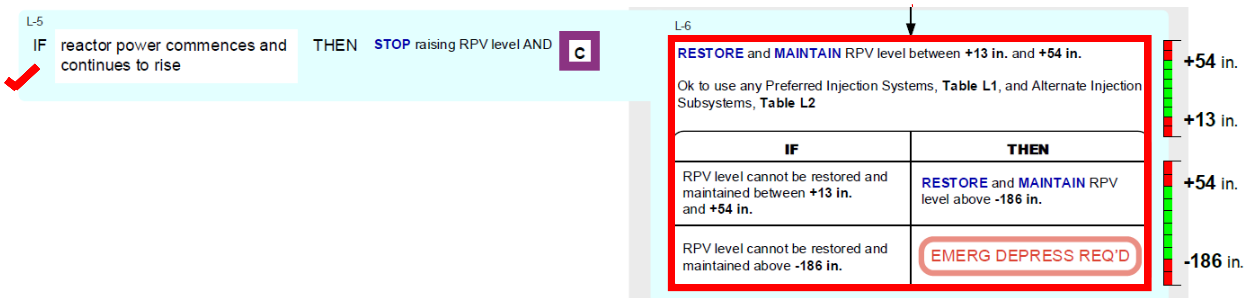




</td></tr>
<tr><td>102.</td><td>**CRS**</td><td>

PPM 5.1.2 Level Leg (cont):

Issues key parameter for power rise and directs new RPV level band of +13 to +54 in



L-5

IF reactor power commences and continues to rise THEN **STOP** raising RPV level AND **C**

L-6

RESTORE and **MAINTAIN** RPV level between **+13 in.** and **+54 in.**

Ok to use any Preferred Injection Systems, **Table L1**, and Alternate Injection Subsystems, **Table L2**

IF / **THEN**

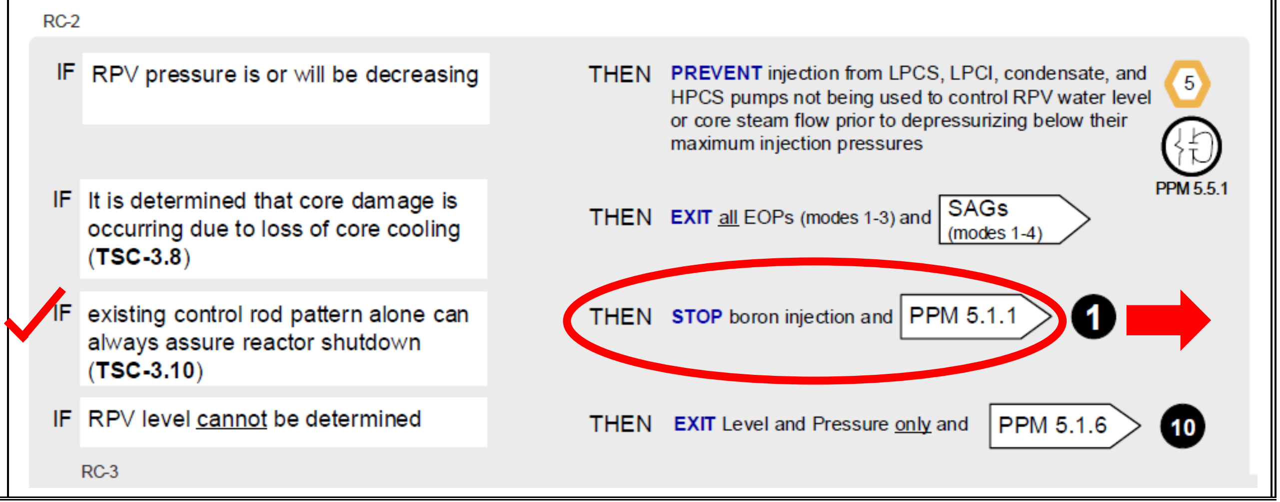
RPV level cannot be restored and maintained between **+13 in.** and **+54 in.** / **RESTORE** and **MAINTAIN** RPV level above **-186 in.**

RPV level cannot be restored and maintained above **-186 in.** / EMERG DEPRESS REQ'D

</td></tr>
</table>

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

ST EP	OPERATOR ACTIVITIES

	Position	CREW RESPONSE
103.	**CRS**	When report received that all control rods are in (based on RPS fuse removal), CRS evaluates PPM 5.1.2 override: - Directs Boron injection secured - Updates crew and transition from PPM 5.1.2 back to PPM 5.1.1  RC-2 IF RPV pressure is or will be decreasing THEN **PREVENT** injection from LPCS, LPCI, condensate, and HPCS pumps not being used to control RPV water level or core steam flow prior to depressurizing below their maximum injection pressures 5 PPM 5.5.1 IF It is determined that core damage is occurring due to loss of core cooling (**TSC-3.8**) THEN **EXIT** all EOPs (modes 1-3) and SAGs (modes 1-4) ✓ IF existing control rod pattern alone can always assure reactor shutdown (**TSC-3.10**) THEN **STOP** boron injection and PPM 5.1.1 ① IF RPV level cannot be determined THEN **EXIT** Level and Pressure only and PPM 5.1.6 10 RC-3

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS		
STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**

EXAMINER NOTE: WW Temp (Wetwell Temperature) Leg will only be entered when/if WW temperature reaches 90°F (Entry Condition)

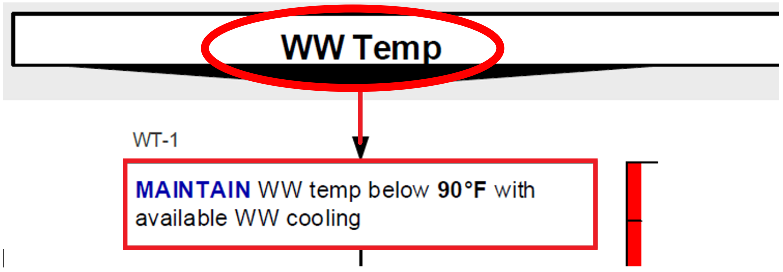
104.

CRS

PPM 5.2.1 WW Temp Leg:

Enters PPM 5.2.1 on high Wetwell temperature of 90°F (as necessary)

Directs BOP to place RHR system in Suppression Pool Cooling

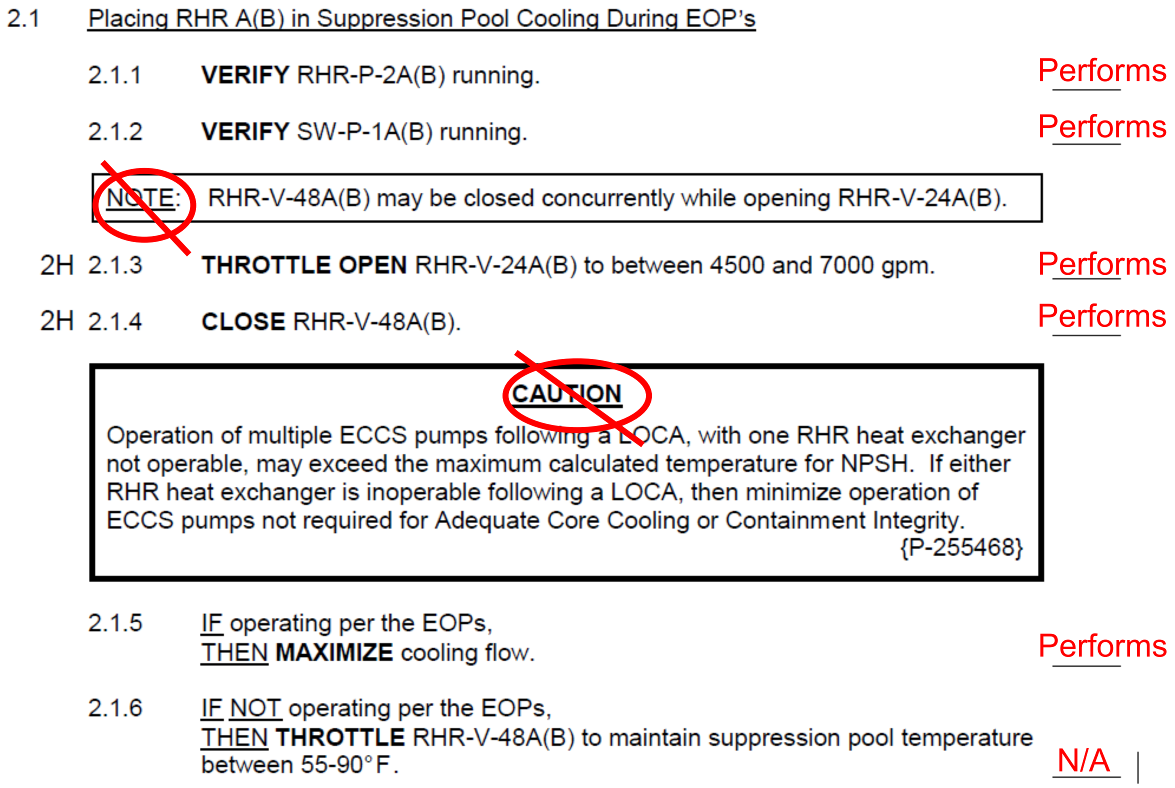


MAINTAIN WW temp below **90°F** with available WW cooling

105.

BOP

Places RHR-SYS-A(B) in Suppression Pool Cooling per SOP-RHR-SPC-QC:



2.1 Placing RHR A(B) in Suppression Pool Cooling During EOP's

2.1.1 **VERIFY** RHR-P-2A(B) running. Performs

2.1.2 **VERIFY** SW-P-1A(B) running. Performs

NOTE: RHR-V-48A(B) may be closed concurrently while opening RHR-V-24A(B).

2H 2.1.3 **THROTTLE OPEN** RHR-V-24A(B) to between 4500 and 7000 gpm. Performs

2H 2.1.4 **CLOSE** RHR-V-48A(B). Performs

CAUTION

Operation of multiple ECCS pumps following a LOCA, with one RHR heat exchanger not operable, may exceed the maximum calculated temperature for NPSH. If either RHR heat exchanger is inoperable following a LOCA, then minimize operation of ECCS pumps not required for Adequate Core Cooling or Containment Integrity. {P-255468}

2.1.5 IF operating per the EOPs,
THEN **MAXIMIZE** cooling flow. Performs

2.1.6 IF NOT operating per the EOPs,
THEN **THROTTLE** RHR-V-48A(B) to maintain suppression pool temperature between 55-90°F. N/A

EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE

EXAMINER NOTE: WW Level (Wetwell Level) Leg will only be entered when/if WW level reaches + 2 inches. (Entry Condition)

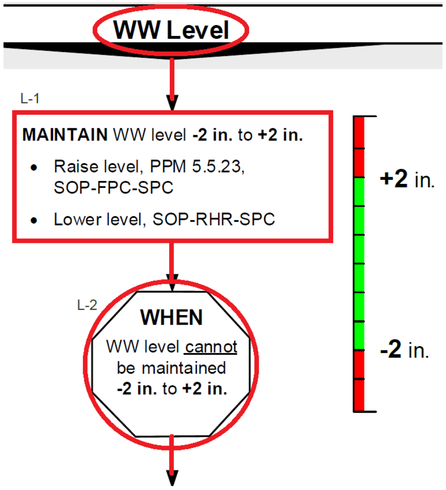
EXAMINER NOTE: Although the CRS may direct the BOP to lower Wetwell level per SOP-RHR-SPC, it is not anticipated that the task be completed in the time allotted. (no BOP actions specified)

106.

CRS

PPM 5.2.1 WW Level Leg:

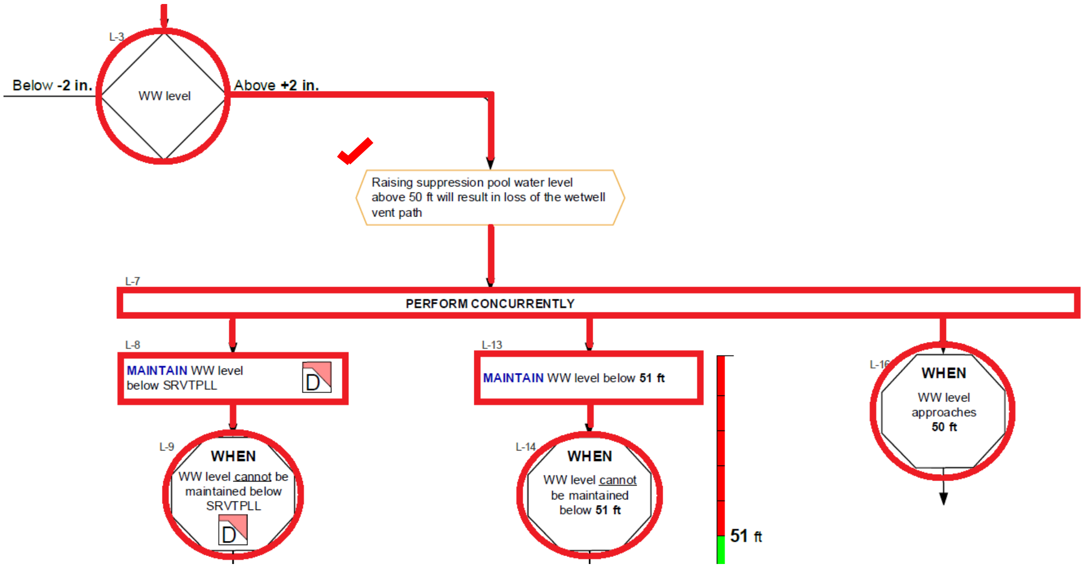
Enters PPM 5.2.1 on high Wetwell level of + 2 inches (as necessary)



107.

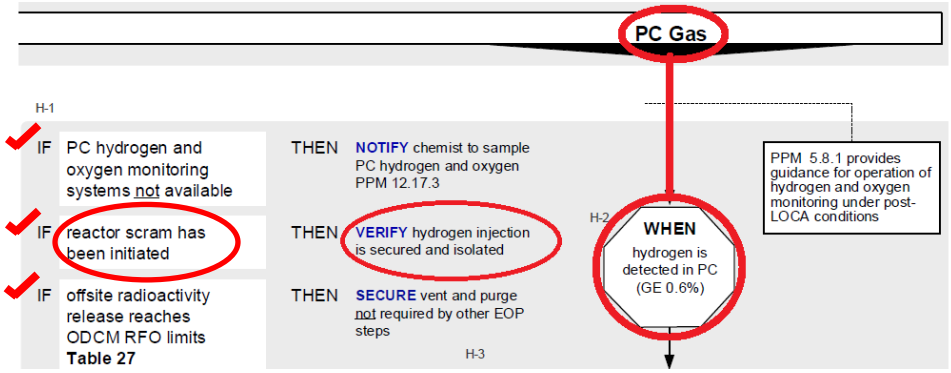
CRS

PPM 5.2.1 WW Level Leg (cont):



EVENT 4: Manual Scram required due to CAS Air Leak – Electric ATWS

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

108.	**CRS**	PPM 5.2.1 PC Gas Leg: Directs Hydrogen Water Chemistry (HWC) be secured per override 
109.	**BOP**	Secures HWC by placing Hydrogen Water Chemistry Enable switch to SHUTDN.

EVENT 5: FDR-V-4 Fails to Automatically Close while Intentionally Lowering RPV Level

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		NO TRIGGER: FDR-V-4 Fails to Auto Close **Results in: Manual operation by BOP operator to close**
		EXAMINER NOTE: Taking manual action is permitted by PPM 1.3.1 (Operating Policies, Programs, and Practices), Step 4.6.6.
110.	**BOP**	Recognizes that FDR-V-4 failed to automatically close on RPV Level 2 (-50 in.) isolation signal. Takes manual action to close valve and informs CRS.

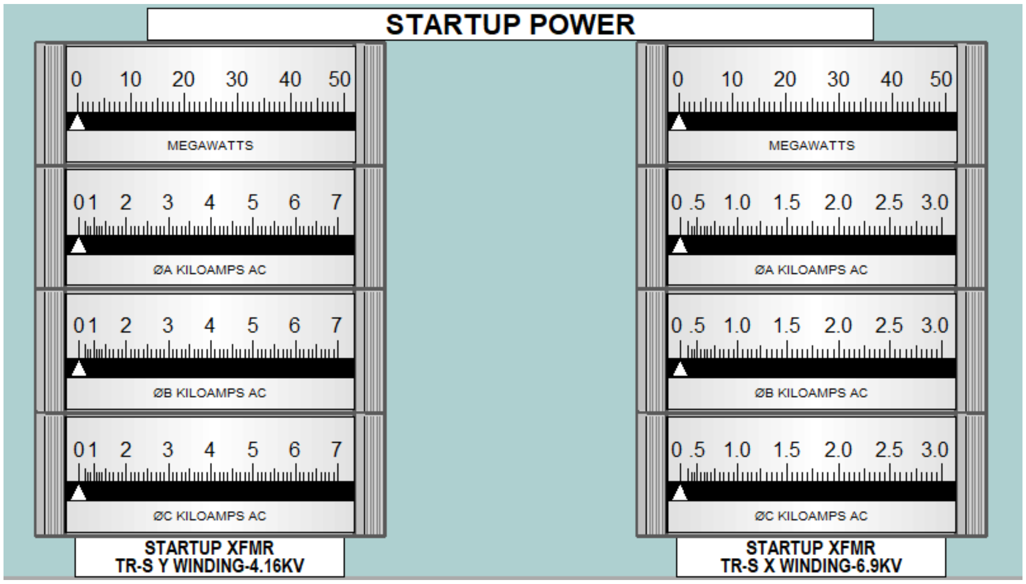
EVENT 6: TR-S Lockout Requires RPV level Control be Shifted from Condensate and Feedwater to RCIC (DG-3 Breaker Failure makes HPCS Unavailable)

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

When directed:

INSERT TRIGGER 6: Startup Transformer (TR-S) Lockout

Results in: Loss of Feed & Condensate / Loss of HPCS due to DG3 Breaker Failure

111	**BOP**	Reports alarm P800-C4 Drop 1-7 (XFMR TR-S LOCKOUT TRIP). May include zero volts from the Startup Transformer (TR-S) and loss of SM-1, SM-2, SM-3, SH-5, SH-6. 

If directed to check TR-S locally

Wait 3 minutes and

ROLE-PLAY

"I'm in the Startup Transformer Control Cabinet which shows the relay flag for the Buchholz Relay has dropped out. There is a strong acrid odor but NO indication of fire."

112	**ATC**	Reports loss of condensate and condensate booster pumps (loss of feed).

EXAMINER NOTE: RCIC may have been initiated earlier.

113	**ATC**	Initiates RCIC for injection. See steps next page

EVENT 6: TR-S Lockout Requires RPV level Control be Shifted from Condensate and Feedwater to RCIC (DG-3 Breaker Failure makes HPCS Unavailable)

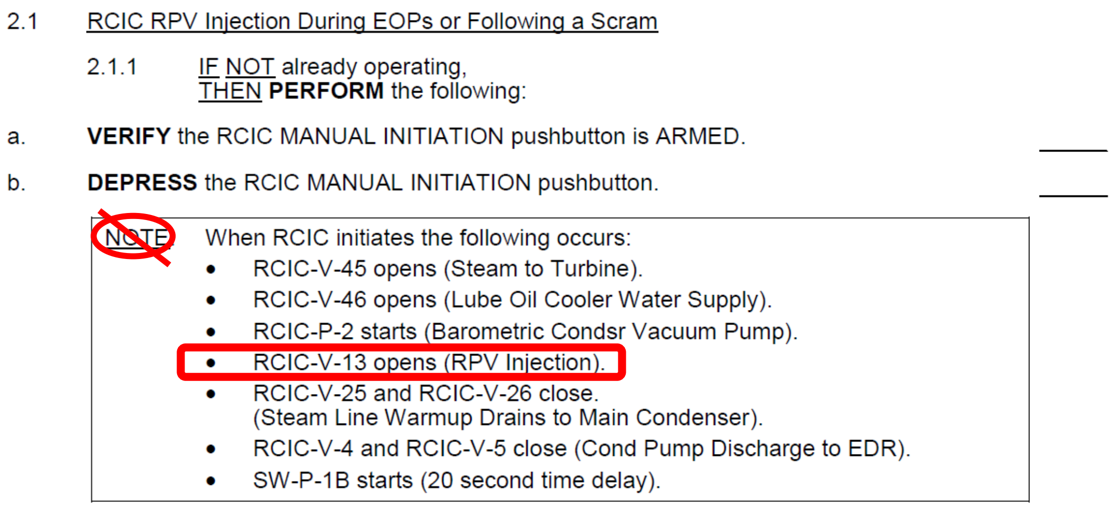
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

EXAMINER NOTE: ATC needs to operate RCIC for "credit". May have to prompt the CRS.

114. **ATC**

When **RCIC** used for injection per SOP-RCIC-INJECTION-QC:

Re-opens RCIC-V-1 (closed earlier) then performs the following:



2.1 RCIC RPV Injection During EOPs or Following a Scram

2.1.1 IF NOT already operating,
THEN **PERFORM** the following:

a. **VERIFY** the RCIC MANUAL INITIATION pushbutton is ARMED. ____

b. **DEPRESS** the RCIC MANUAL INITIATION pushbutton. ____

~~NOTE~~ When RCIC initiates the following occurs:

- RCIC-V-45 opens (Steam to Turbine).
- RCIC-V-46 opens (Lube Oil Cooler Water Supply).
- RCIC-P-2 starts (Barometric Condsr Vacuum Pump).
- RCIC-V-13 opens (RPV Injection).
- RCIC-V-25 and RCIC-V-26 close.
  (Steam Line Warmup Drains to Main Condenser).
- RCIC-V-4 and RCIC-V-5 close (Cond Pump Discharge to EDR).
- SW-P-1B starts (20 second time delay).

Performs all steps

Recognizes RCIC-V-13 failed to auto open and opens it (see Event 8 [page 65])

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">EXAMINER NOTE: There are several abnormal procedures (ABNs) which have entry conditions which the CRS may enter. Several of these contain actions which the crew will not get to based on higher priorities for the remainder of the scenario. Actions which the crew may take are listed below.</td></tr>
<tr><td colspan="3">EXAMINER NOTE: Since all rods are in with reactor shutdown, the CRS may use either CRO to perform below actions.</td></tr>
<tr><td>115</td><td>CRS</td><td>Enters ABN-TRANSFORMER, ABN-ELEC-GRID, ABN-ELEC-SM1/SM7, ABN-ELEC-SM2/SM4, ABN-ELEC-SM3/SM8, ABN-RPS, ABN-CRD, ABN-BACKPRESSURE</td></tr>
<tr><td>116</td><td>ATC/
BOP</td><td>If still open, fast closes MSIVs per ABN-BACKPRESSURE:

~~CAUTION~~
If no CW pumps are operating, the Main Condenser will be unavailable due to the loss of the CW pumps.

4.4 IF no CW Pumps are in operation,
AND cannot be started,
THEN FAST CLOSE the MSIVs. Performs</td></tr>
<tr><td>117</td><td>ATC/
BOP</td><td>Restarts Drywell Cooling fans per ABN-ELEC-SM1/SM7 & SM3/SM8:
• RE-START DW Cooling fans.
  • PLACE CRA-RMS-FC/1A in NORMAL-after-ON (Lower Drywell Cooling Fans CRA-FC-1A). Performs
  • PLACE CRA-RMS-FC/2A in NORMAL-after-ON (Upper Drywell Cooling Fans CRA-FC-2A). Performs
• RE-START DW Cooling Fans per SOP-CRA-START.
  • PLACE CRA-RMS-FC/1B (Lower Drywell Cooling Fans CRA-FC-1B) in NORMAL-after-ON. Performs
  • PLACE CRA-RMS-FC/1C (Lower Drywell Cooling Fans CRA-FC-1C) in NORMAL-after-ON. Performs
  • PLACE CRA-RMS-FC/2B (Upper Drywell Cooling Fans CRA-FC-2B) in NORMAL-after-ON. Performs</td></tr>
</table>

EVENT 6: TR-S Lockout Requires RPV level Control be Shifted from Condensate and Feedwater to RCIC (DG-3 Breaker Failure makes HPCS Unavailable)

STEP #	**Position**	**OPERATOR ACTIVITIES** **CREW RESPONSE**

EXAMINER NOTE: The HPCS DG Output breaker should have auto closed after the Startup Transformer lockout. Manual action is required as permitted by PPM 1.3.1 (Operating Policies, Programs, and Practices), Step 4.6.6. This action may be performed without referencing procedure steps below – Will be UNSUCCESSFUL making HPCS unavailable.

118

ATC/ BOP

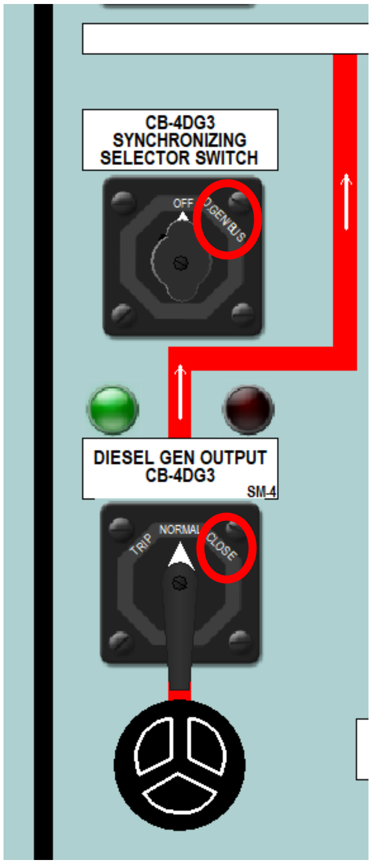
Attempts to re-energize SM-4 from DG-3 per ABN-ELEC-SM2/SM-4:

4.1.5 IF power has NOT been restored to E-SM-4, THEN **PERFORM** Section 4.3 concurrently. Performs

4.3 Loss of E-SM-4

4.3.1 **VERIFY** HPCS Diesel Generator has energized SM-4. _____

Will attempt to energize SM-4 (see below steps) (Unsuccessful)



2. Places sync switch in D.GEN/Bus position

1. Places DG output breaker switch in CLOSE (Recognizes breaker did not close)

EVENT 6: TR-S Lockout Requires RPV level Control be Shifted from Condensate and Feedwater to RCIC (DG-3 Breaker Failure makes HPCS Unavailable)

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
EXAMINER NOTE: Since attempt to re-energize SM-4 was unsuccessful above, DG-3 must be tripped (Immediate Action per ABN-SW) to prevent overheating/damage due to loss of service water cooling. OI-09 permits below action without having to enter or refer to ABN.		
119	**ATC/ BOP**	Recognizes that HPCS DG (DG-3) is running without service water cooling and directs the field to emergency trip DG-3.

When directed to emergency trip DG-3 locally

Wait 2 minutes and

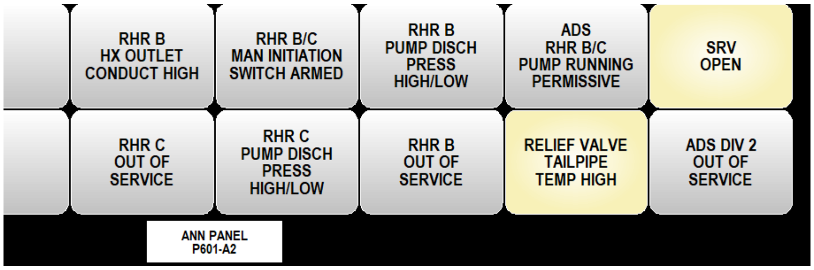
INSERT TRIGGER 11 and

ROLE-PLAY

“DG-3 has been emergency tripped.”

EVENT 7: Main Steam Relief Valve 1C (MS-RV-1C) Inadvertently Opens

ST EP	OPERATOR ACTIVITIES

<table>
<tr><th></th><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">When directed:
INSERT TRIGGER 7: MS-RV-1C inadvertently opens
Results in: Manual re-closure of MS-RV-1C per ABN-SRV</td></tr>
<tr><td colspan="3">EXAMINER NOTE: BOP needs to respond to open SRV event. May have to prompt the CRS.</td></tr>
<tr><td>120</td><td>BOP</td><td>Reports P601.A2 5-8 (SRV OPEN) annunciator and that MS-RV-1C indicates open.
 
Refers to ARP for P601-A2 Drop 5-8 (SRV OPEN):
NOTE: MS-RV-2A indication has been bypassed per EC 18888.
1. REFER to ABN-SRV, Safety Relief Valve opening. Refers CRS to ABN-SRV</td></tr>
<tr><td>121</td><td>CRS</td><td>Enters ABN-SRV and directs subsequent actions.</td></tr>
<tr><td>122</td><td>BOP</td><td>4.2 VERIFY the SRV is open by one or more of the following:
• Rising tail pipe temperature at MS-TR-614 on H13-P614 Performs
• Rising Suppression Pool temperature or level Performs
4.3 PLACE the control switch for the open SRV to OFF. Performs
Reports that MS-RV-1C (SRV 1C) has closed.</td></tr>
</table>

EVENT 8: RCIC-V-13 (RCIC injection valve) fails to automatically open requiring manual operation

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		NO TRIGGER: RCIC-V-13 Fails to Auto Open **Results in: Manual operation by ATC operator to open**
		EXAMINER NOTE: ATC needs to respond to event. May have to prompt the CRS.
123.	**ATC**	Recognizes that RCIC-V-13 failed to automatically open upon RCIC initiation. **See page 52 or page 60 for RCIC steps.**

TERMINATION CUE:

This scenario will be terminated (with concurrence from NRC Examiner) when all control rods are inserted, the transition back to PPM 5.1.1 (RPV Control) is complete, Main Steam Relief Valve 1C has been re-closed, and reactor water level is stable in the directed band using RCIC.

INFORM THE CREW NOT TO DISCUSS THE SCENARIO, NOT TO ERASE FLOWCHARTS OR NOTES, NOT TO PUT AWAY PROCEDURES. THE EVALUATORS WILL CAUCUS TO DETERMINE IF THERE ARE ANY FOLLOWUP QUESTIONS.

Assign someone (usually the booth operator) to remain with the crew on the floor.

SAVE INSIGHT FILE TO THE SECURE DRIVE BEFORE RESET AND CLEAR URI FILE WHEN DONE.

CRITICAL TASKS

CRITICAL TASK 1

Critical Task Statement:

Stop and prevent injection into the RPV, with the exception of SLC, RCIC, and CRD, to establish an LL of -65 inches in an ATWS with GT 5% power within 10 minutes of receipt of the scram signal.

Safety Significance:

If reactor power is above 5% or unknown, direction will be given to lower RPV level below the elevation of the feedwater spargers to prevent or mitigate the consequences of any irregular neutron flux oscillations induced by neutronic/thermal-hydraulic instabilities. With the spargers in the steam space, heating of the feedwater by contact with the steam reduces core inlet subcooling. The initiation and growth of oscillations is principally dependent upon the core inlet subcooling; the greater the subcooling, the more likely oscillations will commence and increase in magnitude. -65 in. (twenty-four inches below the feedwater sparger) has been selected as the upper bound of the RPV water level control band. This water level is sufficiently low that steam heating of the injected water will be at least 75% effective.

Industry operating experience (IER L1 17-5) has shown that thermal-hydraulic instabilities can occur within approximately 10 minutes of entering high-power/low-flow conditions.

Initiating Cue:

Mode switch is in shutdown and reactor not shutdown as indicated by APRM Downscale lights not lit and Reactor Power indicating >5% on APRMs or cannot be determined.

Measurable Performance Standard:

All flow into the RPV except for CRD, SLC, and RCIC has been prevented using a method approved in OI-15 Attachment 5.3.

Performance Feedback:

RPV level is lowering as indicated on MS-LI-604 and reactor power is lowering as indicated on APRMs.

CRITICAL TASK 2

Critical Task Statement:

With a reactor scram required and the reactor not shutdown, take actions (initiates SLC from MCR) to inject SLC per PPM 3.3.1 QC prior to commencing performance of PPM 5.5.11 Alternate Rod Insertions.

Safety Significance:

If reactor power is elevated (above the APRM downscale trip setpoint) or cannot be determined, the core may be susceptible to large, irregular neutron flux oscillations.

If boron injection is initiated during an ATWS event before wetwell temperature reaches the BIIT, emergency RPV depressurization may be precluded at reactor power levels at or below the APRM downscale trip setpoint. At higher reactor power levels, however, the wetwell heatup rate may become so high that the Hot Shutdown Boron Weight of boron cannot be injected before wetwell temperature reaches the Heat Capacity Temperature Limit even if boron injection is initiated early in the event. For ATWS power levels greater than the APRM downscale trip setpoint, EOP ATWS strategies require boron injection immediately upon entry to the EOPs irrespective of suppression pool temperature.

Initiating Cue:

Reactor scram required and reactor not shutdown as indicated by APRM Downscale Lights not lit and Reactor Power indicating >5% on APRMs or cannot be determined.

Measurable Performance Standard:

SLC System A and/or B keylock switch has been placed in operate, SLC-V-1A and/or B open, and system flow as indicated on SLC-FI-1 in accordance with SOP-SLC-INJECTION-QC, PRIOR to the performance of PPM 5.5.11 Alternate Rod Insertion.

Performance Feedback:

APRM Downscale Lights are lit and / or Reactor Power as indicated on the APRMs is decreasing.

Examiner Note: Reactor Operator manually driving rods does NOT constitute performance of PPM 5.5.11. When the operator has started place keeping in PPM 5.5.11 (Proceeding with the flow chart on page 5 of PPM 5.5.11) then the operator has "commenced performance".

Time Start: ____________ Reactor Scram initiated.

Time Stop: ____________ First Control Rod Inserted OR Boron Injected

CRITICAL TASK 3 (CONDITIONAL)

Critical Task Statement:

During an ATWS condition, prior to RPV level lowering to LT -129” (automatic initiation of ADS), inhibit ADS to prevent an uncontrolled RPV depressurization.

Safety Significance:

Actuation of ADS imposes a severe thermal transient on the RPV and complicates the efforts to maintain RPV water level within prescribed ranges. Rapid and uncontrolled injection of relatively cold, unborated water from low pressure injection systems may occur as RPV pressure decreases below the shutoff heads of these pumps. This would quickly dilute boron concentration in the core and reduce reactor coolant temperature. When the reactor is not shutdown, or when the shutdown margin is small, sufficient positive reactivity might be added in this way to cause a reactor power excursion large enough to severely damage the core. Therefore, ADS initiation is purposely prevented as the first action of the failure-to-scram procedure.

Initiating Cue:

Reactor scram required and reactor not shutdown as indicated by APRM Downscale Lights not lit and Reactor Power indicating >5% on APRMs or cannot be determined.

Measurable Performance Standard:

MS-RMS-ADS-12A and MS-RMS-ADS-12B are placed in INHIBIT **PRIOR** to automatic initiation of ADS.

Performance Feedback:

ADS is inhibited as indicated by 4.601.A2 6-8 and 4.601.A3 6-1 annunciators are in and ADS Div 1 Inhibited and ADS Div 2 Inhibited BISIs are lit.

Time: ____________ ADS is Inhibited.

Simulator Set Up

☐ Perform TDI-24 Attachment 9.2 (Simulator Exam Security Setup Checklist)

☐ Unload simulator (between each scenario)

☐ Verify in ILC load

☐ Load correct S/D Sequence (if necessary)

☐ Reload simulator

☐ Reset to ILC Exam IC 196 (reset, go to Run, reset again)

☐ Load Schedule file ILC-25 SC-2 Schedule

☐ Execute SBT file

☐ Validate that there are no unexpected annunciators or parameters out of band

☐ Verify GDS and PPC screens are updating

☐ Verify LEFMs are in Check Plus mode on PPC

☐ Verify CAS Compressor Lineup: (A in STBY, B in RUN, C in STBY)

☐ Verify pump running magnets

☐ Select control rod 02-19

☐ Verify normally removed keys REMOVED except for: NONE

☐ Flag the following: NONE

☐ Place clearance tag on: NONE

☐ Protect the following: NONE

☐ Print one copy of each of the following (<u>use Document and Markups print option</u>):

    ☐ PPM 3.2.6 (ILC-25 SC-2 Candidate Ref 1.pdf)

    ☐ SOP-MT-GV/OPTIMIZATION (ILC-25 SC-2 Candidate Ref 2.pdf)

    ☐ OSP-MS-Q702 (ILC-25 SC-2 Candidate Ref 3.pdf)

SECURITY PROCEDURE VERIFICATION

Procedures

• PPM 1.3.1, Operating Policies, Programs, and Practices	☐		
• PPM 3.2.6, Power Maneuvering	☐		
• PPM 3.3.1, Reactor Scram	☐	☐	
• PPM 3.3.1 – QC, Reactor Scram – Quick Card	☐	☐	☐
• PPM 5.1.1, RPV Control	☐		
• PPM 5.1.2, RPV Control – ATWS	☐		
• PPM 5.2.1, Primary Containment Control	☐		
• PPM 5.5.1, Overriding ECCS Valve Logic To Allow Throttling/Injection	☐		
• PPM 5.5.6, Bypassing MSIV Low Level/High MST Temp Interlocks	☐		
• PPM 5.5.11, Alternate Control Rod Insertions	☐		
• SOP-CRD-HCU, Control Rod Drive System HCU Operations	☐		
• SOP-DEH-QC, Main Turbine DEH Operations – Quick Card	☐		
• SOP-HPCS-INJECTION-QC, HPCS RPV Injection – Quick Card	☐		
• SOP-MT-GV/OPTIMIZATION, Governor Valve Optimization	☐		
• SOP-RCIC-INJECTION-QC, RCIC RPV Injection – Quick Card	☐		
• SOP-RFT-RESTART-QC, Reactor Feed Pump Restart – Quick Card	☐		
• SOP-RFW-FCV-QC, Transfer RPV Level Control To RFW FCVs	☐		
• SOP-RHR-SPC-QC, Placing RHR Loop A(B) In SPC – Quick Card	☐		
• SOP-RRC-FLOW-QC, Rx Power Change With RRC Flow Controllers	☐		
• SOP-SLC-INJECTION-QC, SLC RPV Injection – Quick Card	☐		
• OI-09, Operations Standards and Expectations	☐		
• OI-15, EOP And EAL Clarifications	☐		
• OSP-MS-Q702, Bypass Valves Test	☐		

ABNs

• ABN-BACKPRESSURE, Rise In Main Condenser Backpressure	☐	☐
• ABN-CAS, Control Air System Failure	☐	☐
• ABN-ELEC-SM1/SM7, SM-1/SM-7 Distribution Failures	☐	☐
• ABN-ELEC-SM2/SM4, SM-2/SM-4 Distribution Failures	☐	☐
• ABN-ELEC-SM3/SM8, SM-3/SM-8 Distribution Failures	☐	☐
• ABN-ROD, Control Rod Faults	☐	☐
• ABN-SRV, Safety Relief Valve Opening	☐	☐
• ABN-SW, Service water Trouble	☐	☐
• ABN-TRANSFORMER, Transformer Abnormal Operation	☐	☐

Tech Specs

3.1.3	☐	☐	☐
3.7.6	☐	☐	☐

ARPs

• 4.601.A2 (5-8)	☐
• 4.603.A7 (2-7), (5-7)	☐
• 4.603.A8 (3-5)	☐
• 4.800.C4 (1-7)	☐
• 4.840.A5 (6-4), (7-4), (7-5)	☐
• 4.840.A5 (7-6)	☐

CREW TURNOVER

Initial Conditions:

- Columbia is operating at 100% power.
- No systems or equipment are OOS.

Shift Turnover:

- Following shift turnover, lower reactor power to 95% at 1% per minute using Reactor Recirculation flow per PPM 3.2.6 (Power Maneuvering) to support OSP-MS-Q702 (Bypass Valves Test).
  - Steps 5.1.1 thru 5.1.5 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.

- Perform OSP-MS-Q702 following power reduction.
  - All the expected annunciators per step 3.4 have NOT been flagged. ARPs will be referenced, as needed.
- Power will remain at 95% following testing.

Verify Revision Information Prior To Use	Initials	JM
	Date	Today

Number: 3.2.6	Use Category: CONTINUOUS	Major Rev: 021 Minor Rev: N/A Page: 1 of 20
Title: Power Maneuvering		

PLANT PROCEDURES MANUAL	PCN #: N/A
3.2.6	Effective Date: 03/31/22

JM – Jamal Matthews
RP – Rusty Peterson

NOTE - Only procedural steps in section 5.1 are being performed. Remaining procedural sections are Not Applicable (N/A). JM

*1 - (Step 5.1.14) Reactor power will remain above 1000 MWe following RRC flow reduction to 95% CTP to support performance of OSP-MS-Q702. JM

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	Description (including summary, reason, initiating document, if applicable)
	This revision is administrative only. Rev 020.001 added a conditional to step 5.2.4 (AR-419182) that could impact dose received by personnel without routing the change through ALARA personnel for approval. This revision adds that review to the procedure review process per SWP-PRO-02. (AR-430764)

TABLE OF CONTENTS

1.0 PURPOSE

Provide operating instructions for maneuvering the plant between approximately 100% power and 25% power (300 MWe) to support planned evolutions.

2.0 REFERENCES

2.1 P-92247, NCR 292-0993, Core Oscillations

2.2 AR OER 82911, OER 89075, (GE SIL 502) DER Flow Limiter

2.3 AR CR 125969, PERA 202-0822, Feedwater Heaters Tripped

2.4 NFM 5-2, Nuclear Fuels Manual

2.5 PPM 1.3.76, Integrated Risk Management

2.6 PPM 1.3.84, Reactivity Management Control

2.7 SOP-CFD-OPS, Main Condensate Filter Demineralizer System Operations

2.8 SOP-CFD-SHUTDOWN, Main Condensate Filter Demineralizer System Shutdown

2.9 SOP-COND-OPS, Main Condensate System Operations

2.10 SOP-COND-SHUTDOWN, Main Condensate System Shutdown

2.11 SOP-COND-START, Main Condensate System Pump Startup

2.12 SOP-CW-OPS, Circulating Water and Cooling Towers System Operations

2.13 SOP-FWH-START, Extraction Steam and Heater Vents/Drains Startup

2.14 SOP-FWH-SHUTDOWN, Extraction Steam and Heater Vents/Drains System Shutdown

2.15 SOP-MSR-OPS, Main Turbine Moisture Separator Reheater Operations

2.16 SOP-MT-GV/OPTIMIZATION, Main Turbine Generator GV Optimization.

2.17 PPM 3.1.11, Final Feedwater Temperature Reduction

2.18 PPM 3.3.1, Reactor Scram

2.19 ABN-CORE, Unplanned Core Operating Conditions

2.20 OSP-CRD-M702, Control Rod Exercise

2.21 OSP-RWM-C402, Rod Worth Minimizer CFT Prior to Shutdown

2.22 TSP-APRM-C301, APRM and Core Thermal Power Channel Calibration Check

2.23 TSP-CRD-C101, CRD Scram Timing with Autoscram Timer

2.24 PPM 9.3.9, Control Rod Withdrawal Sequence Development and Control

2.25 PPM 9.3.12, Plant Power Maneuvering

2.26 PPM 9.3.16, RWM Control Rod Sequence Installation

2.27 PPM 16.11.2, Gas Grab Samples Following Shutdown Startup and Thermal Power Changes

2.28 AR CR 240219, Indication Reported on Jet Pump #17 Riser at Weld RS-9

2.29 AR OER 230496, (OER) GEH RICSIL-092, Single Loop Operations (SLO) at BWRs

2.30 COLR, 1.0, P3.S3, The Minimum Flow for Operation at Rated Power is 82.7% of Rated Flow; the Maximum Is 106%

3.0 PREREQUISITES

3.1 **EVALUATE** this power maneuver per the requirements of PPM 1.3.76. JM

3.2 **VERIFY** the CRS/Shift Manager has cleared the Control Room of all unnecessary personnel. JM

3.3 **VERIFY** all maintenance and operational activities, other than the reactor power maneuver, which could affect reactivity, have been stopped. JM

3.4 **VERIFY** the CRS/Shift Manager and Reactor Operator(s) have reviewed PPM 1.3.84 prior to control rod manipulation. N/A JM

3.5 **VERIFY** the CRS/Shift Manager have reviewed and approved the Reactivity Control Plan, if applicable. N/A JM

> NOTE: Per GE RICSIL 092, each RRC Loop is limited to 57.5 Mlb/hr. During automatic operation, RRC Loop A should be biased slightly GT RRC Loop B.

3.6 IF possible,
THEN **VERIFY** RRC Loop A is biased slightly GT RRC Loop B. RP

3.7 IF time allows,
THEN **ENSURE** the Unit Coordinator has provided the power profile to the BPA Hydro Desk (primary, 503-230-4374) or Real Time Duty Scheduler (backup, PGSD/Portland, 503-230-3931). JM

4.0 PRECAUTIONS AND LIMITATIONS

4.1 When operating in the Area of Increased Awareness (AIA), the Boiling Boundary should be GT 4.0 feet. Otherwise, initiate action to restore the boiling Boundary to GT 4.0 feet or exit the AIA within 4 hours by reducing CTP with control rods, or increasing core flow.

> NOTE: Substitutions or data source changes in the N4 screen for the primary computer (normally TDAS) should be performed on the backup computer at the same time. It is important for maintaining accurate CTP reporting in the backup system to ensure that all calculations are matching between both systems.

4.2 With Computer points B031 and/or B032 inoperable, ensure appropriate substitute values are entered. If RRC pump speed is LT 52.0 Hz, enter 0.08 MWe as RRC pump electrical power. If RRC pump speed is GE 52.0 Hz, enter 4.5 MWe as RRC pump electrical power.

4.3 A Level II qualified SNE should be in the Control Room providing technical direction for the following:

- All rod sets and rod sequence adjustments
- All startups, from initial rod pull to the point of adding heat
- All shallow rod adjustments above 25% thermal power, excluding those performed per OSP-CRD-W701, or those following the approved Fast Shutdown Sequence, or the approved pull sheet, or an approved set of standing orders, or an approved down power instruction, or an approved Reactivity Control Plan (RCP).

4.4 Do not make manual changes in recirculation flow concurrent with control rod withdrawals.

4.5 If only two booster pumps are available, power may be raised above 65% power provided the following parameters are satisfied:

- **MAINTAIN** Condensate Booster Pump suction pressure GE 80 psig on running pumps. (COND-PI-14AG(148G)(14CG)
- **MAINTAIN** Condensate Booster Motor amps LE 375 amps. (Monitor all 3 phases at switchgear and Control Room panels.)
- **MAINTAIN** Condensate Booster Motor stator winding temperature LE 275 °F. (Stator winding temperatures will take several minutes to peak following power change) Monitor the following computer points:

  COND-P-2A: W063, W066, W069, W072, W075, W078

  COND-P-2B: W064, W067, W070, W073, W076, W079

  COND-P-2C: W065, W068, W071, W074, W077, W080

- **MAINTAIN** Reactor Feedwater pump suction pressure GE 400 psig.
  Monitor COND-PI-28A (28B) (28AG) (28BG).

4.6 Power changes are to be performed within the limits of the Power/Flow Map.

4.6.1 The COLR provides operating limits for dual recirculation pump operations in the Maximum Extended Load Line Limit Analysis (MELLLA) domain. During single recirculation loop operations (SLO) the operational limits revert to the ELLLA domain (i.e., rod line LE 106.2%) {R-2.30}

> NOTE: Operations in relation to the MELLLA boundary may be ascertained by comparing the current plant conditions to the dual loop power / flow map. An alternate indication for determining proximity to the MELLLA boundary is the parameter Fraction Load Line Limiting Power (FLLLP). When FLLLP is less than or equal to 1.0 (similar to a fuel thermal limit) the plant is operating below the MELLLA boundary.

4.6.2 When the plant is in dual recirculation loop operations, do not exceed the MELLLA boundary. If the one minute thermal power average indicates that the plant is operating above the MELLLA boundary, or if FLLLP is GT 1.0, take action within 15 minutes to reduce the rod line to restore compliance with the MELLLA boundary.

4.6.3 During normal operations at steady state conditions, maintain the FLLLP to LE 0.98 to provide margin to the administrative limit on FLLLP of 0.99.

4.6.4 When the plant is in SLO, do not exceed the 106.2% rod line. If the one minute average rod line is found above 106.2%, take action within 15 minutes to reduce rod line to LT 106.2%. The SLO operation limit on RRC loop flow (averaged over an hour period) is 57.5 Mlb/hr for RRC Loop A Flow

4.6.5 If entering Single Loop operation due a tripped pump, then the flow limit specified above should be achieved within two hours per the directions specified in this procedure. If otherwise entering SLO, then reduce the respective Loop Flow prior to the pump trip to preclude exceeding the above limit(s). {AR-2.28}, {OE-2.29}

4.7 If one or more LEFM feedwater flow meters are not in Check Plus Mode (i.e., Check Mode on the Plant Overview screen), the plant shall be down powered to 3533 MWt, (which is about a 0.3% power reduction) within 72 hours of the LEFM switching. Refer to LCS 1.3.9

4.8 A complete loss of one or both LEFM Meter status indication, reduce reactor power level to 3486 MWt within 72 hours. The plant may return to 3544 MWt after LEFM functionality has been restored. Refer to LCS 1.3.9

4.9 A power change of GT 15% in one hour requires performance of PPM 16.11.2, if Offgas release rates are elevated. Notify Chemistry to evaluate the Offgas system release rate and perform PPM 16.11.2, if necessary.

4.10 Observe preconditioning limits when changing power.

4.11 Do not exceed 28% RTP, unless the requirements of an AIA Entry Reactivity Control Plan (RCP) have been met. Do not exceed 26.5% RTP with recirculation pumps at 15 HZ.

4.12 If during the performance of this procedure it becomes necessary to delay startup or regress, the previously completed steps should be reviewed to ensure appropriate system status prior to recommencing.

5.0 PROCEDURE

> ~~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 Power Reduction to 60% Power

5.1.1 **VERIFY** Prerequisites are met prior to downpower. JM

5.1.2 **NOTIFY** BPA of the down power as follows:

a. IF planned down power,
THEN **NOTIFY** Dittmer Dispatcher. RP

b. IF down power was unplanned,
AND when time permits,
OR desired power level is reached,
THEN **NOTIFY** BPA Hydro Desk (primary, 503-230-4374) or
Real Time Duty Scheduler (backup, PGSD/Portland, 503-230-3931)
of the following:

1) Time down power started. N/A JM

2) Reason for down power. _____

3) Expected steady state power level. _____

4) Estimated time to return to full power. N/A JM

5.1.3 IF down power was unplanned,
THEN **NOTIFY** the Unit Coordinator, OCC, or WWM to develop power profile N/A JM
AND **COMMUNICATE** plan to BPA. N/A JM

5.1.4 **NOTIFY** the Radwaste Control Room. RP

5.1.5 **NOTIFY** Health Physics. RP

5.1.6 **RECORD** date and time downpower initiated: __________ / __________ _____

5.1.7 IF in Governor Valve Optimization,
THEN **ENTER** Sequential Valve Operation per SOP-MT-GV/OPTIMIZATION. _____

5.1.8 IF required,
THEN **INSERT** control rods as directed by the CRS to maintain reactor power below the administrative rod line limit during power reduction. N/A JM

5.1.9 **ASSIGN** an individual to track thermal power changes. _____

5.1.10 IF thermal power changes GT 15% in one hour,
THEN **NOTIFY** Chemistry to evaluate the Offgas release rate. N/A JM

5.1.11 IF required, based on the above evaluation,
THEN **PERFORM** PPM 16.11.2. N/A JM
CHEM

5.1.12 IF necessary,
THEN **LOWER** Circulating Water basin level in preparation for removing Circulating Water pumps. N/A JM

5.1.13 IF desired,
THEN **LOWER** DEH Load Demand per SOP-MT-SHUTDOWN. N/A JM

> NOTE: Rapid power reduction rates may upset feedwater heater level controls.
>
> NOTE: Recirculation loop flows may be changed in AUTO (master control) or MANUAL (individual loop control) control.
>
> NOTE: Slowly correlates to a power reduction rate of approximately 1% CTP per minute, or slower, as needed to support plant maneuvering.

5.1.14 **SLOWLY REDUCE** power to approximately ~~1000 MWe.~~ 95% CTP JM *1 _____

5.1.15 PRIOR to reaching 900 MWe,
REMOVE the number 1 and 2 Feedwater Heaters from service
per SOP-FWH-SHUTDOWN. {AR-2.3} N/A JM

5.1.16 PRIOR to lowering power to LT 74% CTP,
OR prior to lowering Final Feedwater temperature LE 355°F,
THEN **VERIFY** the following valves are **CLOSED** per PPM 3.1.11.

- RFW-V-109 _____
- COND-V-144 _____

5.1.17 IF necessary,
THEN **VERIFY** appropriate substitute value for RRC pump electrical power in use per Precaution 4.2. _____

> NOTE: For a temporary reduction in power or load (to as low as 400 MWe), the second stage reheat should stay in service.

5.1.18 IF power maneuvering is planned below 400 MWe,
THEN **INITIATE** MSR second stage reheat removal per SOP-MSR-OPS. _____

> **CAUTION**
>
> Entry into the Area of Increased Awareness may result in core oscillations. {P-2.1}

5.1.19 **SLOWLY REDUCE** total core flow to approximately 74 Mlb/hr (approximately 68% Core Flow) or as determined by the CRS. N/A JM

5.2 Power Reduction to LT 300 MWe

5.2.1 **VERIFY** Section 5.1 is complete. _____

CAUTION

Entry into the Area of Increased Awareness may result in core oscillations. {P-2.1}

5.2.2 WHEN power is LT 65%,
THEN **STOP** a Condensate Booster pump per SOP-COND-SHUTDOWN to leave two operating. _____

CAUTION

Basin level can swell 1.5' when a circulating water pump is stopped. Overflow into the electrical vault occurs at 27' (445') in CW Bay A.

5.2.3 IF desired,
THEN **STOP** one CW pump per SOP-CW-OPS to leave two operating. _____

NOTE: The following step can be performed by Operations, Maintenance, Instrument Techs, or other knowledgeable personnel, and should be combined with fluid leak walkdowns if possible.

5.2.4 WHEN power is LT 60% OR during fluid leak walkdowns
(for downpowers to below 60%),
THEN **REQUEST** a local walkdown to evaluate the following level control valves for yoke, positioner, or other AOV damage.

- HD-LCV-5A1A (COND-HX-5A Drain to COND-HX-4A) (T516, F8/7.7) _____
- HD-LCV-5A1B (COND-HX-5A Drain to COND-HX-4B) (T516, F8/9.5) _____
- HD-LCV-5A1C (COND-HX-5A Drain to COND-HX-4C) (T516, F8/11.6) _____
- HD-LCV-5B1A (COND-HX-5B Drain to COND-HX-4A) (T514, F9/7.7) _____
- HD-LCV-5B1B (COND-HX-5B Drain to COND-HX-4B) (T514, F9/9.5) _____
- HD-LCV-5B1C (COND-HX-5B Drain to COND-HX-4C) (T514, F9/11.6) _____

CAUTION

Continuous insert of deep (power) control rods between notch 12 and full-in may upset feedwater heater level controls.

5.2.5 IF in two loop operation,
THEN **REDUCE** reactor power to the 50% rod line (~40% Core Thermal Power), or that level determined by the CRS, by inserting control rods per the rod withdrawal sequence sheets, or deviation sheets. _____

5.2.6 WHEN power is approximately 50%,
THEN **VERIFY OPEN** the following Main Steam drain valves (H13-P602):

- MS-V-69 _____
- MD-V-73 _____
- MS-V-156 _____

5.2.7 **OPEN** the following drains (H13-P602).

- MD-V-70A _____
- MD-V-70B _____
- MD-V-70C _____
- MD-V-70D _____

5.2.8 WHEN MD-V-73 is open,
THEN **OPEN** MD-V-71 (H13-P602). _____

NOTE: Each OPRM conservatively enables at approximately 64% (± 2%) core flow.

5.2.9 IF Reactor Power is GE 24.6%,
AND Core Flow is LE 60% (the OPRM enabled values in the COLR),
THEN **VERIFY** OPRM TRIP ENABLED annunciator is illuminated.
(H13-P603-A7.3-7) _____

5.2.10 IF operating in the AIA of the Power to Flow map,
THEN **VERIFY** the Boiling Boundary is GT 4.0 feet,
OR **INITIATE** action to restore the Boiling Boundary to GT 4.0 feet within 4 hours,
OR **EXIT** the AIA by reducing CTP with control rods or increasing core flow.
{P-2.1} _____

5.2.11 PRIOR to a planned entry into the AIA (ie Single Loop Operation),
THEN **VERIFY** the Reactor Feedwater temperature (RFW-TI-5) is to the left of the curve in Attachment 7.1. (H13-P840) _____

5.2.12 PRIOR to a planned entry into the AIA, if time permits,
THEN **VERIFY** an AIA Entry Reactivity Control Plan (RCP) has been prepared and approved per PPM 9.3.12. _____

NOTE: Slowly correlates to a power reduction rate of approximately 1 % CTP per minute, or slower, as needed to support plant maneuvering.

5.2.13 **SLOWLY REDUCE** core flow while performing the following steps. _____

NOTE: Normally, Feedwater Heater groups 3, 4 and 5 should be left in service unless level control issues develop.

5.2.14 IF desired,
THEN **REMOVE** Feedwater Heater Group 3 from service prior to 500 MWe per SOP-FWH-SHUTDOWN. _____

5.2.15 IF desired,
THEN **REMOVE** Feedwater Heater Group 4 from service prior to 400 MWe per SOP-FWH-SHUTDOWN. _____

NOTE: For temporary reduction in power or load following (to as low as 400 MWe), the second stage reheat should remain in service.

5.2.16 IF continued operation below 600 MWe is planned,
THEN **VERIFY** removal of MSR second stage reheating prior to 400 MWe per SOP-MSR-OPS. _____

NOTE: If power is reduced to LT 400 MWe, the MSR 2nd Stage inlet isolation valves should be closed to reduce thermal transient to the MSR.

5.2.17 IF the downpower is a temporary reduction in power,
AND power is reduced to LT 400 MWe,
THEN **REMOVE** MSR 2nd Stage reheat per SOP-MSR-OPS, section for MSR Operation for Temporary Reduction in Power or Load Following (H13-P820). _____

5.2.18 IF desired,
THEN **REMOVE** Feedwater Heater Group 5 from service prior to 300MWe per SOP-FWH-SHUTDOWN. _____

5.2.19 IF necessary,
THEN **ADJUST** control rods to accomplish the following:

- Control rod line. _____
- Support AIA Entry Reactivity Control Plan (RCP). _____
SNE

5.2.20 **MONITOR** Feedwater Heater 6A and 6B outlet temperatures (PPCRS points F018 and F019). _____

5.2.21 IF desired,
WHEN total Condensate flow is LT 20,000 gpm,
AND Cond Booster pump suction pressure is GT 75 psig (Comp point E020),
THEN **STOP** one Condensate pump per SOP-COND-SHUTDOWN, to leave two operating. _____

CAUTION

An RRC flow runback occurs if a feedpump is tripped and a reactor low water level is received prior to RRC pump frequency decreasing to LT 30 Hz (~54% flow).

NOTE: The RFT being removed from service may be left rotating at minimum speed (~2500 rpm).

5.2.22 IF two Reactor Feedwater Pumps are in service,
THEN **REMOVE** one Reactor Feedwater Pump from service per SOP-RFT-SHUTDOWN. _____

5.2.23 **VERIFY** the Rod Worth Minimizer BELOW LPAP indication is received (approximately 37% power). _____

5.2.24 **PERFORM** section 7.1 of OSP-RWM-C402. _____

NOTE: H13-603.A7.5-4 and H13-603.A8.5-4 are activated when 1 of 2 RPS relays RPS-RLY-K9A,C and RPS-RLY-K9B,D respectively is energized the associated Half Scram signal is only bypassed if both relays are energized.

5.2.25 WHEN power is approximately 29.5%,
THEN **VERIFY** TURBINE GOV VLV THROTTLE VALVE TRIP BYPASS alarms (H13-603.A7.5-4 and H13-603.A8.5-4) are received. _____

5.2.26 **RECORD** Reactor Power level and the normal level controller output for each in-service Feedwater Heater in the electronic logging system. _____

5.2.27 WHEN demineralizer flows
AND system differential pressure permits,
THEN **REMOVE** demineralizers from service until three remain in service per SOP-CFD-SHUTDOWN. _____

> NOTE: The preferred temperature for Condensate and TSW as defined in SOP-COND-START and SOP-TSW-OPS respectively are listed in the following step. If plant conditions will not allow control within the preferred range the CRS/SM will provide operating limits consistent with plant conditions.

5.2.28 **REMOVE** cooling tower fans and towers from service per SOP-CW-OPS, as necessary to maintain the following:

- Condensate temperature 90-125°F. _____
- Drywell temperature and pressure. _____
- TSW Pump Discharge GE 65°F and LT 80°F
  (To maintain proper cooling of the associated TSW cooled/systems). _____

5.2.29 IF the operating TSW pump discharge temperature is GT 80°F,
THEN **MAINTAIN** a heightened awareness of TSW cooled components, _____
AND **CONSIDER** supplemental monitoring of TSW cooled components. _____

5.2.30 IF the tower makeup rate drops to LT 10,000 gpm,
THEN **STOP** one TMU pump per SOP-TMU-SHUTDOWN. _____

5.2.31 IF in Single Loop Operation,
THEN **VERIFY** temperature requirements of OSP-RRC-C102 are satisfied. _____

> **CAUTION**
>
> Do not allow thermal power or recirculation flow increases.

5.2.32 IF in Single Loop Operation,
AND the temperature requirements of OSP-RRC-C102 are not satisfied.
THEN **CONTINUE** in this procedure until Main Turbine is ready to be tripped, _____
AND **SCRAM** the Reactor at the direction of the CRS/Shift Manager
per PPM 3.3.1, Reactor Scram. _____

5.2.33 **MAINTAIN** Reactor Power at 25% unless otherwise directed by the Reactivity Control Plan, PPM 9.3.12, or CRS/Shift Manager. _____

5.2.34 IF a reactor shutdown is imminent,
THEN **EXIT** this procedure, _____
AND **SHUT DOWN** the Plant per PPM 3.2.1, Normal Plant Shutdown. _____

5.3 Power Ascension to 60% Power

5.3.1 **NOTIFY** Dittmer of intent to raise reactor power. (N/A if already notified.) _____

5.3.2 IF power was reduced to LT 25%,
THEN **VERIFY** the following surveillances are current prior to 25%:

- OSP-MS-Q702 _____
- ISP-RFW-Q401 _____
- ISP-RFW-B301 _____
- ISP-MS-B701 _____
- ISP-MS/IST-R101 _____

5.3.3 IF power was reduced to LT 28%,
THEN **VERIFY** the following surveillances are current prior to 28%:

- ESP-RPS-B301 _____
- ESP-RPS-B302 _____
- ESP-RPT-F601 _____
- ISP-MS-X308 _____
- ISP-MS-X309 _____
- ISP-MS-X310 _____
- ISP-MS-X311 _____
- ISP-RBM-S401 _____
- ISP-RBM-S402 _____
- ISP-RBM-B301 _____
- ISP-RBM-B302 _____
- ISP-RPS-B605 _____
- ISP-RPS-B606 _____
- ISP-RPS-B607 _____
- ISP-RPS-B608 _____
- ISP-RPS-B609 _____
- ISP-RPS-B610 _____
- ISP-RPS-B611 _____
- ISP-RPS-B612 _____
- ISP-RPS-B613 _____
- ISP-RPS-B614 _____
- ISP-RPS-S901 _____
- ISP-RPS S902 _____
- ISP-RPS-S903 _____
- ISP-RPS-S904 _____
- OSP-MS-S701 _____
- OSP-RPS-S401 _____

5.3.4 **VERIFY** Prerequisites are met prior to power ascension. _____

5.3.5 **PLACE** additional condensate filter demineralizers in service as required by flow rates and differential pressure per SOP-CFD-OPS. _____

5.3.6 **ASSIGN** an individual to track thermal power changes. _____

5.3.7 **VERIFY** a Level II qualified SNE is in the Control Room providing technical direction for the following:

- All rod sets and rod sequence adjustments
- All startups, from initial rod pull to the point of adding heat
- All shallow rod adjustments above 25% thermal power, excluding those performed per OSP-CRD-W701, or those following the approved Fast Shutdown Sequence, or the approved pull sheet, or an approved set of standing orders, or an approved down power instruction, or an approved Reactivity Control Plan (RCP). _____

5.3.8 IF the Area of Increased Awareness (AIA) is to be intentionally entered (single loop ops),
THEN **PERFORM** the following prior to entering the AIA:

a. **VERIFY** the reactor feedwater temperatures indicated on RFW-TI-5 are to the left of the curve on Attachment 7.1, (H13-P840) _____

b. **VERIFY** the AIA Entry Reactivity Control Plan has been prepared and approved per PPM 9.3.12 and NFM 5-2. _____

5.3.9 IF power was reduced to LT 29.5%,
THEN **VERIFY** TV/GV Fast Closure operability prior to 29.5% by observing the following:

- Annunciator H13-P603.A7-5.4 is clear _____
- Annunciator H13-P603.A8-5.4 is clear _____
- RPS-RLY-K9A is de-energized _____
- RPS-RLY-K9B is de-energized _____
- RPS-RLY-K9C is de-energized _____
- RPS-RLY-K9D is de-energized _____

5.3.10 **RAISE** power to about 29.5% RTP per PPM 9.3.12. _____

5.3.11 IF Reactor power was reduced to LT 25%,
THEN **LOG** the time when reactor power is GE 25%. _____

5.3.12 IF power was reduced to LT 25%,
THEN **VERIFY** the following surveillances have been completed within 12 hours after reactor power is GE 25%:

- TSP-THERM-C101 _____
- TSP-APRM-C301 _____

5.3.13 IF power was reduced to LT 25%,
THEN **VERIFY** the OSP-RRC-D701 is completed within 24 hours after reactor power is GT 25%. _____

5.3.14 WHEN power is approximately 29.5%,
THEN **VERIFY** the following:

- RWM is auto bypassed. _____
- RBM DOWNSCALE alarm is cleared. _____

5.3.15 IF required when GT 300 MWe,
THEN **RESTORE** Group 5 feedwater heaters to service per SOP-FWH-START. _____

5.3.16 WHEN Main Generator output is approximately 400 MWe,
AND ascending in power to GE 600 MWe,
THEN **PLACE** MSR 2nd stage reheating in service per SOP-MSR-OPS, section for MSR Operation for Temporary Reduction in Power or Load Following. _____

$ 5.3.17 IF thermal power changes GT 15% in one hour,
THEN **NOTIFY** Chemistry to evaluate the Offgas release rate. _____

5.3.18 IF required when GT 400 MWe,
THEN **RESTORE** Group 4 feedwater heaters to service per SOP-FWH-START. _____

5.3.19 **VERIFY** the following prior to exceeding 40% reactor power

- At least 4 Condensate Filter Demineralizer are service (SOP-CFD-OPS) _____
- TSP-CRD-C101 is current. _____
- RRC flow biased per SOP-RRC-START. _____

5.3.20 **RAISE** Reactor power to GT 50% RTP or as determined by Reactivity Control Plan. _____

5.3.21 IF required when GT 500 MWe,
THEN **RESTORE** Group 3 feedwater heaters to service per SOP-FWH-START. _____

5.3.22 **PERFORM** the following during power ascension:

- **MONITOR** RPV level and feedwater system operation. _____
- **MONITOR** recirculation pump vibration, _____
  AND **RESET** the alarms when vibration has normalized. _____

5.3.23 WHEN RTP is approximately 50%,
THEN **PERFORM** the following:

a. **VERIFY** the following valves **CLOSED**. (H13-P602)

- MS-V-69 _____
- MD-V-73 _____
- MS-V-156 _____

b. **CLOSE** the following Steam Line Drains (H13-P602):

- MD-V-70A _____
- MD-V-70B _____
- MD-V-70C _____
- MD-V-70D _____

c. WHEN MD-V-73 is closed,
THEN **CLOSE** MD-V-71 (H13-P602). _____

5.3.24 **RAISE** Reactor Power to approximately 60% RTP per PPM 9.3.12. _____

5.3.25 IF necessary,
THEN **START** a third Circulating Water pump per SOP-CW-OPS. _____

5.3.26 PRIOR to exceeding 65% power,
THEN **START** the third Condensate Booster Pump per SOP-COND-START. _____

5.3.27 **PLACE** cooling tower fans in service per SOP-CW-OPS as necessary to maintain the following:

- Condensate temperature 90-125°F. _____
- DW temperature and pressure. _____
- TSW pump discharge GE 65°F and LT 80°F. _____

5.3.28 IF the operating TSW pump discharge temperature is GT 80°F,
THEN **MAINTAIN** a heightened awareness of TSW cooled components, _____
AND **CONSIDER** supplemental monitoring of TSW cooled components. _____

5.3.29 **CONTINUE** power ascension to 100% power per Section 5.4, Power Ascension to 100% Power. _____

5.4 Power Ascension to 100%

5.4.1 **NOTIFY** Dittmer of intent to raise reactor power. (N/A if already notified.) _____

5.4.2 **VERIFY** Section 5.3 is complete. _____

5.4.3 WHEN Reactor Power is approximately 70%, and each 10% rise thereafter, THEN **RECORD** Reactor Power level and the normal level controller output for each in-service feedwater heater in the electronic logging system. _____

5.4.4 **CONTINUE** power ascension to rated conditions per PPM 9.3.12. _____

5.4.5 IF applicable,
THEN **LOG** the time when 75% power is obtained. _____

5.4.6 WHEN GE 900 MWe,
THEN **RESTORE** Group 1 and 2 Feedwater Heaters to service per SOP-FWH-START. (N/A if not removed.) _____

5.4.7 WHEN Generator output is GE 1092 MWe,
THEN **PLACE** the Main Turbine in Governor Valve Optimization per SOP-MT-GV/OPTIMIZATION. _____

5.4.8 **RECORD** the Reactor power level (APRM indication) at which this procedure is exited:

_____________Rx Pwr _____

5.4.9 **NOTIFY** BPA of Reactor power level (APRM indication) at which this procedure is exited: _____

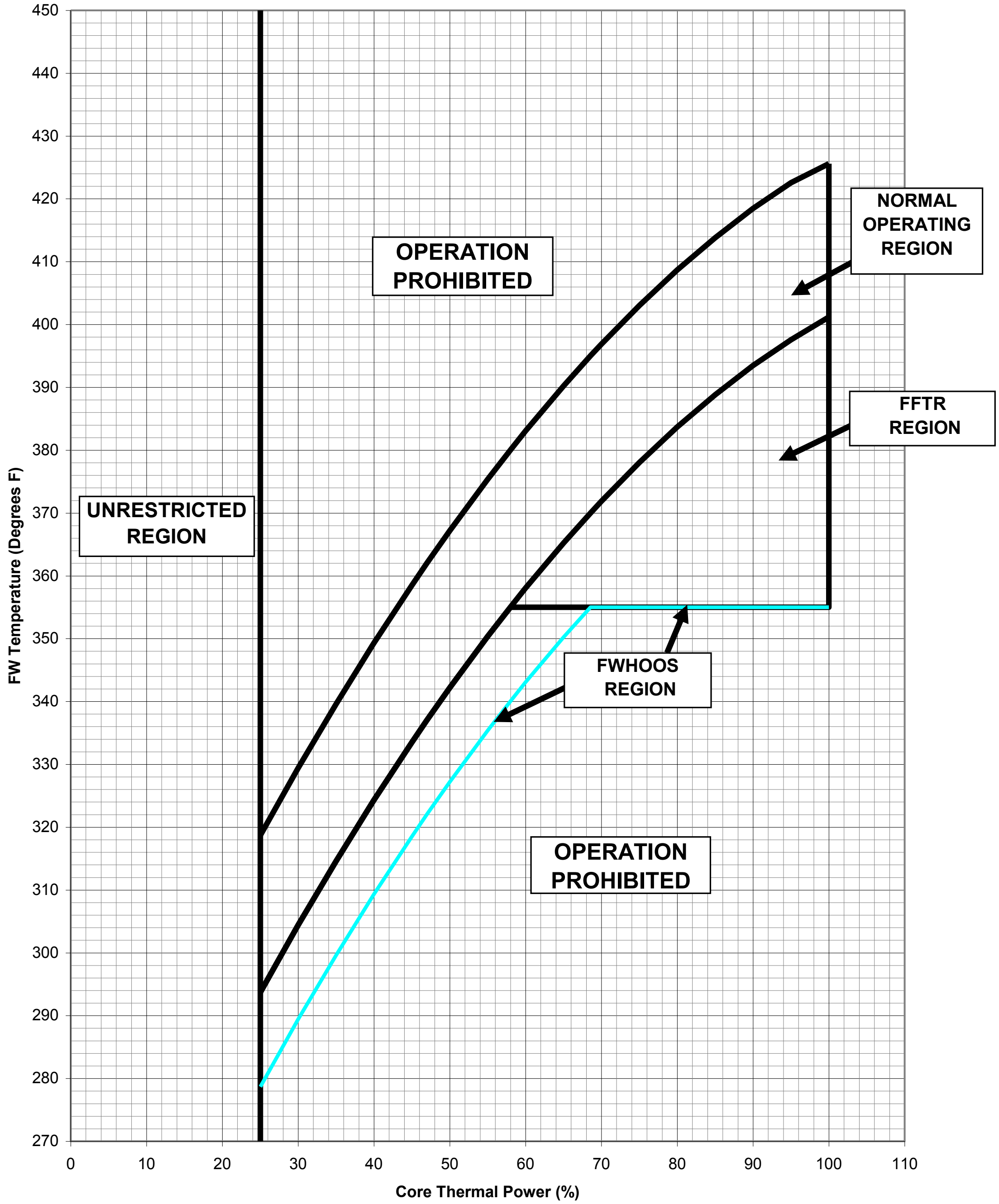
6.0 DOCUMENTATION

Maintain the completed procedure in the permanent plant file in accordance with the appropriate record procedure.

7.0 ATTACHMENTS

7.1 Feedwater Temperature Versus Reactor Power

FEEDWATER TEMPERATURE VERSUS REACTOR POWER



END

Attachment 7.1, Feedwater Temperature Versus Reactor Power

Verify Revision Information Prior To Use	Initials	JM
	Date	Today

Number: SOP-MT-GV/OPTIMIZATION	Use Category: CONTINUOUS	Major Rev: 006 Minor Rev: 005 Page: 1 of 7
Title: Governor Valve Optimization		

PLANT PROCEDURES MANUAL	PCN#: 17-0027
SOP-MT-GV/OPTIMIZATION	Effective Date: 05/13/21

JM – Jamal Matthews

NOTE - Only procedural steps in section 5.2 are being performed. Section 5.1 is Not Applicable (N/A). JM

DESCRIPTION OF CHANGES

Justification (required for major revision)
Incorporated changes per action request recommendations

Page(s)	Description (including summary, reason, initiating document, if applicable)
6	Added note “The Governor valves will not stay in Optimize if LT 90% VPL.” AR-249948
6	MR-001 – Enhancement – Modified steps 5.1.2g, 5.1.2g Note, and 5.1.2g.2 to remove “GE”. 92% is sufficient to ensure GV stay in Optimize (AR-323470)
5, 6	MR-002, Editorial, Grammar changes to notes before 5.1.2.a and 5.1.2.g. AR-342443
6	MR-003, PCN-17-0027. Modified steps 5.1.2g, 5.1.2g Note, and 5.1.2g.2 to update the 92% to 95% due to the MUR project, this is sufficient to ensure GV stay in Optimize at the high power. AR-368315
5	MR-004, Editorial, Added PPC after TDAS for referenced inop. computer points (AR 382051)
5	MR-005: Added Note for entering substitute values. (AR 407807)

TABLE OF CONTENTS

1.0 PURPOSE

Provide directions for the entry into Governor Valve Optimization and sequential valve operation modes.

2.0 REFERENCES

2.1 SIL 502 (OER 89075C) Max Combined Flow Limiter Setting of 130% {P-105020}

2.2 TRICON OMM Manual

2.3 Wonder Ware Manual

3.0 PREREQUISITES

3.1 **VERIFY** Generator output GE 1092 MWe prior to GV Optimization. _____

> NOTE: The following step may require slightly GT 1092 MWe.

3.2 **VERIFY** Optimize Valve Mode OKAY to SELECT light illuminated. _____

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open.

4.2 The Main Turbine automatically comes out of Governor Valve Optimization when Generator Output drops below 1058 MWe.

5.0 PROCEDURE

5.1 Governor Valve Optimization

NOTE: The Governor Valve Optimization Mode enhances Generator Output at maximum reactor power. Generator output must be GE 1092 MWe prior to GV Optimization.

CAUTION

Do not sustain Optimization if reactor power is LE 1092 MWe and GV 4 is LT 1% open.

5.1.1 **VERIFY** the following:

NOTE: Substitutions or data source changes on the N4 screen for the primary computer (normally TDAS) should be performed on the backup computer at the same time. It is important for maintaining accurate CTP reporting in the backup system to ensure that all calculations are matching between both systems.

- IF TDAS or PPC points B031 and/or B032 are inoperable,
  THEN **VERIFY** appropriate substitute values are entered for RRC pump electric power. _____
- DEH in Turbine Follow Reactor mode. _____
- Reactor Pressure and Reactor Power stable. _____

5.1.2 **ENTER** Governor Valve Optimization as follows: {P-105020}

NOTE: GV Optimization involves substantially throttling closed GV-4 then using GV-1, throttled to approximately 55% open, to control RPV pressure. Both valves still move to control reactor pressure.

a. **VERIFY** LOAD TARGET is set at 1370 MW (Main Display, Load Control Display) _____

b. IF VPL DEMAND is not at 100%,
THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display):

1) **SELECT** VPL TARGET. _____

2) **ENTER** 100%. _____

3) **SELECT** OK. _____

4) **SELECT** GO. _____

5) **SELECT** YES. _____

6) **VERIFY** GO ILLUMINATED. _____

7) **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

c. **VERIFY** Optimize Valve Mode OKAY TO SELECT light illuminated. _____

d. **SELECT** OPTIMIZED VALVE MODE. _____

e. **SELECT** YES. _____

f. **VERIFY** GV-1 moves to approximately 50-55% as GV-4 throttles. _____

<u>NOTE</u>: VPL DEMAND is set 10% GT GV DEMAND or 95%, whichever is greater, to allow the Turbine Bypass Valves to open sooner if there is a GV failure.

<u>NOTE</u>: The Governor valves will not stay in Optimize if LT 90% VPL.

g. **SET** VPL DEMAND approximately 10% above GV DEMAND or 95%, whichever is greater, as follows:

1) **SELECT** VPL TARGET. _____

2) **ENTER** value that is approximately 10% above GV DEMAND or 95%, whichever is greater. _____

3) **SELECT** OK. _____

4) **SELECT** GO. _____

5) **SELECT** YES. _____

6) **VERIFY** GO illuminated. _____

h. **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

i. **VERIFY** final VPL DEMAND indicates VPL TARGET value. _____

5.2 Enter Sequential Valve Operation {P-105020}

> NOTE: The Main Turbine automatically comes out of Governor Valve Optimization when Main Generator Load drops below 1058 MWe.

5.2.1 IF VPL DEMAND is not at 100%,
THEN **SET** VPL DEMAND to 100% as follows (Menu, Main Display):

a. **SELECT** VPL TARGET. _____

b. **ENTER** 100%. _____

c. **SELECT** OK. _____

d. **SELECT** GO. _____

e. **SELECT** YES. _____

f. **VERIFY** GO illuminated. _____

g. **VERIFY** VPL DEMAND ramps to VPL TARGET value. _____

5.2.2 **COMPLETE** entry into Sequential Valve Mode as follows:

a. **SELECT** SEQUENTIAL VALVE MODE. _____

b. **SELECT** YES. _____

c. **VERIFY** GV-1 and GV-4 move to their pre-optimization positions (approximately equal). _____

d. **VERIFY** SEQUENTIAL VALVE MODE is illuminated. _____

6.0 ATTACHMENTS

None

Verify Revision Information Prior To Use	Initials	J.M
	Date	Today

Number: OSP-MS-Q702	Use Category: CONTINUOUS	Major Rev: 003 Minor Rev: N/A Page: 1 of 12
Title: BYPASS VALVES TEST		

PLANT PROCEDURES MANUAL	PCN#: N/A
OSP-MS-Q702	Effective Date: 12/27/21

Performed By

Print Name	Initials	Print Name	Initials
Jamal Matthews	J.M	Rusty Peterson	R.P

Test Satisfactory ☐ Yes ☐ No

CR Initiated ☐ Yes ☐ No

If Yes, CR Number: ____________

WR Initiated ☐ Yes ☐ No

If Yes, WR Number: ____________

CRS/Shift Manager Review ______________________ Date ________ Time ________

Print Name /Sign Name

Assigned Reviewer ______________________ Date ________

Print Name / Sign Name

Comments ______________________

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	Description (including summary, reason, initiating document, if applicable)
3	Revised Purpose to align with TS SR 3.7.6.1 requirements. (CA 428128)
Throughout	Revised references in French brackets to short form. (Editorial) (no rev bars)

1.0 PURPOSE

1.1 Provide instructions for determining the operability of Main Steam Bypass Valves (MS-V-160A-D) as per Technical Specification SR 3.7.6.1.

1.2 This surveillance is required quarterly when the plant is GE 25% rated thermal power.

This surveillance is required prior to exceeding 25% power during a reactor startup if not performed within the previous quarter or if maintence has been performed that could affect Main Steam Bypass Valve operability.

2.0 REFERENCES

2.1 PER 200-0601, Feedwater Heater Trip

2.2 Technical Specifications SR 3.7.6.1, Cycle each Bypass Valve

2.3 SS2-PE-93-310 (Response to RFTS 91-11-126, RPS TV/GV Fast Closure Scram Signal)

2.4 SS2-PE-93-370 (RPS TV/GV Fast Closure Scram Signal prerequisite to be LE 30% or GE 40% power when testing Bypass Valves)

2.5 PPM 3.1.2, Reactor Startup

2.6 PPM 3.2.1, Reactor Plant Shutdown

2.7 PPM 3.2.6, Power Maneuvering

2.8 OSP-MS-S701, Turbine Valve Surveillance

2.9 SOP-FWH-START, Extraction Steam And Heater Vents/Drains Startup

2.10 SOP-FWH-SHUTDOWN, Extraction Steam and Heater Vents/drains System Shutdown

2.11 SOP-MT-START, Main Turbine Start

2.12 PPM 9.3.18, Implementation of Fuel Vendor Preconditioning Recommendations

2.13 Wonder Ware Manual

2.14 TRICON Manual

3.0 PREREQUISITES

3.1 **VERIFY** Reactor Power is LE 29.5% or GE 40%. RP

3.2 **NOTIFY** Dittmer Dispatcher of Bypass Valve testing. RP

3.3 **VERIFY** the Main Turbine is operating in TURBINE FOLLOW REACTOR mode (Menu, Valve Testing). RP

3.4 **NOTIFY** the Control Room Operators that the following annunciators are expected during performance of this surveillance:

- H13-P840-A2.5-2, LOW PRESSURE HEATER 5A LEVEL HIGH RP
- H13-P840-A2.5-4, LOW PRESSURE HEATER 5B LEVEL HIGH RP
- H13-P840-A3.6-4, MAIN CONDENSER HOTWELL LEVEL HIGH RP
- H13-P840-A3.6-5, MAIN CONDENSER CONDUCTIVITY HIGH RP
- H13-P840-A3.1-2, Moisture Separator Reheator A Drain Tank 2B Level High RP
- H13-P840-A3.2-1, Moisture Separator Reheator A Drain Tank 1A Level High RP
- H13-P840-A3.2-2, Moisture Separator Reheator A Drain Tank 2B Level Low RP
- H13-P840-A3.4-1, Moisture Separator Reheator A Drain Tank 2A Level High RP
- H13-P840-A3.5-1, Moisture Separator Reheator A Drain Tank 2A Level Low RP
- H13-P840-A3.5-2, Moisture Separator Reheator B Drain Tank 2D Level High RP
- H13-P840-A3.6-2, Moisture Separator Reheator B Drain Tank 2D Level Low RP

4.0 PRECAUTIONS AND LIMITATIONS

~~4.1~~ When each Bypass Valve is full open, Main Turbine load is reduced approximately 75 MWe, as Governor Valves throttle to maintain steam pressure.

~~4.2~~ Use care to prevent pressure transients which may create a flux spike capable of causing a Reactor trip.

~~4.3~~ Tests should be conducted as quickly as possible so as to minimize off standard steam flows or temperature.

~~4.4~~ During the performance of this surveillance, Reactor Power is maintained LE 29.5% or GE 40%.

~~4.5~~ Due to low extraction steam pressures, therefore slower heater level control, low pressure heaters 1 and 2 are removed from service when Reactor Power is LE 76% and testing Turbine Bypass Valves. {P-2.1}

~~4.6~~ During Plant Startup, prior to synchronizing to the grid, FWHs 5A and 5B dump setpoint should be adjusted in accordance with SOP-FWH-START to prevent the High Level Trip of the 5A or 5B FWH since there is insufficient pressure to push the heater drains from TB 471 to TB 501.

~~4.7~~ The intent of the 75 MWth reduction is to ensure that reactor power is not deliberately raised above the allowed thermal limit for the given LEFM status. As each Turbine Bypass Valve is cycled, the Governor Valves throttle to maintain steam pressure causing reactor power to fluctuate. The reduction of 75 MWth bounds this power change.

5.0 MATERIALS, TOOLS, AND TEST EQUIPMENT

None

6.0 ACCEPTANCE CRITERIA

This surveillance is satisfactorily completed when all steps preceded by a # have been initialed, all other steps have either been initialed or properly documented, and the CRS/Shift Manager has reviewed and signed the cover sheet.

7.0 PROCEDURE

> NOTE: The intent of the 75 MWth reduction is to ensure that reactor power does not exceed the allowed thermal power as the bypass valves are opened and closed. The allowe for the given LEFM status.

7.1 **VERIFY** Reactor power is at least 75 MWt below the current LEFM limit using PPM 3.2.1 or PPM 3.2.6 per one of the following:

7.1.1 IF LEFM Mode of Operation is in Check Plus Mode,
THEN **VERIFY** Reactor power is LE 3469 MWt. _____

7.1.2 IF LEFM Mode of Operation is in Check Mode,
THEN **VERIFY** Reactor power is LE 3462 MWt. _____

7.1.3 IF LEFM Mode of Operation is in a Failure Mode
THEN **VERIFY** Reactor power is LE 3411 MWt. _____

7.2 **VERIFY** proper margin to Pre-Conditioned Status (PCS) exists per PPM 9.3.18. _____

> ~~NOTE~~: Due to low extraction steam pressures, therefore slower heater level control, low pressure heaters 1 and 2 are removed from service when Reactor Power is LT 76% and testing Turbine Bypass Valves. {P-2.1}

> ~~NOTE~~: During Plant startup, prior to synchronizing to the grid, FWHs 5A and 5B dump setpoint should be adjusted in accordance with SOP-FWH-START to prevent the High Level Trip of FWH 5A or 5B since there is insufficient pressure to push the heater drains from TB 471 to TB 501.

7.3 IF reactor power is LT 76%,
THEN **VERIFY** the following feedwater heaters are removed from service per SOP-FWH-SHUTDOWN: {P-2.1}

- COND-HX-1A N/A JM
- COND-HX-1B _____
- COND-HX-1C _____
- COND-HX-2A _____
- COND-HX-2B _____
- COND-HX-2C N/A JM

> ~~NOTE:~~ The following condensate flow requirement is to allow sufficient margin for Desuperheat Sprays and Hotwell dump flow, while providing sufficient flow to the Reactor.
>
> ~~NOTE:~~ Each Condensate Booster Pump is rated for 11,000 gpm.

7.4 IF condensate flow is NOT 3000 gpm LT the rated flow for the present condensate pump configuration (as indicated on COND-FR-11), THEN **REDUCE** Reactor power until condensate flow is 3000 gpm LT the rated flow for the present pump configuration. N/A JM

7.5 **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). _____
- **THROTTE OPEN** COND-V-178 (Desuper Spray Bypass). N/A JM
- **PLACE** COND-PIC-40 in **MANUAL** (TB 441, IR-9) to establish desuperheat spray at ~100 psig. N/A JM

7.6 **SELECT** BV on the SELECT VALVE panel (Menu, Valve Testing). _____

7.7 **VERIFY** OK TO TEST BV VALVES is green. _____

7.8 **PERFORM** the following to test BV1:

> NOTE: Use indication on DEH Monitor panel for MWe.

7.8.1 **RECORD** MWe: __________ MWe, CLOSED _____

7.8.2 **SELECT** TEST BV1. _____

> NOTE: When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again.

7.8.3 **SELECT** TEST. _____

7.8.4 **TOUCH** and **HOLD** OPEN BV1 button. _____

7.8.5 WHEN BPV1 is fully open,
THEN **RELEASE** OPEN BV1 button. _____

7.8.6 **VERIFY** BPV1 is **OPEN**. _____

7.8.7 **RECORD** MWe: __________ MWe, OPEN _____

7.8.8 **TOUCH** and **HOLD** CLOSE BV1 button. _____

7.8.9 WHEN BPV1 is fully closed,
THEN **RELEASE** CLOSE BV1 button. _____

7.8.10 **VERIFY** BPV1 is **CLOSED**. _____

7.8.11 **RECORD** MWe: __________ MWe, CLOSED _____

7.8.12 **SELECT** TEST BV1. _____

7.8.13 **SELECT** EXIT TEST. _____

7.8.14 **VERIFY** Plant conditions have stabilized before continuing to the next step. _____
CRS

7.9 **PERFORM** the following to test BV2:

> NOTE: Use indication on DEH Monitor panel for MWe.

7.9.1 **RECORD** MWe: ___________ MWe, CLOSED _____

7.9.2 **SELECT** TEST BV2. _____

> NOTE: When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again.

7.9.3 **SELECT** TEST. _____

7.9.4 **TOUCH** and **HOLD** OPEN BV2 button. _____

7.9.5 WHEN BPV2 is fully open,
THEN **RELEASE** OPEN BV2 button. _____

\# 7.9.6 **VERIFY** BPV2 is **OPEN**. _____

7.9.7 **RECORD** MWe: ___________ MWe, OPEN _____

7.9.8 **TOUCH** and **HOLD** CLOSE BV2 button. _____

7.9.9 WHEN BPV2 is fully closed,
THEN **RELEASE** CLOSE BV2 button. _____

\# 7.9.10 **VERIFY** BPV2 is **CLOSED**. _____

7.9.11 **RECORD** MWe: ___________ MWe, CLOSED _____

7.9.12 **SELECT** TEST BV2. _____

7.9.13 **SELECT** EXIT TEST. _____

7.9.14 **VERIFY** Plant conditions have stabilized before continuing to the next step. _____
CRS

7.10 **PERFORM** the following to test BV3:

> NOTE: Use indication on DEH Monitor panel for MWe.

7.10.1 **RECORD** MWe: __________ MWe, CLOSED ______

7.10.2 **SELECT** TEST BV3. ______

> NOTE: When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again.

7.10.3 **SELECT** TEST. ______

7.10.4 **TOUCH** and **HOLD** OPEN BV3 button. ______

7.10.5 WHEN BPV3 is fully open,
THEN **RELEASE** OPEN BV3 button. ______

\# 7.10.6 **VERIFY** BPV3 is **OPEN**. ______

7.10.7 **RECORD** MWe: __________ MWe, OPEN ______

7.10.8 **TOUCH** and **HOLD** CLOSE BV3 button. ______

7.10.9 WHEN BPV3 is fully closed,
THEN **RELEASE** CLOSE BV3 button. ______

\# 7.10.10 **VERIFY** BPV3 is **CLOSED**. ______

7.10.11 **RECORD** MWe: __________ MWe, CLOSED ______

7.10.12 **SELECT** TEST BV3. ______

7.10.13 **SELECT** EXIT TEST. ______

7.10.14 **VERIFY** Plant conditions have stabilized before continuing to the next step. ______
CRS

7.11 **PERFORM** the following to test BV4:

> NOTE: Use indication on DEH Monitor panel for MWe.

7.11.1 **RECORD** MWe: __________ MWe, CLOSED _____

7.11.2 **SELECT** TEST BV4. _____

> NOTE: When in the Valve Testing Mode, BPVs will move only while the OPEN BV or CLOSE BV button is being touched. Valve motion will stop if finger is lifted from the touch screen, and will resume when the button is touched and held again.

7.11.3 **SELECT** TEST. _____

7.11.4 **TOUCH** and **HOLD** OPEN BV4 button. _____

7.11.5 WHEN BPV4 is fully open,
THEN **RELEASE** OPEN BV4 button. _____

7.11.6 **VERIFY** BPV4 is **OPEN**. _____

7.11.7 **RECORD** MWe: __________ MWe, OPEN _____

7.11.8 **TOUCH** and **HOLD** CLOSE BV4 button. _____

7.11.9 WHEN BPV4 is fully closed,
THEN **RELEASE** CLOSE BV4 button. _____

7.11.10 **VERIFY** BPV4 is **CLOSED**. _____

7.11.11 **RECORD** MWe: __________ MWe, CLOSED _____

7.11.12 **SELECT** TEST BV4. _____

7.11.13 **SELECT** EXIT TEST. _____

7.11.14 **VERIFY** Plant conditions have stabilized before continuing to the next step. _____
CRS

7.12 **SECURE** desuperheat spray by one or more of the following methods:
(N/A method(s) not used)

- **PLACE** COND-PCV-40 (Desuper Spray Press Control) to **NORM** (AUTO). _____
- **CLOSE** COND-V-178 (Desuper Spray Bypass). N/A JM
- **PLACE** COND-PIC-40 in **AUTO** (TB 441, IR-9). N/A JM

7.13 **VERIFY** Desuperheat Spray is secured (approximately 0 psig on COND-PI-40). _____

7.14 IF required to raise reactor power,
THEN **RESTORE** Reactor Power per PPM 3.1.2 or PPM 3.2.6. N/A JM

8.0 DOCUMENTATION

Maintain the completed surveillance in the permanent plant file in accordance with Plant Records procedure(s).

9.0 ATTACHMENTS

None

ENERGY NORTHWEST

ILC 25 SC-3

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE OPERATIONS REQUALIFICATION TRAINING

COURSE TITLE COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE ABN-CRD Scram
Loss of Instrumentation PPM 5.1.6 RPV Flooding - ATWS

LENGTH OF LESSON 1 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	N/A	Rev. No.	
Simulator Guide PQD Code		Rev. No.	
JPM PQD Code	N/A	Rev. No.	
Exam PQD Code	N/A	Rev. No.	

DIVISION TITLE Nuclear Training – NRC EXAM

DEPARTMENT Operations Training

PREPARED BY Jeff Lux DATE 07/22/22

REVISED BY N/A DATE

VALIDATED BY DATE

TECHNICAL REVIEW BY DATE

INSTRUCTIONAL REVIEW BY DATE

APPROVED BY DATE
Operations Training Manager

MAJOR REVISION RECORD

MINOR REVISION RECORD

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

Review Comments and Resolution

Date	Comment	Resolution
07/22	RCIC-V-13 Fuse Failure Masked if DG-1 Not taken to maintenance	Change to Spurious closure of RCIC-V-8
09/21	"DG-1 Sounds like it is hunting" field operator report	Removed that part of the comment, booth operator now reports vibrations and voltage oscillations and does not use the term "hunting" which is not a characteristic of voltage oscillations.
09/21	Wrong IC listed in set up instructions.	Corrected.
09/21	Validations initially direct SOP-DG-SHUTDOWN in place of emergency trip	Added examiner note to for clarification.

SCENARIO OUTLINE

Facility: Columbia Generating Station
Scenario No.: 3
Op Test No.:

Examiners: ____________________
____
____

Operators: ____________________
____
____

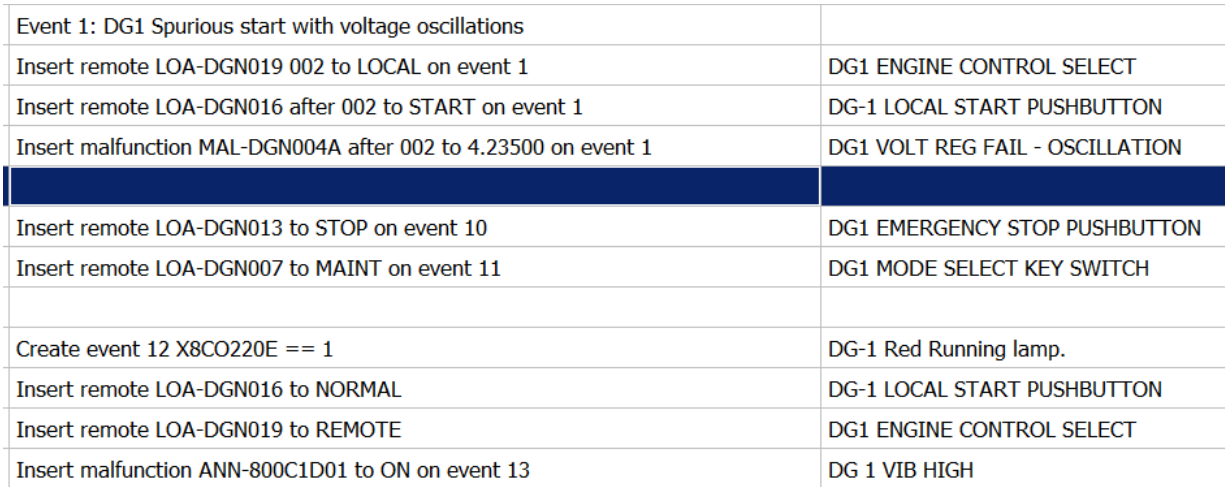
Initial Conditions:	Columbia is operating at 100% power. CRD-P-1B is tagged out for pump coupling repairs and is expected back in service next shift.
Turnover:	No evolutions scheduled for this shift.

Critical Tasks:

CT-1	With CRD pressure LT 940 psig and two or more control rod accumulator trouble alarms in, initiate a manual scram within 20 minutes of CRD pressure LT 940 psig. (With a loss of both CRD pumps it would be acceptable for the crew to determine that the accumulator trouble alarms are due to low accumulator pressure, therefore it is not required for the crew to wait on a report from a field operator to perform a manual reactor scram.
CT-2	With a loss of all Reactor Water level indication in an ATWS condition, open 7 SRVs per PPM 5.1.6 and commence flood up within 15 minutes of loss of all level indication.

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.	Trig.	Event Type*	Scenario Summary / Event Description
1	1	C (BOP, CRS) TS (CRS)	DG-1 will spuriously start and will have severe voltage oscillations. 2 Minutes after spurious start the alarm will come in for DG-1 high vibrations. The crew will take actions to trip DG-1 (per OI-9 Transient Acts). The CRS will evaluate TS and declare 3.8.1B AC sources Operating, perform SR 3.8.1.1 for operable offsite circuits with in 1 hour and restore DG to operable status in 72 hours.



Event 1: DG1 Spurious start with voltage oscillations	
Insert remote LOA-DGN019 002 to LOCAL on event 1	DG1 ENGINE CONTROL SELECT
Insert remote LOA-DGN016 after 002 to START on event 1	DG-1 LOCAL START PUSHBUTTON
Insert malfunction MAL-DGN004A after 002 to 4.23500 on event 1	DG1 VOLT REG FAIL - OSCILLATION
Insert remote LOA-DGN013 to STOP on event 10	DG1 EMERGENCY STOP PUSHBUTTON
Insert remote LOA-DGN007 to MAINT on event 11	DG1 MODE SELECT KEY SWITCH
Create event 12 X8CO220E == 1	DG-1 Red Running lamp.
Insert remote LOA-DGN016 to NORMAL	DG-1 LOCAL START PUSHBUTTON
Insert remote LOA-DGN019 to REMOTE	DG1 ENGINE CONTROL SELECT
Insert malfunction ANN-800C1D01 to ON on event 13	DG 1 VIB HIGH

2	2	TS (CRS) C (BOP)	RCIC Turbine experiences a spurious Mechanical over speed trip. The CRS will enter ABN-RCIC-ISOL/TRIP and perform actions to attempt to restore. The CRS will evaluate TS and declare LCO 3.5.3 condition A to verify HPCS operable immediately and restore RCIC to an operable status in 14 Days.

Event 2: RCIC Mechanical Overspeed	
Insert malfunction BST-RCI036F to SPURIOUS_TRIP on event 2	RCIC-SS-MECH TURB SPEED MECH TRIP

3	3	I, MC (ATC)	CRD-FC-600 slowly fails upscale in automatic. ATC will take manual control of CRD-FC-600 to restore CRD parameters to normal.

Event 3: CRD-FC-600 severe oscillations in automatic	
Insert malfunction CNH-CRD001F to 80.00000 on event 3	CRD-FC-600 FLOW CONTROL (M/A STATION) AUTO OSCILLATION
Insert malfunction ANN-603A7E08 to ON on event 3 delete in 5	CRD PUMP SUCTION FILTER dP HIGH

4	4	C (CRS, ATC)	MSE with Excess flow check valve closures. CRS enters ABN-INSTRUMENTATION and ABN-EARTHQUAKE to evaluate the loss of level and pressure instrumentation. ATC will verify available level instruments; BOP will perform actions for ABN-EARTHQUAKE. RFW-LI-606B was the in service level instrument, ATC will swap to RFW-LI-606A.

Event 4: MSE with Excess flow check valve failures	
Insert malfunction MAL-SEIS001 on event 4	EARTHQUAKE MINIMUM SEISMIC EVENT VERSION 1
Insert malfunction MAL-RRS007H after 5 to 8.00000 on event 4	INST LN BRK DOWNSTRM PI-EFC-X106
Insert malfunction MAL-RRS007F after 5 to 7.00000 on event 4	INST LN BRK DOWNSTRM PI-EFC-X109

5	5	M (ALL)	CRD-P-1A will experience a slow failure resulting in lowering CRD pressure (with multiple accumulator alarms) the CRS will enter ABN-CRD and take action to manually scram the reactor (**CT-1**). (Charging header pressure cannot be restored to GE 940 psig within 20 minutes with steam dome pressure GE 900 psig). On scram 6 Rods will fail to insert, reactor power will be LT 1%. CRS will enter PPM 5.1.1 RPV Control and transition to PPM 5.1.2 RPV Control ATWS.

Event 5: CRD-P-1A Reduced Head / ABN-CRD Scram required	
Insert malfunction PMP-CRD001H to 10.00000 in 300 on event 5	CRD-P-1A CONTROL ROD DRIVE PUMP REDUCED HEAD

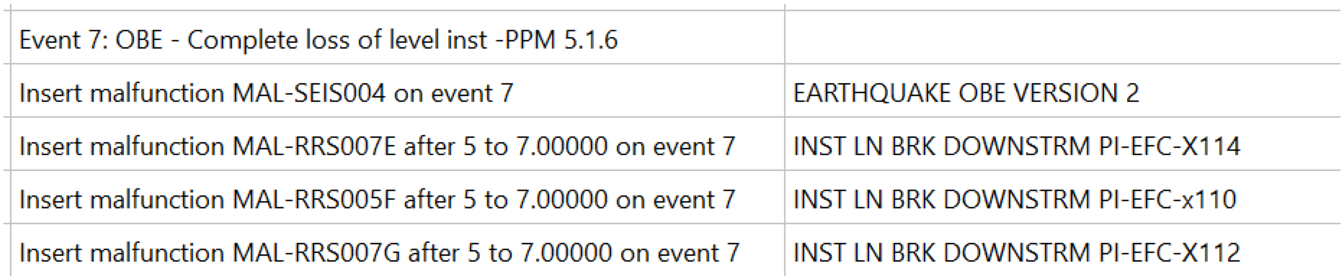
Insert malfunction MAL-RMC005-1831	ROD 1831 STUCK
Insert malfunction MAL-RMC005-1827	ROD 1827 STUCK
Insert malfunction MAL-RMC005-1423	ROD 1423 STUCK
Insert malfunction MAL-RMC005-1027	ROD 1027 STUCK
Insert malfunction MAL-RMC005-1035	ROD 1035 STUCK

6	-	C, MC (BOP)	On Turbine trip and electric plant transfer Breaker S-1 Fails to auto close, BOP will manually close breaker S-1 and re-power SL-11 per SOP-ELEC-480V-OPS-QC

Event 6: S-1 Fails to auto close	
Insert malfunction BKR-EPS049 to FAI_AUT_CLOS	CB-S1 BUS 1 STARTUP FDR

7	7	I (ALL)	OBE Earthquake results in further excess flow check valve closures. The CRS and ATC will evaluate ABN-INSTRUMENTATION and declare that all level instrumentation has been lost. ATC will perform SOP-RXSD-

			DETERMINATION-QC to determine that the reactor is shut down under existing control rod pattern, the CRS will transition to PPM 5.1.6 RPV Flooding. Crew will open 7 SRVs and inject to the RPV per PPM 5.1.6 RPV Flooding ATWS. (**CT-2**)



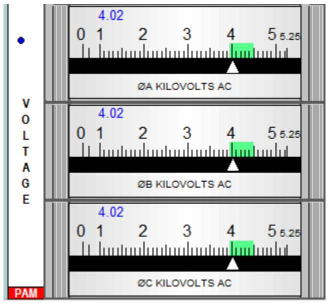
Event 7: OBE - Complete loss of level inst -PPM 5.1.6	
Insert malfunction MAL-SEIS004 on event 7	EARTHQUAKE OBE VERSION 2
Insert malfunction MAL-RRS007E after 5 to 7.00000 on event 7	INST LN BRK DOWNSTRM PI-EFC-X114
Insert malfunction MAL-RRS005F after 5 to 7.00000 on event 7	INST LN BRK DOWNSTRM PI-EFC-x110
Insert malfunction MAL-RRS007G after 5 to 7.00000 on event 7	INST LN BRK DOWNSTRM PI-EFC-X112

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

Target Quantitative Attributes	**Actual**	**Description**
Events after EOP entry (1-2)	**2**	S-1 Breaker fails to auto close / OBE loss of instrumentation.
Abnormal events (2-4)	**2**	ABN-INSTRUMENTATION / ABN-EARTHQUAKE
Major transients (1-2)	**1**	Scram on loss of CRD pressure
EOPs entered/requiring substantive actions (1-2)	**2**	PPM 5.1.1 RPV Control / PPM 5.1.2 RPV Control ATWS
Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	**1**	PPM 5.1.6 RPV Flooding ATWS
Pre-identified Critical tasks (≥ 2)	**2**	See Critical Task Sheets

TERMINATION CRITERIA:

The scenario will be terminated when 7 SRV's are opened, and injection has commenced to flood the RPV per PPM 5.1.6 RPV Flooding ATWS.

<table>
<tr><th colspan="3">EVENT 1: DG-1 Spurious start with severe voltage oscillations</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">After crew assumes the shift and when directed.
INSERT TRIGGER 1: DG-1 Spurious start with voltage oscillations.
Results in: BOP Actions / CRS TS Call</td></tr>
<tr><td>1.</td><td>BOP</td><td>4.800.C1 3-1 DG 1 LOCAL PANEL ALARM
4.800.C1 10-1 DG 1 OUT OF SERVICE
May inform CRS of DG-1 Voltage Oscillations


May dispatch field operator to investigate DG-1</td></tr>
<tr><td colspan="3">If directed as field operator to investigate DG-1 spurious start, wait 3 Minutes and
ROLE-PLAY
“DG-1 has mild vibrations and significant voltage oscillations”</td></tr>
<tr><td>2.</td><td>CRS</td><td>Directs RO to secure DG-1 (Per OI-9 Transient acts)
16.2.3 Transient Act(s): Actions that can be performed by Reactor Operators during a transient as directed by the Control Room Supervisor without immediate procedure reference.
16.3.1 Transient Acts
• Tripping Diesel Generators
Examiner Note: CRS May initially direct SOP-DG-SHUTDOWN due to only having mild vibrations. Once the evaluators have to continue to step 8 (Indications of high vibes and leaving the area for safety) it would no longer be pertinent for normal shutdown and emergency trip would be the definitive correct diagnosis.</td></tr>
<tr><td>3.</td><td>BOP</td><td>Secures DG-1 by depressing emergency stop push button.
Acknowledges:
4.800.C1 1-4 DG1 BKR 7DG1 TRIP
Informs CRS that SW-A is running.</td></tr>
<tr><td>4.</td><td>CRS</td><td>May direct taking DG-1 to maintenance</td></tr>
</table>

EVENT 1: DG-1 Spurious start with severe voltage oscillations

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

If directed as field operator to take DG-1 to Maintenance, wait **2** Minutes and

ACTIVATE TRIGGER 11

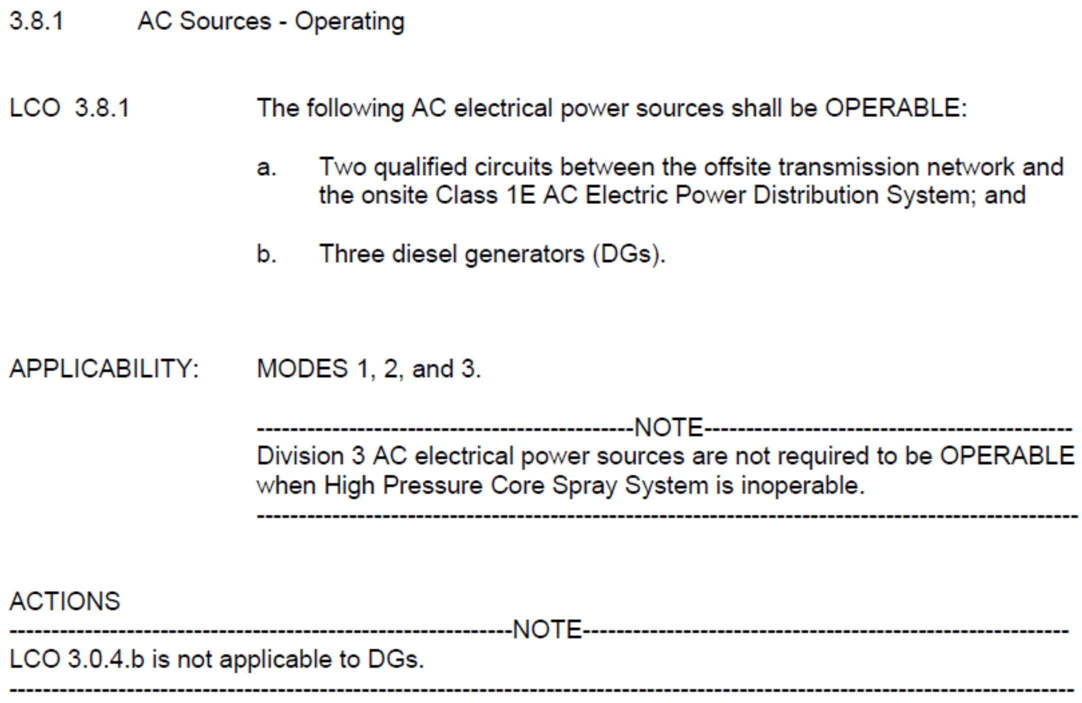
ROLE-PLAY

“DG-1 is in maintenance”

5. **CRS**

Technical Specification Action Statement:

Evaluates TS and declares 3.8.1B



3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electric Power Distribution System; and

b. Three diesel generators (DGs).

APPLICABILITY: MODES 1, 2, and 3.

--NOTE--
Division 3 AC electrical power sources are not required to be OPERABLE when High Pressure Core Spray System is inoperable.

ACTIONS
--NOTE--
LCO 3.0.4.b is not applicable to DGs.

EVENT 1: DG-1 Spurious start with severe voltage oscillations

STEP #	OPERATOR ACTIVITIES			
	Position	**CREW RESPONSE**		
6.	**CRS**	B. One required DG inoperable.	B.1 Perform SR 3.8.1.1 for OPERABLE offsite circuit(s).	1 hour AND Once per 8 hours thereafter
			AND	
			B.2 Declare required feature(s), supported by the inoperable DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
			AND	
7.	**CRS**	B. (continued)	B.3.1 Determine OPERABLE DG(s) are not inoperable due to common cause failure.	24 hours
			OR	
			B.3.2 Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours if not performed within the past 24 hours
			AND	
			B.4.1 Restore required DG to OPERABLE status.	72 hours from discovery of an inoperable DG AND 6 days from discovery of failure to meet LCO

EXAMINER NOTE: The following steps are contingency steps that are only use if the crew does NOT determine that shutdown of DG-1 is required within 10 minutes of spurious auto start. If Crew proceeed to the below steps, the examiner should at a minimum apply prejudice against RO Competancies 1b and 1c and SRO competancies 1a, 1c and 5a.

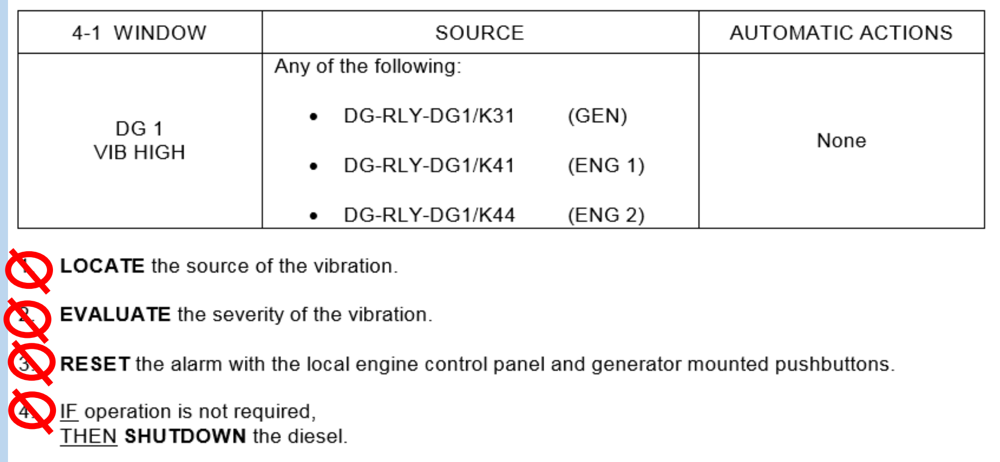
EVENT 1: DG-1 Spurious start with severe voltage oscillations

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

IF DG-1 has been running for **10 minutes** and direction has NOT been given to trip DG-1

ACTIVATE TRIGGER 13 – DG-1 Vibes High

STEP #	Position	CREW RESPONSE
8.	**BOP**	4.800.C1 DG 1 VIB HIGH



4-1 WINDOW	SOURCE	AUTOMATIC ACTIONS
DG 1 VIB HIGH	Any of the following: • DG-RLY-DG1/K31 (GEN) • DG-RLY-DG1/K41 (ENG 1) • DG-RLY-DG1/K44 (ENG 2)	None

1. **LOCATE** the source of the vibration.
2. **EVALUATE** the severity of the vibration.
3. **RESET** the alarm with the local engine control panel and generator mounted pushbuttons.
4. IF operation is not required,
   THEN **SHUTDOWN** the diesel.

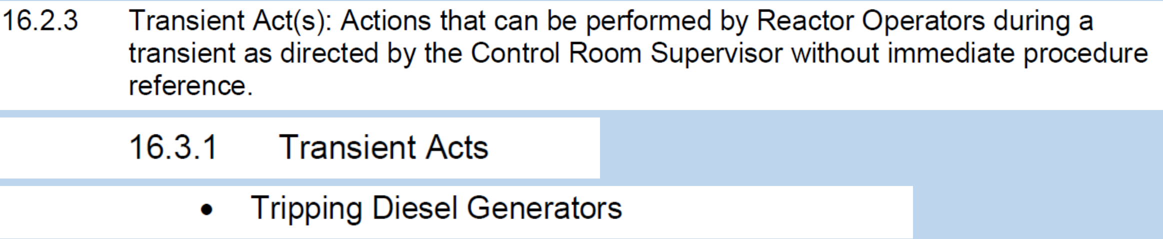
STEP #	Position	CREW RESPONSE
9.	**BOP**	May direct field operator for evaluation of vibration severity

If directed to investigate DG-1 vibrations, wait **1** Minute and

ROLE-PLAY

"DG-1 Vibrations are getting worse. I am leaving the area for safety"

STEP #	Position	CREW RESPONSE
10.	**CRS**	Directs RO to secure DG-1 (Per OI-9 Transient acts)



16.2.3 Transient Act(s): Actions that can be performed by Reactor Operators during a transient as directed by the Control Room Supervisor without immediate procedure reference.

16.3.1 Transient Acts

- Tripping Diesel Generators

STEP #	Position	CREW RESPONSE
11.	**BOP**	Secures DG-1 by taking the control switch to stop.

When the Crew has tripped DG-1.

In the Director, Change event 13, ANN-800C1D01 from "ON" to "OFF"

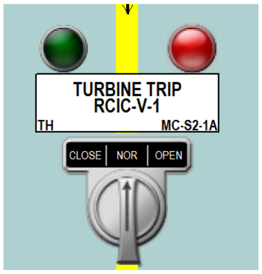
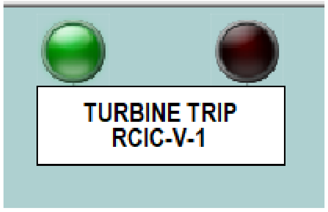
STEP #	Position	CREW RESPONSE
12.	**CRS**	May direct taking DG-1 to maintenance

If directed as field operator to take DG-1 to Maintenance, wait **2** Minutes and

ACTIVATE TRIGGER 11

ROLE-PLAY

"DG-1 is in maintenance"

<table>
<tr><th colspan="3">EVENT 2: RCIC Spurious Mechanical Over speed</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">Following crew actions for DG-1 (Manual Trip)
INSERT TRIGGER 2: RCIC Spurious Mechanical over speed trip.
Results in: CRS TS Call</td></tr>
<tr><td>13.</td><td>**BOP**</td><td>Responds to annunciators:
4.601.A4 1-5 RCIC TURBINE TRIP


Diagnoses Spurious mechanical over speed trip based on indications.
Informs CRS.
Directs field operator to investigate RCIC Turbine trip.</td></tr>
<tr><td colspan="3">If directed as field operator to investigate RCIC **Wait 3 Minutes** and
ROLE-PLAY
“The mechanical linkage for RCIC-V-1 is in the trip position ”</td></tr>
<tr><td>14.</td><td>**BOP**</td><td>Per 4.601.A4 1-5 RCIC TURBINE TRIP<table><tr><th>1-5 WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr><tr><td>RCIC TURBINE TRIP</td><td>RCIC Trip and Throttle valve closed
(RCIC-LS-4/SP)</td><td>• RCIC-V-13 Closes
• RCIC-V-19 Closes</td></tr></table>🚫1 **VERIFY** RCIC-V-1 is **CLOSED** (RCIC Turbine Trip and Throttle Valve) (H13-P601).
🚫2 **VERIFY** RCIC-V-46 is **CLOSED** (RCIC Lube Oil Cooling Water Valve).
Informs CRS of conflicting indications for RCIC-V-1. May inform CRS that it indicates spurious Mechanical Overspeed.
Closes RCIC-V-1 per ARP</td></tr>
</table>

EVENT 2: RCIC Spurious Mechanical Over speed

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
15.	**BOP**	~~3.~~ **DETERMINE** the cause of the RCIC TURBINE TRIP. **REFER** to the following annunciator alarms to assist in determining the cause: • H13-P601.A4.2.8, RCIC TURBINE EXHAUST PRESS HIGH • H13-P601.A4.6-4, RCIC PUMP SUCTION PRES LOW • H13-P601.A3.1-4, LEAK DET RCIC EQUIP AREA TEMP HI-HI (Division 1 Isol. Signal) • H13-P601.A3.1-8, LEAK DET RCIC PIPE ROUTING AREA TEMP HI HI (Division 1 Isol Signal) None of these alarms are present. • RCIC OVERSPEED • MANUAL TURBINE TRIP (H13-P601 or Local) ~~4.~~ **REFER** to ABN-RCIC-ISOL/TRIP, RCIC Recovery Following an Isolation or Trip, for system recovery. Informs CRS ~~5.~~ IF in Mode 1, 2, or 3, AND RCIC is inoperable, THEN **REFER** to Technical Specification 3.5.3. Informs CRS
16.	**CRS**	Enters ABN-RCIC-ISOL/TRIP 4.0 SUBSEQUENT OPERATOR ACTIONS 4.1 **DETERMINE** the need to recover RCIC, based on plant conditions and system integrity. ______ Will attempt to recover RCIC by attempting mechanical over speed reset 4.2 IF RCIC is required to be operable, THEN **ENTER** RCIC as inoperable and unavailable in the electronic logging system. ______ CRS Evaluates 4.3 IF RCIC is going to be non-functional for GT 10 minutes, THEN **NOTIFY** Security to take compensatory action for RCIC out of service. Directs BOP ______ 4.4 **IDENTIFY** and **CORRECT** the cause of the Isolation/Trip. ______ Cause indicated by field operator 4.5 IF RCIC is isolated, THEN **UNISOLATE** RCIC as follows: N/A – Not Isolated

If directed as security for RCIC out of service

ROLE-PLAY

"I understand, take compensatory actions for RCIC out of service"

EVENT 2: RCIC Spurious Mechanical Over speed

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
17.	**CRS**	4.6 IF RCIC tripped on overspeed, THEN **VERIFY** the RCIC Mechanical Overspeed Trip Assembly is reset per Attachment 7.1. Directs BOP to coordinate with field operator ____ **NOTE**: If RPV level is LT -50 inches, RCIC-V-45 will automatically open after the valve is closed. RCIC-V-1 should be opened at the same time RCIC-V-45 is opening. This will allow the ramp generator to control RCIC speed.
18.	**BOP**	7.1 Resetting RCIC Turbine Mechanical Overspeed Trip **NOTE**: This Attachment is to be used if RCIC Turbine has tripped on Mechanical Overspeed. 7.1.1 **VERIFY** the RCIC Turbine speed is LT 3000 RPM. Performs ____ 7.1.2 **VERIFY** RCIC-V-1 is **CLOSED**. ____ Verifies (Performs if not previously closed per annunciator response) **WARNING** To prevent personnel injury, exercise extreme care while climbing on the RCIC Turbine. {R-6.1} Directs field operator to attempt to reset mechanical overspeed linkage Per ABN-RCIC-ISOL-TRIP 4.6 IF RCIC tripped on overspeed, THEN **VERIFY** the RCIC Mechanical Overspeed Trip Assembly is reset per Attachment 7.1. ____

If directed as field operator to reset RCIC mechanical over speed:

Wait 3 Minutes IF NOT PREVIOUSLY dispatched

OR

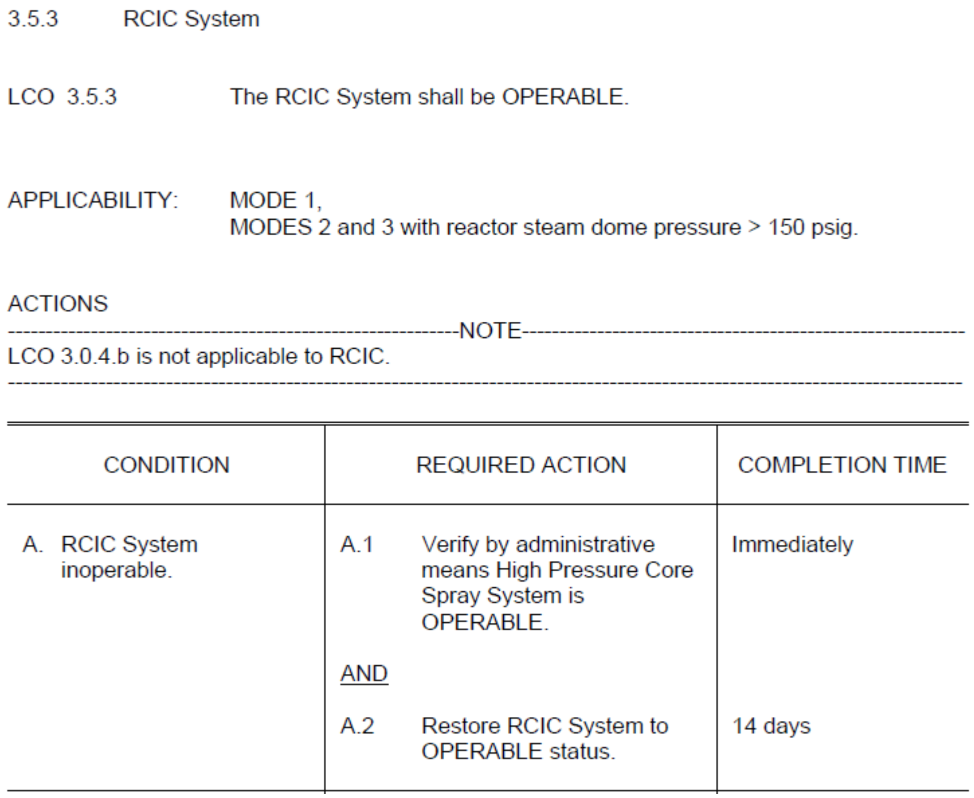
IF dispatched to the RCIC Room previously wait 1 minute and:

ROLE-PLAY

“The mechanical linkage will NOT reset”

Examiner Note: CGS OE – During performance of RCIC testing, field operator could not reset mechanical over speed linkage.

EVENT 2: RCIC Spurious Mechanical Over speed

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
19.	CRS	Evaluates and declares TS 3.5.3 Condition A, TS 3.6.13 Condition A 

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

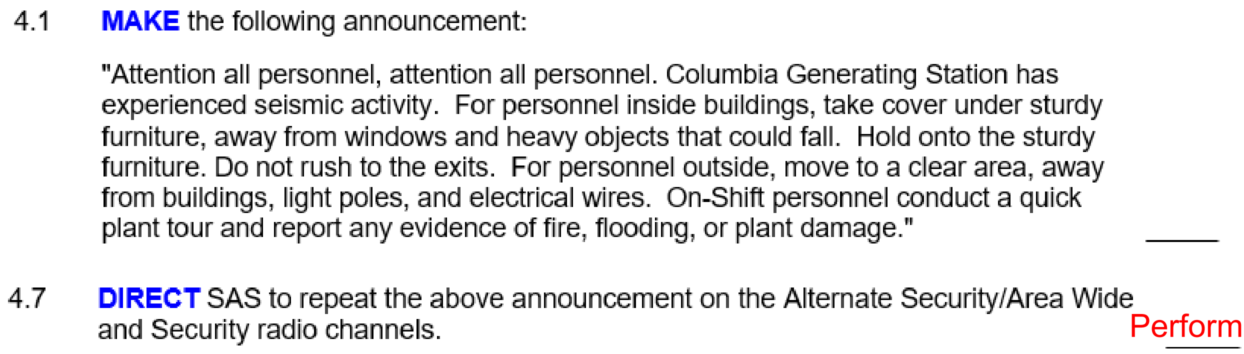
APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

---NOTE---
LCO 3.0.4.b is not applicable to RCIC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCIC System inoperable.	A.1 Verify by administrative means High Pressure Core Spray System is OPERABLE.	Immediately
	AND	
	A.2 Restore RCIC System to OPERABLE status.	14 days

EVENT 3: CRD-FC-600 Flow controller oscillations in automatic		
STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
Following CRS TS call for power loss to RCIC-V-13 **INSERT TRIGGER 3: CRD-FC-600 controller oscillations in automatic** **Results in: Manual control of CRD-FC-600**		
20.	**ATC**	Responds to: 4.603.A7 5-8 CRD PUMP SUCTION FLTR DP HIGH Notes major fluctuations on CRD Flows and differential pressures. Notes Flow Control CRD-FC-600 is erratic in automatic mode of operation. Reports condition to CRS.
Examiner Note: The CRD pump suction DP high alarm in and clear is a symptom of the system flow fluctuations.		
21.	**CRS**	May direct ATC to take manual control of CRD-FC-600 May refer to ABN-CRD
22.	**ATC**	May determine the CRD-FC-600 has failed in the automatic mode of operation and take manual control of CRD-FC-600 by taking the switch to manual. Adjusts flow to restore system parameters to normal by manual taking the controller to about 80% using the open pushbutton in manual.

<table>
<tr><th colspan="3">EVENT 4: MSE with loss of instrumentation.</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">Following recovery from CRD-FC-600 failure in automatic
INSERT TRIGGER 4: MSE / EFC valve closures (X106 and X109)
Results in: ABN-INSRUMENTATION</td></tr>
<tr><td>23.</td><td>**RO**</td><td>**Examiner Note: Annunciators are a symptom of closure of excess flow check valves on the penetration lines.**
Responds to annunciators and indications:
Closure of EFC-106 and EFC-109
4.601.A2 4-4 RHR B/C INJECTION VALVE OPEN PERMISSIVE
4.601.A3 3-3 LPCS INJECTION VALVE OPEN PERMISSIVE
4.601.A4 4-3 RHR A INJECTION VLV OPEN PERMISSIVE
4.603.A8 1-7 RFW CONTR SYSTEM TROUBLE
4.603.A8 4-7 RFW/TURBINE RPV LEVEL HIGH TRIP
4.851.S1 2-5 MINIMUM SEISMIC EARTHQUAKE EXCEEDED
Informs CRS or EFCV Closures</td></tr>
<tr><td>24.</td><td>**CRS**</td><td>Enters ABN-EARTHQUAKE and ABN-INSTRUMENTATION</td></tr>
<tr><td>25.</td><td>**CRS**</td><td>Direct subsequent actions of ABN-EARTHQUAKE.</td></tr>
<tr><td>26.</td><td>**BOP**</td><td>Performs actions of ABN-EARTHQUAKE

4.1 **MAKE** the following announcement:
"Attention all personnel, attention all personnel. Columbia Generating Station has experienced seismic activity. For personnel inside buildings, take cover under sturdy furniture, away from windows and heavy objects that could fall. Hold onto the sturdy furniture. Do not rush to the exits. For personnel outside, move to a clear area, away from buildings, light poles, and electrical wires. On-Shift personnel conduct a quick plant tour and report any evidence of fire, flooding, or plant damage." _____
4.7 **DIRECT** SAS to repeat the above announcement on the Alternate Security/Area Wide and Security radio channels. _____
Performs</td></tr>
<tr><td colspan="3">If contacted as SAS Operator
ROLE-PLAY
"I understand, Repeat ABN-EARTHQUAKE announcement"</td></tr>
<tr><td>27.</td><td>**BOP**</td><td>
4.10 **INSPECT** the Spent Fuel Pool for damage. Contacts field operator {AR-6.7} _____</td></tr>
</table>

EVENT 4: MSE with loss of instrumentation.

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">If contacted as Field Operator to inspect the Spent Fuel Pool for damage
WAIT 3 MINUTES
ROLE-PLAY
"There is no visible damage to the Spent Fuel Pool"</td></tr>
<tr><td>28.</td><td>ATC</td><td>4.13 CHECK the neutron monitoring system for proper operation and changes. Monitors</td></tr>
<tr><td>29.</td><td>CRS</td><td>Per ABN-EARTHQUAKE
4.2 VERIFY adequate systems are available to safely shutdown and cool down the plant (e.g. SSW, SDC, DGs, Off-site power). {OE-6.9} _____ Evaluates
4.3 <u>IF</u> the Plant cannot be safely shut down, <u>THEN</u> NOTIFY Plant Management to request relief from the NRC to not shut down until safe shutdown systems can be restored. {OE-6.9} N/A
Directs ATC and BOP to:
4.9 MONITOR Control Room instrumentation for evidence of increases in the following:
• Drywell leakage rates _____
• Drywell pressure _____
• Drywell gaseous or particulate activity _____
• Leak detection temperatures _____</td></tr>
<tr><td>30.</td><td>CRS</td><td>Per ABN-INSTRUMENTATION
4.0 <u>SUBSEQUENT OPERATOR ACTIONS</u>
4.1 <u>IF</u> a fire in the reactor building has occurred, <u>THEN</u> REFER to ABN-FIRE. N/A
4.2 <u>IF</u> a piping break in the reactor building has occurred, <u>THEN</u> REFER to ABN-HELB. N/A
4.3 VERIFY excess flow check valves are OPEN (H13-P851) (Board S). _____
X106 and X109 are Closed
~~NOTE~~: ISP-EFC-B101 through ISP-EFC-B108 may also be referred to for additional information about what instrumentation is lost when an excess flow check valve is shut and for instructions on how to reset an excess flow check valve.
4.4 <u>IF</u> an excess flow check valve has closed, <u>THEN</u> REFER to Attachment 7.1, 7.2, and 7.3 to determine affected instruments and logic functions. Performs</td></tr>
</table>

EVENT 4: MSE with loss of instrumentation.

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
31.	CRS	Evaluates ABN-INSTRUMENTATON for EFCV Closures.

Level Indication	EFCV											Isolated (Yes/No)
RFW-LI-606A (NR)					X107						X114		
RFW-LI-606B (NR)						X109	X110						Yes
RFW-LI-606C (NR)							X110		X112				
RFW-LI-606D (NR)							X110		X112				
RFW-LR-608 (NR)					X107	X109	X110				X114		Yes
MS-LI-604 (WR)									X112	X113			
MS-LR/PR-623A (WR)											X114	X115	
MS-LR/PR-623B (WR)						X109		X111					Yes
RFW-LR-608 (UR)			X72a				X110						
MS-LI-605 (S/D Level)			X72a				X110						
MS-LI-610 (Fuel Zone)	X44AI					X109							Yes
MS-LI-612 (Comp Fuel Zone)	X44AI					X109							Yes
MS-LR-615 (Comp Fuel Zone)		X44BI		X106									Yes
MS-LR-615 (Fuel Zone)		X44BI		X106									Yes

STEP #	Position	CREW RESPONSE
32.	CRS	

Level Indication	EFCV											Isolated (Yes/No)
MS-LIS-200A (WR)											X114	X115	
MS-LIS-200B (WR)				X106	X108								Yes
MS-LIS-200C (WR)									X112	X113			
MS-LIS-200D (WR)						X109		X111					Yes
Pressure Indication	EFCV											Isolated (Yes/No)
MS-LR/PR-623A											X114		
MS-LR/PR-623B						X109							Yes
MS-PI-9 (digital)											X114		
MS-PR/FR-609											X114		
RFW-PI-605											X114		

EVENT 4: MSE with loss of instrumentation.

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
33.	CRS	May Also reference Attachment 7.3.

PI-V-X 109	570	M5/6.4	195	M529	MS-PS-20D MS-PS-23D MS-LIS-36C MS-LIS-36D MS-LT-26D MS-LIS-200D	MS-PS-45C MS-PS-45D MS-LIS-37B MS-LIS-37D MS-LT-44B	MS-PS-413D MS-PS-413B MS-LIS-38B MS-LT-61D RRC-PT-38B	MS-PI-4B MS-PT-51B MS-LI-10 MS-LIS-24D RFW-DPT-4B
PI-V-X 106	570	J5/5.8	15	M529	MS-LT-44A MS-PS-413A MS-LIS-36A MS-LT-61B MS-LIS-200B	MS-PS-20B MS-PS-45A MS-PS-413C MS-LIS-36B	MS-PS-23B MS-PS-45B MS-PS-39 MS-LIS-37A	MS-LIS-38A MS-LIS-24B MS-PI-4A MS-LIS-37C

Directs ATC to verify lost level instrumentation ans flag affected instruments.

34. **ATC**

Flags affected instruments.

Acknowledges 4.603.A8 1-7 REACTOR FEEDWATER CONTROL SYSTEM TYROUBLE.

1-7 WINDOW	SOURCE	AUTOMATIC ACTIONS
RFW CONTR SYSTEM TROUBLE	RFW-CRM-L308	None

> NOTE: This annunciator provides primarily system trouble information. Critical functions monitored by the DFW system have their own annunciator and associated response. The displayed alarms are after-the-fact alarms and do not require an immediate response.
>
> NOTE: This is an expected alarm when reactor level is GT 54.5" and system is controlling normally.

1. **VERIFY** RPV level is being maintained at the desired setpoint

Level is being controlled automatically at desired set point.

> NOTE: The last three alarms, if active (not acknowledged), are displayed at the bottom of the current screen. The listed alarms are generic alarms that identify the alarm source. Additional alarms can be viewed by going to the Alarm screen from the main menu.

35. **ATC**

2. **CHECK** the DFW Video Display Unit to determine source of alarm (H13-P612).

> NOTE: If the RFTs are in service with CPU B as the active controller, then a return to CPU A as the active controller may not be bumpless. {P-134398}

EVENT 4: MSE with loss of instrumentation.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
36.	**ATC**	Checks DFW Alarm display. RFW Control sytem trouble is due to HiHi Level Trip B. Notes that RFW-LR-608 NR is currently selected to CH B and RFW-LI-606B is upscale as a result of Exces Flow check valve closures. Changes Reactor Vessel Level Control channel to the CH A position such that RFW-LR-608 NR indicates actual reactor water level and not the failed instrument. (Restores the level indication but does not clear the alarm.)

Examiner Note: The CRS will evaluate Technical Specifications for this event however the TS evaluation is not required for grading for this event. The scenario already contains 2 required TS evaluations and calls. The nature of this malfunction also results in an unreasonable amount of TS entries for the EFC valve closures.

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

Following the crew evaluation / actions of ABN-INSTRUMENTATION and ABN-EARTHQUAKE

INSERT TRIGGER 5 : CRD-P-1A degraded flow over 5 minute ramp.

Results in: ABN-CRD Scram

37. **ATC**

Responds to annunciator and indications.

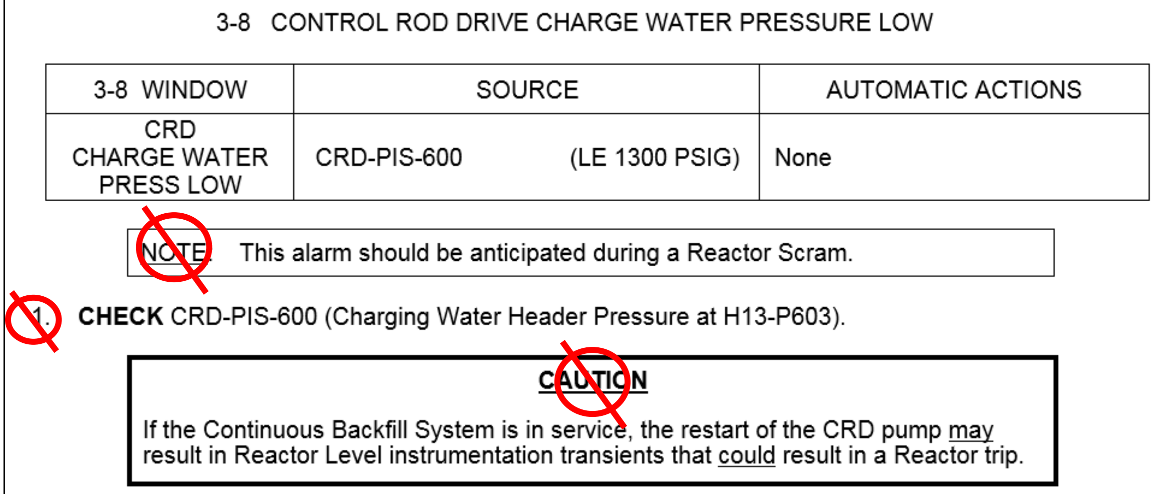
4.603.A7 3-8 CRD CHARGE WATER PRESSURE LOW

(Comes in Several minutes following initial annunciator)

4.602.A5 4-8 / 4-7 RWCU PUMP TROUBLE

(Comes in when pressure finally degrades allowing accumulators to depressurize)

4.603.A7 6-7 ROD ACUMULATOR TROUBLE



3-8 CONTROL ROD DRIVE CHARGE WATER PRESSURE LOW

3-8 WINDOW	SOURCE	AUTOMATIC ACTIONS
CRD CHARGE WATER PRESS LOW	CRD-PIS-600 (LE 1300 PSIG)	None

NOTE: This alarm should be anticipated during a Reactor Scram.

1. **CHECK** CRD-PIS-600 (Charging Water Header Pressure at H13-P603).

CAUTION

If the Continuous Backfill System is in service, the restart of the CRD pump may result in Reactor Level instrumentation transients that could result in a Reactor trip.

Lowering AMPS on CRD-P-1A and lowering flows / pressures on CRD system.

Reports indications to CRS.

Should direct a field operator to investigate CRD Pumps

If directed to investigate CRD Pumps, Wait **3 minutes** and:

ROLE-PLAY

"CRD-P-1A Motor is hot to the touch"

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
38.	ATC	~~2.~~ IF neither pump is running, THEN **PERFORM** the following: ~~a.~~ **PLACE** CRD-FC-600 in **MANUAL** (CRD Flow Controller). Already in manual from previous event. ~~b.~~ **REDUCE** CRD-FC-600 output to zero. c. **START** the standby pump. Stand by pump (CRD-P-1B) is not available d. **NULL** CRD-FC-600. e. **TRANSFER** CRD-FC-600 to **AUTO**. f. IF necessary, THEN **ADJUST** CRD-V-3 (Drive/Cooling Water Pressure Control) to 255-265 psid on CRD-DPI-602 (Drive HDR/RX ΔP). g. IF the Standby CRD pump cannot be started, THEN **REFER** to ABN-CRD, Complete Loss of CRD Drive Flow. 3. IF pressure continues to lower, THEN **REFER** to ABN-CRD. Informs CRS that complete loss of flow is imminent, and pressure continues to lower Reports to CRS that CRD-P-1B is not available for start (Crew turnover) Informs the CRS when there are multiple accumulator trouble alarms (As they come in).
39.	ATC	Should direct field operators to investigate accumulator trouble alarms.

If directed to investigate Accumulator alarms

Wait 3 minutes with a least 2 accumulator alarms in on the full core display and:

ROLE-PLAY

“I have multiple accumulators that are < 900psig and down slow”

CRITICAL TASK # 1

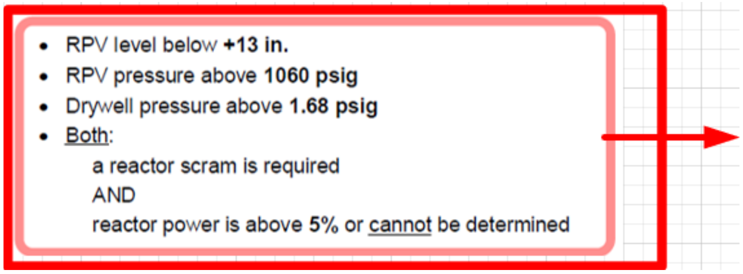
Time ______________. No CRD pumps providing pressure, Charging Header Pressure is less than 940 psig, as read on CRD-PIS-600, and two or more Control Rod Accumulator Trouble, Amber, lights are in on the Full Core Display.

Examiner Note: With a loss of both CRD pumps it would be acceptable for the crew to determine that the accumulator trouble alarms are due to low accumulator pressure, therefore it is not required for the crew to wait on a report from a field operator to perform a manual reactor scram.

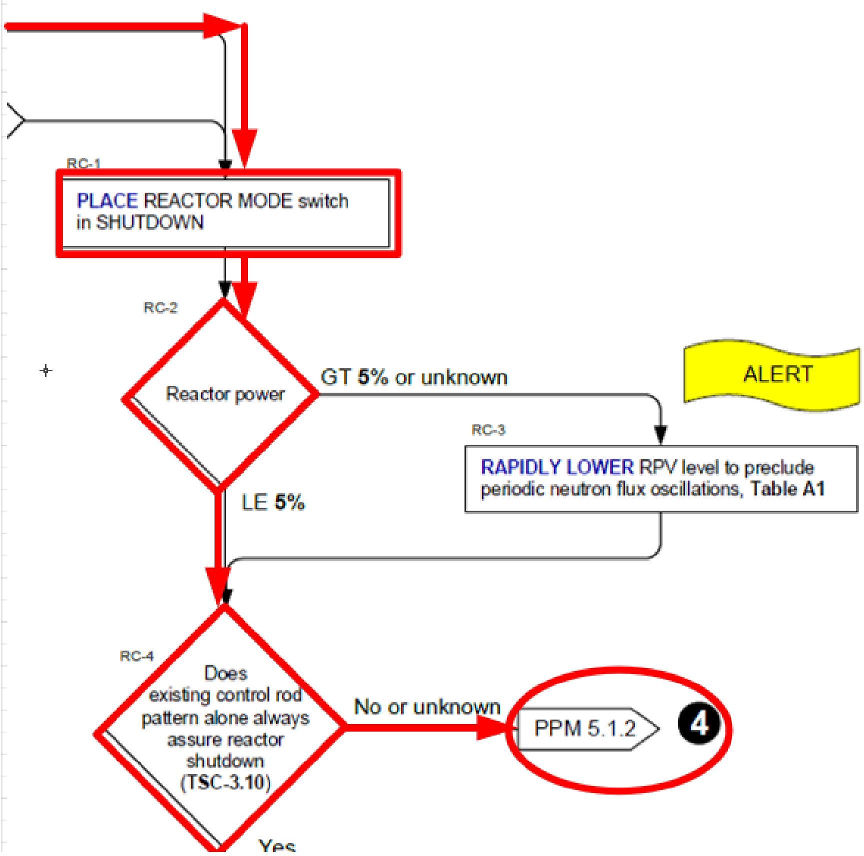
Time ______________. Manual Reactor Scram initiated.

Examiner Note: The critical task is considered met if the crew scrams the reactor within 20 minutes of charging header pressure dropping below 940 psig.

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
40.	CRS	Updates the crew on intent to scram the reactor per ABN-CRD 4.1 IF in Mode 1 or 2, AND charging water header pressure is LT 940 psig, THEN **PERFORM** the following: 4.1.1 IF reactor steam dome pressure is GE 900 psig, AND two or more control rod scram accumulators are inoperable, AND charging water header pressure cannot be restored to GE 940 psig within 20 minutes, THEN **SCRAM the Reactor** per PPM 3.3.1. ____
41.	CRS	Directs manual reactor scram.
42.	ATC	Performs Actions of PPM 3.3.1 QC 2.0 IMMEDIATE ACTIONS 2.1 **PLACE** the Reactor Mode Switch in **SHUTDOWN**. Performs 2H 2.2 **DEPRESS** the Manual Scram Pushbuttons. Performs 2.3 **REPORT** Reactor Power, Pressure, and Level to the CRS. Performs 2H 2.4 IF APRMs are NOT downscale, THEN **INITIATE** ARI. N/A 2.5 IF Reactor power is GT 5%, THEN **PERFORM** the following: 2.5.1 **NOTIFY** CRS of initiating SLC. N/A 2.5.2 **INITIATE** SLC injection by performing the following (H13-P603): • **PLACE** SLC System A control switch to the **OPER** position. N/A • **PLACE** SLC System B control switch to the **OPER** position. N/A Reports EOP Entry on Reactor Water . Reports 5 ROD ATWS with reactor power LT 5%. Rods 18-31, 18-27, 14-23, 10-27 and 10-35 failed to insert into the core.
43.	CRS	Enters PPM 5.1.1 RPV Control.  • RPV level below **+13 in.** • RPV pressure above **1060 psig** • Drywell pressure above **1.68 psig** • Both: a reactor scram is required AND reactor power is above **5%** or cannot be determined

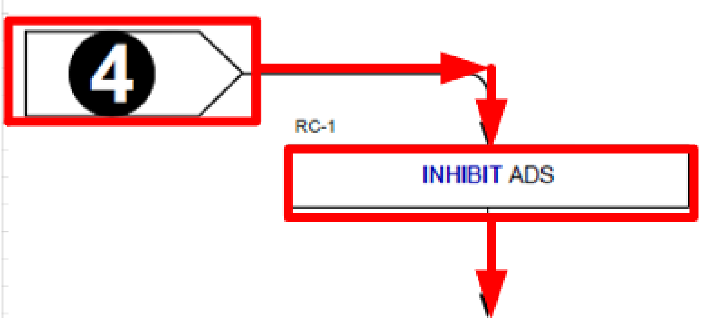
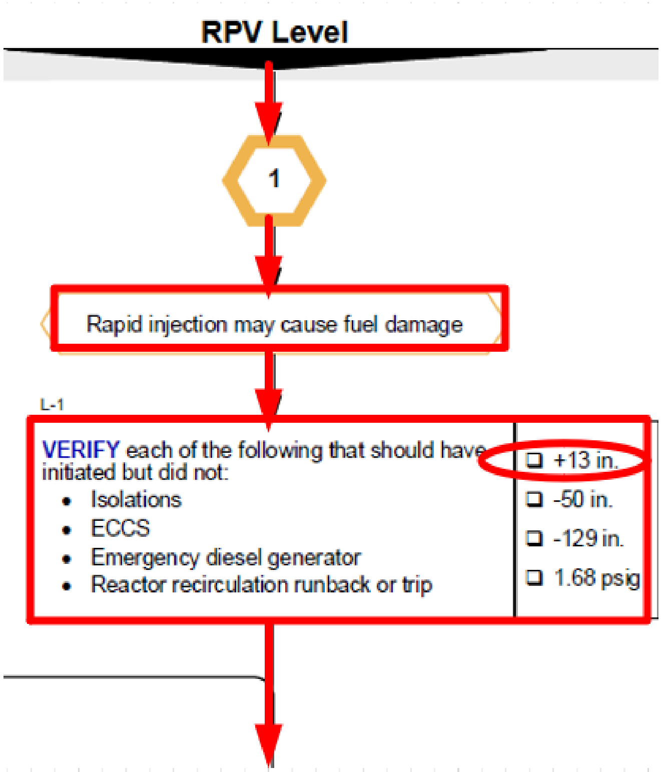
EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
44.	CRS	 Transitions to PPM 5.1.2 RPV Control ATWS
45.	ATC	May continue with the current prescribed level band (From prior to scram) (Per OI-15) From OI-15 Clarrifications 4.2.2 PPM 5.1.2 RPV Control - ATWS b. Authority to Inject • During ATWS conditions, RO-1 will maintain RPV water level +13 to +54" until given the order to stop and prevent or when the CRS gives a level band.

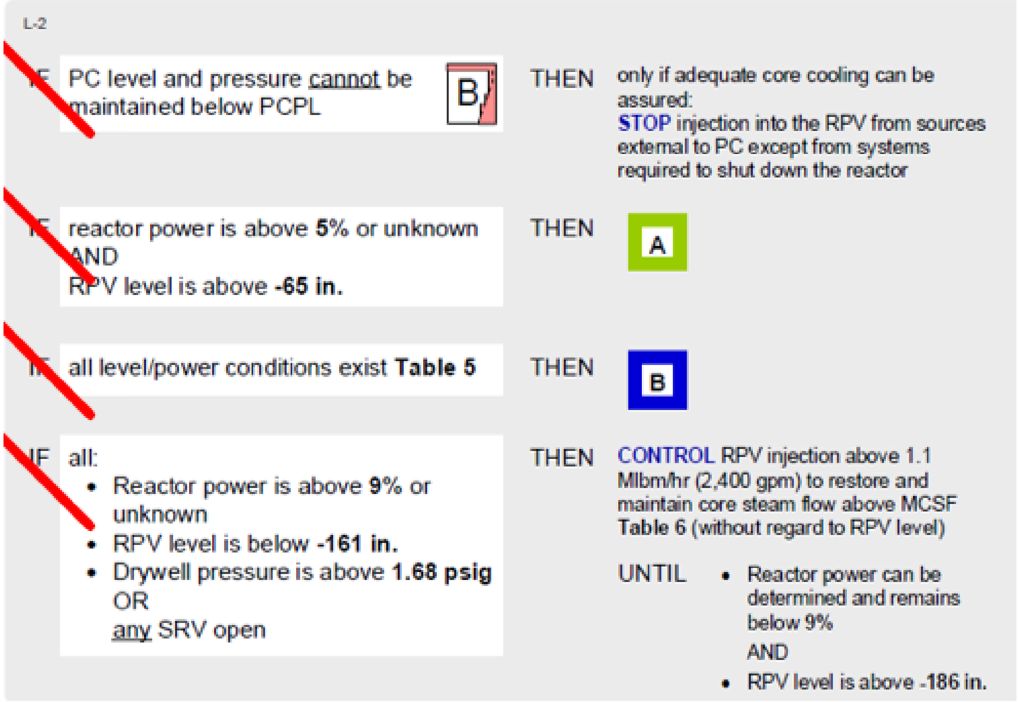
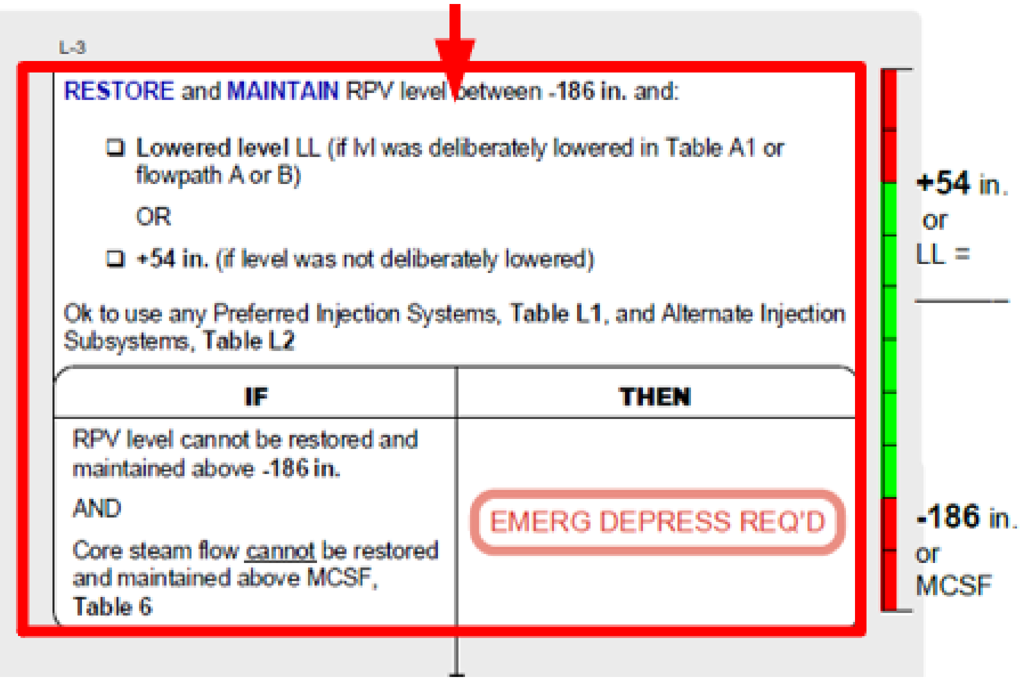
EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
46.	**BOP**	Performs subsequent actions of PPM 3.3.1 QC Subsequent Actions – CRO2/3 (Pressure control initial response) 3.2.1 IF in an ATWS GT 5% Reactor power, AND directed by the CRS, THEN **PERFORM** the following: • **OVERRIDE** ECCS injection per PPM 5.5.1, starting with HPCS system. N/A • **OVERRIDE** MSIV isolations per PPM 5.5.6. N/A • INHIBIT ADS. N/A • IF the SCRAM was due to an F or A signal, AND power to E-SM-8 has been lost, THEN **ALIGN** Fire Protection water cooling to CAS air compressors per SOP-CAS-OPS. N/A
47.	**BOP**	3.2.2 WHEN Main Generator output is LT 50 MWE, THEN **PERFORM** the following: a. **VERIFY** Main Turbine trips. Performs 2H b. IF Main Turbine is NOT tripped, THEN **SIMULTANEOUSLY DEPRESS** both Emergency Trip pushbuttons (H13-P820). N/A c. IF Main Generator has NOT tripped, THEN **DEPRESS** Unit Emergency Trip pushbutton (H13-P800) OR **DEPRESS** Unit Overall Trip pushbutton (H13-P800). N/A d. **VERIFY** power transfers to TR-S. **SEE EVENT 6** 3.2.3 **STABILIZE** RPV Pressure 800 - 1050 psig, or as directed by the CRS. Performs

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
48.	**CRS**	Continues / Directs PPM 5.1.2 RPV Control ATWS 
49.	**BOP**	Inhibits ADS as directed by the CRS
50.	**CRS**	 VERIFY each of the following that should have initiated but did not: • Isolations • ECCS • Emergency diesel generator • Reactor recirculation runback or trip ☐ +13 in. ☐ -50 in. ☐ -129 in. ☐ 1.68 psig

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
51.	CRS	Verifies overrides  L-2 IF PC level and pressure cannot be maintained below PCPL B THEN only if adequate core cooling can be assured: STOP injection into the RPV from sources external to PC except from systems required to shut down the reactor IF reactor power is above 5% or unknown AND RPV level is above -65 in. THEN A IF all level/power conditions exist Table 5 THEN B IF all: • Reactor power is above 9% or unknown • RPV level is below -161 in. • Drywell pressure is above 1.68 psig OR any SRV open THEN CONTROL RPV injection above 1.1 Mlbm/hr (2,400 gpm) to restore and maintain core steam flow above MCSF Table 6 (without regard to RPV level) UNTIL • Reactor power can be determined and remains below 9% AND • RPV level is above -186 in.
52.	CRS	 L-3 RESTORE and MAINTAIN RPV level between -186 in. and: ☐ Lowered level LL (if lvl was deliberately lowered in Table A1 or flowpath A or B) OR ☐ +54 in. (if level was not deliberately lowered) Ok to use any Preferred Injection Systems, Table L1, and Alternate Injection Subsystems, Table L2 IF RPV level cannot be restored and maintained above -186 in. AND Core steam flow cannot be restored and maintained above MCSF, Table 6 THEN EMERG DEPRESS REQ'D +54 in. or LL = ______ -186 in. or MCSF May direct ATC to maintain +13 to +54” RPV Level

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
53.	ATC	Lines up Feed and Condensate to inject per SOP-RFW-FCV-QC

2.1 Transfer RPV Level Control to RFW-FCV-10A/B:

2H 2.1.1 **START CLOSING** RFW-V-112A and RFW-V-112B. Performs

2.1.2 **START OPENING** RFW-V-118. Performs

2.1.3 **VERIFY** RFW-V-109 is **CLOSED**. Performs

2H 2.1.4 **VERIFY** RFW-V-117A and RFW-V-117B **OPEN**. Requires SL-11 Power restoration ____

2.1.5 **VERIFY** RFW-LIC-620 is in **MANUAL** (V selected for Valve position demand with 0 output). Performs

2.1.6 IF Reactor Feed Pump(s) (RFP) are operating, THEN **PERFORM** the following:

a. IF non-ATWS, THEN **VERIFY** RFP(s) have ramped down in speed. Performs

b. **PLACE** RFW-P-1B in MDEM mode. Performs

c. **PLACE** RFW-P-1A in MDEM mode. Performs

d. **CONTROL** Turbine speed as required. Performs

e. IF desired, THEN **PLACE** RFW-FCV-2A(B) in **MANUAL**, AND **SLOWLY OPEN** to approximately 80%. Performs Performs

> **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 **VERIFY** RFW-V-112A and RFW-V-112B are **FULLY CLOSED**. Performs

2.1.8 **VERIFY** RFW-V-118 is FULLY **OPEN**. Performs

2.1.9 IF Reactor Feed Pump(s) (RFP) are operating, THEN **ADJUST** the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840). Performs

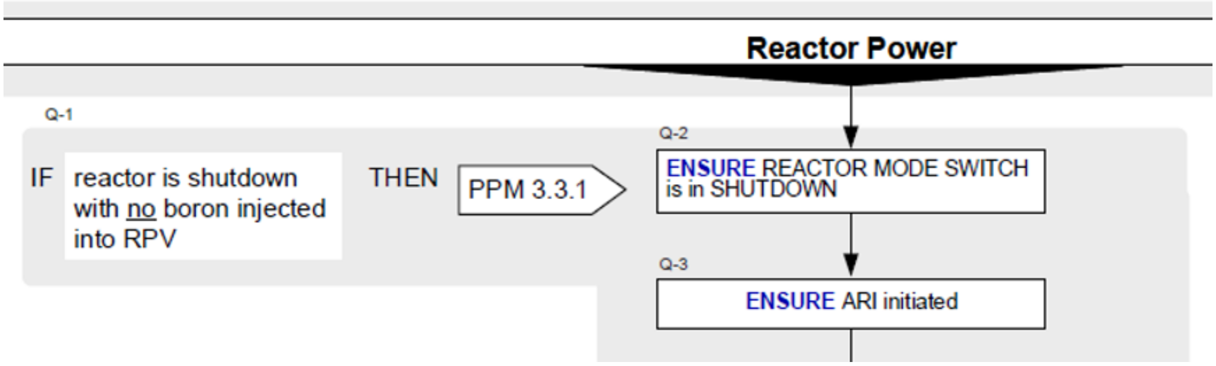
2.1.10 **ADJUST** RFW-LIC-620 manual output to control RPV level. Performs

2.1.11 WHEN RPV level is approximately 36", THEN **PLACE** RFW-LIC-620 in **AUTOMATIC**. Performs

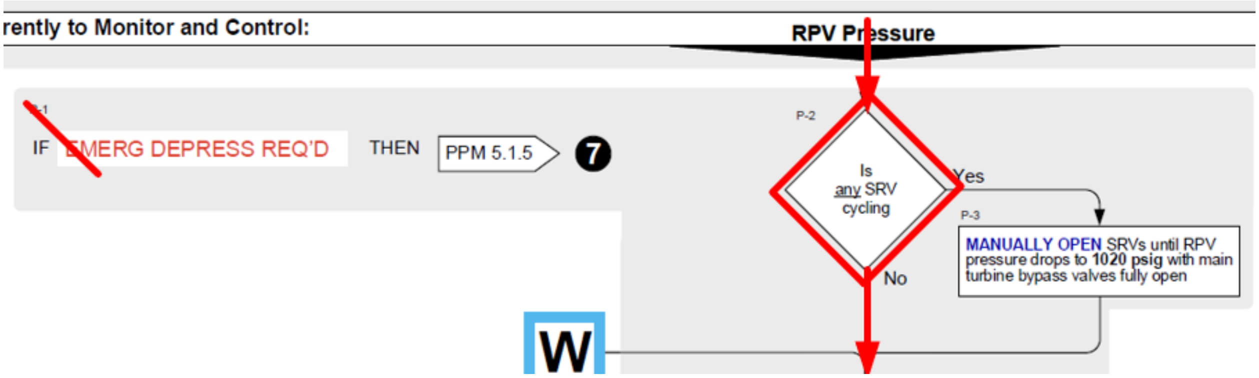
May direct BOP to restore power to SL-11 Following turbine transfer. (Event 6)

Examiner Note: Even with a 5 Rod ATWS, with no leak present ATC does not have any level complications and should get level control into Automatic on the start-up flow control valves. Stable level greater than 13" is paramount to the performance of SOP-RXSD-DETERMINATION-QC.

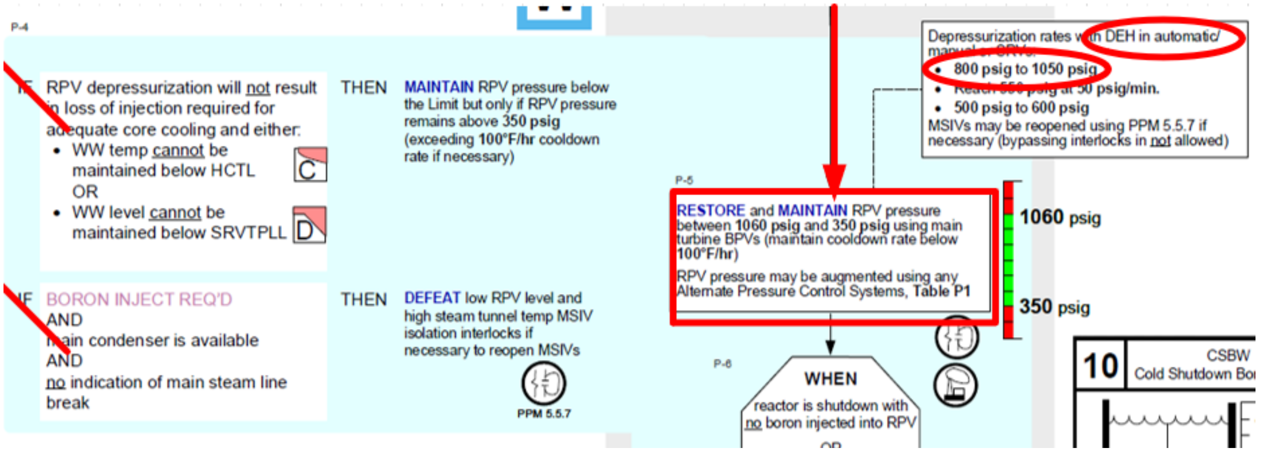
EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	OPERATOR ACTIVITIES Position	 CREW RESPONSE
54.	**CRS**	Continues with PPM 5.1.2 RPV Control ATWS  Directs BOP to perform SOP-RXSD-DETERMINATION-QC
55.	**BOP**	Performs SOP-RXSD-DETERMINATION-QC 2.1 Reactor Shutdown Determination During an ATWS NOTE: This determination indicates that under the current conditions the reactor is shutdown. Conditions should continue to be assessed if reactor conditions (e.g., coolant temperature) are changing. NOTE: To be considered shutdown, the reactor must be subcritical AND power is below the heating range. NOTE: SRMs and IRMs do not need to be fully inserted to make this determination, but should not be moving.
56.	**BOP**	2.1.1 **VERIFY** reactor power below the heating range as follows: NOTE: APRM data cannot be used when both RPS busses have lost power. NOTE: Core Thermal Power indication (N4 screen) cannot be used when the reactor is LT 25% rated power. a. **VERIFY** reactor power level is LT 1.0% as indicated by valid instrumentation on ANY: (N/A those not used) Performs one of the methods and N/As those not used • SRMs fully retracted (out of the core) reading less than 100 cps. _____ • IRMs fully inserted reading less than 25 on range 8. _____ • PPCRS screens (any of screens E1, N3, N4, or L4). _____ • APRMs using back panel meters. _____ (Most likely method used) • APRMs using the digital value displayed at the recorders on H13-P603 _____

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
57.	**BOP**	2.1.2 Subcritical Determination a. **VERIFY** the reactor is subcritical as follows: NOTE: The intent of this restriction is to ensure reactor power is not decreasing solely due to the dropping reactor water level 1) **VERIFY** Reactor water level is GE +13" OR IF LT +13", THEN **NOT LOWERING**. One of these SHOULD be true for current plant conditions. If not, then allows ATC to stabilize RPV level prior to performing. AND 2) **VERIFY** SRM period meters show a sustained negative period for at least three minutes. Most likely method of determination because no math is involved. OR **VERIFY** SRM or IRM power shows a (-) 1/3 decade per minute change for at least three minutes (e.g., check the current SRM or IRM power level and check again in three minutes for a factor of ten less than the initial SRM or IRM power level). 2.1.3 Report results to the CRS/Shift Manager. Performs
58.	**CRS**	 MANUALLY OPEN SRVs until RPV pressure drops to 1020 psig with main turbine bypass valves fully open

EVENT 5: CRD-P-1A Reduced head / ABN-CRD Scram

STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
59.	**CRS**	 P-4 IF RPV depressurization will not result in loss of injection required for adequate core cooling and either: • WW temp cannot be maintained below HCTL C OR • WW level cannot be maintained below SRVTPLL D THEN **MAINTAIN** RPV pressure below the Limit but only if RPV pressure remains above **350 psig** (exceeding **100°F/hr** cooldown rate if necessary) IF BORON INJECT REQ'D AND main condenser is available AND no indication of main steam line break THEN **DEFEAT** low RPV level and high steam tunnel temp MSIV isolation interlocks if necessary to reopen MSIVs PPM 5.5.7 Depressurization rates with DEH in automatic/ manual or SRVs: • **800 psig to 1050 psig** • **Reach 550 psig at 50 psig/min.** • **500 psig to 600 psig** MSIVs may be reopened using PPM 5.5.7 if necessary (bypassing interlocks in not allowed) P-5 **RESTORE** and **MAINTAIN** RPV pressure between **1060 psig** and **350 psig** using main turbine BPVs (maintain cooldown rate below **100°F/hr**) RPV pressure may be augmented using any Alternate Pressure Control Systems, **Table P1** **1060** psig **350** psig P-6 **WHEN** reactor is shutdown with no boron injected into RPV 10 CSBW Cold Shutdown Bo

EVENT 6: S-1 Breaker Fails to Auto Close on Turbine Transfer

STEP #		OPERATOR ACTIVITIES
	Position	**CREW RESPONSE**
		Pre-Inserted Malfunction: S-1 Breaker fails to automatically close in on Turbine Transfer. **Results in: Manual action to restore SM-1 and SL-11 Power**
60.	**BOP**	During verifications of power transfer to TR-S Finds SM-1 S-1 Breaker failed to close. Automatic actuation that should have occurred, BOP Manually closes in the S-1 Breaker by taking the Synch switch to MAN and taking the S-1 breaker control switch to close. Informs the CRS that TR-B has re-powered SM-7.
61.	**CRS**	May direct BOP to re-power SM-1 / SL-11
62.	**BOP**	Re-Powers SL-11 using SOP-ELEC-480V-OPS-QC 2.1 Energizing SL-11 from SM-1 (Dead Bus) 2.1.1 **VERIFY** SM-1 is energized. Performs 2.1.2 **PLACE** CB-21/11 in **PTL**. Performs 2.1.3 **VERIFY** CB-11/1 green light illuminated and green flag displayed. Performs 2.1.4 IF CB-1/11 is **OPEN**, THEN **PERFORM** the following: a. **VERIFY** CB-1/11 white LOCKOUT CIRCUIT AVAIL light illuminated. Performs b. **VERIFY** CB-1/11 green light illuminated and green flag displayed. Performs c. **CLOSE** CB-1/11. Performs 2.1.5 **CLOSE** CB-11/1. Performs 2.1.6 **PLACE** CB-21/11 in **NORMAL-after-TRIP**. Performs 2.1.7 **VERIFY** SL-11 voltage is approximately 480 (432-528) volts. Performs Updates the CREW SL-11 is energized from its normal source.

<table>
<tr><th colspan="3">EVENT 7: Aftershock and further closure of EFC valves</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">After level is stable or by direction of the Lead evaluator
INSERT TRIGGER 7: OBE and EFC Valve closures (X114 / X110 / X112).
Results in: PPM 5.1.6 RPV Flooding ATWS</td></tr>
<tr><td>63.</td><td>CRS</td><td>Re-enters ABN-EARTHQUAKE and directs actions</td></tr>
<tr><td>64.</td><td>BOP</td><td>Performs actions of ABN-EARTHQUAKE
4.1 MAKE the following announcement:
"Attention all personnel, attention all personnel. Columbia Generating Station has experienced seismic activity. For personnel inside buildings, take cover under sturdy furniture, away from windows and heavy objects that could fall. Hold onto the sturdy furniture. Do not rush to the exits. For personnel outside, move to a clear area, away from buildings, light poles, and electrical wires. On-Shift personnel conduct a quick plant tour and report any evidence of fire, flooding, or plant damage." Performs ______
4.7 DIRECT SAS to repeat the above announcement on the Alternate Security/Area Wide and Security radio channels. Performs ______</td></tr>
<tr><td colspan="3">If contacted as SAS Operator
ROLE-PLAY
"I understand, Repeat ABN-EARTHQUAKE announcement"</td></tr>
<tr><td>65.</td><td>BOP</td><td>4.10 INSPECT the Spent Fuel Pool for damage. Contacts field operator {AR-6.7} ______</td></tr>
<tr><td colspan="3">If contacted as Field Operator to inspect the Spent Fuel Pool for damage
WAIT 3 MINUTES
ROLE-PLAY
"There is no visible damage to the Spent Fuel Pool"</td></tr>
</table>

EVENT 7: Aftershock and further closure of EFC valves

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

66. **CRS**

Per ABN-EARTHQUAKE

4.2 **VERIFY** adequate systems are available to safely shutdown and cool down the plant (e.g. SSW, SDC, DGs, Off-site power). {OE-6.9} _____

Evaluates

4.3 IF the Plant cannot be safely shut down, THEN **NOTIFY** Plant Management to request relief from the NRC to not shut down until safe shutdown systems can be restored. {OE-6.9} N/A

Directs ATC and BOP to:

4.9 **MONITOR** Control Room instrumentation for evidence of increases in the following:

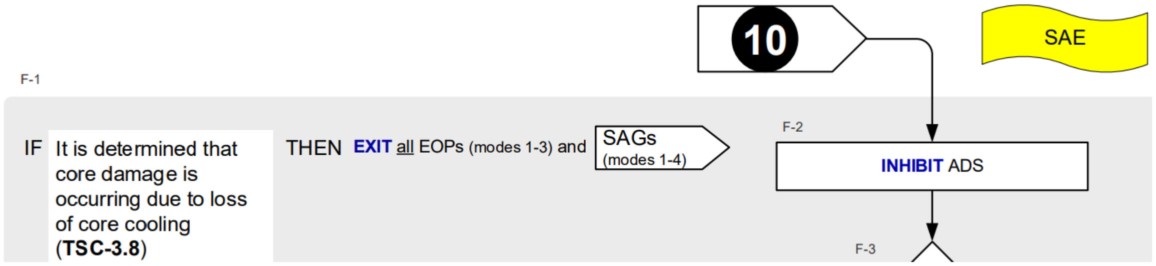
- Drywell leakage rates _____
- Drywell pressure _____
- Drywell gaseous or particulate activity _____
- Leak detection temperatures _____

67. **CRS** Refers to ABN-INSTRUMENTATION and Updates from previous EFC Closures

68. **CRS** Evaluates ABN-INSTRUMENTATON for EFCV Closures (X110, X112, X114)

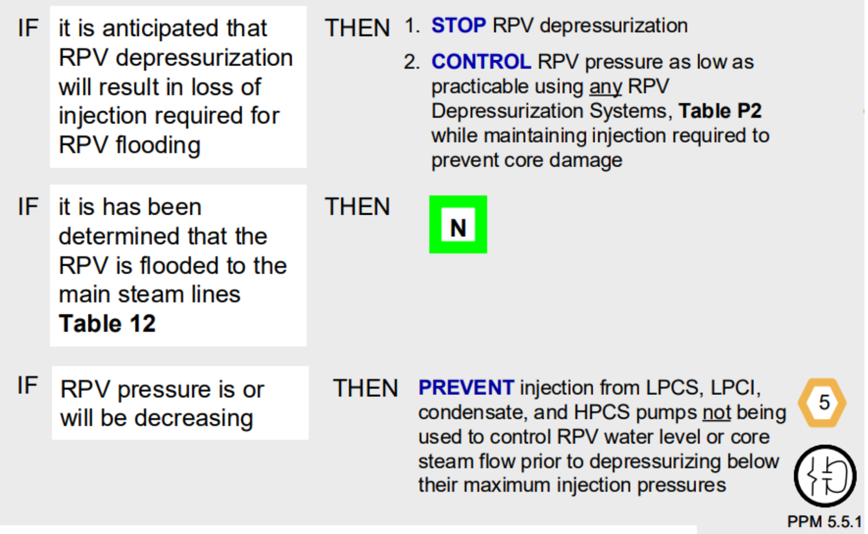
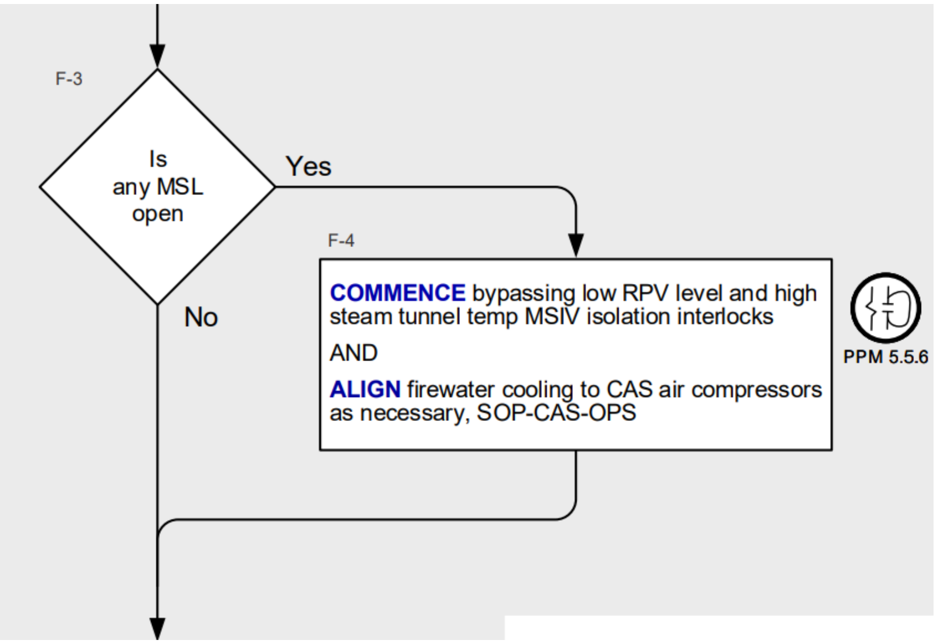
Level Indication	EFCV												Isolated (Yes/No)
RFW-LI-606A (NR)					X107						X114		Yes
RFW-LI-606B (NR)						X109	X110						Yes - Previous
RFW-LI-606C (NR)							X110		X112				Yes
RFW-LI-606D (NR)							X110		X112				Yes
RFW-LR-608 (NR)					X107	X109	X110				X114		Yes - Previous
MS-LI-604 (WR)									X112	X113			Yes
MS-LR/PR-623A (WR)											X114	X115	Yes
MS-LR/PR-623B (WR)						X109		X111					Yes - Previous
RFW-LR-608 (UR)			X72a				X110						Yes
MS-LI-605 (S/D Level)			X72a				X110						Yes
MS-LI-610 (Fuel Zone)	X44AI					X109							Yes - Previous
MS-LI-612 (Comp Fuel Zone)	X44AI					X109							Yes - Previous
MS-LR-615 (Comp Fuel Zone)		X44BI		X106									Yes - Previous
MS-LR-615 (Fuel Zone)		X44BI		X106									Yes - Previous

EVENT 7: Aftershock and further closure of EFC valves

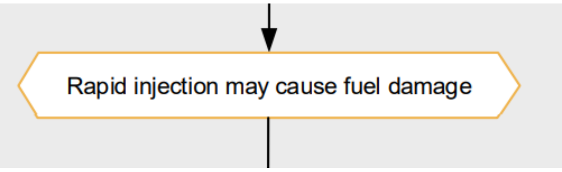
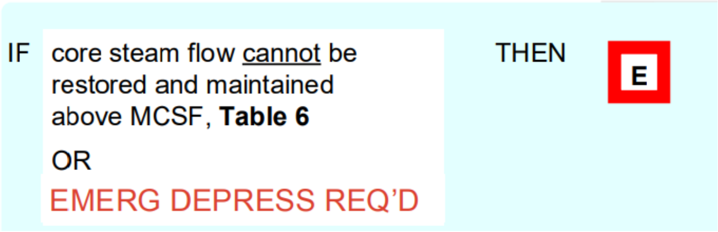
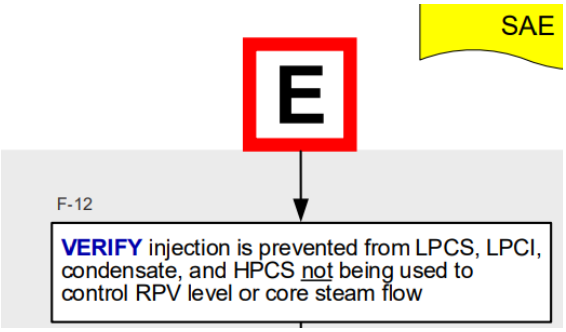
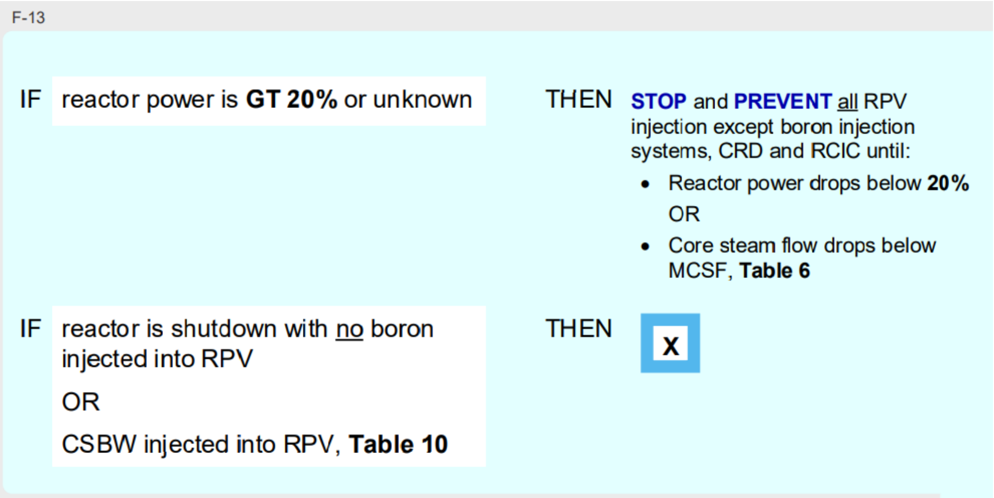
<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>69.</td><td>CRS</td><td>
<table>
<tr><td>Level Indication</td><td colspan="12">EFCV</td><td>Isolated (Yes/No)</td></tr>
<tr><td>MS-LIS-200A (WR)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X114</td><td>X115</td><td>Yes</td></tr>
<tr><td>MS-LIS-200B (WR)</td><td></td><td></td><td></td><td>X106</td><td>X108</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Yes - Previous</td></tr>
<tr><td>MS-LIS-200C (WR)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X112</td><td>X113</td><td></td><td></td><td>Yes</td></tr>
<tr><td>MS-LIS-200D (WR)</td><td></td><td></td><td></td><td></td><td></td><td>X109</td><td></td><td>X111</td><td></td><td></td><td></td><td></td><td>Yes - Previous</td></tr>
<tr><td>Pressure Indication</td><td colspan="12">EFCV</td><td>Isolated (Yes/No)</td></tr>
<tr><td>MS-LR/PR-623A</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X114</td><td></td><td>Yes</td></tr>
<tr><td>MS-LR/PR-623B</td><td></td><td></td><td></td><td></td><td></td><td>X109</td><td></td><td></td><td></td><td></td><td></td><td></td><td>Yes - Previous</td></tr>
<tr><td>MS-PI-9 (digital)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X114</td><td></td><td></td></tr>
<tr><td>MS-PR/FR-609</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X114</td><td></td><td></td></tr>
<tr><td>RFW-PI-605</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>X114</td><td></td><td>Yes</td></tr>
</table>
</td></tr>
<tr><td>70.</td><td>CRS</td><td>Directs ATC / BOP to verify loss of all RPV Level indication.</td></tr>
<tr><td>71.</td><td>ATC
BOP</td><td>Confirms loss of all RPV Level (and pressure) instrumentation.</td></tr>
<tr><td>72.</td><td>CRS</td><td>Updates the crew on intent to transition to PPM 5.1.6 RPV Flooding – ATWS due to a loss of all level instrumentation.
~~IF~~ RPV level <u>cannot</u> be determined THEN EXIT Level and Pressure <u>only</u> and PPM 5.1.6 ❿</td></tr>
<tr><td>73.</td><td>CRS</td><td>

IF It is determined that core damage is occurring due to loss of core cooling (TSC-3.8) THEN EXIT <u>all</u> EOPs (modes 1-3) and SAGs (modes 1-4)</td></tr>
<tr><td>74.</td><td>CRS</td><td>IF RPV level indication is restored THEN PPM 5.1.1 ❶
IF PC level and pressure <u>cannot</u> be maintained below PCPL B THEN only if RPV flooding conditions can be maintained: STOP injection into the RPV from sources external to PC except from systems required to shut down the reactor
IF existing control rod pattern alone can always assure reactor shutdown (TSC-3.10) THEN STOP boron injection and PPM 5.1.4 ❽</td></tr>
</table>

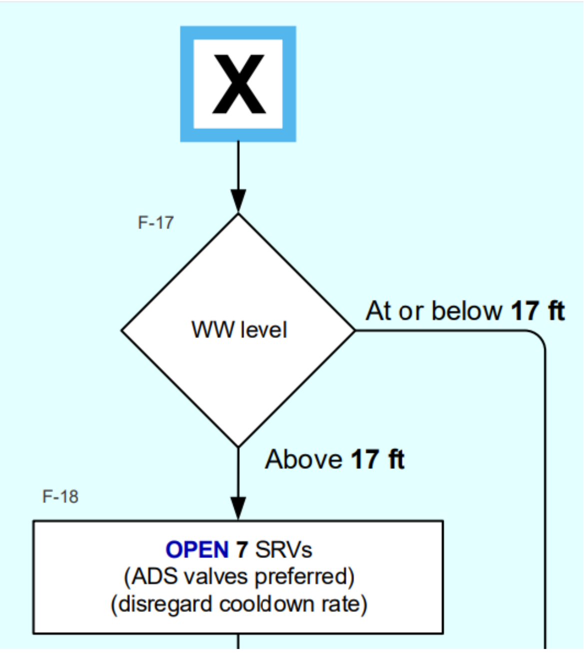
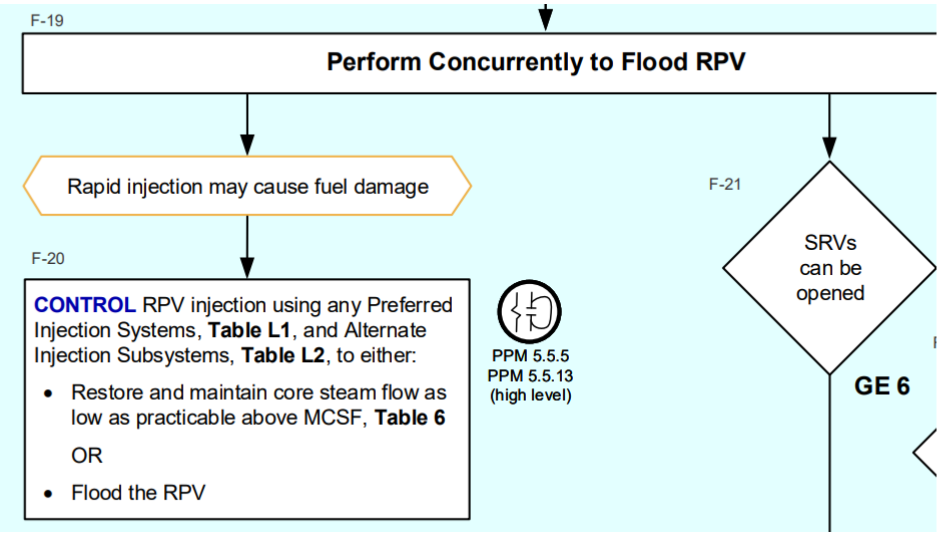
EVENT 7: Aftershock and further closure of EFC valves

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
75.	CRS	 IF it is anticipated that RPV depressurization will result in loss of injection required for RPV flooding THEN 1. **STOP** RPV depressurization 2. **CONTROL** RPV pressure as low as practicable using any RPV Depressurization Systems, **Table P2** while maintaining injection required to prevent core damage IF it is has been determined that the RPV is flooded to the main steam lines **Table 12** THEN **N** IF RPV pressure is or will be decreasing THEN **PREVENT** injection from LPCS, LPCI, condensate, and HPCS pumps not being used to control RPV water level or core steam flow prior to depressurizing below their maximum injection pressures 5 PPM 5.5.1
76.	CRS	 **COMMENCE** bypassing low RPV level and high steam tunnel temp MSIV isolation interlocks AND **ALIGN** firewater cooling to CAS air compressors as necessary, SOP-CAS-OPS
77.	BOP	Prforms PPM 5.5.6 as directed by CRS 4.0 PROCEDURE • **BYPASS** the MSIV SYS A LOW RPV LVL / HI STM TUNNEL TEMP ISOLATIONS by removing the keylock blank, inserting the key, and placing MS-RMS-S84 in the **BYPASS** position (H13-P609). _____ • **BYPASS** the MSIV SYS B LOW RPV LVL / HI STM TUNNEL TEMP ISOLATIONS by removing the keylock blank, inserting the key, and placing MS-RMS-S85 in the **BYPASS** position (H13-P611). _____

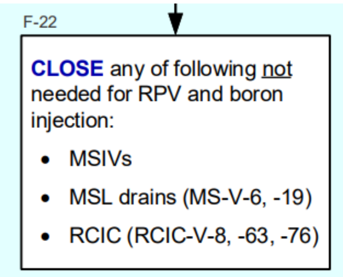
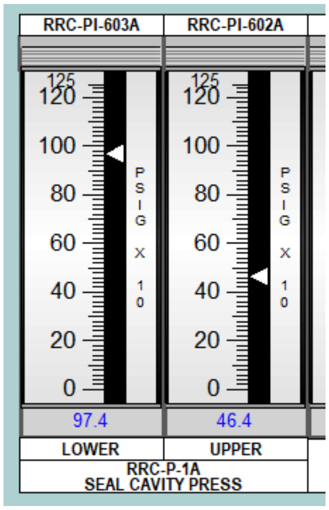
EVENT 7: Aftershock and further closure of EFC valves

STEP #	**OPERATOR ACTIVITIES**	
	Position	**CREW RESPONSE**
78.	**CRS**	 Rapid injection may cause fuel damage
79.	**CRS**	 IF core steam flow cannot be restored and maintained above MCSF, **Table 6** OR EMERG DEPRESS REQ'D THEN E Based on current plant conditions, CRS determines that MCSF can NOT be maintained. (Not enough energy in the core on a 5 rod ATWS)
80.	**CRS**	Codensate / Feed was being used to control RPV level but the Reactor feed pumps have tripped due to the EFC Valve closures.  SAE E F-12 **VERIFY** injection is prevented from LPCS, LPCI, condensate, and HPCS not being used to control RPV level or core steam flow
81.	**CRS**	 F-13 IF reactor power is **GT 20%** or unknown THEN **STOP** and **PREVENT** all RPV injection except boron injection systems, CRD and RCIC until: • Reactor power drops below **20%** OR • Core steam flow drops below MCSF, **Table 6** IF reactor is shutdown with no boron injected into RPV OR CSBW injected into RPV, **Table 10** THEN X

EVENT 7: Aftershock and further closure of EFC valves

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">CRITICAL TASK # 2
Time Start: _____________ Loss of ALL RPV level instrumentation
Time Stop: _____________ 7 SRV’s are Open.
Examiner Note: The critical task is considered met if 7 SRVs are open within 15 minutes of a loss of all control room level instrumentation.</td></tr>
<tr><td>82.</td><td>CRS</td><td> </td></tr>
<tr><td>83.</td><td>CRS</td><td> </td></tr>
</table>

EVENT 7: Aftershock and further closure of EFC valves

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
84.	CRS	F-22 **CLOSE** any of following <u>not</u> needed for RPV and boron injection: • MSIVs • MSL drains (MS-V-6, -19) • RCIC (RCIC-V-8, -63, -76)
85.	BOP	Open 7 SRVs as directed by CRS. Coordinates with ATC for pressure indications and level control. Closes the MSIV's / MSL Drains and RCIC Steam valves.
86.	ATC	Monitors Reactor Pressure via RRC Pump A or B lower bearing pressure.  Once Reactor pressure has been reduced via opening of 7 SRV's, Condensate booster pumps will inject via the start up flow control valves. ATC Controls / monitors injection rate with start up flow control valves in manual. **Examiner Note: HPCS Could be used for RPV flood up but condensate booster pumps would be prefered due to the ease at which the flow rate is controlled using the start up flow control vlaves in manual.** **Startup flow control valves MUST be taken to manual control to initiate flow. If left in automatic they will fully close due to the resultant level control indications following the closure of excess flow check valves.**

TERMINATION CRITERIA

TERMINATION CUE:

This scenario will be terminated when 7 SRVs are open and there is injection flow into the RPV via condensate booster pumps or HPCS.

INFORM THE CREW NOT TO DISCUSS THE SCENARIO, NOT TO ERASE FLOWCHARTS OR NOTES, NOT TO PUT AWAY PROCEDURES. THE EVALUATORS WILL CAUCUS TO DETERMINE IF THERE ARE ANY FOLLOWUP QUESTIONS.

Assign someone (usually the booth operator) to remain with the crew on the floor.

SAVE INSIGHT FILE TO THE SECURE DRIVE BEFORE RESET AND CLEAR URI FILE WHEN DONE.

CRITICAL TASKS

CRITICAL TASK #1

Critical Task Statement:

With CRD pressure LT 940 psig and two or more control rod accumulator trouble alarms in, initiate a manual scram within 20 minutes of CRD pressure LT 940 psig. (With a loss of both CRD pumps it would be acceptable for the crew to determine that the accumulator trouble alarms are due to low accumulator pressure, therefore it is not required for the crew to wait on a report from a field operator to perform a manual reactor scram. (ABN-CRD / TS 3.1.5)

Safety Significances:

This step reflects the requirements of Technical Specification 3.1.5. With inadequate charging water pressure, all the accumulators could become inoperable, resulting in a potentially severe degradation of the scram performance. Therefore, within 20 minutes from discovery of charging water header pressure < 940 psig concurrent with two or more control rod scram accumulators inoperable, adequate charging water header pressure must be restored. The allowed Completion Time of 20 minutes is reasonable, to place a CRD pump into service to restore the charging header pressure, if required. This Completion Time is based on the ability of the reactor pressure alone (GE 900#) to fully insert all control rods.

The ANALYSES Design Basis Accident (DBA) and transient analyses assume that all the control rods scram at a specified insertion rate. The scram function of the CRD System, and, therefore, the OPERABILITY of the accumulators, protects the MCPR Safety Limit which ensure that no fuel damage will occur if these limits are not exceeded

Initiating Cues:

No CRD pumps generating discharge pressure, Charging Header Pressure is less than 940 psig, as read on CRD-PIS-600, and two or more Control Rod Accumulator Trouble, Amber, lights are in on the Full Core Display.

Measurable Performance Standard:

Reactor Mode Switch placed in Shutdown within 20 minutes of CRD pressure LT 940 psig.

Performance Feedback:

Reactor Power as indicated on the APRMs / IRMs / SRM is decreasing as control rods are being inserted.

CRITICAL TASK #2

Critical Task Statement:

With a loss of all Reactor Water Level Indication from the main control room, Open 7 SRV's per PPM 5.1.6 and commence flood up within 15 minutes of loss of all level indication.

Safety Significance:

Heat removal from the reactor must be sufficient to prevent rupturing the fuel clad. Four viable mechanisms of adequate core cooling exist. In order of preference, they are:

- Core Submergence (-161 in.)
- Steam cooling with injection of makeup water to the RPV (-186 in.)
- Steam cooling without injection of makeup water to the RPV (-198 in.)
- Spray cooling with HPCS or LPCS injecting at equal to or greater than 6000 gpm with RPV water level at or above 2/3 core height (-210 in.)

If an injection source is available, the only method to ensure adequate core cooling is to flood the RPV to the elevation of the main steam lines (Core Submergence).

Uncovery to 1/3 core height can be sustained for 25 – 30 minutes without significant core damage. Uncovery below 1/3 core height for 10 to 20 minutes can foster clad temperatures around 2200 °F. Total uncover for about 4 minutes (immediately after shutdown) can probably be experienced without significant core damage.

Initiating Cue:

Loss of all Control room RPV Level Indication per ABN-INSTRUMENTATION Attachment 1.

Measurable Performance Standard:

7 Safety Relief Valves (ADS preferred) manually opened, within 15 minutes of complete loss of RPV level instrumentation.

Performance Feedback:

7 Safety relief valves are open as indicated on H13-P601 and a minimum of one Injection source is lined up and injecting into the RPV.

Simulator Set Up

☐ Unload simulator (between each scenario)

☐ Verify in ILC load

☐ Load correct S/D Sequence (if necessary)

☐ Reload simulator

☐ Reset to Exam Drive IC-197 (reset, go to Run, reset again)

☐ Test EQ machine at correct volume for OBE event

☐ Load Schedule file ILC-25 SC-3

☐ Validate that there are no unexpected annunciators or parameters out of band

☐ Verify pump running magnets

☐ Verify normally removed keys REMOVED except for: NONE

☐ Flag the following: 4.603.A7 4-6 CRD PUMPS ABNORMAL OPERATION

☐ Place clearance tag on: CRD-P-1B

☐ Protect the following: CRD-P-1A

EXAM SECURITY PROCEDURE VERIFICATION

Procedures

PPM 3.3.1, Reactor Scram	☐	☐	
PPM 5.1.1, RPV Control	☐		
PPM 5.1.2 RPV Control – ATWS	☐		
PPM 5.1.6 RPV Flooding - ATWS	☐		
PPM 1.3.83 Protected Equipment Program	☐		
ALL Quick Cards	☐		

ABNs

ABN-CRD	☐	☐	
ABN-RCIC-ISOL/TRIP	☐	☐	
ABN-INSTRUMENTATION	☐	☐	
ABN-EARTHQUAKE	☐	☐	

Tech Specs

3.5.3 A	☐	☐	☐
3.8.1 B	☐	☐	☐

LCS, ODCM

- N/A

ARPs

4.601.A4 1-5 RCIC TURBINE TRIP		☐	
4.601.A4 4-3 RHR A INJECTION VLV OPEN PERMISSIVE		☐	
4.601.A2 4-4 RHR B/C INJECTION VALVE OPEN PERMISSIVE		☐	
4.601.A3 3-3 LPCS INJECTION VALVE OPEN PERMISSIVE		☐	
4.603.A7 3-8 CRD CHARGE WATER PRESSURE LOW		☐	
4.602.A5 4-8 / 4-7 RWCU PUMP TROUBLE		☐	
4.603.A7 6-7 ROD ACUMULATOR TROUBLE		☐	
4.603.A8 1-7 RFW CONTR SYSTEM TROUBLE		☐	
4.603.A8 4-7 RFW/TURBINE RPV LEVEL HIGH TRIP		☐	
4.800.C1 3-1 DG 1 LOCAL PANEL ALARM		☐	
4.800.C1 10-1 DG 1 OUT OF SERVICE		☐	
4.851.S1 2-5 MINIMUM SEISMIC EARTHQUAKE EXCEEDED		☐	

CREW TURNOVER

Initial Conditions:

- Columbia is operating at 100% power.
- CRD-P-1B is tagged out for pump coupling repairs and is expected back in service next shift.

Shift Turnover:

- No evolutions scheduled for shift.

SC-4

ILC-25 SPARE

INSTRUCTIONAL COVER SHEET

PROGRAM TITLE: OPERATIONS REQUALIFICATION TRAINING

COURSE TITLE: COLUMBIA GENERATING STATION SIMULATOR EXAMINATION

LESSON TITLE: Flooding near the tool crib, Loss of SL-63, RRC ASD issues, WW leak requires makeup to prevent ED.

LENGTH OF LESSON: 1 Hour

INSTRUCTIONAL MATERIALS INCLUDED

Lesson Plan PQD Code	N/A	Rev. No.	
Simulator Guide PQD Code		Rev. No.	
JPM PQD Code	N/A	Rev. No.	
Exam PQD Code	N/A	Rev. No.	

DIVISION TITLE: Nuclear Training – NRC EXAM

DEPARTMENT: Operations Training

PREPARED BY: Jeff Lux DATE: 11/10/22

REVISED BY: N/A DATE:

VALIDATED BY: DATE:

TECHNICAL REVIEW BY: DATE:

INSTRUCTIONAL REVIEW BY: DATE:

APPROVED BY: DATE:

Operations Training Manager

MAJOR / MINOR REVISION RECORD

Validation Comments

Minor Rev #	Description of Revision
Exam Group Scenario Testing: RFW-V-112A Failure to close could result in a level 8 scram when RFW pumps are taken to MDEM if speed is not adjusted immediately after taken to MDEM. This would in effect eliminate the malfunction for the Bypass valve failure due to MSIVs closure on level 8 trip.	Changed the Malfunction to RFW-FCV-620 failure of auto function. This prevents ATC from placing reactor feedwater into automatic level control regardless of the feed source. ATC will have to manually control position of the startup flow control valves both before and after MSIV closure.
Crew Validation:	
For event 2 Crew asked for information on whether or not resin had already been added to RWCU-TK-2 for the concern of a "mixed waste" spill.	Added Booth operator response if prompted as RWCR Operator.
DW/WW pressure does not have normal mismatch.	Lowered WW pressure to provide a normal looking mismatch. (0.1 psig– 0.2 psig mismatch)
RWCU Flow through "A" Demin is lower than expected for normal 1 demin in service. System flow is also less than normal.	Adjusted remotes to make flows slightly higher to match what is seen during normal in plant evolution.
Concerns over running HPCS to add water to the WW with the room starting to flood with FDR-V-608 failing in the open position.	Changed malfunction to FDR-V-608 fails to auto close so that the room flooding can be stopped.

SCENARIO OUTLINE

Facility:	Columbia Generating Station	Scenario No.: 4 **Spare Scenario**	Op Test No.:
Examiners:	______________________ ______________________ ______________________	Operators:	______________________ ______________________ ______________________

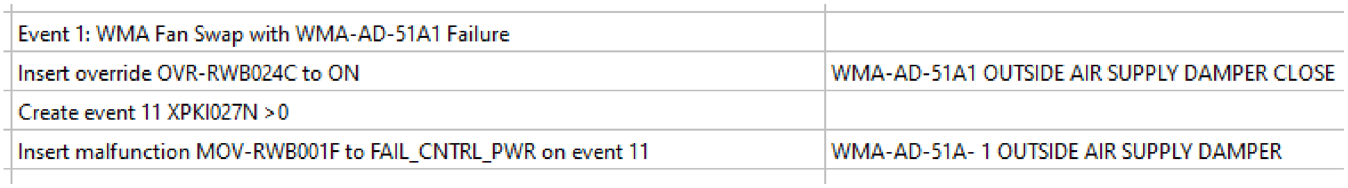
Initial Conditions:	Columbia is operating at 100% power. RWCU-DM-1B is removed from service for planned backwash/precoat.
Turnover:	Following shift turnover, you have been directed to swap operating WMA fans for run time equalization. Start WMA-FN-51A and secure WMA-FN51B. Pre-requisites 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6 of SOP-HVAC/CR-OPS have been previously completed by the off-going crew

Critical Tasks:

CT-1	With both ASD inverters on battery power and normal power cannot be restored Scram the reactor within 20 minutes of loss of normal power to ASD Inverters.
CT-2	With suppression pool water level lowering, take actions to make up to the wetwell per PPM 5.5.23 to prevent emergency depressurization. (Emergency depressurization would be required when WW level cannot be restored and maintained GT 19'2")

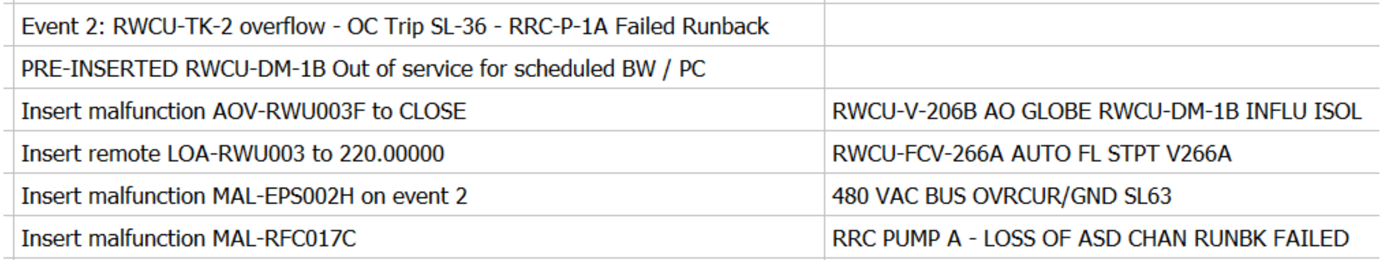
NOTE: An unintentional or unnecessary RPS or ESF actuation may result in the creation of a post-scenario Critical Task, if that actuation results in a significant plant degradation or significantly alters a mitigation strategy.

Event No.	Trigger	Event Type*	Event Description
1	C1	C (CRS / BOP) TS (CRS)	During the performance of WMA Fan Swap, WMA-AD-51A1 control power fuse fails with charring to the fuse block. The operator backs out of the procedure and does not secure WMA-FN-51B CRS Evaluates Tech Specs and enters LCO 3.7.3 Condition A (restore CREF in 7 days) and LCO 3.7.4 condition A (restore CR AC subsystem in 30 days)



Event 1: WMA Fan Swap with WMA-AD-51A1 Failure	
Insert override OVR-RWB024C to ON	WMA-AD-51A1 OUTSIDE AIR SUPPLY DAMPER CLOSE
Create event 11 XPKI027N >0	
Insert malfunction MOV-RWB001F to FAIL_CNTRL_PWR on event 11	WMA-AD-51A- 1 OUTSIDE AIR SUPPLY DAMPER

2	2	C (CRS) C, MC (ATC)	Crew receives a call from the Radwaste tool crib attendant who reports a large puddle of water in the service air compressor area. The Crew will enter ABN-FLOODING. The flooding causes a ground in MC-6B resulting in an overcurrent trip of SL-63. After the bus loss RRC-P-1A fails to automatically run back to 51HZ. The RWCR operator reports that during the performance of RWCU backwash and pre-coat, RWCU-TK-2 overflowed, and the flooding has been stopped.

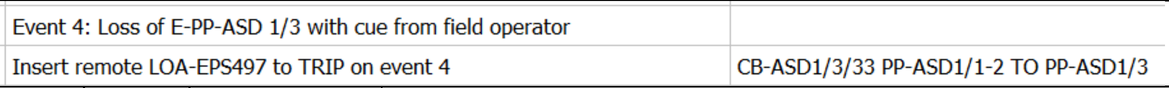


Event 2: RWCU-TK-2 overflow - OC Trip SL-36 - RRC-P-1A Failed Runback	
PRE-INSERTED RWCU-DM-1B Out of service for scheduled BW / PC	
Insert malfunction AOV-RWU003F to CLOSE	RWCU-V-206B AO GLOBE RWCU-DM-1B INFLU ISOL
Insert remote LOA-RWU003 to 220.00000	RWCU-FCV-266A AUTO FL STPT V266A
Insert malfunction MAL-EPS002H on event 2	480 VAC BUS OVRCUR/GND SL63
Insert malfunction MAL-RFC017C	RRC PUMP A - LOSS OF ASD CHAN RUNBK FAILED

3	3	R (CRS, ATC)	RRC-P-1A trips - CRS enters ABN-RRC-LOSS, ABN-CORE and ABN-POWER and directs ATC actions to reduce rodline below 80% per ABN-RRC-LOSS. The CRS will evaluate TS and declare LCO 3.4.1A1 and declare Loop A not in operation in 2 hours.

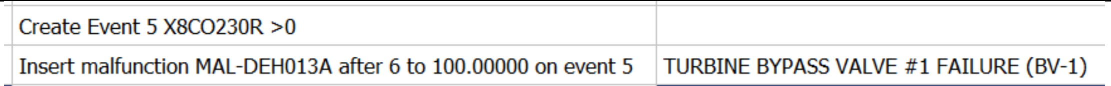
Event 3: RRC-P-1A pump trip	
Insert malfunction MAL-RFC005F on event 3	ASD CH A1 LOAD OVERCURRENT FLT

4	4	M (ALL)	Continued ASD electrical problems result in a loss of E-PP-ASD 1/3. With both inverters on battery power the crew will manually Scram the reactor per ABN-ASD-INV. (**CT-1**)



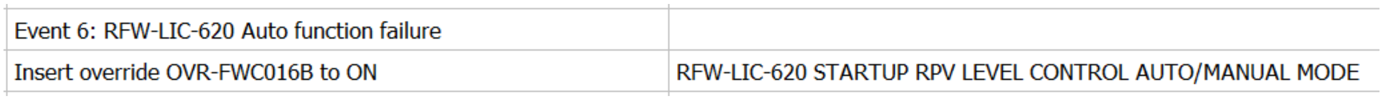
Event 4: Loss of E-PP-ASD 1/3 with cue from field operator	
Insert remote LOA-EPS497 to TRIP on event 4	CB-ASD1/3/33 PP-ASD1/1-2 TO PP-ASD1/3

5		C (CRS / BOP)	Following the scram and automatic turbine trip. After BPV fast opening occurs, Bypass valve 1 will stick in the open position (Will not be controlled by servo valve). Operators will be unsuccessful is manually closing the bypass valve from DEH control panel. Crew will be required to take actions to fast close the MSIV's prior to 500# per ABN-PRESSURE and use SRV's for pressure control.



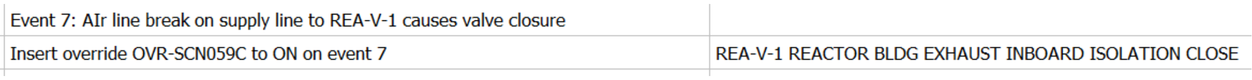
Create Event 5 X8CO230R >0	
Insert malfunction MAL-DEH013A after 6 to 100.00000 on event 5	TURBINE BYPASS VALVE #1 FAILURE (BV-1)

6	6	C (ATC)	Following scram when aligning to the startup flow control valves. RFW-LIC-620 auto function is failed (cannot place RFC-LIC-620 in automatic mode of operation). ATC will be forced to manually control reactor water level using the startup flow control valves both before and after MSIV closure.



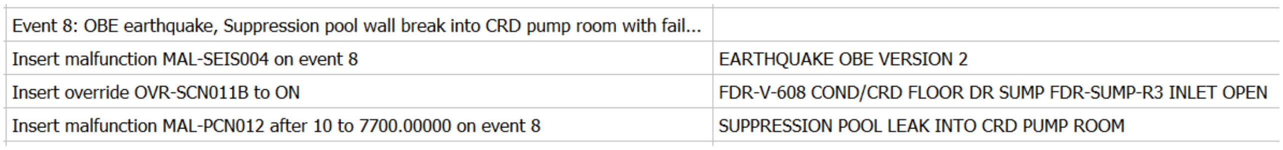
Event 6: RFW-LIC-620 Auto function failure	
Insert override OVR-FWC016B to ON	RFW-LIC-620 STARTUP RPV LEVEL CONTROL AUTO/MANUAL MODE

7	7	C (CRS / BOP)	Following plant stabilization after the scram, the air line for REA-V-1 will break, this results in REA-V-1 closure. Secondary containment DP alarm will come in and the crew will take action to start SGT to restore secondary containment per ABN-HVAC and annunciator response procedures.



Event 7: AIr line break on supply line to REA-V-1 causes valve closure	
Insert override OVR-SCN059C to ON on event 7	REA-V-1 REACTOR BLDG EXHAUST INBOARD ISOLATION CLOSE

8		M (ALL)	The plant will experience an OBE earthquake with a suppression pool wall break. Crew will enter ABN-FLOODING and PPM 5.2.1 Primary Containment Control. Level in the suppression pool will lower and the crew will take actions to make up to the wetwell per PPM 5.5.23 using HPCS to prevent a required emergency depressurization per PPM 5.2.1 Primary Containment Control. Crew will also enter PPM 5.3.1 Secondary Containment Control on Reactor building water levels.



Event 8: OBE earthquake, Suppression pool wall break into CRD pump room with fail...	
Insert malfunction MAL-SEIS004 on event 8	EARTHQUAKE OBE VERSION 2
Insert override OVR-SCN011B to ON	FDR-V-608 COND/CRD FLOOR DR SUMP FDR-SUMP-R3 INLET OPEN
Insert malfunction MAL-PCN012 after 10 to 7700.00000 on event 8	SUPPRESSION POOL LEAK INTO CRD PUMP ROOM

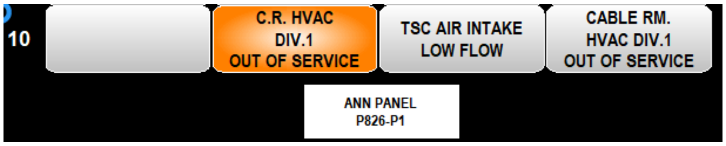
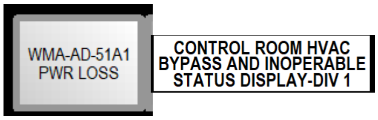
* (N)ormal (R)eactivity (I)nstrument (C)omponent (M)ajor (MC)Manual Control (TS)Technical Specifications

Target Quantitative Attributes	Actual	Description
Events after EOP entry (1-2)	4	RFW-LIC-620 Auto Failure / BPV 1 Fails open / REA-V-1 Closure / WW Leak
Abnormal events (2-4)	5	ABN-FLOODING / ABN-RRC-LOSS / ABN-POWER / ABN-ASD-INV / ABN-PRESSURE
Major transients (1-2)	2	ABN-ASD-INV Scram / WW Leak into CRD pump room
EOPs entered/requiring substantive actions (1-2)	2	PPM 5.1.1 RPV Control / PPM 5.2.1 Primary Containment Control / 5.3.1 Secondary Containment control.
Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	**0**	
Pre-identified Critical tasks (≥ 2)	2	See Critical Task Sheets

TERMINATION CRITERIA:

The scenario will be terminated when reactor water level is stable and in band and the crew has made up to the wetwell per PPM 5.5.23 Using HPCS to prevent Emergency Depressurization.

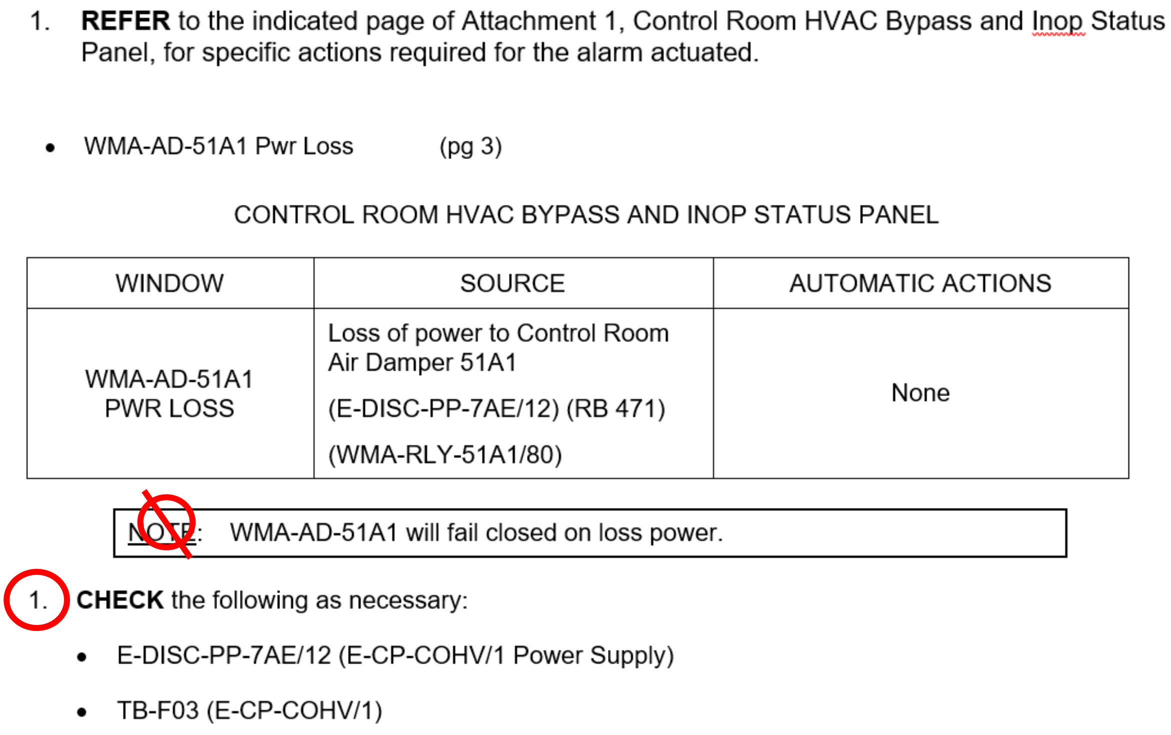
EVENT 1: Failure of WMA-AD-51A1 During performance of SOP-HVAC/CR-OPS section 5.1.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
		PRE-INSERTED MALFUNCTION: WMA-AD-51A1 Fuse failure **Results in: BOP Normal Evolution and CRS TS Call**
1.	**CRS**	Directs WMA Fan swap per shift turnover.
2.	**BOP**	Per SOP-HVAC/CR-OPS 5.1 Shifting WMA-FN-51A/B during Normal Operation (Supply Fan for WMA-AH-51A/B) 5.1.1 **VERIFY** the following Remote Air Intake isolation valves are **OPEN**: • WOA-V-51A (Control Room Remote Air Intake No. 1 (NW) Isol) Verifies ____ • WOA-V-52A (Control Room Remote Air Intake No. 1 (NW) Isol) Verifies ____ • WOA-V-51B (Control Room Remote Air Intake No. 2 (SE) Isol) Verifies ____ • WOA-V-52B (Control Room Remote Air Intake No. 2 (SE) Isol) Verifies ____
3.	**BOP**	NOTE: Unless otherwise indicated, all control switches and annunciators are located on H13-P826. 5.1.2 IF shifting from WMA-FN-51A to WMA-FN-51B, THEN **PERFORM** the following: N/A – Shifting from "B" Fan to "A" fan
4.	**BOP**	5.1.3 IF shifting from WMA-FN-51B to WMA-FN-51A, THEN **PERFORM** the following: a. **PLACE** WMA-FN-51A control switch in **ON**. Performs ____ b. **VERIFY** WMA-AD-51A1 **OPEN** (Fresh Air Inlet). Notes loss of indicating lights. ____ c. **PLACE** WMA-FN-51B control switch in **AUTO** to stop WMA-FN-51B. ____ d. **VERIFY** WMA-AD-51B1 **CLOSED** (Fresh Air Inlet). ____
5.	**BOP**	Notes that WMA-AD-51A1 indicating lights are extinguished and alarms following WMA-FN-51A Fan start. Acknowledges 4.826.P1 10-2 CR HVAC DIV 1 OUT OF SERVICE  

EVENT 1: Failure of WMA-AD-51A1 During performance of SOP-HVAC/CR-OPS section 5.1.

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>6.</td><td>BOP</td><td>Does not proceed with stopping WMA-FN-51B (Step 5.1.3c)

Informs CRS
May stop WMA-FN-51A to place the system in a safe configuration.</td></tr>
<tr><td>7.</td><td>BOP</td><td>Per 4.826.P1 10-2 CR HVAC DIV 1 OUT OF SERVICE


1. REFER to the indicated page of Attachment 1, Control Room HVAC Bypass and Inop Status Panel, for specific actions required for the alarm actuated.

• WMA-AD-51A1 Pwr Loss (pg 3)

CONTROL ROOM HVAC BYPASS AND INOP STATUS PANEL
<table>
<tr><th>WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr>
<tr><td>WMA-AD-51A1
PWR LOSS</td><td>Loss of power to Control Room Air Damper 51A1
(E-DISC-PP-7AE/12) (RB 471)
(WMA-RLY-51A1/80)</td><td>None</td></tr>
</table>

NOTE: WMA-AD-51A1 will fail closed on loss power.

1. CHECK the following as necessary:
• E-DISC-PP-7AE/12 (E-CP-COHV/1 Power Supply)
• TB-F03 (E-CP-COHV/1)

Directs OPS2 to check E-DISC-PP-7AE/12 and TB-F03</td></tr>
<tr><td colspan="3">If directed to investigate E-DISC-PP-7AE/12 and TB-F03 wait 3 minutes and
ROLE-PLAY
“E-DISC-PP-7AE/12 is closed, TB-F03 fuse block appears to be charred”</td></tr>
<tr><td>8.</td><td>CRS</td><td>May direct BOP to secure WMA-FN-51A (If not already secured)
Provides a crew brief
Contacts production / work control for assistance
Evaluates TS</td></tr>
</table>

9.

CRS

Technical Specification Action Statement:

Evaluates and declares LCO 3.7.3 condition A and LCO 3.7.4 condition A.

Evaluates and declares LCS 1.3.3.1 A1 and D1

May reference OI-41 Operations Work Control Expectations, Attachment 7.3

EPN	SUB-EPN	Direct TS	Basis Document	Comments
WMA-FN-51A	WMA-FN-51A	3.7.3, 3.7.4		Work on this component removes the fan from service resulting in the loss CREF and CR AC. Therefore, this division is INOPERABLE.
	WMAAH51AINSP	3.7.3, 3.7.4		
	WMA-42-7F3E	3.7.3, 3.7.4		
	WMA-AD-51A1	TS 3.7.3, TS 3.7.4 LCS 1.3.3.1		

LCO 3.7.3 Two CREF subsystems shall be OPERABLE.

---NOTE---

The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREF subsystem inoperable for reasons other than Condition B.	A.1 Restore CREF subsystem to OPERABLE status.	7 days

LCO 3.7.4 Two control room AC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One control room AC subsystem inoperable.	A.1 Restore control room AC subsystem to OPERABLE status.	30 days

EVENT 1: Failure of WMA-AD-51A1 During performance of SOP-HVAC/CR-OPS section 5.1.

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>10.</td><td>CRS</td><td>LCS 1.3.3.1 Post Accident Monitoring
Table 1.3.3.1-1: FUNCTION 17 – Emergency Ventilation Damper Position
1.3.3.1 A.1:
A. One or more functions with one or more required channels inoperable. | A.1 Enter the Condition referenced in Table 1.3.3.1-1 for the channel. | Immediately
1.3.3.1 D.1:
D. As required by Required Compensatory Measure A.1 and referenced in Table 1.3.3.1-1. | D.1 Restore channel to OPERABLE status. | 30 days</td></tr>
</table>

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

Following WMA-AD TS Evaluation or when directed by the lead evaluator.

Call the main control room X2171 as the tool crib attendant and

ROLE-PLAY

"There is a lot of water on the floor in the Service Air Compressor area, Water appears to be coming from the back area by the electrical panels and stairwell"

Wait **FOUR minutes** after completion of phone call and activate **TRIGGER 2**

Results in: Overcurrent trip of SL-63 and RRC-P-1A automatic runback failure

Examiner Note: The Crew will take actions of ABN-FLOODING. Based on the 4 minute booth operator time delay for trigger 2, the crew may still be taking actions for ABN-FLOODING and then concurrently performing actions for the loss of SL-63. The actions listed in this scenario guide have been grouped into 2 sections (Flooding and loss of SL-63) for ease of use.

11.	**BOP**	Reports the flooding to the CRS.
12.	**CRS**	Enters and directs actions of ABN-FLOODING
13.	**BOP**	Per ABN-FLOODING 4.0 SUBSEQUENT OPERATOR ACTIONS **WARNING** Flooding in the Power Block may cause personnel injury. Use extreme caution when investigating the source of the flooding. **CAUTION** This is not a stand-alone procedure. This procedure should be performed in conjunction with all other applicable procedures. **NOTE:** If normal lighting is lost, handheld lights may be obtained from the emergency cabinets.
14.	**BOP**	4.1 **DISPATCH** Equipment Operator(s) to determine the source. Performs 4.1.1 **INFORM** the Equipment Operator(s) that a potential hazardous condition exists (flooding), Performs AND **TAKE** necessary precautions to prevent personal injury. Performs Contacts RWCR to investigate the flooding.

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">When contacted as RWCM operator, immediately:
ROLE-PLAY
“During the performance of the backwash and precoat of RWCU-DM-1B, RWCU-TK-2 over flowed. I have secured RWCU-P-4 and the flooding has stopped, there is about 2” of water covering the floor in the tank area”
Examiner Note: This is reflective of CGS OE 390321 02/25/2019</td></tr>
<tr><td>15.</td><td>BOP</td><td>Informs CRS of RWCR Report and source of flooding.</td></tr>
<tr><td>16.</td><td>CRS</td><td>Enters / Directs actions of ABN-RAD-SPILL</td></tr>
<tr><td>17.</td><td>BOP</td><td>Per ABN-RAD-SPILL
4.1 NOTIFY Health Physics. Performs</td></tr>
<tr><td colspan="3">If contacted as Health Physics, immediately:
ROLE-PLAY
Give verbatim repeat back of BOP report</td></tr>
<tr><td>18.</td><td>CRS</td><td>4.2 IF there are indications of increasing radiation levels, THEN REFER to ABN-RAD-HIGH. N/A
4.3 IF the spilled material is mixed waste, THEN EXIT to ABN-HAZMAT. N/A</td></tr>
<tr><td>19.</td><td>CRS</td><td>4.4 IF radiological conditions permit, THEN PERFORM the following to minimize/stop the effects of the spill:
• CLOSE the applicable valve. N/A
• SECURE the applicable pump. Per the report from the RWCR Operator, the pump is secure.
• UP RIGHT the spilled container. N/A
• COVER the spill. N/A
• CONSTRUCT a temporary dam. N/A
• DIRECT spillage to floor drains if it does not contain chemicals.</td></tr>
<tr><td>20.</td><td>CRS</td><td>NOTE: The CRS/Shift Manager has the discretion for Localized Evacuation. A leak that warrants entry into this procedure need not require evacuation if installed drains and sumps are sufficient to address the leak and prevent the spread of contamination.
Examiner Note: Installed drains ARE suffient to prevent the spread, however this is at the discretion of the CRS and they may direct evacuation per ABN-RAD-SPILL if not previously performed in ABN-FLOODING.</td></tr>
</table>

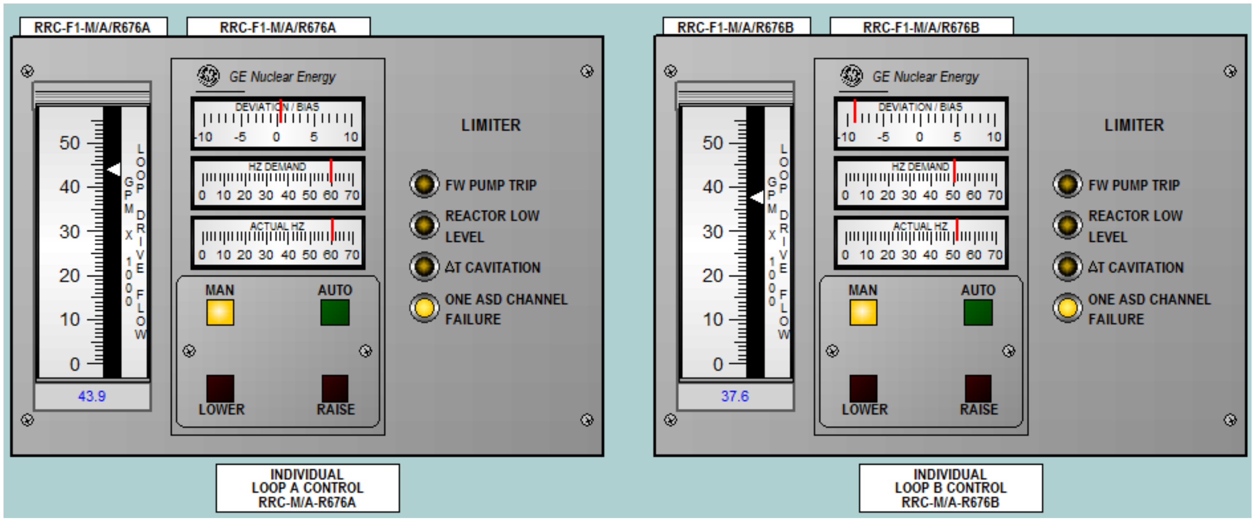
EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>21.</td><td>BOP</td><td>If Directed by CRS
4.5 PERFORM the following to evacuate the affected area:
4.5.1 REFER to PPM 13.5.1 for Localized Evacuation. If Directed ____
4.5.2 SOUND the alerting tone for 5 seconds. If Directed ____
4.5.3 ANNOUNCE an evacuation of all non-emergency personnel from the affected area. If Directed ____
4.5.4 REPEAT the above two steps. If Directed ____</td></tr>
<tr><td>22.</td><td>BOP</td><td>4.6 IF large amounts of water have spilled,
THEN VERIFY the floor drain sump pumps operate to prevent flooding. Performs ____
NOTE: The need to secure the sump pump(s) will be determined by the CRS/Shift Manager. The CRS/Shift Manager has the discretion for operation of the sump pump(s), as warranted.</td></tr>
<tr><td colspan="3">When contacted as RWCM operator, immediately:
ROLE-PLAY
“The W-4 sump pumps are operating as expected”</td></tr>
<tr><td colspan="3">Examiner Note: The following actions taken are for the loss of SL-63 and failure of RRC-P-1A to runback the actions of BOP and ATC are simultaneous. This occurs 4 minutes after the report of flooding.</td></tr>
<tr><td>23.</td><td>ATC</td><td>Responds to the loss of SL-63, Monitors RFW pump response to RRC-P-1B Runback. Monitors RPV power / pressure and level.
Acknowledges annunciators due to the loss of SL-63.
4.602.A6 5-1 LOOP A ASD CHANNEL FAILURE LIMIT
4.602.A6 5-5 LOOP B ASD CHANNEL FAILURE LIMIT
4.602.A13 4-3 ASD 1A2 ALARM
4.602.A13 5-3 ASD 1A2 FAULT
4.602.A13 4-4 ASD 1A2 ALARM
4.602.A13 5-4 ASD 1A2 FAULT
4.602.A6 6-2 RECIRC A OR B HIGH FLOW DELTA</td></tr>
</table>

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>24.</td><td>BOP</td><td>Responds to the electric plant annunciators:
4.800.C2 7-6 BUS 63 GROUND
4.800.C2 8-5 BKR 6/63 TRIP
4.800.C2 8-6 BUS 63 MCC OL TRIP
4.800.C5 5-7 125 VDC CHARGER C1-7 TROUBLE
Reports to the SRO overcurrent trip or loss of SL-63</td></tr>
<tr><td>25.</td><td>BOP</td><td>Per Annunciator Response Procedure 4.800.C2 7-6 BUS 63 GROUND
NOTE: The lack of illumination of the white ground indication lights on SL-63 Ground Fault Indication Panel provides indication of the grounded bus.
1. DETERMINE the location of the ground by checking SL-63 Ground Fault Indication Panel.
2. RESET the applicable 50GX relay at SL-63 or the associated breaker cubicle.
☐ And Per 4.800.C2 8-6 BUS 63 MCC OL TRIP
1. DETERMINE which breaker tripped (SL-63).
2. INVESTIGATE and CORRECT the overload condition.
3. RESET overload trip switch at SL-63 prior to closing the breaker.
<i>BOP should NOT Direct reset of overload trip switch.</i>
<i>The cause has NOT ben corrected.</i></td></tr>
<tr><td colspan="3">When contacted as field operator to investigate the loss of SL-63, Wait 3 minutes and:
ROLE-PLAY
“Loss of SL-63 was due to a ground on MC-6B, the ground will not reset”</td></tr>
<tr><td>26.</td><td>CRS</td><td>Enters ABN-POWER for unexpected power change.</td></tr>
</table>

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
27.	**ATC**	 Based on indications reports RRC-P-1A Failed to run back to 51hz. Automatic action that should have occurred, ATC may inform CRS of intent to runback RRC-P-1A to 51hz per SOP-RRC-FLOW-QC section 2.2 (Automatic Action that should have occurred) OR reduced flow per 4.602.A6 6-2 RECIRC A OR B HIGH FLOW DELTA
28.	**ATC**	2.2 Reactor Power Change with RRC Flow Controllers in Manual NOTE: Two handed operation of the individual loop controllers is authorized ONLY if a rapid flow/power reduction is required. NOTE: When RRC flow controllers are in Manual, then alternate flow changes between Loop A and Loop B to maintain the delta between loop flows less than 2000 gpm per TS 3.4.1.1.

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
29.	**ATC**	NOTE: Per PPM 1.3.84, the performer verifies and verbalizes to the peer checker the following information: • Current RRC loop flows • 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 Requests BOP to peer check
30.	**ATC**	☐ 2.2.1 IF desired to control RRC flow using the Individual ASD Controllers in MANUAL within the constraints of fuel preconditioning, THEN **RAISE/LOWER** RRC flow using RRC-M/A-R676A(B) (Individual Loop A(B) Control), as necessary. Performs ____ Verifies controller in manual and reduces RRC-A to 51 hz 2.2.2 **VERIFY** total core flow is LT 105%. Verifies ____ 2.2.3 **VERIFY** RRC loop A and B is LT 57.5 Mlb/hr. Verifies ____ 2.2.4 **NOTIFY** the CRS when the change in Reactor power is complete. Informs CRS ____
31.	**CRS**	Per ABN-POWER Marks section 3 as N/A, Immediate operator actions listed are not applicable to current plant conditions. 4.0 SUBSEQUENT OPERATOR ACTIONS NOTE: Refer to Section 4.1 for RRC Flow change. Refer to Section 4.2 for Jet Pump failure. Refer to Section 4.3 for a unplanned feedwater temperature reduction.

EVENT 2: RWCU-TK-2 Overflow / OC Trip SL-63 / RRC-P-1A runback failure

STEP #	Position	OPERATOR ACTIVITIES
		CREW RESPONSE
32.	**CRS**	4.1 RRC Flow Change **CAUTION** Reducing the core flow to LT ~64% may cause the OPRM to be Enabled. The OPRM trip functions will enable when the drive flow as measured by the APRM is reduced to LT 60% drive flow. If the OPRM enables then this is considered an entry into the OPRM Enabled Region and requires entry into ABN-CORE. Reducing core flow to LT 55% of rated flow may cause entry into the Area of Increased Awareness of the Power-to-Flow map. 4.1.1 IF RRC pump speed is lowering for one pump, AND cannot be controlled, THEN **STOP** the affected pump prior to exceeding the allowable mismatch in Attachment 7.2. N/A 4.1.2 IF RRC flow is fluctuating, THEN **PLACE** the RRC pump controllers in **MANUAL**, AND **VERIFY** flow has stabilized, N/A OR **STOP** the uncontrolled pump. N/A
33.	**CRS**	4.1.3 IF RRC flow has risen, AND RRC system flow control is restored, THEN **REDUCE** RRC flow to the pre-transient value. N/A 4.1.4 IF the OPRM Enables (APRM STP GE 24.6% and RRC Drive Flow LT 60% as specified in the COLR), THEN **REFER** to ABN-CORE. N/A 4.1.5 **REFER** to Technical Specification 3.4.1. May Refer to it. **Examiner Note: Once loop flows are balanced entry into TS 3.4.1 will not be required.**
34.	**CRS**	4.1.6 IF RRC flow must be changed to balance loop flows, THEN **REFER** to the current power to flow map, AND **ADJUST** RRC flow to match, _____ OR **DECLARE** the loop with the lower flow not in operation. _____ If ATC did not previously runback RRC in Manual to 51hz, CRS directs runback. **Examiner Note: Refer to ATC step 30 Above**

EVENT 3: RRC-P-1A Trip

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE

When directed by the lead evaluator.

ACTIVATE TRIGGER 3: RRC-P-1A Trip

Results in: ABN-RRC-SINGLE-LOOP

(CGS OE – Both ASD Channels failed on RRC-P-1A Resulting in single loop operations – CR404225 02/14/20)

STEP #	Position	CREW RESPONSE
35.	**ATC**	Responds to: 4.602.A13 1-3 ASD 1A/1 ALARM 4.602.A13 2-3 ASD 1A/1 FAULT 4.603.A8 3-7 RPV LEVEL HIGH / LOW ALERT 4.603.A7 3-7 OPRM TRIP ENABLED Verifies RFW Pumps speed lowers as expected to maintain RPL level in automatic. Reports to SRO RRC-P-1A trip and entry into the OPRM Enabled region of the power to flow map.
36.	**CRS**	Declares Entry into ABN-CORE and ABN-RRC-LOSS (May Re-Enter ABN-POWER) for entry into the OPRM enabled region and the loss of RRC-P-1A
37.	**BOP**	Acknowledges variuos Feedwater Heater Alarms (Expected) due to the rapid power transient.
38.	**ATC**	Verifies position on power to flow map and reports to SRO. Gives P/P/L Report
39.	**CRS**	Second Checks Position on power to flow map

IF called as OPS 4 to investigate the loss of RRC-P-1A at ASD, **Wait 3 minutes** and call **X2171**:

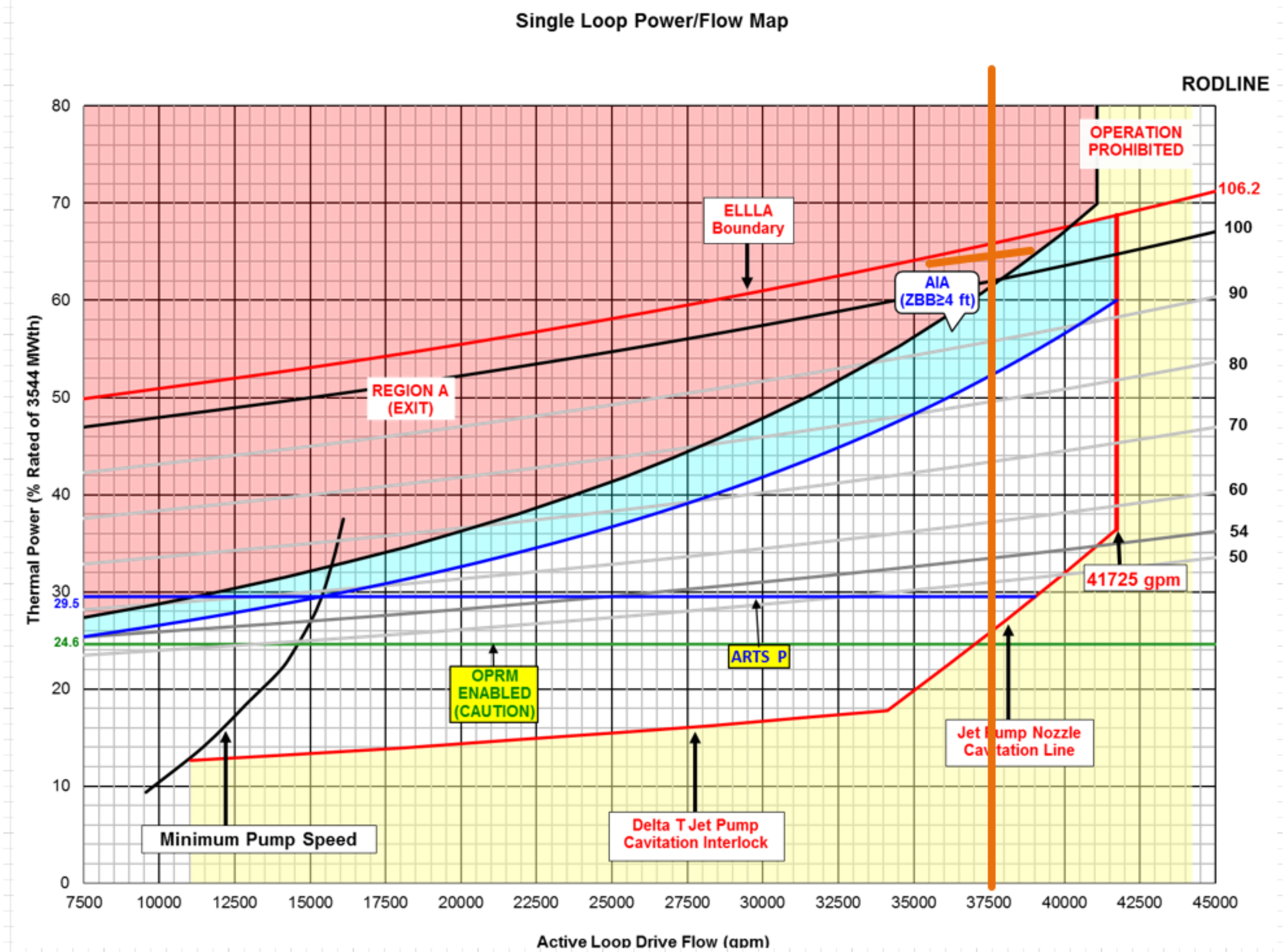
ROLE-PLAY

"The was an overload trip of ASD-CH-1A1"

Examiner Note: Diagram of SINGLE LOOP POWER / FLOW (ABN-RRC-LOSS Attachment 6.1) provided for reference. Rod line will be approx. 104% to 105% following this transient which places the operators in REGION A.

EVENT 3: RRC-P-1A Trip

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**



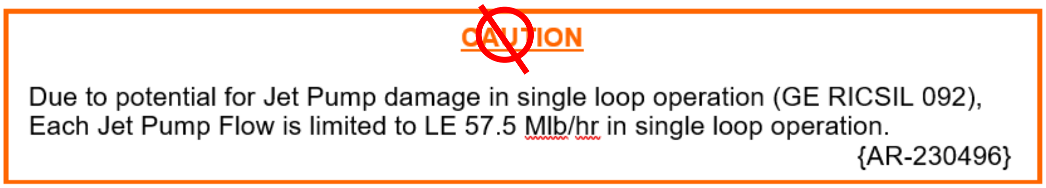
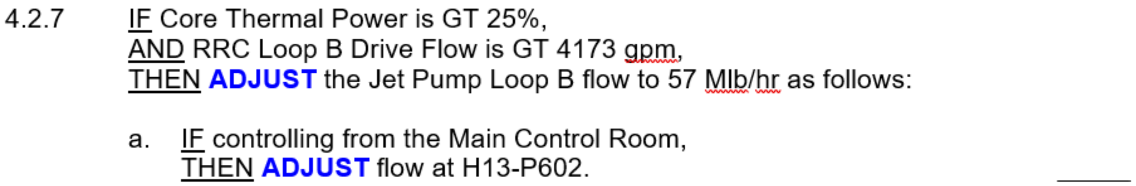
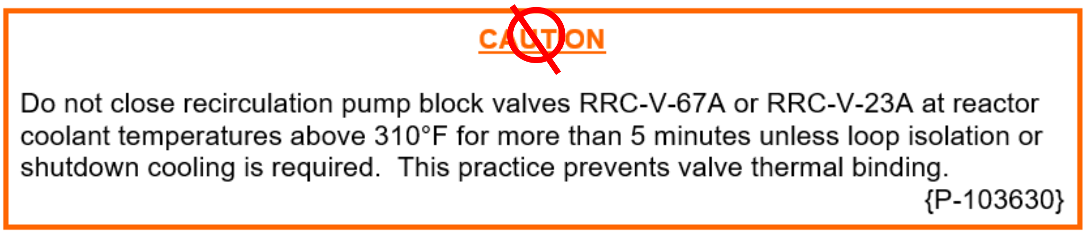
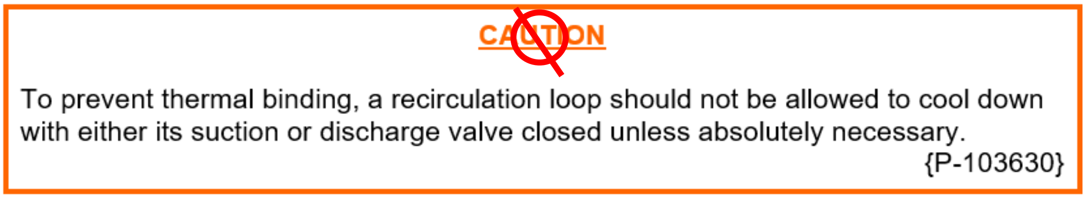
Examiner Note: ABN-CORE does not contain applicable actions other than reference to using ABN-RRC-LOSS. Applicable actions of ABN-RRC-LOSS are referenced below.

40.	CRS	Enters and Evaluates ABN-CORE. In several locations **ABN-CORE** directs the SRO to ABN-RRC-LOSS of actions. Section 4.1 RRC Pump Abnormal Opration 4.1.2 IF a single RRC pump has tripped, THEN **REFER** to ABN-RRC-LOSS. 4.1.3 **REFER** to ABN-POWER. And Section 4.2 for Entry into Region A or the AIA

EVENT 3: RRC-P-1A Trip

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
41.	**CRS**	Entry into Region A or the (AIA) **NOTE**: While operating in the AIA if the Boiling Boundary is LT 4.0 feet the risk of a core instability is significantly higher. **NOTE**: Raising core flow by restarting a reactor Recirculation pump IS NOT an acceptable method of exiting Region A or the AIA. **NOTE**: Promptly exit Region A to reduce the risk of a core instability. **NOTE**: Exit the AIA as soon as practical to reduce the risk of a core instability. 4.2.1 IF in single RRC loop operation THEN **REFER** to ABN-RRC-LOSS for single loop entry actions. SRO Refers to ABN-POWER and ABN-RRC-LOSS Section 4.2, Loss of RRC-P-1A
42.	**CRS**	Performs the following associated actions of ABN-RRC-LOSS section 4.2 Loss of RRC-P-1A. **CAUTION** If operating on a rod line GT 70%, it is possible to enter Region A following the removal of RRC-P-1A from service. Operation in Region A has an elevated risk of a core instability event. Operation in Region A is an accepted risk. Minimize operation in Region A by reducing the rod line as soon as practical to reduce the potential of a core instability event. {P-77714} **NOTE**: This section provides proper actions to be taken in the event of an automatic tripping of RRC-P-1A or when RRC-P-1A is manually tripped per procedural direction. 4.2.1 **CONCURRENTLY** enter ABN-CORE for AIA and OPRM Enabled entry. 4.2.2 **LOG** the time Single Loop was entered in the Control Room Log. 4.2.3 **VERIFY** RRC-M/A-676B is in **MANUAL** (Loop "B" Auto/Manual Controller) (H13-P602). Marks Step 4.2.4 as N/A (RRC Loop B is NOT GT 41,725gpm) Marks Step 4.2.5 s N/A (RRC Loop flow is NOT between 4173gpm and 33,000gpm.
43.	**CRS**	Direct ATC to perform step 4.2.6 of ABN-RRC-LOSS 4.2.6 IF operating in Region A of the Power to Flow Map OR above the 80% rod line of the Power to Flow Map (Attachment 7.1), THEN **INSERT** control rods to exit Region A, AND to reduce rod line to LE 80% by one of the following: {R-6.15} • Fast Shutdown Sequence, AIA Entry section Directs

EVENT 3: RRC-P-1A Trip

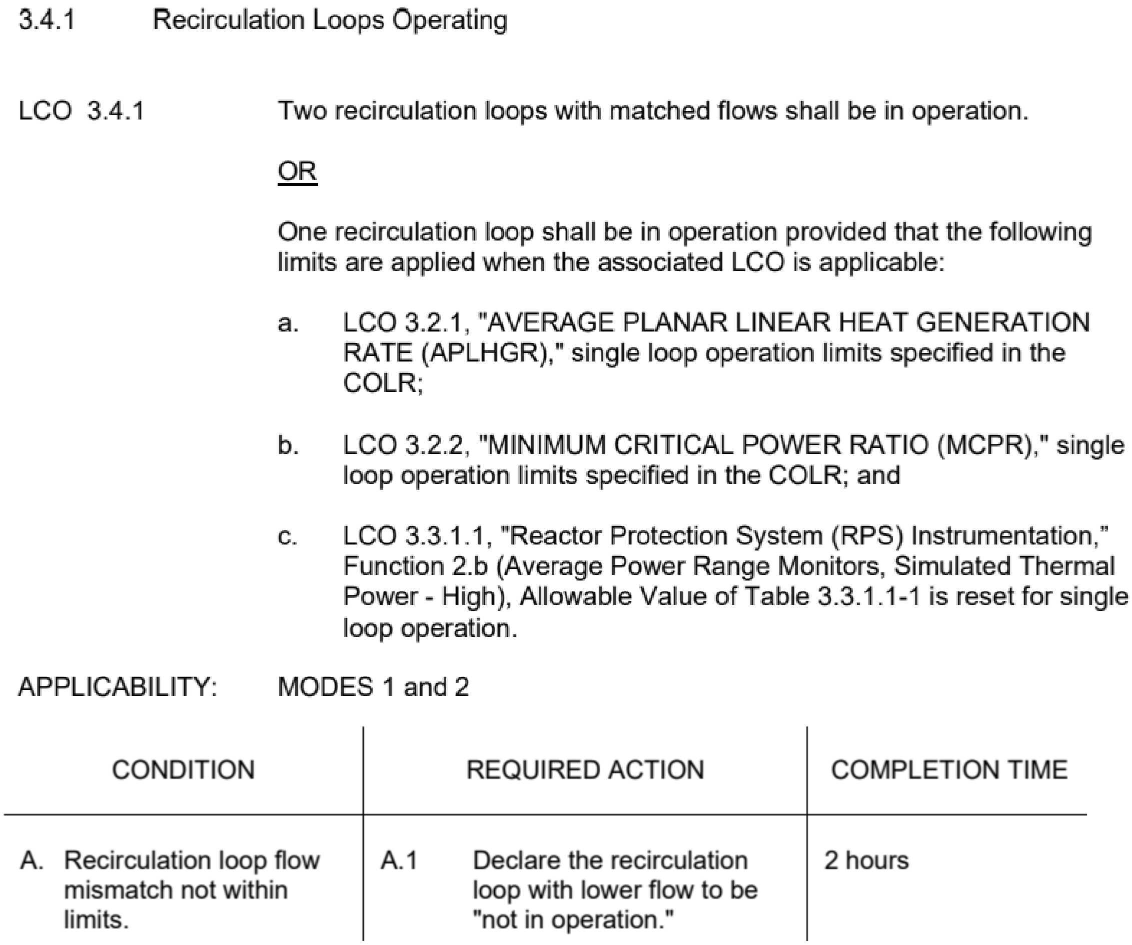
STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
44.	ATC	Lowers Rodline to LT 80% Using the Fast Shutdown Sequence, AIA Section. Upon completion of reactivity manipulation, Informs the SRO and gives the SRO a P/P/L report
45.	CRS	Continues with ABN-RRC-LOSS and directs ATC to perform steps 4.2.7 and 4.2.8
46.	ATC	Per ABN-RRC-LOSS  CAUTION Due to potential for Jet Pump damage in single loop operation (GE RICSIL 092), Each Jet Pump Flow is limited to LE 57.5 Mlb/hr in single loop operation. {AR-230496}  4.2.7 IF Core Thermal Power is GT 25%, AND RRC Loop B Drive Flow is GT 4173 gpm, THEN **ADJUST** the Jet Pump Loop B flow to 57 Mlb/hr as follows: a. IF controlling from the Main Control Room, THEN **ADJUST** flow at H13-P602. _____ **EXAMINER NOTE: Due to the loss of a single channel for RRC-P-1B, the crew will not be able to raise recirculation flow with RRC-P-1B.**
		EXAMINER NOTE: Lead examiner does not have to wait for the entire rod line reduction to be completed. After the operator has commenced inserting rods per the fast shutdown sequence, the lead examiner can direct continuing on to event 4 at their disgresion. **The TS call CAN be a follow up question for the SRO candidate if needed.**
47.	CRS	Directs BOP to perform step 4.2.8 of ABN-RRC-LOSS
48.	BOP	Performs Step 4.2.7 of ABN-RRC-LOSS as directed by the SRO  CAUTION Do not close recirculation pump block valves RRC-V-67A or RRC-V-23A at reactor coolant temperatures above 310°F for more than 5 minutes unless loop isolation or shutdown cooling is required. This practice prevents valve thermal binding. {P-103630}  CAUTION To prevent thermal binding, a recirculation loop should not be allowed to cool down with either its suction or discharge valve closed unless absolutely necessary. {P-103630}

EVENT 3: RRC-P-1A Trip

STEP #		OPERATOR ACTIVITIES
	Position	CREW RESPONSE
49.	BOP	Performs Step 4.2.7 of ABN-RRC-LOSS as directed by the SRO **NOTE**: CB-RPT-3A will auto trip when closing RRC-V-67A or RRC-V-23A 4.2.8 IF RRC-V-67A is available, THEN **PERFORM** the following to prevent reverse rotation of RRC-P-1A: a. **CLOSE** RRC-V-67A (Pump Discharge Valve) (H13-P602). Performs b. **LOG** the time RRC-V-67A was closed in the Control Room log. Performs **NOTE**: The following two substeps may be marked N/A if entering RHR SDC or isolating the loop. c. WHEN LT 5 minutes has elapsed, THEN **OPEN** RRC-V-67A. Performs d. **LOG** the time RRC-V-67A was opened in the Control Room log. Performs
50.	CRS	Call Work Control / Production SRO for support. Provides a crew brief. Evaluates Technical Specification

EVENT 3: RRC-P-1A Trip

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
51.	**CRS**	**Technical Specification Action Statement:** **SRO Declares RRC Loop A inoperable -OR- Applies the single loop operation limits specified / resets APRM STP high for single loop operation within 2 hours.**



3.4.1 Recirculation Loops Operating

LCO 3.4.1 Two recirculation loops with matched flows shall be in operation.

OR

One recirculation loop shall be in operation provided that the following limits are applied when the associated LCO is applicable:

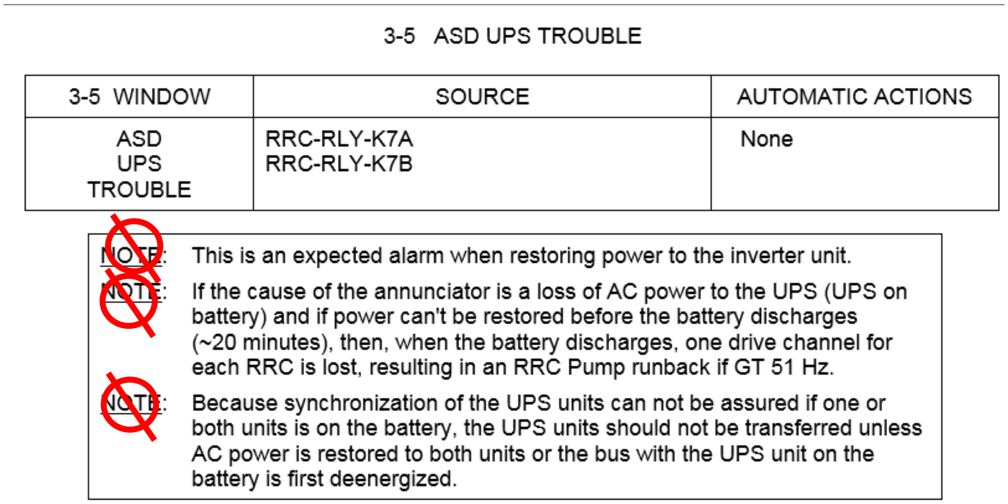
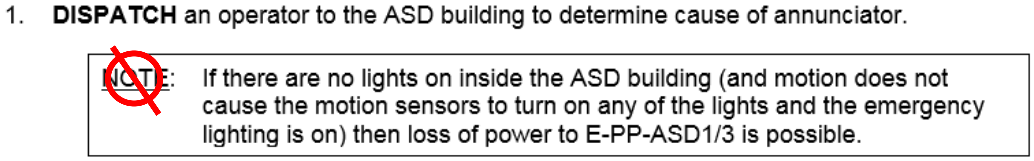
a. LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," single loop operation limits specified in the COLR;

b. LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," single loop operation limits specified in the COLR; and

c. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," Function 2.b (Average Power Range Monitors, Simulated Thermal Power - High), Allowable Value of Table 3.3.1.1-1 is reset for single loop operation.

APPLICABILITY: MODES 1 and 2

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Recirculation loop flow mismatch not within limits.	A.1 Declare the recirculation loop with lower flow to be "not in operation."	2 hours

<table>
<tr><th colspan="3">EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">Following crew actions of ABN-POWER or when directed by lead evaluator.
ACTIVATE TRIGGER 4: E-PP-ASD1/3 Trip
Results in: ABN-ASD-INV Scram required.
30 Seconds after the initiation of trigger 4
Cal X2171 as OPS 4 and</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“I was still in the ASD building investigating RRC-P-1A ASD when all the lights in the ASD building went out.”</td></tr>
<tr><td>52.</td><td>ATC</td><td>Acknowledges 4.602 A13 3-5 ASD UPS TROUBLE (The only new alarm that is received along with the report from the field operator)

3-5 ASD UPS TROUBLE
<table>
<tr><th>3-5 WINDOW</th><th>SOURCE</th><th>AUTOMATIC ACTIONS</th></tr>
<tr><td>ASD
UPS
TROUBLE</td><td>RRC-RLY-K7A
RRC-RLY-K7B</td><td>None</td></tr>
</table>
NOTE: This is an expected alarm when restoring power to the inverter unit.
NOTE: If the cause of the annunciator is a loss of AC power to the UPS (UPS on battery) and if power can't be restored before the battery discharges (~20 minutes), then, when the battery discharges, one drive channel for each RRC is lost, resulting in an RRC Pump runback if GT 51 Hz.
NOTE: Because synchronization of the UPS units can not be assured if one or both units is on the battery, the UPS units should not be transferred unless AC power is restored to both units or the bus with the UPS unit on the battery is first deenergized.</td></tr>
<tr><td>53.</td><td>BOP</td><td>
1. DISPATCH an operator to the ASD building to determine cause of annunciator.
NOTE: If there are no lights on inside the ASD building (and motion does not cause the motion sensors to turn on any of the lights and the emergency lighting is on) then loss of power to E-PP-ASD1/3 is possible.</td></tr>
<tr><td colspan="3">IF contacted as OPS4 to determine the cause of the annunciator
(DO NOT RESPOND ON THE RADIO) Call X2171 as OPS 4 and immediately (OPS 4 was already in the building went the lights went out)</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“The supply breaker to E-PP-ASD1/3 is tripped, there are scorch marks indicating electrical damage to E-PP-ASD1/3, there is no smoke or fire”</td></tr>
</table>

EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
54.	**BOP**	2. IF loss of power to E-PP-ASD1/3 is indicated per the NOTE above, THEN **PERFORM** the following: a. **CYCLE** the breaker on the back of the following transformers to attempt to re-energize the transformer: • E-TR-ASD1 • E-TR-ASD2 b. **VERIFY** the following **CLOSED**: • E-CB-ASD1/1/1 • E-CB-ASD1/2/1 **RO Should NOT perform these steps based on the report from field operator.**

IF contacted as OPS4 to cycle breakers to attempt to re-energize E-PP-ASD1/3 (DO NOT RESPOND ON THE RADIO) Call X2171 as OPS 4 and immediately

ROLE-PLAY

/

55.	**ATC or BOP**	3. **REFER** to ABN-ASD-INV. 4. IF necessary, THEN **NOTIFY** Electrical maintenance.
56.	**CRS**	ENTERS ABN-ASD-INV and notifies electrical maintenance.

CRITICAL TASK # 1

Time Trigger 4 is inserted (Results in both inverters on battery power): _____________.

Time Manual scram is inserted per ABN-ASD-INV: _____________.

Examiner Note: The critical task is considered met if the crew inserts a manual reactor scram within 20 minutes of the loss of E-PP-ASD1/3.

Examiner Note: 20 Minutes after trigger 4 is inserted (ASD Inverters are on battery power) RRC-P-1B will automatically trip, Reactor water level will not result in a level 8 trip (Due to reactor power was approx. 60% in single loop operation at 51hz. This does not cause a downcomer swell large enough to result in level 8 trip).

Allowing the ASD battery power to run out would result in Reactor power at ≈40% with no recirculation pumps in operation and clear failure of this critical task)

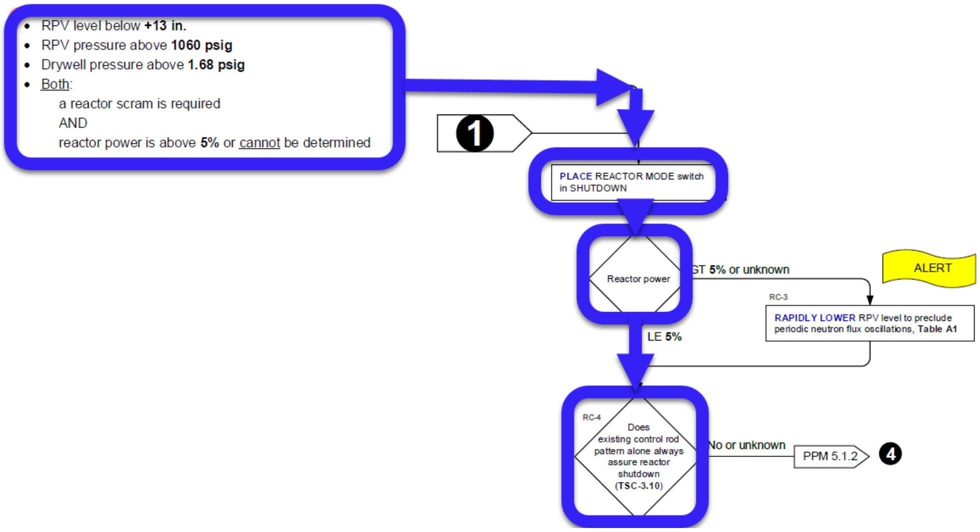
EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

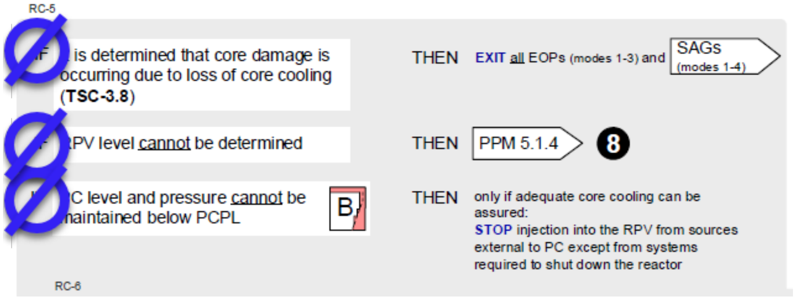
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
57.	**CRS**	4.0 SUBSEQUENT OPERATOR ACTIONS **NOTE:** If the UPS transfers to BATTERY, it continues to power its respective MEM Units for approximately 20 minutes. If normal power becomes available prior to battery depletion, the inverter will return to normal power. If the battery is exhausted, there is a loss of control power to one channel per recirc pump AND both RRC-P-1A/1B will run back to 51Hz. 4.1 IF one RRC pump has tripped, THEN **VERIFY** operation within allowable limits of the power to flow map, ______ AND **REFER** to ABN-RRC-LOSS, for single loop operation. Previously performed ______ 4.2 IF both inverters are battery powered, AND normal power cannot be restored to both inverters, THEN **SCRAM the Reactor** per PPM 3.3.1. Performs ______
58.	**ATC**	Scrams the reactor per PPM 3.3.1 QC 2.0 IMMEDIATE ACTIONS 2.1 **PLACE** the Reactor Mode Switch in **SHUTDOWN**. Performs ______ 2H 2.2 **DEPRESS** the Manual Scram Pushbuttons. Performs ______ 2.3 **REPORT** Reactor Power, Pressure, and Level to the CRS. Performs ______ 3.1 Subsequent Actions - CRO1 3.1.1 **REPORT** control rod status (all rods in / not in) to CRS. Reports all rods in ______

EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

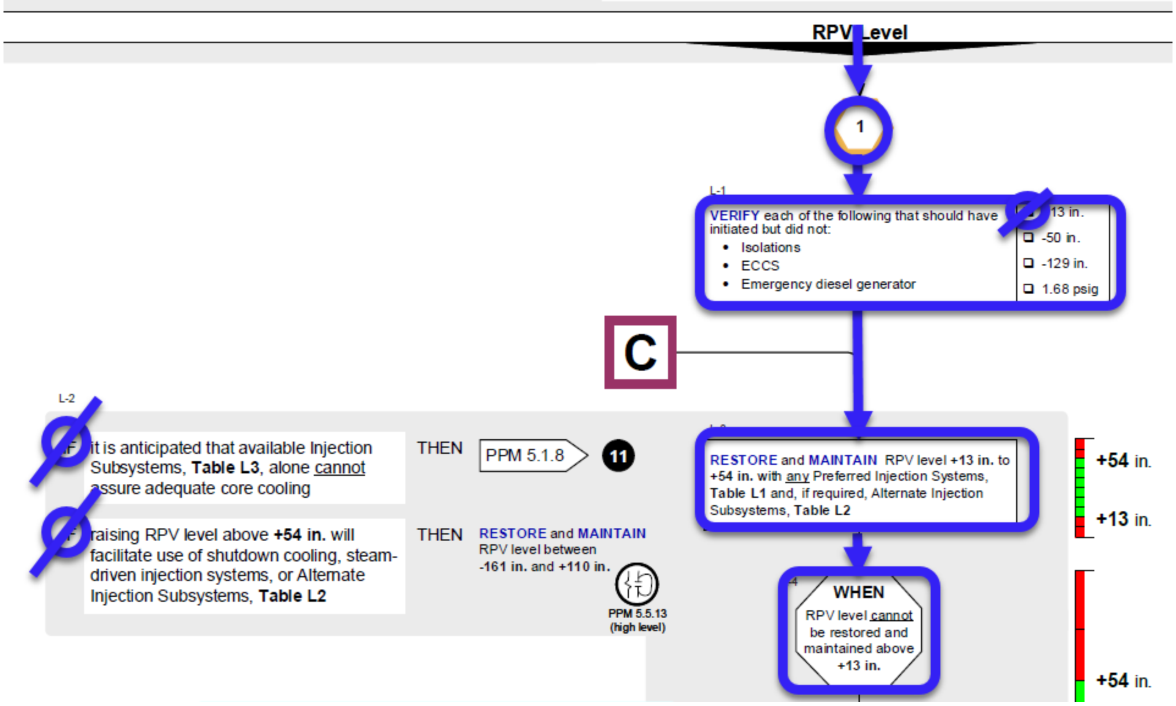
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
59.	**ATC**	3.1.3 IF NOT in an ATWS, THEN **PERFORM** the following: a. **RESTORE** and **MAINTAIN** Reactor water level +13" to +54". Performs b. **VERIFY** Reactor Recirculation pumps have runback to ~15 Hz. Performs NOTE: The preferred methods for stopping an RRC pump is by use of the STOP pushbuttons or by opening E-CB-RRA(B). 1) IF RRC pump(s) is uncontrolled, THEN **TRIP** affected RRC pump N/A AND **REFER** to ABN-RRC-LOSS. N/A 3.1.4 **INSERT** IRMs and SRMs. Performs
60.	**BOP**	3.2.2 WHEN Main Generator output is LT 50 MWE, THEN **PERFORM** the following: a. **VERIFY** Main Turbine trips. Performs 2H b. IF Main Turbine is NOT tripped, THEN **SIMULTANEOUSLY DEPRESS** both Emergency Trip pushbuttons (H13-P820). N/A c. IF Main Generator has NOT tripped, THEN **DEPRESS** Unit Emergency Trip pushbutton (H13-P800) OR **DEPRESS** Unit Overall Trip pushbutton (H13-P800). N/A d. **VERIFY** power transfers to TR-S. Performs
61.	**BOP**	3.2.3 **STABILIZE** RPV Pressure 800 - 1050 psig, or as directed by the CRS. _____ Following turbine transfer, notes that pressure is lowering due to stuck open Bypass valve. **SEE EVENT 5**

EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

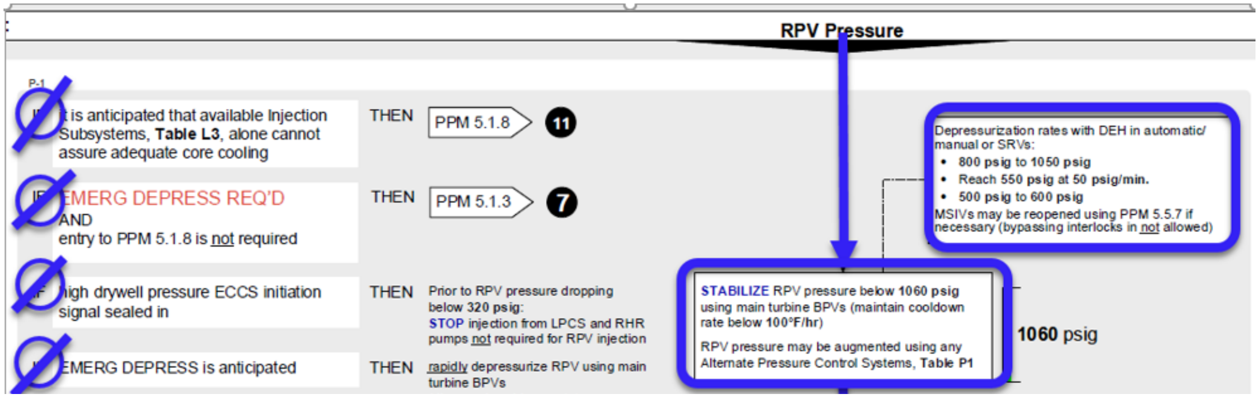
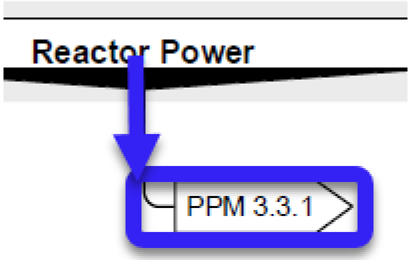
<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>62.</td><td>CRS</td><td>Enters PPM 5.1.1 RPV Control


Simultaneously works through Level / Pressure / Power legs of PPM 5.1.1 RPV Control.</td></tr>
<tr><td>63.</td><td>CRS</td><td>Verifies overrides in section L-2 of PPM 5.1.1 RPV Control

 </td></tr>
</table>

EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

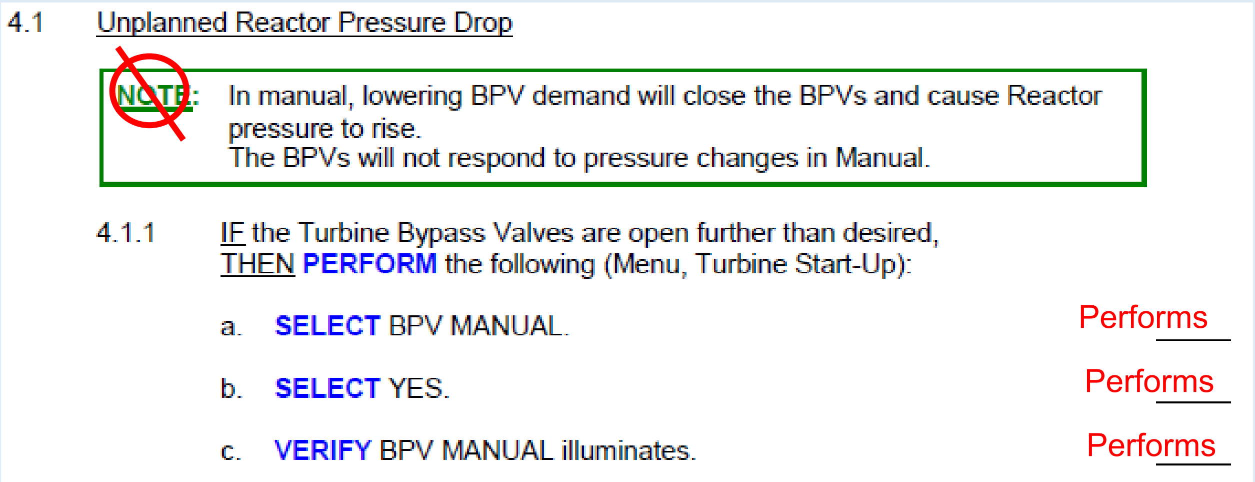
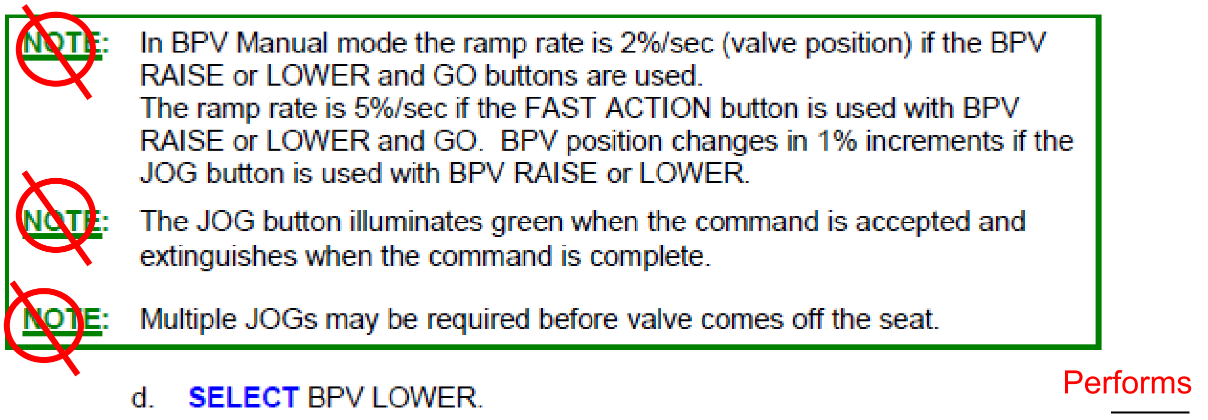
STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
64.	CRS	Directs BOP to verify +13” Actuations Verifies overrides in section L-2 of PPM 5.1.1 RPV Control Directs ATC to maintain RPV level +13” to +54” using Feed and Condensate. Directs a pressure band of 800-1050psig with DEH in Automatic. **Examiner Note: May not have the opportunity to direct the initial pressure band due to the report of stuck open bypass valve. (See event 5 for Stuck open Bypass Valves)** **Pressure band that is eventually prescibed will be dependant on the timing of the scenario and reports due to the Bypass valve failure.** 

EVENT 4: Trip of PP-ASD-1/3 / ABN-ASD-INV Scram

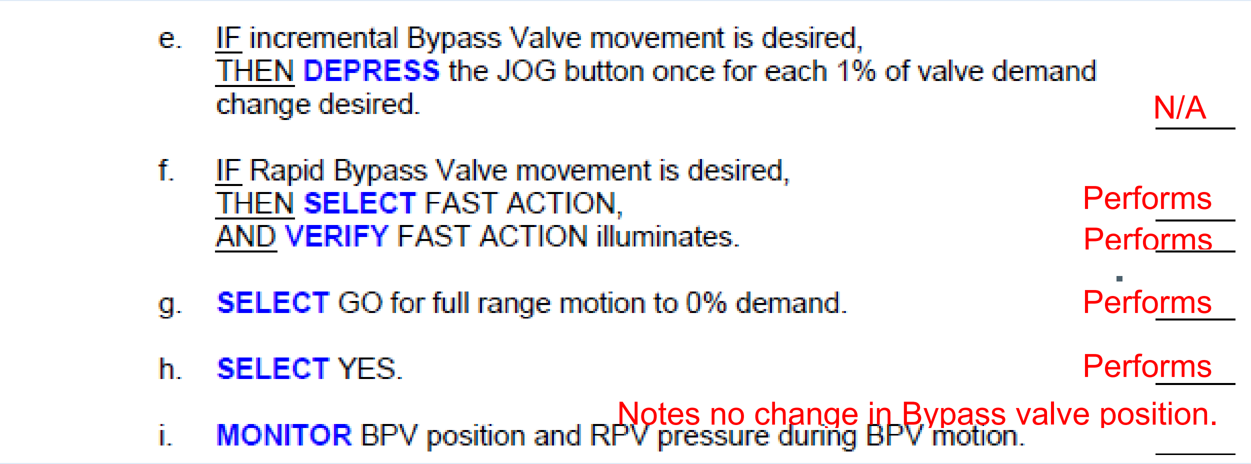
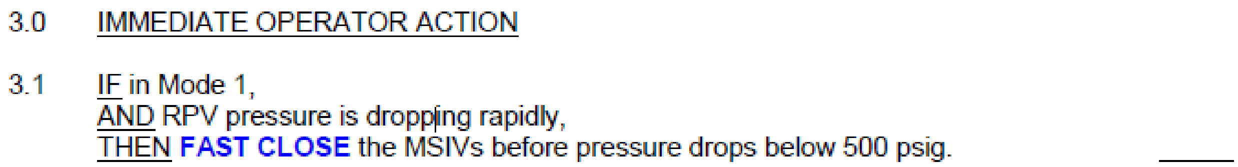
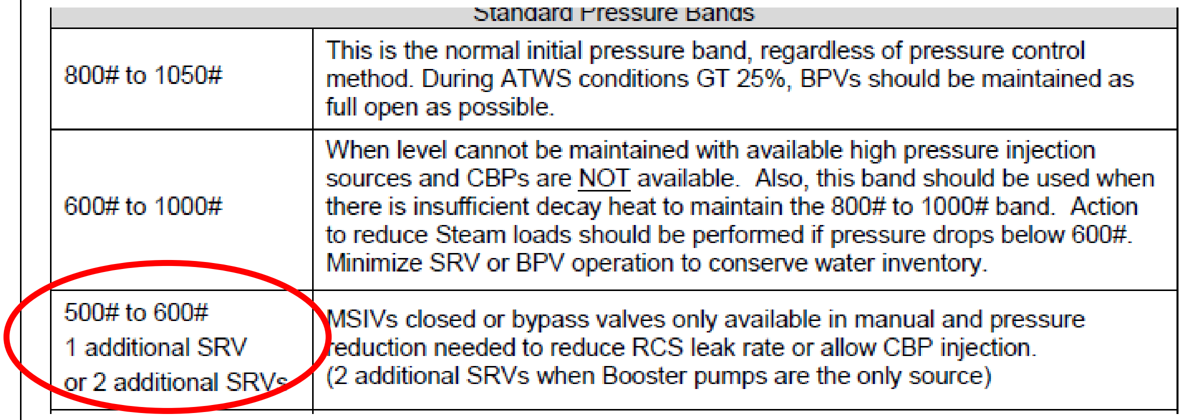
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
65.	**CRS**	RPV Pressure P-1 IF It is anticipated that available Injection Subsystems, **Table L3**, alone cannot assure adequate core cooling THEN PPM 5.1.8 ⓫ IF EMERG DEPRESS REQ'D AND entry to PPM 5.1.8 is <u>not</u> required THEN PPM 5.1.3 ❼ IF high drywell pressure ECCS initiation signal sealed in THEN Prior to RPV pressure dropping below **320 psig**: **STOP** injection from LPCS and RHR pumps <u>not</u> required for RPV injection IF EMERG DEPRESS is anticipated THEN <u>rapidly</u> depressurize RPV using main turbine BPVs Depressurization rates with DEH in automatic/ manual or SRVs: • **800 psig to 1050 psig** • **Reach 550 psig at 50 psig/min.** • **500 psig to 600 psig** MSIVs may be reopened using PPM 5.5.7 if necessary (bypassing interlocks in <u>not</u> allowed) **STABILIZE** RPV pressure below **1060 psig** using main turbine BPVs (maintain cooldown rate below **100°F/hr**) RPV pressure may be augmented using any Alternate Pressure Control Systems, **Table P1** **1060** psig
66.	**CRS**	Directs ATC to perform PPM 3.3.1 Reactor Scram 
67.	**ATC**	Attempts to line up on start up flow control valves per SOP-RFW-FCV-QC. **Examiner Note: See EVENT 6 for ATC Lining up on startup flow control valves.**

EXAMINER NOTE: Event 5 and Event 6 will happen concuourently. ATC will experience RFW-LIC-620 automatic mode failure (EVENT 6) at the same time that BOP encounters Bypass valve 1 sticks open on turbine transfer (EVENT 5).

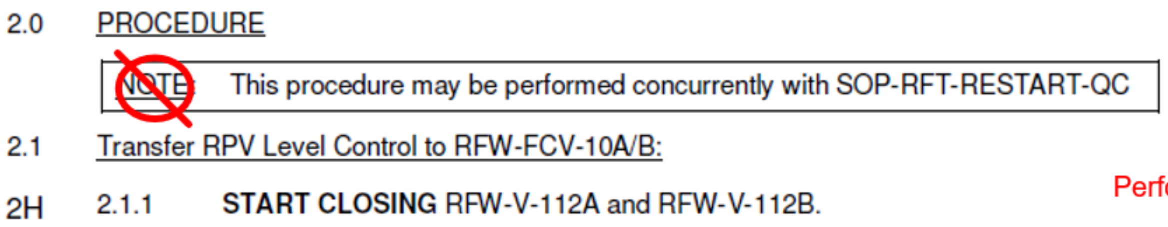
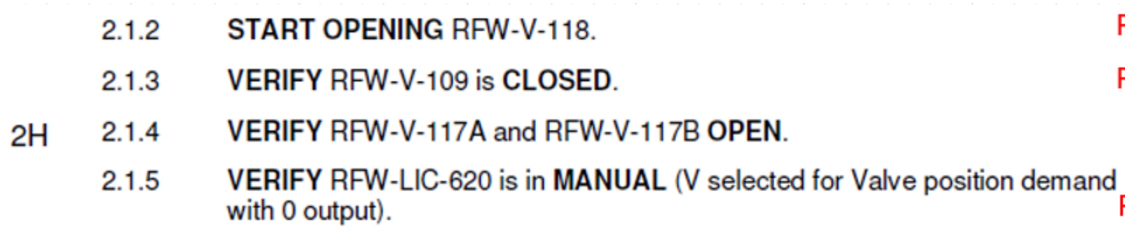
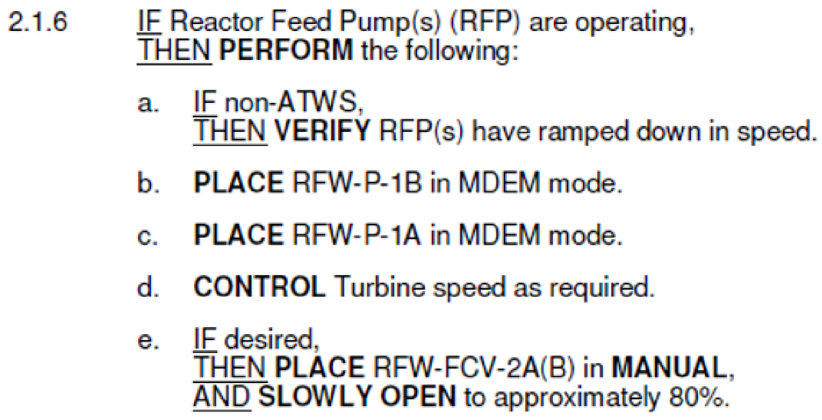
EVENT 5: Bypass Valve sticks open following turbine trip

STEP #		OPERATOR ACTIVITIES
	Position	CREW RESPONSE
No Cue required / Occurs on Turbine Transfer **CONDITIONAL TRIGGER 5: Bypass Valve 1 stick open following turbine transfer and fast opening.** **Results in: Fast Closure of the MSIVs per ABN-PRESSURE**		
68.	**RO**	Reports bypass valve stuck open following turbine transfer. Reports pressure lowering.
69.	**CRS**	Enters ABN-PRESSURE. May direct manual closure of bypass valves per ABN-PRESSURE. **Examiner Note: Based on rate of pressure drop, the CRS may attempt to manually close bypass valves using DEH; however, those actions will not be successful resulting in Fast Closure of the MSIVs per ABN-PRESSURE.**
70.	**RO**	May attempt to manually close the bypass valve using DEH as directed by the CRS  4.1 Unplanned Reactor Pressure Drop NOTE: In manual, lowering BPV demand will close the BPVs and cause Reactor pressure to rise. The BPVs will not respond to pressure changes in Manual. 4.1.1 IF the Turbine Bypass Valves are open further than desired, THEN **PERFORM** the following (Menu, Turbine Start-Up): a. **SELECT** BPV MANUAL. Performs b. **SELECT** YES. Performs c. **VERIFY** BPV MANUAL illuminates. Performs
71.	**RO**	 NOTE: In BPV Manual mode the ramp rate is 2%/sec (valve position) if the BPV RAISE or LOWER and GO buttons are used. The ramp rate is 5%/sec if the FAST ACTION button is used with BPV RAISE or LOWER and GO. BPV position changes in 1% increments if the JOG button is used with BPV RAISE or LOWER. NOTE: The JOG button illuminates green when the command is accepted and extinguishes when the command is complete. NOTE: Multiple JOGs may be required before valve comes off the seat. d. **SELECT** BPV LOWER. Performs

EVENT 5: Bypass Valve sticks open following turbine trip

<table>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>72.</td><td>RO</td><td>
e. <u>IF</u> incremental Bypass Valve movement is desired, <u>THEN</u> DEPRESS the JOG button once for each 1% of valve demand change desired. N/A ____
f. <u>IF</u> Rapid Bypass Valve movement is desired, <u>THEN</u> SELECT FAST ACTION, Performs ____
<u>AND</u> VERIFY FAST ACTION illuminates. Performs ____
g. SELECT GO for full range motion to 0% demand. Performs ____
h. SELECT YES. Performs ____
i. MONITOR BPV position and RPV pressure during BPV motion. ____
Notes no change in Bypass valve position.</td></tr>
<tr><td>73.</td><td>CRS</td><td>As pressure continues to lower, directs fast closure of the MSIVs per ABN-PRESSURE

3.0 <u>IMMEDIATE OPERATOR ACTION</u>
3.1 <u>IF</u> in Mode 1, <u>AND</u> RPV pressure is dropping rapidly, <u>THEN</u> FAST CLOSE the MSIVs before pressure drops below 500 psig. ____</td></tr>
<tr><td>74.</td><td>BOP</td><td>Fast closes MSIVs by direction of the CRS OR per immediate actions of ABN-PRESURE (above)
Examiner Note: BOP does NOT require CRS permission, this is an immediate operator action of ABN-PRESSURE.</td></tr>
<tr><td>75.</td><td>BOP</td><td>Takes pressure control using SRVs.</td></tr>
<tr><td>76.</td><td>CRS</td><td>Directs pressure band per OI-15 and PPM 5.1.1 RPV Control.

<table><tr><th colspan="2">Standard Pressure Bands</th></tr><tr><td>800# to 1050#</td><td>This is the normal initial pressure band, regardless of pressure control method. During ATWS conditions GT 25%, BPVs should be maintained as full open as possible.</td></tr><tr><td>600# to 1000#</td><td>When level cannot be maintained with available high pressure injection sources and CBPs are <u>NOT</u> available. Also, this band should be used when there is insufficient decay heat to maintain the 800# to 1000# band. Action to reduce Steam loads should be performed if pressure drops below 600#. Minimize SRV or BPV operation to conserve water inventory.</td></tr><tr><td>500# to 600#
1 additional SRV
or 2 additional SRVs</td><td>MSIVs closed or bypass valves only available in manual and pressure reduction needed to reduce RCS leak rate or allow CBP injection. (2 additional SRVs when Booster pumps are the only source)</td></tr></table></td></tr>
<tr><td>77.</td><td>BOP</td><td>Controls reactor pressure using SRV’s.
Coordinates opening and closing of SRV’s with ATC.</td></tr>
</table>

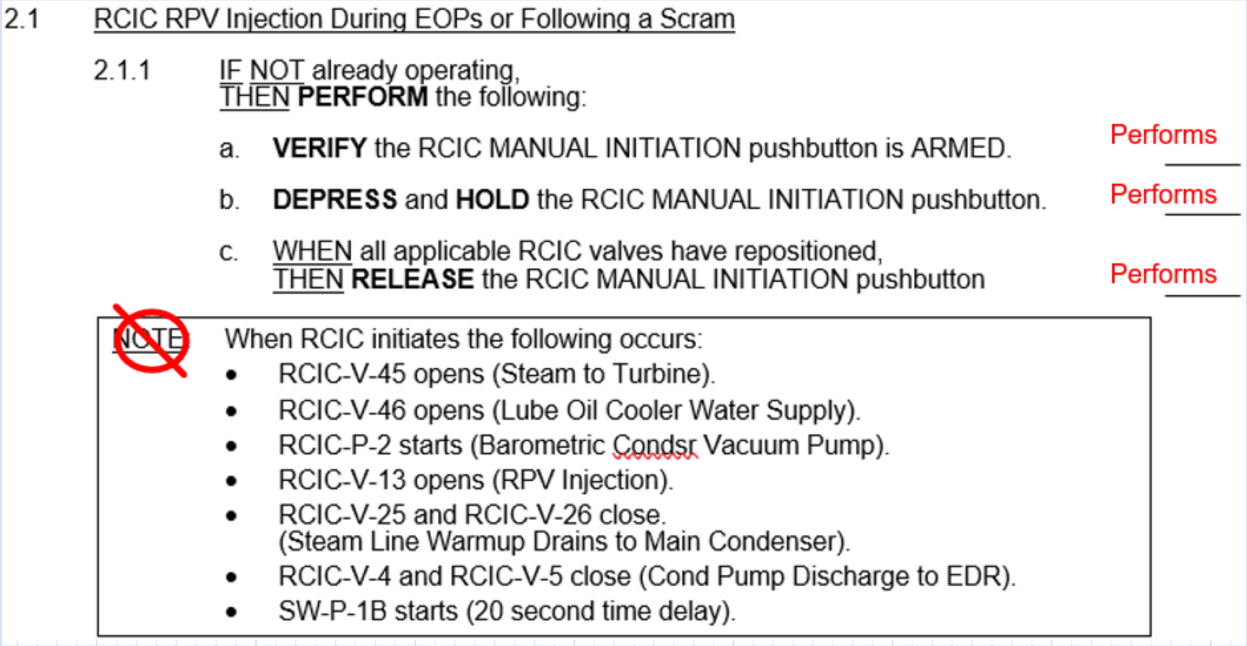
EVENT 6: RFW-LIC-620 Auto function failure.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
		Pre-Inserted Malfunction: RFW-LIC-620 Auto function failure **Results in: ATC level control complication.** **Examiner Note: ATC will not be able to place start up flow control valves in automatic resulting in manual level control.**
78.	**ATC**	Following scram, line up RFW for injection on startup flow control valves per SOP-RFW-FCV-QC.  2.0 PROCEDURE NOTE This procedure may be performed concurrently with SOP-RFT-RESTART-QC 2.1 Transfer RPV Level Control to RFW-FCV-10A/B: 2H 2.1.1 **START CLOSING** RFW-V-112A and RFW-V-112B. Performs
79.	**ATC**	 2.1.2 **START OPENING** RFW-V-118. Performs 2.1.3 **VERIFY** RFW-V-109 is **CLOSED**. Performs 2H 2.1.4 **VERIFY** RFW-V-117A and RFW-V-117B **OPEN**. Verifies 2.1.5 **VERIFY** RFW-LIC-620 is in **MANUAL** (V selected for Valve position demand with 0 output). Performs
80.	**ATC**	 2.1.6 IF Reactor Feed Pump(s) (RFP) are operating, THEN **PERFORM** the following: a. IF non-ATWS, THEN **VERIFY** RFP(s) have ramped down in speed. Performs b. **PLACE** RFW-P-1B in MDEM mode. Performs c. **PLACE** RFW-P-1A in MDEM mode. Performs d. **CONTROL** Turbine speed as required. Performs as required e. IF desired, THEN **PLACE** RFW-FCV-2A(B) in **MANUAL**, Performs AND **SLOWLY OPEN** to approximately 80%. Performs

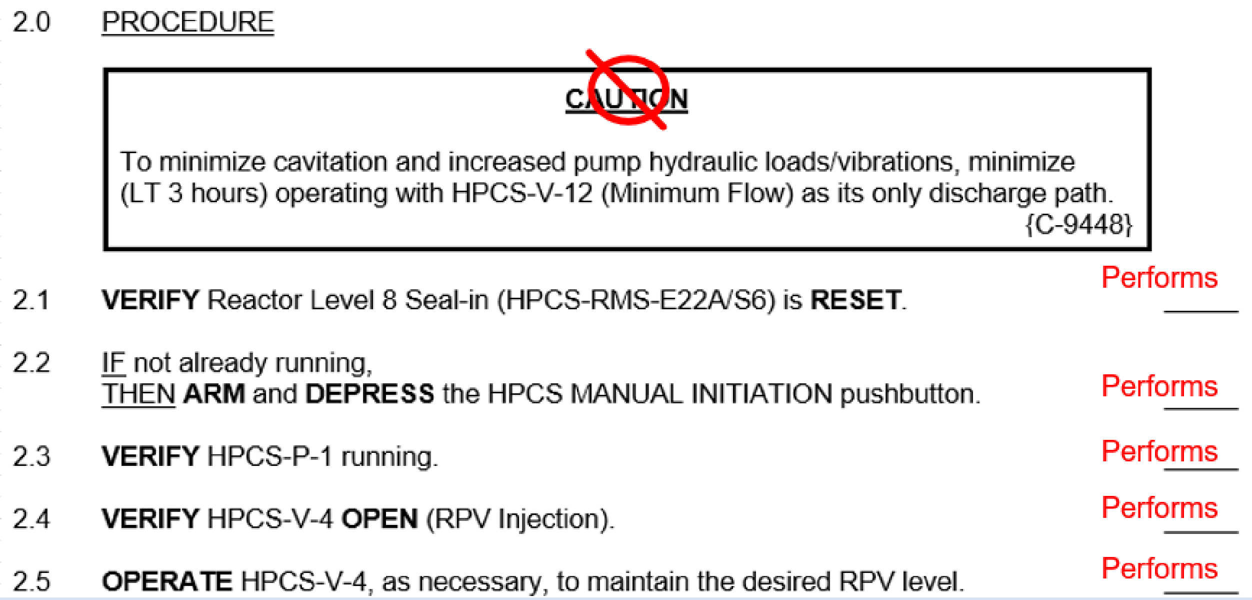
EVENT 6: RFW-LIC-620 Auto function failure.

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
81.	ATC	2.1.7 **VERIFY** RFW-V-112A and RFW-V-112B are **FULLY CLOSED**. Performs 2.1.8 **VERIFY** RFW-V-118 is FULLY **OPEN**. Performs 2.1.9 IF Reactor Feed Pump(s) (RFP) are operating, THEN **ADJUST** the running RFP speed to establish ~ 200 psid across RFW-FCV-10A & 10B using either Feedwater touch screen (H13-P840). Performs 2.1.10 **ADJUST** RFW-LIC-620 manual output to control RPV level. Performs
82.	ATC	2.1.12 IF unable to control RPV level with RFW-FCV-10A/B, THEN **CONSIDER THROTTLING** RFW-V-109 or RFW-V-118 to control RPV level. N/A 2.1.13 IF RFW-P-1A and RFW-P-1B are not in service, THEN **OPEN** COND-V-149. Initially N/A. Wil re-visit this step with MSIVs closed and pressure band changed to allow for CBP injection per OI-15
83.	ATC	Will attempts to place RFW-LIC-620 in automatic. Reports to the CRS that RFW_LIC-620 cannot be placed in automatic. Manually control RFW injection rate to control reactor water level. When MSIV's are closed and RFP's are no longer able to inject: 2.1.13 IF RFW-P-1A and RFW-P-1B are not in service, THEN **OPEN** COND-V-149. Performs **Examiner Note: IF the CRS does NOT reduce pressure band to allow injection with CBPs per OI-15, then ATC may use RCIC for alternate level control.**

EVENT 6: RFW-LIC-620 Auto function failure.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
84.	**ATC**	May use RCIC for alternate level control (will result in manually closing down on start up flow control valves, with no leak present high injection rates are not required) Using RCIC fo level control with MSIVs closed assists greatly with pressure control (Less cycling of MSIVs and less energy added to containment)  2.1 RCIC RPV Injection During EOPs or Following a Scram 2.1.1 IF NOT already operating, THEN **PERFORM** the following: a. **VERIFY** the RCIC MANUAL INITIATION pushbutton is ARMED. Performs ____ b. **DEPRESS** and **HOLD** the RCIC MANUAL INITIATION pushbutton. Performs ____ c. WHEN all applicable RCIC valves have repositioned, THEN **RELEASE** the RCIC MANUAL INITIATION pushbutton Performs ____ NOTE When RCIC initiates the following occurs: • RCIC-V-45 opens (Steam to Turbine). • RCIC-V-46 opens (Lube Oil Cooler Water Supply). • RCIC-P-2 starts (Barometric Condsr Vacuum Pump). • RCIC-V-13 opens (RPV Injection). • RCIC-V-25 and RCIC-V-26 close. (Steam Line Warmup Drains to Main Condenser). • RCIC-V-4 and RCIC-V-5 close (Cond Pump Discharge to EDR). • SW-P-1B starts (20 second time delay). With no leak in progress, ATC can adjust the flowrate thumbwheel to control reactor water level.

EVENT 6: RFW-LIC-620 Auto function failure.

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
85.	**ATC**	HPCS could be used for alternate level control. **Examiner Note: Even though HPCS can be used for alternate level control, it would not be a preferred source based on current plant conditions (Large flow rate pump with no leak in progress results in large level swings with only “broad” control).** **RFW is much easier to control flowrate even with S/U flow control valves unable to be placed in automatic operation.** **RCIC is a better source for controlling pressure and level (adjusting thumbwheel while in automatic) with MSIVs closed.**  2.0 PROCEDURE **CAUTION** To minimize cavitation and increased pump hydraulic loads/vibrations, minimize (LT 3 hours) operating with HPCS-V-12 (Minimum Flow) as its only discharge path. {C-9448} 2.1 **VERIFY** Reactor Level 8 Seal-in (HPCS-RMS-E22A/S6) is **RESET**. Performs ____ 2.2 IF not already running, THEN **ARM** and **DEPRESS** the HPCS MANUAL INITIATION pushbutton. Performs ____ 2.3 **VERIFY** HPCS-P-1 running. Performs ____ 2.4 **VERIFY** HPCS-V-4 **OPEN** (RPV Injection). Performs ____ 2.5 **OPERATE** HPCS-V-4, as necessary, to maintain the desired RPV level. Performs ____

EVENT 7: REA-V-1 Airline break

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**

Following crew actions of ABN-PRESSURE to close MSIVs, level is being controlled per PPM 5.1.1 or when directed by lead evaluator.

ACTIVATE TRIGGER 7: Airline break on REA-V-1 (Valve Closes)

Results in: ABN-HVAC, Secondary Containment high differential pressure and actions to start a SGT train.

Immediately after inserting trigger 7

Contact MCR as OPS 2 and

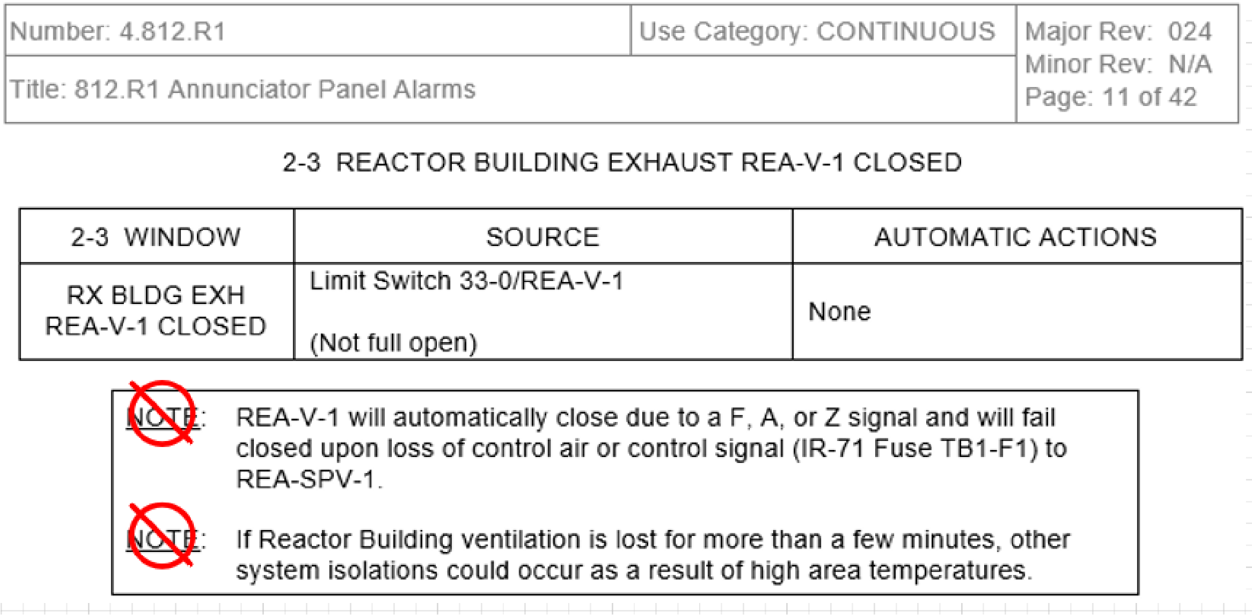
ROLE-PLAY

“I am on the reactor building 572’ and I can hear air leakage in the vicinity of the REA fans.”

86.	**BOP**	Responds to Front Panel Anunciators 4.851.S1 (S2) 1-2 RX BLDG HVAC DIV 1 BOARD R TROUBLE. Investigates Board R (RB HVAC Panels) **4.812.R1 2-3 RX BLDG EXH REA V 1 CLOSED** 4.812.R1 7-3 SEC PRESS CONTR A ΔP HIGH/LOW 4.812.R1 9-2 SLC RM AIR FLOW LOW 4.812.R1 10-3 BOTH RX BLDG EXH FANS NOT RUNNING 4.812.R2 7-1 SEC PRESS CONTR B ΔP HIGH/LOW 4.812.R2 10-4 BOTH RX BLDG INLET FANS NOT RUNNING Diagnoses cause, REA-V-1 Closed is the cause, all other annunciators are symptoms. Informs CRS REA-V-1 is closed
87.	**CRS**	Enters ABN-HVAC

EVENT 7: REA-V-1 Airline break

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
88.	BOP	Proceeds with annuciator response



Number: 4.812.R1	Use Category: CONTINUOUS	Major Rev: 024 Minor Rev: N/A Page: 11 of 42
Title: 812.R1 Annunciator Panel Alarms		

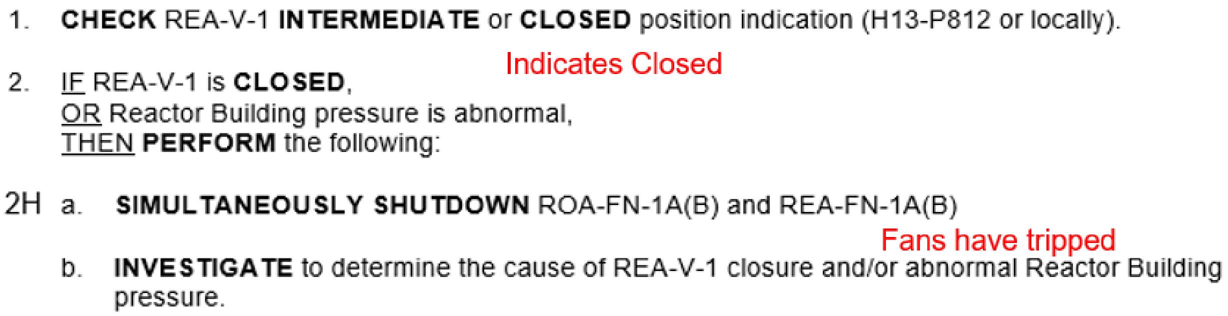
2-3 REACTOR BUILDING EXHAUST REA-V-1 CLOSED

2-3 WINDOW	SOURCE	AUTOMATIC ACTIONS
RX BLDG EXH REA-V-1 CLOSED	Limit Switch 33-0/REA-V-1 (Not full open)	None

NOTE: REA-V-1 will automatically close due to a F, A, or Z signal and will fail closed upon loss of control air or control signal (IR-71 Fuse TB1-F1) to REA-SPV-1.

NOTE: If Reactor Building ventilation is lost for more than a few minutes, other system isolations could occur as a result of high area temperatures.

STEP #	Position	CREW RESPONSE
89.	BOP	



1. **CHECK** REA-V-1 **INTERMEDIATE** or **CLOSED** position indication (H13-P812 or locally).

Indicates Closed

2. IF REA-V-1 is **CLOSED**,
OR Reactor Building pressure is abnormal,
THEN **PERFORM** the following:

2H a. **SIMULTANEOUSLY SHUTDOWN** ROA-FN-1A(B) and REA-FN-1A(B)

Fans have tripped

b. **INVESTIGATE** to determine the cause of REA-V-1 closure and/or abnormal Reactor Building pressure.

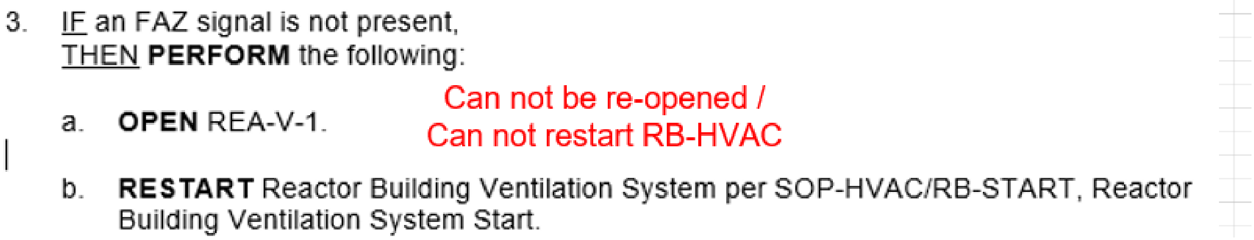
May direct field operator to further investigate.

If directed to further investigate REA-V-1, Wait 2 minutes and

ROLE-PLAY

"REA-V-1 has a broken airline."

STEP #	Position	CREW RESPONSE
90.	BOP	



3. IF an FAZ signal is not present,
THEN **PERFORM** the following:

a. **OPEN** REA-V-1.

Can not be re-opened /
Can not restart RB-HVAC

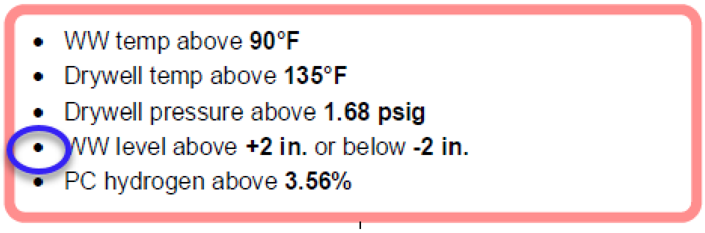
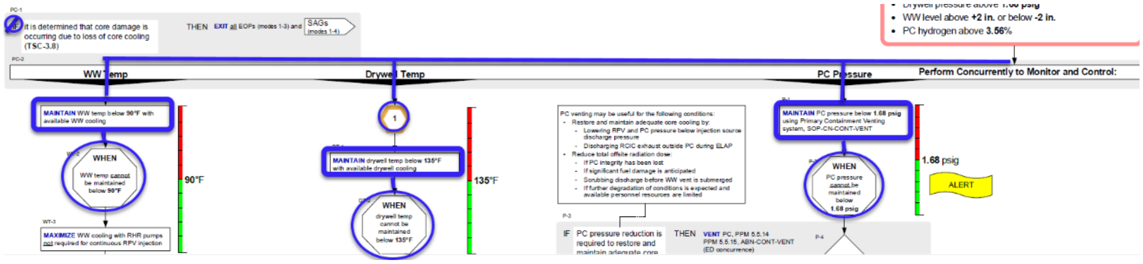
b. **RESTART** Reactor Building Ventilation System per SOP-HVAC/RB-START, Reactor Building Ventilation System Start.

EVENT 7: REA-V-1 Airline break

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
91.	**BOP**	4. IF REA-V-1 cannot be opened, AND no FAZ signal is present, THEN **PERFORM** the following: Informs CRS on intent to start SGT or starts SGT by direction of the CRS per ABN-HVAC a. **MANUALLY START** one train of the SGT system to maintain Secondary Containment pressure negative per SOP-SGT-START-DIV1(2)-QC. b. **NOTIFY** Chemistry to monitor Reactor Building ventilation per ODCM 6.1.2.1 and LCS 1.3.3.1.
92.	**CRS**	Per ABN-HVAC 4.2 Reactor Building HVAC Trouble 4.2.1 IF the inlet air flow is being restricted due to snow or ice buildup on air filters, THEN **CONSIDER** advancing the air filters. N/A 4.2.2 IF advancing the air filters does not resolve inlet filter air flow restriction, THEN **CONSIDER** cutting down the air filters. N/A 4.2.3 IF Reactor Building HVAC cannot maintain Reactor Building dP due to a fan malfunction, THEN **SHIFT** fans per SOP-HVAC/RB-OPS: N/A 4.2.4 IF Reactor Building HVAC cannot maintain Reactor Building dP or system flow due air intake louver blockage, THEN **PERFORM** the following: Directs (or directs per annunciator response) a. **START** the Standby Gas Treatment System to maintain a negative pressure in the Reactor Building of at least -1.7" WG per SOP-SGT-START-DIV/1(DIV/2)-QC. May direct the start of SGT pe the Annunciator response OR ABN-HVAC.
93.	**BOP**	Per SOP-SGT-START-DIV1-QC 3.1 SGT DIV-1 Start NOTE: The non-running fans should be placed to PTL first. 2H 3.1.1 IF Reactor Building ventilation has been lost or degraded, AND cannot be restored, THEN **PLACE** the following fans **PTL**: • ROA-FN-1A Performs • ROA-FN-1B Performs • REA-FN-1A Performs • REA-FN-1B Performs

EVENT 7: REA-V-1 Airline break

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
94.	**BOP**	3.1.2 IF Reactor Building ventilation has been lost or degraded, AND cannot be restored, THEN **CLOSE** the following valves: • ROA-V-1 Performs ____ • ROA-V-2 Performs ____ • REA-V-1 Performs ____ • REA-V-2 Performs ____
95.	**BOP**	3.1.3 **MOMENTARILY TURN** SGT-FN-1A1 fan control switch from **AUTO** to **PTL SYS. START**. Performs ____ 3.1.4 **VERIFY** the following: • Main Heaters **ENERGIZE** as indicated by Main Heater ON light and A1 amp meters. Performs ____ • SGT-V-5A1 **OPENS** (Exhaust to Stack). Performs ____ • SGT-FN-1A1 **STARTS** (within 10 seconds). Performs ____ NOTE: To prevent a fan trip, SGT flow should be GT 750 CFM and LT 5378 CFM. {P-91428} 3.1.5 IF required to operate in manual flow control, THEN **REFER** to SOP-SGT-START. May adjust in manual and then return to auto ____
96.	**BOP**	Informs CRS SGT is in service.

<table>
<tr><th colspan="3">EVENT 8: OBE Earthquake / Suppression pool wall break</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td colspan="3">Following crew actions to place SGT in service and by direction of the lead evaluator.
ACTIVATE TRIGGER 8: OBE Earthquake and Suppression pool wall break.
Results in: ABN-FLOODING / PPM 5.2.1 Primary Containment Control.
ABN-EARTHQUAKE
Examiner Note: WW Wall break leak size is only very slightly smaller than the flow rate of HPCS at maximum flow.</td></tr>
<tr><td>97.</td><td>BOP</td><td>Responds to multiple alarms of lowering Wetwell level and OBE
4.601 A11 2-3 SUPP POOL LEVEL HIGH/LOW
Reports to CRS lowering suppression pool level and potential EOP entry.</td></tr>
<tr><td>98.</td><td>CRS</td><td>Enters ABN-EARTHQUAKE
Enters PPM 5.2.1 Primary Containment Control on Wetwell level below -2”

- WW temp above 90°F
- Drywell temp above 135°F
- Drywell pressure above 1.68 psig
- WW level above +2 in. or below -2 in.
- PC hydrogen above 3.56%</td></tr>
<tr><td>99.</td><td>CRS</td><td> </td></tr>
<tr><td>100.</td><td>BOP</td><td>Contacts Field operator to investigate Reactor Building 422’</td></tr>
<tr><td colspan="3">If dispatched to investigate lowering WW level. Wait 2 Minutes.</td></tr>
<tr><td colspan="3">ROLE-PLAY</td></tr>
<tr><td colspan="3">“There is a lot of water in the CRD pump room, I cannot determine the source.”</td></tr>
<tr><td>101.</td><td>CRS</td><td>Enter ABN-FLOODING. Directs evacuation of the Reactor Building</td></tr>
</table>

EVENT 8: OBE Earthquake / Suppression pool wall break

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
102.	BOP	Per ABN-FLOODING 4.2 IF flooding is confirmed by local visual indication, THEN **PERFORM** the following: 4.2.1 **SOUND** the "alert" tone for 5-10 seconds. _____ 4.2.2 **ALERT** station personnel to flooding in the affected room(s). _____ 4.2.3 **EVACUATE** all non-emergency personnel from the affected area. _____ 4.2.4 **REFER** to PPM 13.5.1 for localized evacuation. _____
		ABN-EARTHQUAKE SECTION
103.	CRS	Directs / Performs actions of ABN-EARTHQUAKE
104.	BOP	4.1 **MAKE** the following announcement: "Attention all personnel, attention all personnel. Columbia Generating Station has experienced seismic activity. For personnel inside buildings, take cover under sturdy furniture, away from windows and heavy objects that could fall. Hold onto the sturdy furniture. Do not rush to the exits. For personnel outside, move to a clear area, away from buildings, light poles, and electrical wires. On-Shift personnel conduct a quick plant tour and report any evidence of fire, flooding, or plant damage." Performs
105.	CRS	4.2 **VERIFY** adequate systems are available to safely shutdown and cool down the plant (e.g. SSW, SDC, DGs, Off-site power). No Safety Systems lost on OBE {OE-6.9} Performs 4.3 IF the Plant cannot be safely shut down, THEN **NOTIFY** Plant Management to request relief from the NRC to not shut down until safe shutdown systems can be restored. {OE-6.9} N/A
106.	CRS	4.4 IF 4.851.S1.5-1 has alarmed (Operating Basis Earthquake Exceeded), OR 4.851.S1.2-5 has alarmed (Minimum Seismic Earthquake Exceeded) OR SEISMIC ACTIVITY light(s) (Red or Yellow) for RB 422', RW 437', or FREE FIELD are illuminated on SEIS-COMP-NCC at Board L, THEN **PERFORM** an OBE determination evaluation per Attachment 7.3 within 4 hours of the earthquake. Has 4 hours to perform. (After plant is stable) {RG-6.5}, {AR-6.10} ○ 4.5 IF the Attachment 7.3 evaluation determined that an OBE has occurred, THEN **INITIATE** a controlled Reactor Shutdown per PPM 3.2.1. {AR-6.10} ○

EVENT 8: OBE Earthquake / Suppression pool wall break

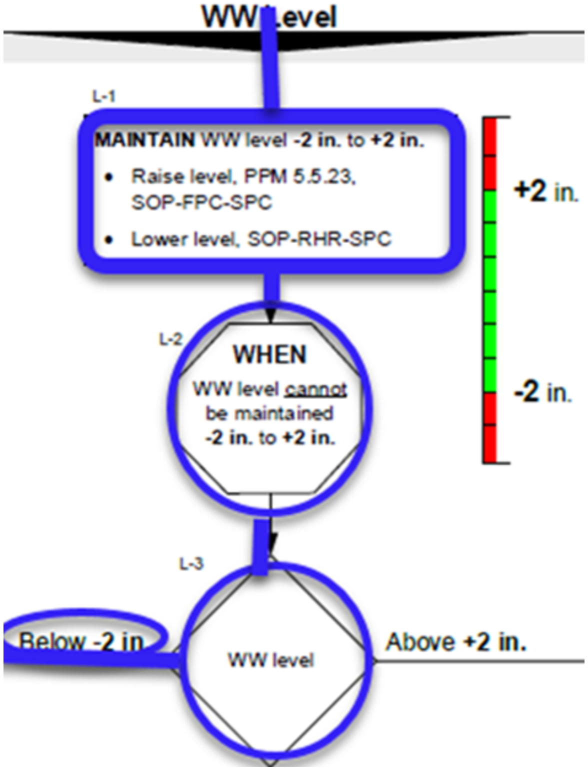
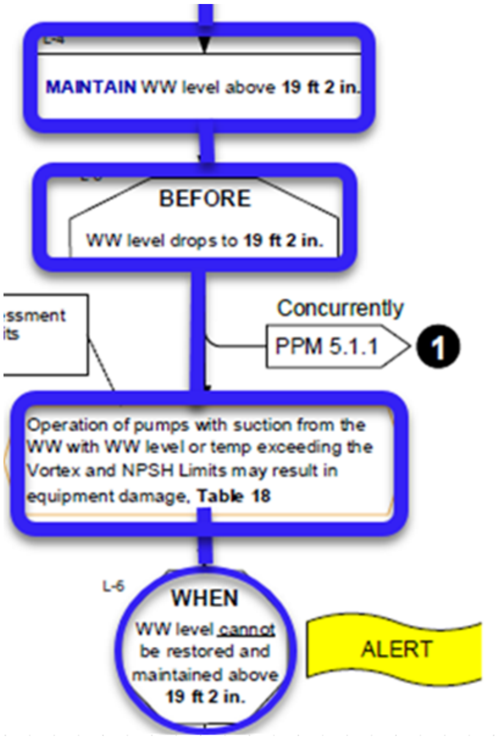
STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
107.	**CRS**	4.6 IF seismic instrumentation is non-functional, N/A AND any of the following is TRUE, THEN **INITIATE** a controlled Reactor Shutdown per PPM 3.2.1. N/A {RG-6.5}, {AR-6.1}, {AR-6.2} • The Modified Mercalli Intensity Scale is GE VI and within 3.1 miles (5 km) of plant. See Attachment 7.4 for scale. (True/False _____) • The earthquake was felt within the plant and was of magnitude GE 6 (Richter Scale). (True/False _____) • The earthquake was of magnitude GE 5 (Richter Scale) and occurred within 125 miles (200 km) of plant. (See Attachment 7.5 for map.) (True/False _____)
108.	**BOP**	4.7 **DIRECT** SAS to repeat the above announcement on the Alternate Security/Area Wide and Security radio channels. RO DIrects
109.	**CRS** **ATC** **BOP**	4.9 **MONITOR** Control Room instrumentation for evidence of increases in the following: • Drywell leakage rates _____ • Drywell pressure _____ • Drywell gaseous or particulate activity _____ • Leak detection temperatures _____ CRS / ATC / BOP all Monitor
110.	**BOP**	4.10 **INSPECT** the Spent Fuel Pool for damage. Directs Field Operator {AR-6.7} _____

If contacted as Field Operator to inspect FP for damage, Wait 3 Minutes

ROLE-PLAY

"There is no damage to the Spent Fuel Pool"

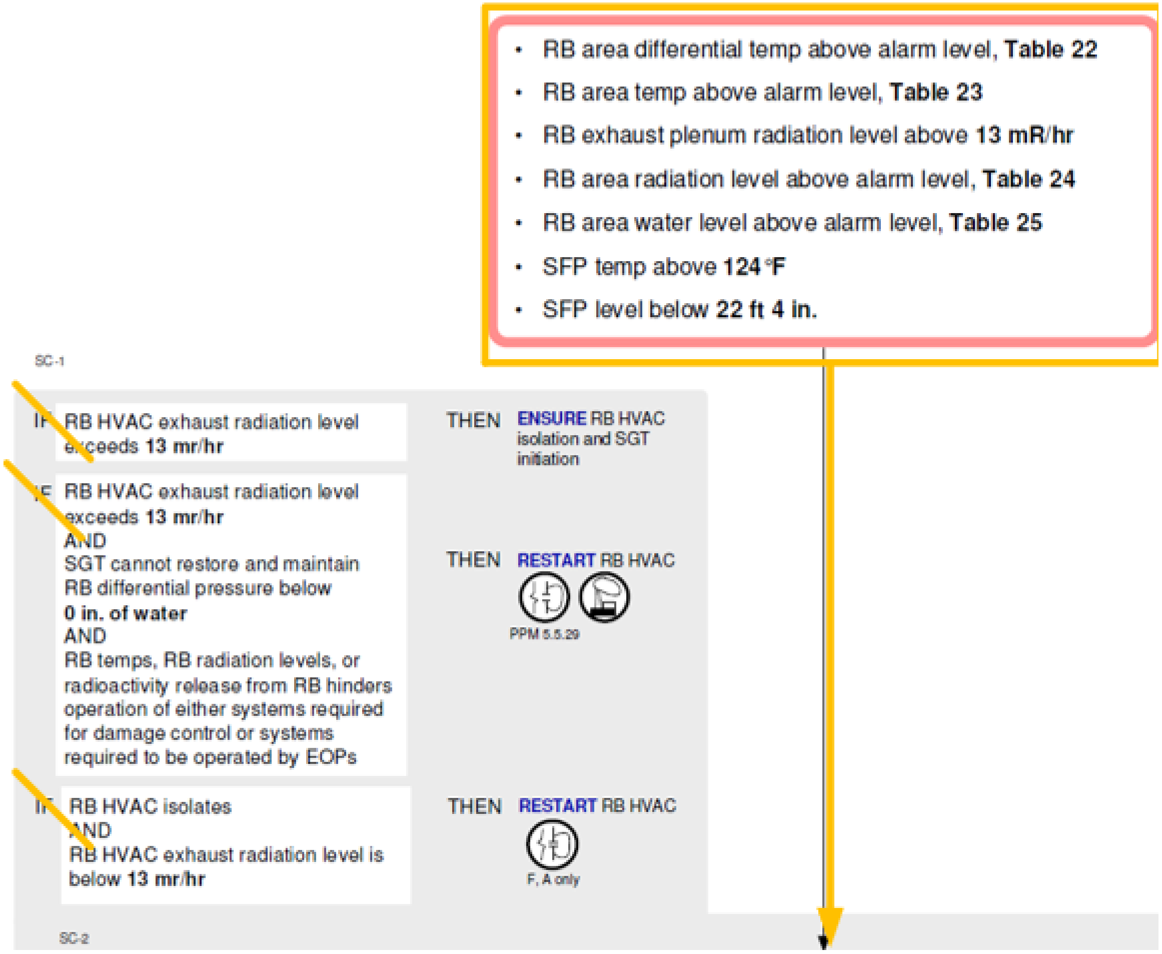
EVENT 8: OBE Earthquake / Suppression pool wall break

STEP #	OPERATOR ACTIVITIES	
	Position	CREW RESPONSE
111.	CRS	
112.	CRS	

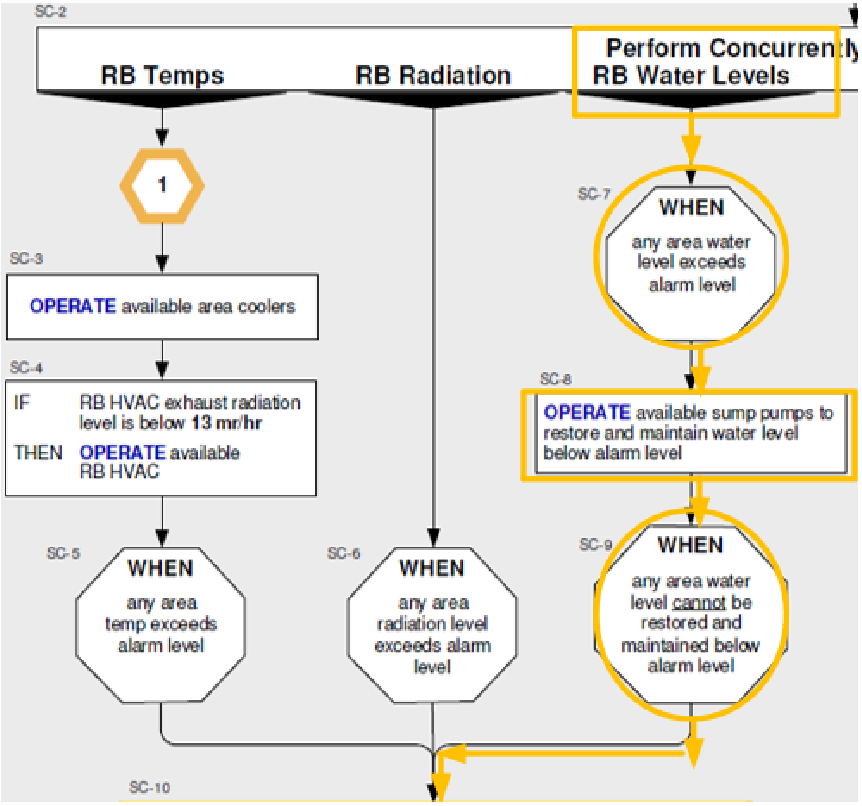
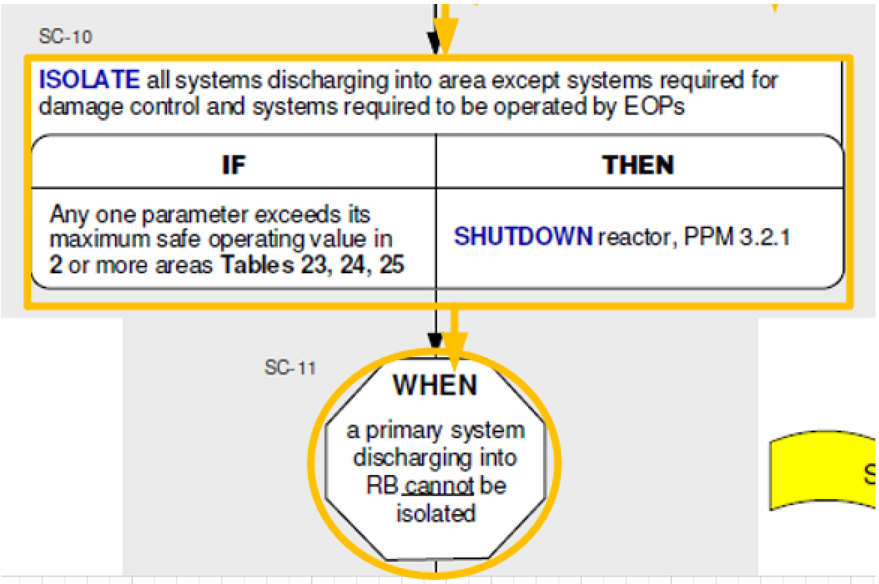
<table>
<tr><th colspan="3">EVENT 8: OBE Earthquake / Suppression pool wall break</th></tr>
<tr><th rowspan="2">STEP #</th><th colspan="2">OPERATOR ACTIVITIES</th></tr>
<tr><th>Position</th><th>CREW RESPONSE</th></tr>
<tr><td>113.</td><td>CRS</td><td>Directs RO makeup to the WW per 5.5.23.
May set a key parameter for Wetwell level.</td></tr>
<tr><td colspan="3">CRITICAL TASK # 2
Make up to the Wetwell using HPCS prior to proceeding to Emergency Depressurization required per step L-6 (Stop Sign: When Wetwell level cannot be restored and maintained above 19ft 2in)

Examiner Note: The critical task is considered met if HPCS is lined up to make up to the wetwell per PPM 5.5.23 prior to the performance of Emergency Depressurization per PPM 5.1.3 Emergency RPV Depressurization
AND
Prior to Anticipation of ED per PPM 5.1.1 RPV Control.</td></tr>
<tr><td>114.</td><td>BOP</td><td>Makes up to the Wetwell per PPM 5.5.23.
4.0 PROCEDURE
~~NOTE~~: HPCS is the preferred Suppression Pool makeup source due to providing reactor grade water. If HPCS is unavailable, SW-SYS-B is available as a backup method.</td></tr>
<tr><td>115.</td><td>BOP</td><td>4.1 Using HPCS
4.1.1 VERIFY HPCS-V-1 OPEN (Pump Suction from CST). Verifies
4.1.2 START HPCS-P-1. Performs
4.1.3 VERIFY HPCS-V-12 OPENS (HPCS-P-1 Minimum Flow Bypass). Performs
4.1.4 START HPCS-P-2 (HPCS Service Water Pump). Performs
4.1.5 VERIFY SW-V-29 OPENS (Service Water Pump Discharge). Performs</td></tr>
<tr><td>116.</td><td>BOP</td><td>4.1.6 IF a HPCS auto initiation signal is present, AND HPCS is NOT being used to ensure adequate core cooling, THEN OVERRIDE the HPCS-V-23 close signal, by installing a contact boot on HPCS-RLY-K3 contact 1-2 at H13-P625. N/A
4.1.7 THROTTLE OPEN HPCS-V-23 (Test Bypass to Suppression Pool) (H13-P601). Performs
4.1.8 ADJUST flow as necessary to a maximum of 7175 gpm to fill the Suppression Pool. Performs</td></tr>
<tr><td>117.</td><td>BOP</td><td>4.1.9 VERIFY HPCS-V-12 CLOSES. Performs
4.1.10 MONITOR Suppression Pool level. Performs</td></tr>
</table>

EVENT 8: OBE Earthquake / Suppression pool wall break

STEP #	Position	OPERATOR ACTIVITIES CREW RESPONSE
		Examiner Note: The following steps have been included because the entry requirements have been met to enter PPM 5.3.1 Secondary Containment Control. Because this is a Suppression pool leak, it does not meet the requirement to proceed beyond Step SC-11. Suppression pool is not classified as a primary system. **The CRS will enter PPM 5.3.1 Secondary Containment Control, but no "significant" actions will be taken in this EOP.**
118.	**CRS**	Enters PPM 5.3.1 Secondary containment control on Reactor Building Area Water levels.
119.	**BOP**	Reports sump high level alarms to the CRS. When high level alarms are received for the HPCS Pump room (sump R-3), Investigates and reports that FDR-V-608 Will not close)
120.	**CRS**	 • RB area differential temp above alarm level, **Table 22** • RB area temp above alarm level, **Table 23** • RB exhaust plenum radiation level above **13 mR/hr** • RB area radiation level above alarm level, **Table 24** • RB area water level above alarm level, **Table 25** • SFP temp above **124 °F** • SFP level below **22 ft 4 in.** SC-1 IF RB HVAC exhaust radiation level exceeds **13 mr/hr** THEN **ENSURE** RB HVAC isolation and SGT initiation IF RB HVAC exhaust radiation level exceeds **13 mr/hr** AND SGT cannot restore and maintain RB differential pressure below **0 in. of water** AND RB temps, RB radiation levels, or radioactivity release from RB hinders operation of either systems required for damage control or systems required to be operated by EOPs THEN **RESTART** RB HVAC PPM 5.5.29 IF RB HVAC isolates AND RB HVAC exhaust radiation level is below **13 mr/hr** THEN **RESTART** RB HVAC F, A only SC-2

EVENT 8: OBE Earthquake / Suppression pool wall break

STEP #	OPERATOR ACTIVITIES	
	Position	**CREW RESPONSE**
121.	**CRS**	
122.	**CRS**	

TERMINATION CRITERIA

TERMINATION CUE:

This scenario will be terminated when the reactor has been emergency depressurized as indicated by a minimum of 6 SRV's open and RPV pressure is decreasing.

If this scenario is being run for EP Performance Indicators, the scenario will be allowed to run until all performance indicator criteria is complete.

INFORM THE CREW NOT TO DISCUSS THE SCENARIO, NOT TO ERASE FLOWCHARTS OR NOTES, NOT TO PUT AWAY PROCEDURES. THE EVALUATORS WILL CAUCUS TO DETERMINE IF THERE ARE ANY FOLLOWUP QUESTIONS.

Assign someone (usually the booth operator) to remain with the crew on the floor.

SAVE INSIGHT FILE TO THE SECURE DRIVE BEFORE RESET AND CLEAR URI FILE WHEN DONE.

CRITICAL TASKS

CRITICAL TASK #1

Critical Task Statement:

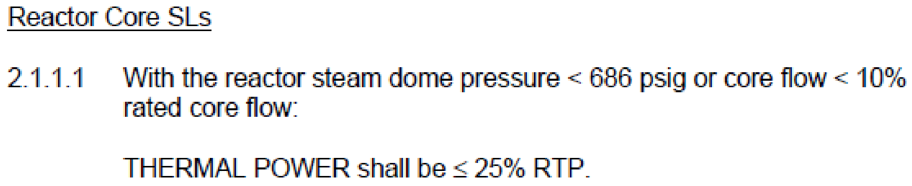
In Mode 1 with both ASD inverters being powered from battery (Loss 0f E-PP-ASD1/3), Scram the reactor within 20 minutes of the power loss resulting in both ASD inverters to be powered from the batteries.

Safety Significance:

If both ASD inverters are battery powered and there is no ability to restore normal ASD power both RRC pumps will automatically trip when the batteries are depleted (approximately 20 minutes). Since the plant in not allowed to operate in Mode 1 natural circulation, the reactor must be scrammed.

Examiner Note: Due to scenario previous malfunctions, reactor power will be approximately 60%. The trip of the remaining RRC pump will result in level swell but will not be sufficient to cause an automatic level 8 scram. Resultant trip of the RRC pump (no RRC pumps running) will result in about 40% reactor power and no forced circulation through the core.

Per Technical Specification Safety Limits



Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 686 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

Initiating Cue:

The plant is in Mode 1 when events occur that result in both ASD inverters being powered from the ASD Batteries.

Measurable Performance Standard:

Manual reactor scram (Per ABN-ASD-INV) is initiated by placing the mode switch to shut down **PRIOR** to loss of power to both ASD inverters (20 Minutes from the time of initiation for the loss of E-PP-ASD1/3)

Performance Feedback:

The mode switch is placed in the Shutdown position and APRMs are downscale.

CRITICAL TASK #2

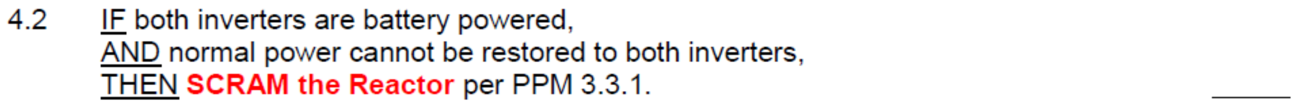
Critical Task Statement:

On lowering Wetwell level take action to make up to the Wetwell (Using HPCS per PPM 5.5.23) to prevent unnecessary emergency depressurization.

Safety Significance:

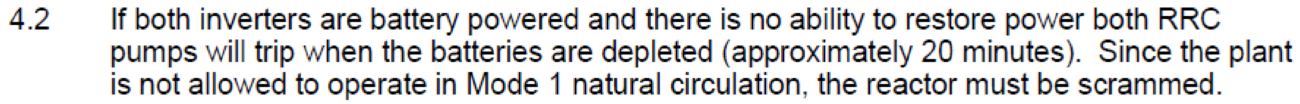
Emergency depressurization (And opening of Bypass valves on anticipation of ED) imposes a severe thermal transient on the RPV and complicates the efforts to maintain RPV water level within prescribed ranges. Rapid and uncontrolled injection of relatively cold, unborated water from low pressure injection systems may occur as RPV pressure decreases below the shutoff heads of these pumps.

Per ABN-ASD-INV:



4.2 IF both inverters are battery powered,
AND normal power cannot be restored to both inverters,
THEN **SCRAM the Reactor** per PPM 3.3.1. ______

ABN-ASD-INV Bases:



4.2 If both inverters are battery powered and there is no ability to restore power both RRC pumps will trip when the batteries are depleted (approximately 20 minutes). Since the plant is not allowed to operate in Mode 1 natural circulation, the reactor must be scrammed.

Initiating Cue:

Wetwell level is lowering as indicated CMS-LR-3 and CMS-LR-4 down fast.

Measurable Performance Standard:

HPCS is lined up to make up to the wetwell per PPM 5.5.23 prior to the performance of Emergency Depressurization per PPM 5.1.3 Emergency RPV Depressurization step L-6 AND Prior to Anticipation of ED per PPM 5.1.1 RPV Control.

Performance Feedback:

HPCS is making up to the Wetwell with Wetwell level up slow and ED / Anticipation of ED is **NOT** performed.

Simulator Set Up

☐ Unload simulator (between each scenario)

☐ Verify in ILC load

☐ Load correct S/D Sequence (if necessary)

☐ Reload simulator

☐ Reset to ILC Exam IC 198 (reset, go to Run, reset again)

☐ Test EQ machine at correct volume for OBE event

☐ Load Schedule file ILC-25 SC-4

☐ Validate that there are no unexpected annunciators or parameters out of band

☐ Verify pump running magnets

☐ Verify normally removed keys REMOVED except for: NONE

☐ Flag the following: NONE

☐ Place clearance tag on: NONE

☐ Protect the following: NONE

☐ Have printed copy of ILC-25 SC-4 Candidate Ref 1 printed to give to the crew with turnover sheet. (Marked up copy of SOP-HVAC/CR-OPS)

EXAM SECURITY PROCEDURE VERIFICATION

Procedures

• PPM 3.3.1, Reactor Scram	☐	☐	
• PPM 3.3.1 – QC, Reactor Scram – Quick Card	☐	☐	
• PPM 5.1.1, RPV Control	☐		
• PPM 5.2.1 Primary Containment Control	☐		
• PPM 5.5.23, Emergency Suppression Pool Makeup	☐		
• OI-41	☐		

ABNs

ABN-FLOODING	☐	☐	
ABN-RAD-SPILL	☐	☐	
ABN-POWER	☐	☐	
ABN-RRC-SINGLE-LOOP	☐	☐	
ABN-CORE	☐	☐	
ABN-RRC-LOSS	☐	☐	
ABN-ASD-INV	☐	☐	
ABN-PRESSURE	☐	☐	
ABN-EARTHQUAKE	☐	☐	
ABN-HVAC	☐	☐	

Tech Specs

3.7.3	☐	☐	☐
3.7.4	☐	☐	☐
3.4.1	☐	☐	☐

LCS, ODCM

1.3.3.1

ARPs

• 4.826.P1 10-2 CR HVAC DIV 1 OUT OF SERVICE	☐		
• 4.602.A6 5-1 LOOP A ASD CHANNEL FAILURE LIMIT	☐		
• 4.602.A6 5-5 LOOP B ASD CHANNEL FAILURE LIMIT	☐		
• 4.602.A13 4-3 ASD 1A2 ALARM	☐		
• 4.602.A13 5-3 ASD 1A2 FAULT	☐		
• 4.602.A13 4-4 ASD 1A2 ALARM	☐		
• 4.602.A13 5-4 ASD 1A2 FAULT	☐		
• 4.602.A6 6-2 RECIRC A OR B HIGH FLOW DELTA	☐		
• 4.800.C2 7-6 BUS 63 GROUND	☐		
• 4.800.C2 8-5 BKR 6/63 TRIP	☐		
• 4.800.C2 8-6 BUS 63 MCC OL TRIP	☐		
• 4.800.C5 5-7 125 VDC CHARGER C1-7 TROUBLE	☐		
• 4.602.A13 1-3 ASD 1A/1 ALARM	☐		
• 4.602.A13 2-3 ASD 1A/1 FAULT	☐		
• 4.603.A8 3-7 RPV LEVEL HIGH / LOW ALERT	☐		
• 4.603.A7 3-7 OPRM TRIP ENABLED	☐		
• 4.602 A13 3-5 ASD UPS TROUBLE	☐		

CREW TURNOVER

Initial Conditions:

- Reactor Power is 100%.
- RWCU-DM-1B is out of service for scheduled backwash / precoat

Shift Turnover:

- Perform SOP-HVAC/CR-OPS to shift WMA Fans section 5.1 to place WMA-FN-51A in service and secure WMA-FN-51B.
- Pre-requisites 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6 have been previously completed by the off-going crew. (As listed below)
    - Radwaste Chilled Water System **IS** available and aligned to supply the cooling coils for the Control, Cable, and Critical Switchgear Room Air Handling Units, as required.
    - Standby Service Water System **IS** available and aligned, as required.
    - Plant Service Water System **IS** available.
    - Control and Service Air System **IS** available to supply the air-operated control valves for the chilled water supply to the Cable Room Air Handling Unit
    - Plant Potable Water System **IS** available to supply makeup water to the Air Handling Unit Loop Seals and Emergency Chillers.
    - Fire Protection System **IS** available for the Control Room Emergency Filters.
- Backwash / Precoat of RWCU-DM-1B is scheduled for the shift. Section 5.1 of SOP-RWCU-DEMIN was completed the previous shift (Removing Filter Demineralizers from Service and Placing in Hold.) RWCR Operator will commence backwash and precoat of RWCU-DM-1B following crew turnover.

Verify Revision Information Prior To Use	Initials	JL
	Date	Today

Number: SOP-HVAC/CR-OPS	Use Category: CONTINUOUS	Major Rev: 030 Minor Rev: N/A Page: 1 of 52
Title: Control, Cable, and Critical Switchgear Rooms HVAC Operation		

PLANT PROCEDURES MANUAL	PCN#: N/A
SOP-HVAC/CR-OPS	Effective Date: 07/28/22

JL: Jiffy Lube

DESCRIPTION OF CHANGES

Justification (required for major revision)
See below.

Page(s)	**Description (including summary, reason, initiating document, if applicable)**
7	Revised Precaution and Limitation to include WMA-CC-51B1. (AR 433075)
12, 17	Added Note and revised Note for ladder location.
17	Revised step to conditional for fire in Fire Area RC-13. (AR 433075)
17	Added Note. (AR 433075)

TABLE OF CONTENTS

1.0 PURPOSE

Provide instructions for operating the Control Room, Cable Spreading Room, and Critical Switchgear Rooms HVAC Systems.

2.0 REFERENCES

2.1 FSAR 9.4.1, Main Control Room Temperature Control

2.2 PER 296-0671, Possible Hazardous Material Release

2.3 PERA 201-0115-01, WCH-CR-51A Trip on Low Temperature

2.4 CR-AI 2-04-02215, Managing Risk per PPM 1.5.14

2.5 AR-195495, Valve Misposition Event, During Performance of OSP-CCH/IST-M701, SW-V-822A was incorrectly verified OPEN.

2.6 AR-280119, Calc ME-02-14-01, Main Control Room Cooling Analysis

2.7 Technical Specifications 3.7.3, Control Room Emergency Filtration (CREF) System

2.8 CVI 339-00,5, York Technical Manual

2.9 E503-11

2.10 E519, Sheets 17, 18, 19, 29, and 32

2.11 M548, HVAC for Control and Switchgear Room - Radwaste Building

2.12 M775, Emergency Chilled Water Piping System

2.13 NOV 94-12, Procedural Deficiencies

2.14 ABN-FIRE, Fire

2.15 ABN-HAZMAT, Hazardous Materials Spills/Releases

2.16 ABN-RAD-CR, Control Room HVAC High Radiation

2.17 OSP-SW-M101, Standby Service Water Loop A Valve Position Verification

2.18 OSP-SW-M102, Standby Service Water Loop B Valve Position Verification

2.19 SOP-SW-FILL, Standby Service Water Fill

2.20 SOP-SW-SHUTDOWN, Standby Service Water System Shutdown

2.21 SOP-SW-START, Standby Service Water System Start

2.22 SOP-ELEC-480V-OPS, 480 Volt and Below AC Electrical Power Distribution System Operations

2.23 SOP-HVAC/CR-START, Control, Cable, and Critical Switchgear Rooms HVAC Startup

2.24 SOP-CCH-START-QC, Emergency Chill Water Start Quick Card (CCH-CR-1A(B))

2.25 Calculation NE-02-85-19, section 3.d, Operator Actions

2.26 FPF 4.1 Item 2, Normal Shutdown Manual Action Feasibility Review

3.0 PREREQUISITES

3.1 **VERIFY** Radwaste Chilled Water System available and aligned to supply the cooling coils for the Control, Cable, and Critical Switchgear Room Air Handling Units, as required. JL

3.2 **VERIFY** Standby Service Water System available and aligned, as required. JL

3.3 **VERIFY** Plant Service Water System available. JL

3.4 **VERIFY** Control and Service Air System available to supply the air-operated control valves for the chilled water supply to the Cable Room Air Handling Unit. JL

3.5 **VERIFY** Plant Potable Water System available to supply makeup water to the Air Handling Unit Loop Seals and Emergency Chillers. JL

3.6 **VERIFY** Fire Protection System available for the Control Room Emergency Filters. JL

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The area temperature limits of LCS 1.7.1 shall be met.

4.2 Technical Specification 3.7.3 requires two CREF subsystems to be operable in Mode 1, 2, or 3.

4.3 Main Control Room temperature is normally maintained 72 - 78°F by radwaste chillers during normal operations (RW Chillers operating, SW not operating) (FSAR 9.4.1.1.a).

- Maximum allowable Control Room temperature is 78°F, based on Station Blackout criteria (LCS 1.7.1.1 Bases).
- Minimum allowable Control Room temperature is 40°F (FSAR Table 3.11-1).
- Control Room temperature may be LT 72°F when Service Water is operating (especially in winter time), due to the design of the Control Room ventilation system. {2.1}

4.4 When CCH-CR-1A/1B, emergency chiller, is non-functional, then LCO 3.7.4 must be entered for the associated Control Room AC subsystem, unless it can be demonstrated that SW can maintain control room temperatures less than 85°F. {2.6}

Analysis ME-02-14-01 determined that SW is capable of maintaining LE 85°F Control Room temperatures, if the following compensatory measures are in place:

- Maintain spray pond temperature less than 60°F.
- Initiate spray mode at 60°F SW pond temperature; and splash mode at 55°F SW pond temperature. This maintains pond temperatures and inventory adequate assuming a loss of TMU.
- If sustained wind speed exceeds 15 mph, and TMU makeup is not available, orient SW into splash mode and consult with Engineering.

4.5 The Control Room temperature may exceed 78°F during the process of placing the Emergency Chiller in service. This condition can occur if the Emergency Chiller shuts down on “low chilled water temperature” due to low load conditions, such as cold SW temperature or during conditions where low outside temperatures exist. This condition is expected and normal as long as the Emergency Chiller can be restarted and control the cooling load prior to the Control Room temperature reaching 85°F. {2.1}

4.6 CCH-CR-1A/B should be run for GE 24 hours for proper oil level check.

4.7 If the only cooling water supply to the Control Room Ventilation System is Standby Service Water, and the temperature of the Main Control Room approaches 95°F, turn off the normal Control Room lighting to reduce the system heat load.

4.8 To verify proper operation of purge valves, WOA-RMS-V/51A and WOA-RMS-V/52B should remain in the AUTO position.

4.9 If oil heaters are de-energized during a shutdown period, they should be energized for 12 hours prior to starting the chiller to prevent foaming. The 12-hour energization may be waived if the chiller has had all oil removed and recharged with new oil. The oil heaters may be de-energized for periods of LE 1 hour.

4.10 When WMA-FN-54A(B) is started, 4.826.P1(P2).5-3(5.2) (EMERG FLTR 54A(B) ΔP HIGH/LOW) will alarm momentarily, then clear. If the alarm does not clear, the unit heaters will not energize, and WMA-FN-54A(B) will be inoperable.

4.11 If Standby Service Water temperature is cold (LT 35°F) and is aligned directly to WMA-CC-51A1(51B1), then avoid running SW-P-1A, WCH-CR-51A(B), and WMA-FN-51A at the same time. This alignment may cause WCH-CR-51A(B) to trip on low chill water temperature and/or low refrigerant temperature. {2.3}

4.12 WEA-FN-51 (Toilet/Kitchen Exhaust Fan) will not auto start if either WMA-FN-54A or WMA-FN-54B are running. If both trains of Control Room HVAC are aligned to pressurization mode, expect WEA-FN-51 to start when the second WMA-FN-54A(B is secured.)

4.13 When directed by ABN-FIRE for a fire in Fire Area RC-13, Section 5.4, Aligning WMA-CC-51A1 for Standby Service Water Cooling, or Section 5.6, Aligning WMA-CC-51B1 for Standby Service Water Cooling, must be completed within 3.1 hours of the start of the fire. During a fire in Fire Area RC-13, simultaneous and independent verifications are not required.

5.0 PROCEDURE

5.1 Shifting WMA-FN-51A/B during Normal Operation (Supply Fan for WMA-AH-51A/B)

5.1.1 **VERIFY** the following Remote Air Intake isolation valves are **OPEN**:

- WOA-V-51A (Control Room Remote Air Intake No. 1 (NW) Isol) _____
- WOA-V-52A (Control Room Remote Air Intake No. 1 (NW) Isol) _____
- WOA-V-51B (Control Room Remote Air Intake No. 2 (SE) Isol) _____
- WOA-V-52B (Control Room Remote Air Intake No. 2 (SE) Isol) _____

NOTE: Unless otherwise indicated, all control switches and annunciators are located on H13-P826.

5.1.2 IF shifting from WMA-FN-51A to WMA-FN-51B,
THEN **PERFORM** the following:

a. **PLACE** WMA-FN-51B control switch in **ON**. _____

b. **VERIFY** WMA-AD-51B1 **OPEN** (Fresh Air Inlet). _____

c. **PLACE** WMA-FN-51A control switch in **AUTO** to stop WMA-FN-51A. _____

d. **VERIFY** WMA-AD-51A1 **CLOSED** (Fresh Air Inlet). _____

5.1.3 IF shifting from WMA-FN-51B to WMA-FN-51A,
THEN **PERFORM** the following:

a. **PLACE** WMA-FN-51A control switch in **ON**. _____

b. **VERIFY** WMA-AD-51A1 **OPEN** (Fresh Air Inlet). _____

c. **PLACE** WMA-FN-51B control switch in **AUTO** to stop WMA-FN-51B. _____

d. **VERIFY** WMA-AD-51B1 **CLOSED** (Fresh Air Inlet). _____