Facility: Fort Calhoun	Date of Examination: 5/19/2014
Examination Level: **RO**	Revision Number: 0

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A-1 Conduct of Operations	R,M	Title: Calculate Shutdown margin KA: 2.1.37 (RO Imp:4.3)
A-2 Conduct of Operations	R,M	Title: Time to empty EFWST KA 2.1.25 (RO Imp: 3.9)
A-3 Equipment Control	R,D	Title: Verify Boration Path with Equipment Out of Service KA 2.2.15 (RO Imp: 3.9)
A-4 Radiation Control	R,M	Title: Read a survey map and apply RWP requirements KA 000000 2.3.7 (RO Imp: 3.5)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

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

Facility: Fort Calhoun
Examination Level: **SRO**
Date of Examination: 5/19/2014
Revision Number: 0

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A-5 Conduct of Operations	R, M	Title: Review SDM calculation KA 2.1.37 (SRO Imp: 4.6)
A-6 Conduct of Operations	R,D	Title: Determine Shift Staffing per SO-O-1 KA: 2.1.5 (SRO Imp: 3.9)
A-7 Equipment Control	R, M	Title Determine allowed outage time for failed CS valve KA 2.2.23 (SRO Imp: 4.6)
A-8 Radiation Control	R, M	Title: Authorize Waste Gas Decay Tank Release KA 2.3.6 (SRO Imp: 3.8)
A-9 Emergency Procedures/Plan	R,M	Title: Classify EP Event and make PARs KA 2.4.41 (SRO Imp: 4.6)

NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.

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

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-1 Rev. 4

JPM Title: Shutdown margin with inoperable CEA

Location: Classroom

Approximate Time: 20 minutes

Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.1.37 (RO Imp: 4.3)
Knowledge of procedures, guidelines, or limitations associated with reactivity| management.
TDB-V.9 “Shutdown Margin Worksheet”
TDB-II “Reactivity Curves”
RE-ST-RX-0008 “SHUTDOWN MARGIN VERIFICATION DURING HOT SHUTDOWN, COLD SHUTDOWN OR REFUELING”

Handout(s): TDB-V-9

FCS Task List #: 0062

Training Objective: Lesson Plan 07-05-09 Objective 6.0:

DESCRIBE and USE the shutdown margin worksheet.

Applicable Position(s): RO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ___________

PM Reviewed by: ______________________________ Date: ___________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-1 Rev. 4

JPM Title: Shutdown margin with inoperable CEA

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment:	Technical Data Book, RE-ST-RX-0008, calculator
Safety Considerations:	None
Comments:	Student may or may not use RE-ST-RX-0008.

JPM No: A-1 Rev. 4

JPM Title: Shutdown margin with inoperable CEA

TASK STANDARD: **The Applicant calculated the shutdown margin Using TDB-V-9 and TDB-II and determined that the shutdown margin met Technical Specification requirements.**

INITIAL CONDITIONS:

- **The plant is operating at 100% power with all CEAs fully withdrawn.**
- **Group 2 CEA #27 has been declared inoperable (untrippable).**
- **The latest GARDEL information is as follows:**

REACTOR STATE SUMMARY	
Cycle Burnup	2000 MWd/T 1639 EFPH
Core Thermal Power	1497.9 MWt 99.9%
Inlet Temperature	542.9°F
Boron Concentration Measured Calculated	 875.0 ppm 895.0 ppm
Xenon (boron equivalent) Now In two hours	 329.0 ppm 328.6 ppm
Control Bank withdrawal Bank 4 Bank 3	 127.3 in 125.5 in

IINTIATING CUE: **You are directed to perform an instantaneous shutdown margin calculation to determine if technical specification requirements for shutdown margin are being met.**

JPM No: A-1 Rev. 4

JPM Title: Shutdown margin with inoperable CEA

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Obtain a copy of TDB-V.9 Student may also obtain or request copy of RE-ST-RX-0008.	Applicant located appropriate procedure(s). **CUE: After candidate locates TDB-V.9 in the Technical Data Book, provide a copy of TDB-V.9- I. If candidate locates or requests copy of RE-ST-RX-008, provide a copy.** [SAT] [UNSAT]
2.	Obtain a copy of TDB section II, Reactivity Curves.	Applicant obtained copy of TDB-II. [SAT] [UNSAT]
3.	Determines part I of TDB-V.9 should be used.	Applicant performed calculation using part 1 of TDB-V.9. [SAT] [UNSAT]
4.	Performs calculation of the difference between actual and required shutdown margin.	Applicant calculated the difference on line 12 of TDB-V.9-1 is -0.615 [Band = -0.625, -0.595] (See attached Key) [SAT] [UNSAT]
5.	Determines if SDM is adequate	Shutdown margin is adequate [SAT] [UNSAT]

STEP	ELEMENT	STANDARD

Termination Criteria: **Shutdown margin with inoperable CEA has been determined.**

NAME: ________________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:

- **The plant is operating at 100% power with all CEAs fully withdrawn.**
- **Group 2 CEA #27 has been declared inoperable (untrippable).**
- **The latest GARDEL information is as follows:**

REACTOR STATE SUMMARY	
Cycle Burnup	2000 MWd/T 1639 EFPH
Core Thermal Power	1497.9 MWt 99.9%
Inlet Temperature	542.9°F
Boron Concentration Measured Calculated	 875.0 ppm 895.0 ppm
Xenon (boron equivalent) Now In two hours	 329.0 ppm 328.6 ppm
Control Bank withdrawal Bank 4 Bank 3	 127.3 in 125.5 in

INITIATING CUE: **You are directed to perform an instantaneous shutdown margin calculation to determine if technical specification requirements for shutdown margin are being met.**

Fort Calhoun Station
Unit 1

TDB-V.9

TECHNICAL DATA BOOK

SHUTDOWN MARGIN WORKSHEET

Change No.	EC 55737, 55738
Reason for Change	Change requirement in Condition Step 4 Parts I and II, to require RCS boron analysis to be performed within the past 72 hours vice 24 hours (EC 55738). Incorporate a table method to simplify the calculation. Reformat to a simpler approach (EC 55737). Major Change, no rev bars used.
Requestor	J. Willett, K. Kingston
Preparer	K. Bessey
Issue Date	05-21-13 3:00 pm

SHUTDOWN MARGIN WORKSHEET

PART I - Instantaneous Shutdown Margin for use prior to a Reactor Trip or immediately following a Reactor trip. No changes are assumed for either boron or xenon, since this worksheet is only applicable for calculation of an instantaneous shutdown margin.

NOTE: Enter values in **Table TDB-V.9-1,** exactly as determined from the figures in the Technical Data Book and carry the algebraic signs through the calculations.

Plant Conditions

1. Record Present Date/Time

2. Record Reactor Power (before trip)

3. Record CEA Group Positions

4. Record Reactor Coolant System Boron Concentration prior to shutdown (Boron concentration analysis must have been performed within the past 72 hours or more recently if boration or dilution has occurred)

5. Record Burnup - Take the most recent burnup from GARDEL OR take the most recent Burnup from the Control Room Log and add 30 MWD/MTU per EFPD to the Control Room Log Burnup Value.

Calculation of Shutdown Margin

6. Enter Regulating Group Worth, based on burnup (Step 5) and CEA positions using TDB Figure II.B.2.

7. Enter Shutdown Group Worths, based on burnup (Step 5) using TDB Figure II.B.1.a.

   a. Sum the total shutdown CEA worth by adding Group A (7.a) and Group B (7.b) and recording in line 7.c.

8. Determine Power Defect

   a. Enter Power Defect based on Reactor power level (Step 2) and burnup (Step 5) using TDB Figure II.C.2.b.

   b. Calculate power defect by multiplying Reactor Power Level (Step 2) by Power Defect per Percent Reactor Power (Step 8.a).

9. Determination of Stuck CEA Allowance (3 cases)

NOTE: Consider dropped CEAs which cannot be verified to be fully inserted as inoperable.

a. Case I - All CEAs are assumed to be operable. (No known inoperable CEAs)

(Enter N/A if this case is not applicable.)

Assume the highest worth CEAs will stick out of the core upon a Reactor trip. Enter the value of the most reactive CEA, based on burnup (Step 5), from TDB Figure II.B.1.b., lines (1) thru (3) for the pre-trip configuration. Select the higher value.

NOTE: The worth of one inoperable CEA is dependent on the configuration of the withdrawn group(s) and the inoperable CEA.

b. Case II - One CEA is known to be inoperable (per Technical Specification 2.10.2(4) a.)

(Enter N/A if this case is not applicable.)

Account for this defective CEA (and the highest worth stuck CEA) by entering only the value from lines (4) thru (17) of TDB Figure II.B.1.b. for the inoperable CEA, based on burnup (Step 5). Select the higher value.

NOTE: The worth of more than one inoperable CEA is calculated by multiplying the most conservative Stuck CEA plus Ejected CEA Worth (TDB Figure II.B.1.b. lines 4-17 by the number of inoperable CEAs).

NOTE: The values of lines (4) thru (17) of TDB Figure II.B.1.b. Include the total reactivity associated with the known inoperable CEA and the highest worth CEA which is assumed to stick out of the core upon a Reactor trip.

c. Case III - More than one CEA is known to be inoperable (per Technical Specification 2.10.2.(4)a.).

(Enter N/A if this case is not applicable.)

i. Enter total number of CEA’s which are known to be inoperable per Technical Specification 2.10.2.(4) a.

ii. Enter the most conservative defective CEA worth from TDB Figure II.B.1.b. Lines (4) thru (17) depending on inoperable CEA(s) location, based on burnup (Step 5). Select the higher value.

iii. Multiply the total number of inoperable CEA’s (Step 9.c.i) by the highest/ most conservative CEA Worth (Step 9.c.ii).

9.c

iv. Enter total available CEA worth from TDB Figure II.B.1.a. based on burnup (Step 5) (Use Worth Without Group N value unless Group N Rods are inserted.)

NOTE: The Rod Worth Value found in Step 9.c.iv, is the maximum CEA Worth possible, therefore using the lesser of the two values from Steps 9.c.iii and 9.c.iv is more accurate and conservative.

v. Determine the Multiple Stuck CEA Worth by selecting the minimum of either Step 9.c.iii or Step 9.c.iv and record that value.

d. Enter Stuck CEA Allowance value from Step 9.a or 9.b or 9.c.v as appropriate.

10. Calculation of the Total Instantaneous Shutdown Margin (SDM_I):

SDM_I = Stuck CEAs (Step 9.d) + Power Defect (Step 8.b) - S/D CEAs worth (Step 7.c) - Regulating CEA worth (Step 6)

11. Document the Technical Specification required Shutdown Margin per TS 2.10.1(1).

12. Calculate difference from required Shutdown Margin per TS 2.10.2(1).

NOTE: A 3.6% $\Delta\rho$ shutdown margin must be maintained in a Hot Shutdown condition, Tc > 210°F and a 3.0% $\Delta\rho$ Shutdown Margin must be maintained T_c<210°F. (Technical Specification 2.10.2(1) and TDB-VI Item 13.0).

13. Shutdown Margin check:

a. If Step 12 is less than or equal to zero, the shutdown margin is adequate.

b. If Step 12 is greater than zero, use OI-ERFCS-1, to determine the number of gallons of acid to add.

REMARKS

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Completed by ______________________________ Date/Time _______/______

TDB-V.9 - 1	
1. Present Date/Time	/
2. Reactor Power (before trip)	%
3. CEA Positions:	
a. Group 1	inches
b. Group 2	inches
c. Group 3	inches
d. Group 4	inches
4. RCS Boron Concentration	ppm
5. Burnup	MWD/MTU
6. Regulating Group Worth	% Δρ
a. Figure Used	
7. Shutdown Worths	
a. Group A	% Δρ
b. Group B	% Δρ
c. Total Shutdown Worth (Step 7.a + Step 7.b)	% Δρ
8. Power Defect	
a. Power Defect per Percent power	% Δρ / %
b. Total Power Defect (Step 2 X Step 8a.)	% Δρ
9. Stuck CEA Allowance	
a. Highest CEA Worth	% Δρ
b. Inoperable CEA Worth	% Δρ
c. Multiple Inoperable CEAs	
i. Number of Inoperable CEAs	
ii. Most Conservative CEA Worth	% Δρ
iii. Total Inoperable CEA Worth (Step 9.c.i X Step 9.c.ii)	% Δρ
iv. Total Available CEA Worth	% Δρ
v. Multiple Stuck CEA Worth (Step 9.c.iii or Step 9.c.iv)	% Δρ
d. Stuck CEA Allowance Value (9.a Step or 9.b or 9.c.v)	
10. Instantaneous Shutdown Margin= Step 9.d + Step 8.b – Step 7.c – Step 6	% Δρ
11. Tech. Spec. Shutdown Margin	3.6 % Δρ
12. Shutdown Margin (Step 10 + Step 11)	% Δρ
13. Is Shutdown Margin Adequate?	YES(≤ 0) / NO (> 0)

PART II - Hot Shutdown, Cold Shutdown, and Refueling (No CEA Movement Planned)

NOTE: This calculation is valid for transient Xenon conditions, as PART II assumes the core is Xenon Free.

NOTE: Enter values in **Table TDB-V.9-2** exactly as determined from the figures in the Technical Data Book and carry the algebraic signs through the calculations.

Conditions

1. Record Enter Date/Time

2. Record Burnup - Take the most recent burnup from GARDEL OR take the most recent Burnup from the Control Room Log and add 30 MWD/MTU per EFPD to the Contol Room Log value.

3. Record the Reactor Coolant System indicated loop temperature:

    a. If on Shutdown Cooling, use TE-346Y (TR-346, RED Pen = Outlet temperature)

    b. If not on Shutdown Cooling, then use the lowest valid RCS loop temperature.

4. Reactor Coolant System Boron Concentration (Boron Analysis must have been performed within the past 72 hours or more recently if boration or dilution has occurred.)

5. Verify that all regulating and shutdown CEAs are inserted to at least the Lower Electrical Limit (LEL).

Calculation of Shutdown Margin Boron

6. Determine the required boron concentration by using the applicable TDB Figure II.A.3, based on RCS temperature (Step 3.a or Step 3.b), core burnup (Step 2) and Group N position.

   If in mode 5 enter the refueling boron concentration from the COLR.

7. Determine the deviation between actual and predicted critical boron (N/A if in Mode 5).

    a. Reactor Coolant System boron concentration prior to shutdown or trip (N/A if in Mode 5).

    b. Reactor power level before shutdown or trip (% of 1500 MWth)

    c. Using core burnup (Step 2), determine the predicted full power boron concentration from the applicable TDB Figure II.A.1.b.

7.

d. Using the Reactor power (Step 7.b), determine the predicted Delta Boron Concentration for the previous power conditions (use TDB Figure II.A.2).

(1) Record the Delta Boron Concentration 7.d (1)

(2) Calculate the Predicted boron concentration by adding 7.c and 7.d (1)

e. Calculate the deviation between predicted and actual boron concentrations by subtracting 7.d(2) from 7.a. (if the deviation is negative, enter zero)

8. Adjust the required boron (Step 6) by adding the value of the boron deviation (Step 7.e). If in Mode 5, enter the refueling boron concentration on line 8.

9. Calculate the difference between actual and adjusted required boron by subtracting the adjusted boron value (Step 8) form the Actual Boron Concentration (Step 4).

10. Soluble Boron Concentration

a. IF Step 9 is greater than or equal to zero, the boron concentration is adequate.

b. IF Step 9 is less than zero, use OI-ERFCS-1, or manual calculations and borate the Reactor coolant system to the concentration given in Step 8.

REMARKS
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Completed by ______________________ Date/Time ______/______

Table TDB-V.9-2	
1. Present Date/Time	/
2. Burnup	MWD/MTU
3. RCS Indicated Loop Temperature	
a. TE-346Y	˚F
b. Low RCS Loop Temperature	˚F
4. RCS Boron Concentration	ppm
5. Verify CEAs are inserted (Initials/Date)	/
6. Required Boron Concentration	ppm
a. Figure Used	
b. Group N	IN/OUT
7. Deviation Between Actual & Predicted Critical Boron	
a. Concentration Prior to Shutdown	ppm
b. Power Level Prior to Shutdown	%
c. Predicted Full Power Boron Concentration	ppm
d. Determine Predicted Delta Boron Concentration	
(1) Predicted Delta (TDB Figure II.A.2)	ppm
(2) Predicted Concentration (Step 7.c + Step 7.d(1))	ppm
e. Deviation (Step 7.a - Step 7.d(2))	ppm
8. Adjusted Required Boron (Step 6 + Step 7.e)	ppm
9. Difference Between Actual & Adjusted (Step 4 – Step 8)	ppm
10. Is Boron Concentration Adequate?	YES (≥ 0) / NO (< 0)

PART III - Use to calculate Shutdown Margin when the Reactor is in a Hot or Cold Shutdown with possible CEA movement or Inoperable CEA's, or not at equilibrium xenon.

NOTE: Enter values in **Table TDB-V.9-3** exactly as determined from the figures in the Technical Data Book and carry the algebraic signs through the calculations.

<u>Condition</u>

1. Record Present Date/Time
2. Record Date/Time of Shutdown
3. Determine hours elapsed since shutdown by Step 1 minus Step 2.
4. Record Reactor power level before shutdown (% of 1500 MWth).
5. Record Reactor Coolant cold leg temperature.
6. Circle appropriate shutdown condition

   $T_c \geq$ 210°F - > Hot shutdown margin required
   $T_c <$ 210°F - > Cold shutdown margin required

7. Record CEA Positions before shutdown
8. Record Burnup - Take the most recent burnup from GARDEL OR take the most recent Burnup from the Control Room Log and add 30 MWD/MTU per EFPD to the Control Room Log Value.

Calculation of Shutdown Margin Boron

9. Determine the deviation between actual and predicted critical boron.

   a. Reactor coolant system boron concentration prior to shutdown or trip.

   b. Using core burnup in (Step 8), determine the Predicted Full Power Boron Concentration from the applicable TDB Figure II.A.1.b.

   c. Using the Reactor power (Step 4), determine the predicted delta boron concentration for the previous power conditions (use TDB Figure II.A.2).

   d. Calculate the predicted boron concentration (Step 9.b) plus (Step 9.c).

   e. Calculate the deviation between predicted (Step 9.d) and actual boron concentrations (Step 9.a). (if the deviation is negative, enter zero).

10. Calculate Xenon Reactivity

   a. Add 36 hours to the value from Step 3, Hours since shutdown.

      NOTE: If desired, a conservative valve of zero may be entered in 10.b If this is done, annotate in the REMARKS section.

   b. Determine the Xenon worth using TDB Figure II.D.2 and hours plus 36 since shutdown, (Step 10.a).

11. CEA(s) Withdrawn (Enter N/A if not applicable.)

   a. Enter the most withdrawn CEA positions, if group withdrawal is required.

   b. Enter the position if an individual CEA is to be withdrawn.

12. Determine the worth of the most reactive CEA withdrawn based on core burnup (Step 8) and CEA position (Step 11) using TDB Figure II.B.1.b. (Enter N/A if not applicable.)

13. Determination of Stuck CEA Allowance (2 cases)

NOTE: Consider dropped CEAs which cannot be verified to be fully inserted as inoperable.

a. Case I - One CEA is known to be inoperable (per Technical Specification 2.10.2(4)a.)

(Enter N/A if this case is not applicable.)

NOTE: The worth of one inoperable CEA is dependent on the configuration of the withdrawn group(s) and the inoperable CEA.

(1) Account for this defective CEA (and the highest worth stuck CEA) by entering only the value from lines (4) thru (17) of TDB Figure II.B.1.b. for the inoperable CEA, based on burnup (Step 8). Select the higher value.

b. Case II - More than one CEA is known to be inoperable (per Technical Specification 2.10.2.(4)a.).

(Enter N/A if this case is not applicable.)

NOTE: The worth of more than one inoperable CEA is calculated by multiplying the most conservative Stuck CEA plus Ejected CEA Worth (TDB Figure II.B.1.b. lines 4-17 by the number of inoperable CEAs).

NOTE: The values of lines (4) thru (17) of TDB FIGURE II.B.1.b. Include the total reactivity associated with the known inoperable CEA and the highest worth CEA which is assumed to stick out of the core upon a Reactor trip.

(1) Enter total number of CEA's which are known to be inoperable per Technical Specification 2.10.2.(4) a.

(2) Enter the most conservative defective CEA worth from TDB Figure II.B.1.b. Lines (4) thru (17) depending on defective CEA(s) location, based on burnup (Step 8). Select the higher value.

(3) Calculate the Total CEA Worth for Multiple Stuck Rod Case by multiplying Total Number of Inoperable CEA's (Step 13.b(1)) by the most conservative CEA Worth (Step 13.b(2)).

c. Enter value from 13.a or 13.b(3) as appropriate.

13

NOTE: The Rod Worth Value found in Step 13.d is the maximum CEA Worth possible, therefore using the lesser of the two values from steps 13.d and 13.c is more accurate and conservative.

d. Enter total available CEA worth from TDB Figure II.B.1.a. based on burnup (Step 8). (Use Worth Without Group N value unless Group N Rods are inserted)

e. Determine the stuck CEA worth by selecting the minimum of either 13.c or 13.d and record that value.

14. Reactivity for group or individual CEA withdrawals: (Enter N/A if not applicable)

a. If shutdown Group A is withdrawn, use TDB Figure II.B.1.a and burnup (Step 8) to determine the worth of Group A.

b. If shutdown Group B is withdrawn, use TDB Figure II.B.1.a and burnup (Step 8) to determine the worth of Group B.

c. If regulating groups are withdrawn sequentially, use TDB Figure II.B.2, the CEA positions (Step 11) and the burnup (Step 8) to determine worth of the withdrawn regulating CEAs.

d. If an individual regulating or shutdown CEA is withdrawn, consult the Reactor Engineer to calculate its reactivity.

e. If all regulating groups are to be withdrawn to 20 inches, use TDB Figure II.B.1.a and core burnup (Step 8) to determine worth of the withdrawn regulating CEAs.

f. Total CEA withdrawal reactivities add 14.a through 14.e, as applicable.

15. Determine the change in reactivity from the assumptions in the TDB figure for required shutdown margin boron by summing the Worth of the most reactive CEA (Step 12), the Stuck CEA Worth (Step 13.e), and subtracting the Xenon Worth from Step 10.b.

16. Determine the inverse boron worth for hot zero power (Hot Zero Power, HZP) using TDB Figure II.A.4 and core burnup (Step 8).

17. Calculate Change in Boron

a. If Step 15 is positive, calculate the change in boron required by multiplying the change in reactivity (Step 15) by the Inverse Boron Worth (Step 16). Otherwise, N/A.

b. If Step 15 is negative, calculate the change in boron required by multiplying the change in reactivity (Step 15) by a conservative Inverse Boron Worth of 55 ppm/%$\Delta\rho$. Otherwise, N/A.

18. Calculate Excess CEA Withdrawal

a. Calculate excess CEA Withdrawal by subtracting required Shutdown Margin (3.6% $\Delta\rho$) from Total CEA Withdrawal Reactivities from Step 14.f.

b. Boron to be added.

(1) If the above value (Step 18.a) is negative, then enter zero in Step 18.b(1).

(2) If the above value (Step 18.a) is positive, then calculate the amount of boron to be added by multiplying the excess CEA Withdrawal (Step 18.a) by the HZP Inverse Boron Worth (Step 16).

(3) Enter N/A in Step 18.b(1) or Step 18.b(2) if blank.

.

19. Record the present Reactor coolant boron concentration.

20. Determine the required boron concentration by using the applicable TDB Figure II.A.3, based on RCS temperature (Step 5), core burnup (Step 8) and Group N position.

21. Adjust TDB Value from Step 20 by adding the boron deviation adjustment (Step 9.e), the changes in assumed reactivity (Step 17) and the excess CEA withdrawal adjustment (Step 18.b).

TDB ppm + boron deviation + (CEAs and xenon) + excess CEA withdrawal = ppm

22. Calculate the difference between actual (Step 19) and adjusted required boron (Step 21).

23. Determine if the Shutdown Margin is adequate (circle one).

NOTE: This Shutdown Margin calculation is valid for 36 hours from the Date/Time this worksheet is performed (Step 10.a).

a. If the difference (Step 22) is greater than or equal to zero, THEN the shutdown margin boron is adequate.

b. If the difference (Step 22) is less than zero, THEN borate to at least the adjusted required value of boron (Step 21).

REMARKS

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Completed by ______________________________ Date/Time ______/______

Table TDB-V.9-3

1. Present Date/Time	/
2. Date/Time of Shutdown	/
3. Hours Elapsed Since Shutdown (Step 1 – Step 2)	hours
4. Power Level before Shutdown	%
5. RCS Cold Leg Temperature	˚F
6. Shutdown Condition (Circle One)	Hot (3.6 %Δρ) Cold (3.0%Δρ)
7. CEA Position before Shutdown Group 1	inches
Group 2	inches
Group 3	inches
Group 4	inches
8. Burnup	MWD/MTU
9. Deviation Between Actual & Predicted Critical Boron	
a. Concentration Prior to Shutdown	ppm
b. Predicted Full Power Concentration	ppm
c. Predicted Delta Boron Concentration	ppm
d. Predicted Concentration (Step 9.b + Step 9.c)	ppm
e. Deviation (Step 9.a – Step 9.d)	ppm
10. Xenon Reactivity	
a. Hours Since Shutdown (Step 3) + 36	hours
b. Xenon Worth	% Δρ
c. Figure Used	
11. CEA(s) Withdrawn	
a. Group Withdrawn	
Group A	inches
Group B	inches
Group 1	inches
Group 2	inches
Group 3	inches
Group 4	inches
Non-trippable Group N	inches
b. Individual CEA	
Group	
Number	
Inches Withdrawn	inches

Table TDB-V.9-3 (cont'd)	
12. Most Reactive CEA	% Δρ
13. Stuck CEA Allowance	
a. One Inoperable CEA	% Δρ
b. Multiple Inoperable CEAs	
(1). Number of Inoperable CEAs	
(2). Most Conservative CEA Worth	% Δρ
(3). Total CEA Worth (Step 13.b(1) X Step 13.b(2))	% Δρ
c. Applicable Stuck CEA Worth (Step 13.a or Step 13.b(3))	% Δρ
d. Total Available CEA Worth	% Δρ
e. Stuck CEA Worth(Step 13.c or Step 13.d)	% Δρ
14. Reactivity for Group or Individual CEA Withdrawals	% Δρ
a. Group A	% Δρ
b. Group B	% Δρ
c. Regulating Groups	% Δρ
d. Individual CEA	% Δρ
e. Reg Groups Withdrawn 20 Inches	% Δρ
f. Total CEA Withdrawal Reactivities (Step 14.a + Step 14.b + Step 14.c + Step 14.d + Step 14.e)	% Δρ
15. Change in Reactivity (Step 12 + Step 13.e – Step 11.b)	% Δρ
16. Inverse Boron Worth for HZP	$\frac{\text{ppm}}{\%\ \Delta\rho}$
17. Change in Boron	
a. Positive Change (Step 15 X Step 16)	ppm
b. Negative Change (Step 15 X 55 ppm/%Δρ)	ppm
18. Excess CEA Withdrawal	
a. Excess CEA Worth (Step 14.f – 3.6%Δρ)	% Δρ
b. Boron to be Added	
(1) If Negative – Enter 0	ppm
(2) If Positive – (Step 18.a X Step 16)	ppm
19. Present RCS Boron Concentration	ppm

Table TDB-V.9-3 (cont'd)	
20. Required Boron Concentration	ppm
a. TDB Figure Used/Group N Position	/(IN / OUT)
21. Adjusted Required Boron Concentration (Step 20 + Step 9.e + Step 17 + Step 18.b)	ppm
22. Difference Between Actual and Adjusted (Step 19 – Step 21)	ppm
23. Is Shutdown Margin Adequate?	YES / NO

SHUTDOWN MARGIN WORKSHEET

PART I - Instantaneous Shutdown Margin for use prior to a Reactor Trip or immediately following a Reactor trip. No changes are assumed for either boron or xenon, since this worksheet is only applicable for calculation of an instantaneous shutdown margin.

NOTE: Enter values in **Table TDB-V.9-1,** exactly as determined from the figures in the Technical Data Book and carry the algebraic signs through the calculations.

Plant Conditions

1. Record Present Date/Time

2. Record Reactor Power (before trip)

3. Record CEA Group Positions

4. Record Reactor Coolant System Boron Concentration prior to shutdown (Boron concentration analysis must have been performed within the past 72 hours or more recently if boration or dilution has occurred)

5. Record Burnup - Take the most recent burnup from GARDEL OR take the most recent Burnup from the Control Room Log and add 30 MWD/MTU per EFPD to the Control Room Log Burnup Value.

Calculation of Shutdown Margin

6. Enter Regulating Group Worth, based on burnup (Step 5) and CEA positions using TDB Figure II.B.2.

7. Enter Shutdown Group Worths, based on burnup (Step 5) using TDB Figure II.B.1.a.

   a. Sum the total shutdown CEA worth by adding Group A (7.a) and Group B (7.b) and recording in line 7.c.

8. Determine Power Defect

   a. Enter Power Defect based on Reactor power level (Step 2) and burnup (Step 5) using TDB Figure II.C.2.b.

   b. Calculate power defect by multiplying Reactor Power Level (Step 2) by Power Defect per Percent Reactor Power (Step 8.a).

9. Determination of Stuck CEA Allowance (3 cases)

NOTE: Consider dropped CEAs which cannot be verified to be fully inserted as inoperable.

a. Case I - All CEAs are assumed to be operable. (No known inoperable CEAs)

N/A (Enter N/A if this case is not applicable.)

Assume the highest worth CEAs will stick out of the core upon a Reactor trip. Enter the value of the most reactive CEA, based on burnup (Step 5), from TDB Figure II.B.1.b., lines (1) thru (3) for the pre-trip configuration. Select the higher value.

NOTE: The worth of one inoperable CEA is dependent on the configuration of the withdrawn group(s) and the inoperable CEA.

b. Case II - One CEA is known to be inoperable (per Technical Specification 2.10.2(4) a.)

(Enter N/A if this case is not applicable.)

Account for this defective CEA (and the highest worth stuck CEA) by entering only the value from lines (4) thru (17) of TDB Figure II.B.1.b. for the inoperable CEA, based on burnup (Step 5). Select the higher value.

NOTE: The worth of more than one inoperable CEA is calculated by multiplying the most conservative Stuck CEA plus Ejected CEA Worth (TDB Figure II.B.1.b. lines 4-17 by the number of inoperable CEAs).

NOTE: The values of lines (4) thru (17) of TDB Figure II.B.1.b. Include the total reactivity associated with the known inoperable CEA and the highest worth CEA which is assumed to stick out of the core upon a Reactor trip.

c. Case III - More than one CEA is known to be inoperable (per Technical Specification 2.10.2.(4)a.).

(Enter N/A if this case is not applicable.)

i. Enter total number of CEA's which are known to be inoperable per Technical Specification 2.10.2.(4) a.

ii. Enter the most conservative defective CEA worth from TDB Figure II.B.1.b. Lines (4) thru (17) depending on inoperable CEA(s) location, based on burnup (Step 5). Select the higher value.

iii. Multiply the total number of inoperable CEA's (Step 9.c.i) by the highest/ most conservative CEA Worth (Step 9.c.ii).

9.c

iv. Enter total available CEA worth from TDB Figure II.B.1.a. based on burnup (Step 5) (Use Worth Without Group N value unless Group N Rods are inserted.)

NOTE: The Rod Worth Value found in Step 9.c.iv, is the maximum CEA Worth possible, therefore using the lesser of the two values from Steps 9.c.iii and 9.c.iv is more accurate and conservative.

v. Determine the Multiple Stuck CEA Worth by selecting the minimum of either Step 9.c.iii or Step 9.c.iv and record that value.

d. Enter Stuck CEA Allowance value from Step 9.a or 9.b or 9.c.v as appropriate.

10. Calculation of the Total Instantaneous Shutdown Margin (SDM_I):

SDM_I = Stuck CEAs (Step 9.d) + Power Defect (Step 8.b) - S/D CEAs worth (Step 7.c) - Regulating CEA worth (Step 6)

11. Document the Technical Specification required Shutdown Margin per TS 2.10.1(1).

12. Calculate difference from required Shutdown Margin per TS 2.10.2(1).

NOTE: A 3.6% $\Delta\rho$ shutdown margin must be maintained in a Hot Shutdown condition, Tc > 210°F and a 3.0% $\Delta\rho$ Shutdown Margin must be maintained T_c<210°F. (Technical Specification 2.10.2(1) and TDB-VI Item 13.0).

13. Shutdown Margin check:

a. If Step 12 is less than or equal to zero, the shutdown margin is adequate.

b. If Step 12 is greater than zero, use OI-ERFCS-1, to determine the number of gallons of acid to add.

REMARKS SDM is adequate

Completed by [signature] Date/Time 5/20/14 0900

TDB-V.9 - 1	
1. Present Date/Time	5/20/141 0900
2. Reactor Power (before trip)	99.9 %
3. CEA Positions:	
a. Group 1	128 inches
b. Group 2	128 inches
c. Group 3	127.3 inches
d. Group 4	125.5 inches
4. RCS Boron Concentration	875 ppm
5. Burnup	2000 MWD/MTU
6. Regulating Group Worth	3.21 % Δρ
a. Figure Used	11.B.2.a
7. Shutdown Worths	
a. Group A	1.777 % Δρ
b. Group B	3.107 % Δρ
c. Total Shutdown Worth (Step 7.a + Step 7.b)	4.884 % Δρ
8. Power Defect	
a. Power Defect per Percent power	0.015 % Δρ / %
b. Total Power Defect (Step 2 X Step 8a.)	1.4985 % Δρ
9. Stuck CEA Allowance	
a. Highest CEA Worth	% Δρ
b. Inoperable CEA Worth	2.38 % Δρ
c. Multiple Inoperable CEAs	
i. Number of Inoperable CEAs	
ii. Most Conservative CEA Worth	% Δρ
iii. Total Inoperable CEA Worth (Step 9.c.i X Step 9.c.ii)	% Δρ
iv. Total Available CEA Worth	% Δρ
v. Multiple Stuck CEA Worth (Step 9.c.iii or Step 9.c.iv)	% Δρ
d. Stuck CEA Allowance Value (9.a Step or 9.b or 9.c.v)	2.38
10. Instantaneous Shutdown Margin= Step 9.d + Step 8.b – Step 7.c – Step 6	-4.2155 % Δρ
11. Tech. Spec. Shutdown Margin	3.6 % Δρ
12. Shutdown Margin (Step 10 + Step 11)	-0.615 % Δρ
13. Is Shutdown Margin Adequate?	YES(≤ 0) / NO (> 0)

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-2 Rev. 2

JPM Title: Time to empty EFWST

Location: Classroom

Approximate Time: 10 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.1.25 (RO Imp: 3.9)
Ability to interpret reference materials, such as graphs, curves, tables, etc.
AOP-30
TDB VII EFWST Tank Curve

Handout(s): AOP-30 Attachment A
TDB-VII, EFWST Tank Curve

FCS Task List #: 0780
Objective: 07-17-30 Objective 1.0

Use the Emergency Fill of EFWST Procedure to makeup to the tank if it goes below Technical Specification levels and normal makeup is not available.

Applicable Position(s): RO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: _______________________________ Date: ____________

JPM Reviewed by: _______________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-2 Rev. 2

JPM Title: Time to empty EFWST

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

JPM No: A-2 Rev. 2

JPM Title: Time to empty EFWST

TASK STANDARD: **The Applicant determined the time to empty the EFWST in accordance with AOP-30.**

INITIAL CONDITIONS: **A loss of feedwater has occurred. FW-6 is being used to provide auxiliary feedwater to the steam generators at a rate of 95 gpm each. The water level in the Emergency Feedwater Storage Tank is at 120 inches.**

INITIATING CUE: **You are directed to determine how long it will take to empty the Emergency Feedwater Storage Tank.**

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-2 Rev. 2

JPM Title: Time to empty EFWST

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1	Applicant refers to AOP-30, Attachment A “EFWST Emptying Characteristics” or TDB VII EFWST Tank Curve.	Applicant referred to AOP-30, Attachment A and or TDB VII, EFWST Tank Curve. [SAT] [UNSAT]
2	Applicant Determines that the time to empty.	Applicant determined that the time to empty the EFWST is 3.98 hours ± .10 hours. [SAT] [UNSAT]

Termination Criteria: **The time to empty the EFWST has been determined.**

NAME: ______________________

Fort Calhoun Station – Operations Training

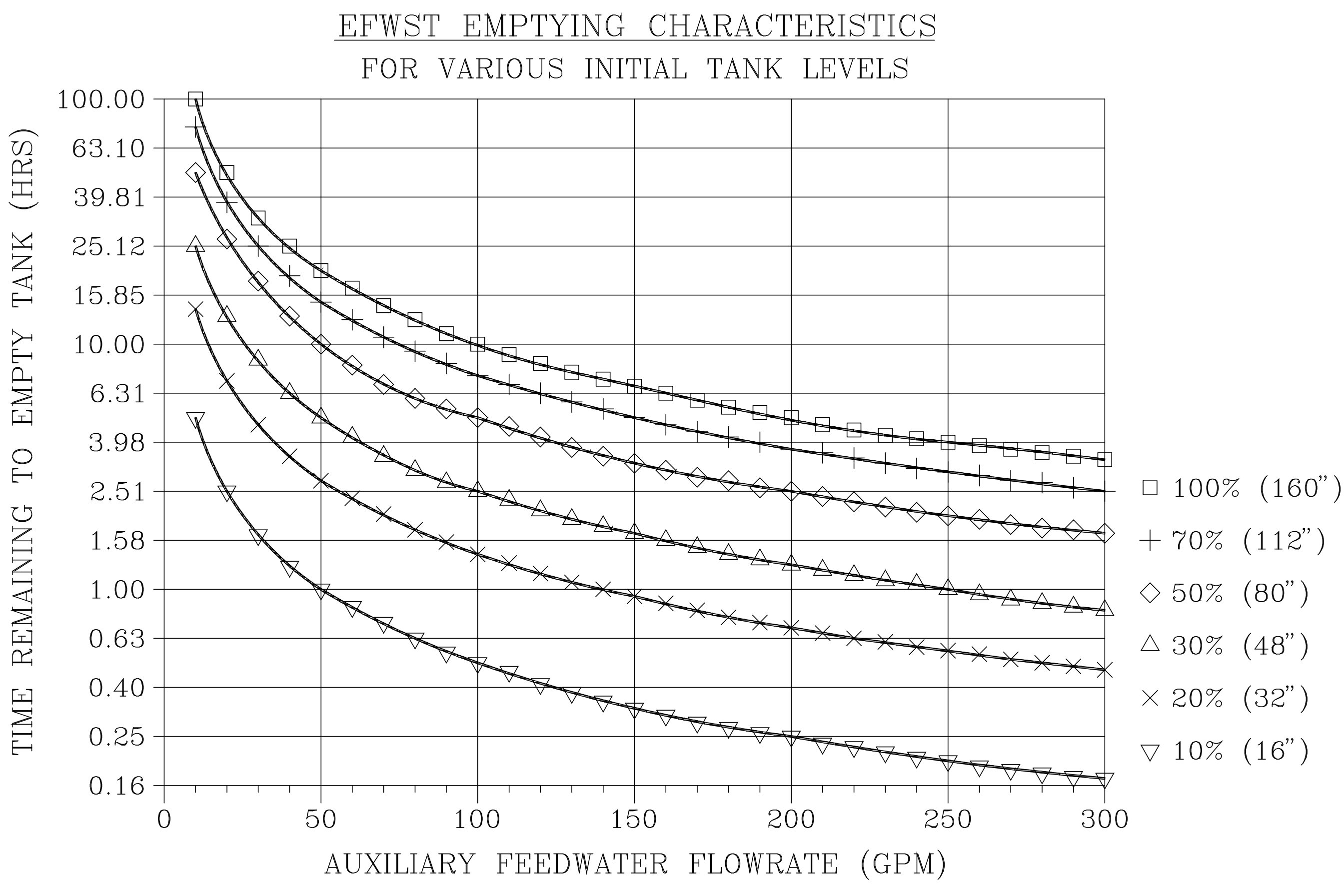
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:	**A loss of feedwater has occurred. FW-6 is being used to provide auxiliary feedwater to the steam generators at a rate of 95 gpm each. The water level in the Emergency Feedwater Storage Tank is at 120 inches.**
INITIATING CUE:	**You are directed to determine how long it will take to empty the Emergency Feedwater Storage Tank.**

Time to Empty: __________________

Attachment A

EFWST Emptying Characteristics



End of Attachment A

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-3 Rev. 2

JPM Title: Boration paths with equipment out of service

Location: Classroom

Approximate Time: 20 minutes

Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.2.15 (RO Imp: 3.9)
Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc.
SO-O-21
TDB-VI
One line electrical drawing
TS section 2.2

Handout(s):

FCS Task List #: 0119
Lesson Plan 07-11-02 Objective 2.1

EXPLAIN the operation of the CVCS for boration, dilution and blended makeup of the reactor Coolant System during normal power operation and when depressurized.

Applicable Position(s): RO

Time Critical: NO

Alternate Path: NO
JPM Prepared by: ________________________________ Date: ____________

JPM Reviewed by: ______________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-3 Rev. 2

JPM Title: Boration paths with equipment out of service

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: SO's, TDB, TS, and plant drawings

JPM No: A-3 Rev. 2

JPM Title: Boration paths with equipment out of service

TASK STANDARD: **Boration paths have been identified.**

INITIAL CONDITIONS:

- **The plant is in SO-O-21, Shutdown Condition 1, "Refueling Cavity Water Level Greater than or Equal to 23 feet above the top of the core with UGS removed"**
- **CH-11A and CH-11B levels are both 30% with a boron concentration of 3.5 WT % Boric Acid. The SIRWT level is 42" with a boron concentration of 2150 ppm. Charging pump CH-1C has been tagged out of service.**
- **480 volt buses 1B3A and 1B3A-4A will be deenergized to allow work to be performed on BT-1B3A.**

INITIATING CUE: **You are directed to determine if 2 independent boration paths will be available once the buses are deenergized. If so, identify:**

(1) the borated water source(s) and

(2) pump(s) for each boration path.

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-3 Rev. 2

JPM Title: Boration paths with equipment out of service

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Determine equipment that will be affected by deenergizing the busses.	**NOTE to Evaluator;** Steps 1-3 may be performed in any order: Applicant referred to plant one line electrical drawing (or other suitable plant reference) and determined that there will be no power to CH-1A, SI-2A and SI-2C. [SAT] [UNSAT]
2.	Determine BAST suitability as a boric acid source.	Applicant referred to TDB-VI (COLR) figure 9 and determines that with 2150 PPM in the SIRWT and BAST boron at 3.5%, BAST level must be greater than 89% total both tanks. With a level of 30% in each BAST neither BAST can be a source by itself, but together they can count as one source. [SAT] [UNSAT]
3.	Determine SIRWT suitability as a boric acid source.	Determine that the SIRWT cannot be used as a source with the charging pumps because the level is less that 92" but that it can be used as a source for the HPSI pump. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
4.	Determines if two independent boration paths are available with the buses deenergized and identifies them.	Applicant determined that 2 independent boration paths are available: 1. CH-11A AND CH-11B (source) through (pump) CH-1B. 2. SIRWT (Source) through pump SI-2B [SAT] [UNSAT]

Termination Criteria: Boration paths have been identified.

NAME: ___________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:

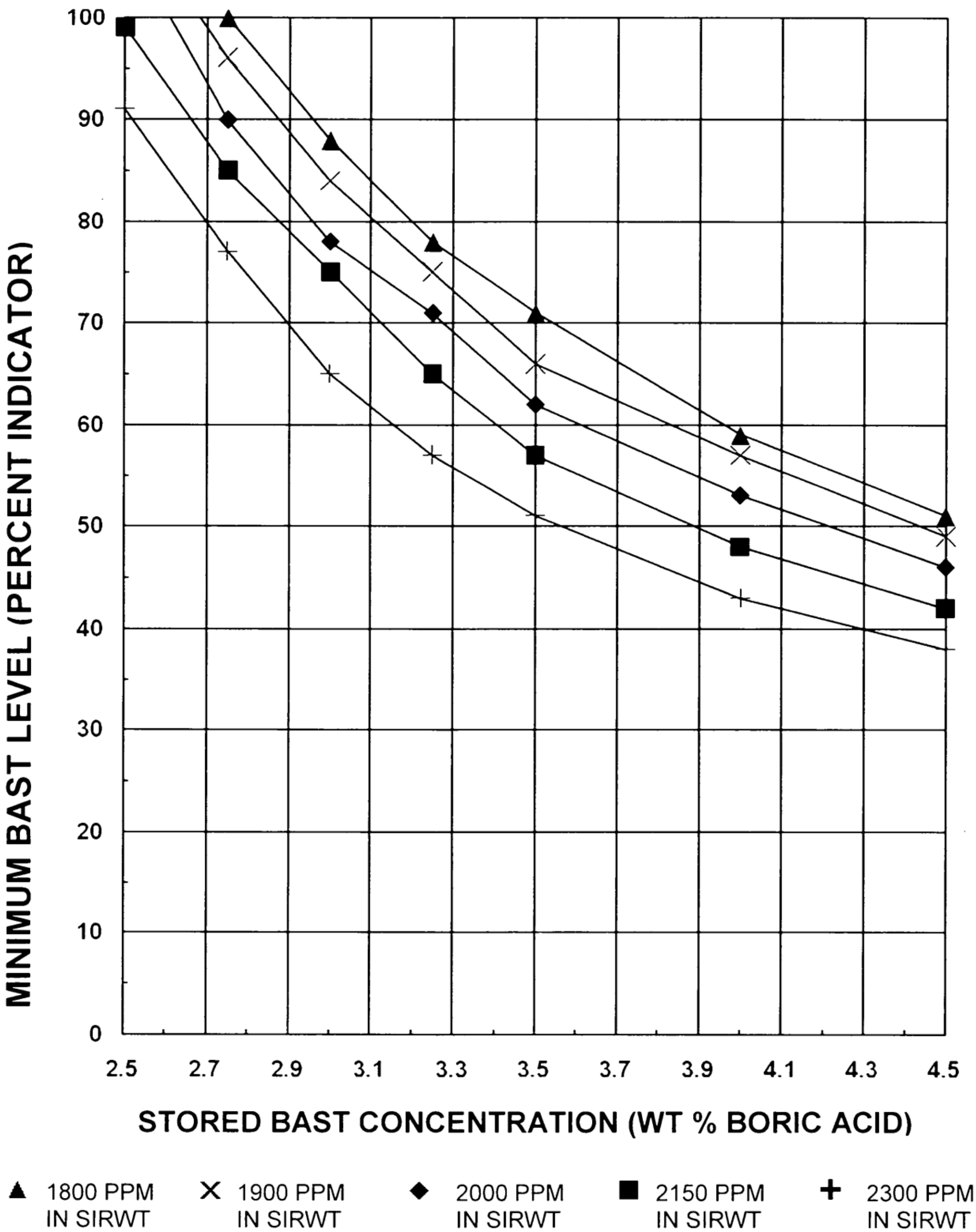
- **The plant is in SO-O-21, Shutdown Condition 1, "Refueling Cavity Water Level Greater than or Equal to 23 feet above the top of the core with UGS removed"**
- **CH-11A and CH-11B levels are both 30% with a boron concentration of 3.5 WT % Boric Acid. The SIRWT level is 42" with a boron concentration of 2150 ppm. Charging pump CH-1C has been tagged out of service.**
- **480 volt buses 1B3A and 1B3A-4A will be deenergized to allow work to be performed on BT-1B3A.**

INITIATING CUE: **You have been requested to determine if 2 independent boration paths will be available once the buses are deenergized. If so, identify:**

ANSWERS:

(1) the borated water source(s) and

(2) pump for each boration path.



COLR	MINIMUM BAST LEVEL vs. STORED BAST CONCENTRATION	FIGURE 9

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-4 Rev. 1

JPM Title: Read a Survey Map and apply RWP Requirements

Location: Classroom

Approximate Time: 7 minutes Start Time:__________________

End Time:__________________

Actual Time: __________________

Reference(s): K/A 000000 2.3.7 (RO Imp: 3.5)
Room 22 Survey Map
RWP 14-0002

Handout(s): Room 22 Survey Map
RWP 14-0002

Task List #: 0062
Lesson Plan 10-27-20 Objective 1.1.3 Demostrate an understanding of RCA access controls to include: Review the work area Survey Map.

Applicable Position(s): RO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ____________

JPM Reviewed by: ______________________________ Date: ____________

JOB PERFORMANCE MEASURE

JPM No: A-4 Rev. 1

JPM Title: Read a Survey Map and apply RWP Requirements

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: RWP 14-0002 and Rm 22 Survey Map

Safety Considerations: None

Comments: None

JPM No: A-4 Rev. 1

JPM Title: Read a Survey Map and apply RWP Requirements

TASK STANDARD: **Read Survey Map and applied RWP requirements in that the Low Dose waiting area was identified, the highest radiation level at 30cm was identified and single PC dress out for entering CA is necessary.**

INITIAL CONDITIONS:

- **The plant is in Mode 1.**
- **The previous shift's EONA noticed a small leak coming from the discharge flange of SI-1B.**
- **The previous EONA placed a catch basin under the leak.**

INITIATING CUE: **You are the EONA and are directed to establish a clearance on SI-1B, mechanically isolating it from the system. Vent and draining the pump will be required.**

- **Using the provided Survey Map and RWP, determine: the low dose waiting area,**
- **the highest radiation level at 30cm and**
- **any RWP requirements that need to be applied.**

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-4 Rev. 1

JPM Title: Read a Survey Map and apply RWP Requirements

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Review the Survey Map for responses to Initial Condition and Initiating Cue.	Applicant determined the Low Dose Waiting Area is in the SW corner of the room (<.5 mrem), Applicant determined the highest dose at 30cm is +20 for HS#69 and HS#70. Applicant determined that mechanically isolating SI-1B and establishing a clearance would require entry into a CA or reach across a boundary. [SAT] [UNSAT]
2.	Review the RWP to apply requirements/work instructions.	Applicant determined the RWP EAD Dose and Rate are adequate for the task. Applicant determined Protective Clothing Requirements. Single PC dress is required inside CA. RP may authorize lab coats for work which has minimal risk of whole body contamination. Applicant may also include Contact RP for requirements for reaching across radiological boundaries [SAT] [UNSAT]

STEP	ELEMENT	STANDARD

Termination Criteria: **Read Survey Map and applied RWP requirements in that the Low Dose waiting area was identified, the highest radiation level at 30cm was identified and single PC dress out for entering CA is necessary.**

NAME: ________________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:

- **The plant is in Mode 1.**
- **The previous shift's EONA noticed a small leak coming from the discharge flange of SI-1B.**
- **The previous EONA placed a catch basin under the leak.**

INITIATING CUE: **You are the EONA and are directed to establish a clearance on SI-1B, mechanically isolating it from the system. Vent and draining the pump will be required.**

- **Using the provided Survey Map and RWP, determine: the low dose waiting area,**
- **the highest radiation level at 30cm and**
- **any RWP requirements that need to be applied.**

ANSWER:

OPPD
Fort Calhoun Station

RADIATION WORK PERMIT

14-0002 Rev 0

RWP Start: January 1, 2014 0:00

RWP Expiration: December 31, 2014 23:59

Job Location:
AUX/RW - ALL LOC.

RWP Type:
GENERAL

Job Description:
Routine Operation duties

Tasks

Task 1 - Shift Aux Bldg Operator
RP Coverage: CONTINUOUS/INTERMITT
EAD: Dose=40 mrem, Rate=400 mrem/hr; Budget=640 mrem
Protective Clothing: SEE WORKER INSTRUCTIONS
Respiratory Protection: Conditional: FFM/PAPR
Allowed Posting: RA, HRA, RHRA, CA, HCA, ARA

Task 2 - Aux Bldg Support
RP Coverage: CONTINUOUS/INTERMITT
EAD: Dose=40 mrem, Rate=400 mrem/hr; Budget=103 mrem
Protective Clothing: SEE WORKER INSTRUCTIONS
Respiratory Protection: Conditional: FFM/PAPR
Allowed Posting: RA, HRA, RHRA, CA, HCA, ARA

Task 3 - Ops Training Activities
RP Coverage: CONTINUOUS/INTERMITT
EAD: Dose=10 mrem, Rate=80 mrem/hr; Budget=28 mrem
Protective Clothing: SEE WORKER INSTRUCTIONS
Respiratory Protection: Prohibited
Allowed Posting: RA, HRA, RHRA, CA, HCA, ARA

Task 4 - Supervisory Tours
RP Coverage: CONTINUOUS/INTERMITT
EAD: Dose=10 mrem, Rate=80 mrem/hr; Budget=5 mrem
Protective Clothing: SEE WORKER INSTRUCTIONS
Respiratory Protection: Prohibited
Allowed Posting: RA, HRA, CA, HCA, ARA

Worker Instructions

-TLD & EAD required for entry into the Radiological Control Area (RCA)
-Entries into a RHRA or HRA require a specific RP briefing.
-A High Noise EAD is required for work in a posted Hearing Protection Required area within an HRA unless continuous RP coverage or Teledosimetry is provided.
-Unless otherwise stated, the Stop Work dose rate shall be the EAD dose rate alarm set point for the task.
-Workers shall utilize low dose areas as applicable to minimize exposure.
-Contact Contamination Control (Decon) for work area setup (e.g. drip catches, HEPA ventilation equipment/vacuums in advance of work.
-HEPA ventilation or vacuum required for contaminated system breach as directed by RP.
-Workers shall conduct work IAW SO-G-101 (Radiation Worker Practices).
-Workers shall review the electronic survey maps for work area conditions.
-Contact RP prior to entering a posted Alpha II or Alpha III area, work in these areas requires additional controls.
-Contact RP for requirements prior to reaching across radiological boundaries.

(Protective Clothing Requirements)
Contaminated Area (CA) = Single PC dress.
RP may authorize the use of lab coats for work which has minimal risk of whole body contamination.
High Contamination Area (HCA) = Double PC dress
RP may authorize the use of double gloves and shoe covers for work in an HCA deemed to be a moderate risk for whole body contamination.

NOTE: Deviation from RWP requirements requires RP Supervisor approval.

OPPD Fort Calhoun Station	RADIATION WORK PERMIT	14-0002 Rev 0

Task-Specific Instructions

Task

RP Instructions

Task
-

Approvals

RP TECHNICIAN	Date 1/8/14
SUPERVISOR-RAD OPERATIONS	Date 1/8/14
SUPERVISOR-ALARA	Date 1-8-14
MANAGER-RAD PROTECTION	Date 1-9-14

Fort Calhoun Station Radiation Protection Form

Survey M-20140117-4

General Information

Title: Room 22

Survey Date/Time: 1/17/2014 11:30

Lead Surveyor: [redacted]

Survey Type: Monthly

Work Order/Task #:

Counted By: Surveyor 1/24/2014 14:29

Rx % Pwr: 100%

RWP Number: 14-0001

Status: Ready for Review by: [redacted] 1/24/2014 14:52:02

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:
= Hot Spot
* = Contact
+ = 30cm

Dose Rates with No Prefixes:
General

Default Prefixes:
HS = Hot Spot

Default Suffixes:
"n" = Neutron
"b" = Beta
"c" = Corrected

Postings Legend

BelowGrate=Below Grating
CA=Contaminated Area
CRP=Contact RP Prior to Entry
HCA=Highly Contaminated Area
In Taped=Inside Taped Area
RA=Radiation Area

Map Location

File Name	Image Description	Location Code	Bldg/Area Name	Location Description
Aux 989\FC-RP-202-68	Room 22	Aux 989 (Corridor 4)	Room 22	Roon 22, SI Pump Room

Instruments Used

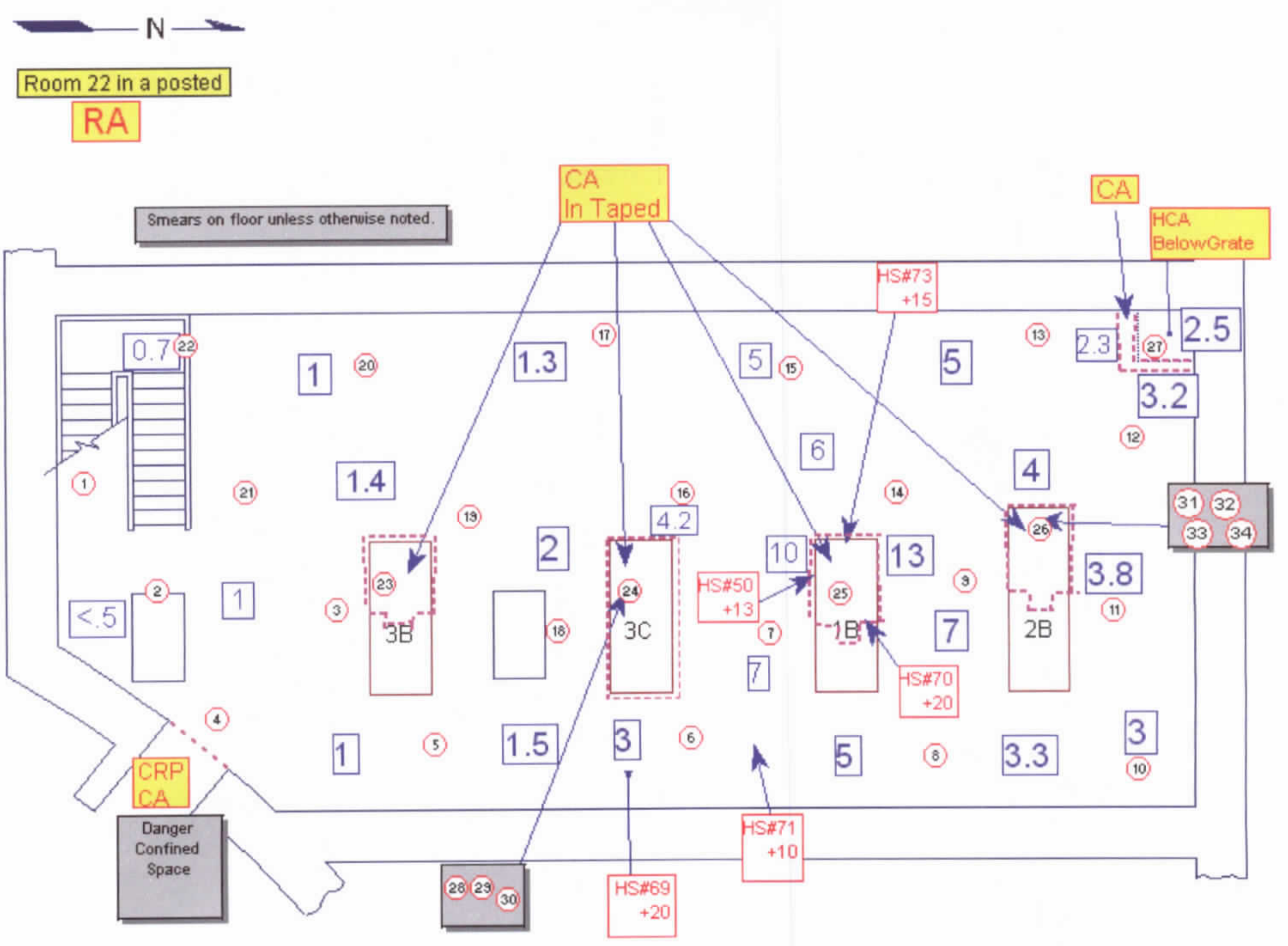
#	Instrument Model	Instrument Serial #	Inst Type	Probe Model	Probe Type	Calibration Date/Time
1	RO-20	2720	D	NONE	D	3/25/2014
2	WPC-9550	2	C	NONE	C	4/15/2014

Instruments Used - Notes

#	Notes
1	date is cal. due
2	date is cal. due

Fort Calhoun Station Radiation Protection Form

Room 22	Survey #: M-20140117-4	Date/Time: 1/17/2014 11:30



Comments: Peer checked by [redacted]

Type: Monthly

Symbol Legend (for example only)

*100 ← Contact Reading
+30 ← 30 cm Reading
5 ← General Area
Radiological Boundary
1 Smear
1 Air Sample
1 Direct Frisk
LAS/Wipe

RWP #: 14-0001
Reactor Power = 100%

Lead Surveyor: [redacted]	Status: Ready for Review by: [redacted] 1/24/2014 14:52:02
Location Code: Aux 989 (Corridor 4)	Bldg/Area Name: Room 22
Location Description: Roon 22, SI Pump Room (East)	

Data Point Details

Survey #: M-20140117-4

Map: Room 22

#	Type	Inst.	Value	Units	Position	Notes
DR	γ	N/A	3.2	mrem/hr		
DR	γ	N/A	2.5	mrem/hr		
DR	γ	N/A	2	mrem/hr		
DR	γ	N/A	4.2	mrem/hr		
DR	γ	N/A	5	mrem/hr		
DR	γ	N/A	1.4	mrem/hr		
DR	γ	N/A	0.7	mrem/hr		
DR	γ	N/A	<.5	mrem/hr		
DR	γ	N/A	1.3	mrem/hr		
DR	γ	N/A	5	mrem/hr		
DR	γ	N/A	3.8	mrem/hr		
DR	γ	N/A	3.3	mrem/hr		
DR	γ	N/A	5	mrem/hr		
DR	γ	N/A	1	mrem/hr		
DR	γ	N/A	13	mrem/hr		
DR	γ	N/A	1	mrem/hr		
DR	γ	N/A	1	mrem/hr		
DR	γ	N/A	2.3	mrem/hr		
DR	γ	N/A	3	mrem/hr		
DR	γ	N/A	1.5	mrem/hr		
DR	γ	N/A	3	mrem/hr		
DR	γ HS	N/A N/A	HS # 69 + 20	mrem/hr mrem/hr	H/S 69 in Overhead	
DR	γ HS	N/A N/A	HS # 50 + 13	mrem/hr mrem/hr	H/S 50	
DR	γ HS	N/A N/A	HS # 70 + 20	mrem/hr mrem/hr	Under LPSI shaft shroud	
DR	γ	N/A	4	mrem/hr		
DR	γ	N/A	6	mrem/hr		
DR	γ	N/A	7	mrem/hr		
DR	γ	N/A	7	mrem/hr		
DR	γ	N/A	10	mrem/hr		
DR	γ HS	N/A N/A	HS # 71 + 10	mrem/hr mrem/hr	8' in overhead	
DR	γ HS	N/A N/A	HS # 73 + 15	mrem/hr mrem/hr	drain under pump	
1	Smear	N/A N/A	β 37 α <17	DPM/100 cm2 DPM/100 cm2		
2	Smear	N/A N/A	β <31 α <17	DPM/100 cm2 DPM/100 cm2	on column	
3	Smear	N/A N/A	β <31 α <17	DPM/100 cm2 DPM/100 cm2		
4	Smear	N/A N/A	β <31 α <17	DPM/100 cm2 DPM/100 cm2		
5	Smear	N/A N/A	β <31 α <17	DPM/100 cm2 DPM/100 cm2		
6	Smear	N/A N/A	β <31 α <17	DPM/100 cm2 DPM/100 cm2		
7	Smear	N/A N/A	β 74 α <17	DPM/100 cm2 DPM/100 cm2		

Fort Calhoun Station Radiation Protection Form

Data Point Details

Survey #: M-20140117-4

Map: Room 22

#	Type	Inst.	Value	Units	Position	Notes
8	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
9	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
10	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
11	Smear	N/A	β 31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
12	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
13	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
14	Smear	N/A	β 59	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
15	Smear	N/A	β 43	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
16	Smear	N/A	β 40	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
17	Smear	N/A	β <31	DPM/100 cm2	vent duct	
		N/A	α <17	DPM/100 cm2		
18	Smear	N/A	β 56	DPM/100 cm2	ladder	
		N/A	α <17	DPM/100 cm2		
19	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
20	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
21	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
22	Smear	N/A	β <31	DPM/100 cm2		
		N/A	α <17	DPM/100 cm2		
23	Smear	N/A	β 1213	DPM/100 cm2	pump base	
		N/A	α <17	DPM/100 cm2		
24	Smear	N/A	β 11012	DPM/100 cm2	pump base	deconned and resmeared #'s 28 - 30
		N/A	α 38	DPM/100 cm2		
		N/A	β:α 289	:1 Beta/Alpha Ratio		
25	Smear	N/A	β 11779	DPM/100 cm2	pump base	
		N/A	α <17	DPM/100 cm2		
26	Smear	N/A	β 23540	DPM/100 cm2	pump base	
		N/A	α 71	DPM/100 cm2		
		N/A	β:α 331	:1 Beta/Alpha Ratio		
27	Smear	N/A	β 659	DPM/100 cm2	pump base	
		N/A	α <17	DPM/100 cm2		
28	Smear	N/A	β 448	DPM/100 cm2	pump base	post decon #24
		N/A	α <17	DPM/100 cm2		
29	Smear	N/A	β 249	DPM/100 cm2	pump base	post decon #24
		N/A	α <17	DPM/100 cm2		
30	Smear	N/A	β 323	DPM/100 cm2	pump base	post decon #24
		N/A	α <17	DPM/100 cm2		
31	Smear	N/A	β 3155	DPM/100 cm2	post decon smear #26	
		N/A	α <16	DPM/100 cm2		
32	Smear	N/A	β 1749	DPM/100 cm2	post decon smear #26	
		N/A	α <16	DPM/100 cm2		

Data Point Details

Survey #: M-20140117-4

Map: Room 22

#	Type	Inst.	Value	Units	Position	Notes
33	Smear	N/A	β 2090	DPM/100 cm2	post decon smear #26	
		N/A	α 23	DPM/100 cm2		
34	Smear	N/A	β 1493	DPM/100 cm2	recount #33	
		N/A	α <16	DPM/100 cm2		
	Text		Room 22 in a posted			
	Note					Danger Confined Space
	Note					Smears on floor unless otherwise noted.
	Note					
	Note					
	Posting		RA			
	Posting		HCA BelowGrate			
	Posting		CRP CA		Stressing Gallery Entrance	
	Posting		CA		Around grating area	
	Posting		CA In Taped		Around pumps	

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-5 Rev. 3

JPM Title: Review Shutdown Margin Calculation

Location: Classroom

Approximate Time: 15 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.1.37 (SRO Imp 4.6)
Knowledge of procedures, guidelines, or limitations associated with reactivity management.
TDB-V.9
TDB-II

Handout(s):

FCS Task List #: 0062
Training Objective: Lesson Plan 07-05-09 Objective 6.0:

DESCRIBE and USE the shutdown margin worksheet

Applicable Position(s): SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ________________________________ Date: ____________

JPM Reviewed by: ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-5 Rev. 3

JPM Title: Review Shutdown Margin Calculation

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: Ensure TDB-II Rev 27 is available.

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-5 Rev. 3

JPM Title: Review Shutdown Margin Calculation

TASK STANDARD:	**Shutdown Margin Calculation was reviewed, Mistakes were identified and shutdown margin was determined to be inadequate.**

INITIAL CONDITIONS:	**CEAs 37 and 41 have just been declared inoperable (untrippable) following a surveillance test.** **The plant conditions are as follows:** **Reactor Power: 75%** **CEA position: GRP 4 @ 100", all other CEAs fully withdrawn** **Boron concentration: 900 ppm** **Burnup: 6000 MWD/MTU**

INITIATING CUE:	**The STA has determined that shutdown margin is adequate. You are directed to review the SDM calculation.**

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-5 Rev. 3

JPM Title: Review Shutdown Margin Calculation

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
		Note to Examiner: **Provide Shutdown Margin Calculation to candidate with initiating cue.**
1.	Reviews shutdown margin calculation.	Applicant determined shutdown worth for 8 GWD/MTU mistakenly used for step 7.a and b. [SAT] [UNSAT]
2.	Reviews shutdown margin calculation.	Applicant determined that least conservative CEA worth was mistakenly used in step 9.c.ii instead of the most conservative [SAT] [UNSAT]
3.	Calculates shutdown margin using corrected values.	Determines that shutdown margin is between 2.234 and 2.204 and is not adequate. [SAT] [UNSAT]

Termination Criteria: Shutdown Margin Calculation has been reviewed.

NAME: ______________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:	**CEAs 37 and 41 have just been declared inoperable (untrippable) following a surveillance test.** **The plant conditions are as follows:** **Reactor Power: 75%** **CEA position: GRP 4 @ 100", all other CEAs fully withdrawn** **Boron concentration: 900 ppm** **Burnup: 6000 MWD/MTU**

INITIATING CUE:	**The STA has determined that shutdown margin is adequate. You are directed to review the SDM calculation.**

ANSWER:

TDB-V.9 - 1	
1. Present Date/Time	DATE / TIME
2. Reactor Power (before trip)	75 %
3. CEA Positions:	
a. Group 1	126 inches
b. Group 2	126 inches
c. Group 3	126 inches
d. Group 4	100 inches
4. RCS Boron Concentration	900 ppm
5. Burnup	6000 MWD/MTU
6. Regulating Group Worth	3.15 % Δρ
a. Figure Used	11.8.2.b
7. Shutdown Worths	
a. Group A	2.109 % Δρ
b. Group B	2.901 % Δρ
c. Total Shutdown Worth (Step 7.a + Step 7.b)	5.01 % Δρ
8. Power Defect	
a. Power Defect per Percent power	0.0166 % Δρ / %
b. Total Power Defect (Step 2 X Step 8a.)	1.254 % Δρ
9. Stuck CEA Allowance	
a. Highest CEA Worth	N/A TODAY % Δρ
b. Inoperable CEA Worth	N/A TODAY % Δρ
c. Multiple Inoperable CEAs	
i. Number of Inoperable CEAs	2
ii. Most Conservative CEA Worth	1.64 % Δρ
iii. Total Inoperable CEA Worth (Step 9.c.i X Step 9.c.ii)	3.28 % Δρ
iv. Total Available CEA Worth	7.813 % Δρ
v. Multiple Stuck CEA Worth (Step 9.c.iii or Step 9.c.iv)	3.28 % Δρ
d. Stuck CEA Allowance Value (9.a Step or 9.b or 9.c.v)	3.28
10. Instantaneous Shutdown Margin= Step 9.d + Step 8.b – Step 7.c – Step 6	– 3.626 % Δρ
11. Tech. Spec. Shutdown Margin	3.6 % Δρ
12. Shutdown Margin (Step 10 + Step 11)	– 0.026 % Δρ
13. Is Shutdown Margin Adequate?	YES(≤ 0) / NO (> 0)

DO NOT HAND THIS OUT

ANSWER KEY "ACTUAL"

TDB-V.9 - 1		JPM BAND	
1. Present Date/Time	/		
2. Reactor Power (before trip)	75 %		
3. CEA Positions:			
a. Group 1	126 inches		
b. Group 2	126 inches		
c. Group 3	126 inches		
d. Group 4	100 inches		
4. RCS Boron Concentration	900 ppm		
5. Burnup	6000 MWD/MTU		
6. Regulating Group Worth	3.15 % Δρ		
a. Figure Used	11.B.2.b		
7. Shutdown Worths			
a. Group A	1.982 % Δρ		
b. Group B	2.974 % Δρ		
c. Total Shutdown Worth (Step 7.a + Step 7.b)	4.956 % Δρ		
8. Power Defect			
a. Power Defect per Percent power	0.0166 % Δρ / %	0.0168	0.0164
b. Total Power Defect (Step 2 X Step 8a.)	1.245 % Δρ	1.26	1.23
9. Stuck CEA Allowance			
a. Highest CEA Worth	N/A % Δρ		
b. Inoperable CEA Worth	N/A % Δρ		
c. Multiple Inoperable CEAs			
i. Number of Inoperable CEAs	2		
ii. Most Conservative CEA Worth	2.74 % Δρ		
iii. Total Inoperable CEA Worth (Step 9.c.i X Step 9.c.ii)	5.48 % Δρ		
iv. Total Available CEA Worth	7.813 % Δρ		
v. Multiple Stuck CEA Worth (Step 9.c.iii or Step 9.c.iv)	5.48 % Δρ		
d. Stuck CEA Allowance Value (9.a Step or 9.b or 9.c.v)	5.48		
10. Instantaneous Shutdown Margin= 5.48 1.245 4.956 3.15 Step 9.d + Step 8.b – Step 7.c – Step 6	-1.381 % Δρ	-1.366	-1.396
11. Tech. Spec. Shutdown Margin	3.6 % Δρ		
12. Shutdown Margin (Step 10 + Step 11)	2.219 % Δρ	2.234	2.204
13. Is Shutdown Margin Adequate?	YES(≤ 0) / NO (> 0)		

ANSWER KEY

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-6 Rev. 3

JPM Title: Determine Shift Staffing per Technical Specifications and SO-O-1

Location: Classroom

Approximate Time: 10 minutes

Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.1.5 (SRO Imp 4.6)
Ability to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.
SO-O-1
T.S. 5.2.2
SO-G-52

Handout(s):

Task List #: 1656
Lesson Plan 07-62-01 Objective 2.0
STATE some of the activities, covered by Standing Orders, which require written procedures per Regulatory Guide 1.33

Applicable Position(s): SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ________________________________ Date: ____________

JPM Reviewed by: ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-6 Rev. 3

JPM Title: Determine Shift Staffing per Technical Specifications and SO-O-1

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

JPM No: A-6 Rev. 3

JPM Title: Determine Shift Staffing per Technical Specifications and SO-O-1

TASK STANDARD:	**Shift Staffing was determined per T.S. 5.2.2 and SO-O-1 and actions taken to ensure requirements are met were specified.**

INITIAL CONDITIONS:

- **The Station is at 100% power and stable.**
- **You are the Shift Manager and are preparing to assume the shift**
- **Your CRS notifies you, that due to an accident, he will not be at work today.**

INITIATING CUE: **Determine what actions need to be taken to assure Shift staffing requirements are met.**

JPM No: A-6 Rev. 3

JPM Title: Determine Shift Staffing per Technical Specifications and SO-O-1

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Obtain and review procedure SO-O-1, Conduct of Operations, 5.10, Operations Shift Manning.	Applicant obtained and reviewed SO-O-1, Conduct of Operations, 5.10, Operations Shift Manning. **NOTE to Evaluator;** SO-O-1 refers to T.S. 5.2.2 [SAT] [UNSAT]
2.	Obtain and review T.S. 5.2.2, Plant Staffing.	Applicant obtained and reviewed T.S. 5.2.2, Plant Staffing and Table 5.2-1 and determined Table 5.2-1 (ii) applies. Applicant determined Shift manning will be as specified in T.S. 5.2.2a,b,c and e [SAT] [UNSAT]
3.	Determine required actions to ensure proper staffing requirements are met.	Per T.S. 5.2.2 and Table 5.2-1(ii), Applicant determined that two SROs are required to be on-shift. 2 hours are allowed to find a relief. However, This provision does not permit any shift crew position to be unmanned upon shift change due to an oncoming shift crew member being late or absent. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
3.	Determine that the present CRS needs to be held over.	Applicant determined that the present CRS needs to be held over per T.S. Table 5.2-1 (ii). [SAT] [UNSAT]
4.	Due to T.S. Table Review Procedure SO-G-52 and determine that a maximum holdover time for the on-shift CRS is 4 hours so that the 16 hour maximum limit is not exceeded.	Applicant reviewed SO-G-52 and determined that a maximum holdover time for the on-shit CRS is 4 hours so that the 16 hour maximum limit is not exceeded. [SAT] [UNSAT]
5.	Uses the Operations Call list of SO-O-1 Section 5.10.2.B to locate an off-shift SRO to take the remainder of the shift.	Applicant uses the Operations Call list of SO-O-1 Section 5.10.2.B to locate an off-shift SRO to take the remainder of the shift. [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **Shift Staffing has been determined per T.S. 5.2.2 and SO-O-1 and actions taken to ensure requirements are met.**

NAME: ________________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:

- **The Station is at 100% power and stable.**
- **You are the Shift Manager and are preparing to assume the shift**
- **Your CRS notifies you, that due to an accident, he will not be at work today.**

INITIATING CUE: **Determine what actions need to be taken to assure Shift staffing requirements are met.**

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-7 Rev. 3

JPM Title: Determine Allowed Outage Time for Failed CS Valves

Location: Classroom

Approximate Time: 12 minutes

Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 2.2.23 (SRO Imp 4.6)
Ability to track Technical Specification limiting conditions for operations.
Technical Specifications 2.3
TDB-VIII

Handout(s):

FCS Task List #: 0066
07-11-22 Objective 1.12 Given a copy of Technical Specifications, Apply the applicable Limiting Conditions for Operation.

Applicable Position(s): SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ___________

JPM Reviewed by: ______________________________ Date: ___________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-7 Rev. 3

JPM Title: Determine Allowed Outage Time for Failed CS Valves

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-7

JPM Title: Determine Allowed Outage Time for Failed CS Valves

TASK STANDARD: **Outage Time for Failed CS Valve has been determined.**

INITIAL CONDITIONS:

- **The plant is operating at full power.**
- **The Equipment Operator reported the airline is disconnected from the valve operator of LCV-383-1 and that he has isolated the airline.**

INITIATING CUE: **You are directed to determine the applicable Technical Specification(s) and required actions, if any, to be taken.**

JPM No: A-7 Rev. 3

JPM Title: Determine Allowed Outage Time for Failed CS Valves

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Determines from drawings, AOPs, TDB or plant knowledge that HCV-385 fails open without air	Applicant made determination. [SAT] [UNSAT]
2.	Refers to Technical Specification 2.3.	Applicant determined that T.S. 2.3(2)e requires that the valve must be restored to operability within 24 hours. [SAT] [UNSAT]
4.	Refers to TDB VIII	Applicant determined that with LCV-383-1 failed open, Table 1.2 determined that plant is in 24 hour LCO. [SAT] [UNSAT]
5.	Determines appropriate LCO and Action Statements.	Applicant entered Tech Specs 2.3(2)e. and determined that operation may continue for up to 24 hours with LCV-383-1 inoperable. [SAT] [UNSAT]

Termination Criteria: Outage Time for Failed CS Valve has been determined.

NAME: ______________________________

Fort Calhoun Station – Operations Training

JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:	• **The plant is operating at full power.** • **The Equipment Operator reported the airline is disconnected from the valve operator of LCV-383-1 and that he has isolated the airline.**

INITIATING CUE: **You are directed to determine the applicable Technical Specification(s) and required actions, if any, to be taken.**

ANSWER:

Tech Spec(s) Entered (If any):

Required Actions with Time Limits(if any):

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-8 Rev. 4

JPM Title: Approve Gas Decay Tank Release

Location: Classroom

Approximate Time: 15 minutes

Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 000000 2.3.6 (SRO Imp: 3.8)
Ability to approve release permits.
OI-WDG-2 Attachment 2, Manual Waste Gas Release
Form FC-213, Waste Gas Decay Tank Release Permit
CH-ODCM-0001, Off-Site Dose Calculation Manual

Handout(s): FC-213, Waste Gas Decay Tank Release Permit
OI-WDG-2 Attachment 2, Manual Waste Gas Release
Form FC-213, Waste Gas Decay Tank Release Permit

FCS Task List #:0738
LP 07-11-31 Obejctive 3.1 (SRO Only)
COMPLETE applicable portions of a dummy FC-213, waste gas release permit, and EXPLAIN the sections that are reviewed by the Shift Supervisor.

Applicable Position(s): SRO

Time Critical: NO

Alternate Path: NO
JPM Prepared by: ______________________________ Date: ___________

JPM Reviewed by: ______________________ Date: __________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-8 Rev. 4

JPM Title: Approve Gas Decay Tank Release

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment:	None
Safety Considerations:	None
Comments:	None

JPM No: A-8 Rev. 4

JPM Title: Approve Gas Decay Tank Release

TASK STANDARD: **The SRO candidate reviewed OI-WDG-2, Waste Gas Disposal System release, Attachment 2, Manual Waste Gas Release, and FC-213, Waste Gas Decay Tank Release Permit, and determined that:**

- **WD-29B, Waste Gas Decay Tank has only been isolated for 25 days vice the required 30 days.**
- **Section V. has the incorrect isolation date, 25-MAR-2014 vice 25-APR-2014.**

The release was not authorized as written.

INITIAL CONDITIONS:

- **The Plant is operating at 100% power**
- **A release of Waste Gas Decay Tank, WD-29 B is scheduled to be completed on your shift.**

INITIATING CUE: **You are the Shift Manager. The EONA has given you a copy of OI-WDG-2, Attachment 2 and a Release Permit for the release of WD-29B. Review the permit and the procedure. If acceptable, authorize the release. If not acceptable, mark up the procedure and or the permit explaining all reasons for not authorizing the release.**

JPM No: A-8 Rev. 4

JPM Title: Approve Gas Decay Tank Release

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Review Release Package.	Applicant reviewed the OI-WDG-2 Attachment 2 and FC-213 Release Permit. [SAT] [UNSAT]
2.	Authorize the release of WD-29B, Waste Gas Decay Tank.	Applicant determined that WD-29B, Waste Gas Decay Tank has only been isolated for 25 days vice the required 30 days. Applicant determined the isolation date in Section V. is incorrect. It should read 25-APR-2014 vice 25-MAR-2014. Applicant **DID NOT** authorize the release of WD-29B. [SAT] [UNSAT]

Termination Criteria: **The SRO candidate reviewed OI-WDG-2, Waste Gas Disposal System release, Attachment 2, Manual Waste Gas Release, and FC-213, Waste Gas Decay Tank Release Permit, and determined that:**

- **WD-29B, Waste Gas Decay Tank has only been isolated for 25 days vice the required 30 days.**
- **Section V. has the incorrect isolation date, 25-MAR-2014 vice 25-APR-2014.**

The release was not authorized as written.

NAME: ___________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:	• **The Plant is operating at 100% power** • **A release of Waste Gas Decay Tank, WD-29 B is scheduled to be completed on your shift.**
INITIATING CUE:	**You are the Shift Manager. The EONA has given you a copy of OI-WDG-2, Attachment 2 and a Release Permit for the release of WD-29B. Review the permit and the procedure. If acceptable, authorize the release. If not acceptable, mark up the procedure and or the permit explaining all reasons for not authorizing the release.**

Attachment 2 - Manual Waste Gas Release

PREREQUISITES (✓) INITIALS

1. Procedure Revision Verification

   Revision Number 26 Date: TODAY

2. Auxiliary Building Ventilation System is in operation per OI-VA-2.

3. One of the following Auxiliary Building Exhaust Stack Noble Gas Radiation Monitors is in operation monitoring the Ventilation Stack per OI-RM-1 (ODCM Section 3.2.2):

   - RM-062 ✓
   - RM-052 ✓

4. Verify one of the four following sets of CRHS/VIAS lockout relays are reset AND amber lights are on:

   a.
      - 86A/CRHS ✓
      - 86A/VIAS ✓

   b.
      - 86A/CRHS ✓
      - CHAN "A" DERIVED SIG CUTOFF SWITCH CS-A1/SP-A IN EMERGENCY STANDBY ✓
      - 86A1/CRHS ✓
      - 86A1/VIAS ✓

   c.
      - 86B/CRHS ✓
      - 86B/VIAS ✓

   d.
      - 86B/CRHS ✓
      - CHAN "B" DERIVED SIG CUTOFF SWITCH CS-B1/SP-B IN EMERGENCY STANDBY ✓
      - 86B1/CRHS ✓
      - 86B1/VIAS ✓

Attachment 2 - Manual Waste Gas Release

PREREQUISITES (continued) (✓) INITIALS

NOTES

1. The radiation monitor is considered inoperable during the Check Source. Remaining stationed at the monitor AND ensuring the monitor returns to normal before leaving the area administratively replaces the log entry.
2. Steps 5.a through 5.c is repeated for RM-052 and RM-062 as required.

5. Perform Check Source on all operational Auxiliary Building Exhaust Stack Noble Gas Radiation Monitors by completing the following:

   a. With the keypad switch in the ON position, record the background reading:

      - RM-052 4.00E+1 cpm
      - RM-062 5.00E+1 cpm DJ

NOTE

The Check Source is only energized for a 2 minute time period.

   b. Depress the CHECK SOURCE pushbutton and verify the meter reading rises above the background reading.

      - RM-052 ✓
      - RM-062 ✓ DB

   c. WHEN the check source deenergizes, THEN verify the meter returns to its background reading.

      - RM-052 ✓
      - RM-062 ✓ DB

6. Verify all operational Auxiliary Building Exhaust Stack Noble Gas Radiation Monitors (RM-062 and/or RM-052) Alert and High Alarm Setpoints are per TBD-IV.7. ______

7. Attachment 4 of OI-WDG-2 has been completed within the previous 90 days. ______

Attachment 2 - Manual Waste Gas Release

PREREQUISITES (continued) (✓) INITIALS

> **NOTE**
> The most recently completed Checklist, OI-WDG-1-CL-B, with deviations maintained on file, may be used for alignment verification.

8. Waste Gas Disposal System is aligned for normal operation per OI-WDG-1-CL-B. ____ SD

9. Verify the following recorders are operable:
   - RR-049A, Process Radiation Monitor Recorder (AI-31E) ✓
   - FR-758, Stack Total Flowrate Recorder (AI-44) ✓
   - FR-532, Waste Gas Release Rate Recorder (AI-100) ✓ ____ SD

10. IF one or more of the recorders is inoperable or a manual release thru the orifice is used,
    THEN take applicable readings per ODCM Section 3.2.1 on FC-213, Gas Discharge Log. ____ N/A SB TODAY

11. Record the maximum release flowrate specified in the Waste Decay Tank Release Permit, FC-213:

    907 SCFH ____ SD

> **NOTE**
> If FIC-532 is in AUTO and the Release Flow Rate exceeds the FIC-532 Setpoint by 30 SCFH, FIC-532 will automatically close Waste Gas Flow Control Valves FCV-532A, FCV-532B, FCV-532C, and the HIGH DEVIATION FROM SET POINT alarm will be displayed on the controller.

> **CAUTION**
> To prevent exceeding the Maximum Release Rate specified in FC-213, the FIC-532 Setpoint should be set at least 30 SCFH below the Maximum Release Rate.

12. Record the recommended release flowrate:

    877 SCFH ____ SD

Attachment 2 - Manual Waste Gas Release

PREREQUISITES (continued) (✓) INITIALS

13. At least one of the following conditions is met:

- Condenser Evacuation is in service per OI-CE-1
- VA-412, Condenser Evacuation Stack Discharge Isolation Valve, is closed

14. Authorization has been given to perform a Waste Gas Decay Tank Release. ________ Shift Mgr

PROCEDURE (✓) INITIALS

NOTE
The following steps are located in the Auxiliary Building or as designated.

1. Record the following information:

   Permit No. ________________

   WGDT to be released:

   - WD-29A ___
   - WD-29B ___
   - WD-29C ___
   - WD-29D ___ ________

2. Complete Checklist OI-WDG-2-CL-A. ________

3. Verify the following:

   - Flow Orifice is installed upstream of WD-165 (Room 16) ___
   - Diameter of the Flow Orifice matches the Release Permit requirement ___ ________

4. Record the Installed Orifice Diameter:

   ________________ inches ________

Attachment 2 - Manual Waste Gas Release

PROCEDURE (continued) (✓) INITIALS

5. Unlock and open the following Gas Release Header Isol Valves (Rm 16):

- WD-150, Waste Gas Decay Tanks WD-29A, B, C & D Gas Release Header Isolation Valve ___
- WD-167, Waste Gas Decay Tanks WD-29A, B, C & D Gas Release Header Isolation Vlv ___ ________

6. Open WD-165, Gas Release Header Bypass Isolation Valve (Rm 16). ________

7. IF FIC-532, Flow indicating Controller Temp and Press Compen, is operable, THEN place FR-532, Waste Gas Release Flow Recorder, Chart Drive Switch in ON. ________

NOTES

1. When FIC-532 is in MANUAL, the set point indication will automatically track the Process Variable to ensure a bumpless transfer.
2. If unable to switch FIC-532 to manual, the following step will be N/A.

8. Ensure FIC-532 is as follows (AI-100):

- In MANUAL (Display indicates ME) ___
- Zero Output is indicated on the Bar Graph and digital displays ___ ________

Attachment 2 - Manual Waste Gas Release

PROCEDURE (continued) (✓) INITIALS

NOTE

Since there is no flow at this time, A50/A-4, WASTE GAS RELEASE THRU FCV-532C HI-LO Annunciator should alarm when HC-532 is placed in AUTO.

9. Place HC-532, Waste Gas Release Control Switch, in AUTO and verify the following:

- FCV-532C opens (Red Light on) (AI-100) ___
- FCV-532A remains closed (Green Light on) (AI-100) ___
- FCV-532B remains closed (Rm 16) ___ ________

NOTE

If FIC-532 is not functioning properly, the alarm may not occur.

- A50/A-4, WASTE GAS RELEASE THRU FCV-532C HI - LO Annunciator is in alarm (AI-100) ___ ________

NOTE

Step 10 need not be completed prior to performance of subsequent steps.

10. IF FIC-532 is operable AND the flow indication goes to full-scale during the release,
THEN complete the following (AI-100):

- Place HC-532 in CLOSE to immediately terminate the release ___
- Verify flow indicator is over the reference mark, ensuring the magnetic coupling on the flow transmitter was not misaligned during the rapid process change ___
- If not over the reference mark, contact I&C ___ ________

Attachment 2 - Manual Waste Gas Release

PROCEDURE (continued) (✓) INITIALS

11. Record the Date, Start Time and Permit No. on the following:

- RR-049A, Process Radiation Monitor Recorder (AI-31E) ___
- FR-758, Stack Total Flowrate Recorder (AI-44) ___
- IF operable, FR-532, Waste Gas Release Rate Recorder ___
- Control Room Log ___ ________

12. Depress F1 or F2, as necessary, to display TOTAL CU FT on FIC-532 (Refer to Figure 1 for pushbutton location). ________

13. Record Start Data on Table 2. ________

14. Depress F1 or F2, as necessary, to display FIC-532 on FIC-532 (Refer to Figure 1). ________

15. IF FIC-532 is operable,
THEN open the selected WGDT Outlet to Gas Release Header Valve (Rm 16) AND verify Waste Gas flow is indicated on FR-532 and FIC-532.

- WD-132, Gas Decay Tank WD-29A Outlet Valve ___
- WD-143, Gas Decay Tank WD-29B Outlet Valve ___
- WD-163, Gas Decay Tank WD-29C Outlet Valve ___
- WD-177, Gas Decay Tank WD-29D Outlet Valve ___ ________

16. Calculate and log the flow rate every hour as specified on FC-213. ________

17. Commence logging VA-82 Δp readings on Table 1 every 3 hours for the duration of the release. ________

NOTE

When FIC-532 is operable and Waste Gas Flow has decreased to the point where the A50/A-4, WASTE GAS RELEASE THRU FCV-532C HI - LO Annunciator is in alarm, the WGDT pressure will be much greater than that seen for an Automatic Waste Gas Release due to the restricted flow caused by the Flow Orifice.

18. WHEN the selected WGDT has dropped to approximately 2.0 psig or as directed by the Shift Manager,
THEN place HC-532 in CLOSE (AI-100). ________

Attachment 2 - Manual Waste Gas Release

PROCEDURE (continued) (✓) INITIALS

19. Record the Date, Termination Time and Permit No. on the following:

- RR-049A, Process Radiation Monitor Recorder (AI-31E) ___
- FR-758, Stack Total Flowrate Recorder (AI-44) ___
- IF operable, FR-532, Waste Gas Release Rate Recorder ___
- Control Room Log ___ ________

20. Record Stop Data on Table 2. ________

21. Verify the following Gas Release Control Valves closed:

- FCV-532A (AI-100) ___
- FCV-532C (AI-100) ___
- FCV-532B (Rm 16) ___ ________

22. Close the selected WGDT Outlet to Gas Release Header Valve (Rm16):

- WD-132, WD-29A ___
- WD-143, WD-29B ___
- WD-163, WD-29C ___
- WD-177, WD-29D ___ ________

23. Close and lock the following Gas Release Header Isolation Valves (Rm 16):

- WD-150 ___
- WD-167 ___ ________

____
Ind Verif

24. Close WD-165, Gas Release Header Bypass Valve (Rm 16). ________

25. Open the selected WGDT Drain Valve (Rm 16):

- WD-136, Gas Decay Tank WD-29A Drain Valve ___
- WD-149, Gas Decay Tank WD-29B Drain Valve ___
- WD-169, Gas Decay Tank WD-29C Drain Valve ___
- WD-180, Gas Decay Tank WD-29D Drain Valve ___ ________

Attachment 2 - Manual Waste Gas Release

PROCEDURE (continued) (✓) INITIALS

26. Slowly open WD-181, Gas Decay Tanks WD-29A, B, C & D Drain Header Outlet (Rm 16). ________

27. When no water is observed flowing by FI-531, Flow Indicator (Rm 16), close WD-181.

28. Close the selected WGDT Drain Valve (Rm16):

- WD-136, Gas Decay Tank WD-29A Drain Valve ___
- WD-149, Gas Decay Tank WD-29B Drain Valve ___
- WD-169, Gas Decay Tank WD-29C Drain Valve ___
- WD-180, Gas Decay Tank WD-29D Drain Valve ___ ________

29. IF FR-532 is operable or energized,
THEN place FR-532, Waste Gas Release Flow Recorder, Chart Drive Switch in OFF. ________

30. Attach the completed OI-WDG-2 and this attachment to the FC-213. ________

31. Complete FC-213. ________

Completed by________________________________Date/Time________/______

4.2.4B (continued)

2. OPERABLE is defined as follows:

   a. Waste Gas System

      1) The waste airborne radioactive material at Fort Calhoun Station is collected in the vent header where the gas compressors take suction, compress the gas and deliver it to one of the four gas decay tanks. The waste airborne radioactive material is treated in these gas decay tanks by holding for radioactive decay prior to final controlled release to the environs. In order to provide conformance with the dose design objectives, gas decay tanks are normally stored for approximately 30 days and thus achieve decay of short half-life radioactive materials, e.g., I-131, Xe-133. Earlier release is allowed when a plant need exists and analytical results are in accordance with ALARA release objectives. If the radioactive airborne wastes from the gas decay tanks are discharged without processing in accordance with the above conditions, and it is confirmed that one half of the annual dose objective will be exceeded during the calendar quarter, a special report shall be submitted to the Commission pursuant to Section 4.2.4A.

   b. Ventilation Exhaust Systems

      1) The radioactive effluents from the controlled access area of the auxiliary building are filtered by the HEPA filters in the auxiliary building ventilation system. If the radioactive effluents are discharged without the HEPA filters, a special report shall be submitted to the NRC as defined in Action 4.2.4B.2.a above.

      2) The discharge from the gas decay tanks is routed through charcoal and HEPA filter unit VA-82. No credit was taken for the operation of hydrogen purge filters during the 10 CFR Part 50, Appendix I dose design evaluation and doses through the airborne effluent pathways were well below the design objectives. The unavailability of hydrogen purge filters will not be considered a reportable event.

WASTE GAS DECAY TANK RELEASE PERMIT

RELEASE NUMBER: 2014001

"B" WGDT

I. Permit Information:

Issue Date:	Today	Issue Time:	08:59
Sample Date:	Today	Sample Time:	06:16
Isolation Date:	25-APR-2014	Days of Isolation:	31
Preparer:	TEST	Pressure (psig):	91.0

II. Initial Plant Status:

Radiation Monitors/Sampler:

	Gross(cpm)	Bkgd(cpm)	Net(cpm)
RM-062	6.00E+01	5.OOE+01	1.00E+01

* Particulate/Iodine Sample Collection via: RM-062

NOTE - An Aux Bldg Stack Gas Monitor MUST be in operation, or WGDT samples done in accordance with the ODCM.

* NOTE - The monitor in service for gaseous analysis of the Auxiliary Building Stack should be utilized for Particulate/Iodine Sample Collection.

WASTE GAS DECAY TANK RELEASE PERMIT

RELEASE NUMBER: 2014001

"B" WGDT

III. **Gamma Analysis (uCi/cc):**

WGDT Sample 1: 11862		WGDT Sample 2: 11863	
* NSA *		* NSA *	
Total:	0.00E+00	Total:	0.00E+00
AEC Sum:	0.00E+00	AEC Sum:	0.00E+00

Spectrum 11863 will be used for all release calculations.

****
* No Significant Activity *
****

IV. **Projected Release Information at 907 scfh:**

Nuclide	WGDT Conc. (uCi/cc)	Unrestricted Area Conc. (uCi/cc)	AEC Limit (uCi/cc)	UA Fraction	Activity (uCi)

****
* No Significant Activity *
****

Projected Dose Rate Calculations:

	Dose Rate	Limit	% Limit
Total Body (mRem/yr):	0.00E+00	<= 500	0.00
Skin (mRem/yr):	0.00E+00	<=3000	0.00
Total Organ (mRem/yr):	0.00E+00	<=1500	0.00

"NSA" - (No Significant Activity) No identified activity above sample LLD.

WASTE GAS DECAY TANK RELEASE PERMIT

RELEASE NUMBER: 2014001

"B" WGDT

V. Special Instructions:

A. Verify that "B" WGDT was isolated on 25-MAR-2014 per Section I, Permit Information, prior to release. ____/______
Ops

B. Release Flowrate Maximum: 907 scfh MANUAL RELEASE

C. Terminate the Release if Iodine/Particulate sampling is lost and alternate sampling can not be established.

D. Make release using installed orifice of 0.10 inch diameter, with a maximum flow rate capacity at 100 psi of 907.24 scfh.

Remarks: ____

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-9 Rev. 4

JPM Title: Emergency Plan Classification and PARs

Location: Classroom

Approximate Time: 10 minutes Start Time:__________________

End Time:__________________

Actual Time: __________________

Reference(s): K/A 2.4.41 (SRO Imp 4.6)
Knowledge of the emergency action level thresholds and classifications.
EPIP-OSC-1
EPIP-EOF-7

Handout(s): FC-1188 and Eagle Data Sheet

FCS Task List #: 0361
Lesson Plan 10-70-103 Objective 1.8
EXPLAIN how the Three Fission Product Barrier Criteria is used in the classification process.

Applicable Position(s): SRO

Time Critical: YES (15 minutes)

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ____________

JPM Reviewed by: ______________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: A-9 Rev. 4

JPM Title: Emergency Plan Classification and PARs

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

JPM No: A-9 Rev. 4

JPM Title: Emergency Plan Classification and PARs

TASK STANDARD:	**Emergency Plan Classification and PARs completed.**

INITIAL CONDITIONS:	**A 800 gpm steam generator tube rupture has occurred in RC-2A resulting in PPLS actuation. EOP-00 has been completed and EOP-04 has been entered. The MSIV for RC-2A could not be closed. A plant cooldown is being performed using both steam generators. The EAGLE output is attached. The meteorological indications are as follows: • Indicated 10m wind speed – 12 mph, 14 mph • Indicated wind direction – 120°, 128° • Indicated ΔT is -1.0°C/100m, -1.2°C/100m • It is raining, 0.4 inches daily total**

INITIATING CUE:	*******TIME CRITICAL***** You are directed to enter the Emergency Plan, classify the event and determine offsite Protective Action Recommendations. Complete page 1 of form FC-1188.**

JPM No: A-9 Rev. 4

JPM Title: Emergency Plan Classification and PARs

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
1.	Refer to Emergency Plan	Applicant referred to EPIP-OSC-1F. [SAT] [UNSAT]
2.	Classify the event.	*******TIME CRITICAL******* **Form FC-1188 must be filled out within 15 minutes** Applicant classified as a FS1- Site Area, Loss or Potential Loss of ANY Two Barriers, Applicant documented the following on for FC-1188: Fuel Cladding = N/A RCS = EAL 2, Loss Containment = EAL 3 Loss [SAT] [UNSAT]
3.	Determine Protective Action Recommendations.	Applicant referred to EPIP-EOF-7 and determined that there are no PARs for this situation. Applicant documented “None” for 0-2 Miles, 2-5 Miles and 5-10 Miles for PARS on form FC-1188. [SAT] [UNSAT]
4.	Document other items on form FC-1188.	Applicant documented information on FC-1188. • Wind from – 120° - 128° • Wind Speed – 12 mph • Precipitation – Yes • Stability class – D • There is an airborne radioactive release • Prognosis is worsening • Plant is shutdown

STEP	ELEMENT	STANDARD	
		[SAT]	[UNSAT]

Termination Criteria: **Emergency Plan Classification and PARs completed.**

NAME: ________________________________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

INITIAL CONDITIONS:

A 800 gpm steam generator tube rupture has occurred in RC-2A resulting in PPLS actuation. EOP-00 has been completed and EOP-04 has been entered. The MSIV for RC-2A could not be closed. A plant cooldown is being performed using both steam generators.
The EAGLE output is attached.

The meteorological indications are as follows:

- **Indicated 10m wind speed – 12 mph, 14 mph**
- **Indicated wind direction – 120°, 128°**
- **Indicated ΔT is -1.0°C/100m, -1.2°C/100m**
- **It is raining, 0.4 inches daily total**

INITIATING CUE:

*******TIME CRITICAL*******
You are directed to enter the Emergency Plan, classify the event and determine offsite Protective Action Recommendations.

Complete page 1 of form FC-1188.

FORT CALHOUN STATION – EMERGENCY NOTIFICATION FORM

Off-Site Contact Time:	Person Making Off-Site Report:	Contactor's Call Back #:

1. [ ] **Initial Declaration** – for **Initial** declaration of any emergency classification.
   [ ] **Hourly** – **When** completing **Hourly** updates, one hour from time of the most recent event notification and on an hourly basis until event termination.
   [ ] **PAR Change** – **Any** change in Protective Action Recommendations (PARs) and a new classification is not being declared.
   [ ] **Shiftly** during ongoing events **IF** requested by the states **AND** the status of the event has not changed.
   [ ] **Termination** - Requirements of EPIP-OSC-2, Attachment 6.6, must be met.

2. Classification:					3. IC#:	4. EAL#: (If Fission Product Barrier, complete box #6)
[ ] NOUE	[ ] Alert	[ ] Site Area	[ ] General	[ ] None		

REVIEW **EPIP-EOF-7** FOR GUIDANCE ON PARS.

5. Protective Action Recommendations (PARs)

	None	Evacuate Sectors	Shelter Sectors
0-2 Miles			
2-5 Miles			
5-10 Miles			

6. Complete if Fission Product Barrier

Fuel Cladding:
EAL # ________ Loss/ Potential Loss (Circle one)
RCS:
EAL # ________ Loss / Potential Loss (Circle one)
Containment:
EAL# ________ Loss / Potential Loss (Circle one)

7. Time PAR information given: _________ (**This time is to be filled out by the Person Making Off-Site Report**.)

8. Time Event Declared:	9. Time Event Terminated:	10. Prognosis [ ] Stable [ ] Worsening	11. Plant Status [ ] At Power [ ] Shutdown

OBTAIN METEOROLOGICAL DATA FROM **ERF PAGE 197** (see Note 1 on page 2, if ERFCS is unavailable)

12. Wind From Degrees(10m):	13. Wind Speed MPH (Use Slowest 10m):	14. Precipitation: [ ] Yes [ ] No

15. Temperature Difference ________ °C/100m (use most positive ΔT)

16. Stability Class	-[ ] A ≤ -1.9	[ ] B >-1.9 to ≤ -1.7	[ ] C > -1.7 to ≤ -1.5	[ ] D > -1.5 to ≤ -0.5	[ ] E > -0.5 to ≤ 1.5	[ ] F > 1.5 to ≤ 4.0	[ ] G+ > 4.0

17. There	[ ] is [ ] was [ ] will be	[ ] no [ ] an airborne [ ] a liquid	release of radioactive effluent to the environment that is the result of or associated with this event

18. Remarks

Approved:	Date:	Time:

CONFIRMED TIME (COUNTY USE ONLY) _________

ENSURE that PAR information is given to the group within 15 minutes of event declaration, **DO NOT** delay relaying information if all members have not answered the COP.

ENSURE the following agencies are notified.

CONTACT any agency that has not answered the COP by using the number or alternate number listed in the Emergency Phone Book, after relaying the information contained on this form to the agencies that did answer the COP.

Notify the following agencies: (refer to Emergency Phone Book for alternate phone numbers)	✓	Name of contact (optional)
State of Iowa		
State of Nebraska		
Harrison County		
Pottawattamie County		
Washington County		

Record any comments, difficulties or observations you had while making this notification:

i	**NOTE** If on-site meteorological data is not available, contact the National Weather Service (number in the Emergency Phone Book), and request wind speed and direction. For night time (sunset to sunrise), use a Δ T of +2.0 and a stability class F. For all other conditions, use a Δ T of -1.0 and a stability class D.	i

CONFIRMED TIME (COUNTY USE ONLY) _________

PAR WORK SHEET
TRAINING

Eagle Version: 6.0 Page: 1 of 1
User ID: LOCAL Date: Today 2014
Plume Segment No: 1 Transmittal Time: 10:30:30 Time: 10:30:30 AM

---

1. Location: ( ) CONTAINMENT (X) STACK ( ) CDSR/M STM ( ) RW BLD
2. ESTIMATED RELEASE DURATION: 4.000
3. QUANTITY AND RATE:
   8.21 E+00 CURIES NOBLE GAS AT 3.42 E-02 CURIES/SECOND
   5.75 E-02 CURIES IODINE AT 2.40 E-04 CURIES/SECOND
   0.00 E+00 CURIES PARTICULATE AT 0.00 E-00 CURIES/SECOND

4. CORE STATUS: UNDAMAGED
5. METEOROLOGICAL:
   ATMOSPHERIC MIXING CONDITION: UNLIMITED
   WIND SPEED 12(MPH) WIND DIRECTION: FROM 120 (DEG)
   DELTA T: -1.0(DEG) AMBIENT TEMP: 8 (DEG C)
   VERT. STABILITY: D

6. Affected Sectors: P, Q

7.

	A. PROJECTED DOSE RATE (REM/HR)		B. PROJECTED INTEGRATED DOSE (REM)	
	TEDE	CDE	TEDE	CDE
SITE BOUNDARY:	4.47 E-04	6.38 E-03	1.79 E-03	2.55 E-02
AT 2 MILES:	1.02 E-04	1.45 E-03	4.09 E-04	5.79 E-03
AT 5 MILES:	0.00 E+00	3.74 E-04	1.07 E-04	1.50 E-03
AT 10 MILES:	0.00 E+00	1.34 E-04	0.00 E+00	5.35 E-04

Notes: 1. Calculated using the Straightline Gaussian Model.
2. Doses/Rates < 1E-4 are displayed as zero.
3. Red indicates Action Required.

Reviewed by: ______________________________

Path	Monitor Name	Value	Unit	Flow Rate
Aux Building Stack	RM-063	1.00 E-03	uCi/cc	72500

Iodine Ratio: 7.00 E-03 Particulate Ratio: 0.00 E+00

KEY

FORT CALHOUN STATION – EMERGENCY NOTIFICATION FORM

Off-Site Contact Time:	Person Making Off-Site Report:	Contactor's Call Back #:

1. [ ] **Initial Declaration –** for **Initial** declaration of any emergency classification.
   [ ] **Hourly – When** completing **Hourly** updates, one hour from time of the most recent event notification and on an hourly basis until event termination.
   [ ] **PAR Change – Any** change in Protective Action Recommendations (PARs) and a new classification is not being declared.
   [ ] **Shiftly** during ongoing events **IF** requested by the states **AND** the status of the event has not changed.
   [ ] **Termination** - Requirements of EPIP-OSC-2, Attachment 6.6, must be met.

2. Classification:					3. IC#:	4. EAL#: (If Fission Product Barrier, complete box #6)
[ ] NOUE	[ ] Alert	[X] Site Area	[ ] General	[ ] None	FS-1	

REVIEW **EPIP-EOF-7** FOR GUIDANCE ON PARS.

5. Protective Action Recommendations (PARs)

	None	Evacuate Sectors	Shelter Sectors
0-2 Miles	X		
2-5 Miles	X		
5-10 Miles	X		

6. Complete if Fission Product Barrier

Fuel Cladding:
EAL # N/A Loss/ Potential Loss (Circle one)

RCS:
EAL # 2 Loss / Potential Loss (Circle one)

Containment:
EAL# 3 Loss / Potential Loss (Circle one)

7. Time PAR information given: _________ (**This time is to be filled out by the Person Making Off-Site Report.**)

8. Time Event Declared:	9. Time Event Terminated:	10. Prognosis	11. Plant Status
Time		[ ] Stable [X] Worsening	[ ] At Power [X] Shutdown

OBTAIN METEOROLOGICAL DATA FROM **ERF PAGE 197** (see Note 1 on page 2, if ERFCS is unavailable)

12. Wind From Degrees(10m):	13. Wind Speed MPH (Use Slowest 10m):	14. Precipitation:
120	12	[X] Yes [ ] No

15. Temperature Difference -1.0 °C/100m (use most positive ΔT)

16. Stability Class	-[ ] A	[ ] B	[ ] C	[X] D	[ ] E	[ ] F	[ ] G+
	≤ -1.9	>-1.9 to ≤ -1.7	> -1.7 to ≤ -1.5	> -1.5 to ≤ -0.5	> -0.5 to ≤ 1.5	> 1.5 to ≤ 4.0	> 4.0

17. There	[X] is [ ] was [ ] will be	[ ] no [X] an airborne [ ] a liquid	release of radioactive effluent to the environment that is the result of or associated with this event

18. Remarks

Approved: Shift Manager	Date: Today	Time: Now

CONFIRMED TIME (COUNTY USE ONLY) _________

Facility: __Fort Calhoun_____________________ Date of Examination: 5/19/2014
Exam Level: **RO** Revision Number.: 0

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
S-1. Emergency Boration from the Control Room K/A 004000 A4.01 (3.9/3.7)	A,C,D	1
S-2. Establish Charging Flow via the HPSI Header K/A 006000 A4.08 (34.0/3.8)	C,D	2
S-3 Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (3.7/3.5)	A,C,M	3
S-4. Rotation of Shutdown Cooling Pumps K/A 005000 A4.01 (3.6/3.4)	C, N, L,A	4P
S-5 Raw Water Pipe Rupture K/A 076000 A2.01 (3.5/3.7)	C, M	4S
S-6 Operate Containment Hydrogen Analyzer K/A 028000 A1.01 (3.4/3.8)	C, E, EN	5
S-7 Restoration of Offsite Electrical Power Bus 1A4 & DG-2 K/A 064000 A4.07 (3.4/3.4)	C, A	6
S-8. Verify Radiation Monitor Operation using Check Source K/A 073000 A4.03 (3.1/3.2)	C,D	7

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

P-1 Energize 480v bus from 13.8 kv K/A 000055 EA1.07 (4.3/4.5)	EN,	6
P-2 Initiate Air Compressor Backup Cooling K/A 078000 2.1.23 (2.6/2.9)	E, M	8
P-3 Perform Concentrated Boric Acid Batching K/A 004000 A4.04 (3.2/3.6)	R, N, A	1
P-4 (Spare) Emergency Start of the Diesel Fire Pump	A	8

@	All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility: Fort Calhoun	Date of Examination: 5/19/2014
Exam Level: **ISRO**	Revision Number.: 0

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title	Type Code*	Safety Function
S-1. Emergency Boration from the Control Room K/A 004000 A4.07 (3.9/3.7)	A,C,D	1
S-2. Establish Charging Flow via the HPSI Header K/A 006000 A4.08 (34.0/3.8)	C,D	2
S-3 Reduce RCS Pressure using Auxiliary Spray K/A 010000 A4.01 (3.7/3.5)	A,C,M	3
S-4. Rotation of Shutdown Cooling Pumps K/A 005000 A4.01 (3.6/3.4)	C, N, L, A	4P
S-5 Raw Water Pipe Rupture K/A 076000 A2.01 (3.5/3.7)	C, M	4S
S-6 Operate Containment Hydrogen Analyzer K/A 028000 A1.01 (3.4/3.8)	C, E, EN	5
S-7 Restoration of Offsite Electrical Power Bus 1A4 & DG-2 K/A 064000 A4.07 (3.4/3.4)	C, A	6

In-Plant Systems@ (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)

P-1 Energize 480v bus from 13.8 kv K/A 000055 EA1.07 (4.3/4.5)	EN,	6
P-2 Initiate Air Compressor Backup Cooling K/A 078000 K1.04 (2.6/2.9)	E, M	8
P-3 Perform Concentrated Boric Acid Batching K/A 004000 A4.04 (3.2/3.6)	R, N, A	1
P-4 (Spare) Emergency Start of the Diesel Fire Pump	A	8

@	All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-1 Rev. 12

JPM Title: Emergency Boration from the Control Room (Alternate Path)

Location: Simulator

Approximate Time: 5 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A 004, A2.14 Emergency Boration (RO 3.8/SRO 3.9) **Ability to (a) predict the impacts of the following malfunctions or operations on the CVCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations**: **(CFR: 41.5 / 43/5 / 45/3 / 45/5)**

AOP-03

Handout(s): AOP-03 Emergency Boration

Task List #: 0008
Lesson Plan # 07-11-02 EO EXPLAIN the flowpath for emergency boration of the Reactor Coolant System.

Applicable Position(s): RO/SRO

Time Critical: NO

Alternate Path: YES

JPM Prepared by: ________________________________ Date: ____________

JPM Reviewed by: ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-1 Rev. 12

JPM Title: Emergency Boration from the Control Room (Alternate Path)

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

Simulator Setup

- **Ensure the Count Rate Meter is on the lowest setting and highest volume that will provide obvious indication of the event.**

INSERT: malfunction to keep HCV-268, 265, 258 closed.					
Type	**Filter**	**Item**	**Value**	**Ramp**	**Delay**
VLV	CVC	CVC_HCV268	0.0	none	none
VLV	CVC	CVC_HCV265	0.0	none	none
VLV	CVC	CVC_HCV258	0.0	none	none
Pending: Dilution Event					

JPM No: S-1 Rev. 12

JPM Title: Emergency Boration from the Control Room (Alternate Path)

TASK STANDARD: **Emergency Boration has been established.**

INITIAL CONDITIONS:

- **Plant is in Mode 3.**
- **BOPO is out of the Control Room.**
- **EONA has recently placed CH-8A in service and removed CH-8B.**
- **EONA is making preparations to place the SIRWT Purification in service.**

INITIATING CUE: **You are the ATCO; perform all actions as directed by the CRS or in accordance with procedures.**

JPM No: S-1 Rev. 12

JPM Title: Emergency Boration from the Control Room (Alternate Path)

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
Note to Evaluator; **A Dilution Event will cause the Audible Count Rate Meter and the Start Up Rate on CB-4 to rise. AOP-3, Emergency Boration entry is required. The Applicant should announce that count rate is raising and enter AOP-3 to emergency borate.**		
	Applicant recognizes SUR and or the Audio Count Rate Meter is rising.	Applicant recognized that the Audio Count Rate and or the SUR is rising and made announcement. After announcement is made; **CUE: CRS Acknowledged.** [SAT] [UNSAT]
AOP-03 Step 1.	Secure all positive reactivity additions in progress: • CEA withdrawals • RCS dilutions	**Note to Evaluator;** **After Applicant locates AOP-3, Provide a copy of AOP-3 with Step 1 completed.** [SAT] [UNSAT]
AOP-03 Step 2.	**IF BOTH** of the following conditions exist: • BAST level(s) greater than 10% • BAST(s) available	**(CB-1,2,3)** Applicant verified the BASTs are available. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-03 Step 2.a.	Ensure both of the following are closed: • FCV-269X, Demin Water Makeup Valve • FCV-269Y, Boric Acid Makeup Valve	**(CB-4)** Applicant ensured both valves are closed. Green light on. Red light off. [SAT] [UNSAT]
AOP-03 Step 2.b	Open ALL of the following valves: • HCV-268, Boric Acid Pump Header to Charging Pumps Isolation Valve • HCV-265, CH-11A Gravity Feed Valve • HCV-258, CH-11B Gravity Feed Valve	**(CB-4)** Applicant took HCV-268 control switch to Open and recognized the valve did not open. **NO Light is On.** Applicant took HCV-265 control switch to Open and recognized the valve did not open. **NO Light is On.** Applicant took HCV-258 control switch to Open and recognized the valve did not open. **NO Light is On.** Applicant recognized the valves did not open. If EONA is contacted; **CUE: EONA does not respond.** **<u>ALTERNATE PATH</u>** **Note to Evaluator;** **The BAST's are not available. The Applicant may announce the valves not opening to the CRS.** If CRS is informed; **CUE: CRS Acknowledged** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-03 Step 2.b.1.	**(LOCAL) IF** HCV-268 did **NOT** open, **THEN** perform the following (Corridor 26): 1) Open MCC-3C2-C02, "EMERGENCY BORATION MOV HCV-268". 2) Manually open HCV-268, "CHARGING PUMPS CH-1A, B, C EMERGENCY SUCTION HEADER STOP VALVE".	**(Local)** Applicant calls for the EONA to perform Local Actions to open MCC-3C2-CO2 and Manually open HCV-268. After Applicant calls for the EONA; **CUE: EONA does not respond.** Applicant N/A'd the remaining steps in Step 2 and proceeded to Step 3. [SAT] [UNSAT]
AOP-03 Step 3.	**IF** at least **ONE** of the following conditions exist: • BAST levels are less than or equal to 10% • BASTs are **NOT** available	**(CB-1,2,3)** Applicant confirmed the BASTs are not available due to HCV-268,265 and HCV-258 did not open and the EONA is not responding. [SAT] [UNSAT]
AOP-03 Step 3.a.	**THEN** align Charging Pump suction to the SIRWT by performing the following: a. Verify SIRWT has greater than 86 inches of Borated Water available.	**(AI-30A/B)** Applicant verified SIRWT is >86" water level. [SAT] [UNSAT]
AOP-03 Step 3.b.	Open LCV-218-3, Charging Pump Suction SIRWT Isolation Valve.	**(CB-1,2,3)** Applicant opened LCV-218-3. Red light on. Green light off. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-03 Step 3.c.	Close LCV-218-2, VCT Outlet Valve.	**(CB-1,2,3)** Applicant closed LCV-218-2. Green light on. Red light off. [SAT] [UNSAT]
AOP-03 Step 3.d.	Ensure **ALL** of the following Charging Isolation Valves are open: • HCV-247 • HCV-238 • HCV-248 • HCV-239	**(CB-1,2,3)** **NOTE to Evaluator;** **These valves should have already been open.** Applicant ensured ALL of the Charging Isolation Valves are open. Red light on. Green light off. [SAT] [UNSAT]
AOP-03 Step 3.e.	Start all available Charging Pumps, CH-1A/B/C.	**(CB-1,2,3)** Applicant started all available Charging Pumps. **NOTE to Evaluator;** **Unless the Applicant adjusts the Letdown bias for 3 charging pumps running, two will eventually trip on high Pzr level. One will remain running providing emergency boration.** [SAT] [UNSAT]
AOP-03 Step 3.f.	Stop both Boric Acid Pumps, CH-4A/B.	**(CB-4)** Applicant stopped CH-4A/B. **NOTE to Evaluator; These pumps may have already been stopped or have been running in recirculation.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-03 Step 3.g.	Close **ALL** of the following valves: • HCV-268, Boric Acid Pump Header to Charging Pumps Isolation Valve • HCV-265, CH-11A Gravity Feed Valve • HCV-258, CH-11B Gravity Feed Valve	**(CB-4)** Applicant closed HCV-268, 265 and HCV-258. **NOTE to Evaluator; These valves may have already been closed.** **STOP, JPM is finished.** [SAT] [UNSAT]

Termination Criteria: **Emergency Boration has been established.**

INITIAL CONDITIONS:

- **Plant is in Mode 3.**
- **BOPO is out of the Control Room.**
- **EONA has recently placed CH-8A in service and removed CH-8B.**
- **EONA is making preparations to place the SIRWT Purification in service.**

INITIATING CUE: **You are the ATCO; perform all actions as directed by the CRS or in accordance with procedures.**

4.0 INSTRUCTIONS/CONTINGENCY ACTIONS

INSTRUCTIONS | CONTINGENCY ACTIONS

1. Secure all positive reactivity additions in progress:
   - CEA withdrawals
   - RCS dilutions

2. **IF BOTH** of the following conditions exist:
   - BAST level(s) greater than 10%
   - BAST(s) available

   THEN commence Emergency Boration from the Boric Acid Tanks, CH-11A/B, by performing the following:

   a. Ensure **BOTH** of the following valves are closed:
      - FCV-269X, Demin Water Makeup Valve
      - FCV-269Y, Boric Acid Makeup Valve

(continue)

INSTRUCTIONS

2. (continued)

b. Open **ALL** of the following valves:

- HCV-268, Boric Acid Pump Header to Charging Pumps Isolation Valve
- HCV-265, CH-11A Gravity Feed Valve
- HCV-258, CH-11B Gravity Feed Valve

(continue)

CONTINGENCY ACTIONS

b.1 **(LOCAL) IF** HCV-268 did **NOT** open,
THEN perform the following (Corridor 26):

1) Open MCC-3C2-C02, "EMERGENCY BORATION MOV HCV-268".

2) Manually open HCV-268, "CHARGING PUMPS CH-1A, B, C EMERGENCY SUCTION HEADER STOP VALVE".

INSTRUCTIONS

2. (continued)

c. Ensure **ALL** of the following Charging Isolation Valves are open:

- HCV-247
- HCV-238
- HCV-248
- HCV-239

(continue)

CONTINGENCY ACTIONS

c.1 **IF** the Charging Header discharge is **NOT** available, **THEN** perform the following:

1) Open **ALL** of the following valves to charge via the HPSI Header:

- HCV-308, Charging Pump HPSI Header Isolation Valve
- HCV-2987, HPSI Header Isolation Valve
- HCV-315, HPSI Loop Injection Valve
- HCV-318, HPSI Loop Injection Valve
- HCV-312, HPSI Loop Injection Valve
- HCV-321, HPSI Loop Injection Valve

2) Ensure the following are open:

- HCV-307, HPSI Header Isolation Valve
- HCV-306, HPSI Header Isolation Valve
- HCV-304, SI-2B and SI-2C Discharge Cross-Connect Valve
- HCV-305, SI-2A and SI-2C Discharge Cross-Connect Valve

INSTRUCTIONS | CONTINGENCY ACTIONS

2. (continued)

d. Start **ALL** of the following pumps:

1) Boric Acid Pumps, CH-4A/B

2) Charging Pumps, CH-1A/B/C

e. Close LCV-218-2, VCT Outlet Valve.

f. Ensure **ALL** of the following valves are closed:

- LCV-218-3, Charging Pump Suction SIRWT Isolation Valve
- HCV-257, CH-4B Recirc Valve
- HCV-264, CH-4A Recirc Valve

INSTRUCTIONS | CONTINGENCY ACTIONS

3. **IF** at least **ONE** of the following conditions exist:

- BAST levels are less than or equal to 10%
- BASTs are **NOT** available

THEN align Charging Pump suction to the SIRWT by performing the following:

a. Verify SIRWT has greater than 86 inches of Borated Water available.

b. Open LCV-218-3, Charging Pump Suction SIRWT Isolation Valve.

c. Close LCV-218-2, VCT Outlet Valve.

(continue)

INSTRUCTIONS

3. (continued)

d. Ensure **ALL** of the following Charging Isolation Valves are open:

- HCV-247
- HCV-238
- HCV-248
- HCV-239

(continue)

CONTINGENCY ACTIONS

d.1 **IF** the Charging Header discharge is **NOT** available,
THEN perform the following:

1) Open **ALL** of the following valves to charge via the HPSI Header:

- HCV-308, Charging Pump HPSI Header Isolation Valve
- HCV-2987, HPSI Header Isolation Valve
- HCV-315, HPSI Loop Injection Valve
- HCV-318, HPSI Loop Injection Valve
- HCV-312, HPSI Loop Injection Valve
- HCV-321, HPSI Loop Injection Valve

2) Ensure the following are open:

- HCV-307, HPSI Header Isolation Valve
- HCV-306, HPSI Header Isolation Valve
- HCV-304, SI-2B and SI-2C Discharge Cross-Connect Valve
- HCV-305, SI-2A and SI-2C Discharge Cross-Connect Valve

INSTRUCTIONS

3. (continued)

e. Start all available Charging Pumps, CH-1A/B/C.

f. Stop both Boric Acid Pumps, CH-4A/B.

g. Close **ALL** of the following valves:

- HCV-268, Boric Acid Pump Header to Charging Pumps Isolation Valve
- HCV-265, CH-11A Gravity Feed Valve
- HCV-258, CH-11B Gravity Feed Valve

CONTINGENCY ACTIONS

g.1 **(LOCAL) IF** opened locally, **THEN** manually close HCV-268, "CHARGING PUMPS CH-1A, B, C EMERGENCY SUCTION HEADER STOP VALVE" (Corridor 26).

Fort Calhoun Station – Operations Training

JOB PERFORMANCE MEASURE

JPM No: S-2 Rev 3

JPM Title: Establish Charging Flow via the HPSI Header

Location: Simulator

Approximate Time: 12 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A# 004 A4.08 Charging (RO 3.8/SRO 3.4)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

AOP-33, Attachment B, "CHARGING FROM THE HPSI HEADER."

Handout(s): AOP-33, Attachment B, "CHARGING FROM THE HPSI HEADER."

Task List #: MTL 1390
Lesson Plan # 07-17-33 EO DESCRIBE the major recovery actions of this AOP.
Applicable Position(s)

Time Critical: NO

Alternate Path: NO

JPM Prepared by: _______________________________ Date: ___________

JPM Approved by _______________________________ Date: ___________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-2 Rev 3

JPM Title: Establish Charging Flow via the HPSI Header

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

Simulator Setup: Charging and Letdown is secured. All charging pumps are in PTL. HCV-238, 239, 240 and HCV-249 are all closed. CH-194 is closed.

INSERT: CH-194 closed. Requires charging to the HPSI header.					
Type	**Filter**	**Item**	**Value**	**Ramp**	**Delay**
Rem	CVC	REM_CVC_CH194	0	none	none

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-2 Rev 3

JPM Title: Establish Charging Flow via the HPSI Header

TASK STANDARD:	**Charging flow to the RCS using the Loop 2A High Pressure Safety Injection (HPSI) header has been established.**
INITIAL CONDITIONS:	• **The plant is operating at full power.** • **AOP-22, Section I was entered due to a RCS leak inside Containment.** • **The leak was isolated by securing Charging and Letdown.**
INITIATING CUE:	**You are the ATCO and have been directed to reestablish charging pump flow via the HPSI header using HPSI loop 2A injection valve, HCV-318, per AOP-33, Attachment B.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
AOP-33 Att. B	Applicant reads NOTE prior to Step 1.	Applicant read NOTE. [SAT] [UNSAT]
AOP-33 Att. B Step 1.	Ensure all Charging Pumps in PULL-TO-Lock	**(CB-1,2,3)** Applicant ensured all Charging Pump Control Switches in Pull-To-Lock for CH-1A, CH-1B and CH-1C. [SAT] [UNSAT]
AOP-33 Att. B Step 2.	Unlock and close CH-194, "CHARGING PUMPS CH- 1 A/B/C DISCHARGE HEADER CONTAINMENT OUTBOARD ISOLATION VALVE" (Room 13).	**(EONA action)** Applicant directed EONA to close CH-194. After Applicant directed EONA to close CH-194; **CUE: EONA reports that CH-194 is closed.** [SAT] [UNSAT]
AOP-33 Att. B Step 3.	Open HCV-308, Charging Pump HPSI Header Isolation Valve.	**(CB-1,2,3)** Applicant held HCV-308 Control Switch in OPEN until GREEN light goes OFF and Red light is ON, then released and allowed it to return to NORM. Applicant verified RED light ON and GREEN light OFF. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-33 Att. B Step 4.	Ensure ALL of the following valves are open: • HCV-2987, HPSI Header Isolation Valve • HCV-307, HPSI Header Isolation Valve • HCV-305, SI-2A and SI-2C Discharge Cross-Connect Valve • HCV-304, SI-2B and SI-2C Discharge Cross-Connect Valve • HCV-306, HPSI Header Isolation Valve	Applicant ensured all of the following valves were open: **(AI-30A-ESF)** HCV-2987 has been opened. RED light ON / GREEN light OFF. **(AI-30B-ESF)** HCV-307 has been opened. RED light ON / GREEN light OFF. **(AI-30B-ESF)** HCV-305 has been opened. RED light ON / GREEN light OFF. **(AI-30A-ESF)** HCV-304 has been opened. RED light ON / GREEN light OFF. **(AI-30A-ESF)** HCV-306 has been opened. RED light ON / GREEN light OFF. [SAT] [UNSAT]
AOP-33 Att. B Step 5.b.c.	Open HCV-318 (Loop 2A) by performing the following: 1) Rotate thumbwheel for PCV-2949, “LEAKAGE CLR SI-4C DISCH VLV CNTRLR fully clockwise to close “C”.	**(AI-30A)** Applicant rotated PCV-2949 Controller fully clockwise such that needle indicated 100%. GREEN light ON / RED light OFF. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-33 Att. B Step 5.b.c.	2) Place PCV-2949 “Leakage CLR SI-4C DISCHARGE VALVE CNTRLR” in “MANUAL”	**(AI-30A)** Applicant placed PCV-2949 Control Switch in “MANUAL” position. Amber light off. [SAT] [UNSAT]
AOP-33 Att. B Step 5.b.c.	3) Open HCV-318, “LOOP 2A HPSI INJECTION VALVE”	**(AI-30B)** Applicant moved HCV-318 Control Switch to OPEN position. RED light ON / GREEN light OFF. **Note to Evaluator**: Applicant may also PULLOUT switch, but not required. [SAT] [UNSAT]
AOP-33 Att. B	Applicant reads NOTE prior to Step 6.	Applicant read NOTE. [SAT] [UNSAT]
AOP-33 Att. B Step 6.	Ensure a charging pump suction source is available.	**(CB-1,2,3)** **Note to Examiner;** **The SIRWT is not used for remaining at power.** Applicant ensured LCV-218-2 was open. RED light ON and VCT level indicated on chart or indicator. **(VCT)** [SAT] [UNSAT]
	Applicant reads NOTE prior to Step 7.	Applicant read NOTE. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-33 Att. B Step 7	Operate any available Charging Pumps as necessary to maintain PZR level within 4% of programmed level.	**(CB-1,2,3)** Applicant started at least one charging pump, CH-1A/B/C by taking control switch out of Pull-To-Lock and taking it to AFTER-START. RED light ON. If needed; **CUE: CRS acknowledged.** Then, applicant verified normal single pump flow of ~40gpm either on HPSI flow indicators for Loop 2A or on ERF (Page 323). **Note to Evaluator;** Charging flow is difficult to see on the HPSI flow indicators. Applicant maintained PZR level within 4% of programed level. (60% ± 4%) [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **Charging flow to the RCS using the Loop 2A High Pressure Safety Injection (HPSI) header has been established.**

INITIAL CONDITIONS:	• **The plant is operating at full power.** • **AOP-22, Section I was entered due to a RCS leak inside Containment.** • **The leak was isolated by securing Charging and Letdown.**

INITIATING CUE:	**You are the ATCO and have been directed to reestablish charging pump flow via the HPSI header using HPSI loop 2A injection valve, HCV-318, per AOP-33, Attachment B.**

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

Charging through the HPSI Header will result in the addition of approximately 100 gallons of water at refueling boron concentration into the RCS.

1. Ensure all Charging Pumps are in "PULL-TO-LOCK".

2. Unlock and close CH-194, "CHARGING PUMPS CH-1A/B/C DISCHARGE HEADER CONTAINMENT OUTBOARD ISOLATION VALVE" (Room 13).

3. Open HCV-308, Charging Pump HPSI Header Isolation Valve.

4. Ensure **ALL** of the following valves are open:

   - HCV-2987, HPSI Header Isolation Valve
   - HCV-307, HPSI Header Isolation Valve
   - HCV-305, SI-2A and SI-2C Discharge Cross-Connect Valve
   - HCV-304, SI-2B and SI-2C Discharge Cross-Connect Valve
   - HCV-306, HPSI Header Isolation Valve

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS	CONTINGENCY ACTIONS

5. Open at least **ONE** of the following HPSI Loop Injection Valves:

   a. Open HCV-312 (Loop 1B) by performing the following:

      1) Rotate thumbwheel for PCV-2909, "LEAKAGE CLR SI-4A DISCH VLV CNTRLR" fully clockwise to close "C".

      2) Place PCV-2909, "LEAKAGE CLR SI-4A DISCHARGE VALVE" in "MANUAL".

      3) Open HCV-312, "LOOP 1B HPSI INJECTION VALVE".

   b. Open HCV-315 (Loop 1A) by performing the following:

      1) Rotate thumbwheel for PCV-2929, "LEAKAGE CLR SI-4B DISCH VLV CNTRLR" fully clockwise to close "C".

(continue)

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS | CONTINGENCY ACTIONS

5.b (continued)

2) Place PCV-2929, "LEAKAGE CLR SI-4B DISCHARGE VALVE" in "MANUAL".

3) Open HCV-315, "LOOP 1A HPSI INJECTION VALVE".

c. Open HCV-318 (Loop 2A) by performing the following:

1) Rotate thumbwheel for PCV-2949, "LEAKAGE CLR SI-4C DISCH VLV CNTRLR" fully clockwise to close "C".

2) Place PCV-2949, "LEAKAGE CLR SI-4C DISCHARGE VALVE" in "MANUAL".

3) Open HCV-318, "LOOP 2A HPSI INJECTION VALVE".

(continue)

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS | CONTINGENCY ACTIONS

5. (continued)

d. Open HCV-321 (Loop 2B) by performing the following:

1) Rotate thumbwheel for PCV-2969, "LEAKAGE CLR SI-4D DISCH VLV CNTRLR" fully clockwise to close "C".

2) Place PCV-2969, "LEAKAGE CLR SI-4D DISCHARGE VALVE" in "MANUAL".

3) Open HCV-321, "LOOP 2B HPSI INJECTION VALVE".

NOTE

Using the SIRWT as a suction source will inject water with refueling boron concentration into the RCS.

6. Ensure a charging pump suction source is available.

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS / CONTINGENCY ACTIONS

NOTE

Charging flow can be verified on the associated HPSI flow indicator(s) for the HPSI Loop Valve(s) in use, or on ERF (Page 323).

7. Operate any available Charging Pumps as necessary to maintain PZR level within 4% of programmed level.

8. **IF** Charging Header repairs are possible with the Plant in its current operating mode,
THEN direct Maintenance to repair leak.

8.1 **IF** Charging Header repairs are **NOT** possible with the Plant in its current operating mode,
THEN place the Plant in desired mode PER **ONE** of the following procedures:

- AOP-05, Emergency Shutdown
- OP-4, Load Change and Normal Power Operations

9. **WHEN** the Charging Header has been repaired,
THEN return the CVCS to normal operation PER OI-CH-1, Startup of Charging and Letdown.

Attachment B

Charging Via the HPSI Header

INSTRUCTIONS	CONTINGENCY ACTIONS
10. **WHEN** the CVCS has been returned to normal, **THEN** IMPLEMENT Attachment E, HPSI Piping Flush, to flush all safety injection piping used in this procedure.	
11. **WHEN** HPSI piping flush is completed, **THEN** GO TO Section 5.0, Exit Conditions.	

End of Attachment B

Attachment C

Charging Via the HPSI Header Using Only CH-1C

INSTRUCTIONS | CONTINGENCY ACTIONS

NOTE

Charging flow can be verified on the associated HPSI flow indicator(s) for the HPSI Loop Valve(s) in use, or on ERF (Page 323).

1. Ensure all Charging Pumps are in "PULL-TO-LOCK".

2. Unlock and close **BOTH** of the following valves:

   - CH-194, "CHARGING PUMPS CH-1A/B/C DISCHARGE HEADER CONTAINMENT OUTBOARD ISOLATION VALVE" (Room 13)

   - CH-191, "CHARGING PUMPS CH-1A & B DISCHARGE HEADER TO SAFETY INJECTION ISOLATION VLV." (Charging Pump Valve Room)

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-3 Rev 0

JPM Title: Reduce RCS Pressure using Auxiliary Spray (Alternate Path)

Location: Simulator

Approximate Time: 10 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A# 010 A4.01 PZR spray valve (RO 3.7/SRO 3.5)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
EOP/AOP Attachment PC-11
EOP/AOP Attachment PC-12
OI-RC-7 Attachment 3

Handout(s): EOP/AOP Attachment PC-11
OI-RC-7

Task List #: MTL 0626
Lesson Plan # 07-11-20 EO 4.4 EXPLAIN the interlocks and control functions associated with RCS Instrumentation.

Applicable Position(s) RO/SRO

Time Critical: NO

Alternate Path: YES

JPM Prepared by: ________________________________ Date: ____________

JPM Approved by ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-3 Rev 0

JPM Title: Reduce RCS Pressure using Auxiliary Spray (Alternate Path)

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

Simulator Setup: PC-103X is OOS (Caution Tagged). Pressurizer Spray Valves PCV-103-1 and PCV-103-2 are failed closed.

JPM No: S-3 Rev 0

JPM Title: Reduce RCS Pressure using Auxiliary Spray (Alternate Path)

TASK STANDARD:	**RCS Pressure Control using Auxiliary Spray has been established.**

INITIAL CONDITIONS:	• **The Control Room has entered EOP-3, Loss of Coolant Accident for a Small Break LOCA.** • **Prior to the accident, PC-103X was removed from service for required maintenance.**

INITIATING CUE:	• **The CRS has arrived at Step 23.b. of EOP-03.** • **You are the ATCO.** • **You are directed to maintain RCS pressure per EOP/AOP Attachment PC-11.** • **Maintain a pressure band of 1650 psia to 1850 psia.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
<u>NOTE to Evaluator;</u> Provide copy of Attachments PC-11 and PC-12 to applicant. **PCV-103-1 and PCV-103-2 are failed closed and will not open. The Applicant will attempt to lower RCS pressure to the band of 1650 to 1850 psia per the Initiating Cue either in AUTOMATIC or MANUAL. If Automatic is chosen, the Applicant will go to Manual. Because of the valves not opening, the Applicant will have to go to Contingency Action 1.1b to use Auxiliary Spray to reduce RCS pressure.**		
Attachment PC-11	Applicant reads CAUTION prior to Step 1.	Applicant read CAUTION. **NOTE to Evaluator;** **If the Applicant isolates the charging path, the JPM is failed.** [SAT] [UNSAT]
Attachment PC-11 Step 1.	Maintain RCS pressure PER Attachment PC-12, RCS Pressure-Temperature Limits, by performing any of the following: a. Automatically control Pressurizer pressure PER OI-RC-7, Reactor Coolant System Pressure Control Normal Operation.	**NOTE to Evaluator;** If Applicant gets OI-RC-7; **CUE: Provide copy to Applicant.** [SAT] [UNSAT]
OI-RC-7 Attachment 3.		
	Applicant reads NOTE prior to Step 1.	Applicant read NOTE prior to Step 1. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 1.	IF raising the RCS pressure, THEN perform the following steps:	Applicant N/A'd step. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 2.	IF lowering the RCS pressure, THEN perform the following steps:	Applicant started with step 2. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
	Applicant reads NOTE prior to Step 2.	Applicant read NOTE prior to Step 2. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 2.a.	Verify the Selected Controller is in AUTOMATIC. • PC-103X, Pressurizer Press Controller • PC-103Y, Pressurizer Press Controller	**(CB-1,2,3)** OOS - Cautioned Tagged Applicant verified PC-103Y is in AUTOMATIC. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 2.b.	Ensure the following Proportional Heaters Control Switches are in AUTO: • 75 KW Proportional Htrs Bank P1 Group 6 • 75 KW Proportional Htrs Bank P2 Group 7	**(CB-1,2,3)** Applicant ensured the Proportional Heaters Control Switches are in AUTO. [SAT] [UNSAT]
	Applicant reads NOTE prior to Step 2.c.	Applicant read NOTE prior to Step 2.c. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 2.c.	IF one (1) Bank of Heaters is in ON, THEN ensure the remaining Backup Heater Switches are in AUTO; OTHERWISE ensure all of the following switches are in AUTO: • 225 KW Backup Htrs Bank 1 Group 1/2/3 • 150 KW Backup Htrs Bank 2 Group 4/5 • 150 KW Backup Htrs Bank 3 Group 8/9 • 225 KW Backup Htrs Bank 4 Group 10/11/12	**(CB-1,2,3)** Applicant ensured one bank of heaters is on and the other are in AUTO. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-RC-7 Att. 3 Step 2.d.	Ensure the following Spray Control Switches are in AUTO: • PCV-103-1, PZR Spray Valve From Loop 2A • PCV-103-2, PZR Spray Valve From Loop 1B	**(CB-1,2,3)** Applicant ensured the Spray Control Switches are in AUTO. [SAT] [UNSAT]
	Applicant reads CAUTION prior to Step 2.e.	Applicant read CAUTION prior to Step 2.e. [SAT] [UNSAT]
OI-RC-7 Att. 3 Step 2.e.	Lower RCS pressure by adjusting the Set point Push-button(s) on selected controller to the desired RCS pressure set point. • PC-103X, Pressurizer Press Controller • PC-103Y, Pressurizer Press Controller	**(CB-1,2,3)** OOS – Caution Tagged Applicant adjusted set point and recognized the Spray Valves are not responding. Applicant may report this to the CRS. If reported; **CUE: CRS acknowledged.** [SAT] [UNSAT]
	Attachment PC-11	
Attachment PC-11 Step 1.	b. Manually control Pressurizer pressure by performing the following	Applicant determined AUTO was not functioning and returned to Attachment PC-11 and continued to MANUAL Pressurizer Pressure control. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
Attachment PC-11 Step 1.b.1)	Ensure selected Pressurizer Pressure Controller is in "MANUAL": • PC-103X • PC-103Y	**(CB-1.2.3)** OOS – Caution Tagged Applicant ensured PC-103Y in MANUAL. [SAT] [UNSAT]
Attachment PC-11 Step 1.b.2)	Ensure Proportion Heaters Control Switches are in "AUTO": • 75 KW Proportional Htrs Bank P1 Group 6 • 75 KW Proportional Htrs Bank P2 Group 7	**(CB-1.2.3)** Applicant ensured Proportion Heaters are in AUTO. [SAT] [UNSAT]
Attachment PC-11 Step 1.b.3)	**IF** raising RCS Pressure, **THEN** adjust the selected Pressurizer Pressure Controller left:	Applicant N/Ad step. [SAT] [UNSAT]
Attachment PC-11 Step 1.b.4)	**IF** lowering RCS pressure, **THEN** adjust the selected Pressurizer Pressure Controller right: • PC-103X • PC-103Y	**(CB-1.2.3)** PC-103X is out of service. Applicant attempted to manually reduce RCS pressure to the band and determined both PCV-103-1 and PCV-103-2 are not opening. If needed; **CUE: CRS acknowledged** **ALTERNATE PATH** Applicant transitioned to Contingency Actions 1.1b. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
Contingency Actions		
Attachment PC-11 Step 1.1b	Depressurize the RCS using Aux Spray by operating the following valves as necessary: • HCV-240, PZR Auxiliary Spray Isolation Valve • HCV-249, PZR Auxiliary Spray Isolation Valve • HCV-238, Loop 1 Charging Isolation Valve • HCV-239, Loop 2 Charging Isolation Valve	Applicant reduced and stabilized RCS pressure to within 1650 to 1850 psia utilizing Auxiliary Spray and Charging Isolation Valves as necessary. **NOTE to Evaluator;** **If the Applicant isolates the charging pump flow path anytime during this evolution, the JPM is failed. Refer to NOTE at the beginning of procedure.** [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **RCS Pressure Control using Auxiliary Spray has been established.**

INITIAL CONDITIONS:	• **The Control Room has entered EOP-3, Loss of Coolant Accident for a Small Break LOCA.** • **Prior to the accident, PC-103X was removed from service for required maintenance.**

INITIATING CUE:	• **The CRS has arrived at Step 23.b. of EOP-03.** • **You are the ATCO.** • **You are directed to maintain RCS pressure per EOP/AOP Attachment PC-11.** • **Maintain a pressure band of 1650 psia to 1850 psia.**

Attachment PC-11

Pressure Control

INSTRUCTIONS | CONTINGENCY ACTIONS

****

CAUTION

A charging header flow path must be maintained at all times.

****

1. Maintain RCS pressure PER Attachment PC-12, RCS Pressure-Temperature Limits, by performing any of the following:

   a. Automatically control Pressurizer pressure PER OI-RC-7, Reactor Coolant System Pressure Control Normal Operation.

   b. Manually control Pressurizer pressure by performing the following:

      1) Ensure selected Pressurizer Pressure Controller is in "MANUAL":

         - PC-103X
         - PC-103Y

(continue)

NOTE

During an Uncontrolled Cooling event, if the P-T limits are exceeded, the Appendix E Curve provides guidance until P-T limits are restored.

1.1 **IF** RCS pressure-temperature exceeds the limits of Attachment PC-12, RCS Pressure-Temperature Limits, as indicated by **ANY** of the following:

- Uncontrolled cooldown rate of greater than 100°F per hour
- RCS pressure-temperature is above the P-T Curve limits

THEN restore the RCS to within the P-T limits by performing the following:

(continue)

Attachment PC-11

Pressure Control

INSTRUCTIONS

1.b. (continued)

2) Ensure Proportion Heaters Control Switches are in "AUTO":

- 75 KW Proportional Htrs Bank P1 Group 6
- 75 KW Proportional Htrs Bank P2 Group 7

3) **IF** raising RCS Pressure, **THEN** adjust the selected Pressurizer Pressure Controller left:

- PC-103X
- PC-103Y

4) **IF** lowering RCS pressure, **THEN** adjust the selected Pressurizer Pressure Controller right:

- PC-103X
- PC-103Y

(continue)

CONTINGENCY ACTIONS

1.1 (continued)

a. Depressurize the RCS by performing the following:

1) Ensure selected Pressurizer Pressure Controller is in "MANUAL":

- PC-103X
- PC-103Y

2) Adjust the selected Pressurizer Pressure Controller right:

- PC-103X
- PC-103Y

(continue)

Attachment PC-11

Pressure Control

INSTRUCTIONS

1. (continued)

c. **IF** SIAS has initiated
AND pressurizer heaters are required,
THEN perform the following:

1) Place **ALL** Backup Heater control switches in "OFF":

- "225 KW BACKUP HTRS BANK 1 GROUP 1/2/3"
- "150 KW BACKUP HTRS BANK 2 GROUP 4/5"
- "150 KW BACKUP HTRS BANK 3 GROUP 8/9"
- "225 KW BACKUP HTRS BANK 4 GROUP 10/11/12"

(continue)

CONTINGENCY ACTIONS

1.1 (continued)

b. Depressurize the RCS using Aux Spray by operating the following valves as necessary:

- HCV-240, PZR Auxiliary Spray Isolation Valve
- HCV-249, PZR Auxiliary Spray Isolation Valve
- HCV-238, Loop 1 Charging Isolation Valve
- HCV-239, Loop 2 Charging Isolation Valve

c. **IF** HPSI stop and throttle criteria are met,
THEN control Pressurizer level using **ANY** or all of the following:

- Charging
- Letdown
- HPSI flow

PER Attachment IC-11, Inventory Control.

(continue)

Attachment PC-11

Pressure Control

INSTRUCTIONS

1.c. (continued)

2) Place selected Heater Control Switch(es) to "ON".

3) Verify small "top hat" light is "ON" for selected Heaters.

d. Manually control Pressurizer Heaters as necessary.

e. Control Aux Spray as necessary by operating the following valves:

- HCV-240, PZR Auxiliary Spray Isolation Valve
- HCV-249, PZR Auxiliary Spray Isolation Valve
- HCV-238, Loop 1 Charging Isolation Valve
- HCV-239, Loop 2 Charging Isolation Valve

(continue)

CONTINGENCY ACTIONS

1.1 (continued)

d. Stabilize RCS temperature PER Attachment HR-12, Secondary Heat Removal Operation.

e. IMPLEMENT Attachment PC-13, P-T Limit Restoration.

Attachment PC-11

Pressure Control

INSTRUCTIONS | CONTINGENCY ACTIONS

1. (continued)

f. **IF** HPSI stop and throttle criteria are met,
THEN control Pressurizer level using **ANY** or all of the following:

- Charging
- Letdown
- HPSI flow

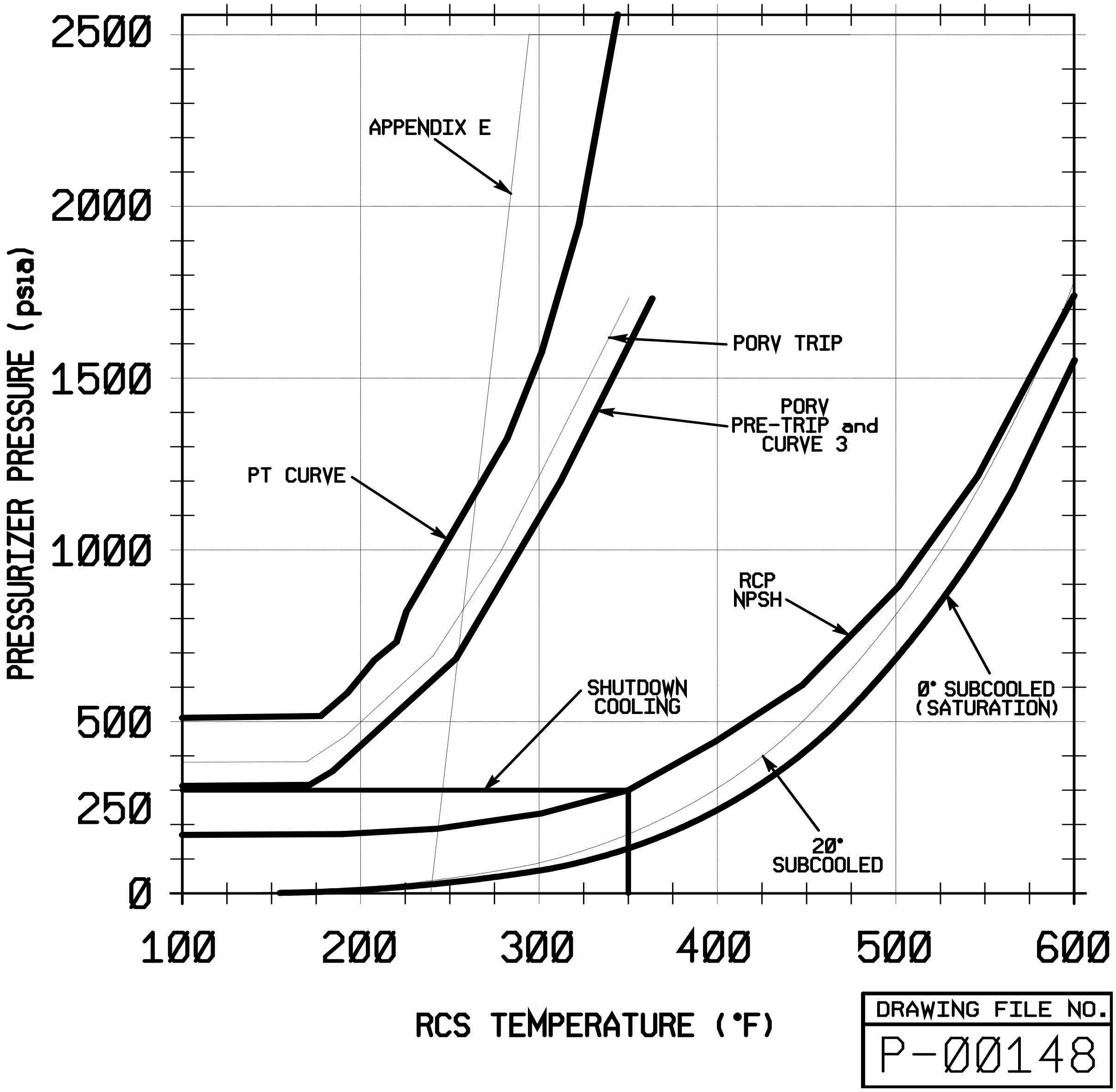
PER Attachment IC-11, Inventory Control.

g. Control RCS heat removal PER Attachment HR-12, Secondary Heat Removal Operation.

End of Attachment PC-11

Attachment PC-12

RCS Pressure-Temperature Limits



NOTES

1. During forced circulation, use T_H for the 20° F subcooled curve and saturation curve. During natural circulation, use CETs for the 20° F subcooled curve and the saturation curve. Use T_C for all other curves.

2. Curve 3 is the Maximum Pressure for First Start RCP curve.

Attachment PC-12

RCS Pressure-Temperature Limits

RCS TEMPERATURE (°F)	**MINIMUM PRESSURE TO MEET RCP NPSH (psia)**
64	171
95	170
145	171
195	176
245	191
295	225
300	232
345	289
395	428
445	597
495	850
545	1207
595	1697

End of Attachment PC-12

Attachment 3 - Automatic RCS Pressure Control with a Steam Bubble in the Pressurizer

PREREQUISITES (✓) INITIALS

1. Procedure Revision Verification

Revision Number_______________ Date:_________ _______

PROCEDURE

NOTE

RCS Pressure Control should automatically maintain setpoint for normal operation at 2100 (2080 to 2145) psia.

1. IF raising the RCS pressure,
THEN perform the following steps:

 a. Verify the Selected Controller is in AUTOMATIC.

 - PC-103X, Pressurizer Press Controller ___
 - PC-103Y, Pressurizer Press Controller ___ _______

 b. Ensure the following Proportional Heater Control Switches are in AUTO:

 - 75 KW Proportional Htrs Bank P1 Group 6 ___
 - 75 KW Proportional Htrs Bank P2 Group 7 ___ _______

NOTE

During normal operation, one bank of pressurizer heaters is usually maintained in the ON position.

 c. IF one Bank of Heaters is in ON,
 THEN ensure the remaining Backup Heater Switches are in AUTO;
 OR ensure all of the following switches are in AUTO:

 - 225 KW Backup Htrs Bank 1 Group 1/2/3 ___
 - 150 KW Backup Htrs Bank 2 Group 4/5 ___
 - 150 KW Backup Htrs Bank 3 Group 8/9 ___
 - 225 KW Backup Htrs Bank 4 Group 10/11/12 ___ _______

Attachment 3 - Automatic RCS Pressure Control with a Steam Bubble in the Pressurizer

PROCEDURE (continued) (✓) INITIALS

1

d. Ensure the following Spray Control Switches are in AUTO:

- PCV-103-1, PZR Spray Valve From Loop 2A ___
- PCV-103-2, PZR Spray Valve From Loop 1B ___ _______

e. Raise the RCS pressure by adjusting the Setpoint Push-button(s) on selected controller to desired RCS pressure setpoint.

- PC-103X, Pressurizer Press Controller ___
- PC-103Y, Pressurizer Press Controller ___ _______

f. Ensure RCS pressure stabilizes at the desired setpoint. _______

2. IF lowering the RCS pressure,
THEN perform the following steps:

NOTE
If the temperature differential between Pressurizer and Spray Line is greater than 200°F, refer to SO-O-23, Systems and Equipment Usage Data.

a. Verify the Selected Controller is in AUTOMATIC.

- PC-103X, Pressurizer Press Controller ___
- PC-103Y, Pressurizer Press Controller ___ _______

b. Ensure the following Proportional Heaters Control Switches are in AUTO:

- 75 KW Proportional Htrs Bank P1 Group 6 ___
- 75 KW Proportional Htrs Bank P2 Group 7 ___ _______

Attachment 3 - Automatic RCS Pressure Control with a Steam Bubble in the Pressurizer

PROCEDURE (continued) (✓) INITIALS

NOTE

During normal operation, one bank of pressurizer heaters is usually maintained in the ON position.

2

c. IF one (1) Bank of Heaters is in ON,
THEN ensure the remaining Backup Heater Switches are in AUTO;
OTHERWISE ensure all of the following switches are in AUTO:

- 225 KW Backup Htrs Bank 1 Group 1/2/3 ___
- 150 KW Backup Htrs Bank 2 Group 4/5 ___
- 150 KW Backup Htrs Bank 3 Group 8/9 ___
- 225 KW Backup Htrs Bank 4 Group 10/11/12 ___ ________

d. Ensure the following Spray Control Switches are in AUTO:

- PCV-103-1, PZR Spray Valve From Loop 2A ___
- PCV-103-2, PZR Spray Valve From Loop 1B ___ ________

CAUTION

When reducing RCS pressure, decreasing pressure in small increments will prevent overshoot from selected setpoint.

e. Lower RCS pressure by adjusting the Setpoint Push-button(s) on selected controller to the desired RCS pressure setpoint.

- PC-103X, Pressurizer Press Controller ___
- PC-103Y, Pressurizer Press Controller ___ ________

f. Ensure RCS pressure stabilizes at the desired setpoint. ________

Completed by____Date/Time_______/_____

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-4 Rev 0

JPM Title: Rotation of Shutdown Cooling Pumps (Alternate Path)

Location: Simulator

Approximate Time: 10 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A# 005 A4.01 Residual Heat Removal System (RO 3.6/SRO 3.4)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
OI-SC-2 Attachment 3
ARP CB-1,2,3/A2

Handout(s): OI-SC-2 Attachment 3

Task List #: MTL 1021
Lesson Plan # 07-11-22 EO Using the Annunciator Response Procedures (ARPs) as a guide, interpret alarms received in the Control Room associated with ECCS and explain the corrective actions to be taken.

Applicable Position(s)

Time Critical: NO

Alternate Path: YES

JPM Prepared by: ______________________________ Date: ___________

JPM Approved by ______________________________ Date: ___________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-4 Rev 0

JPM Title: Rotation of Shutdown Cooling Pumps (Alternate Path)

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

Simulator Setup:

Simulator is in Mode 4. Scenario 2014 ILT JPM S4 has to be inserted from the JPM flash drive.

Keys needed to be inserted: # 84, 85, 86, 87, 88, 46, 47, 48, 49, 24, 25 and 8 Zero Mode Bypass Keys.

JPM No: S-4 Rev 0

JPM Title: Rotation of Shutdown Cooling Pumps

TASK STANDARD:	**SI-1B is rotated on and SI-1A is rotated off. FCV-326 adjusted in MANUAL or Loop Injections valves have been throttled to maintain required Shutdown cooling flow of 1200 to 1700 gpm.**

INITIAL CONDITIONS:	**The plant is Mode 4 for a normal refueling outage. All required systems are operating normally.**

INITIATING CUE:

- **You are the ATCO and have been directed to rotate SI-1B, Shutdown Cooling Pump on and SI-1A, Shutdown Cooling Pump off per OI-SC-2 Attachment 3.**
- **Prerequisites and Pre-Job brief have been completed.**
- **Report when pump rotation is complete and normal Shutdown Cooling flow has been established.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
OI-SC-2 Att. 3 Step 1.	Place FCV-326, Shutdown CLG HT EXCHS AC-4A & 4B LPSI Bypass Flow Control Valve, in MANUAL (CB-1,2,3).	**(CB-1,2,3)** Applicant placed FCV-326 Flow Control Valve in MANUAL. [SAT] [UNSAT]
	Applicant reads the NOTE prior to Step 2.	Applicant read NOTE. **Note to Evaluator; Alarm CB-1/2/3, A2, D-2U may come in when the second SDC pump is started.** [SAT] [UNSAT]
OI-SC-2 Att. 3 Step 2.	Start the desired LPSI Pump: (AI-30B) • SI-1A, Low Pressure Safety Injection Pump • **SI-1B**, Low Pressure Safety Injection Pump	**(AI-30B)** Applicant started SI-1B. Red light on. Green light off. [SAT] [UNSAT]

<table>
<tr><th>STEP</th><th>ELEMENT</th><th>STANDARD</th></tr>
<tr><td>OI-SC-2 Att. 3 Step 3.</td><td>WHEN satisfactory pump operation has been verified, THEN stop the off going LPSI Pump:
SI-1A
SI-1B</td><td>(AI-30A)

Applicant stopped SI-1A Green light on. Red light off.

[SAT] [UNSAT]</td></tr>
<tr><td colspan="3"><u>Alternate Path</u>

FCV-326 Flow Transmitter and FCV-326 will fail closed when FIC-326 is switched to AUTOMATIC after pump rotation causing Annunciator D-2U, SHUTDOWN COOLING FLOW HI-LO, of CB-1,2,3/A2 to alarm due to low flow conditions. Due to the limiter on FCV-326, SDC flow will be ~ 700 to 900 gpm. FIC-326 has to be returned to Manual to adjust SDC flow to 1500 gpm.</td></tr>
<tr><td>OI-SC-2 Att. 3 Step 4.</td><td>IF desired, THEN place FCV-326 in AUTOMATIC AND verify 1500 gpm flow is maintained.</td><td>(CB-1,2,3)

If needed;
CUE: CRS acknowledged.

Applicant placed FCV-326 in AUTOMATIC.

NOTE to Evaluator;
When Applicant places the Controller for FCV-326 in AUTOMATIC the valve will fail closed requiring the Applicant to return the controller to MANUAL to restore flow to 1500 gpm.

Applicant noticed FIC-326 and FCV-326 failed closed.

If needed;
CUE: CRS Acknowledged.

[SAT] [UNSAT]</td></tr>
</table>

STEP	ELEMENT	STANDARD
	Applicant responds to CB-1/2/3 D-2U, SHUTDOWN COOLING FLOW HI-LO Alarm and transition to ARP CB-1/2/3 D-2U for guidance.	**<u>ALTERNATE PATH</u>** Applicant responded to Annunciator CB-1,2,3/A-2 D-2U, SHUTDOWN COOLING FLOW HI-LO Alarm. Applicant recognized the valve has failed closed and made report to the CRS. If needed; **CUE: CRS acknowledged.** **Note to Evaluator;** **After Applicant locates APR-CB-1,2,3/A2 D-2U, provide copy to Applicant.** [SAT] [UNSAT]
	ARP-CB-1,2,3/A2	
ARP-CB-1,2,3/A2 D-2U	Applicant reads NOTE.	Applicant read NOTE. [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 1.	Check Shutdown Cooling flow on FIC-326.	**(CB-1,2,3)** Applicant checked Shutdown Cooling flow on FIC-326 and determined flow was low. **NOTE to Evaluator;** **SFLPSI (ERF point) = ~700 – 900 gpm.** [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 2.	IF Shutdown Cooling flow is low, THEN:	**(CB-1,2,3or SFLPSI)** Applicant verified flow is low. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
ARP-CB-1,2,3/A2 D-2U Step 2.1	Check for proper operation of Shutdown Cooling Pump(s).	**(AI-30A/B)** Applicant verified pump is operating properly. SI-1B = Red light on. Green light off. Amps are normal. If need; **CUE: EONA reports the pump is operating properly.** [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 2.2	Check position of FCV-326 and HCV-341/347/348.	**(CB-1,2,3)** Applicant noticed that FCV-326 and FIC-326 controller are in AUTO and closed. HCV-341/347/348 are verified open. Red light on. Green light off. If report is made or if needed; **CUE: CRS acknowledged.** **Note to Evaluator;** **When FC-326 is switched to MANUAL, the controller and valve will go full open requiring the Applicant to manually lower flow.** If asked by Applicant to return FIC-326 to MANUAL; **CUE: CRS concurs.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
ARP-CB-1,2,3/A2 D-2U Step 2.3	Restore proper valve lineup and/or restore pump operation.	**(CB-1,2,3)** Applicant switched FIC-326 switched FIC-326 back to MANUAL to get FCV-326 to go back open. [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 2.4	Monitor cooling/heatup rate and adjust flow for proper rate.	**(CB-1,2,3)** **NOTE to Evaluator;** **When FIC-326 is switched back to MANUAL, the valve will go all the way open.** Applicant adjusted flow to 1500 gpm manually. If needed; **CRS Acknowledged.** [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 2.5	Monitor Aux Building and Containment sumps.	Applicant verified no upward trends in the Aux Building and Containment sumps. [SAT] [UNSAT]
ARP-CB-1,2,3/A2 D-2U Step 2.6	If Shutdown Cooling flow cannot be re-established, enter AOP-19, Loss of Shutdown Cooling.	Applicant N/A'd step and reported to CRS Shutdown Cooling is in manual and flow is steady. [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **SI-1B is rotated on and SI-1A is rotated off. FCV-326 adjusted in MANUAL or Loop Injections valves have been throttled to maintain required Shutdown cooling flow of 1200 to 1700 gpm.**

INITIAL CONDITIONS: **The plant is Mode 4 for a normal refueling outage. All required systems are operating normally.**

INITIATING CUE:

- **You are the ATCO and have been directed to rotate SI-1B, Shutdown Cooling Pump on and SI-1A, Shutdown Cooling Pump off per OI-SC-2 Attachment 3.**
- **Prerequisites and Pre-Job brief have been completed.**
- **Report when pump rotation is complete and normal Shutdown Cooling flow has been established.**

Attachment 3 – Rotation of Shutdown Cooling Pumps

PREREQUISITES

(✓) INITIALS

1. Procedure Revision Verification

   Revision No. 30 Date: TODAY — DB

2. The Shutdown Cooling System is in operation per OI-SC-1. — DB

3. Ensure LPSI pump to be started is aligned for operation per OI-SC-1. — DB

PROCEDURE

1. Place FCV-326, Shutdown CLG HT EXCHS AC-4A & 4B LPSI Bypass Flow Control Valve, in MANUAL (CB-1,2,3). ______

> **NOTE**
>
> When second Shutdown Cooling Pump is started, **SHUTDOWN COOLING FLOW HI-LO** (CB-1/2/3, A2, D-2U) alarm may annunciate.

2. Start the desired LPSI Pump: (AI-30B)

   - SI-1A, Low Pressure Safety Injection Pump __
   - SI-1B, Low Pressure Safety Injection Pump __ ______

3. WHEN satisfactory pump operation has been verified,
   THEN stop the off going LPSI Pump:

   - SI-1A __
   - SI-1B __ ______

4. IF desired,
   THEN place FCV-326 in AUTOMATIC AND verify 1500 gpm flow is maintained. ______

Completed by ______________________ Date/Time ________/________

Panel: **CB-1/2/3**	Annunciator: **A2**	Window: **D-2U**

SHUTDOWN COOLING FLOW HI-LO

SAFETY RELATED

SHUTDOWN COOLING FLOW HI-LO

Tech Spec References: 2.1.1, 2.1.2, 2.8

Initiating Device FS-326/HC-348 in OPEN Setpoint 1200 GPM
Initiating Device FS-326/HC-348 in OPEN Setpoint 2000 GPM

OPERATOR ACTIONS

NOTE: No compensatory measures required if ERF point SFLPSI high and low flow alarms are set at 2000 and 1200 gpm.

1. Check Shutdown Cooling flow on FIC-326.
2. IF Shutdown Cooling flow is low, THEN:
   - 2.1 Check for proper operation of Shutdown Cooling Pump(s).
   - 2.2 Check position of FCV-326 and HCV-341/347/348.
   - 2.3 Restore proper valve lineup and/or restore pump operation.
   - 2.4 Monitor cooling/heatup rate and adjust flow for proper rate.
   - 2.5 Monitor Aux Building and Containment sumps.
   - 2.6 If Shutdown Cooling flow cannot be re-established, enter AOP-19, Loss of Shutdown Cooling.
3. IF Shutdown Cooling flow is high, THEN:
   - 3.1 Check position of FCV-326.
   - 3.2 Monitor cooling/heatup and adjust RCS flow for proper rate.

PROBABLE CAUSES

- FCV-326 failed open
- Pipe rupture
- Loss of Shutdown Cooling Pump
- Two pump operation
- Loss of Flow

REFERENCES

AOP-19 EM-326 15318 136B3081 Sh 18 6242

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-5 Rev. 1

JPM Title: Raw Water leak on West Header

Location: Simulator

Approximate Time: 15 minutes Start Time:__________________

End Time:__________________

Actual Time: __________________

Reference(s):

K/A # 025, AA2.04 Loss of Residual heat Removal System (RO 3.3/SRO 3.6)
Ability to determine and interpret the following as they apply to the Loss of Residual Heat Removal System:
(CFR: 43.5 / 45.13)

AOP-18

Handout(s): AOP-18

Task List #: 0785
Lesson Plan # 07-17-18 EO 1.3 Describe the major recovery actions of this AOP.

Applicable Position(s): RO/SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ____________

JPM Reviewed by: ______________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-5 Rev. 1

JPM Title: Raw Water leak on West Header

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment:	None
Safety Considerations:	None
Comments:	Ensure the raw water leak is entered after the student has begun this JPM.

SIMULATOR SETUP: 100% Reactor Power, Steady State. AC-10C Raw Water Pump is running. The In-service Spent Regenerant Tank level is high to expedite the AI-100 Alarm when the leak is inserted. RW leak is high enough to cause the 25psig lights to go out.

INSERT:

RWSO02A is a leak on the West RW Header. Leak location is upstream of HCV-2877A.					
Type	**Filter**	**Item**	**Value**	**Ramp**	**Delay**
MALF	RWS	RWS02A	10.0	none	none

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-5 Rev. 1

JPM Title: Raw Water leak on West Header

TASK STANDARD:	**Raw water leak is isolated and Raw Water System has been restored via the east header.**

INITIAL CONDITIONS:

- **Plant is Operating at 100% Power.**
- **BOPO is out of the Control Room.**
- **AOP-18 has been entered.**

INITIATING CUE:

- **You are the ATCO.**
- **CRS has entered AOP-18, Loss of Raw Water.**
- **The Auxiliary Building Operator has reported water is present in corridor 4 of the Auxiliary Building.**
- **The CRS directs you to perform AOP-18 actions beginning at Step 4.**

JPM No: S-5 Rev. 1

JPM Title: Raw Water leak on West Header

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
		Note to Evaluator; **Provide a copy of AOP-18 to Applicant after CUE.** Applicant started at Step 4. [SAT] [UNSAT]
AOP-18 Step 4.	**IF** Raw Water leakage is indicated in **ANY** of the following Areas: • **Auxiliary Building** • Intake Structure • Turbine Building • Room 19 • Room 81	Applicant understood that leak was in the **Auxiliary Building** from the CRS report and or indications and continued. [SAT] [UNSAT]
AOP-18 Step 4.a.	**THEN** perform the following: Ensure only **ONE** Raw Water Pump, AC-10A/B/C/D is running.	**(CB-1,2,3)** Applicant ensured only ONE Raw Water Pump is running. **NOTE to Evaluator;** Applicant may request to secure ALL Raw Water Pumps per CONTINGENCY ACTION Step 4.a.1. If so, grant permission per CUE. If requested; **CUE: Secure ALL Raw Water Pumps.** Applicant secured all RW pumps by placing all RW pumps in PTL. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-18 Step 4.b.	IMPLEMENT Attachment C, Equipment Isolation.	**Note to Evaluator;** **Provide a copy of AOP-18 Attachment C to Applicant after it is located in AOP or if requested.** Applicant transitioned to AOP-18 Attachment C. [SAT] [UNSAT]
	AOP-18 Attachment C	
AOP-18 Att. C Step 1.	**IF** the leak is on the Raw Water System, **THEN** GO TO Step 8.	Applicant may contact the EONA to determine the location of the leak or use Control Room indications. If the EONA is asked; **CUE: EONA reports there is a cracked weld on the upstream side of HCV-2877A.** Applicant determined the leak is located on the Raw Water System and proceeds to Step 8. [SAT] [UNSAT]
AOP-18 Att. C	Applicant reads NOTE prior to Step 8.	Applicant read NOTE. [SAT] [UNSAT]
AOP-18 Att. C Step 8.	**IF** leak is on **ANY** of the following: • WEST RW header • AC-12A, Raw Water Strainer • AC-1C, RW Heat Exchanger **THEN** isolate header by performing the following:	**NOTE to Evaluator;** **Applicant may contact the EO to determine the location of the leak or use Control Room indications.** If the EONA is asked; **CUE: EO reports there is a cracked weld on the upstream side of HCV-2877A.** Applicant determined the leak is on the WEST RW header. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-18 Att. C Step 8.a.	Place AC-10A, Raw Water Pump, in "PULL-TO-LOCK".	**(CB-1,2,3)** Applicant placed AC-10A in PULL-TO-LOCK. Both light off. [SAT] [UNSAT]
AOP-18 Att. C Step 8.b.	Close **ALL** of the following Raw Water Header Isolation Valves: • HCV-2874A/B • HCV-2893 • HCV-2877A/B • HCV-2882 A/B	**(CB-1,2,3)** Applicant closed the listed RW header isolation valves. Green lights on. Red lights off. [SAT] [UNSAT]
AOP-18 Att. C Step 8.c.	**(LOCAL)** Close RW-144, "RAW WATER STRAINER AC-12A BACKWASH VALVE HCV-2805A OUTLET ISOLATION VALVE" (RW Vault).	**(Raw Water Vault)** After AON is contacted; **CUE: RW-144 is closed.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-18 Att. C Step 8.d.	**IF** leak is isolated, **THEN** ensure at least one Raw Water Pump, AC-10B/C/D is restored to service.	**Note to Evaluator;** **This step is Critical only if needing to start a RW pump to restore flow.** Applicant may contact EO to verify the leak has stopped. If EONA is contacted; **CUE: The leak has stopped.** **NOTE to Evaluator;** **Applicant may communicate the leak is isolated prior to starting RW pumps, if RW pumps were all stopped.** If needed; **CUE: CRS acknowledges.** Applicant ensured at least one RW Pump, AC-10B, C or D. **STOP, JPM is finished.** [SAT] [UNSAT]

Termination Criteria: **Raw water leak is isolated and Raw Water System has been restored via the east header.**

INITIAL CONDITIONS:	• **Plant is Operating at 100% Power.** • **BOPO is out of the Control Room.** • **AOP-18 has been entered.**

INITIATING CUE:	• **You are the ATCO.** • **CRS has entered AOP-18, Loss of Raw Water.** • **The Auxiliary Building Operator has reported water is present in corridor 4 of the Auxiliary Building.** • **The CRS directs you to perform AOP-18 actions beginning at Step 4.**

INSTRUCTIONS	CONTINGENCY ACTIONS
4. **IF** Raw Water leakage is indicated in **ANY** of the following Areas: • Auxiliary Building • Intake Structure • Turbine Building • Room 19 • Room 81 **THEN** perform the following:	
a. Ensure only **ONE** Raw Water Pump, AC-10A/B/C/D is running.	a.1 **IF** required, **THEN** secure **ALL** Raw Water Pumps, AC-10A/B/C/D.
b. IMPLEMENT Attachment C, Equipment Isolation.	
5. Verify CCW temperature is less than or equal to 110°F.	5.1 **IF** CCW temperature is greater than 110°F, **THEN** GO TO Step 10.
6. IMPLEMENT the Emergency Plan.	

INSTRUCTIONS | CONTINGENCY ACTIONS

7. Reduce CCW heat loads by performing the following:

   a. Isolate CH-7, Letdown Heat Exch by performing the following:

      1) Close TCV-202, Letdown Isolation Valve.

      2) Close HCV-204, Letdown Isolation Valve.

   b. **(LOCAL)** Secure WD-28A/B PER OI-WDG-1, Waste Gas Disposal System Normal Operation.

   c. **(LOCAL)** Secure DW-46A/B, "VACUUM DEAERATOR PUMP" PER OI-DW-4, Deaerated Water System Normal Operation.

   d. **(CHEM)** Secure SL-8A/B, "SAMPLE HEAT EXCHANGER".

   e. Evaluate reducing other CCW heat loads PER Attachment A, CCW System Heat Loads.

INSTRUCTIONS | CONTINGENCY ACTIONS

8. Restore the RW System to service by performing the following:

   a. Isolate the rupture.

   b. Return at least one of the RW Pumps, AC-10A/B/C/D to service.

9. **IF** RW System has been restored to service,
   THEN GO TO Section 5.0, Exit Conditions.

10. **IF** the Reactor is critical,
    THEN initiate a Reactor Shutdown by performing the following:

    a. Trip the Reactor.

    b. IMPLEMENT EOP-00, Standard Post Trip Actions.

NOTE

Main PZR Spray flow will be reduced with less than four-pump operation.

11. **IF** all Raw Water Pumps are stopped,
    THEN ensure all Reactor Coolant Pumps are secured.

INSTRUCTIONS | CONTINGENCY ACTIONS

NOTE

Technical Specification 2.0.1, General Requirements, requires RCS T_C to be less than 300°F within six hours of the shutdown.

****

CAUTION

Careful consideration must be made prior to cooldown to ensure adequate condensate inventory is available to perform the cooldown and maintain the plant stable without Shutdown Cooling available.

****

12. Commence RCS cooldown to less than 300°F PER EOP-20, Functional Recovery Procedure.

13. Establish alternate cooling for the CCW System on **TWO** heat exchangers using the Fire Protection System PER Attachment B, Fire Protection System Backup.

    13.1 **IF** the Fire Protection System is **NOT** available,
    THEN GO TO Step 16.

14. **IF** alternate cooling is established,
    THEN GO TO Step 16.

INSTRUCTIONS	CONTINGENCY ACTIONS
15. **WHEN** RCS temperature is less than or equal to 300°F, **THEN** stabilize RCS temperature PER Attachment HR-12, Secondary Heat Removal.	
16. Continue attempts to restore RW to service.	

End of Section 4.0

Attachment C

Equipment Isolation

INSTRUCTIONS | CONTINGENCY ACTIONS

1. **IF** the leak is on the Raw Water System,
   THEN GO TO Step 8.

NOTE

SO-G-103, Fire Protection Operability and Surveillance Requirements, contains requirements for fire protection system.

2. **IF** leak is on the Fire Pump(s) **OR** piping,
   THEN secure both Fire Pumps, FP-1A/B by performing the following:

   a. Place **BOTH** of the following to "PULL-TO-LOCK":

      - FP-1A, Electric Fire Pump
      - FP-1B, Diesel Fire Pump

   b. **(LOCAL)** Place FP-1B Diesel Fire Pump local switch, HC/FP-1B-MS, in "OFF" (Intake, AI-183).

   c. Secure FP-5, "JOCKEY FIRE PUMP", by pushing "STOP" pushbutton. (Turbine 994' East)

(continue)

Attachment C

Equipment Isolation

INSTRUCTIONS

2. (continued)

d. Ensure FP-154, "SCREEN WASH HEADER TO FIRE PROTECTION SYSTEM CROSS-TIE VALVE" is closed (RW Vault).

e. **IF** leak was on FP-1A, **THEN** unlock and close **BOTH** of the following valves (Intake):

- FP-500, "MOTOR PMP MAIN HDR VALVE FP-151 BYPASS VALVE"
- FP-151, "MOTOR FIRE PUMP FP-1A MAIN HEADER STOP VALVE"

CONTINGENCY ACTIONS

e.1 **IF** Fire System pipe leak is **NOT** isolated, **THEN** unlock and close **BOTH** of the following Fire Loop isolation valves. (Outside Service Building):

- FP-146, "EAST HEADER STOP VALVE
- FP-145, "EAST HEADER STOP VALVE"

(continue)

Attachment C

Equipment Isolation

INSTRUCTIONS

2. (continued)

f. **IF** leak was on FP-1B,
THEN unlock and close **BOTH** of the following valves (Intake):

- FP-502, "ENGINE PMP MAIN HDR VALVE FP-153 BYPASS VALVE"
- FP-153, "ENGINE FIRE PUMP FP-1B MAIN HEADER STOP VALVE"

g. **(LOCAL) IF** the leak is on the FP-4N or FP-4P, Hose Cabinet piping,
THEN close FP-118, "INTAKE STRUCTURE HOSE CABINET STOP VALVE" (Outside Service Building).

CONTINGENCY ACTIONS

f.1 **IF** Fire System pipe leak is **NOT** isolated,
THEN unlock and close **BOTH** of the following Fire Loop isolation valves. (Outside Service Building):

- FP-119, "NORTH HEADER STOP VALVE"
- FP-147, "EAST HEADER STOP VALVE"

Attachment C

Equipment Isolation

INSTRUCTIONS

CONTINGENCY ACTIONS

3. **IF** isolation is completed
AND the Fire System can be restored,
THEN restore the Fire System to service PER OI-FP-1, Fire Protection System Water System.

4. **IF** leak is on the Screen Wash System piping,
THEN secure both Screen Wash Pumps, CW-3A/B by performing the following:

   a. Place **ALL** of the following to "PULL-TO-LOCK" (AI-120):

      - HC-1902A, "CW-3A, SCREEN WASH PUMP"
      - HC-1902B, "CW-3B, SCREEN WASH PUMP"
      - HC-1902C, "CW-4A, SEAL WATER PUMP"
      - HC-1902D, "CW-4B, SEAL WATER PUMP"

(continue)

Attachment C

Equipment Isolation

INSTRUCTIONS | CONTINGENCY ACTIONS

4. (continued)

b. Close **ALL** of the following valves (Intake):

- CW-412, "FIRE PUMP FP-1B & RW PUMP AC-10D SPARGING HEADER ISOLATION VALVE"
- CW-136, "SCREEN WASH STRAINER CW-7 BACKWASH PRESS CNTR VLV PCV-1912 INLET ISOLATION VALVE "
- CW-131, "FLUSHING WATER HEADER STOP VALVE"
- CW-135, "SCREEN WASH STRAINER CW-7 BACKWASH PRESS CNTR VLV PCV-1912 BYPASS VALVE"
- SW-108, "SCREEN WASH STRAINER CW-7 SERVICE WATER FLUSH ISOLATION VALVE"
- CW-253, "FIRE PUMP FP-1A SPARGER CIRC WATER SUPPLY VALVE"

(continue)

Attachment C

Equipment Isolation

INSTRUCTIONS | CONTINGENCY ACTIONS

4.b (continued)

- CW-312, "RAW WATER PUMP AC-10A SPARGER ISOLATION VALVE"

- CW-130, "SCREEN WASH PUMP CW-3B DISCHARGE VALVE"

- CW-127, "SCREEN WASH PUMP CW-3A DISCHARGE VALVE"

5. **IF** leak is on any Spray Wash Header,

   THEN place the affected pump Control switch to "OFF":

- "CW-2A-PMP-HC, ON-OFF SWITCH" (AI-340A)
- "CW-2B-PMP-HC, ON-OFF SWITCH" (AI-340B)
- "CW-2C-PMP-HC, ON-OFF SWITCH" (AI-340C)
- "CW-2D-PMP-HC, ON-OFF SWITCH" (AI-340D)
- "CW-2E-PMP-HC, ON-OFF SWITCH" (AI-340E)
- "CW-2F-PMP-HC, ON-OFF SWITCH" (AI-340F)

Attachment C

Equipment Isolation

INSTRUCTIONS	CONTINGENCY ACTIONS
6. **IF** leak is on the Auxiliary Steam System, **THEN** isolate AS-138, "UNIT HEATERS VA-164A-164D STEAM SUPPLY HEADER ISOLATION VALVE" (Intake).	6.1 **IF** Auxiliary Steam Leak is **NOT** isolated, **THEN** close AS-1487, "TURB BLDG AUX STEAM HEADER ISOLATION VALVE" (Turbine Building).

Attachment C

Equipment Isolation

INSTRUCTIONS

7. **IF** the leak is on the Raw Water pump seal water line,
THEN perform the following:

a. Isolate seal water for affected pump (RW Vault):

- AC-10A
SW-236, "RAW WATER PUMP AC-10A SEAL WATER SUPPLY ISOLATION VALVE"
- AC-10B
SW-237, "RAW WATER PUMP AC-10B SEAL WATER SUPPLY ISOLATION VALVE"
- AC-10C
SW-238, "RAW WATER PUMP AC-10C SEAL WATER SUPPLY ISOLATION VALVE"
- AC-10D
SW-239, "RAW WATER PUMP AC-10D SEAL WATER SUPPLY ISOLATION VALVE"

b. Verify running Raw Water Pump seal flow is greater than 0.2 gpm (RW Vault).

CONTINGENCY ACTIONS

7.1 **IF** Raw Water Pump seal leak is **NOT** isolated,
THEN perform the following:

a. Close SW-227, "RAW WATER PUMPS AC-10A-10D SEAL WATER SUPPLY ISOLATION VALVE" (Intake, CW bay).

b. Verify running Raw Water Pump seal flow is greater than 0.2 gpm (RW Vault).

Attachment C

Equipment Isolation

INSTRUCTIONS

CONTINGENCY ACTIONS

NOTE

The leak isolation Steps 8 through 15 may be performed in any logical order.

8. **IF** leak is on **ANY** of the following:

- WEST RW header
- AC-12A, Raw Water Strainer
- AC-1C, RW Heat Exchanger

THEN isolate header by performing the following:

a. Place AC-10A, Raw Water Pump, in "PULL-TO-LOCK".

b. Close **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2874A/B
- HCV-2893
- HCV-2877A/B
- HCV-2882 A/B

8.1 **IF** leak was **NOT** isolated,
THEN restore the RW section to service by performing the following:

a. Open any or **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2874A/B
- HCV-2893
- HCV-2877A/B
- HCV-2882A/B

b. **IF** required,
THEN start an available Raw Water Pump, AC-10A/B/C/D.

(continue)

Attachment C

Equipment Isolation

INSTRUCTIONS | CONTINGENCY ACTIONS

8. (continued)

c. **(LOCAL)** Close RW-144, "RAW WATER STRAINER AC-12A BACKWASH VALVE HCV-2805A OUTLET ISOLATION VALVE" (RW Vault).

d. **IF** leak is isolated,
THEN ensure at least one Raw Water Pump, AC-10B/C/D is restored to service.

Attachment C

Equipment Isolation

INSTRUCTIONS

9. **IF** leak is on **ANY** of the following:

- EAST RW header
- AC-12B, Raw Water Strainer
- AC-1D, RW Heat Exchanger

THEN isolate header by performing the following:

a. Place AC-10D, Raw Water Pump, in "PULL-TO-LOCK".

b. Close **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2876A/B
- HCV-2894
- HCV-2879A/B
- HCV-2883A/B

(continue)

CONTINGENCY ACTIONS

9.1 **IF** leak was **NOT** isolated, **THEN** restore the RW section to service by performing the following:

a. Open any or **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2876A/B,
- HCV-2894
- HCV-2879A/B
- HCV-2883A/B

b. **IF** required, **THEN** start an available Raw Water Pump, AC-10A/B/C/D.

Attachment C

Equipment Isolation

INSTRUCTIONS

CONTINGENCY ACTIONS

9. (continued)

c. **(LOCAL)** Close RW-145, "RAW WATER STRAINER AC-12B BACKWASH VALVE HCV-2805B OUTLET ISOLATION VALVE" (RW Vault).

d. **IF** leak is isolated, **THEN** ensure at least one Raw Water Pump, AC-10A/B/C is restored to service.

Attachment C

Equipment Isolation

INSTRUCTIONS

10. **IF** the leak is between Raw Water Pumps, AC-10B and AC-10C, **THEN** isolate by performing the following:

    a. Place AC-10B in "PULL-TO-LOCK".

    b. Place AC-10C in "PULL-TO-LOCK".

    c. Close **ALL** the following RW Pump Discharge Header Isolation Valves:

    - HCV-2874A/B
    - HCV-2876A/B

CONTINGENCY ACTIONS

10.1 **IF** leak was **NOT** isolated, **THEN** restore the RW section to service by performing the following:

   a. Open any or **ALL** of the following Raw Water Header Isolation Valves:

   - HCV-2874A/B
   - HCV-2876A/B

   b. **IF** required, **THEN** start an available Raw Water Pump, AC-10A/B/C/D.

Attachment C

Equipment Isolation

INSTRUCTIONS

11. **IF** the leak is between Raw Water Pumps, AC-10A and AC-10B, **THEN** isolate by performing the following:

    a. Place AC-10B in "PULL-TO-LOCK".

    b. Close **ALL** the following Raw Water Discharge Header Isolation Valves:

    - HCV-2874A/B
    - HCV-2875A/B

CONTINGENCY ACTIONS

11.1 **IF** leak was **NOT** isolated, **THEN** restore the RW section to service by performing the following:

a. Open any or **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2874A/B
- HCV-2875A/B

b. **IF** required, **THEN** start an available Raw Water Pump, AC-10A/B/C/D.

Attachment C

Equipment Isolation

INSTRUCTIONS	CONTINGENCY ACTIONS
12. **IF** the leak is between Raw Water Pumps, AC-10C and AC-10D, **THEN** isolate by performing the following: a. Place AC-10C in "PULL-TO-LOCK". b. Close **ALL** the following RW Pump Discharge Header Isolation Valves: • HCV-2875A/B • HCV-2876A/B	12.1 **IF** leak was **NOT** isolated, **THEN** restore the RW section to service by performing the following: a. Open any or **ALL** of the following Raw Water Header Isolation Valves: • HCV-2875A/B • HCV-2876A/B b. **IF** required, **THEN** start an available Raw Water Pump, AC-10A/B/C/D.
13. **IF** leak is indicated on AC-1A, CCW Heat Exchanger, **THEN** isolate by closing **ALL** of the following Raw Water Header Isolation Valves: • HCV-2877A/B • HCV-2878A/B • HCV-2880A/B	13.1 **IF** leak was **NOT** isolated, **THEN** open any or **ALL** of the following Raw Water Header Isolation Valves: • HCV-2877A/B • HCV-2878A/B • HCV-2880A/B

Attachment C

Equipment Isolation

INSTRUCTIONS

CONTINGENCY ACTIONS

14. **IF** leak is indicated on AC-1B, CCW Heat Exchanger,

THEN isolate by closing Raw Water Header Isolation Valves:

- HCV-2878A/B
- HCV-2879A/B
- HCV-2881A/B

14.1 **IF** leak was **NOT** isolated,

THEN open any or **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2878A/B
- HCV-2879A/B
- HCV-2881A/B

NOTE

Disabling the Raw Water Backup Cooling Water Header valves will require entry into T.S. 2.0.1.

15. **IF** the leak is indicated on Raw Water Backup Cooling Header,

THEN close **BOTH** of the following Raw Water Header Isolation Valves:

- HCV-2893
- HCV-2894

15.1 **IF** leak was **NOT** isolated,

THEN open any or **ALL** of the following Raw Water Header Isolation Valves:

- HCV-2893
- HCV-2894

16. **IF** Raw Water leak is **NOT** isolated,

THEN continue efforts to isolate leak.

Attachment C

Equipment Isolation

INSTRUCTIONS	CONTINGENCY ACTIONS
17. **IF** leak is isolated, **THEN** ensure at least one Raw Water Pump, AC-10A/B/C/D is restored to service.	

End of Attachment C

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-6 Rev 1

JPM Title: Operate Containment Hydrogen Analyzer

Location: Simulator

Approximate Time: 10 minutes Start Time:__________________

End Time:__________________

Actual Time: __________________

Reference(s): K/A# 028 A1.01Hydrogen concentration (RO 3.4/SRO 3.8)
Ability to predict and/or monitor changes in parameter (to prevent exceeding design limits) associated with operating the HRPS controls including: Hydrogen concentration
(CFR: 41.5 / 45.5)

EOP-3 Loss of Coolant Accident
EOP/AOP Attachment CI-12
EOP/AOP Floating Step R
OI-VA-6

Handout(s): EOP/AOP Attachment CI-12
EOP/AOP Floating Step R
OI-VA-6

Task List #: MTL 0156
Lesson Plan 7-14-03 EO 2.0 Using the operating instructions DESCRIBE how to operate the hydrogen analyzer as required by plant conditions.

Applicable Position(s) RO/SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: __________

JPM Approved by ______________________________ Date: __________

JOB PERFORMANCE MEASURE

JPM No: S-6 Rev 1

JPM Title: Operate Containment Hydrogen Analyzer

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: None

JPM No: S-6 Rev 1

JPM Title: Operate Containment Hydrogen Analyzer

TASK STANDARD:	**Hydrogen Analyzer has been placed in service and valid hydrogen concentration has been read.**
INITIAL CONDITIONS:	• **The plant was operating at 100% power when a loss of coolant accident occurred inside Containment.** • **The Reactor tripped and EOP-00, Standard Post Trip Actions were performed.** • **Per Diagnostics, EOP-3, Loss of Coolant Accident was entered by the CRS.**
INITIATING CUE:	• **The CRS has directed you, the ATCO to perform EOP/AOP Floating Step R using the highest sample point.** • **Report when completed.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
EOP/AOP Floating Step R		
Floating Step R	Applicant reads NOTE prior to Step 1 of EOP/AOP Floating Steps R. Containment Hydrogen.	**Cue:** Provide a copy of Floating Step R to Applicant. Applicant read NOTE. [SAT] [UNSAT]
Floating Step R Step 1.	**WHEN** a high energy line break has occurred in the Containment, **THEN** monitor Containment Hydrogen concentration using at least one Hydrogen Analyzer, VA-81A/B.	**(AI-65A and AI-65B)** Applicant verified neither Hydrogen Analyzer is operating and transitioned to the Contingency Action 1.1. [SAT] [UNSAT]
Floating Step R Step 1.1	**IF** neither Hydrogen Analyzer is operating, **THEN** REFER TO Attachment CI-12, Containment Hydrogen Analyzer Startup.	**NOTE to Examiner;** **After Applicant transitioned to EOP/AOP Attachment CI-12 provide a copy of CI-12 to Applicant.** [SAT] [UNSAT]
EOP/AOP Attachment CI-12		
CI-12 Step 1.	Start the Hydrogen Analyzers, by performing the following:	Applicant started with Step 1 of Attachment CI-12. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
CI-12 Step 1.a.	Open **ONE** of the Containment Hydrogen Sampling Valves, HCV- 820 C/D/E/F/G/H.	**(AI-65A) (HVC-820C)** Applicant opened **ONE** of the Hydrogen Sampling Valves, HCV- 820**C**/D/E/F/G/H. **Note to Examiner; HCV-820C is the highest sample point.** Applicant opened HCV-820C. Red light on, Green light off for the Open Valve. [SAT] [UNSAT]
	Alarm AI-65A/A65A-42 in due opening HCV-820C.	Applicant acknowledged alarm AI-65A/A65A-42. [SAT] [UNSAT]
CI-12 Step 1.b.	Open **ONE** of the Containment Hydrogen Sampling Valves, HCV-883C/D/E/F/G/H.	**(AI-65B) (HCV-883C)** Applicant opened **ONE** of the Containment Hydrogen Sampling Valves, HCV-883**C**/D/E/F/G/H. **Note to Examiner; HCV-883C is the highest sample point.** Applicant opened HCV-883C. Red light on, Green light off for the Open Valve. [SAT] [UNSAT]
	Alarm AI-65B/A65B-42 in due opening HCV-883C.	Applicant acknowledged alarm AI-65B/A65B-42. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
CI-12 Step 1.c.	Place **ALL** of the following switches in "O'RIDE": • “H2 ANALYZER VA-81A ISOLATION VALVES OUTBD HCV-820A/821A"	**(AI-43A)** Applicant placed HCV-820A/821A in O’RIDE. [SAT] [UNSAT]
	Alarm AI-43A/A40-B5 in due placing HCV-820A/821A in O’RIDE.	**(AI-43A)** Applicant acknowledged alarm AI-43A/A40-B5. [SAT] [UNSAT]
CI-12 Step 1.c. cont.	Place **ALL** of the following switches in "O'RIDE": • "H2 ANALYZER VA-81B ISOLATION VALVES INBD HCV-883A/884A"	**(AI-43A)** Applicant placed HCV-883A/884A in O’RIDE. [SAT] [UNSAT]
CI-12 Step 1.c. con.	Place **ALL** of the following switches in "O'RIDE": • "H2 ANALYZER VA-81A ISOLATION VALVES INBD HCV-820B/821B"	**(AI-43B)** Applicant placed HCV-820B/821B in O’RIDE. [SAT] [UNSAT]
	Alarm AI-43B/A41-B5 in due to placing HCV-820B/821B.	**(AI-43B)** Applicant acknowledged alarm AI-43B/A41-B5. [SAT] [UNSAT]
CI-12 Step 1.c. con.	Place **ALL** of the following switches in "O'RIDE": • “H2 ANALYZER VA-81B ISOLATION VALVES OUTBD HCV-883B/884B"	**(AI-43B)** Applicant placed HCV-883B/884B in O’RIDE. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
CI-12 Step 1.d.	Place the Hydrogen Analyzer Recorders, HR-81A/B, in service by turning **BOTH** power switches to "ON".	**(AI-65A and AI-65B)** Applicant turned on Hydrogen Analyzer Recorders, HR-81A and HR-81B. Lights/recorders on. [SAT] [UNSAT]
CI-12 Step 1.e.	Ensure the Hydrogen Analyzer Dual Range Selector Switches are in "0-10%".	**(AI-65A and AI-65B)** Applicant ensured the Hydrogen Analyzer Dual Range Selector Switches are in "0-10%". [SAT] [UNSAT]
CI-12 Step 1.f.	Place the Hydrogen Analyzer Power On Selector Switches in "ANALYZE".	**(AI-65A and AI-65B)** Applicant placed both Hydrogen Analyzer Power On Selector Switches in "ANALYZE". [SAT] [UNSAT]
	Alarm AI-65A/A65A- 27 and AI-65B/A65B-27 in due to placing both Hydrogen Analyzer Power On Selector Switches in "ANALYZE".	Applicant acknowledged both alarms: • AI-65A/A65A- 27 • AI-65B/A65B-27 [SAT] [UNSAT]
CI-12 Step 1.g.	Ensure the Function Selector Switches are in "SAMPLE".	**(AI-65A and AI-65B)** Applicant ensured both Function Selector Switches are in "SAMPLE". [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
CI-12 Step 1.h.	Press the "REMOTE" selector push buttons.	**(AI-65A and AI-65B)** Applicant pressed the "REMOTE" selector push buttons. [SAT] [UNSAT]
CI-12 Step 1.i.	Check the following indications: • The "CONTAINMENT H2 SAMPLING SYSTEM REMOTE/LOCAL OFF NORMAL" annunciator (A65A and B, Window 32) are "IN ALARM" • H2 0-10% Range Amber indicating lights are "ON" • The Sample indicating lights are "ON"	**(AI-65A A65A and AI-65B A65B)** Applicant checked annunciator A65A and B, Window 32 are "IN ALARM". Alarms are in. Applicant checked H2 0-10% Range Amber indicating lights are ON. Lights are on. Applicant checked the Sample indicating lights are ON. [SAT] [UNSAT]
CI-12 Step 1.j.	Press the "ALARM RESET" push buttons.	**(AI-65A and AI-65B)** Applicant pressed both ALARM RESET push buttons. [SAT] [UNSAT]
CI-12 Step 1.k	**WHEN** 5 minutes has elapsed since pressing the "ALARM RESET" push buttons, **THEN** valid hydrogen concentrations may be read.	**(AI-65A/B)** After 3.0% H2 concentration is indicated; **CUE: 5 minutes have elapsed**. **NOTE to Evaluator;** **H2 concentration is 3.0%.** Applicant reported 3% H2 concentration reading to CRS. **STOP. JPM is Finished.** [SAT] [UNSAT]

Termination Criteria:	**Hydrogen Analyzer has been placed in service and hydrogen concentration has been read.**

INITIAL CONDITIONS:	• **The plant was operating at 100% power when a loss of coolant accident occurred inside Containment.** • **The Reactor tripped and EOP-00, Standard Post Trip Actions were performed.** • **Per Diagnostics, EOP-3, Loss of Coolant Accident was entered by the CRS.**

INITIATING CUE:	• **The CRS has directed you, the ATCO to perform EOP/AOP Floating Step R using the highest sample point.** • **Report when completed.**

2.0 FLOATING STEPS

R. CONTAINMENT HYDROGEN

INSTRUCTIONS

NOTE

High Containment humidity will cause indicated hydrogen concentration to read higher than the actual concentration.

1. **WHEN** a high energy line break has occurred in the Containment, **THEN** monitor Containment Hydrogen concentration using at least one Hydrogen Analyzer, VA-81A/B.

2. **IF** Containment dewpoint is equal to Containment temperature, **THEN** REFER TO OI-VA-6, Containment Hydrogen Analyzer Operation, to compensate for humidity.

CONTINGENCY ACTIONS

1.1 **IF** neither Hydrogen Analyzer is operating, **THEN** REFER TO Attachment CI-12, Containment Hydrogen Analyzer Startup.

2.0 FLOATING STEPS

R. CONTAINMENT HYDROGEN

INSTRUCTIONS	CONTINGENCY ACTIONS
3. Verify Containment hydrogen concentration is less than 0.5%.	3.1 **IF** Containment hydrogen concentration is greater than 3.0% **AND** the Site Director has directed a Containment purge, **THEN** guidance will be provided by the Technical Support Center for hydrogen purge.

Attachment CI-12

Containment Hydrogen Analyzer Startup

INSTRUCTIONS	CONTINGENCY ACTIONS

1. Start the Hydrogen Analyzers, by performing the following:

   a. Open **ONE** of the Containment Hydrogen Sampling Valves, HCV-820C/D/E/F/G/H.

   b. Open **ONE** of the Containment Hydrogen Sampling Valves, HCV-883C/D/E/F/G/H.

   c. Place **ALL** of the following switches in "O'RIDE":

      - "H2 ANALYZER VA-81A ISOLATION VALVES OUTBD HCV-820A/821A"
      - "H2 ANALYZER VA-81B ISOLATION VALVES INBD HCV-883A/884A"
      - "H2 ANALYZER VA-81A ISOLATION VALVES INBD HCV-820B/821B"
      - "H2 ANALYZER VA-81B ISOLATION VALVES OUTBD HCV-883B/884B"

(continue)

Attachment CI-12

Containment Hydrogen Analyzer Startup

INSTRUCTIONS | CONTINGENCY ACTIONS

1. (continued)

d. Place the Hydrogen Analyzer Recorders, HR-81A/B, in service by turning **BOTH** power switches to "ON".

e. Ensure the Hydrogen Analyzer Dual Range Selector Switches are in "0-10%".

f. Place the Hydrogen Analyzer Power On Selector Switches in "ANALYZE".

g. Ensure the Function Selector Switches are in "SAMPLE".

h. Press the "REMOTE" selector push buttons.

(continue)

Attachment CI-12

Containment Hydrogen Analyzer Startup

INSTRUCTIONS	CONTINGENCY ACTIONS

1. (continued)

   i. Check the following indications:

      - The "CONTAINMENT H_2 SAMPLING SYSTEM REMOTE/LOCAL OFF NORMAL" annunciator (A65A and B, Window 32) are "IN ALARM"
      - H_2 0-10% Range Amber indicating lights are "ON"
      - The Sample indicating lights are "ON"

   j. Press the "ALARM RESET" push buttons.

   k. **WHEN** 5 minutes has elapsed since pressing the "ALARM RESET" push buttons, **THEN** valid hydrogen concentrations may be read.

End of Attachment CI-12

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-7 Rev 9

JPM Title: Restoration of Offsite Electrical Power Bus 1A4 & DG-2 (Alternate Path)

Location: Simulator

Approximate Time: 20 minutes Start Time:__________________

End Time:__________________

Actual Time: __________________

Reference(s): K/A# 064 A4.07 Emergency Diesel Generator (RO 3.8/SRO 3.4)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

AOP-32, Loss of 416 Volt or 480 Volt Bus Power
EOP-7, Station Blackout
MVA-14, Restoring Off-Site Power to Bus
MVA-16, Operation of DS-T1
ARP-CB-20/A18, Annunciator Response Procedure
OI-EE-1, Normal Operation of 4160 Volt System

Handout(s): MVA-14, Restoring Off-Site Power to Bus
MVA-16, Operation of DS-T1

Task List #: MTL 1350
Lesson Plan 07-17-32 EO 1.0 Use the Loss of 4160 Volt or 480 Volt Bus Power Procedure to mitigate the consequences of a Loss of 4160 Volt or 480 Volt bus power.

Applicable Position(s) RO/SRO

Time Critical: NO

Alternate Path: YES

JPM Prepared by: ________________________________ Date: ____________

JPM Approved by ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-7 Rev 9

JPM Title: Restoration of Offsite Electrical Power Bus 1A4 & DG-2 (Alternate Path)

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: Flashlights

Safety Considerations: None

Comments: None

Simulator Setup is Station Blackout with DG-1 and DG-2 supplying Bus 1A3 and Bus 1A4. Breakers 110 and 111 fail to trip upon trying to close them.

INSERT					
Type	**Filter**	**Item**	**Value**	**Ramp**	**Delay**
MALF	SWD	SWD_BKR110	Fail to Trip	none	none
MALF	RWS	SWD_BKR111	Fail to Trip	none	none

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-7 Rev 9

JPM Title: Restoration of Offsite Electrical Power Bus 1A4 & DG-2 (Alternate Path)

TASK STANDARD: **345KV power has been restored to Bus 1A4.**

INITIAL CONDITIONS:

- **The plant was operating at 100%**
- **A severe thunderstorm passed over the site causing a Station Black Out. EOP-7, Station Black Out was entered.**
- **Restoration of Offsite power is in progress.**
- **The Control Room has been informed by T&D Operations that 161KV and 345KV are stable and available to the Station.**

INITIATING CUE: **You are the BOPO and have been directed to restore power to Bus 1A4 per Attachment MVA-14.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
MVA-14 Step 1.	Verify **NONE** of the following Lockout Relays are tripped: • 86/1A24 • 86/1A44 • 86/1A4-TFB	**(AI-25)** Applicant verified all relays are in the RESET position. Relays are in the RESET position. [SAT] [UNSAT]
MVA-14 Step 2.	Ensure **BOTH** of the following breakers are tripped: • 1A24 • 1A44	**(CB-20)** Applicant ensured both breakers are tripped. [SAT] [UNSAT]
MVA-14 Step 3.	Ensure "TRANSFER SWITCH 43/1A2-1A4" is in "MANUAL".	Applicant ensured 43/1A24-1A4 is in MANUAL and should acknowledge annunciator alarm. [SAT] [UNSAT]
MVA-14 Step 4.	Verify **NONE** of the following Lockout Relays are tripped: • 86A/OPLS • 86B/OPLS	**(AI-30A/AI-30B)** Applicant verified 86A/86B OPLS Relays are RESET. [SAT] [UNSAT]
MVA-14 Step 5.	Ensure Offsite Power is in a stable condition and expected to remain stable per T&D Operations.	Per Initial Condition the Applicant determined Offsite Power is stable and continued. If needed; **CUE: 161 and 345KV are stable and available to the Station.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-14 Step 6.	**(LOCAL) IF** Bus 1A4 is energized from DG-2, **THEN** place AI-133B-S4, "DIESEL GENERATOR DG-2 ELECTRONIC DROOP CONTROL SWITCH", in "ENABLED". (AI-133B)	**(AI-133B)** After Applicant contacts Water Plant Operator; **CUE: AI-133B-S4 is in ENABLE.** [SAT] [UNSAT]
MVA-14 Step 7.	**IF** 161 KV voltage is between 161 KV and 168.6 KV, **THEN** energize 1A4 by performing the following:	**(CB-20)** Applicant verified voltage is between 161 KV and 168.6 KV. [SAT] [UNSAT]
MVA-14 Step 7.a.	Ensure Lockout Relay 86/161 is reset (AI-22).	**(AI-22)** Applicant ensured 86/161 is RESET. [SAT] [UNSAT]
MVA-14 Step 7.b.	Ensure **ALL** of the following lockout relays are reset: • 86-1/T1A-4 (AI-25) • 86-2/T1A-4 (AI-25) • 86-1/T1A-3 (AI-24) • 86-2/T1A-3 (AI-24) • 86X/FT161 (AI-26)	**(AI-24/25/26)** Applicant ensured ALL lockout relays are reset. Applicant reset relay. Applicant reset relay. Applicant reset relay. Applicant reset relay. No Action Required [SAT] [UNSAT]

<table>
<tr><th>STEP</th><th>ELEMENT</th><th>STANDARD</th></tr>
<tr><td colspan="3"><u>ALTERNATE PATH</u>

Breaker 110 and Breaker 111 will fail to trip position upon closing.</td></tr>
<tr><td>MVA-14 Step 7.c.</td><td>Synchronize and close at least one of the following breakers:

• Breaker 110

• Breaker 111</td><td>(CB-20)

Note to Evaluator;
Applicant will need to match flags for Bkr 110 and 111.

Applicant placed Sync Switch on for Breaker 110.

Applicant closed Breaker 110 and noticed that the breaker tripped.

Green and White light on.

Applicant may inform CRS.

If needed;
CUE: CRS Acknowledged.

Applicant placed Sync Switch on for Breaker 111.

Applicant closed Breaker 111 and noticed that the breaker tripped.

Green and White light on.

Applicant may inform CRS.

If needed;
CUE: CRS Acknowledged.

[SAT] [UNSAT]</td></tr>
</table>

STEP	ELEMENT	STANDARD
MVA-14 Step 7.1.	**IF** 345 KV is available, **THEN** energize 1A4 by performing the following:	**<u>ALTERNATE PATH</u>** Applicant transitioned to Step 7.1 to restore 345KV to Bus 1A4. [SAT] [UNSAT]
MVA-14 Step 7.1.a.	Ensure flags are matched for **BOTH** of the following Generator Output Breakers: • 3451-4 • 3451-5	**(CB-20)** Applicant ensured flags are matched. Bkr 3451-4 greened flagged. Bkr 3451-5 greened flagged. [SAT] [UNSAT]
MVA-14 Step 7.1.b.	Ensure MOD DS-T1 is open PER Attachment MVA-16, Operation of DS-T1, the Main Disconnect Switch.	**(CB-20)** The Applicant transitioned to MVA-16. When MVA-16 is located; **CUE: Provide a copy of MVA-16 to Applicant.** [SAT] [UNSAT]
EOP/AOP Attachment MVA-16		
MVA-16 Step 1.	Turn the DS-T1 Kirk Key 180 degrees to satisfy the interlock on the Motor Operator (Turbine Building Mezzanine).	**(LOCAL)** Applicant contacted the Turbine Bldg. Operator to insert Kirk Key and turn 180 degrees. **CUE: Kirk Key has been inserted and turned 180 degrees.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-16 Step 2	Ensure **ALL** the following Generator breakers are tripped: • Generator Output Breaker 3451-4 • Generator Output Breaker 3451-5 • Generator Field Breaker 41E/G1F	**(CB-20)** Applicant ensured the breakers are tripped. Tripped (white lite) Tripped (white lite) Tripped (white lite) [SAT] [UNSAT]
MVA-16 Step 3	Ensure Turbine Stop Valves are closed.	**(CB-10/11)** Applicant ensured Turbine Stop Valves are closed. [SAT] [UNSAT]
MVA-16 Step 4.	Ensure **ALL** of the following 4160 V breakers are tripped: • 1A11 • 1A13 • 1A22 • 1A24	**(CB-20)** Applicant ensured all the breakers are tripped. Tripped (white light) Open (green light) Tripped (white light) Open (green light) [SAT] [UNSAT]
MVA-16 Step 5.	Check T1A-1 and T1A-2 secondaries indicate 0 volts.	**(CB-20)** Applicant checked T1A-1 and T1A-2 secondary voltages indicated 0 volts. [SAT] [UNSAT]
MVA-16 Step 6.	Ensure Isolated Phase Bus Duct Cooling Unit is off.	**(CB-10/11)** Applicant secured EE2G-1A and ensured IPBDC unit is off. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-16 Step 7.	**IF** electrical operation of DS-T1 is possible, **THEN** open DS-T1 (CB-20 or Turbine Building Mezzanine).	**(CB-20)** Applicant opened DS-T1 and acknowledged annunciator alarm. [SAT] [UNSAT]
MVA-16 Step 8.	Visually inspect DS-T1 to ensure all three phases are open.	**(LOCAL)** Applicant contacted the Turbine Building Operator to inspect all three phases of DS-T1 are open. When needed; **CUE: All three phases are open.** [SAT] [UNSAT]
MVA-16 Step 9.	Turn the DS-T1 Kirk Key 180 degrees.	**(LOCAL)** Applicant directed EONT to turn DS-T1 Kirk Key. **CUE: Kirk Key has been turned 180 degrees.** [SAT] [UNSAT]
MVA-16 Step 10.	Remove the DS-T1 Kirk Key.	**(LOCAL)** Applicant directed EONT to remove the DS-T1 Kirk Key. **CUE: DS-T1 Kirk Key has been removed.** [SAT] [UNSAT]

ATTACHMENT MVA-14

STEP	ELEMENT	STANDARD
MVA-14 Step 7.1.c.	Place ST-6B, Stator Cooling Pump, in "PULL-TO-LOCK".	**(CB-10/11)** Applicant placed ST-6B in PTL. [SAT] [UNSAT]
MVA-14 Step 7.1.d.	Ensure **ALL** of the following lockout relays are reset: • 86-2/BF4 (AI-23) • 86-2/BF5 (AI-22) • 86-1/SVG1 (AI-22) • 86-2/SVG1 (AI-22) • 86-1/G1 (AI-21) • 86-2/G1 (AI-21) • 86-3/G1 (AI-21) • 86-1/GT1 (AI-21) • 86-2/GT1 (AI-21) • 86-3/GT1 (AI-21)	**(AI-21/22/23)** Applicant ensured ALL lockout relays are in the reset position. Relay handles are vertical. [SAT] [UNSAT]
MVA-14 Step 7.1.e.	Ensure the operable Isolated Bus Duct Cooling Unit is red-flagged.	**(CB-10/11)** Applicant ensured the operable Isolated Bus Duct Cooling Unit is red flagged starting EE2G-1A. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-14 Step 7.1.f	Synchronize and close at least one of the following Generator Output Breakers: • 3451-4 • 3451-5	**(CB-20)** **Note to Evaluator; Applicant needs to close only one breaker to restore power to Bus 1A4.** Applicant placed Sync Switch on for Breaker 3451-4. Applicant closed Breaker 3451-4. Red light on. Green light off. Applicant may inform CRS. **If needed; CUE: CRS Acknowledged.** Applicant placed Sync Switch on for Breaker 3451-5. Applicant closed Breaker 3451-5. Red light on. Green light off. Applicant may inform CRS. **If needed; CUE: CRS Acknowledged.** [SAT] [UNSAT]
MVA-14 Step 7.1.g.	Check that T1A-2 secondary voltage is greater than or equal to 4160 V.	**(CB-20)** Applicant checked secondary voltage is ≥ 4160V. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-14 Step 7.1.h.	Verify the "TRANS T1A-2 SECONDARY LOW VOLTAGE" alarm (A19, A5) is clear.	**(CB-20)** Applicant verified "TRANS T1A-2 SECONDARY LOW VOLTAGE" alarm (A19, A5) is clear. [SAT] [UNSAT]
	Applicant reads CAUTION prior to Step 7.1.i.	Applicant read CAUTION. [SAT] [UNSAT]
MVA-14 Step 7.1.i.	**IF** DG-2 is loaded on Bus 1A4, **THEN** set Diesel Generator, DG-2 Governor Droop Dial to the "SCRIBE MARK" (D-2).	**(D-2)** When Equipment Operator is contacted; **CUE: DG-2 Governor Droop Dial has been set to the "SCRIBE MARK".** [SAT] [UNSAT]
MVA-14 Step 7.1.j	Synchronize and close breaker 1A24.	**(CB-20)** Applicant placed the Sync Switch for breaker 1A24 on. Applicant closed breaker 1A24. Applicant acknowledged annunciator alarms. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-14 Step 7.1.k.	**IF** Diesel Generator load drops below 300 KW, **THEN** open breaker 1AD2.	**Note to Evaluator;** **If Step needed to be performed, it is a <u>Critical Step</u>. If not, it is N/A.** Applicant opened DG-2 Output breaker before breaker tripped on reverse power. [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: 345KV power has been restored to Bus 1A4.

INITIAL CONDITIONS:	• **The plant was operating at 100%** • **A severe thunderstorm passed over the site causing a Station Black Out. EOP-7, Station Black Out was entered.** • **Restoration of Offsite power is in progress.** • **The Control Room has been informed by T&D Operations that 161KV and 345KV are stable and available to the Station.**

INITIATING CUE:	**You are the BOPO and have been directed to restore power to Bus 1A4 per Attachment MVA-14.**

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS	CONTINGENCY ACTIONS
1. Verify **NONE** of the following Lockout Relays are tripped: • 86/1A24 • 86/1A44 • 86/1A4-TFB	1.1 **IF** 1A4 is faulted, **THEN** Off-Site Power can **NOT** be restored to Bus 1A4.
2. Ensure **BOTH** of the following breakers are tripped: • 1A24 • 1A44	
3. Ensure "TRANSFER SWITCH 43/1A2-1A4" is in "MANUAL".	
4. Verify **NONE** of the following Lockout Relays are tripped: • 86A/OPLS • 86B/OPLS	4.1 **IF** OPLS is tripped, **THEN** reset OPLS by performing the following: a. Place "CHAN "A" TEST AND BYPASS SW TS-A/OPLS" in "BYPASS".

(continue)

(continue)

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS	CONTINGENCY ACTIONS
4. (continued)	4.1 (continued)
	b. Place "CHAN "B" TEST AND BYPASS SW TS-B/OPLS" in "BYPASS".
	c. Place **ALL** of the following Condenser Evacuation Pump control switches in '"PULL-TO-LOCK": • FW-8A • FW-8B • FW-8C
	d. Reset **BOTH** of the following lockout relays: • 86A/OPLS • 86B/OPLS
5. Ensure Offsite Power is in a stable condition and expected to remain stable per T&D Operations.	

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS

6. **(LOCAL) IF** Bus 1A4 is energized from DG-2,
THEN place AI-133B-S4, "DIESEL GENERATOR DG-2 ELECTRONIC DROOP CONTROL SWITCH", in "ENABLED". (AI-133B)

7. **IF** 161 KV voltage is between 161 KV and 168.6 KV,
THEN energize 1A4 by performing the following:

   a. Ensure Lockout Relay 86/161 is reset (AI-22).

   b. Ensure **ALL** of the following lockout relays are reset:

      - 86-1/T1A-4 (AI-25)
      - 86-2/T1A-4 (AI-25)
      - 86-1/T1A-3 (AI-24)
      - 86-2/T1A-3 (AI-24)
      - 86X/FT161 (AI-26)

(continue)

CONTINGENCY ACTIONS

6.1 **IF** Bus 1A4 is **NOT** energized from DG-2,
THEN place breaker 1AD2 in "PULL-TO-LOCK".

7.1 **IF** 345 KV is available,
THEN energize 1A4 by performing the following:

   a. Ensure flags are matched for **BOTH** of the following Generator Output Breakers:

      - 3451-4
      - 3451-5

   b. Ensure MOD DS-T1 is open PER Attachment MVA-16, Operation of DS-T1, the Main Disconnect Switch.

(continue)

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS

7. (continued)

c. Synchronize and close at least one of the following breakers:

- Breaker 110
- Breaker 111

d. Check that T1A-4 secondary voltage is greater than or equal to 4160 V.

e. Verify the "TRANS T1A-4 SECONDARY LOW VOLTAGE" alarm (A18, A8) is clear.

f. Ensure **ALL** of the following lockout relays are reset (AI-25):

- 86/1A44
- 86/1A24
- 86/1A4-TFB

(continue)

CONTINGENCY ACTIONS

7.1 (continued)

c. Place ST-6B, Stator Cooling Pump, in "PULL-TO-LOCK".

d. Ensure **ALL** of the following lockout relays are reset:

- 86-2/BF4 (AI-23)
- 86-2/BF5 (AI-22)
- 86-1/SVG1 (AI-22)
- 86-2/SVG1 (AI-22)
- 86-1/G1 (AI-21)
- 86-2/G1 (AI-21)
- 86-3/G1 (AI-21)
- 86-1/GT1 (AI-21)
- 86-2/GT1 (AI-21)
- 86-3/GT1 (AI-21)

e. Ensure the operable Isolated Bus Duct Cooling Unit is red-flagged.

f. Synchronize and close at least one of the following Generator Output Breakers:

- 3451-4
- 3451-5

(continue)

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS

7. (continued)

****

CAUTION

While paralleling, rotation of the synchroscope in the "FAST" direction will result in a reduction of load on the Diesel Generator when off-site power is synchronized to the bus. Reverse power may occur if less than 300 KW is loaded onto 1A4 while synchronizing to off-site power.

****

g. **IF** Diesel is loaded on the Bus, **THEN** set Diesel Generator, DG-2 Governor Droop Dial to the "SCRIBE MARK" (DG-2).

h. Synchronize and close breaker 1A44.

i. **IF** Diesel Generator load drops below 300 KW, **THEN** open breaker 1AD2.

(continue)

CONTINGENCY ACTIONS

7.1 (continued)

g. Check that T1A-2 secondary voltage is greater than or equal to 4160 V.

h. Verify the "TRANS T1A-2 SECONDARY LOW VOLTAGE" alarm (A19, A5) is clear.

****

CAUTION

While paralleling, rotation of the synchroscope in the "FAST" direction will result in a reduction of load on the Diesel Generator when off-site power is synchronized to the bus. Reverse power may occur if less than 300 KW is loaded onto 1A4 while synchronizing to off-site power.

****

i. **IF** DG-2 is loaded on Bus 1A4, **THEN** set Diesel Generator, DG-2 Governor Droop Dial to the "SCRIBE MARK" (D-2).

(continue)

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS	CONTINGENCY ACTIONS
7. (continued)	7.1 (continued)
	j. Synchronize and close breaker 1A24.
	k. **IF** Diesel Generator load drops below 300 KW, **THEN** open breaker 1AD2.
8. **IF** OPLS was bypassed, **THEN** perform the following:	8.1 **IF** OPLS can **NOT** be restored, **THEN** perform the following:
a. Verify at least three of the following four red lights are lit: • 4.16 KV Bus 1A3 on AI-30A-S1-1 • 4.16 KV T1A-1 or 3 on AI-30A-S1-2 • 4.16 KV T1A-2 or 4 on AI-30B-S2-2 • 4.16 KV Bus 1A4 on AI-30B-S2-1	a. Open breaker 1A44 or 1A24. b. Comply with Technical Specification 2.0.1.

(continue)

Attachment MVA-14

Restoring Off-Site Power to Bus 1A4

INSTRUCTIONS | CONTINGENCY ACTIONS

8. (continued)

b. Restore OPLS to standby by performing the following:

1) Place "CHAN "A" TEST AND BYPASS SW TS-A/OPLS" in "NORMAL" (AI-30A-ESF).

2) Place "CHAN "B" TEST AND BYPASS SW TS-B/OPLS" in "NORMAL" (AI-30B-ESF).

NOTE

Minimize operation of the Diesel Generator at no or light load (less than 500 KW). Low loading may allow oil accumulation in the exhaust system and air box.

9. **IF** DG-2 is running,
THEN shutdown DG-2 PER Attachment MVA-21, Shutdown of Diesel Generator DG-2.

End of Attachment MVA-14

Attachment MVA-16

Operation of DS-T1, the Main Disconnect Switch

INSTRUCTIONS

CONTINGENCY ACTIONS

1. Turn the DS-T1 Kirk Key 180 degrees to satisfy the interlock on the Motor Operator (Turbine Building Mezzanine).

2. Ensure **ALL** the following Generator breakers are tripped:

- Generator Output Breaker 3451-4
- Generator Output Breaker 3451-5
- Generator Field Breaker 41E/G1F

3. Ensure Turbine Stop Valves are closed.

4. Ensure **ALL** of the following 4160 V breakers are tripped:

- 1A11
- 1A13
- 1A22
- 1A24

5. Check T1A-1 and T1A-2 secondaries indicate 0 volts.

6. Ensure Isolated Phase Bus Duct Cooling Unit is off.

Attachment MVA-16

Operation of DS-T1, the Main Disconnect Switch

INSTRUCTIONS	CONTINGENCY ACTIONS
7. **IF** electrical operation of DS-T1 is possible, **THEN** open DS-T1 (CB-20 or Turbine Building Mezzanine).	7.1 **IF** electrical operation of DS-T1 is **NOT** possible, **THEN** manually open DS-T1 by performing the following (Turbine Building Mezzanine): a. Place the Manual-Electric Handle in "MANUAL". b. Insert Hand Crank. c. Open DS-T1 using the Hand Crank. d. **WHEN** DS-T1 is OPEN, **THEN** remove the Hand Crank. e. Place the Manual-Electric Control Lever in the "ELECTRIC" (Locked, Detent) position.
8. Visually inspect DS-T1 to ensure all three phases are open.	
9. Turn the DS-T1 Kirk Key 180 degrees.	

Attachment MVA-16

Operation of DS-T1, the Main Disconnect Switch

INSTRUCTIONS	CONTINGENCY ACTIONS
10. Remove the DS-T1 Kirk Key.	

End of Attachment MVA-16

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-8 Rev 0

JPM Title: Verify Radiation monitor Operation using Check Source (RM-055)

Location: Simulator

Approximate Time: 10 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): K/A# 073 A4.03 Process Radiation Monitoring (RO 3.1/SRO 3.2)
Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)
OI-RM-1

Handout(s): OI-RM-1

Task List #: MTL 0585
Lesson Plan 07-12-03 EO 7.0 EXPLAIN the overall operations of the Radiation Monitoring System using OI-RM-1 as a guide.

Applicable Position(s) RO/SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ______________________________ Date: ___________

JPM Approved by ______________________________ Date: ___________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-8 Rev 0

JPM Title: Verify Radiation monitor Operation using Check Source (RM-055)

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: None

Comments: RM-055 is in keypad to start with. This requires a key.

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: S-8 Rev 0

JPM Title: Verify Radiation monitor Operation using Check Source (RM-055)

TASK STANDARD:	**RM-055 (Liquid Waste Disposal) has been placed in service.**

INITIAL CONDITIONS:	• **The plant is Mode 1 and all systems are operating normal.** • **Maintenance on RM-055 has just been completed and the clearance has been removed.**

INITIATING CUE:	• **The CRS has directed you, the ATCO, to place RM-055 in service per OI-RM-1, Attachment 10 so Monitor Tank, WD-22B can be released.** • **The Prerequisite and Pre-Job Brief have been completed.** • **Inform the CRS when completed.**

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
OI-RM-1 Step 2.	IF placing RM-055 in service OR if maintenance was performed, THEN perform the following:	Applicant N/Ad Step 1 and started with Step 2. [SAT] [UNSAT]
OI-RM-1 Step 2.a.	Ensure RM-055-1 local rate meter key switch is in on (Rm 10).	**(Rm 10)** After Aux Bldg. Operator is contacted; **CUE: RM-055-1 local rate meter key switch is in on.** [SAT] [UNSAT]
OI-RM-1 Step 2.b.	Verify RM-055 high setpoint is per TDB-IV.7.	Applicant used the scroll button to access high setpoint on RM-055. Applicant verified high setpoint on RM-055 per TDB-IV.7. **NOTE to Evaluator;** High Setpoint = 1.40E+06 [SAT] [UNSAT]
OI-RM-1 Step 2.c.	Verify RM-055 alert setpoint is per TDB-IV.7.	Applicant used the scroll button to access alert setpoint on RM-055. Applicant verified alert setpoint on RM-055 per TDB-IV.7. **NOTE to Evaluator;** Alert Setpoint = 1.40E+05 [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-RM-1 Step 2.d.	Ensure RM-055 alert setpoint on the ERF is per TDB-IV.7.	Applicant ensured RM-055 alert setpoint on the ERF is per TDB-IV.7. **NOTE to Evaluator;** Alert Setpoint = 1.40E+05 [SAT] [UNSAT]
OI-RM-1 Step 2.e.	Ensure RM-055 high setpoint on the ERF is per TDB-IV.7.	Applicant ensured RM-055 high setpoint on the ERF is per TDB-IV.7. **NOTE to Evaluator;** High Setpoint = 1.40E+06 [SAT] [UNSAT]
OI-RM-1 Step 2.f.	Verify the alert and high alarms are reset.	Applicant verified alarms are reset. [SAT] [UNSAT]
OI-RM-1 Step 2.g.	Place RM-055 Control Room rate meter key switch to ON.	Using RM-055 key, Applicant placed RM-055 Control Room rate meter key switch to ON. [SAT] [UNSAT]
OI-RM-1	Applicant reads NOTE prior to Step 2.h.	Applicant read NOTE. [SAT] [UNSAT]
OI-RM-1 Step 2.h.	To verify operability, source check RM-055 by performing the following:	**NOTE to Evaluator;** The following steps are verifying Radiation Monitor Operation using Check Source.

STEP	ELEMENT	STANDARD
OI-RM-1 Step 2.h.1)	Verify RM-055 Keypad Switch is in the ON position.	Applicant verified RM-055 Keypad Switch is in the ON position. [SAT] [UNSAT]
OI-RM-1 Step 2.h.2)	Record the RM-055 background reading: ____________ cpm	Applicant recorded 1.60E+2 background counts. [SAT] [UNSAT]
OI-RM-1	Applicant reads NOTE prior to Step 2.h.3)	Applicant reads NOTE. [SAT] [UNSAT]
OI-RM-1 Step 2.h.3)	Momentarily depress the Check Source pushbutton and verify the meter reading raises above the background reading.	Applicant depressed the Check Source pushbutton and verified the meter reading raises above the background reading. If needed; **CUE: Counts on RR-049A rose.** [SAT] [UNSAT]
OI-RM-1 Step 2.h.4)	WHEN the Check Source deenergizes, THEN verify the meter returns to its background reading.	Applicant verified the meter returns to its background reading. If needed; **CUE: Counts on RR-049A returned to background reading.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-RM-1 Step 2.h.5)	IF counts fail to rise or restore to background, THEN carryout the actions of the CH-ODCM-0001, Off-Site Dose Calculation Manual, for the inoperable monitor, or terminate the effluent release.	Applicant N/Ad step and reported to the CRS that RM-055 is in service. [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **RM-055 (Liquid Waste Disposal) has been placed in service.**

INITIAL CONDITIONS:	• **The plant is Mode 1 and all systems are operating normal.** • **Maintenance on RM-055 has just been completed and the clearance has been removed.**

INITIATING CUE:	• **The CRS has directed you, the ATCO, to place RM-055 in service per OI-RM-1, Attachment 10 so Monitor Tank, WD-22B can be released.** • **The Prerequisite and Pre-Job Brief have been completed.** • **Inform the CRS when completed.**

Attachment 10 - RM-055 (Liquid Waste Disposal)

PREREQUISITES (✓) INITIALS

1. Procedure Revision Verification

Revision No. 67 Date: TODAY

PROCEDURE

1. IF removing RM-055 from service,
THEN perform the following:

   a. Ensure the ODCM requirement is met. _______

   b. Place RM-055 Control Room ratemeter keyswitch to KEYPAD. _______

   c. IF desired to prevent the trip functions,
   THEN place RM-055-1 local ratemeter keyswitch to KEYPAD (Rm 10). _______

2. IF placing RM-055 in service OR if maintenance was performed,
THEN perform the following:

   a. Ensure RM-055-1 local ratemeter keyswitch is in on (Rm 10). ___

   b. Verify RM-055 high setpoint is per TDB-IV.7. ___

   c. Verify RM-055 alert setpoint is per TDB-IV.7. ___

   d. Ensure RM-055 alert setpoint on the ERF is per TDB-IV.7. ___

   e. Ensure RM-055 high setpoint on the ERF is per TDB-IV.7. ___

   f. Verify the alert and high alarms are reset. ___

   g. Place RM-055 Control Room ratemeter keyswitch to ON. ___

Attachment 10 - RM-055 (Liquid Waste Disposal)

PROCEDURE (continued) (✓) INITIALS

2.

NOTE
RM-055 is considered inoperable during the Check Source. Remaining stationed at RM-055 and ensuring RM-055 returns to normal before leaving the area administratively replaces the log entry during the Check Source.

h. To verify operability, source check RM-055 by performing the following:

1) Verify RM-055 Keypad Switch is in the ON position. ___

2) Record the RM-055 background reading:

___________ cpm ___

NOTE
The Check Source is only energized for a 2 minute period.

3) Momentarily depress the Check Source pushbutton and verify the meter reading raises above the background reading. ___

4) WHEN the Check Source deenergizes,
THEN verify the meter returns to its background reading. ___

5) IF counts fail to rise or restore to background,
THEN carryout the actions of the CH-ODCM-0001, Off-Site Dose Calculation Manual, for the inoperable monitor, or terminate the effluent release. ___

3. IF changing RM-055 alert/high setpoints,
THEN perform the following:

a. Ensure the ODCM requirements are met. **[AR 12250]** ________

b. Place RM-055 Control Room ratemeter keyswitch to KEYPAD. ________

Attachment 10 - RM-055 (Liquid Waste Disposal)

PROCEDURE (continued) (✓) INITIALS

3.

c. Notify I&C to perform the following:

1) Compare the As Found RM-055 alert setpoint with the TDB-IV.7. ___

2) Enter the TDB-IV.7 Value for RM-055 alert setpoint. ___

3) Compare the As Found RM-055 high setpoint with the TDB-IV.7. ___

4) Enter the TDB-IV.7 value for RM-055 high setpoint. ___

5) Using the Mode pushbutton verify RM-055 high setpoint is per TDB-IV.7. ___

6) Using the Mode pushbutton verify RM-055 alert setpoint is per TDB-IV.7. ___

7) Enter the TDB-IV.7 value for RM-055 alert setpoint into the ERF. ___

8) Enter the TDB-IV.7 value for RM-055 high setpoint into the ERF. ___ ________
I&C

d. Verify RM-055 high setpoint is per TDB-IV.7. ___

e. Verify RM-055 alert setpoint is per TDB-IV.7. ___

f. Ensure RM-055 alert setpoint on the ERF is per TDB-IV.7. ___

g. Ensure RM-055 high setpoint on the ERF is per TDB-IV.7. ___

h. Ensure RM-055 ratemeter high alarm is reset. ___

i. Place RM-055 Control Room ratemeter keyswitch to ON. ___ ________

Attachment 10 - RM-055 (Liquid Waste Disposal)

PROCEDURE (continued) (✓) INITIALS

4. IF flushing RM-055,
THEN perform the following:

a. Ensure the ODCM requirement is met. ______

1) Ensure the following:

A. WD-631, Monitor Tank Pumps WD-23A&B Low Flow Rate Control Inlet Valve, is closed. ___

B. WD-632, Monitor Tank Pumps WD-23A&B Overbrd Disch Vlv HCV-692 Inlet Vlv, is closed. ___

C. WD-1031, Rad Monitor RM-055 Sample Inlet Isolation Valve, is open. ___

D. WD-1032, Rad Monitor RM-055 Sample Outlet Isolation Valve, is open. ___

E. WD-624, Monitor Tank Pumps WD-23A&B Discharge Header Drain Valve, is open. ___ ______

2) Open WD-622, Waste Discharge to Condenser Overboard Disch HDR. ___

3) Open WD-626, Demin Water Isol, to begin flushing and observe lowering counts on RM-055. ___

4) WHEN the Flush is no longer needed,
THEN close WD-626. ___

5) Close WD-622. ___ ______

Completed by ______________________________ Date/Time ______ / ______

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-1 Rev 1

JPM Title: Energizing 480V Buses from 13.8 KV

Location: Switchgear Rooms and Upper Electrical Penetration Rooms.

Approximate Time: 20 minutes Start Time:____________________

End Time:____________________

Actual Time: ____________________

Reference(s): K/A 055 EA1.07 Restoration of power from offsite (RO 4.3/SRO 4.5)
Ability to operate and monitor the following as they apply to a Station Blackout: (CFR 41.7 / 45.5 / 45.6)

EOP/AOP Attachments- MVA-22, "Energizing 480 V Buses From 13.8 KV"

Handout(s): EOP/AOP Attachment MVA-22, "Energizing 480 V Buses From 13.8 KV"

Task List #: MTL 0958
Lesson Plan 7-18-17 EO 2.2 Given an a copy of Attachment MVA-22, explain the steps necessary to energize 480 volt buses from 13.8 KV.

Applicable Position(s): EO/RO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ____________________ Date: __________

JPM Approved by: ____________________ Date: __________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-1 Rev 1

JPM Title: Energizing 480V Buses from 13.8 KV

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM.

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: _______________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment:	Breaker racking handle from SM or AOP-6 locker
Safety Considerations:	Electrical Safety when simulating manipulation of breakers and situational awareness to close proximity to of operating equipment.
Comments:	Applicant will start on step 3 of EOP/AOP Attachment –MVA 22.

JPM No: P-1 Rev 1

JPM Title: Energizing 480V Buses from 13.8 KV

TASK STANDARD:	**480V buses 1B3C and 1B3C-4C are energized from the 13.8 KV supply.**

INITIAL CONDITIONS:	• **A station blackout has occurred.** • **Both 161 KV and 345 KV supplies to the station have been lost.** • **Both Diesel Generators have failed to start.** • **Energy Marketing reports that 13.8 KV power is available to the plant.**
INITIATING CUE:	• **You are the Equipment Operator and have been directed to energize 480 volt buses 1B3C, 1B3C-4C and 1B4C using EOP/AOP Attachment MVA-22.** • **The Control Room Operators have completed steps 1 and 2.**

JPM No: P-1 Rev 1

JPM Title: Energizing 480V Buses from 13.8 KV

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
Applicant starts at Step 3 of EOP/AOP Attachment-MVA 22.		
MVA-22 step 3	Trip **ALL** of the following 480 V breakers (East Switchgear Room): • 1B3C, "T1B-3C MAIN SECONDARY FEED TO 480 VAC BUS 1B3C." • 1B3C-2, "MCC-3C2 AUX BUILDING (CORR. 26)." • 1B3C-7, "TURBINE BUILDING CRANE HE-3." • 1B3C-6, "CONTAINMENT SPRAY PUMP SI-3A." • 1B3C-3, "OUTDOOR LIGHTING XFMR T1C-3B." • 1B3C-5, "MCC-3C3 SERVICE BLDG (3RD FLOOR)." • 1B3C-8, "AIR COMPRESSORCA-1A FEED TO LOCAL CONTACTOR."	**(East SWGR room)** Applicant simulated tripping each breaker and verified breaker position indicators displayed "OPEN." • 1B3C • 1B3C-2 • 1B3C-7 • 1B3C-6 • 1B3C-3 • 1B3C-5 • 1B3C-8 [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-22 step 4	Trip **ALL** of the following 480 V breakers: • 1B3C-4C-2, "BREAKER UNIT MCC-3C4C-2 TURBINE BLDG (MEZZANINE)." • 1B3C-4C-3, "BREAKER UNIT CONTAINMENT COOLING FAN VA-7C." • 1B3C-4C-4, "BREAKER UNIT COMPONENT COOLING WATER PUMP AC-3C."	**(East SWGR room)** Applicant simulated tripping each breaker and verified breaker position indicators displayed "OPEN." • 1B3C-4C-2 • 1B3C-4C-3 • 1B3C-4C-4 [SAT] [UNSAT]
MVA-22 step 5	Trip **ALL** of the following 480 V breakers (West Switchgear Room): • 1B4C, "T1B-4C MAIN SECONDARY FEED TO 480 VAC BUS 1B4C" • 1B4C-8, "CONTAINMENT COOLING & FILTER FAN VA-3B" • 1B4C-3, "MCC-4C2 AUX BLDG (CORR 4)" • 1B4C-4, "MCC-4C3 TURB BLDG (MEZZANINE)" • 1B4C-7, "MCC-4C4 INTAKE STRUCTURE" • 1B4C-5, "HI PRESS SAFETY INJ. PUMP SI-2B" • 1B4C-2, "MCC-4C1 ELECT PENET. AREA (RM 57W)" • 1B4C-1, "MCC-4C5 MOTOR CONTROL CENTER TURBINE BUILDING"	**(West Switchgear room)** Applicant identified the location of bus 1B4C. **Note to Evaluator: Due to inaccessibility, after the applicant identifies the location of bus 1B4C provide CUE below.** **CUE: All breakers on 1B4C are in the required position.** Applicant signed off Attachment MVA-22 Step 5 per the Cue. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-22 step 6	Place **ALL** of the following breakers in "OFF"	**(East Upper Electrical Penetration Room)** Applicant simulated placing breakers in the OFF position.
	• MCC-3C1-A01, "PCV-102-1 PZR POWER OPERATED RELIEF VALVE."	• MCC-3C1-A01
	• MCC-3C1-A2R, "AUX BLDG ROOF-DS, AUX BLDG ROOF STRESS TEST DISC SWITCH."	• MCC-3C1-A2R
	• MCC-3C1-A3L, "MPP-58/EE-98 MOTOR PROTECTION PANEL TRANSFORMER."	• MCC-3C1-A3L
	• MCC-3C1-A3R, "HE-12-DS/STRESS GALL-DS, ROOM 66 HOIST & STRESS GALLERY TEST DISC SWITCHES."	• MCC-3C1-A3R
	• MCC-3C1-A4L, "SPARE."	• MCC-3C1-A4L
	• MCC-3C1-A4R, "EE-4Q INVERTER "C" EE-8K BYPASS TRANSFORMER."	• MCC-3C1-A4R
	• MCC-3C1-A05, "TRANSFORMER T1B-3C COOLING FANS."	• MCC-3C1-A05 [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
MVA-22 step 7	Energize Bus 1B3C by performing the following: a. Obtain Circuit breaker handle from the SM or AOP-6 cabinet.	**(SM Office or AOP-6 Cabinet)** **Note to Evaluator; If Applicant has a IC35 key, toolbox may be opened.** After Applicant locates the locked toolbox; **CUE: You have obtained the circuit breaker handle.** [SAT] [UNSAT]
MVA-22 step 7	b. Close breaker 1B3C-4, "EMERG. FEED TO BUS 1B3C FROM 13.8KV/480V XFMR T1B-3C-1."	**(East Switchgear room)** Applicant simulated closing breaker 1B3C-4 and verified breaker position indicators display CLOSED. [SAT] [UNSAT]
MVA-22 step 8	Check that Bus 1B3C is energized.	**(East Switchgear room)** Applicant checked indication on VG-1/1B3C Voltmeters T1B-3C Secondary Phase (1,2,3) (Line to GND) and amber lights for each phase. After Applicant locates and verifies indications, **CUE: The indications are as you see them now.** [SAT] [UNSAT]
MVA-22 step 9	Close **BOTH** of the following 480 V breakers: • BT-1B3C, "BUS TIE 1B3C & 1B3C-4C NORMALLY CLOSED" (East Switchgear Room)	**(East Switchgear Room)** Applicant simulated closing BT-1B3C and verified breaker position indicators display CLOSED. After Applicant starts to proceed to BT-1B4C provide Cue. **CUE:** **Stop. The JPM is finished.** [SAT] [UNSAT]
Termination Criteria: 480 V Bus 1B3C is energized from the 13.8 KV system.		

INITIAL CONDITIONS:	• **A station blackout has occurred.** • **Both 161 KV and 345 KV supplies to the station have been lost.** • **Both Diesel Generators have failed to start.** • **Energy Marketing reports that 13.8 KV power is available to the plant.**

INITIATING CUE:	• **You are the Equipment Operator and have been directed to energize 480 volt buses 1B3C, 1B3C-4C and 1B4C using EOP/AOP Attachment MVA-22.** • **The Control Room Operators have completed steps 1 and 2.**

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS

CONTINGENCY ACTIONS

1. Trip **BOTH** of the following 4160 V breakers:

- T1B-3C
- T1B-4C

2. Place the following control switches in "PULL-TO-LOCK":

- CA-1A, Air Compressor
- AC-3C, CCW pump
- SI-2B, HPSI Pump
- VA-3B, Containment Vent Fan
- SI-3A, CS Pump
- VA-7C, Containment Vent Fan

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS	CONTINGENCY ACTIONS
3. Trip **ALL** of the following 480 V breakers (East Switchgear Room): • 1B3C, "T1B-3C MAIN SECONDARY FEED TO 480 VAC BUS 1B3C" • 1B3C-2, "MCC-3C2 AUX BUILDING (CORR. 26)" • 1B3C-7, "TURBINE BUILDING CRANE HE-3" • 1B3C-6, "CONTAINMENT SPRAY PUMP SI-3A" • 1B3C-3, "OUTDOOR LIGHTING XFMR T1C-3B" • 1B3C-5, "MCC-3C3 SERVICE BLDG (3RD FLOOR)" • 1B3C-8, "AIR COMPRESSOR CA-1A FEED TO LOCAL CONTACTOR"	

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS	CONTINGENCY ACTIONS
4. Trip **ALL** of the following 480 V breakers (East Switchgear Room): • 1B3C-4C-2, "BREAKER UNIT MOTOR CONTROL CENTER MCC-3C4C-2 TURBINE BLDG" • 1B3C-4C-3, "BREAKER UNIT CNTMT CLG FAN VA-7C" • 1B3C-4C-4, "BREAKER UNIT COMPONENT CLG WATER PUMP AC-3C"	

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS	CONTINGENCY ACTIONS

5. Trip **ALL** of the following 480 V breakers (West Switchgear Room):

   - 1B4C, "T1B-4C MAIN SECONDARY FEED TO 480 VAC BUS 1B4C"
   - 1B4C-8, "CONTAINMENT COOLING & FILTER FAN VA-3B"
   - 1B4C-3, "MCC-4C2 AUX BLDG (CORR 4)"
   - 1B4C-4, "MCC-4C3 TURB BLDG (MEZZANINE)"
   - 1B4C-7, "MCC-4C4 INTAKE STRUCTURE"
   - 1B4C-5, "HI PRESS SAFETY INJ. PUMP SI-2B"
   - 1B4C-2, "MCC-4C1 ELECT PENET. AREA (RM 57W)"
   - 1B4C-1, "MCC-4C5 MOTOR CONTROL CENTER TURBINE BUILDING"

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS	CONTINGENCY ACTIONS

6. Place **ALL** of the following breakers in "OFF" (East Upper Electrical Penetration Room):

   - MCC-3C1-A01, "PCV-102-1 PZR POWER OPERATED RELIEF VALVE"
   - MCC-3C1-A2R, "AUX BLDG ROOF-DS, AUX BLDG ROOF STRESS TEST DISC SWITCH"
   - MCC-3C1-A3L, "MPP-58/EE-98 MOTOR PROTECTION PANEL TRANSFORMER"
   - MCC-3C1-A3R, "HE-12-DS/STRESS GALL-DS, ROOM 66 HOIST & STRESS GALLERY TEST DISC SWITCHES"
   - MCC-3C1-A4L, "SPARE"
   - MCC-3C1-A4R, "EE-4Q INVERTER "C" EE-8K BYPASS TRANSFORMER"
   - MCC-3C1-A05, "TRANSFORMER T1B-3C COOLING FANS"

Attachment MVA-22

Energizing 480 V Buses From 13.8 KV

INSTRUCTIONS	CONTINGENCY ACTIONS

7. Energize Bus 1B3C by performing the following:

    a. Obtain the circuit breaker handle from the Shift Manager or the AOP-06 Cabinet.

    b. Close breaker 1B3C-4, "EMERG FEED TO BUS 1B3C FROM 13.8 KV/480 XFMR T1B-3C-1" (East Switchgear Room).

8. Check that Bus 1B3C is energized.

9. Close **BOTH** of the following 480 V breakers:

    - BT-1B3C, "BUS TIE 1B3C & 1B3C-4C NORMALLY CLOSED" (East Switchgear Room)

    - BT-1B4C, "BUS TIE 1B4C & 1B3C-4C NORMALLY OPEN" (West Switchgear Room)

Fort Calhoun Station – Operations Training

JOB PERFORMANCE MEASURE

JPM No: P-2 Rev. 2

JPM Title: Initiate Air Compressor Backup Cooling to CA-1A

Location: Room 19

Approximate Time: 10 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): NRC K/A 078 K1.04 Cooling Water to Compressor (RO2.6/ SRO 2.9)
Knowledge of the physical connections and/or cause-effect relationships between the IAS and the following systems: Cooling Water to Compressor. (CFR: 41.2 to 41.9 / 45.7 to 45.8)

EOP-20, MVA-IA
AOP-20

Handout(s): AOP-20

Task List #: 0225

Lesson Plan 7-17-20 EO Describe the major recovery actions to this AOP.

Applicable Position(s): RO/SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: ________________________________ Date: ____________

JPM Reviewed by: ________________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-2 Rev. 2

JPM Title: Initiate Air Compressor Backup Cooling to CA-1A

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment: None

Safety Considerations: Observe all local Industrial Safety postings.

Comments: This JPM will be performed as a static JPM.

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-2 Rev. 2

JPM Title: Initiate Air Compressor Backup Cooling to CA-1A

TASK STANDARD:	**Potable Water backup cooling is being supplied to CA-1A and it is running.**

INITIAL CONDITIONS:	• **The Plant is recovering from a Station Blackout.** • **No Air Compressor is in service.** • **Turbine Plant Cooling Water is not available.**

INITIATING CUE:	**You are an extra RO on-shift and have been directed to align Potable Water to Air Compressor, CA-1A for backup cooling in accordance with AOP-20 Step 15 so it can be started.**

JPM No: P-2 Rev. 2

JPM Title: Initiate Air Compressor Backup Cooling to CA-1A

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
AOP-20 step 15.	Align backup Potable Water Cooling to **ANY** or all of the Air Compressors by performing step a, b or c:	Per the Initiating Cue the Applicant selected CA-1A and started with Step 15.a. [SAT] [UNSAT]
AOP-20 step 15.a.1)	Align Potable Water Cooling to CA-1A, Air Compressor, by performing the following steps: 1) Close **ALL** of the following valves (Room 19): • AC-584, "AIR COMPRESSOR CA-1A INTERCOOLER INLET VALVE" • AC-588, "AIR COMPRESSOR CA-1A OUTLET VALVE" • AC-586, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A INLET VALVE" • AC-589, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A OUTLET VALVE"	**(Room 19)** **Note to Evaluator; Student simulates closing valves by turning hand wheels in CW direction. (Valve Stem goes in.)** If needed for any of the valves, **CUE: Use pointing device to indicate stem position for each valve or say, as you stated.** • Applicant simulated closing AC-584. • Applicant simulated closing AC-588 • Applicant simulated closing AC-586. • Applicant simulated closing AC-589. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-20 step 15.a 2)	2) Open ALL of the following Potable Water valves:	**(Room 19)** **Note to Evaluator; Applicant simulated opening valves by turning hand wheels in CCW direction. (Valve Stem goes in.)** If needed for any of the valves, **CUE: Use pointing device to indicate stem position for each valve or say, as you stated.**
	• AC-583, "AIR COMPRESSOR CA-1A INTERCOOLER INLET PRESS INDICATOR PI-1942A ROOT VALVE"	• The Applicant simulated opening AC-583.
	• AC-1042, "AIR COMPRESSOR CA-1A INTERCOOLER POTABLE WATER INLET VALVE"	• The Applicant simulated opening AC-1042.
	• AC-1044, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A POTABLE WATER INLET VALVE"	• The Applicant simulated opening AC-1044.
	• AC-1028, "COMP COOLING WTR VALVE FCV-1990 A BYPASS VALVE"	• The Applicant simulated opening AC-1028. [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
AOP-20 step 5.a.3)	3) Throttle open **BOTH** of the following (Room 19): • AC-1043, "AIR COMPRESSOR CA-1A POTABLE WATER OUTLET VALVE" • AC-1045, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A POTABLE WATER OUTLET VALVE"	**(Room 19)** If needed for valves; **CUE: Valves are as you stated.** • Applicant simulated throttling AC-1043. • Applicant simulated throttling AC-1045. [SAT] [UNSAT]
AOP-20 step 5.a.4)	4) Place CA-1A, Air Compressor Control Switch, in "AFTER-START".	Applicant notified CRS to place CA-1A in "AFTER-START". After Applicant notified the CR; **CUE: CRS acknowledged. CA-1A has been placed in "AFTER-START".** [SAT] [UNSAT]
AOP-20 step 5.a.5)	5) Locally ensure 1SS, CA-1A Control Selector Switch, is in CS.	**(Room 19)** Applicant ensured 1SS, CA-1A Control Selector Switch is in CS. [SAT] [UNSAT]

AOP-20 step 5.a.6)	6) Check for flow through FI-1955A (West end of CA-1A, Air Compressor).	**(West end of CA-1A)** After Applicant located FI-1955A; **CUE: Use nonverbal cue to indicate Cooling water flow.** Applicant should notify the CRS that backup cooling to CA-1A has been established. [SAT] [UNSAT] **STOP. JPM is Finished.**

Termination Criteria: **Potable Water backup cooling is being supplied to CA-1A and it is running.**

INITIAL CONDITIONS:	• **The Plant is recovering from a Station Blackout.** • **No Air Compressor is in service.** • **Turbine Plant Cooling Water is not available.**

INITIATING CUE:	**You are an extra RO on-shift and have been directed to align Potable Water to Air Compressor, CA-1A for backup cooling in accordance with AOP-20 Step 15 so it can be started.**

INSTRUCTIONS

15. Align backup Potable Water Cooling to **ANY** or all of the Air Compressors by performing step a, b or c:

    a. Align Potable Water Cooling to CA-1A, Air Compressor, by performing the following steps:

        1) Close **ALL** of the following valves (Room 19):

            - AC-584, "AIR COMPRESSOR CA-1A INTERCOOLER INLET VALVE"
            - AC-586, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A INLET VALVE"
            - AC-588, "AIR COMPRESSOR CA-1A OUTLET VALVE"
            - AC-589, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A OUTLET VALVE"

(continue)

CONTINGENCY ACTIONS

15.1 **IF** Potable Water is **NOT** available, **THEN** IMPLEMENT AOP-17, Loss of Instrument Air.

INSTRUCTIONS | CONTINGENCY ACTIONS

15.a (continued)

2) Open **ALL** of the following valves (Room 19):

- AC-583, "AIR COMPRESSOR CA-1A INTERCOOLER INLET PRESS INDICATOR PI-1942A ROOT VALVE"
- AC-1042, "AIR COMPRESSOR CA-1A INTERCOOLER POTABLE WATER INLET VALVE"
- AC-1044, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A POTABLE WATER INLET VALVE"
- AC-1028, "COMPR COOLING WTR VALVE FCV-1990A BYPASS VALVE"

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

15.a (continued)

NOTE

Maintain 40 to 50 psig on PI-1988A for CA-1A, Air Compressor. Air Compressors will trip on low cooling water pressure at 30 psig or cooling water temperature of 130°F.

3) Throttle open **BOTH** of the following (Room 19):

- AC-1043, "AIR COMPRESSOR CA-1A POTABLE WATER OUTLET VALVE"
- AC-1045, "AIR COMPRESSOR CA-1A AFTERCOOLER CA-2A POTABLE WATER OUTLET VALVE"

4) Place CA-1A, Air Compressor Control Switch, in "AFTER-START".

5) Locally ensure 1SS, CA-1A Control Selector Switch, is in CS.

(continued)

INSTRUCTIONS

CONTINGENCY ACTIONS

15.a (continued)

6) Check for flow through FI-1955A (West end of CA-1A, Air Compressor).

b. Align Potable Water Cooling to CA-1B, Air Compressor, by performing the following steps:

1) Close **ALL** of the following valves (Room 19):

- AC-577, "AIR COMPRESSOR CA-1B INTERCOOLER INLET VALVE"
- AC-579, "AIR COMPRESSOR CA-1B AFTERCOOLER CA-2B INLET VALVE"
- AC-581, "AIR COMPRESSOR CA-1B OUTLET VALVE"
- AC-582, "AIR COMPRESSOR CA-1B AFTERCOOLER CA-2B OUTLET VALVE"

(continue)

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-3 Rev. 1

JPM Title: Perform Concentrated Boric Acid Batching

Location: Room 69

Approximate Time: 15 minutes Start Time:__________________

End Time:___________________

Actual Time: _________________

Reference(s): NRC K/A 004 A4.12 (RO 3.8/SRO 3.3)
Ability to manually operate and/or monitor in the control Room: Boration/dilution batch control.
OI-CH-5 Attachment 1
T.S. Fig. 2-12

Handout(s): OI-CH-5 Attachment 1
T.S. Fig. 2-12

Task List #: 0144

Lesson Plan 7-18-13 EO 3.31 Given a copy of Attachment IC-15, explain the steps necessary to restore the SIRWT level after a RAS actuation.

Applicable Position(s): RO/SRO

Time Critical: NO

Alternate Path: NO

JPM Prepared by: _______________________________ Date: ____________

JPM Reviewed by: _______________________________ Date: ____________

Fort Calhoun Station – Operations Training
JOB PERFORMANCE MEASURE

JPM No: P-3 Rev. 1

JPM Title: Perform Concentrated Boric Acid Batching

Operators' Name: ____

All Critical Steps (shaded) must be performed or simulated in accordance with the standards contained in this JPM

The Operator's performance was evaluated as (circle one):

SATISFACTORY **UNSATISFACTORY**

Evaluator's Signature: ____________________________ Date: __________

Reason, if unsatisfactory:

Tools & Equipment:	None
Safety Considerations:	None
Comments:	This JPM will be performed as a static JPM.

JPM No: P-3 Rev. 1

JPM Title: Perform Concentrated Boric Acid Batching

TASK STANDARD:	**The Applicant has simulated batching boric acid to CH-11B, Boric Acid Stroage Tank.**

INITIAL CONDITIONS:

- **The Contol Room has enterd EOP-3 for a Loss of Coolant Accident.**
- **Additional borated water is needed to replenish the SIRWT post RAS.**
- **EOP/AOP Attachment IC-15, Methods for Refilling The SIRWT has been entered.**

INITIATING CUE:

- **The CRS directs you to relieve the EONA and continue batching batching boric acid using a 3 and 2 bag batching rotation, starting with 3 bags to CH-11B, Boric Acid Storage Tank using OI-CH-5 Attachment 1 starting at Step 4.**
- **All prerequisites have been completed.**
- **Flushing of the Batching Tank has been completed**

JPM No: P-3 Rev. 1

JPM Title: Perform Concentrated Boric Acid Batching

Critical Steps shown in gray

STEP	ELEMENT	STANDARD
CAUTIONS Before step 1	Read CAUTIONS 1 and 2 prior to performing Step 4.	Applicant may read CAUTIONS. [SAT] [UNSAT]
OI-CH-5 step 4.	WHEN flushing is completed, THEN close the following valves: • CH-444 • CH-279	**(RM 69)** Initiating cue indicated flushing was completed. Applicant simulated closing /checking closed CH-444 and CH-279. (Clockwise direction) [SAT] [UNSAT]
OI-CH-5 step 5.	WHEN Batching Tank is approximately 4 inches below overflow when using 50 pound bags, 8 inches below the over flow when using 25 kilogram bags, OR desired level is reached, THEN close <u>DW-147</u>.	**(Rm 69)** **NOTE to Evaluator;** **Student determines tank level due to size of bags being used.** When needed: **CUE: 50lb bags are being used.** **4" below for 50lbs** After Applicant determined level' **CUE: Use pointing device to indicate ~4" below tank overflow.** Applicant closed DW-147. (Clockwise direction) [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
CAUTIONS Before step 6	Applicant reads CAUTIONS prior to Step 6	Reads CAUTIONS. If needed; **CUE: You have reviewed MSDS and are adhering to FCSG-15-12.** [SAT] [UNSAT]
OI-CH-5 step 6.	IF Batching Tank Heaters are available, (MCC-3C2-D03, Corr 26), THEN place Boric Acid Batching Tank Heaters Control Switch in AUTO. (Room 69)	**(Room 69)** If needed; **CUE: Heater indication is as you see it.** Green light on. Applicant determined Electric Heaters are available. Applicant placed heater switch in AUTO. **CUE: Red heater light is on.** [SAT] [UNSAT]
OI-CH-5 step 6.a	Set TIC-252, Boric Acid Batching Tank CH-12 Temperature Indicator Controller above 80°F (approximately 30°F above desired boric acid solubility temperature, per Tech Spec Figure 2-12).	Applicant verified solubility temperature per T.S. 2-12 operator aid. Applicant determines that TIC-252 should be set to $\geq$95°F to $\leq$ 99°F. [SAT] [UNSAT]
OI-CH-5 step 7	Applicant determines that step 7 is not applicable.	**(RM 69)** Note: There is no steam available to the Auxiliary Building. Applicant N/As step [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-CH-5 step 8.	Start CH-12-AG, Boric Acid Batching Tank Mixer.	**(RM 69)** Applicant simulated starting CH-12-AG. **CUE: If needed; CH-12-AG is running.** [SAT] [UNSAT]
NOTES Before step 9	Read NOTES prior to Step 9.	Reads NOTES. [SAT] [UNSAT]
OI-CH-5 step 9.	WHEN the desired temperature is reached, THEN slowly add the desired number of Boric Acid Crystal bags (3 for 50 pound bags, 2 for 25 kilogram bags, or the amount directed by the Shift Manager). **[AR 15144]** **Note 2:** Each 50 pound bag of boric acid added to a full batch tank raises the concentration approximately 1.3%.	**(RM 69)** Applicant calculated required temperature using information in previous note and T.S. Figure 2-12. **Three 50lbs bags = 3.9% (65°F + 30°F = $\geq$95°F to $\leq$ 99°F.)** After Applicant verified temperature requirements and indication on the temperature indicator; **CUE: Use pointing device to indicate the temperature from Figure 2-12 as determined by applicant.** Applicant simulated adding 3 50lbs bag. [SAT] [UNSAT]
OI-CH-5 step 10.	WHEN Boric Acid Crystals are completely dissolved, THEN stop Batching Tank Mixer.	**CUE: Boric Acid Crystals are completely dissolved.** [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-CH-5 step 11.	IF Batching Tank Heaters are energized, THEN place Heater Control Switch in OFF.	Applicant stated the Heater Control Switch placed in the OFF position. [SAT] [UNSAT]
OI-CH-5 step 12.	IF Aux Steam Coil is in service, THEN close the following: • AS-868 • AS-813	**(RM 69)** Applicant indicated the step is N/A. [SAT] [UNSAT]
OI-CH-5 step 13.	Unlock and Open CH-103, Boric Acid Batching Tank CH-12 Outlet Valve.	**(RM 69)** Applicant simulated unlocking and opening CH-103. (Counter Clockwise) Applicant may contact the Control Room. If so; **CUE: CRS Acknowledged.** [SAT] [UNSAT]
OI-CH-5 step 14.	Open desired Boric Acid Storage Tank Inlet valve to drain the Boric Acid Batching Tank: • CH-105, Boric Acid Storage Tank CH-11A Boric Acid Inlet Valve • CH-104, Boric Acid Storage Tank CH-11B Boric Acid Inlet Valve.	**(RM 69)** Applicant simulated opening CH-104. (Counter Clockwise) [SAT] [UNSAT]

STEP	ELEMENT	STANDARD
OI-CH-5 step 17	WHEN the Boric Acid Tank is drained, THEN close the selected valve: • CH-105 • CH-104	Applicant simulated closing CH-104. (Clockwise) [SAT] [UNSAT]
OI-CH-5 step 18	Close CH-103.	Applicant simulated closing CH-103. (Clockwise) **STOP, JPM is Finished.** [SAT] [UNSAT]

Termination Criteria: The student has simulated batching boric acid to CH-11B, Boric Acid Stroage Tank.

INITIAL CONDITIONS:	• **The Contol Room has enterd EOP-3 for a Loss of Coolant Accident.** • **Additional borated water is needed to replenish the SIRWT post RAS.** • **EOP/AOP Attachment IC-15, Methods for Refilling The SIRWT has been entered.**

INITIATING CUE:	• **The CRS directs you to relieve the EONA and continue batching batching boric acid using a 3 and 2 bag batching rotation, starting with 3 bags to CH-11B, Boric Acid Storage Tank using OI-CH-5 Attachment 1 starting at Step 4.** • **All prerequisites have been completed.** • **Flushing of the Batching Tank has been completed**

Attachment 1 - Batching Boric Acid

PREREQUISITES (✓) INITIALS

1. Procedure Revision Verification

   Revision Number R41 Date: Today — B B

2. Boric Acid is available in Room 69 for batching. — B B

3. Demineralized Water System is in operation for batching per OI-DW-4. — B B

NOTES
The most recently completed checklist, OI-CH-5-CL-A, with deviation maintained on file, may be used for alignment verification.

4. Concentrated Boric Acid Batching System is lined up per Checklist OI-CH-5-CL-A. — B B

PROCEDURE

CAUTIONS
1. Care must be taken to prevent foreign material from entering Batching Tank.
2. Ensure that the Boric Acid Lift is fully lowered before moving.

1. Open the following valves: (Room 69)
   - CH-279, Boric Acid Batching Tank CH-12 Outlet Drain First Isolation Vlv to Waste Disposal System — ✓
   - CH-444, Boric Acid Batching Tank CH-12 Outlet Drain Second Isol Valve to Waste Disposal System — ✓ — B B

2. Open DW-147, Boric Acid Batching Tank CH-12 Isolation Valve and flush CH-12, Boric Acid Batching Tank. (Room 69) — B B

3. Open DW-147, Boric Acid Batching Tank CH-12 Isolation Valve and flush CH-12, Boric Acid Batching Tank. (Room 69) — B B

Attachment 1 - Batching Boric Acid

PROCEDURE (continued) (✓) INITIALS

4. WHEN flushing is completed,
THEN close the following valves:

- CH-444 ___
- CH-279 ___ ________

5. WHEN Batching Tank is approximately 4 inches below overflow when using 50 pound bags, or 8 inches below the over flow when using 25 kilogram bags, OR required level is reached,
THEN close DW-147. ________

CAUTIONS

1. The Material Safety Data Sheet (MSDS) for the chemicals to be added must be reviewed.
2. The requirements of the FCSG-15-12, Chemical Handling & Use shall be followed.
3. The Boric Acid Batching Tank and water may be hot enough to cause burns.

6. IF Batching Tank Heaters are available, (MCC-3C2-D03, Corr 26),
THEN place Boric Acid Batching Tank Heaters Control Switch in AUTO. (Room 69)

   a. Set TIC-252, Boric Acid Batching Tank CH-12 Temperature Indicator Controller above 80°F (approximately 30°F above desired boric acid solubility temperature, per Tech Spec Figure 2-12). (Room 69) ________

7. IF placing the Aux Steam Heating Coil in service,
THEN open the following (Room 69):

- AS-868, Steam Trap AS-20H Inlet Drain Valve ___
- AS-813, Aux Steam to Boric Acid Batching Tank Ch-12 Heating Coil Isolation Valve ___ ________

8. Start CH-12-AG, Boric Acid Batching Tank Mixer. (Room 69) ________

Attachment 1 - Batching Boric Acid

PROCEDURE (continued) (✓) INITIALS

NOTES

1. BAST levels should be kept greater than or equal to 85% and BAST concentrations should be kept greater than or equal to 3% (NRC Bulletin 2003-01).

2. Each 50 pound bag of boric acid added to a full batch tank raises the concentration approximately 1.3%.

3. Each 25 kilogram bag of boric acid weighs approximately 55 pounds and when added to a full batch tank raises the concentration approximately 1.43%.

4. The Shift Manager may change the amount of boric acid crystals to be added, provided water temperatures are above solubility temperature per Tech Spec Figure 2-12. **[AR 15144]**

9. WHEN the required temperature is reached,
   THEN slowly add the desired number of Boric Acid Crystal bags (3 for 50 pound bags, 2 for 25 kilogram bags, or the amount directed by the Shift Manager). **[AR 15144]** ________

10. WHEN Boric Acid Crystals are completely dissolved,
    THEN stop CH-12-AG, Boric Acid Batching Tank Mixer. ________

11. IF Batching Tank Heaters are energized,
    THEN place Heater Control Switch in OFF. ________

12. IF Aux Steam Coil is in service,
    THEN close the following:

    - AS-868 ___
    - AS-813 ___ ________

13. Unlock and Open CH-103, Boric Acid Batching Tank CH-12 Outlet Valve. (Room 69) ________

Attachment 1 - Batching Boric Acid

PROCEDURE (continued) (✓) INITIALS

14. Open selected Boric Acid Storage Tank Inlet Valve to drain the Boric Acid Batching Tank: (Room 69)

- CH-105, Boric Acid Storage Tank CH-11A Boric Acid Inlet Valve ___
- CH-104, Boric Acid Storage Tank CH-11B Boric Acid Inlet Valve ___ ________

15. WHEN the Boric Acid Tank is empty,
THEN close the selected valve:

- CH-105 ___
- CH-104 ___ ________

16. Close CH-103. ________

17. IF additional batching is required, open DW-147 and GO TO Step 4. ________

18. WHEN batching is completed,
THEN close and lock CH-103. ________

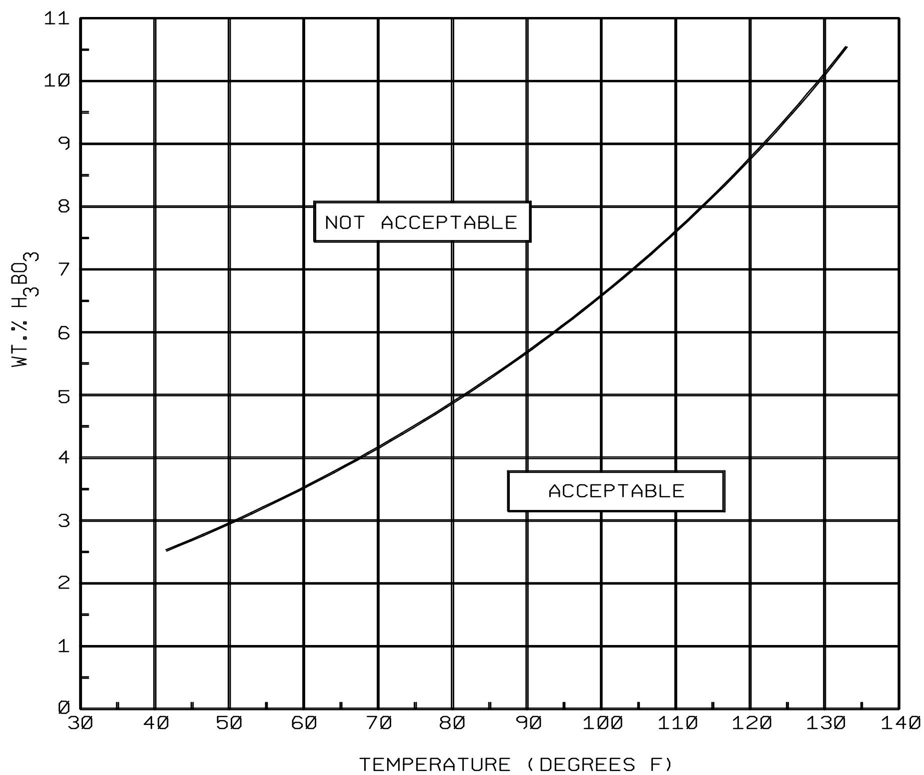
____
Ind Verif

19. Flush Boric Acid Batching Tank drain line per Attachment 12. ________

20. Close lid on Batching Tank to prevent foreign material from entering. ________

Completed by____________________________________Date/Time______/_____

Figure 2-12



BORIC ACID SOLUBILITY IN WATER	OMAHA PUBLIC POWER DISTRICT FORT CALHOUN STATION-UNIT 1	FIGURE 2-12

This scenario was withheld from public disclosure in accordance with 10CFR 2.390

Facility: Fort Calhoun Station Scenario No.: 2 Revision 2 Op-Test No.: _______

Examiners: ______________________ Operators: ______________________

______________________ ______________________

______________________ ______________________

Initial Conditions: 100% power. FW-54 OOS due to excessive vibration.

Turnover: Continue full power operations. Rotate EHC-3A on and EHC-3B off.

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOPO	Rotate EHC-3A on and EHC-3B off
2		I-ATCO TS-CRS	Pressurizer Pressure Safety Channel, A/PIA-102Y, Fails Low
3		C-BOPO TS-CRS	Loss of 480v Bus, 1B3B-4B. Bus Tie Breaker Trip
4		C-ATCO	RCP, RC-3B, Lower and Middle Seal Failure
5		N-All R-ATCO	AOP-05, Emergency Shutdown
6		C-BOPO	Stator Cooling Water Pump, ST-6B, Trips
7		M-All	Feedwater piping rupture on the recirculation line of FW-4B. Water spray will trip FW-4A. FW-4C will not start. Loss of all Feedwater.
8		C-BOPO	FW-6 Pump Coupling Failure
9		C-BOPO	FW-10 Trips on overspeed when started
10		C-ATCO	HPSI Pump, SI-2B, fails to start on safeguards actuation

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	8
2. Malfunctions after EOP entry (1–2)	3
3. Abnormal events (2–4)	3
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	2
6. EOP contingencies requiring substantive actions (0–2)	3
7. Critical tasks (2–3)	2

SCENARIO SUMMARY NRC #2

The crew will assume the watch at 100% power with FW-54 out of service due to excessive vibrations.

The first event is a rotation of Electrohydraulic Pumps, EHC-3A on and EHC-3B off.

The next event is a safety channel of pressurizer pressure, A/PT-102Y failing low. Operator actions are per ARP-CB-1,2,3/A4, Trip Unit #9 will be bypassed and Trip Unit #8 may be bypassed, **T.S. 2.15.1(1)** applies, and requires bypass within 1 hour and can remain bypassed for 48 hours.

The next event is a trip of 480v bus 1B3B-4B. Operator actions are per ARP-CB-20/A17 and include determining the cause and entry into AOP-32, LOSS OF 4160 VOLT OR 480V BUS POWER. SRO will refer to the Technical Specifications and reference T.S. 2.7(2)l for Island bus 1B3B-4B inoperable, no time limit because 1B3A-4A and 1B3C-4C are operable. Enter **T.S. 2.4(1)b**, 7 day time limit for VA-7D being inoperable.

The next event is a failure of RC-3B Lower and Middle Seals. Operator actions are per ARP-CB-1,2,3/A6, ARP-CB-1,2,3/A1 and AOP-35, REACTOR COOLANT PUMP MALFUNCTIONS. Actions may include adjusting CCW flow to the seal cooler to clear high temperature alarm and adjusting RCP Bleedoff pressure. SRO will enter AOP-05, EMERGENCY SHUTDOWN, for two failed seals.

The next event is a plant shutdown per AOP-05.

Then next event is a trip of the running Stator Cooling Water Pump, ST-6B. Operator actions are per ARP-CB-10,11/A10 and ARP-DCS-EHC. Operator will be dispatched and the standby Stator Cooling Water Pump will be started, all alarms will reset.

The next event will be a Feedwater Pump recirculation line rupture on FW-4B, the control room will respond to alarms and indications, FW-4A will trip and the crew will recognize the need to trip the reactor due to inadequate feed flow. On the trip, FW-4B will trip. FW-4C will not start if the crew attempts to start pump.

When operators attempt to restore feedwater during post trip actions. FW-6 will start but the pump coupling will fail and the pump will have no flow. On start of FW-10, it will trip on overspeed. SRO will determine that all feedwater is lost and diagnostics will direct entering EOP-06, LOSS OF ALL FEEDWATER.

The crew will attempt to feed S/G's with condensate in EOP-06. During this time S/G level will lower to entry conditions for once through cooling. The crew will recognize once through cooling is required and perform actions when the least affected S/G level is less than 27% WR **(critical task)**. EOP-06 will send crew to EOP-20 HR-4 for once through cooling and verify actions taken. When initiating PPLS for once through cooling, SI-2B will fail to start. Crew will recognize the need for two HPSI pumps for adequate heat removal during once through cooling and start SI-2C **(critical task).**

The scenario can be terminated when once through cooling is established.

Procedure Number	Procedure Title	Revision
OI-ST-12	TURBINE HYDRAULIC POWER UNIT OPERATION	31
ARP-CB-1,2,3/A4		32
OI-RC-7	REACTOR COOLANT SYSTEM PRESSURE CONTOL NORMAL OPERATION	18
ARP-CB-20/A17		30
AOP-32	LOSS OF 4160 VOLT OR 480 VOLT BUS POWER	19
OI-RM-1	RADIATION MONITORING	67
ARP-CB-1,2,3/A6		48
AOP-35	REACTOR COOLANT PUMP MALFUNCTIONS	7
ARP-CB-10,11/A10		17
ARP-DCS-EHC		5
AOP-05	EMERGENCY SHUTDOWN	12
EOP-00	STANDARD POST TRIP ACTIONS	31
	EOP/AOP ATTACHMENTS	0
	EOP/AOP FLOATING STEPS	5
EOP-06	LOSS OF ALL FEEDWATER	18
EOP-20	FUNCTIONAL RECOVERY PROCEDURE	27a

Op-Test No.: ______ Scenario No.: 2 Event No.: 1

Event Description: Rotate EHC-3A on and EHC-3B off.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct BOPO to rotate EHC-3A on and EHC-3B off.
	BOPO	**Per OI-ST-12, Attachment 7 NORMAL ROTATION OF ELECTROHYDRAULIC PUMPS**
	BOPO	Read Notes on page 15.
	BOPO	(Step 1) Start standby EHC Pump, EHC-3A.
	BOPO	(Step 2) Ensure EHC system pressure is stable and indicating greater than 1500 psig on PI-2101.
	BOPO	(Step 3) Check EHC-3A motor current is 40 to 50 amps.
	BOPO	Read Note
	BOPO	(Step 4) Check for proper local operation. • PI-5116 pressure approximately equal to PI-2101A pressure • PI-5115 pressure approximately equal to PI-2101A pressure • No bubbles visible in EHC-3A suction strainer NOTE: BOPO will direct the Turbine Bldg Operator to verify local operation per step 4.
When directed as Turbine Bldg Operator to verify local operation per step 4, report after 30 seconds that step 4 is completed and everything looks good.		
	BOPO	(Step 5) Stop EHC Pump, EHC-3B by placing pump control switch in AFTERSTOP.
	BOPO	(Step 6) If EHC-3A fails to maintain adequate pressure, start EHC-3B. NOTE: Pressure is maintained, step is N/A.
		Event is terminated when EHC pumps are rotated. Lead examiner will cue next event.

Event Description: Pressurizer Pressure Safety Channel, A/PIA-102Y, Fails Low.

Time	Position	Applicant's Actions or Behavior
	ATCO	Respond to alarms CB-4/A20 Window A-5, TM/LOW PRESSURE CHANNEL TRIP, Window B-5, TM/LOW PRESSURE PRETRIP and CB-1,2,3/A4 Window A-5, PRESSURIZER SAFETY INJ SIGNAL LO-LO PRESSURE A/P102Y.
	ATCO	Inform CRS of failure of A/P102Y.
	ATCO	**Per ARP-CB-4/A20 Window A-5**
	ATCO	(Step 1) Check for TM/LP trip lights. NOTE: Channel 'A' RPS will indicate tripped and no other channels.
	ATCO	(Step 2) Verify the following Reactor Protection and RCS parameters: • A,B,C,D/PIA-102Y, Pressurizer Pressure. NOTE: Only 'A' failed • TI-112C/122C, RCS Cold Leg Temps. NOTE: All are normal • ASI, NI and ΔT Power. NOTE: All are normal • TM/LP setpoint greater than 1750 psia. NOTE: All are normal • Verify Turbine load corresponds to Reactor Power. NOTE: No change in power
	ATCO	(Step 3) If any parameter is out of limit, trip the Reactor. NOTE: No parameters are out of limit.
	ATCO	(Step 4) If all parameters are within limits, notify Work Week Manager. NOTE: ATCO will inform the CRS to make notification.
	ATCO	(Step 5) If a TM/LP channel is declared inoperable, bypass the affected channel.
	CRS	Direct ATCO to bypass TM/LP Trip Unit on AI-31A per OI-RPS-1. NOTE: CRS may also direct bypassing Trip Unit #8.
	ATCO	Bypass Trip Units #8 and 9 on AI-31A.
	CRS	Enter **T.S. 2.15.1(1)**, 1 hour to bypass trip unit and may be bypassed for 48 hours.
		Event is terminated once Tech Spec call is made and Trip Unit is bypassed. Lead examiner will cue next event.

Event Description Loss of 480v Bus, 1B3B-4B. Bus Tie Breaker Trip.

Time	Position	Applicant's Actions or Behavior
	BOPO	Respond to alarms CB-20/A17 Window B-9, 480V BUS TIE BKRS TRIP/OFF NORM and Window D-8, 480V BUS 1B3A-4A 1B3B-4B 1B3C-4C LOW VOLTAGE. Will determine the 480v Bus which was lost and update the crew. May read placard on CB-20 which lists the major loads on the bus.
	BOPO	May walk down panels to verify proper equipment operation and determine that Condenser Evacuation Pump, FW-8C, has tripped. FW-8A will be started on direction of CRS or per ARP-CB-10,11/A9 Window B-6U, VAC PUMP C STOPPED OR SEAL TEMP HI.
	CRS	Enter AOP-32, LOSS OF 4160 VOLT OR 480 VOLT BUS POWER, Section 1, Plant Stabilization and Diagnostics.
	BOPO	Enter ARP-CB-20/A17 Window B-9.
	BOPO	**Per ARP-CB-20/A17 Window B-9**
	BOPO	(Step 1) Determine the 480v Island Bus with the off normal breaker.
	BOPO	(Step 1.1) If the breaker has tripped, notify Work Week Manager. NOTE: Informs CRS to notify WWM.
	CRS	Notifies Work Week Manager of breaker trip.
	BOPO	(Step 1.2) Ensure minimum operable Safeguards Equipment is available. NOTE: Operator may read the placard on CB-20 which lists major loads on the bus.
	BOPO	(Step 2 and 2.1) If the 480v supply breaker is not tripped and the normally closed bus tie breaker is open, perform the following: Dispatch Operator to check the following: • Check local 69 switch not in PULL TO LOCK • Check the 69 switch not in AFTER-TRIP • Check breaker is properly racked into position • Check Micrologic Trip unit alarm indication Check the Control Room switch not in PULL TO LOCK.
When directed as Waterplant Operator to investigate breaker trip, report after one minute that breaker BT-1B4B has tripped on overcurrent.		
	BOPO	(Step 3) If any 480v Bus is deenergized, implement AOP-32. NOTE: CRS may have entered the AOP earlier.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 2 Event No.: 3

Event Description: Loss of 480v Bus, 1B3B-4B. Bus Tie Breaker Trip.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 4) Refer to Technical Specification 2.7. NOTE: BOPO may inform CRS of TS reference.
	CRS	**Per AOP-32 Section I, Plant Stabilization and Diagnostics**
	CRS	(Step 1) If a Reactor trip has occurred. NOTE: There was no reactor trip, step is N/A.
	CRS	(Step 2) Ensure both DG Mode Selector Switches are in EMERGENCY STANDBY. • 43-1/D1 • 43-1/D2
	CRS	(Step 3) If plant is not on SDC, go to step 9. NOTE: Plant is not on SDC, CRS will go to step 9.
	BOPO	(Step 9) Verify at least one vital 4160v Bus is energized.
	ATCO	(Step 10 and 11) Verify CCW and RW operation. • At least one CCW pump running with greater than 60 psig • At least one RW pump running.
	BOPO	(Step 12 and 13) Verify a Bearing Water pump is running and an Air Compressor with greater than 90 psig Instrument Air pressure.
	ATCO	(Step 14 and 15) Ensure a Charging Pump is operating and RCS pressure is maintained per Attachment 12.
	CRS	(Step 16) Terminate all radioactive releases. NOTE: No releases in progress, step is N/A.
	CRS	(Step 17) If the plant is on SDC, go to step 21. NOTE: Plant is not on SDC, continues with step 18.
	ATCO	(Step 18) Verify at least one RCP is operating.
	BOPO	(Step 19) Maintains S/G levels at 35-85% per Attachment HR-11.
	BOPO	(Step 20) If condenser vacuum is greater than 19 inches, verify RCS temperature control by Normal Turbine Generator operation per Attachment HR-12.
		Event description continued on next page.

Event Description: Loss of 480v Bus, 1B3B-4B. Bus Tie Breaker Trip.

Time	Position	Applicant's Actions or Behavior
	CRS	(Step 21) If lighting was lost. NOTE: Lighting was not lost, step is N/A.
	CRS	(Step 22) Determine lost bus and go to appropriate section of AOP. NOTE: CRS will go to section XX for Loss of 480v Bus 1B3B-4B.
	CRS	**Per AOP-32 Section XX, Loss of 480V Bus 1B3B-4B**
	CRS	(Step 1) Verify any or all of the following: • Low voltage alarm on CB-20/A17 Window D-8. • Breaker BT-1B3B tripped. • Breaker BT-1B4B tripped. NOTE: Low voltage alarm is in and BT-1B4B is tripped.
	CRS	(Step 2) If CH-1C was lost. NOTE: CH-1A is operating, step is N/A.
	CRS	(Step 3) Restore Condenser vacuum by starting FW-8A/B. NOTE: CRS may have directed starting of FW-8A when FW-8C tripped.
	CRS	(Step 4) Refer to Attachment B for list of components powered from 1B3B-4B.
	CRS	(Step 5) Determine the cause for loss of Bus 1B3B-4B. NOTE: Waterplant Operator may have reported cause of failure.
	CRS **(TS)**	(Step 6) Refer to Technical Specifications for operability requirements. Reference T.S. 2.2.4 for CH-1C inoperable, CH-1A/B are both operable and meet T.S. requirements. Reference T.S. 2.7(2)l for Island bus 1B3B-4B inoperable, no time limit because 1B3A-4A and 1B3C-4C are operable. Enter **T.S. 2.4(1)b**, 7 day time limit for VA-7D being inoperable
	CRS	Read Note.
	CRS	(Step 7) If no fault exists on bus 1B3B-4B, consider energizing bus. NOTE: Cause of breaker trip is still unknown, crew will not energize bus.
	CRS	(Step 8) If Bus 1B3B-4B is energized from Bus 1B3B NOTE: Bus is not energized, step is N/A.
		Event terminated when AOP-32 Section XX is completed. Lead examiner will cue next event.

Event Description: RCP, RC-3B, Lower and Middle Seal Failure.

Time	Position	Applicant's Actions or Behavior
	ATCO	Respond to alarms CB-1,2,3/A6 Window B-1, REACTOR COOLANT PUMP RC-3B SEAL LEAKAGE FLOW HI.
	ATCO/BOPO	Determine that the lower and middle seals have failed on RC-3B by indications on the ERF and inform the CRS.
	CRS	Enter AOP-35, REACTOR COOLANT PUMP MALFUNCTIONS.
	ATCO	Enter ARP-CB-1,2,3/A6 Window B-1
	ATCO	**Per ARP-CB-1,2,3/A6 Window B-1**
	ATCO	(Step 1) Check RC-3B Seal parameters on ERF display 342 or 441.
	ATCO	(Step 2) If either of the following conditions is satisfied: • One or more seals indicate D/P less than 200 psid. NOTE: D/P is less than 200 psid. • Seal Bleedoff temperature greater than 180°F. Implement AOP-35 and inform the Director-Operations and Work Week Manager.
	CRS	Informs Director-Operations and Work Week Manager of entry into AOP.
	ATCO	(Step 3) If Seal Bleedoff flow is greater than 2.0 gpm, verify pressure is 40 to 60 psig. NOTE: Seal Bleedoff flow is less than 2.0 gpm and RCP Bleedoff pressure may be outside the normal band.
	ATCO	(Step 4) If pressure is outside 40 to 60 psig, perform the following: • Ensure HCV-241 and HCV-206 are open. NOTE: Both valves are open. • Adjust CH-275 to maintain Bleedoff Pressure in the normal band. NOTE: Pressure is outside normal band. • Monitor proper Seal Bleedoff flow for all RCP's. Note: May direct Aux Bldg Operator to adjust Seal Bleedoff Pressure.
If directed as Aux Bldg Operator to adjust Controlled Bleedoff pressure, report after one minute that you are standing by to adjust CH-275 or have opened the requested amount.		
	ATCO	Respond to alarm CB-1,2,3/A1 Window A-5L, CC WATER FROM RC-3B SEAL COOLER TEMP HI.
	ATCO	May enter ARP-CB-1,2,3/A1 Window A-5L.
		Event description continued on next page.

Event Description: RCP, RC-3B, Lower and Middle Seal Failure.

Time	Position	Applicant's Actions or Behavior
	ATCO	**Per ARP-CB-1,2,3/A1 Window A-5L**
	ATCO	Read Caution: RCP operation is terminated after five minutes with no CCW flow.
	ATCO	(Step 1) Check the position of HCV-438A/B/C/D, RCP Cooler Containment Isolation valves. NOTE: Valves are open, steps 1.1 and 1.2 are N/A.
	ATCO	(Step 2) If high temperature is due to a loss of CCW, go to AOP-11. NOTE: CCW is not lost, step is N/A.
	ATCO	Read Note: Operating selector switch (HC-450/465) may cause momentary hi temp alarms.
	ATCO	(Step 3) Check TI-558/465, CCW temperature from RC-3B seal cooler, greater than 120°F. NOTE: Temperature is greater than 120°F.
	ATCO	(Step 4) Raise flow through RC-3B seal cooler by throttling open HCV-443, RC-3B PUMP SEAL CLR AC OUTL. • Monitor CCW flow on FI-450/453. • Monitor RC-3B parameters on the ERF. NOTE: ATCO will adjust controller to put more flow on seal cooler.
	CRS	**Per AOP-35, Section I, RCP Seal Failures**
	CRS	Read notes on page 4.
	ATCO	(Step 1) Verify none of the following conditions exist: • Lower seal cavity temperature of 200°F • Vapor seal pressure equals RCS pressure • More than two seals failed NOTE: None of the conditions are met, does not trip reactor.
	ATCO	(Step 2) Verify proper seal operation by all of the following: • D/P across each pump seal is greater than 200 psid • Middle seal inlet pressure is greater than 500 psig with bleedoff flow greater than 0.5 gpm • Controlled Bleedoff temperature is less than 250°F NOTE: D/P is not met and transitions to contingency actions.
		Event description continued on next page.

Event Description: RCP, RC-3B, Lower and Middle Seal Failure.

Time	Position	Applicant's Actions or Behavior
	CRS	(Step 2.1) If only one seal is failed, continue to monitor seal parameters. NOTE: Two seals are failed.
	CRS	(Step 2.2) If any of the following conditions exists: • Two seals have failed • Middle seal inlet pressure is greater than 500 psig with bleedoff flow greater than 0.5 gpm • Controlled Bleedoff temperature is less than 250°F And the Reactor is critical, stop the affected RCP's by performing.
	CRS	(Step 2.2a) Commence immediate Plant Shutdown per AOP-05, EMERGENCY SHUTDOWN.
	CRS	(Step 2.2b) Continue to monitor seal parameters.
	CRS	(Step 2.2c) Monitor for entry conditions of AOP-22.
	CRS	(Step 2.2d) When Reactor is shutdown, stop the affected RCP.
	ATCO	(Step 3) If Controlled Bleedoff temperature is greater than 165°F, ensure adequate CCW flow.
	CRS	Read Note: RCP Bleedoff pressure may not be obtained if the RCS is operating at low pressure.
	ATCO	(Step 4) Verify RCP Controlled Bleedoff pressure is 40 to 60 psig. NOTE: Pressure restoration also directed by ARP.
	ATCO	(Step 5) Ensure HCV-241 and HCV-206, CONTROLLED BLEEDOFF INBOARD AND OUTBOARD ISOLATIONS, are open. NOTE: Valve positions also verified by ARP-CB-1,2,3/A6, B-1.
	CRS	(Step 6) Verify normal seal operating parameters. NOTE: Seal does not meet normal parameters, transition to contingency actions.
	CRS	(Step 6.1) Continue efforts to restore seal operation.
		Event is terminated when crew enters AOP-05 for shutdown.

Event Description: AOP-05, Emergency Shutdown.

Time	Position	Applicant's Actions or Behavior
	CRS	Enter AOP-05, EMERGENCY SHUTDOWN.
	CRS	**Per AOP-05**
	CRS	Read notes on page 3, briefs the crew on the shutdown and gives Reactor trip criteria. NOTE: Trip criteria is in note 4.
	CRS	Read Note: TDB-III-23a and Power Ascension/Power Reduction Strategy provide guidance for shutdown.
	CRS	(Step 1) For additional guidance contact Reactor Engineer.
	CRS	Read Note: Operation of more than one Charging Pump will raise the rate of power reduction.
	ATCO	(Step 2) If borating from the SIRWT, perform the following: (Step 2.a) Ensure one Charging Pump is operating (Step 2.b) Open LCV-218-3 (Step 2.c) Close LCV-218-2
	CRS	(Step 3) If borating from CVCS. NOTE: Boration is from SIRWT, step is N/A.
	CRS	(Step 4) Notify Energy Marketing of the power reduction.
	CRS	Read Note: Maintain Tcold per TDB Figure III.1, Tave Program.
	BOPO	(Step 5) Maintain RCS Temperature Control using Attachment HR-12, Secondary Heat Removal Operation within the following: • Tcold 527-545°F • Tcold within +0°F, -1°F of program
	BOPO	**Per Attachment HR-12 Secondary Heat Removal Operation**
	BOPO	(Step 1) If Turbine is online, ensure Turbine Control is in MANUAL.
	BOPO	Read Note: Output will be highlighted by a yellow box when selected.
	BOPO	(Step 2) Select OUTPUT by pushing the OUT button.
	BOPO	Read Note: Single arrow will adjust turbine load 0.1% and the double arrow 0.5% and maintain temperature within the program.
		Event description continued on next page.

Event Description: AOP-05, Emergency Shutdown.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 3) Adjust Turbine load by pressing the single or double UP or DOWN arrows to maintain the following: • Tcold 527-545°F • Tcold within +0°F, -1°F of program
	CRS	**Per AOP-05**
	ATCO	(Step 6) Maintain Pressurizer Level using Attachment IC-11, Inventory Control within the following: • PZR level 45-60% • PZR level within 4% of program
	ATCO	(Step 7) Maintain VCT level 55-85% by performing the following: • Place LCV-218-1 to RWTS • When diversion to waste is complete, place LCV-218-1 in AUTO
	ATCO	(Step 8) Maximize pressurizer heaters and spray per the following: (Step 8.a) Energize Backup Heaters by placing each Control Switch to ON: • 225KW Backup Htrs Bank 1 Group 1/2/3 • 150KW Backup Htrs Bank 2 Group 4/5 • 150KW Backup Htrs Bank 2 Group 8/9 • 225KW Backup Htrs bank 4 group 10/11/12 (Step 8.b) Adjust the controller, PC-103X, setpoint pushbutton to maintain pressure 2080-2145 psia. NOTE: Controller setpoint will be adjusted in the lower direction
	CRS	(Step 9) Adjust Regulating Group 4 during shutdown to control ASI per OI-RR-1 Att. 4.
	CRS	(Step 10) If Reactor power change is greater than 15% in one hour, direct Shift Chemist to sample RCS to satisfy T.S. 3.2. NOTE: Shift Chemist will be notified of power reduction and sample requirement.
		When down power has commenced and reactor effects have been noted. Lead examiner will cue the next event.

Event Description: Stator Cooling Water Pump, ST-6B, Trips.

Time	Position	Applicant's Actions or Behavior
NOTE: From the time the Stator Cooler Panel Trouble alarm comes in, the crew has 60 seconds before an automatic Turbine trip to start the other pump.		
	BOPO	Respond to alarm CB-10,11/A10 Window B-5U, STATOR COOLER PANEL TROUBLE. NOTE: DCS alarms will show Low Flow and Low Pressure on Stator Cooling.
	BOPO	Enters ARP-CB-10,11/A10 and dispatches Turbine Bldg Operator to investigate Stator Cooling pumps. Informs CRS of alarms and failure of the standby Stator Cooling Water pump to start.
	CRS	May direct starting of the standby pump, ST-6A.
When directed as Turbine Bldg Operator to investigate Stator Cooling Water, report after 30 seconds that the pump motor is hot to the touch. If dispatched to the breaker, report after one minute that it is tripped.		
	BOPO	May direct Turbine Bldg Operator to ensure proper operation of Stator Cooling pump, ST-6A, and ensure normal indications at AI-134.
When directed as Turbine Bldg Operator to ensure proper operation of Stator Cooling, report after one minute that ST-6A looks good and all low flow and pressure alarms at AI-134 have reset.		
	BOPO	May backup actions with ARP-DCS-EHC for the Stator Cooling Low Flow and Pressure alarms. NOTE: Dispatching operator and starting the standby pump was performed, all other actions will be N/A.
		Event is terminated when Stator Cooling Pump is started and plant is stable. Lead examiner will cue the next event.

Event Description: Feedwater piping ruptures on the recirculation line of FW-4B, FW-6 Pump Coupling Failure and FW-10 Trips on overspeed when started.

Time	Position	Applicant's Actions or Behavior
Report as Turbine Bldg Operator that there is a feed rupture in the Turbine Bldg basement. If location is requested, report that you have evacuated the area due to steam.		
	BOPO	Recognize lowering S/G levels and verifies the following: • Feed Pump suction flow on CB-10/11 • Feed flow of DCS • Feed Regulating valves opening May recommend tripping Reactor prior to Low S/G Level trip.
	CRS	Directs tripping of the Reactor.
	ATCO	Trips the Reactor.
	BOPO	May report FW-4A and FW-4B tripped.
	CRS	**Enter EOP-00, STANDARD POST TRIP ACTIONS**
	ATCO	(Step 1) Verify reactivity control established: • Reactor power is lowering • Startup rate is negative • No more than 1 regulating or shutdown CEA not inserted • Monitor for uncontrolled RCS cooldown
	BOPO	(Step 2) Verify turbine tripped as indicated by stop and intercept valves indicating closed.
	CRS	May direct securing RC-3B.
	BOPO	(Step 3) Ensure all of the following generator breakers tripped: • Generator Output Breaker 3451-4 • Generator Output Breaker 3451-5 • Generator Field Breaker 41E/G1F.
	BOPO	(Step 4) Verify buses 1A3 and 1A4 energized.
	BOPO	(Step 5) Ensure Diesel Generators have started if SIAS has occurred. NOTE: No SIAS, DG's do not start.
	BOPO	(Step 6) Check that Buses 1A1 and 1A2 are energized.
	BOPO	(Step 7) Check that 125 VDC buses 1 and 2 are energized.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 2 Event No.: 7,8,9

Event Description: Feedwater piping ruptures on the recirculation line of FW-4B, FW-6 Pump Coupling Failure and FW-10 Trips on overspeed when started.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 8) Verify instrument air is available by both of the following: • IA pressure greater than or equal to 90 psig • At least one air compressor running
	ATCO	(Step 9) Determine normal CCW system operation: • At least one CCW pump operating • CCW pressure is greater than or equal to 60 psig • At least one RW pump is operating • RCP coolers CCW valves HCV-438A/B/C/D are open
	ATCO	(Step 10) Verify RCS Inventory Control by all of the following: • PZR level 30-70% • PZR level trending to 45-60% • RCS subcooling greater than or equal to 20°F
	ATCO	(Step 11) Verify RCS Pressure Control by all of the following: • RCS pressure 1800-2300 psia • RCS pressure trending to 2050-2150 psia • PORV's are closed.
If all feed Pumps have been secured, report as Turbine Bldg Operator that the rupture is on FW-4B Recirc line and can be isolated with FW-1262, FW-4B Recirc Isolation Valve.		
	ATCO	(Step 12) Verify Core Heat Removal by all of the following: • RCP NPSH satisfied per Attachment PC-12 • At least one RCP running • Core ΔT less than or equal to 10°F NOTE: CRS may have directed tripping of RC-3B due to failed seals.
	BOPO	Requests from CRS to perform a contingency action 13.1c and start FW-6 to feed. Report to CRS on start of FW-6 that there is no flow but the pump is running.
	BOPO	Requests from CRS to perform a contingency action 13.1c and start FW-10 to feed. Report to CRS on start of FW-10 that the trouble alarm came in and the pump is not running.
	BOPO	May direct Waterplant Operator to investigate FW-6 and FW-10 failure to function correctly.
If directed as Waterplant Operator to investigate FW-6 & FW-10, report after one minute that FW-6 pump coupling has failed and FW-10 has tripped on overspeed.		
		Event description continued on next page.

Event Description: Feedwater piping ruptures on the recirculation line of FW-4B, FW-6 Pump Coupling Failure and FW-10 Trips on overspeed when started.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 13) Verify Main Feedwater is restoring level in at least one steam generator. NOTE: Transition to contingency step 13.1c, attempts to start AFW pumps may have been attempted by BOPO.
	BOPO	(Step 13.a,b) Ensure both Feed Reg valves are closed and Bypass Valves ramped to 40-45%.
	BOPO	(Step 13.c) Place the 43/FW switch in OFF.
	BOPO	(Step 13.d) Ensure no more than one Feed Pump is operating. NOTE: No Feedwater Pumps are running.
	BOPO	(Step 13.e) Ensure no more than one Condensate Pump is operating, NOTE: FW-2A will be secured, FW-2B is running.
	BOPO	(Step 13.f) Stop all Heater Drain Pumps.
	BOPO	(Step 13.g) Ensure S/G Blowdown Isolation valves are closed, HCV-1387A/B and HCV-1388A/B.
	BOPO	(Step 14) Verify Steam Dump and Bypass Valves controlling: • RCS T_C 525-535°F • S/G pressure 850-925 psia
	ATCO	(Step 15) Verify normal containment conditions: • No unexpected rise in sump level • No containment area alarms • RM-051, 052, and 062 not in alarm • RM-054A/B and RM-057 not in alarm or trending upward • Containment pressure less than 3.0 psig • Containment temperature less than 120°F
	CRS	(Step 16) Determine appropriate procedure to implement per Section 6.0 Diagnostic Actions
	CRS	**Enters EOP-06, LOSS OF ALL FEEDWATER**
	CRS	(Step 1) Confirm SPTA's performed.
	CRS	(Step 2) Confirm diagnosis of Loss of All Feedwater by verifying Safety Function Status Check Acceptance Criteria.
		Event description continued on next page

Event Description: HPSI Pump, SI-2B fails to start on safeguards actuation.

Time	Position	Applicant's Actions or Behavior
	CRS	(Step 3) Implement the Emergency Plan.
	CRS	Read Note: Floating Step BB requires minimizing DC loads within 15 minutes of either battery charger.
	ATCO/BOPO	(Step 4) Monitor the Floating Steps.
	ATCO	(Step 5) Trip all RCP's.
	ATCO	May place TCV-909 controller in MANUAL and make output zero percent.
	BOPO	(Step 6) Minimize loss of S/G inventory by: • Ensure blowdown is isolated. NOTE: Blowdown was isolated in EOP-00. • Isolate blowdown sampling. HCV-2506A/B HCV-2507A/B
	BOPO	(Step 7) If Feedwater line break is suspected, isolate leak. NOTE: May have directed the Turbine Bldg operator to isolate leak.
When directed as Turbine Bldg operator to isolate feed leak, report after one minute that FW-1262 is closed.		
	CRS	(Step 8) If SGIS has actuated. NOTE: SGIS has not actuated, step is N/A.
	CRS	(Step 9) If Off-Site power has been lost. NOTE: Off-Site power has not been lost, step is N/A.
	CRS	(Step 10) If Main Feedwater is available. NOTE: May attempt to start FW-4C per Attachment HR-15 which directs starting of Feed Pump per Attachment MVA-25. FW-4C will not start.
	CRS	(Step 11 & 12) Initiate AFW using FW-6 or FW-10. NOTE: No AFW pumps are available, step is N/A.
	CRS	May request status of FW-54 maintenance from the Work Week Manager and how long to return it to service.
If contacted as Work Week Manager on when FW-54 can be returned to service, report that it is partially disassembled and will require two hours to restore.		
		Event description continued on next page

Event Description: HPSI Pump, SI-2B fails to start on safeguards actuation.

Time	Position	Applicant's Actions or Behavior
	CRS	Read Cautions on page 10.
	CRS	(Step 13) If any Condensate Pumps are operating and a flow path to at least one S/G is available perform the following.
	BOPO	(Step 13.a) Place all Feed Pump control switches is PULL TO LOCK.
	BOPO	(Step 13.b) Locally open all Feed Pump Discharge Valves. Dispatch Turbine Bldg Operator to open valves HCV-1150A, HCV-1150C. May open HCV-1150B if FW-1262 is closed.
When directed as Turbine Bldg operator to open Feed Pump Discharge Valves, report when valves are full open.		
	BOPO	(Step 13.c) Verify all Feed Pump Recirc Valves, FCV-1151A/B/C are closed.
	BOPO	(Step 13.d) Start all Feed Pump Lube Oil pumps, FW-30A/B/C. NOTE: BOPO will start the Lube Oil pumps for the Feed Pumps with discharge valve open.
	BOPO	(Step 13.e) Reduce S/G pressure to less than 550 psia per Attachment HR-12.
	BOPO	**Per Attachment HR-12, Secondary Heat Removal Operation**
		(Step 1) If Turbine is online. NOTE: Turbine is not online, transitions to contingency action 1.1 which directs go to step 4.
	BOPO	Reads notes and caution on page 16.
	BOPO	(Step 4) If Steam Dump and Bypass is available, control RCS temperature with a single valve by performing the following: • Select the valve to be operated (PCV-910) • Place the controller for PCV-910 in MANUAL • Push the UP and DOWN arrows as required to adjust PCV-910 output NOTE: BOPO will lower S/G pressure till feed flow via Condensate Pumps is established.
		Per EOP-06
	ATCO	(Step 13.f) Maintain PZR level 10-70% per Attachment IC-11.
		Event description continued on next page.

Event Description: HPSI Pump, SI-2B fails to start on safeguards actuation.

Time	Position	Applicant's Actions or Behavior
	ATCO	(Step 13.g) Maintain RCS pressure per Attachment PC-12 by controlling PZR heaters and spray per Attachment PC-11.
	BOPO	(Step 13.h) Locally ensure FCV-1172, Condensate Pump Recirc Valve is closed. Direct Turbine Bldg Operator to ensure FCV-1172 is closed.
When directed as Turbine Bldg Operator to ensure FCV-1172 is closed, report after one minute that the valve is closed.		
	CRS	Read Note: SGLS Block Permissive is enabled at less than 550 psia.
	BOPO	(Step 13.i) When S/G pressure is less than 550 psia, ensure SGLS is blocked by performing: (Step 13.i.1) Place SGLS Block key into SGLS Block key switch (Step 13.i.2) Block SGLS by turning key to BLOCK (Step 13.i.3) Verify both SGLS 'A' and 'B' BLOCKED alarms
	BOPO	(Step 13.j) Ensure both Feed Header Isolation Valves are open. • HCV-1385 • HCV-1386
	BOPO	(Step 13.k) Ensure both Feed Reg Block Valves are closed. • HCV-1103 • HCV-1104
	BOPO	(Step 13.l) Control feed flow with Feed Reg Bypass Valves, HCV-1105/1106, per Attachment HR-11.
	ATCO/BOPO	(Step14) Verify adequate RCS Heat Removal by both of the following: • At least one S/G has level greater than or equal to 27% WR • TCS Tcold is stable or lowering. NOTE: CRS will transition to contingency action 14.1 when either indication is met. The CRS will commence actions up to opening the PORV's at a level greater than 27% in preparation for Once Through Cooling.
	BOPO **(CT)**	**When the least affected S/G level is less than 27% WR, the crew will commence once through cooling and it will be in progress by 10% WR.**
		Event description continued on next page.

Event Description: HPSI Pump, SI-2B fails to start on safeguards actuation.

Time	Position	Applicant's Actions or Behavior
	ATCO	(Step 14.1a) If both Vital buses are energized perform the following: • Stop all RCP's. NOTE: This was performed in step 5 of EOP-06 • Deenergize all PZR heaters • Initiate PPLS by placing both test switches in TEST • Ensure two HPSI pumps start • Ensure all HPSI Loop Injection valves are open • Verify all Charging pumps start • Ensure both PORV block valves are open, HCV-150/151 • Open PORV's • Go to EOP-20, Success Path HR-4.
	ATCO **(CT)**	**On actuation of PPLS, recognize that SI-2B failed to start and start SI-2C for adequate heat removal.**
	CRS	**Per EOP-20 HR-4, Once Through Cooling**
	CRS	Read Note and Cautions on page 381.
	CRS	The actions in step 1 are a verification of actions just completed in EOP-06 step 14. Step 1.h is a go to step 60.
	BOPO	(Step 60) Isolate both S/G's.
		Terminate scenario when Once through Cooling is in progress.

Facility: _Fort Calhoun Station__ Scenario No.: ___3____ Revision __1__ Op-Test No.: _______

Examiners: ______________________________ Operators: ______________________________

______________________________ ______________________________

______________________________ ______________________________

Initial Conditions: Reactor is currently at 100% power. DG-1 is out of service for Generator Brush replacement.

Turnover: Continue full power operations. Rotate AC-3C off for breaker maintenance and place AC-3A in service.

Event No.	Malf. No.	Event Type*	Event Description
1		N-ATCO	Rotate Component Cooling Water Pumps
2		C-ALL R-BOPO TS-CRS	Dropped CEA (Rod 03)
3		N-ALL R-ATCO	AOP-05, Emergency Shutdown to 70% Power
4		I-ATCO	Pressurizer Level Transmitter, LT-101X, Fails High
5		C-ALL TS-CRS	Loss of 161 KV
6		C-ALL	Second Dropped CEA (Rod 01)– Manual Reactor Trip Required
7		M-ALL C-BOPO	Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4 – Station Blackout

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5–8)	5
2. Malfunctions after EOP entry (1–2)	1
3. Abnormal events (2–4)	3
4. Major transients (1–2)	1
5. EOPs entered/requiring substantive actions (1–2)	2
6. EOP contingencies requiring substantive actions (0–2)	2
7. Critical tasks (2–3)	2

SCENARIO SUMMARY NRC #3

The crew assumes the watch with the reactor at 100% power. Diesel Generator #1 is out of service for Generator brush replacement.

The first event is rotating Component Cooling Water Pumps, place AC-3A in service and secure AC-3C. SRO will refer to Technical Specification. **T.S. 2.4(1)b, 7 day LCO** applies while CCW Pump discharge valve is closed.

The next event is CEA 03 drops into core. This will require the BOPO to lower turbine load to restore RCS Tcold to program temperature. The CRS will direct the crew to lower Reactor power to less than 70% within one hour per **T.S. 2.10.2(4)e** and AOP-02, CEA AND CONTROL SYSTEM MALFUNCTIONS to recover dropped rod. The power reduction will be per AOP-05, EMERGENCY SHUTDOWN.

The next event is a plant shutdown to 70% per AOP-05.

The next event is a failure of the controlling pressurizer level instrument. Operator actions are taken per ARP-CB-1,2,3/A4 and OI-RC-8 to select other channel or the CRS may direct placing the pressurizer level control switch to channel Y and backup actions with the procedures.

The next event is a failure of the offsite 161 KV line to the plant. Operator actions are per ARP-CB-20/A15 and AOP-31, 161 KV GRID MALFUNCTIONS and include establishing balanced 4160 V bus loading by ensuring that Condensate Pump, FW-2A, Feed Pump, FW-4A and Heater Drain Pump, FW-5A are operating. SRO will refer to Technical Specifications. The SRO will enter **T.S. 2.7.2(c)** for transformers T1A-3 and T1A-4 being inoperable and is a 72 hour time limit. The SRO will also enter **T.S. 2.0.1** for loss of 161 KV and DG-1 being out of service, two components inoperable in T.S. 2.7. Requires plant to be in Hot Shutdown within 6 hours.

The next event is a second dropped CEA placing the plant in an unanalyzed condition (2 dropped CEA's) requiring a manual reactor trip **(Critical Task).** The manual reactor trip will result in a Station Blackout. This will require minimizing of DC Loads **(Critical Task).** DG-1 is OOS and the breaker for CW-1C, Circulating Water Pump, does not open preventing DG-2 from loading onto bus 1A4. The crew will recognize the failure of CW-1C breaker to open and direct local opening of the breaker which will allow DG-2 to power vital bus 1A4.

The scenario may be terminated when Bus 1A4 is energized and all safety functions are verified.

Scenario Procedures
NRC Scenario #3

Procedure Number	Procedure Title	Revision
OI-CC-1	COMPONENT COOLING SYSTEM NORMAL OPERATION	77
ARP-CB-4/A20		46
ARP-CB-4/A8		26
AOP-02	CEA and CONTROL SYSTEM MALFUNCTIONS	10a
AOP-05	EMERGENCY SHUTDOWN	12
ARP-CB-1,2,3/A4		32
OI-RC-8	REACTOR COOLANT SYSTEM LEVEL CONTROL NORMAL OPERATION	17
ARP-CB-20/A15		42
AOP-31	161 KV GRID MALFUNCTIONS	14
OI-VD-1	FEEDWATER HEATER VENTS AND DRAINS NORMAL OPERATION	55
EOP-00	STANDARD POST TRIP ACTIONS	31
	EOP/AOP ATTACHMENTS	0
	EOP/AOP FLOATING STEPS	5a
EOP-07	STATION BLACKOUT	17

Op-Test No.: _____ Scenario No.: 3 Event No.: 1

Event Description: Rotate Component Cooling Water Pumps.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct ATCO to place AC-3A, CCW Pump, in service and secure AC-3C, CCW Pump, per OI-CC-1 Attachment 2.
	ATCO	**Per OI-CC-1 Attachment 2, Rotating In Service Pumps**
	ATCO	Read Note and Caution.
	ATCO	(Step 1) Vent the pump to be started using AC-353, AC-3A Casing Vent Valve. Directs Aux Bldg Operator to vent AC-3A per step 1.
When directed as Aux Bldg Operator to vent AC-3A, report after 30 seconds that AC-3A has been vented per step 1.		
	ATCO	(Step 2) Start AC-3A.
	CRS	(Step 3) Log into **T.S. 2.4(1)b**, 7 day time limit. NOTE: AC-3C will be inoperable while its discharge valve is closed.
	ATCO	Read Note: When stopping a CCW Pump with two or more running, the discharge valve is closed to prevent check valve slamming.
	ATCO	(Step 4) Close AC-108, AC-3C Discharge Valve. Directs Aux Bldg Operator to close AC-108.
When directed as Aux Bldg Operator to close AC-108, report after 15 seconds that AC-108 is closed.		
	ATCO	(Step 5) Verify PI-499, CCW Pump Disch Header Pressure, is approximately 90 psig.
	ATCO	(Step 6) Stop AC-3C.
	ATCO	(Step 7) Open AC-108. Direct Aux Bldg Operator to open AC-108 and independently verify open.
When directed as Aux Bldg Operator to open AC-108, report after 15 seconds that AC-108 is open and independently verified open.		
	CRS	Exit T.S. 2.4(1)b.
		Event is terminated when AC-3A is in service and AC-3C is secured and T.S. exited. Lead examiner will cue next event.

Event Description: Dropped CEA (Rod 03).

Time	Position	Applicant's Actions or Behavior
	ATCO	Respond to multiple alarms including CB-4/A20 Window B-6, ROD DROP NUCLEAR INSTRUMENTATION CHANNEL, CB-4/A8 Window B-1U & B1-L, ROD POSITION DEVIATION LOW AND LOW LOW LIMIT and Window A-5U and A-5L, ROD DRIVE POWER INTERRUPT and DROPPED ROD.
	ATCO	Determine that Rod 03 has dropped and is the only rod to drop. Informs the CRS.
	CRS	Directs the BOPO to maintain Tcold on program by reducing turbine load.
	CRS	May enter T.S 2.10.4(5)(ii) for RCS pressure lowering below 2075 psia during transient, 2 hours to restore.
	CRS	Enter AOP-02, CEA AND CONTROL SYSTEM MALFUNCTIONS.
	ATCO	Enter ARP-CB-4/A20 Window B-6.
	ATCO	**Per ARP-CB-4/A20 Window B-6**
	ATCO	(Step 1) If more than one rod dropped, then trip the reactor and go to EOP-00. NOTE: Only one rod dropped, step is N/A.
	ATCO	(Step 2) Check for indication of Dropped Rod: • Core mimic for green rod bottom light NOTE: Rod 03 shows a green rod bottom light • Decrease in reactor power NOTE: Power is lowering • Decrease in reactor coolant loop Tavg NOTE: Tcold is lowering • DROPPED ROD (CB-4, A8, A-5L) NOTE: In alarm • 4" and 8" Rod Deviation Annunciators (CB-4, A8, B-1U and B1L) NOTE: Both in alarm • SCEAPIS indicates rod deviation NOTE: DEV indicated • SCEAPIS indicates dropped rod NOTE: ROD DROP indicated • PPDIL and PDIL alarms NOTE: Both in alarm • Rod drop light on RPS NOTE: On AI-31A/C
	ATCO	(Step 2.1) If a dropped rod is indicated, go to AOP-02. NOTE: CRS may be in AOP-02.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 2		
Event Description: Dropped CEA (Rod 03).		

Time	Position	Applicant's Actions or Behavior
	ATCO	(Step 2.2) Reset the six rod drop detection circuit bistables on the four RPS Linear Power Channel and two Power Range Control Channel drawers.
	ATCO	(Step 3) If there is no indication of a dropped rod. NOTE: There is a dropped rod, step is N/A.
	ATCO	(Step 4) If NI channel high voltage is lost. NOTE: High voltage is not lost, step is N/A.
	ATCO	(Step 5) If switch is found out of position and testing is not in progress. NOTE: No testing in progress, step is N/A.
	ATCO	(Step 6) If an NI channel is declared inoperable. NOTE: NI channel is not inoperable, step is N/A.
	CRS	**Per AOP-02 Section II, Misaligned Group A,B,N,1,2 or 3 CEA.**
	CRS	Review notes on page 21.
	CRS	(Step 1) If any of the following conditions exist: • Dropped CEA occurs during Reactor Startup • More than one CEA is misaligned by greater than 18 inches NOTE: No startup in progress and only one CEA dropped, step is N/A.
	CRS	(Step 2) Stop all CEA movement by placing Rod Mode Selector Switch in OFF.
	BOPO	(Step 3) Adjust Turbine load to match Reactor power per Attachment HR-12. NOTE: CRS may have directed this when the rod dropped.
	BOPO	**Per Attachment HR-12, Secondary Heat Removal Operation**
	BOPO	(Step 1) If Turbine is online, ensure Turbine Control is in MANUAL.
	BOPO	Read Note: Output will be highlighted by a yellow box when selected.
	BOPO	(Step 2) Select OUTPUT by pushing the OUT button.
	BOPO	Read Note: Single arrow will adjust turbine load 0.1% and the double arrow 0.5% and maintain temperature +0°F,- 1° of program per TDB-III.1.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 2		
Event Description: Dropped CEA (Rod 03).		
Time	**Position**	**Applicant's Actions or Behavior**
	BOPO	(Step 3) Adjust Turbine load by pressing the single or double UP or DOWN arrows to maintain the following: • Tcold 527-545°F • Tcold within +0°F, -1°F of program
	CRS	**Per AOP-02**
	CRS	(Step 4) Establish steady Reactor power.
	ATCO	(Step 5) Ensure RCS pressure is 2075 psia to 2150 psia per Attachment PC-11.
	ATCO	(Step 6) Ensure PZR level is within 2% of program level per Attachment IC-11.
	ATCO	(Step 7) Reset the rod drop detection circuit bistables on all RPS Linear Power Range and Power Range Control Channels.
	ATCO	(Step 8) Verify ROD DROP NUCLEAR INSTRUMENTATION CHANNEL alarm resets.
	CRS	(Step 9) Notify T&D Operations of power reduction.
	CRS	(Step 10) Notify Reactor Engineer of CEA misalignment.
	CRS	(Step 11) If one or more Group N CEA's becomes misaligned. NOTE: No Group N rods are misaligned, step is N/A.
	CRS	Read Note: States that steps 12 and 13 are for misalignment of between 12 and 18 inches.
	CRS	(Step 12) If misaligned CEA is less than 18 inches. NOTE: CEA misaligned by greater than 18 inches, transitions to contingency action 12.1 which directs go to step 14.
	CRS	Read note and caution on page 16.
	CRS	(Step 14) Lower Reactor power to less than or equal to 70% ΔT Power within one hour using boration from the SIRWT per AOP-05, EMERGENCY SHUTDOWN.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 2

Event Description: Dropped CEA (Rod 03).

Time	Position	Applicant's Actions or Behavior
	CRS	(Step 15) If Reactor power change is greater than 15% ΔT power in one hour, direct Shift Chemist to sample RCS to satisfy T.S. 3.2, Equipment and Sampling Tests. NOTE: Shift Chemist will be informed of power reduction and sample requirements.
	CRS	Enter **T.S. 2.10.2(4)e,** one hour to reduce power to ≤70% and within one hour after reducing power, restore CEA to within 12 inches of any CEA in its group.
		Event continues with transition to AOP-05.

Event Description: AOP-05, Emergency Shutdown to 70% Power.

Time	Position	Applicant's Actions or Behavior
	CRS	**Enter AOP-05, EMERGENCY SHUTDOWN**
	CRS	Read notes on page 3, briefs the crew on the shutdown and gives Reactor trip criteria. NOTE: Trip criteria is in note 4.
	CRS	Read Note: TDB-III-23a and Power Ascension/Power Reduction Strategy provide guidance for shutdown.
	CRS	(Step 1) For additional guidance contact Reactor Engineer.
	CRS	Read Note: Operation of more than one Charging Pump will raise the rate of power reduction.
	ATCO	(Step 2) If borating from the SIRWT, perform the following: (Step 2.a) Ensure one Charging Pump is operating (Step 2.b) Open LCV-218-3 (Step 2.c) Close LCV-218-2
	CRS	(Step 3) If borating from CVCS. NOTE: Boration is from SIRWT, step is N/A.
	CRS	(Step 4) Notify Energy Marketing of the power reduction.
	CRS	Read Note: Maintain Tcold per TDB Figure III.1, Tave Program.
	BOPO	(Step 5) Maintain RCS Temperature Control using Attachment HR-12, within the following: • Tcold 527-545°F • Tcold within +0°F, -1°F of program
	BOPO	**Per Attachment HR-12, Secondary Heat Removal Operation**
	BOPO	(Step 1) If Turbine is online, ensure Turbine Control is in MANUAL
	BOPO	Read Note: Output will be highlighted by a yellow box when selected.
	BOPO	(Step 2) Select OUTPUT by pushing the OUT button.
	BOPO	Read Note: Single arrow will adjust turbine load 0.1% and the double arrow 0.5% and maintain temperature within the program.
	BOPO	(Step 3) Adjust Turbine load by pressing the single or double UP or DOWN arrows to maintain the following: • Tcold 527-545°F • Tcold within +0°F, -1°F of program
		Event description continued on next page.

Event Description: AOP-05, Emergency Shutdown to 70% Power.

Time	Position	Applicant's Actions or Behavior
	CRS	**Per AOP-05**
	ATCO	(Step 6) Maintain Pressurizer Level using Attachment IC-11, Inventory Control within the following: • PZR level 45-60% • PZR level within 4% of program
	ATCO	(Step 7) Maintain VCT level 55-85% by performing the following: • Place LCV-218-1 to RWTS • When diversion to waste is complete, place LCV-218-1 in AUTO
	ATCO	(Step 8) Maximize pressurizer heaters and spray per the following: (Sep 8.a) Energize Backup Heaters by placing each Control Switch to ON: • 225KW Backup Htrs Bank 1 Group 1/2/3 • 150KW Backup Htrs Bank 2 Group 4/5 • 150KW Backup Htrs Bank 3 Group 8/9 • 225KW Backup Htrs Bank 4 Group 10/11/12 (Step 8.b) Adjust the controller, PC-103X, setpoint pushbutton to maintain pressure 2080-2145 psia NOTE: Controller setpoint will be adjusted in the lower direction
	CRS	Read Caution: Do not insert CEAs below PDIL.
	CRS	(Step 9) Adjust Regulating Group 4 during shutdown to control ASI per OI-RR-1 Attachment 4.
	CRS	(Step 10) If Reactor power change is greater than 15% inone hour, direct Shift Chemist to sample RCS to satisfy T.S. 3.2. NOTE: Shift Chemist will be notified of power reduction and sample requirement.
		When down power has commenced and reactor effects have been noted, the lead examiner will cue the next malfunction.

Event Description: Pressurizer Level Transmitter, LT-101X, Fails High.

Time	Position	Applicant's Actions or Behavior
	ATCO	Respond to alarm ARP-CB-1,2,3/A4 Window A-8, PRESSURIZER LEVEL HI-LO CHANNEL X.
	ATCO	Diagnose the failure of the 'X' channel and inform CRS.
	CRS(Step 4)	May direct selecting the 'Y' channel and backup actions with ARP or to perform ARP actions.
	ATCO	Enter ARP-CB-1,2,3/A4 Window A-8.
	ATCO	**Per ARP-CB-1,2,3/A4 Window A-8**
	ATCO	(Step 1) Verify pressurizer level on LR-101X/LR-101Y.
	ATCO	(Step 2) If PZR Level is low, verify the following. NOTE: Transmitter is failing high, step is N/A.
	ATCO	(Step 3) If PZR Level is high, verify the following: NOTE: ATCO will determine level is high due to transmitter failure and not actual. • Verify VCT level trend. NOTE: Trend will be up as letdown flow increases • Ensure one Charging pump is running • Ensure Letdown flow is maximized, may place HC-101 to Channel Y per OI-RC-8. NOTE: Letdown flow will be increasing to maximum. • Ensure Pressurizer Backup Heaters are energized.
	ATCO	**Per OI-RC-8 Attachment 8, Transferring PZR Level Control Channel**
	ATCO	(Step 1) Ensure both level controllers are in CASCADE. • LC-101X-1 • LC-101Y-1
	ATCO	(Step 2) If desired, place the Letdown Controller in MANUAL. NOTE: ATCO and CRS will determine, not desired.
	ATCO	(Step 3) Verify the non-controlling Controller LR-101Y has indicated level and program level setpoint matched.
	ATCO	(Step 4) Transfer Control Channels by placing HC-101 to Channel Y.
	ATCO	(Step 5) Ensure Channel Y is controlling indicated level at program setpoint.
		Event description continued on next page.

Event Description: Pressurizer Level Transmitter, LT-101X, Fails High.

Time	Position	Applicant's Actions or Behavior
	ATCO	(Step 6) Ensure all Charging Pump bistables are reset by pushing reset pushbuttons. • LC-101-1 • LC-101-2 NOTE: Resets are on backside of Control Boards CB-1,2,3 on AI-4B.
	ATCO	**Per ARP-CB-1,2,3/A4**
	ATCO	(Step 4) If Automatic Pressurizer Level Control does not control, take manual control per OI-RC-8. NOTE: Channel Y will be controlling in automatic, step is N/A.
	ATCO	(Step 5) If LI-101X has failed, notify Work Week Manager.
	ATCO	(Step 5.1) If LI-101X has failed low, place HC-101-1, Pzr Heater Cutout Channel Selector Switch, to channel Y. NOTE: Transmitter failed high, step is N/A.
		Event is terminated when level is selected to Channel Y. Lead examiner will cue next event.

Event Description: Loss of 161 KV.

Time	Position	Applicant's Actions or Behavior
	BOPO	Respond to alarms CB-20/A15 Windows A-1, BREAKER 111 TRIPPED, Window A-2, 161 KV SUPPLY BKR LOCKOUT RELAY OPERATED 86/161, Window A-3, BREAKER 110 TRIPPED
	BOPO	Report to CRS, 161 KV is lost and all 4160v buses are powered from 22 KV.
	CRS	Enter AOP-31, 161 KV GRID MALFUNCTIONS.
	BOPO	Enter ARP-CB-20/A15, Windows A-2.
	BOPO	**Per ARP-CB-20/A15 Window A-2**
	BOPO	(Step 1) If Reactor trips, go to EOP-00. NOTE: No trip, step is N/A.
	BOPO	(Step 2) If fast transfer has occurred implement AOP-31. • 1A33 Tripped • 1A13 Closed • 1A44 Tripped • 1A24 Closed NOTE: CRS may have entered AOP-31.
	BOPO	(Step 3) If any 4160v Bus is not energized. NOTE: All 4160v Buses are energized, step is N/A.
	BOPO	(Step 4) Notify System Operator and Shift Manager. NOTE: CRS will make notifications and request status of 161KV system.
When notified as System Operator of loss of 161 KV, report that the 161 kV line has been lost and there is no time estimate for its return.		
	CRS	**Per AOP-31 Section II, All 4160 V Buses Fed from 22 KV**
	CRS	Read Caution: To protect 1A1, FW-2A and FW-4A should not both be left running.
	CRS	(Step 1) If greater than 50% power, ensure 2 condensate pumps, 2 feed pumps, and 2 heater drain pumps are operating.
	CRS	(Step 2) Adjust main generator terminal voltage less than 22,000 volts. NOTE: Voltage is less than 22 KV, step is N/A.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 5		
Event Description: Loss of 161 KV.		

Time	Position	Applicant's Actions or Behavior
	CRS	(Step 3) Establish balanced 4160 V bus loading on T1A1 and T1A2 by ensuring all the following pumps on Bus 1A1 are operating: • Condensate Pump, FW-2A • Feed Pump, FW-4A • Heater Drain Pump, FW-5A. NOTE: FW-2A and FW-4A are running
	CRS	Direct BOPO to rotate FW-5A on and FW-5B or FW-5C off per OI-VD-1.
	BOPO	**Per OI-VD-1 Attachment 2, Rotating Operating Heater Drain Pumps**
	BOPO	Perform prerequisites.
	BOPO	Direct Turbine Bldg Operator to perform local actions of step 1.
When directed as Turbine Bldg operator to perform step 1, report after one minute that step 1 has been completed.		
	BOPO	(Step 2) Inform CRS to suspend GARDEL.
	BOPO	Read cautions.
	BOPO	(Step 3) Perform the following: • Place the 43/FW switch in OFF • Verify the 43/FW TRANSFER SWITCH OFF AUTO is in alarm.
	BOPO	Read cautions and note.
	BOPO	(Step 4) Start FW-5A by placing control switch in AFTER-START.
	BOPO	(Step 5) Verify ammeter returns to less than 80 amps in less than 15 seconds.
	BOPO	(Step 6) Ensure Recirculation Valve, FCV-1216A, closes.
	BOPO	Read note and caution.
	BOPO	(Step 7) Stop the selected pump, FW-5B or FW-5C, by placing control switch in AFTER-STOP.
	BOPO	Read Note.
	BOPO	Direct Turbine Bldg Operator to verify proper operation by performing local actions of steps 8 and 9.
		Event description continues on next page.

Event Description: Loss of 161 KV.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 8) Monitors following indications in the Control Room. • Motor amps • Heater Drain Tank level • Bearing temperatures on ERF display FWD
When directed as Turbine Bldg operator to perform local actions of step 8 and 9, report that all local indications look good and the pump is not rotating in reverse direction.		
	BOPO	(Step 10) Place the 43/FW in AUTO and verify the alarm resets.
	BOPO	(Step 11) Inform CRS to restore GARDEL.
	CRS	**Per AOP-31**
	CRS	(Step 4) Verify voltage is greater than 430 volts on all the following buses: 1B3A, 1B3B, 1B3C, 1B4A, 1B4B, 1B4C. NOTE: All bus voltages are greater than 430 volts.
	CRS	(Step 5) Notify NRC Operation Center of loss of 161 KV within 4 hours.
	BOPO	(Step 6) Match flags on following breakers: • **110** • **111** • 1A31 • **1A33** • 1A42 • **1A44** NOTE: Breakers 110, 111, 1A33, 1A44 will be repositioned to match flags.
	CRS	Read caution.
	BOPO	(Step 7) Direct Waterplant Operator to place signs on switchgear room doors which direct personnel to stay out during 161 KV power outage.
	CRS	(Step 8) Prepare for loss of Off-Site power caused by a Reactor Trip by reviewing EOP-00, EOP-02, EOP-07 and EOP-20.
	CRS	Enter **T.S. 2.7.2(c)** for loss of 161 kV line making both house service transformers inoperable. May be inoperable for up to 72 hours, after which the reactor must be placed in a hot shutdown condition within following 12 hours. Notify NRC Operations Center by phone within 4 hours of inoperability of transformers. Enter **T.S. 2.0.1** because a loss of 161kV and DG-1 OOS concurrently, requires plant to be in Hot Shutdown within 6 hours.
		Event is terminated when plant is stabilized and TS entered. Lead examiner will cue next event.

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	ATCO	Respond to alarm CB-4/A20 Window B-6, ROD DROP NUCLEAR INSTRUMENTATION CHANNEL. Recognize a second dropped rod by alarms and indications.
	ATCO **(CT)**	**Manually trips the Reactor with two CEA's that have dropped into core within 30 seconds.**
	CRS	**Enter EOP-00, STANDARD POST TRIP ACTIONS**
	ATCO	(Step 1) Verify reactivity control established: • Reactor power is lowering • Startup rate is negative • No more than 1 regulating or shutdown CEA not inserted • Monitor for uncontrolled RCS cooldown
	BOPO	(Step 2) Verify turbine tripped as indicated by stop and intercept valves indicating closed.
	BOPO	(Step 3) Ensure all of the following generator breakers tripped: • Generator Output Breaker 3451-4 • Generator Output Breaker 3451-5 • Generator Field Breaker 41E/G1F
	BOPO	(Step 4) Verify buses 1A3 and 1A4 energized. NOTE: Loss of off-site power, DG-1 OOS and DG-2 did not load onto 1A4, no bus is energized. Transition to contingency action 4.1a to minimize DC loads.
	BOPO **(CT)**	**Direct Waterplant Operator to minimize DC Loads per Attachment MVA-24 within 15 minutes.**
When directed as Waterplant Operator to minimize DC Loads per Attachment MVA-24, report after seven minutes that DC Loads have been minimized.		
	BOPO	(Step 5) Ensure Diesel Generators have started if SIAS has occurred. NOTE: DG-2 started due to loss of power.
	BOPO	(Step 6) Check that Buses 1A1 and 1A2 are energized. NOTE: No off-site power, no bus is energized.
	BOPO	(Step 7) Check that 125 VDC buses 1 and 2 are energized.
		Event description continued on next page.

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 8) Verify instrument air is available by both the following conditions: • IA pressure greater than or equal to 90 psig • At least one air compressor is operating NOTE: No off-site power, no air compressor running and IA pressure will be lowering.
	BOPO	May diagnose the breaker for CW-1C being closed and inform CRS. CRS may direct BOPO to open breaker which does not open. Direct Waterplant to locally open CW-1C breaker.
	ATCO	(Step 9) Determine normal CCW system operation: • At least one CCW pump operating • CCW pressure greater than or equal to 60 psig • At least one RW pump is operating • RCP coolers CCW valves HCV-438A/B/C/D are open NOTE: No off-site power, no CCW or RW pumps running.
	ATCO	(Step 10) Verify RCS inventory control: • PZR level 30-70% • Trending to 45-60% • RCS subcooling is greater than or equal to 20 degrees F NOTE: No off-site power, level will be lowering with no charging pumps running.
	ATCO	(Step 11) Verify RCS pressure control: • RCS pressure is 1800-2300 psia • Trending to 2050-2150 psia • PORVs are closed NOTE: No off-site power, pressure is lowering with no PZR heaters available.
	ATCO	(Step 12) Verify core heat removal via forced circulation, with no RCP's running transition to contingency action 12.2.
	ATCO	(Step 12.2a,b) Place TCV-909 temperature controller in manual and ensure output is zero.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 6,7		Page 18 of 22
Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.		

Time	Position	Applicant's Actions or Behavior
	ATCO	(Step 12.2c) Verify the development of natural circulation by all of the following: • Core ΔT is less than or equal to 50°F • Difference between CET and RCS Th is less than or equal to 10°F • RCS subcooling is greater than or equal to 20°F • Thot and Tcold are stable or lowering NOTE: ATCO may inform the CRS when natural circulation has been verified.
	BOPO	(Step 13) Verify main feedwater is restoring level in at least one S/G to 35-85% NR (73-94% WR) by performing the following: • Ensure FCV-1101 and FCV-1102 feed reg valves have ramped closed. • Ensure both feed reg bypass valves have ramped to 40-45% • Place 43/FW switch in OFF • Ensure no more than one feed pump operating • Ensure no more than one condensate pump operating • Stop all operating heater drain pumps • Ensure both sets of S/G blowdown isolation valves are closed (HCV-1387A/B and HCV-1388A/B) NOTE: No off-site power, all pumps are off, transitions to contingency action 13.1.
	CRS	Directs initiating AFW with FW-54 when requested by the BOPO to perform contingency action for restoring feedwater.
	BOPO	(Step 13.1b) Starts FW-54 and commences restoration of S/G levels to 35-85% NR using the Feed Ring.
	BOPO	(Step 14) Verify steam dump and bypass valves are controlling both of the following: • RCS Tcold 525-535°F • S/G pressure 850-925 psia NOTE: No off-site power, no vacuum and SDBP will not be functioning, transitions to contingency actions for steaming.
	CRS	Directs steaming with HCV-1040 when requested by the BOPO to perform contingency action for step 14.
		Event description continued on next page.

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 14.1b) Controls RCS temperature 525-535°F and S/G pressure 850-925 psia using HCV-1040, Atmospheric Dump Valve.
	ATCO	(Step 15) Verify normal containment conditions: • No unexpected rise in the containment sump level • No containment area radiation alarms • No alarms on RM-051, RM-052, and RM-062 • RM-054A, RM-054B, and RM-057 not in alarm or trending upward • Containment pressure less than 3.0 psig • Containment temperature less than 120°F
	CRS	(Step 16) Determine the appropriate procedure to be implemented per Section 6.0 Diagnostic Actions.
	CRS	**Enter EOP-07, STATION BLACKOUT**
	CRS	May call T&D Operations to determine status of off-site power.
When contacted as T&D Operations on status of off-site power, report that 161 KV and 345 KV are unavailable, return is unknown at this time.		
	CRS	(Step 1) Confirm SPTA's have been performed.
	CRS	(Step 2) Confirm diagnosis of SBO by verifying SFSC acceptance criteria,
	CRS	(Step 3) Implement the Emergency Plan.
	CRS	Read Note: Floating Step BB, Minimizing DC Loads, requires action within 15 minutes.
	ATCO/BOPO	(Step 4) Monitor the Floating Steps.
	CRS	(Step 5) If condenser vacuum is less than 19 inches, ensure SDBP valves and Turbine Stop valves are closed. NOTE: With no vacuum, SDBP valves are closed and Stop Valves were verified closed in EOP-00.
	ATCO	(Step 6) Minimize RCS leakage by performing the following: • Ensure TCV-202, Letdown Isolation Valve, is closed • RCP Controlled Bleedoff is aligned to the RCDT • RCS Sample Isolation valves, HCV-2504A/B, are closed.
		Event description continued on next page.

Op-Test No.: _____ Scenario No.: 3 Event No.: 6,7

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 7) Maintain S/G pressure 850-1000 psia by one of the following: • Attachment HR-12, Secondary Heat Removal Operation • Attachment HR-13, Local MS-291, MS-292 Operation • Attachment HR-17, FW-6/FW-10 Operation NOTE: Steaming was commenced in EOP-00 using HCV-1040 under contingency action 14.1b and will be controlled under Att. HR-12.
	BOPO	(Step 8) If feeding through the AFW Nozzles, operate FW-10 per Attachment HR-17. NOTE: Feeding is through the Feed Ring and commenced in EOP-00 using contingency action 13.1b. Transition to contingency action 8.1. The feed valves may close on loss of air, BOPO may request to use HC-1105 & 1106 by placing in OPEN or start FW-10 and feed through the AFW nozzles.
	BOPO	(Step 8.1) If feeding through the Feed Ring, verify S/G level 35-85% NR per both of the following; • Attachment HR-11, Manual Feed Control • Attachment HR-16, FW-54 Operation
		Note: Crew may decide to use an override on the Main FW regulating bypass valves, which allows the use of an accumulator to hold these valves open (cannot throttle). This action would allow FW-54 to continue to feed directly into the steam generators through the MFW line, since a SBO causes a loss of instrument air, resulting in these valves drifting closed. This would keep the operators from having to realign FW-54 to go through the AFW nozzles. However, the override of the feed reg bypass valves is NOT proceduralized in the EOP.
	CRS	(Step 9) Terminate all radiological releases. NOTE: No releases are in progress.
	BOPO	(Step 10) Trip all the following 4160V breakers: 1A13, 1A33, 1A24, 1A44.
		Event description continued on next page.

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	BOPO	(Step 11) Ensure all the following breakers are tripped: • CW-1C, Circ Water Pump • FW-5C, Heater Drain Pump • FW-2C, Condensate Pump • FW-6, Electric AFW Pump • FW-4C, Feed Pump • RC-3C, RCP • RC-3D, RCP • AC-10A/B/C/D, Raw Water Pumps • SI-1A/B, LPSI Pumps NOTE: If not found earlier, BOPO will inform CRS that CW-1C breaker indicates closed and attempt to open breaker. When breaker does not open, direct Waterplant Operator to locally open breaker per Attachment MVA-12 per contingency action 11.1.
When directed as Waterplant Operator to open CW-IC breaker locally per Attachment MVA-12, report two minutes after commencing EOP-07 actions that the breaker is open.		
	BOPO	(Step 12) Verify none of the following lockouts are tripped, 86/1A13, 86/1A33, 86/1A3-TFB. NOTE: No lockouts are tripped.
	CRS	CRS should not perform steps 13 and 14, DG-1 is OOS.
	BOPO	(Step 15) Verify none of the following lockouts are tripped, 86/1A24, 86/1A44, 86/1A4-TFB. NOTE: No lockouts are tripped.
	CRS	CRS should not perform steps 16 and 17, DG-2 is running and CW-1C breaker is holding out DG from loading onto bus 1A4.
	CRS	(Step 18) If either Vital 4160V Bus is energized, go to step 26. NOTE: Bus 1A4 is powered from DG-2 and goes to step 26.
	CRS	(Step 26) Perform RS-ST-RX-0008, Shutdown Margin Verification. NOTE: May state for the STA to perform this.
	CRS	Read note and caution.
	CRS	(Step 27) Maintain 20 to 100°F subcooling based on CET temperature by feeding and steaming one S/G. NOTE: Crew may elect to continue with feed from FW-54 and steaming using HCV-1040.
		Event description continued on next page.

Event Description: Second Dropped CEA (Rod 01), Circulating Water Pump, CW-1C, breaker fails to open preventing DG-2 from loading onto bus 1A4.

Time	Position	Applicant's Actions or Behavior
	CRS	Will determine steps 28 to 35 are N/A. NOTE: These steps are for safeguards verification and no safeguards have actuated.
	ATCO/BOPO	(Step 36) Attempt to start all of the following equipment: • Two CCW pumps, AC-3A/B/C NOTE: Power to AC-3B only • One RW pump, AC-10A/B/C/D NOTE: Power to AC-10B/D only • One Bearing Water pump, AC-9 NOTE: Power to AC-9B only • One Air Compressor, CA-1A/B/C NOTE: Power to CA-1B only NOTE: DG loading should be monitored when starting equipment.
		Event is terminated when DG-2 loads onto Bus 1A4 and loads have been started.

Facility: Fort Calhoun Date of Exam: Revision Number.:

APPLICANT	EVENT TYPE	Scenarios 1 CREW POSITION CRS	1 ATCO	1 BOPO	2 CREW POSITION CRS	2 ATCO	2 BOPO	3 CREW POSITION CRS	3 ATCO	3 BOPO	TOTAL	MINIMUM(*) R	I	U
R1	RX		6							2	2	1	1	0
	NOR		1				1,5			3	4	1	1	1
	I/C		2,4,9				3,6,8.9			5,6	9	4	4	2
	MAJ		7				7			7	3	2	2	1
	TS											0	2	2
R2	RX		6								1	1	1	0
	NOR		1				1,5				3	1	2	1
	I/C		2,4,9				3,6,8.9				7	4	4	2
	MAJ		7				7				2	2	2	1
	TS											0	2	2
R3	RX					5				2	2	1	1	0
	NOR			6						3	2	1	1	1
	I/C			3,5,8		2,4,10				5,6	8	4	4	2
	MAJ			7		7				7	3	2	2	1
	TS											0	2	2
R4	RX					5					1	1	1	0
	NOR			6							1	1	1	1
	I/C			3,5,8		2,4,10					6	4	4	2
	MAJ			7		7					2	2	2	1
	TS											0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the “at-the-controls (ATC)” and “balance-of-plant (BOP)” positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant’s competence count toward the minimum requirements specified for the applicant’s license level in the right-hand columns.

Facility: Fort Calhoun Date of Examination: Revision No:

Competencies	R1 SCENARIO 1	R1 SCENARIO 2	R1 SCENARIO 3	R2 SCENARIO 1	R2 SCENARIO 2	R2 SCENARIO 3	R3 SCENARIO 1	R3 SCENARIO 2	R3 SCENARIO 3	R4 SCENARIO 1	R4 SCENARIO 2	R4 SCENARIO 3
Position (A-ATCO, B-BOPO,C-CRS)	A	B	B	A	B		B	A	B	B	A	
Interpret/Diagnose Events and Conditions	2,4,9	3,6,8, 9	5,7	2,4,9	3,6,8, 9		3,5, 7,8	2,4,7, 10	5,7	3,5,7, 8	2,4,7, 10	
Comply With and Use Procedures (1)	2,4,9	3,6,8, 9	2,3,5,7	2,4,9	3,6,8, 9		3,5, 7,8	2,4,5, 7,10	2,3,5, 7	3,5,7, 8	2,4,5, 7,10	
Operate Control Boards (2)	1,2,4	1,5,6, 7,8,9	2,3,5,6	1,2,4	1,5,6, 7,8,9		3,5, 6,8	2,5,7, 10	2,3,5, 6	3,5,6, 8	2,5,7, 10	
Communicate and Interact	2,4,9	3,6,8, 9	2,3,5,6	2,4,9	3,6,8, 9		3,5, 7,8	2,4,5, 7,10	2,3,5, 6	3,5,7, 8	2,4,5, 7,10	
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Facility: Fort Calhoun Date of Exam: Revision Number.:

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION CRS	Scenario 1 CREW POSITION ATCO	Scenario 1 CREW POSITION BOPO	Scenario 2 CREW POSITION CRS	Scenario 2 CREW POSITION ATCO	Scenario 2 CREW POSITION BOPO	Scenario 3 CREW POSITION CRS	Scenario 3 CREW POSITION ATCO	Scenario 3 CREW POSITION BOPO	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
I1	RX							SU	3			1	1	0
	NOR	1,6,			5			SU	1			1	1	1
	I/C	2,3,4,5, 6,7,8,9			3,4,5			SU	2,4,5			4	4	2
	MAJ	7,			7			SU	7			2	2	1
	TS	2,4			2,3			SU				0	2	2
I2	RX							SU	3			1	1	0
	NOR	1,6,			5			SU	1			1	2	1
	I/C	2,3,4,5, 6,7,8,9			3,4,5			SU	2,4,5			4	4	2
	MAJ	7,			7			SU	7			2	2	1
	TS	2,4			2,3			SU				0	2	2
	RX											1	1	0
	NOR											1	1	1
	I/C											4	4	2
	MAJ											2	2	1
	TS											0	2	2
	RX											1	1	0
	NOR											1	1	1
	I/C											4	4	2
	MAJ											2	2	1
	TS											0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the “at-the-controls (ATC)” and “balance-of-plant (BOP)” positions; Instant SROs must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an Instant SRO *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant’s competence count toward the minimum requirements specified for the applicant’s license level in the right-hand columns.

Facility: Fort Calhoun							Date of Examination:						Revision No:		
Competencies	APPLICANTS														
	I1			I2											
	SCENARIO			SCENARIO			SCENARIO			SCENARIO					
	1	2	3	1	2	3	1	2	3	1	2	3			
Position (A-ATCO, B-BOPO,C-CRS)	C	C	A	C	C	A									
Interpret/Diagnose Events and Conditions	2,5,8	2,3,4	2,4,5	2,5,8	2,3,4	2,4,5									
Comply With and Use Procedures (1)	2,5,6	3,4,5	1,2,3,4,	2,5,6	3,4,5	1,2,3,4,									
Operate Control Boards (2)			1,2,3,4, 5,6			1,2,3,4, 5,6									
Communicate and Interact	2,5,6,8	2,3,4, 5	1,2,3,4, 5,6	2,5,6, 8	2,3,4, 5	1,2,3,4, 5,6									
Demonstrate Supervisory Ability (3)	2,5,6,8	2,3,4, 5		2,5,6, 8	2,3,4, 5										
Comply With and Use Tech. Specs. (3)	2,4	2,3		2,4	2,3										

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.