U.S. Nuclear Regulatory Commission
Surry Power Station

SR14301
Administrative Job Performance Measure G2.1.7

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Perform a Quadrant Power Tilt Calculation.

K/A: G.2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(D)/SRO(U)	15 Minutes	

Conditions

- Task is to be PERFORMED in the classroom.

Standards

- Correctly calculates Quadrant Power Tilt for given core conditions on the Calculation of Excore Quadrant Power Tilt Ratios, Attachment 6 of 0-AP-1.00, Rod Control Malfunction.

Initiating Cues

- A dropped rod has occurred on Unit 1.
- A Quadrant Power Tilt Calculation needs to be performed as directed by 0-AP-1.00, Rod Control System Malfunction.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Terminating Cues

- Applicant has completed the QPTR Calculation.

Tools and Equipment

- Calculator
- NIS Setpoints and Power Range Currents Data Sheet

Safety Considerations

- None

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Notes

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted by an asterisk (*****).
- At the completion of the JPM **all SRO Candidates** will have a Follow-Up question.
- **START TIME: _____**

STEP 1: Acknowledges NOTE prior to Step 1 of Att. 6. Calculations for QPTR should be carried out to four places to the right of the decimal place to provide accuracy and consistency of results.	**_____ SAT** **_____ UNSAT**
STEP 2: **[Step 1, Att. 6]** a) Record Reactor Power, Date, and Time in appropriate blocks. b) Initials Step 1. **STANDARD:** Records 100% for Reactor Power block, Current Date in Date block, Time in Time block. **EVALUATOR'S NOTE:** **If Asked**: Current Reactor Power is 100%. **If Asked**: Use todays date. **If Asked**: Use current time. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 3: **[Step 2, Att. 6]** a) Transcribes information from data sheets onto 0-AP-1.00, Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios, Step 2 Table. **STANDARD:** Places PR NI currents and Normalized Currents in appropriate location on Calculation of Excore Quadrant Power Tilt Ratios. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 4: **[STEP 3, Att. 6]** a) Performs calculations to obtain normalized values for Upper Detectors. **STANDARD:** ***a) Divides Upper Detector current by Normalized currents for each detector.** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 5: **[STEP 3, Att. 6]** a) Performs calculations to obtain Sum of normalized values for Upper Detectors. **STANDARD:** ***a) Adds Upper Detector Normalized currents for all Upper detectors** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: **[STEP 3, Att. 6]** a) Performs calculations to obtain normalized values for Lower Detectors. **STANDARD:** ***a) Divides Lower Detector current by Normalized currents for each detector.** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: **[Step 3, Att. 6]** a) Performs calculations to obtain Sum of normalized values for Lower Detectors. **STANDARD:** ***a) Adds Lower Detector Normalized currents for all Lower Detectors.** b) Initials Step 3 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 8: **[Step 4, Att. 6]** a) Records the Number of Detectors in use. b) Initials Step 4. **STANDARD:** a) Records the Number of Detectors in Step 4; b) Initials Step 4. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **If Asked:** All 4 Detectors are used. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 9: **[Step 5, Att. 6]** a) Calculates the average upper and lower detector current values. **STANDARD:** a) Transcribes Upper and Lower detector Sum of Normalized Values from Step 3 of Attachment 6. ***b) Divides each Sum by the number of Detectors in use.** c) Initials Step 5. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 10: **[Step 6, Att. 6]** a) From Step 3, Record the following values. **STANDARD:** * **a) Records the Maximum Normalized Upper Detector Current from Step 3 (N41 value of 1.0143.)** * **b) Records the Maximum Normalized Lower Detector Current From Step 3 (N41 value of 1.0393.)** c) Initials Step 6 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 11: **[Step 7, Att. 6]** a) Calculates the maximum upper and lower Excore Quadrant Power Tilt Ratios. **STANDARD:** ***a) Divides Maximum Upper channel current by the Average Upper Detector currents to determine the Upper Excore Quadrant Power Tilt Ratio.** ***b) Divides Maximum Lower channel current by the Average Lower Detector current to determine the Lower Excore Quadrant Power Tilt Ratio.** c) Initials Step 7 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 12: **[Step 8, Att. 6]** a) Calculates Tilt %. **STANDARD:** ***a) Calculates Tilt % for Upper channels.** ***b) Caculates % Tilt for Lower channels.** c) Initials Step 8 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 13: Determines final Quadrant Power Tilt Value. **STANDARD:** * **a) Determines final Quadrant Power Tilt Value from above calculations to be 1.1026 or 10.26% Tilt based on the Lower Channels. (Range 10.25% - 10.30%; 10.25% based on rounding of NI current values to 5 significant figures; 10.30% based on rounding to 3 significant figures)** b) Notifies Examiner, Task Complete. **EVALUATOR NOTES: .** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

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NUMBER 0-AP-1.00	ATTACHMENT TITLE CALCULATION OF EXCORE QUADRANT POWER TILT RATIOS	ATTACHMENT 6
REVISION 25		PAGE 1 of 2

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

Reactor Power 100 % Date Today Time Now

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U	120.5	N41L	126.2	$N41U_{100}$	118.8	$N41L_{100}$	119.5
N42U	96.5	N42L	94.2	$N42U_{100}$	118.5	$N42L_{100}$	119.3
N43U	114.7	N43L	115.5	$N43U_{100}$	119.1	$N43L_{100}$	119.5
N44U	119.1	N44L	121.8	$N44U_{100}$	119.1	$N44L_{100}$	119.5

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	$\frac{120.5}{118.8}$ =	1.0143	$\frac{N41L}{N41L_{100}}$	$\frac{126.2}{119.5}$ =	1.0561
$\frac{N42U}{N42U_{100}}$	$\frac{96.5}{118.5}$ =	0.8143	$\frac{N42L}{N42L_{100}}$	$\frac{94.2}{119.3}$ =	0.7896
$\frac{N43U}{N43U_{100}}$	$\frac{114.7}{119.1}$ =	0.9631	$\frac{N43L}{N43L_{100}}$	$\frac{115.5}{119.5}$ =	0.9665
$\frac{N44U}{N44U_{100}}$	$\frac{119.1}{119.1}$ =	1.0000	$\frac{N44L}{N44L_{100}}$	$\frac{121.8}{119.5}$ =	1.0192
Sum of Normalized Values = ΣI_U=		3.7917	Sum of Normalized Values = ΣI_L=		3.8314

NUMBER 0-AP-1.00	ATTACHMENT TITLE CALCULATION OF EXCORE QUADRANT POWER TILT RATIOS	ATTACHMENT 6
REVISION 26		PAGE 2 of 2

4. ___ Record N = the No. of Detectors in use = 4

5. ___ Calculate the average upper and lower detector current values.

Average $I_U = \frac{\Sigma I_U}{N} = \frac{3.7917}{4} =$ 0.9479

Average $I_L = \frac{\Sigma I_L}{N} = \frac{3.7955}{4} =$ 0.9578

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = 1.0143

Maximum Normalized Lower Detector Current = I_{Lmax} = 1.0561

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{Average I_U}$ = 1.0700

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{Average I_L}$ = 1.1026

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: 7.00 %

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: 10.26 %

9. ___ Notify Unit Supervisor.

10. ___ IF additional Quadrant Power Tilt Ratio Calculations are required, THEN 0-NPT-RX-011, Quadrant Power Tilt Ratio Calculations and Corrective Actions, Attachment 2, should be used.

Completed by: _____ Date: _____

Reviewed by: _____ Date: _____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the classroom.
- Perform a Quadrant Power Tilt calculation.

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

   Reactor Power_____% Date_____ Time_____

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U		N41L		$N41U_{100}$		$N41L_{100}$	
N42U		N42L		$N42U_{100}$		$N42L_{100}$	
N43U		N43L		$N43U_{100}$		$N43L_{100}$	
N44U		N44L		$N44U_{100}$		$N44L_{100}$	

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	----------=		$\frac{N41L}{N41L_{100}}$	---------- =	
$\frac{N42U}{N42U_{100}}$	----------=		$\frac{N42L}{N42L_{100}}$	---------- =	
$\frac{N43U}{N43U_{100}}$	---------- =		$\frac{N43L}{N43L_{100}}$	----------=	
$\frac{N44U}{N44U_{100}}$	---------- =		$\frac{N44L}{N44L_{100}}$	----------=	
Sum of Normalized Values = ΣI_U=			Sum of Normalized Values = ΣI_L=		

4. ___ Record N = the No. of Detectors in use = _____

5. ___ Calculate the average upper and lower detector current values.

Average I_U = $\frac{\Sigma I_U}{N}$ = ---------- = _____

Average I_L = $\frac{\Sigma I_L}{N}$ = ---------- = _____

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = _____

Maximum Normalized Lower Detector Current = I_{Lmax} = _____

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{Average I_U}$ = _____

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{Average I_L}$ = _____

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: _____

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: _____

9. ___ Notify Unit Supervisor.

10. ___ IF additional Quadrant Power Tilt Ratio Calculations are required, THEN 0-NPT-RX-011, Quadrant Power Tilt Ratio Calculations and Corrective Actions, Attachment 2, should be used.

Completed by: _____ Date: _____

Reviewed by: _____ Date: _____

Surry Unit 1 NI Calibration Data

Power Range Currents

	N41		N42		N43		N44	
DELTA FLUX @ 100%	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps
0	118.8	119.5	118.5	119.3	119.1	119.5	119.1	119.5
DELTA FLUX @ 120%	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps
0	142.5	143.4	142.2	143.1	142.9	143.5	142.9	143.4
8	148.6	137.2	148.3	137.0	149.1	137.3	149.1	137.2
- 24	124.2	161.8	123.9	161.5	124.5	161.9	124.6	161.9

Data based on flux map number S1C26M15A

Computer and Recorder Constants
Recorder = K0411 = K0412 = K0413 = K0414 = 18.647

Performed / Verified By: LaFrance / Davis Date: 7/21/14

U.S. Nuclear Regulatory Commission
Surry Power Station

SR14301
Administrative Job Performance Measure G2.1.7

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Perform a Quadrant Power Tilt Calculation.

K/A: G.2.1.7 Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(D)/SRO(U)	15 Minutes	

Conditions

- Task is to be PERFORMED in the classroom.

Standards

- Correctly calculates Quadrant Power Tilt for given core conditions on the Calculation of Excore Quadrant Power Tilt Ratios, Attachment 6 of 0-AP-1.00, Rod Control Malfunction.

Initiating Cues

- A dropped rod has occurred on Unit 1.
- A Quadrant Power Tilt Calculation needs to be performed as directed by 0-AP-1.00, Rod Control System Malfunction.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Terminating Cues

- Applicant has completed the QPTR Calculation.

Tools and Equipment

- Calculator
- NIS Setpoints and Power Range Currents Data Sheet

Safety Considerations

- None

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Notes

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted by an asterisk (*****).
- At the completion of the JPM **all SRO Candidates** will have a Follow-Up question.
- **START TIME: _____**

STEP 1: Acknowledges NOTE prior to Step 1 of Att. 6. Calculations for QPTR should be carried out to four places to the right of the decimal place to provide accuracy and consistency of results.	**_____ SAT** **_____ UNSAT**
STEP 2: **[Step 1, Att. 6]** a) Record Reactor Power, Date, and Time in appropriate blocks. b) Initials Step 1. **STANDARD:** Records 100% for Reactor Power block, Current Date in Date block, Time in Time block. **EVALUATOR'S NOTE:** **If Asked**: Current Reactor Power is 100%. **If Asked**: Use todays date. **If Asked**: Use current time. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 3: **[Step 2, Att. 6]** a) Transcribes information from data sheets onto 0-AP-1.00, Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios, Step 2 Table. **STANDARD:** Places PR NI currents and Normalized Currents in appropriate location on Calculation of Excore Quadrant Power Tilt Ratios. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 4: **[STEP 3, Att. 6]** a) Performs calculations to obtain normalized values for Upper Detectors. **STANDARD:** ***a) Divides Upper Detector current by Normalized currents for each detector.** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 5: **[STEP 3, Att. 6]** a) Performs calculations to obtain Sum of normalized values for Upper Detectors. **STANDARD:** ***a) Adds Upper Detector Normalized currents for all Upper detectors** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: **[STEP 3, Att. 6]** a) Performs calculations to obtain normalized values for Lower Detectors. **STANDARD:** ***a) Divides Lower Detector current by Normalized currents for each detector.** **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: **[Step 3, Att. 6]** a) Performs calculations to obtain Sum of normalized values for Lower Detectors. **STANDARD:** ***a) Adds Lower Detector Normalized currents for all Lower Detectors.** b) Initials Step 3 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 8: **[Step 4, Att. 6]** a) Records the Number of Detectors in use. b) Initials Step 4. **STANDARD:** a) Records the Number of Detectors in Step 4; b) Initials Step 4. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **If Asked:** All 4 Detectors are used. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 9: **[Step 5, Att. 6]** a) Calculates the average upper and lower detector current values. **STANDARD:** a) Transcribes Upper and Lower detector Sum of Normalized Values from Step 3 of Attachment 6. ***b) Divides each Sum by the number of Detectors in use.** c) Initials Step 5. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 10: **[Step 6, Att. 6]** a) From Step 3, Record the following values. **STANDARD:** * **a) Records the Maximum Normalized Upper Detector Current from Step 3 (N41 value of 1.0143.)** * **b) Records the Maximum Normalized Lower Detector Current From Step 3 (N41 value of 1.0393.)** c) Initials Step 6 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 11: **[Step 7, Att. 6]** a) Calculates the maximum upper and lower Excore Quadrant Power Tilt Ratios. **STANDARD:** ***a) Divides Maximum Upper channel current by the Average Upper Detector currents to determine the Upper Excore Quadrant Power Tilt Ratio.** ***b) Divides Maximum Lower channel current by the Average Lower Detector current to determine the Lower Excore Quadrant Power Tilt Ratio.** c) Initials Step 7 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 12: **[Step 8, Att. 6]** a) Calculates Tilt %. **STANDARD:** ***a) Calculates Tilt % for Upper channels.** ***b) Caculates % Tilt for Lower channels.** c) Initials Step 8 of Attachment 6. **EVALUATOR' S NOTE:** (See attached Calculation of Excore Quadrant Power Tilt Ratios for calculations.) **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 13: Determines final Quadrant Power Tilt Value. **STANDARD:** * **a) Determines final Quadrant Power Tilt Value from above calculations to be 1.1026 or 10.26% Tilt based on the Lower Channels. (Range 10.25% - 10.30%; 10.25% based on rounding of NI current values to 5 significant figures; 10.30% based on rounding to 3 significant figures)** b) Notifies Examiner, Task Complete. **EVALUATOR NOTES: .** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

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EVALUATOR NOTE: Proceed to Follow-up question for SRO Candidates.

NUMBER 0-AP-1.00	ATTACHMENT TITLE CALCULATION OF EXCORE QUADRANT POWER TILT RATIOS	ATTACHMENT 6
REVISION 25		PAGE 1 of 2

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

Reactor Power 100 % Date Today Time Now

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U	120.5	N41L	126.2	$N41U_{100}$	118.8	$N41L_{100}$	119.5
N42U	96.5	N42L	94.2	$N42U_{100}$	118.5	$N42L_{100}$	119.3
N43U	114.7	N43L	115.5	$N43U_{100}$	119.1	$N43L_{100}$	119.5
N44U	119.1	N44L	121.8	$N44U_{100}$	119.1	$N44L_{100}$	119.5

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	$\frac{120.5}{118.8}$ =	1.0143	$\frac{N41L}{N41L_{100}}$	$\frac{126.2}{119.5}$ =	1.0561
$\frac{N42U}{N42U_{100}}$	$\frac{96.5}{118.5}$ =	0.8143	$\frac{N42L}{N42L_{100}}$	$\frac{94.2}{119.3}$ =	0.7896
$\frac{N43U}{N43U_{100}}$	$\frac{114.7}{119.1}$ =	0.9631	$\frac{N43L}{N43L_{100}}$	$\frac{115.5}{119.5}$ =	0.9665
$\frac{N44U}{N44U_{100}}$	$\frac{119.1}{119.1}$ =	1.0000	$\frac{N44L}{N44L_{100}}$	$\frac{121.8}{119.5}$ =	1.0192
Sum of Normalized Values = ΣI_U=		3.7917	Sum of Normalized Values = ΣI_L=		3.8314

NUMBER 0-AP-1.00	ATTACHMENT TITLE CALCULATION OF EXCORE QUADRANT POWER TILT RATIOS	ATTACHMENT 6
REVISION 26		PAGE 2 of 2

4. ___ Record N = the No. of Detectors in use = 4

5. ___ Calculate the average upper and lower detector current values.

Average $I_U = \frac{\Sigma I_U}{N} = \frac{3.7917}{4} =$ 0.9479

Average $I_L = \frac{\Sigma I_L}{N} = \frac{3.7955}{4} =$ 0.9578

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = 1.0143

Maximum Normalized Lower Detector Current = I_{Lmax} = 1.0561

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{Average I_U}$ = 1.0700

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{Average I_L}$ = 1.1026

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: 7.00 %

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: 10.26 %

9. ___ Notify Unit Supervisor.

10. ___ IF additional Quadrant Power Tilt Ratio Calculations are required, THEN 0-NPT-RX-011, Quadrant Power Tilt Ratio Calculations and Corrective Actions, Attachment 2, should be used.

Completed by: _____ Date: _____

Reviewed by: _____ Date: _____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the classroom.
- Perform a Quadrant Power Tilt calculation.

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

SRO ONLY ANSWER KEY

NOT FOR TRAINEE

QPTR FOLLOW-UP Question

State all applicable Technical Specifications for this event. (if any)?

ANSWER: TS 3.12.B.6 requires:

- 3.12.B.6.c: If the Quadrant Power Tilt exceeds 10%, the power level shall be reduced from RATED POWER 2% for each percent of QUADRANT POWER TILT within the next 30 minutes. The high neutron flux trip setpoint shall be similarly reduced within the following 4 hours. (Not necessary to read text of Tech Spec)
- 3.12.C.3.b.1(a): Power level shall be reduced to less than 75% of Rated Power within one hour and the High Neutron Flux trip setpoint shall be reduced to less than or equal to 85% of rated power within the next 4 hours, OR
- 3.12.C.3.b.1(b): Remainder of control rods in the group with the inoperable rod aligned within 12 steps…(Text paraphrased, Not necessary to read text of Tech Spec)

SRO ONLY Candidate

QPTR FOLLOW-UP Question

State all applicable Technical Specification actions for this event. (if any)?

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 operating at 100% power.
    - Control Rod D-10, Control Bank B, Group 1 dropped and is currently indicating 0 steps.

Initiating Cues

- Perform the Quadrant Power Tilt Calculation in accordance with Attachment 6, Calculation of Excore Quadrant Power Tilt Ratios.
- You are provided a copy of the Power Range Currents from the NIS Data Book providing Normalized Values.
- When you have determined the Quadrant Power Tilt, inform the examiner.

Actual detector currents taken from the Power Range NIs:

N-41 Upper Detector Current	120.5
N-41 Lower Detector Current	126.2
N-42 Upper Detector Current	96.5
N-42 Lower Detector Current	94.2
N-43 Upper Detector Current	114.7
N-43 Lower Detector Current	115.5
N-44 Upper Detector Current	119.1
N-44 Lower Detector Current	121.8

NOTE: Calculations for QPTR should be carried out to four places to the right of the decimal place to provide for accuracy and consistency of results.

1. ___ Record the following data:

   Reactor Power_____% Date_____ Time_____

2. ___ Record the following Excore Detector Data:

Actual Excore Detector Readings				Expected Excore Detector Readings at 100% Power			
Upper		Lower		Upper		Lower	
N41U		N41L		$N41U_{100}$		$N41L_{100}$	
N42U		N42L		$N42U_{100}$		$N42L_{100}$	
N43U		N43L		$N43U_{100}$		$N43L_{100}$	
N44U		N44L		$N44U_{100}$		$N44L_{100}$	

3. ___ Normalize the Actual Excore Detector Readings to the expected Excore Detector readings at 100% power, and sum the normalized values for both the upper and lower detectors.

Upper Detector Fraction	Upper Detector Fraction Values	Normalized Value (I_U)	Lower Detector Fraction	Lower Detector Fraction Values	Normalized Value (I_L)
$\frac{N41U}{N41U_{100}}$	----------=		$\frac{N41L}{N41L_{100}}$	---------- =	
$\frac{N42U}{N42U_{100}}$	----------=		$\frac{N42L}{N42L_{100}}$	---------- =	
$\frac{N43U}{N43U_{100}}$	---------- =		$\frac{N43L}{N43L_{100}}$	----------=	
$\frac{N44U}{N44U_{100}}$	---------- =		$\frac{N44L}{N44L_{100}}$	----------=	
Sum of Normalized Values = ΣI_U=			Sum of Normalized Values = ΣI_L=		

4. ___ Record N = the No. of Detectors in use = _____

5. ___ Calculate the average upper and lower detector current values.

Average I_U = $\frac{\Sigma I_U}{N}$ = ---------- = _____

Average I_L = $\frac{\Sigma I_L}{N}$ = ---------- = _____

6. ___ From Step 3, record the following values.

Maximum Normalized Upper Detector Current = I_{Umax} = _____

Maximum Normalized Lower Detector Current = I_{Lmax} = _____

7. ___ Calculate the maximum upper and lower Excore Quadrant Power Tilt Ratios.

☐ a. Upper Excore Quadrant Power Tilt Ratio = $\frac{I_{Umax}}{Average I_U}$ = _____

☐ b. Lower Excore Quadrant Power Tilt Ratio = $\frac{I_{Lmax}}{Average I_L}$ = _____

8. ___ Calculate tilt%:

☐ a. Subtract 1 from Step 7.a and multiply by 100 for Upper Tilt %: _____

☐ b. Subtract 1 from Step 7.b and multiply by 100 for Lower Tilt %: _____

9. ___ Notify Unit Supervisor.

10. ___ IF additional Quadrant Power Tilt Ratio Calculations are required, THEN 0-NPT-RX-011, Quadrant Power Tilt Ratio Calculations and Corrective Actions, Attachment 2, should be used.

Completed by: _____ Date: _____

Reviewed by: _____ Date: _____

Surry Unit 1 NI Calibration Data

Power Range Currents

	N41		N42		N43		N44	
DELTA FLUX @ 100%	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps
0	118.8	119.5	118.5	119.3	119.1	119.5	119.1	119.5
DELTA FLUX @ 120%	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps	I (Top) µamps	I (Bottom) µamps
0	142.5	143.4	142.2	143.1	142.9	143.5	142.9	143.4
8	148.6	137.2	148.3	137.0	149.1	137.3	149.1	137.2
- 24	124.2	161.8	123.9	161.5	124.5	161.9	124.6	161.9

Data based on flux map number S1C26M15A

Computer and Recorder Constants
Recorder = K0411 = K0412 = K0413 = K0414 = 18.647

Performed / Verified By: LaFrance / Davis Date: 7/21/14

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2014301
Administrative Job Performance Measure G2.1.40

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Authorize Fuel Movement

K/A: G2.1.40 Knowledge of refueling administrative procedures (2.8/3.9)

Applicability	**Estimated Time**	**Actual Time**
SRO(I)/SRO(U)	20 Minutes	

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- Correctly identify only those plant conditions that do not support fuel movement in accordance with 1-OSP-ZZ-004 attachment 8, given a specific set of plant conditions.

Terminating Cues

- 1-OSP-ZZ-004, attachment 8 assessment complete.

Procedures

- 1-OSP-ZZ-004, Unit 1 Safety Systems Status List For Cold Shutdown/Refueling Conditions, Revision 47.

Tools and Equipment

- None

Safety Considerations

- None

Initial Conditions

- It is a Monday DAYSHIFT.

- Unit One is in refueling shutdown with the head and upper internals removed. A request from the refueling supervisor has been made to authorize fuel movement (core offload) in accordance with 1-OSP-ZZ-004 attachment 8.

- Current conditions are as follows (items not observable from the control room):
  - Refueling containment integrity is set and verified by the shift manager.
  - Cavity level is 26.5'.
  - RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago).
  - The reactor was shutdown 122 hours ago.
  - Both station batteries are operable and split out.
  - All make-up flowpaths to the SFP are available.

- Headset communications between the MCR and the manipulator crane have been verified.

Initiating Cues

- You are to authorize fuel movement after completing attachment 8, if conditions allow. If conditions do not allow, you are to identify only those issues that must be resolved to allow fuel movement to commence.

Terminating Cues

- Applicant has completed the attachment and discussed results and problems with examiner.

Tools and Equipment

- 1-OSP-ZZ-004, Attachment 8
- Technical Specifications
- Simulator

Safety Considerations

- None

Notes

PERFORMANCE CHECKLIST

Simulator Set-up

- Recall a CSD IC **(IC 274 Protected) or (IC35 25% Cold Cal)** and ensure that RHR pump discharge and RCS temperatures are below 140 ^{o}F.
- Align HHSI and fill pressurizer to 56.5% cold cal if necessary.
- Fail Rad Monitor 1-RM-159 HI by inserting Malf RM0202
- Fail NI-32 low → NO0102- Severity –1
- Tagout 1-RH-P-1B and **place a red magnet above control switch.**

Notes to the Evaluator

- This JPM may be **Pre-briefed** as directed by the Chief Examiner.
- Task critical elements are bolded and denoted by an asterisk (*).
- **START TIME: _____**

Evaluator's note- determination of items to be in non-compliance that actually are in compliance constitutes a critical step failure. **STEP 1:** Refueling Containment Integrity set. Remarks: IAW 1-OP-FH-001 **STANDARD:** _____ Recalls (or refers to) turnover statement that refuel integrity is SET. _____ Initials in "D" block for *Refueling Containment Integrity set* **EVALUATOR NOTES:** • **If asked:** The shift manager has verified that refueling integrity is set as directed by 1-OP-FH-001. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 2:

Radiation Monitors Operable:

- Manipulator Crane 1 operable
- Containment Gaseous 1 operable
- Containment Particulate 0 operable
- SFP Bridge 1 operable
- Vent-Vent Gaseous 1 operable
- Vent-Vent Particulate 1 operable

Remarks:
Alarms 1-RM-Q7, and 1-RM-R7 will both be lit.

STANDARD:

_____ Examines each radiation monitor and verifies normal readings.

_____ * **CRITICAL TASK- TRAINEE DETERMINES RADIATION MONITOR 1-RM-RI-159 OPERABILITY PREVENTS FUEL MOVEMENT.**

EVALUATOR NOTES:

- **If asked:** Radiation monitors are as they appear.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 3: Source Range Detectors (audible indication in CTMT must be verified operable) • 2 operable Remarks: None **STANDARD:** _____ Observes normal indication on NI-31 _____ Determines that NI-32 is reading erroneously. _____ * **CRITICAL TASK- TRAINEE DETERMINES TWO SOURCE RANGE NIs ARE NOT OPERABLE.** **EVALUATOR NOTES:** • **If directed:** the operating team will implement 1-AP-4.00 (NI Malfunction). • **If asked:** there is audible count rate in containment. **COMMENTS:**	_____ **SAT** _____ **UNSAT**
STEP 4: Cavity level > 23 feet. Remarks: OU-SU-201, should be maintained as high as possible. No fuel movement permitted if < 23 feet in Cavity **STANDARD:** _____ Recalls (or refers to) turnover statement that cavity level is 26.5'. _____ Determines that adequate cavity level exists to support fuel movement. **EVALUATOR NOTES:** • **If asked:** cavity level has been verified at 26.5'. **COMMENTS:**	_____ **SAT** _____ **UNSAT**

STEP 5: RHR pump and Heat Exchanger: Cavity Level > 23 feet 1 operable Cavity Level < 23 feet 2 operable **STANDARD:** _____ Recalls (or refers to) turnover statement that cavity level is 26.5'. _____ Observes 1 RHR pump in operation and one tagged out. _____ Determines that with present cavity level and operable RHR pump, fuel movement can commence. **EVALUATOR NOTES:** • **If asked:** cavity level has been verified at 26.5'. • **If asked:** 1-RH-P-1B and B H/X is tagged out for maintenance and is expected back in 2 shifts. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: Direct communication between the Control Room and Manipulator Crane Remarks: When changing core geometry **STANDARD:** _____ Recalls (or refers to) turnover statement that communications have been established. _____ Determines that communication capability allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** operator is in the MCR equipped with a headset in communication with the refueling team. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: RCS Boron concentration- ≥ 2350 PPM (Admin limit) Remarks: RCS must be sampled at least once every 24 hours if the head is unbolted (Not required if defueled and cavity is drained below flange level. (Ref 2.3.15) **STANDARD:** _____ Recalls (or refers to) turnover statement that RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago). _____ Determines that current boron concentration allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago). **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 8: RHR Temperature: ≤140 °F Remarks: None **STANDARD:** _____ Observes RHR pump discharge temperature and determines that current RCS temperature allows for fuel movement. **EVALUATOR NOTES:** • **If asked:** All RCS loops are isolated and drained. • **If asked:** All CETCs have been disconnected. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 9: Reactor shutdown greater than 100 hours Remarks: For movement of irradiated fuel **STANDARD:** _____ Recalls (or refers to) turnover statement that unit has been shutdown 122 hours. _____ Determines that sufficient time from shutdown exists to allow fuel movement. **EVALUATOR NOTES:** • **If asked:** The reactor was shutdown 122 hours ago. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 10: Control Room and Relay Room Emergency Ventilation- 2 Trains Remarks: None **STANDARD:** _____ Examines current configuration of MCR/ESGR ventilation and determines that all fans are available. _____ Determines that current MCR/ESGR Emergency Ventilation configuration allows for fuel movement by observing the configuration of 1-VS-F-41/42 and 2-VS-F-41/42. **EVALUATOR NOTES:** • **If asked:** Conditions are as they appear. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 11: Control Room Chillers- 3 minimum Remarks: Operable IAW power supply requirements of TS 3.23 **STANDARD:** _____ Examines current configuration of MCR chillers and determines that all chillers are available. _____ Determines that current MCR Chiller configuration allows for fuel movement by observing the configuration of 1-VS-E-4A, B, C, D, E. **EVALUATOR NOTES:** • **If asked:** Conditions are as they appear. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 12:

MCR/ESGR AHU- 8 minimum

Remarks: None

STANDARD:

_____ Examines current configuration of MCR/ESGR air handlers and determines that all Air Handling Units are operable.

_____ Determines that current MCR/ESGR air handler configuration allows for fuel movement

EVALUATOR NOTES:

- **If asked:** Conditions are as they appear.

COMMENTS:

_____ SAT

_____ UNSAT

STEP 13:

120 Volt Vital Buses- 2 minimum

Remarks: None

STANDARD:

_____ Observes that all vital busses are energized and NO UPS/Battery charger alarms are LIT.

_____ Recalls (or refers to) turnover statement that all vital bus UPS are in a normal

EVALUATOR NOTES:

- **If asked:** All vital bus UPS are in a normal configuration.
- **If asked:** Both station batteries are operable and split out.

COMMENTS:

_____ SAT

_____ UNSAT

STEP 14: SFP Cooling- 1 train available Remarks: None **STANDARD:** _____ Observes that one spent fuel cooling pump is in service. _____ Recalls (or refers to) turnover statement that both trains of SFP cooling are available with one in service. **EVALUATOR NOTES:** • **If asked:** both trains of SFP cooling are available with one in service. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 16: SFP makeup borated water source- 1 source available Remarks: None **STANDARD:** _____ Recalls (or refers to) turnover statement that all make-up flowpaths to the SFP are available. **EVALUATOR NOTES:** • **If asked:** All make-up flowpaths to the SFP are available. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 17: Reports to Shift Manager that task is complete **STANDARD:** _____ Reports that fuel movement **CANNOT** commence until the following problems are resolved: • 1-RM-RI-159 must be returned to operable status. • NI-32 must be returned to operable status **EVALUATOR NOTES:** • **None** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME_____:

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Attachment 8
REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Refueling Containment Integrity set	As Required	✓		3.10.A.1	IAW 1-OP-FH-001
Radiation Monitors: • Manipulator Crane • Containment Gaseous • Containment Particulate • SFP Bridge • Vent-Vent Gaseous • Vent-Vent Particulate	 1 operable 1 operable 1 operable 1 operable 1 operable 1 operable	 ✓ ✓ NO ✓ ✓ ✓		3.10.A.3 3.10.B.1	If the Containment Air Recirculation fans are not running then refer to Tech Spec 3.10 for actions.
Source Range Detectors (audible indication in CTMT must be checked operable)	2 operable	NO		3.10.A.2	
Cavity level > 23 feet	23 feet	✓		3.10.A.6	OU-SU-201, should be maintained as high as possible. No fuel movement permitted if < 23 feet in Cavity.
RHR pump and Heat Exchanger: • Cavity Level > 23 feet • Cavity Level < 23 feet	 1 operable 2 operable	✓		 3.10.A.4 3.10.A.5	
Direct communication between the Control Room and Manipulator Crane	Yes	✓		3.10.A.8	When changing core geometry
RCS Boron concentration	≥ 2350 PPM (Admin limit)	✓		CY-AP-PRI-100	RCS must be sampled at least once every 24 hours if the head is unbolted (Not required if defueled and cavity is drained below flange level. (Ref 2.3.15)
RHR Temperature	≤ 140 °F	✓		1.0.C.1	
Reactor shutdown greater than 100 hours	100 hours	✓		3.10.A.9	For movement of irradiated fuel

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Attachment 8
REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Control Room and Relay Room Emergency Ventilation	2 Trains	✓		3.10.A.11 3.10.B.4	
Control Room Chillers	3	✓		3.10.13	Operable IAW power supply requirements of TS 3.23
MCR/ESGR AHU	8	✓		3.10.14	
120 Volt Vital Buses	2	✓			As a minimum two 120 VAC Vital Buses shall be energized from the inverters connected to the respective DC Buses.
SFP Cooling	1 train available	✓			(*) OU-AA-200, Attachment 5 OU-SU-201 SFP Cooling Pump powered from bus with available EDG preferred
SFP makeup water source	2 sources available	✓			(*) OU-AA-200, Attachment 5

(*) If equipment requirements are not met, then the STA/SRO involved in the review of outage schedules will coordinate development of contingency plans IAW OU-AA-200.

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the simulator.
- Determine if current plant conditions support fuel movement..

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions

- It is a Monday DAYSHIFT.

- Unit One is in refueling shutdown with the head and upper internals removed. A request from the refueling supervisor has been made to authorize fuel movement (core offload) in accordance with 1-OSP-ZZ-004 attachment 8.

- Current conditions are as follows (items not observable from the control room):
    - Refueling containment integrity is set and verified by the shift manager.
    - Cavity level is 26.5'.
    - RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago).
    - The reactor was shutdown 122 hours ago.
    - Both station batteries are operable and split out.
    - All make-up flowpaths to the SFP are available.

- Headset communications between the MCR and the manipulator crane have been verified.

Initiating Cues

- You are to authorize fuel movement after completing attachment 8, if conditions allow. If conditions do not allow, you are to identify only those issues that must be resolved to allow fuel movement to commence.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- It is a Monday DAYSHIFT.

- Unit One is in refueling shutdown with the head and upper internals removed. A request from the refueling supervisor has been made to authorize fuel movement (core offload) in accordance with 1-OSP-ZZ-004 attachment 8.

- Current conditions are as follows (items not observable from the control room):
  - Refueling containment integrity is set and verified by the shift manager.
  - Cavity level is 26.5'.
  - RHR pump discharge and cavity boron is currently 2404 ppm (sampled 30 minutes ago).
  - The reactor was shutdown 122 hours ago.
  - Both station batteries are operable and split out.
  - All make-up flowpaths to the SFP are available.

- Headset communications between the MCR and the manipulator crane have been verified.

Initiating Cues

- You are to authorize fuel movement after completing attachment 8, if conditions allow. If conditions do not allow, you are to identify only those issues that must be resolved to allow fuel movement to commence.

(Page 1 of 2)

Attachment 8
REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Refueling Containment Integrity set	As Required			3.10.A.1	IAW 1-OP-FH-001
Radiation Monitors: • Manipulator Crane • Containment Gaseous • Containment Particulate • SFP Bridge • Vent-Vent Gaseous • Vent-Vent Particulate	 1 operable 1 operable 1 operable 1 operable 1 operable 1 operable			3.10.A.3 3.10.B.1	If the Containment Air Recirculation fans are not running then refer to Tech Spec 3.10 for actions.
Source Range Detectors (audible indication in CTMT must be checked operable)	2 operable			3.10.A.2	
Cavity level > 23 feet	23 feet			3.10.A.6	OU-SU-201, should be maintained as high as possible. No fuel movement permitted if < 23 feet in Cavity.
RHR pump and Heat Exchanger: • Cavity Level > 23 feet • Cavity Level < 23 feet	 1 operable 2 operable			 3.10.A.4 3.10.A.5	
Direct communication between the Control Room and Manipulator Crane	Yes			3.10.A.8	When changing core geometry
RCS Boron concentration	≥ 2350 PPM (Admin limit)			CY-AP-PRI-100	RCS must be sampled at least once every 24 hours if the head is unbolted (Not required if defueled and cavity is drained below flange level. (Ref 2.3.15)
RHR Temperature	≤ 140 °F			1.0.C.1	
Reactor shutdown greater than 100 hours	100 hours			3.10.A.9	For movement of irradiated fuel

(Page 2 of 2)

Attachment 8
REFUELING OPERATIONS REQUIREMENTS

EQUIPMENT	MIN REQ	D	N	TECH SPECS	REMARKS
Control Room and Relay Room Emergency Ventilation	2 Trains			3.10.A.11 3.10.B.4	
Control Room Chillers	3			3.10.13	Operable IAW power supply requirements of TS 3.23
MCR/ESGR AHU	8			3.10.14	
120 Volt Vital Buses	2				As a minimum two 120 VAC Vital Buses shall be energized from the inverters connected to the respective DC Buses.
SFP Cooling	1 train available				(*) OU-AA-200, Attachment 5 OU-SU-201 SFP Cooling Pump powered from bus with available EDG preferred.
SFP makeup water source	2 sources available				(*) OU-AA-200, Attachment 5

(*) If equipment requirements are not met, then the STA/SRO involved in the review of outage schedules will coordinate development of contingency plans IAW OU-AA-200.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR14301
Administrative Job Performance Measure G2.2.12

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Review 1-OPT-FW-006, Auxiliary Feedwater MOV Test.

K/A: G.2.2.12 – Knowledge of surveillance procedures. RO: 3.7/ SRO: 4.1

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(D)/SRO(U)	10/15 minutes (RO/SRO)	

Conditions
- Task is to be PERFORMED in the CLASSROOM.

Standards
- Review 1-OPT-FW-006, Auxiliary Feedwater MOV Test.

Terminating Cues

- 1-OPT-FW-006 review complete.

Tools and Equipment

- Copy of 1-OPT-FW-006

Safety Considerations

- None

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted by an asterisk (*****).
- At the completion of the JPM **all SRO Candidates** will have a Follow-Up question.
- **START TIME: _____**

STEP 1: Evaluate the Test results by reviewing the Acceptance criteria for the components tested. ▪ The valve(s) tested travel(s) full stroke within the specified acceptable range. (step 7.1.1) **STANDARD:** a) Reviews the following: • Starts reviewing each section starting with section 6.2. **EVALUATOR NOTES:** • If asked, it is desired to perform this Review now. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 2: Reviews section 6.2, Testing 1-FW-MOV-151E, SG A AFW Flow Isol. **STANDARD:** a) Step 6.2.1: Cycle 1-FW-MOV-151E and verify full stroke. Record the time required to close **and** to open the MOV. • ***Identifies Close time is at the upper limit, and records in 7.3. This is a critical step.** • Identifies Open time within the Acceptable Range. b) Step 6.2.2: Return 1-FW-MOV-151E to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.2.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** • Acknowledge that 1-FW-MOV-151E is at the upper limit. • Have the Candidate continue with the PT review. • If candidate asks for a CR #: XX-XX. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Reviews section 6.3, Testing 1-FW-MOV-151F, SG A AFW Flow Isol. **STANDARD:** a) Step 6.3.1: Cycle 1-FW-MOV-151F and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close and Open times within the Acceptable Range. b) Step 6.3.2: Return 1-FW-MOV-151F to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.3.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** **COMMENTS:**	_____ **SAT** _____ **UNSAT**
STEP 4: Reviews section 6.4, Testing 1-FW-MOV-151C, SG B AFW Flow Isol. **STANDARD:** a) Step 6.4.1: Cycle 1-FW-MOV-151C and verify full stroke. Record the time required to close **and** to open the MOV. • ***Identifies Close and Open times are outside the Acceptable Range, and records in 7.3**. **This is a critical task**. b) Step 6.4.2: Return 1-FW-MOV-151C to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.4.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** • Acknowledge that return 1-FW-MOV-151C OPEN and CLOSE times are outside the acceptable range. This may be done now or at step 7.1.2. • Have the Candidate continue with the PT review. • If Asked for CR#: YY-YY **COMMENTS:**	_____ **SAT** _____ **UNSAT**

STEP 5: Reviews section 6.5, Testing 1-FW-MOV-151D, SG B AFW Flow Isol. **STANDARD:** a) Step 6.5.1: Cycle 1-FW-MOV-151D and verify full stroke. Record the time required to close **and** to open the MOV. • *__Identifies Close time is at the lower limit, and records in 7.3__. **This is a critical step.** • Identifies Open times within the Acceptable Range. b) Step 6.5.2: Return 1-FW-MOV-151D to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.5.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. filled in appropriately. • Identifies SQC No. and Cal Due Date blanks filled out appropriately**.** **EVALUATOR NOTES:** • Acknowledge 1-FW-MOV-151D CLOSE time is at the minimum limit. • Have the Candidate continue the PT Review. • If candidate asks for a CR #: XX-XX. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: Reviews section 6.6, Testing 1-FW-MOV-151A, SG C AFW Flow Isol. **STANDARD:** a) Step 6.6.1: Cycle 1-FW-MOV-151A and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close and Open times within the Acceptable Range. b) Step 6.6.2: Return 1-FW-MOV-151A to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.6.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: Reviews section 6.7, Testing 1-FW-MOV-151B, SG C AFW Flow Isol. **STANDARD:** a) Step 6.7.1: Cycle 1-FW-MOV-151B and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close time is within the Acceptable range. • ***Identifies Open time is at the upper limit, and records in 7.3. This is a critical step.** b) Step 6.7.2: Return 1-FW-MOV-151B to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.7.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES:** • Acknowledge 1-FW-MOV-151B OPEN time is at the upper limit. • Have the Candidate continue the PT Review **COMMENTS:**	_____ **SAT** _____ **UNSAT**
STEP 8: Completes Section 7.1, Follow-On. **STANDARD:** • Initials Step 7.1.1. • ***Places check mark on Unsatisfactory and initials Step 7.1.2. This is a critical step.** **EVALUATOR NOTES:** **Candidate may identify why test is unsat (1-FW-MOV-151C) at this time.** **COMMENTS:**	_____ **SAT** _____ **UNSAT**

STEP 9: Performs Section 7.2 Follow-On Tasks.
 	
STANDARD:
 	
• 7.2.1) Identifies test was unsatisfactory by performing and initialing the following:
  ○ ***a) Documents reason for unsat test is 1-FW-MOV-151C stroke times are outside acceptable range, in Operator Comments.* This is a critical task.**
  ○ b) Notify System Engineer and record the name.
  ○ c) Notify the IST Engineer and record the name.
  ○ d) Initiate a Condition Report and Record the number.
• N/A step 7.2.2.
• Initials 7.2.3.
 	
EVALUATOR NOTES:
• **Operator documents 1-FW-MOV-151C stroke times are outside acceptable range as reason for the unsat test.**
• If asked for CR: XX-XX.
• If Asked System Engineer: Jignesh Jain, and IST Engineer: IST Engineer: John Rayno
 	
COMMENTS:
	_____ SAT
	
	_____ UNSAT

STEP 10: Completes Section 7.3 Notification, Documentation, and Procedure Closeout.
 	
STANDARD:
 	
• Initial for Step 7.3.1.
• Initials/Prints Name in Table.
• Signature and date at bottom of page.
• Fills out Operator Comments section. Includes the following:
  ○ ***1-FW-MOV-151C, Close and Open outside acceptable range. This is a Critical step.**
  ○ ***1-FW-MOV-151E Close time at upper limit. This is a critical step.**
  ○ ***1-FW-MOV-151D Close time at lower limit. This is a critical step.**
  ○ ***1-FW-MOV-151B Open time at upper limit. This is a critical step.**
 	
EVALUATOR NOTES:
• **If operator does not indicate why the test is unsat then ask. The test is unsat because of 1-FW-MOV-151C stroke times are outside acceptable range. MOVs 1-FW-MOV-151E, 1-FW-MOV-151D, and 1-FW-MOV-151B are sat but P&L 4.4 require that they be noted in the Operator comments sheet because their stroke time is significantly different from their reference value.**
 	
.
COMMENTS:
	_____ SAT
	
	_____ UNSAT

STOP TIME: _____

7.0 FOLLOW-ON

7.1 Acceptance Criteria

7.1.1 Evaluate the test results by reviewing the Acceptance Criteria for the components tested.

- The valve(s) tested travel(s) full stroke within the specified acceptable range.

7.1.2 Document the test results. (✓)

___ Satisfactory ✓ Unsatisfactory

7.2 Follow-On Tasks

7.2.1 IF the test was satisfactory, THEN enter N/A in the following substeps.
IF the test was unsatisfactory, THEN do the following:

✓

a. Document the reason for the unsatisfactory test in Operator Comments.

✓

b. Notify the System Engineer and record the name.

System Engineer: System Engineer

✓

c. Notify the IST Engineer and record the name.

IST Engineer: IST Engineer

✓

d. Initiate a Condition Report and record the number.

CR No. XX-XX

N/A

7.2.2 IF a partial operability test was done, THEN document the reason for the partial test in Operator Comments. IF a full test was done, THEN enter N/A.

✓

7.2.3 Check that an entry has been made or make an entry in the Measuring and Test Equipment Usage Log for each SQC device used in this procedure.

7.3 **Notification, Documentation, and Procedure Closeout**

δ

7.3.1 Notify Unit 1 Shift Supervision that the test is complete.

The Initials in this procedure will be identified by the Printed Name.

Initials	Printed Name
δ	Name

Operator Comments: Test is unsat because 1-FW-MOV-151C OPEN and CLOSE stroke times are outside the acceptable range.

The following valves have stroke times that depart significantly from their refarance value.

- 1-FW-MOV-151E CLOSE time at upper limit.
- 1-FW-MOV-151D CLOSE time at lower limit.
- 1-FW-MOV-151B OPEN time at upper limit.

Completed by: Name Date: Today

Notes:

EVALUATOR’S REFERENCE COPY
Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the Classroom.

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR14301
Administrative Job Performance Measure G2.2.12

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Review 1-OPT-FW-006, Auxiliary Feedwater MOV Test.

K/A: G.2.2.12 – Knowledge of surveillance procedures. RO: 3.7/ SRO: 4.1

Applicability	**Estimated Time**	**Actual Time**
RO/SRO(D)/SRO(U)	10/15 minutes (RO/SRO)	

Conditions
- Task is to be PERFORMED in the CLASSROOM.

Standards
- Review 1-OPT-FW-006, Auxiliary Feedwater MOV Test.

Terminating Cues

- 1-OPT-FW-006 review complete.

Tools and Equipment

- Copy of 1-OPT-FW-006

Safety Considerations

- None

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted by an asterisk (*****).
- At the completion of the JPM **all SRO Candidates** will have a Follow-Up question.
- **START TIME: _____**

STEP 1: Evaluate the Test results by reviewing the Acceptance criteria for the components tested. ▪ The valve(s) tested travel(s) full stroke within the specified acceptable range. (step 7.1.1) **STANDARD:** a) Reviews the following: • Starts reviewing each section starting with section 6.2. **EVALUATOR NOTES:** • If asked, it is desired to perform this Review now. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 2: Reviews section 6.2, Testing 1-FW-MOV-151E, SG A AFW Flow Isol. **STANDARD:** a) Step 6.2.1: Cycle 1-FW-MOV-151E and verify full stroke. Record the time required to close **and** to open the MOV. • ***Identifies Close time is at the upper limit, and records in 7.3. This is a critical step.** • Identifies Open time within the Acceptable Range. b) Step 6.2.2: Return 1-FW-MOV-151E to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.2.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** • Acknowledge that 1-FW-MOV-151E is at the upper limit. • Have the Candidate continue with the PT review. • If candidate asks for a CR #: XX-XX. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Reviews section 6.3, Testing 1-FW-MOV-151F, SG A AFW Flow Isol. **STANDARD:** a) Step 6.3.1: Cycle 1-FW-MOV-151F and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close and Open times within the Acceptable Range. b) Step 6.3.2: Return 1-FW-MOV-151F to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.3.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 4: Reviews section 6.4, Testing 1-FW-MOV-151C, SG B AFW Flow Isol. **STANDARD:** a) Step 6.4.1: Cycle 1-FW-MOV-151C and verify full stroke. Record the time required to close **and** to open the MOV. • ***Identifies Close and Open times are outside the Acceptable Range, and records in 7.3**. **This is a critical task**. b) Step 6.4.2: Return 1-FW-MOV-151C to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.4.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** • Acknowledge that return 1-FW-MOV-151C OPEN and CLOSE times are outside the acceptable range. This may be done now or at step 7.1.2. • Have the Candidate continue with the PT review. • If Asked for CR#: YY-YY **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 5: Reviews section 6.5, Testing 1-FW-MOV-151D, SG B AFW Flow Isol. **STANDARD:** a) Step 6.5.1: Cycle 1-FW-MOV-151D and verify full stroke. Record the time required to close **and** to open the MOV. • *__Identifies Close time is at the lower limit, and records in 7.3__. **This is a critical step.** • Identifies Open times within the Acceptable Range. b) Step 6.5.2: Return 1-FW-MOV-151D to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.5.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. filled in appropriately. • Identifies SQC No. and Cal Due Date blanks filled out appropriately**.** **EVALUATOR NOTES:** • Acknowledge 1-FW-MOV-151D CLOSE time is at the minimum limit. • Have the Candidate continue the PT Review. • If candidate asks for a CR #: XX-XX. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: Reviews section 6.6, Testing 1-FW-MOV-151A, SG C AFW Flow Isol. **STANDARD:** a) Step 6.6.1: Cycle 1-FW-MOV-151A and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close and Open times within the Acceptable Range. b) Step 6.6.2: Return 1-FW-MOV-151A to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.6.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES: NONE** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: Reviews section 6.7, Testing 1-FW-MOV-151B, SG C AFW Flow Isol. **STANDARD:** a) Step 6.7.1: Cycle 1-FW-MOV-151B and verify full stroke. Record the time required to close and to open the MOV. • Identifies Close time is within the Acceptable range. • ***Identifies Open time is at the upper limit, and records in 7.3. This is a critical step.** b) Step 6.7.2: Return 1-FW-MOV-151B to position specified by Shift Supervision. Circle as left position. • Identifies OPEN circled. • Identifies Return to position correctly verified by initial in verification blank. c) Step 6.7.3: record the stopwatch SQC No. and Cal Due Date. • Identifies SQC No. and Cal Due Date blanks filled out appropriately. **EVALUATOR NOTES:** • Acknowledge 1-FW-MOV-151B OPEN time is at the upper limit. • Have the Candidate continue the PT Review **COMMENTS:**	_____ **SAT** _____ **UNSAT**
STEP 8: Completes Section 7.1, Follow-On. **STANDARD:** • Initials Step 7.1.1. • ***Places check mark on Unsatisfactory and initials Step 7.1.2. This is a critical step.** **EVALUATOR NOTES:** **Candidate may identify why test is unsat (1-FW-MOV-151C) at this time.** **COMMENTS:**	_____ **SAT** _____ **UNSAT**

STEP 9: Performs Section 7.2 Follow-On Tasks.
 	
STANDARD:
 	
• 7.2.1) Identifies test was unsatisfactory by performing and initialing the following:
  ○ ***a) Documents reason for unsat test is 1-FW-MOV-151C stroke times are outside acceptable range, in Operator Comments.* This is a critical task.**
  ○ b) Notify System Engineer and record the name.
  ○ c) Notify the IST Engineer and record the name.
  ○ d) Initiate a Condition Report and Record the number.
• N/A step 7.2.2.
• Initials 7.2.3.
 	
EVALUATOR NOTES:
• **Operator documents 1-FW-MOV-151C stroke times are outside acceptable range as reason for the unsat test.**
• If asked for CR: XX-XX.
• If Asked System Engineer: Jignesh Jain, and IST Engineer: IST Engineer: John Rayno
 	
COMMENTS:
	_____ **SAT**
	
	_____ **UNSAT**

STEP 10: Completes Section 7.3 Notification, Documentation, and Procedure Closeout.
 	
STANDARD:
 	
• Initial for Step 7.3.1.
• Initials/Prints Name in Table.
• Signature and date at bottom of page.
• Fills out Operator Comments section. Includes the following:
  ○ ***1-FW-MOV-151C, Close and Open outside acceptable range. This is a Critical step.**
  ○ ***1-FW-MOV-151E Close time at upper limit. This is a critical step.**
  ○ ***1-FW-MOV-151D Close time at lower limit. This is a critical step.**
  ○ ***1-FW-MOV-151B Open time at upper limit. This is a critical step.**
 	
EVALUATOR NOTES:
• **If operator does not indicate why the test is unsat then ask. The test is unsat because of 1-FW-MOV-151C stroke times are outside acceptable range. MOVs 1-FW-MOV-151E, 1-FW-MOV-151D, and 1-FW-MOV-151B are sat but P&L 4.4 require that they be noted in the Operator comments sheet because their stroke time is significantly different from their reference value.**
 	
.
COMMENTS:
	_____ **SAT**
	
	_____ **UNSAT**

STOP TIME: _____

7.0 FOLLOW-ON

7.1 Acceptance Criteria

7.1.1 Evaluate the test results by reviewing the Acceptance Criteria for the components tested.

- The valve(s) tested travel(s) full stroke within the specified acceptable range.

7.1.2 Document the test results. (✓)

___ Satisfactory ✓ Unsatisfactory

7.2 Follow-On Tasks

7.2.1 IF the test was satisfactory, THEN enter N/A in the following substeps.
IF the test was unsatisfactory, THEN do the following:

✓

a. Document the reason for the unsatisfactory test in Operator Comments.

✓

b. Notify the System Engineer and record the name.

System Engineer: System Engineer

✓

c. Notify the IST Engineer and record the name.

IST Engineer: IST Engineer

✓

d. Initiate a Condition Report and record the number.

CR No. XX-XX

N/A

7.2.2 IF a partial operability test was done, THEN document the reason for the partial test in Operator Comments. IF a full test was done, THEN enter N/A.

✓

7.2.3 Check that an entry has been made or make an entry in the Measuring and Test Equipment Usage Log for each SQC device used in this procedure.

7.3 **Notification, Documentation, and Procedure Closeout**

δ

7.3.1 Notify Unit 1 Shift Supervision that the test is complete.

The Initials in this procedure will be identified by the Printed Name.

Initials	Printed Name
δ	Name

Operator Comments: Test is unsat because 1-FW-MOV-151C OPEN and CLOSE stroke times are outside the acceptable range.

The following valves have stroke times that depart significantly from their refarence value.

- 1-FW-MOV-151E CLOSE time at upper limit.
- 1-FW-MOV-151D CLOSE time at lower limit.
- 1-FW-MOV-151B OPEN time at upper limit.

Completed by: Name Date: Today

Notes:

EVALUATOR NOTE: Proceed to Follow-up question for SRO Candidates.

EVALUATOR’S REFERENCE COPY
Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the Classroom.

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

SRO ONLY ANSWER KEY

NOT FOR TRAINEE

1-OPT-FW-006 FOLLOW-UP Question

What actions, if any, are required by Technical Specifications?

ANSWER: TS 3.6.C.3 require two redundant flowpaths, including system piping, headers, valves, and control board indication required for operation.

TS 3.6.G.1 requires a 72 hour clock to restore to OPERABLE status.

SRO ONLY Candidate

1-OPT-FW-006 FOLLOW-UP Question

What actions, if any, are required by Technical Specifications?

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 at 100% power.
- You have just completed 1-OPT-FW-006, Auxiliary Feedwater MOV Test; up to step 7.0, FOLLOW-ON.

Initiating Cues

- You are to complete the OPT in preparation for Supervisory Review.
- When you have completed the OPT, inform your examiner.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2014301
Administrative Job Performance Measure G2.3.4 (RO 3.2 / SRO 3.7)

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Calculate Radiological Dose and maximum allowable time.

K/A: G2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.2/3.7)

Applicability	**Estimated Time**	**Actual Time**
ALL	30 Minutes	

Conditions

- Task is to be PERFORMED in the classroom.

Standards

- Determines the maximum allowable time for opening 1-RH-MOV-1700 is 6 minutes.

Initial Conditions:

- Unit 1 has experienced a small break LOCA with a safety injection.
- The Operating Team is attempting to place the Residual Heat Removal System in service, but they are unable to open 1-RH-MOV-1700 from the Main Control Room.
- You have been tasked with entering Containment and locally opening 1-RH-MOV-1700.
- Your allowable dose limit for this job is 1800 mr.
- General area radiation levels have been manually estimated based on installed radiation monitor readings.
- Survey maps of the Unit 1 Containment are available, showing dose rates and one way travel time to reach the valve via the chosen route.
- Health Physics personnel are currently unavailable to provide assistance for dose determination.

Initiating Cues

You have been directed to determine:

1. The *maximum time* you will have to open 1-RH-MOV-1700 including transit across the loop room, without exceeding your allowable dose.

Terminating Cues

- Determines the maximum time for opening 1-RH-MOV-1700 without exceeding dose limits.

Tools and Equipment

- Calculator
- Survey Data
- VPAP-2101

Safety Considerations

- None

Notes

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and denoted by an asterisk (*).
- Provide survey map to candidate.
- **START TIME:_____**

STEP 1: Calculate path exposure to 1-RH-MOV-1700. **STANDARD:** ___ 1. (3 R/HR)(1000 MR/R)(1 HR/60 MIN)(1 MIN)(2 TRIPS) = 100 MR. (Personnel Hatch to Stairway) ___ 2. (3 R/HR)(1000 MR/R)(1 HR/60 MIN)(3 MIN)(2 TRIPS) = 300 MR. (Stairway) ___ 3. (3 R/HR)(1000 MR/R)(1 HR/60 MIN)(2 MIN)(2 TRIPS) = 200 MR. (Stairway on –3'6" to valve) ___ 4. ***(100 MR)+(300 MR)+(200MR) = * 600 MR.** ***EVALUATOR'S NOTES:*** Total exposure via this path: 600 mr. **THIS IS A CRITICAL STEP** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 2: Calculate remaining allowable exposure at valve. **STANDARD:** __ 1. ***Allowable Dose to open the valve - (1800 MR) - (600 MR) = * 1200 MR** ***EVALUATOR'S NOTES:*** Total allowable dose: 1200 MR. **THIS IS A CRITICAL STEP** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Determine the maximum allowable time the operator has to open 1-RH-MOV-1700. **STANDARD:** ___ 1. **(1200 MR)(HR/6R)(1R/1000 MR)(1 HR/60 MIN) = * 12 MIN**. (Personnel Hatch to Stairway) ***EVALUATOR'S NOTES:*** Determines maximum allowable time to operate the valve is 12 minutes. **THIS IS A CRITICAL STEP** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

_____

_____

_____

_____

_____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Task

- Task is to be performed in the classroom.

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions:

- Unit 1 has experienced a small break LOCA with a safety injection.
- The Operating Team is attempting to place the Residual Heat Removal System in service, but they are unable to open 1-RH-MOV-1700 from the Main Control Room.
- You have been tasked with entering Containment and locally opening 1-RH-MOV-1700.
- Your allowable dose limit for this job is 1800 mr.
- General area radiation levels have been manually estimated based on installed radiation monitor readings.
- Survey maps of the Unit 1 Containment are available, showing dose rates and one way travel time to reach the valve via the chosen route.
- Health Physics personnel are currently unavailable to provide assistance for dose determination.

Initiating Cues

You have been directed to determine:

The *maximum time* you will have to open 1-RH-MOV-1700 including transit across the loop room, without exceeding your allowable dose.

Attachment 1

Radiological Survey Map And Record

Map Number	Location	Date	Time
100	Unit #1 Containment 47' Elevation	Today	Now

PURPOSE: ☐ Routine ☒ Non-Routine ☐ RWP Prep., for RWP No.#

TYPE: ☒ Gamma ☐ Beta ☐ Neutron ☐ Smear, GA ☐ Smear, LA ☐ Smear, HP ☐ Air Sample

REACTOR POWER	
Unit 1	Unit 2
ISD	100%

Instrument	Serial #

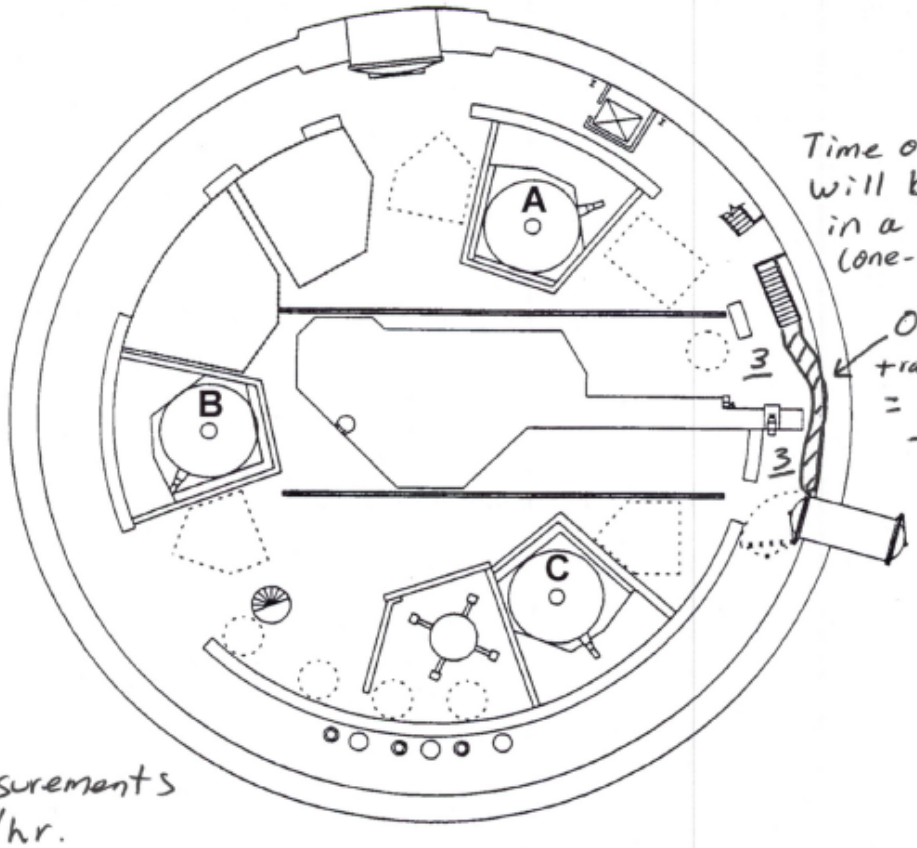
☐ All GA Smears <1000 DPM/100cm² Except as noted on map or smear worksheet.
☐ All GA Smears <1000 DPM/100cm²
☐ All LA smears <1000 DPM/ft²
☐ All HP smears <1 HP/smear
☐ Air particulate + I_2 <0.1 DAC
☐
☐

☐ All GA smears in DPM/100cm²
☐ All HP smears in HPs/smear
☒ All Gamma readings in mrem/hr.
☐ All Neutron readings in mrem/hr.
☐ All Beta readings in mrad/hr.
☐

Comments
General area based on Containment Radiation Monitors. 1000mr = 1R
Denotes Travel Path.

Survey RWP: XX

Survey Team Dose, mrem (SRD/DAD or calculated)	Submitted By (Printed Name, Signature)	Reviewed By (Printed Name, Signature)	Date
			Today



LDWA - Low Dose Waiting Areas
LHRA - Locked High Radiation Area
HRA - High Radiation Area
RA- Radiation Area
HPA - Hot Particle Area
CA - Contaminated Area
ARA - Airborne Radioactivity Area
RM - Radioactive Material (s)
CAM - Continuous Air Monitor
(F) - Frisking Station
RCAB - Radiological Control Area Boundary
NDCR - Neutron Dose Calculation Required

☐ Gen. Area; ◯ Contact; △ GA Smear; ◇ LA Smear; △* HP Smear; **AS** Air Sample Location; **LCK** Locked Gate; X-X-X Barrier

Attachment 1

Radiological Survey Map And Record

Map Number	Location	Date	Time
150	Unit #1 Containment -3'6" Elevation	Today	Now

PURPOSE: ☐ Routine ☒ Non-Routine ☐ RWP Prep., for RWP No.#

TYPE: ☒ Gamma ☐ Beta ☐ Neutron ☐ Smear, GA ☐ Smear, LA ☐ Smear, HP ☐ Air Sample

REACTOR POWER	
Unit 1	Unit 2
ISD	100%

Instrument	Serial #

☐ All GA Smears <1000 DPM/100cm² Except as noted on map or smear worksheet.

☐ All GA Smears <1000 DPM/100cm²
☐ All LA smears <1000 DPM/ft²
☐ All HP smears <1 HP/smear
☐ Air particulate + I_2 <0.1 DAC

☐ All GA smears in DPM/100cm²
☐ All HP smears in HPs/smear
☒ All Gamma readings in mrem/hr.
☐ All Neutron readings in mrem/hr.
☐ All Beta readings in mrad/hr.

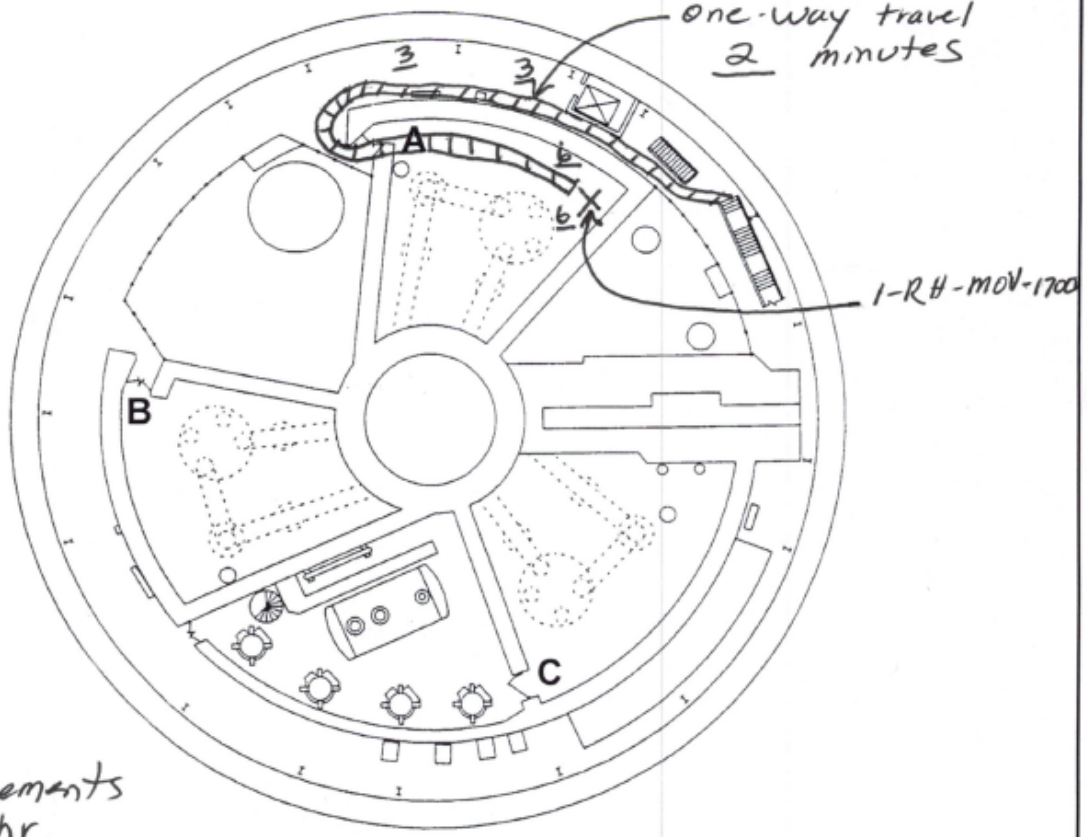
Comments

General area based on Containment Radiation Monitors. 1000 mr = 1R

Denotes Travel Path.

Survey RWP: XX

Survey Team Dose, mrem (SRD/DAD or calculated)	Submitted By (Printed Name, Signature)	Reviewed By (Printed Name, Signature)	Date
			Today



LDWA - Low Dose Waiting Areas
LHRA - Locked High Radiation Area
HRA - High Radiation Area
RA- Radiation Area

HPA - Hot Particle Area
CA - Contaminated Area
ARA - Airborne Radioactivity Area
RM - Radioactive Material (s)

CAM - Continuous Air Monitor
(F) - Frisking Station
RCAB - Radiological Control Area Boundary
NDCR - Neutron Dose Calculation Required

☐ Gen. Area; ◯ Contact; △ GA Smear; ◇ LA Smear; △* HP Smear; **AS** Air Sample Location; **LCK** Locked Gate; X X X Barrier

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Task

- Task is to be performed in the classroom.

Initial Conditions:

- Unit 1 has experienced a small break LOCA with a safety injection.
- The Operating Team is attempting to place the Residual Heat Removal System in service, but they are unable to open 1-RH-MOV-1700 from the Main Control Room.
- You have been tasked with entering Containment and locally opening 1-RH-MOV-1700.
- Your allowable dose limit for this job is 1800 mr.
- General area radiation levels have been manually estimated based on installed radiation monitor readings.
- Survey maps of the Unit 1 Containment are available, showing dose rates and one way travel time to reach the valve via the chosen route.
- Health Physics personnel are currently unavailable to provide assistance for dose determination.

Initiating Cues

You have been directed to determine:

The *maximum time* you will have to open 1-RH-MOV-1700 including transit across the loop room, without exceeding your allowable dose.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2014301
Administrative Job Performance Measure G 2.4.39 (RO 3.8 / SRO 3.7)

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Obtain Required information in accordance with EPIP-2.01, Notification of State and Local Governments.

K/A: G2.4.39 – Knowledge of RO responsibilities in emergency plan implementation.

Applicability	**Estimated Time**	**Actual Time**
RO/SRO	12 Minutes	

Conditions

- Task may be PERFORMED in classroom or Simulator.
- A simulated GENERAL EMERGENCY is in progress.

Standards

- Determines Meteorological data in accordance with EPIP-2.01, Notification of State and Local Governments.

Initiating Cues

- Nuclear Shift Manager direction.

Terminating Cues

- EPIP-2.01 steps 16-21 complete.

Procedures

- EPIP-2.01, Revision 43

Tools and Equipment

- None

Safety Considerations

- None

Initial Conditions

- You are an extra Reactor Operator on shift.
- A General Emergency was declared one-half hour ago due to a LBLOCA.
- Initial Notifications to the State and Local governments were made on time.
- Initial Notification to the NRC was also made on time.
- PCS is inoperable.
- The Corporate Emergency Response Center reports that their link to our MET tower is inoperable.
- Meteorological conditions have been stable for the last 15 minutes.

Initiating Cues

- You are to acquire the following MET data in accordance with the guidance found in EPIP-2.01 and give information to the State and Local Emergency Communicator.

    1) Temperature
    2) Average Wind Direction
    3) Wind Speed
    4) Stability class

Notes

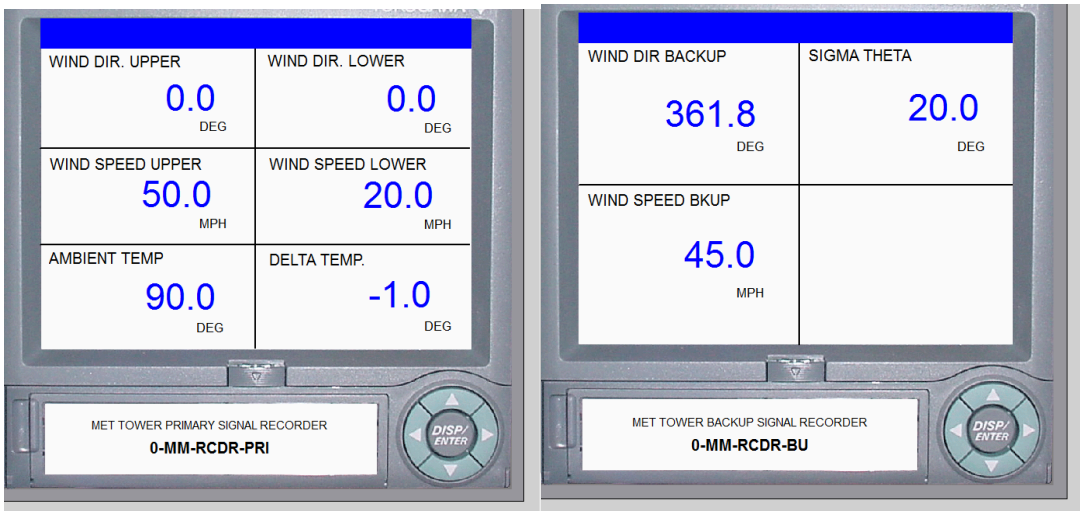
PERFORMANCE CHECKLIST

Simulator Set-up

- Enter the following Meter Overrides for MET PANEL

Recorder Name	Variable Name	Initial Value	Final Value	Recorder Reading
Wind Dir Upper	MET_WIND_DIR_UPR	0.6111111	0	0°
Wind Dir Lower	MET_WIND_DIR_LWR	0.6111111	0	0°
Wind Speed Upper	MET_WIND_SPD_UPR	0.23	0.5	50 mph
Wind Speed Lower	MET_WIND_SPD_LWR	0.23	0.2	20 mph
Ambient Temp.	MET_TEMP	0.651852	0.763	90 °F
Delta Temp	MET_DELTAT	1.0	0.223	-1.0
Wind Dir Backup	MET_WIND_DIR_BKP	0.611111	0.67	361.8 °F
Wind Spd Backup	MET_WIND_SPD_BKP	0.23	0.45	45 mph
Sigma Theta	MET_WIND– MET_SIGMA_THETA	0.28	0.4	20°

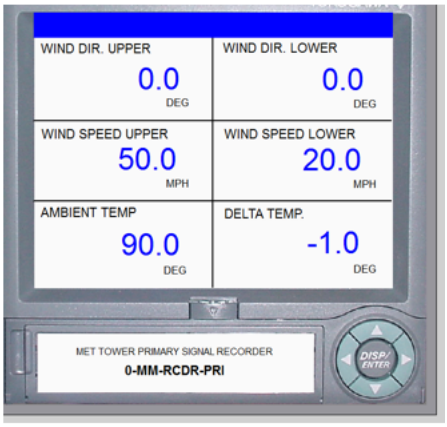
When complete the Recorders should look as shown below.

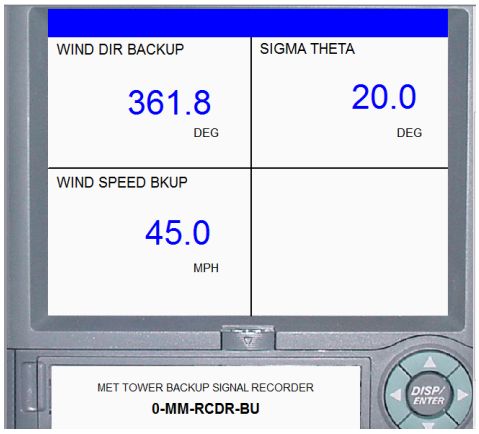


Notes to the Evaluator.

- Task critical elements are bolded and denoted by an asterisk (*****).
- **START TIME: _____.**

STEP 1: Determines EPIP-2.01 steps 16 provides procedural guidance for obtaining MET data. **STANDARD:** a) Continuous Action Page directs RO to go to step 16. **EVALUATOR'S NOTE:** Candidate can also identify step 16 by review of procedure. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 2: Notes: *(Prior to Step 16)* • Data may be obtained from MET panel charts, PCS, the computer modem or local data logger (Described in 0-AP-20.03, LOSS OF METEOROLOGICAL MONITORING INSTRUMENTATION). • Both the PCS EMCOMM feature and PCS Point Group #39, contains meteorological information averaged over the previous 15 minutes **STANDARD:** a) Reads and acknowledges the Notes. **EVALUATOR'S NOTE:** **If asked**: PCS is inoperable, you are to use the MET Data Recorder. **COMMENTS:**	**_____ SAT** **_____ UNSAT**





STEP 3:

Check ON-SITE METEOROLOGICAL INFORMATION - AVAILABLE. *(Step 16)*

STANDARD:

a) Determines that METEOROLOGICAL INFORMATION is available.
b) Initials Step 16.

EVALUATOR'S NOTE:

If asked: MET information is available on site.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 4:

Get current on-site meteorological information as requested. *(Step 17)*

☐ a) Refer to specified step(s) to acquire requested information:

Temperature	Step 18
Wind Speed	Step 19
Wind Direction	Step 20
Stability Class	Step 21

STANDARD:

a) Candidate may obtain the information in any order.
b) Initials Step 17.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 5: Get Temperature from Main Tower Temperature Indicator. *(Step 18)* **STANDARD:** a) Determines from MET Tower Primary Signal Recorder that Temperature is 90 ^{o}F. b) Records Temperature 90.0 ^{o}F on data sheet. c) Initials Step 18. **EVALUATOR'S NOTE:** Data sheet is provided to record indications, but candidate can write value on other paper. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: Notes: (Prior to Step 19) • Primary source of wind speed is the Main Tower Lower Level indicator. Alternate sources are (1) Backup Tower, and (2) Main Tower Upper Level. • The Dose Assessment Team may direct the use of meteorological data from the Main Tower Upper Level, based on the nature of the release. **STANDARD:** a) Acknowledges Notes. **EVALUATOR'S NOTE:** **If asked:** The Dose Assessment Team has not made any requests. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: GET WIND SPEED *(Step 19)* **STANDARD:** a) Determines from MET Tower Primary Signal Recorder that Wind Speed is 20mph. b) Records Wind Speed 20.0 mph on data sheet. c) Initials Step 19 **EVALUATOR'S NOTE:** • Note prior to Step 19 identifies the correct source for Wind Speed. • Data sheet is provided to record indications, but candidate can write value on other paper **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 7: Notes: *(Prior to Step 20)* • An approximate average wind direction for the previous 15 minutes should be determined. • Primary source of wind direction is the Main Tower Lower Level indicator. Alternate sources are (1) Backup Tower, and (2) Main Tower Upper Level. **STANDARD:** a) Candidate reads and acknowledges Notes. **EVALUATOR'S NOTE:** **If asked:** Time Compression: 15 minutes has been met. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 8: GET AVERAGE WIND DIRECTION FROM PCS. (*Step 20)* **STANDARD:** a) Determines PCS is NOT Available. b) Performs RNO gets Average Wind Direction from MET Recorder. c) Records Wind Direction 0.0 reading on data sheet. c) Initials step. **EVALUATOR'S NOTE:** • Note prior to Step 20 identifies Primary source and Alternate source. • Data sheet is provided to record indications, but candidate can write value on other paper. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 9: Notes: *(Prior to Step 21)* • Main Tower Delta T is the preferred source of stability class. Sigma Theta (Backup Tower) is the secondary source. • The value closer to "G" should be used if unable to distinguish Delta T or Sigma Theta value. • Numerical ranges presented below for Delta T and Sigma Theta are less than the range of the chart recorder and indicator in the Control Room. Indications are not expected to read outside the ranges found on these tables. **STANDARD:** a) Candidate reads and acknowledges Notes. **EVALUATOR'S NOTE:** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 10:

DETERMINE STABILITY CLASS. *(Step 21)*

STABILITY CLASS	CONTROL ROOM MAIN TOWER DELTA T (° F)	SIGMA THETA (°)
A (most unstable)	≤ -1.20	≥ 22.5
B	-1.19 to -1.08	22.4 to 17.5
C	-1.07 to -0.95	17.4 to 12.5
D	-0.94 to -0.32	12.4 to 7.5
E	-0.31 to +0.95	7.4 to 3.8
F	+0.96 to +2.54	3.7 to 2.1
G (most stable)	> +2.54	< 2.1

STANDARD:

a) Candidate determines Stability class using Delta T. Delta T is -1.0 ^{o}F from MET Tower Primary Recorder.
b) Records Stability Class C on data sheet.
c) Initials Step.

EVALUATOR'S NOTE:

- Note prior to step 21 identifies the correct column (Delta T) to use.
- Data sheet is provided to record indications, but candidate can write value on other paper.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 11:

Provides MET data to Emergency Communicator.

Temperature	90.0 ^{o}F
Wind Speed	20.0 mph
Wind Direction	0.0
Stability Class	C

STANDARD:

a) * **Provides MET Data as shown above**. **This is a critical step**.

EVALUATOR'S NOTE:

Accept data as Emergency Communicator

COMMENTS:

** **JPM COMPLETE** **

_____ SAT

_____ UNSAT

STOP TIME: _____

Comments: _____

_____

_____

_____

_____

_____

_____

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions

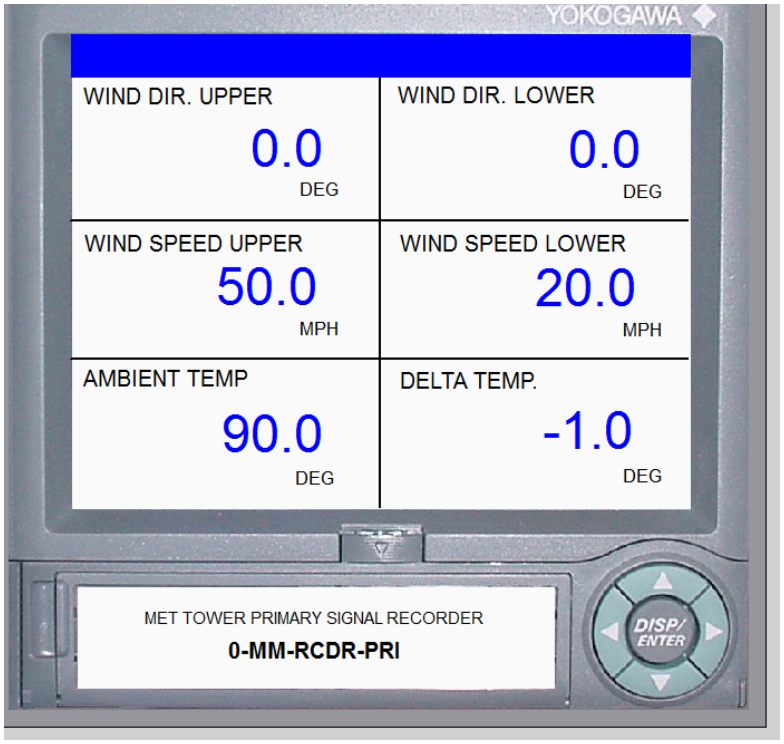
- You are an extra Reactor Operator on shift.
- A General Emergency was declared one-half hour ago due to a LBLOCA.
- Initial Notifications to the State and Local governments were made on time.
- Initial Notification to the NRC was also made on time.
- PCS is inoperable.
- The Corporate Emergency Response Center reports that their link to our MET tower is inoperable.
- Meteorological conditions have been stable for the last 15 minutes.

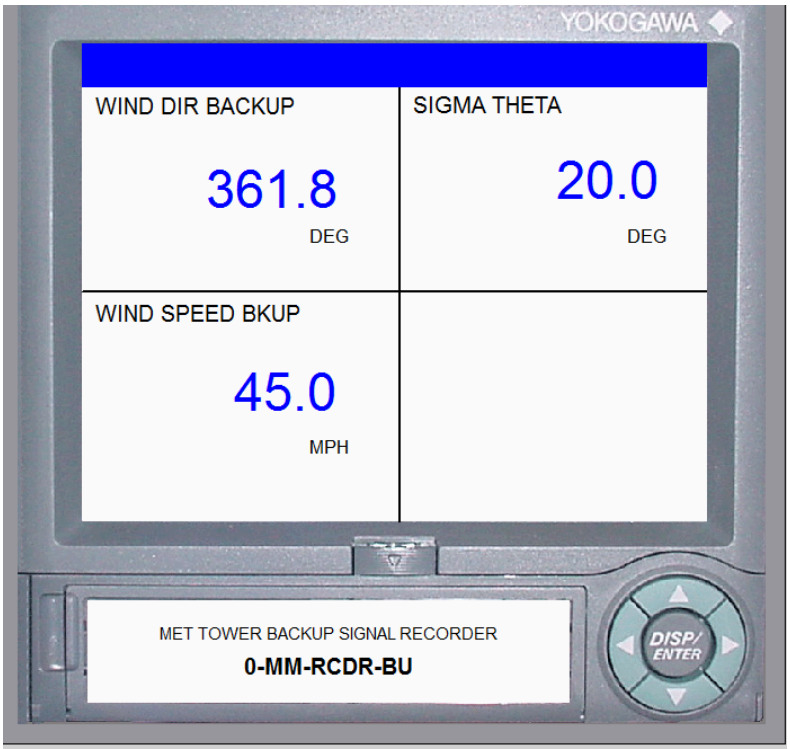
Initiating Cues

- You are to acquire the following MET data in accordance with the guidance found in EPIP-2.01 and give information to the State and Local Emergency Communicator.

    1) Temperature
    2) Average Wind Direction
    3) Wind Speed
    4) Stability class

Operator Handout
(TO BE GIVEN TO APPLICANT)





Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- You are an extra Reactor Operator on shift.
- A General Emergency was declared one-half hour ago due to a LBLOCA.
- Initial Notifications to the State and Local governments were made on time.
- Initial Notification to the NRC was also made on time.
- PCS is inoperable.
- The Corporate Emergency Response Center reports that their link to our MET tower is inoperable.
- Meteorological conditions have been stable for the last 15 minutes.

Initiating Cues

- You are to acquire the following MET data in accordance with the guidance found in EPIP-2.01 and give information to the State and Local Emergency Communicator.

    1) Temperature
    2) Average Wind Direction
    3) Wind Speed
    4) Stability class

Data Sheet

Temperature	
Wind Speed	
Wind Direction	
Stability Class	

U.S. Nuclear Regulatory Commission
Surry Power Station

SR2014301
Administrative Job Performance Measure 2.4.41(RO 2.9 / SRO 3.7)

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

CLASSIFY AN EVENT AND DETERMINE THE REQUIRED PAR ACTIONS

K/A: G2.4.41 – Knowledge of the emergency action level thresholds and classifications. (2.9/4.6)

Applicability	**Est Completion Time**	**Actual Time**
SRO ONLY	20 Minutes **(Portions **TC**)**	_____

Conditions

- Task is to be PERFORMED in the SIMULATOR or CLASSROOM.
- A simulated GENERAL EMERGENCY is in progress.

Standards

- Evaluate a given set of plant conditions, determine that a 'General Emergency' exists in accordance with EPIP-1.01 and the EAL table, and then determine that the appropriate PAR for that 'General Emergency' is PAR 'B'.

Initiating Cues

- Significant event notification.
- EPIP-1.01, Emergency Manager Controlling Procedure.

Terminating Cues

- EPIP-1.06, Step 8 Completed.

Procedures

- EPIP-1.01, Emergency Manager Controlling Procedure, Revision 56.
- EPIP-1.06, Protective Action Recommendations, Revision 10.

Tools and Equipment

- None

Safety Considerations

- None

MAKE SURE YOU PROVIDE THE CORRECT CUE SHEET (PAGE 1, LAST PAGE OF THIS JPM) FOR THE PORTION OF THE TASK TO BE PERFORMED!!!!

Initial Conditions

- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
- The station has experienced a loss of offsite power due to grid collapse. The system operator reports 16 hours for power restoration to Surry's switchyard.
- Both units are currently at Hot Shutdown.
- When attempting to load the AAC diesel on the 1J bus, the 1J bus faulted and electricians have determined that extensive damage has occurred to the buswork with repairs estimated to take 4 days.
- #1 EDG tripped on overspeed during start-up. Mechanics reset the overspeed, and when started, the diesel experienced extremely high vibrations and casing penetration by a piston, and was subsequently tripped locally.
- All radiation monitors indicate pre-event radiation levels.
- Unit 1 team is currently performing the actions of ECA-0.0, Loss of All AC power.
- Unit 2 team is completing the actions of ES-0.1, Reactor Trip Response.

Initiating Cues

- Here is a copy of EPIP 1.01, you are directed to classify this event in accordance with EPIP-1.01 and inform me of your classification as soon as it has been made.
- **This JPM is TIME CRITICAL.**

Performance Checklist

Notes to the Evaluator.

- Task critical elements are denoted by an asterisk (*****). If substeps of a critical element also have an asterisk (*****), then only those asterisked substeps are critical to performance of that task element.
- Critical step sequencing requirements: 1 before 3.
- **START TIME: _____**

Evaluator's note- candidate may choose to make EAL classification straight from EAL tables and NOT implement steps of EPIP-1.01. Steps are given here as guidance. Critical task time ends when classification determined regardless of determination method. Caution and Note prior to step 1. **CAUTION:** Declaration of the highest emergency class for which an Emergency Action Level is exceeded shall be made. **NOTE:** The PCS is potentially unreliable in the event of an earthquake. Therefore, PCS parameters should be evaluated for accuracy should an earthquake occur. **Standards** (a) Acknowledges CAUTION and NOTE **Evaluator's Note** **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**

EAL STEP 1:

_____ SAT

_____ UNSAT

EVALUATE EMERGENCY ACTION LEVELS:

a) Determine event category using the applicable Emergency Action Level Matrix:
   - Hot Conditions (RCS > 200 °F)
   - Cold Conditions (RCS ≤ 200 °F)

b) Review EAL associated with event category

c) Use Control Room monitors, PCS, and outside reports to get indications of emergency conditions listed in the EAL Matrix

d) Verify EAL - CURRENTLY EXCEEDED

e) Initiate a chronological log of events

Standards

(a) Refers to the HOT chart
(b) Determines event category to be Loss of Power.
(c) Refers to given conditions to determine EAL applicability
(d) ***DETERMINES EAL SG1.1 GENERAL EMERGENCY to be met. This is a critical step.**
(e) Initiates (or verbalizes) a chronological log of events.

Evaluator's Note: If candidate makes EAL determination at this step, record stop time.

Evaluator's Comments S**TOP TIME: _____**

TIME CRITIAL- 15 minutes

EAL Step 2: RECORD EAL IDENTIFIER, TIME EMERGENCY DECLARED AND SM/SEM NAME. **Standards** **(a) Determines that event is a General Emergency based on EAL SG1.1 (Loss of all offsite and onsite power to Unit 1 Emergency Busses H and J- This is a critical step.** **(b) Classifies event as a GENERAL EMERGENCY- This is a critical step.** **Evaluator’s Note: If candidate makes EAL determination at this step, record stop time**. **Evaluator's Comments** S**TOP TIME: _____** **TIME CRITIAL- 15 minutes**	**_____ SAT** **_____ UNSAT**
EAL Step 3: ANNOUNCE THE FOLLOWING DECLARATIONS: • Station Emergency Manager position • Emergency Classification • EAL • Time Declared **Standards** (a) Makes announcement **Evaluator’s Note** ***If candidate makes incorrect classification end the JPM at this point.*** **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**

KEY

NUMBER	PROCEDURE TITLE	REVISION
EPIP-1.01	EMERGENCY MANAGER CONTROLLING PROCEDURE	56
		PAGE 3 of 9

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

J 2 RECORD EAL IDENTIFIER, TIME EMERGENCY DECLARED AND SM/SEM NAME

Emergency Classification	EAL Identifier	Time Declared	SM / SEM Name
Notification of Unusual Event			
Alert			
Site Area Emergency			
General Emergency	SG1.1	Now (<15m)	Name

J 3 ANNOUNCE THE FOLLOWING DECLARATIONS:

- ☑ • Station Emergency Manager position
- ☑ • Emergency Classification
- ☑ • EAL
- ☑ • Time Declared

EVALUATOR: Take EPIP-1.01 into your possession at this time.
HANDOUT THE NEXT PAGE of OPERATOR INSTRUCTIONS AT THIS TIME.

Initial Conditions

- EPIP-1.05, Response to General Emergency, Step 3 has been completed.
- The State and Local Communicator has determined wind direction to be 180° and speed to be 17 mph.
- There are no known impediments making evacuation dangerous.
- A dose assessment has not been made.
- All available radiation monitors indicate pre-event trends.

Initiating Cues

- Here's a copy of EPIP-1.06, Protective Action Recommendations. You are to **complete** EPIP-1.06, Protective Action Recommendations in its entirety.
- When you finish the actions necessary to accomplish this, please inform me.
- **This JPM is TIME CRITICAL.**

Notes to the Evaluator.

- **TIME CRITICAL REQUIREMENT:**
  This PAR must be identified and relayed to the S&L communicator within 15 minutes.
- **START TIME: _____**

PAR Step 1: Procedure Step 1 INITIATE PROCEDURE. **Standards** Fills in Name, Time and Date on Step 1. **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**
PAR Step 2: Procedure Step 1 USE ATTACHMENT 1, PROTECTIVE ACTION RECOMMENDATION MATRIX, TO DETERMINE INITIAL PAR **Standards** (a) Goes to Attachment 1. **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**

PAR Step 3: Attachment 1 – Flowchart block 1- Known impediments make evacuation dangerous. **Standards** - Determines there are no known impediments that make evacuation dangerous. **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**
PAR Step 4: Attachment 1 – Flowchart block 2- Radiological release in progress or has occurred related to the event. (YES or NO). **Standards** - Determines that no radiological release in progress. **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**

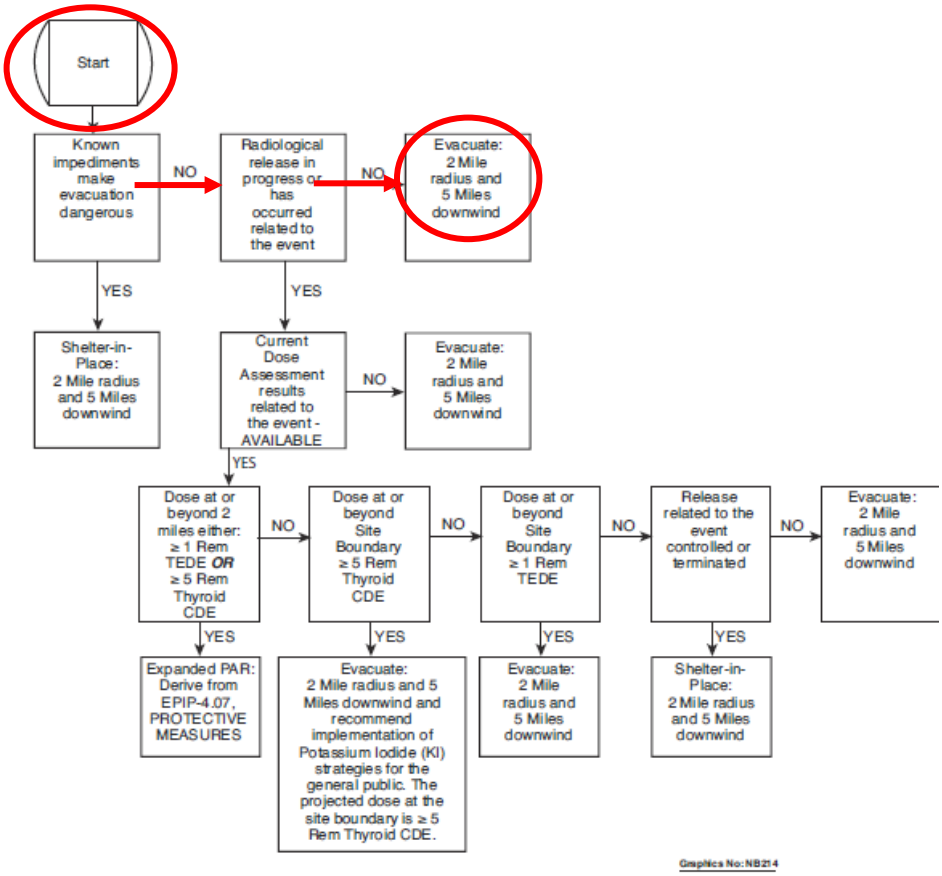
PAR Step 5:

_____ **SAT**

_____ **UNSAT**

Attachment 1 – Flowchart-

Evacuate 2 miles radius and 5 miles downwind.



Standards

***Determines that PAR is required- Evacuate 2 mile radius 360°, and 5 miles downwind in affected sectors. This is a critical step.**

Evaluator's Comments

PAR Step 6 *Evaluator's note – Candidate will now return to step 3 of the procedure (attachment 1 items complete)* Notes prior to step 3- • ATTACHMENT 2, AFFECTED SECTOR(S) MAP, is to be used for all PAR developments from this procedure. ATTACHMENT 2, AFFECTED SECOTR(S) MAP is not to be used for PARs developed IAW EPIP-4.07, PROTECTECTIVE MEASURES. **Standards** - Acknowledges notes **CUES** - None **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**
PAR Step 7 Procedure Step 3 IMPLEMENT ATTACHMENT 2, AFFECTED SECTOR(S) MAP: a) Record time wind data acquired. b) Record average wind direction from, in degrees and compass point. c) Record average wind speed in mph. d) Record affected sectors. e) Mark affected sectors on map (use any writing implement available, e.g., pen, pencil, highlighter etc.) f) GO TO Step 6 **Standards** - Completes attachment 2 as follows: * At (**now**) wind direction from **180° (S)**, Wind Speed **17 mph**, Sectors **RAB.** - **Using attachment 2 (as per the note), determines that affected sectors are R, A, B**. **CUES** - **If asked**: Met data obtained at JPM start time. **Evaluator's Comments**	**_____ SAT** **_____ UNSAT**

PAR Step 8

_____ SAT

_____ UNSAT

Procedure Step 6
COMPLETE ATTACHMENT 3, PROTECTIVE ACTION RECOMMENDATION FORM:

a) Protective Action Recommendation:
   1) Mark appropriate PAR box(s)
   2) Record Mile radius and Miles downwind
   3) Record Downwind Sectors
b) Remarks/Approval Information:
   1) Record Remarks (optional)
   2) Approve PAR (sign report)
   3) Record date and time report approved

Standards

- *** Completes item 1 of attachment 3 by marking EVACUATE 2 mile radius (360°) and 5 miles downwind in the following sectors R, A, B – this is a critical step.**

- Completes item 2 by signing and entering the current time and date.

Evaluator's Note

None

CUES

- **If asked:** None

Evaluator's Comments

PAR Step 9

Procedure Step 7 - HAVE EMERGENCY COMMUNICATORS NOTIFY OFF-SITE AUTHORITIES OF PAR:

- Virginia Emergency Operations Center notified IAW:
  - EPIP-1.06, PROTECTIVE ACTION RECOMMENDATIONS OR
  - EPIP-4.07, PROTECTIVE MEASURES
- NRC notified IAW EPIP-2.02, NOTIFICATION OF NRC (notification made from Control Room or TSC, when activated)
- NRC notified IAW EPIP-4.33, HEALTH PHYSICS NETWORK COMMUNICATIONS (notifications made from TSC or LEOF/CEOF only after NRC requests HPN be established)

Standards

(a) *Directs State and Local EC to notify Virginia EOC - this is a critical step.

(b) Directs NRC EC.

CUES

- **Tell SRO**: State and Local EC will transmit PAR to Virginia EOC.
- **Tell SRO**: NRC EC will notify NRC of PAR.
- **If asked**: HPN has not been requested yet.

Evaluator's Note

This step must be complete within 15 minutes of start of task.

Record Time: _____

Evaluator's Comments

STOP TIME: _____

_____ SAT

_____ UNSAT

KEY

NUMBER EPIP-1.06	ATTACHMENT TITLE	ATTACHMENT 2
REVISION 10	AFFECTED SECTOR(S) MAP	PAGE 1 of 1

NOTE: Rounding shall be used when determining affected sectors using wind direction.
For example: Wind Direction (degrees from) 11.5 to 11.9 would be rounded up to 12.0.
Wind Direction (degrees from) 11.1 to 11.4 would be rounded down to 11.0.

Average Wind Direction and Average Wind Speed Data:

At XXXX (24-hr time), Wind Direction From 180 (degrees), Wind Speed 17 (in mph), Sectors RAB

At _____ (24-hr time), Wind Direction From _____ (degrees), Wind Speed _____ (in mph), Sectors _____

At _____ (24-hr time), Wind Direction From _____ (degrees), Wind Speed _____ (in mph), Sectors _____

At _____ (24-hr time), Wind Direction From _____ (degrees), Wind Speed _____ (in mph), Sectors _____

AVERAGE WIND DIRECTION (Degrees) From	AFFECTED SECTORS
349 - 11	H, J, K
12 - 33	J, K, L
34 - 56	K, L, M
57 - 78	L, M, N
79 - 101	M, N, P
102 - 123	N, P, Q
124 - 146	P, Q, R
147 - 168	Q, R, A
169 - 191	R, A, B
192 - 213	A, B, C
214 - 236	B, C, D
237 - 258	C, D, E
259 - 281	D, E, F
282 - 303	E, F, G
304 - 326	F, G, H
327 - 348	G, H, J

KEY

NUMBER EPIP-1.06	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 10	REPORT OF PROTECTIVE ACTION RECOMMENDATION	PAGE 1 of 1

PAR MESSAGE # _____

NOTE:
- Transmit to Virginia EOC only using the VEOC ARD.
- IF VEOC ARD nonfunctional, THEN use VEOC autodial or direct dial (804) 674-2400 or (804) 310-8868.
- IF all means of communications with VEOC nonfunctional, THEN use Insta-Phone.

This is Surry Power Station with a(n) ☐ Drill Message ☐ Emergency Message for Protective Action Recommendation. **Use the Report of Protective Action Recommendation form to copy this message.**

(READ SLOWLY)

PROTECTIVE ACTION RECOMMENDATION:

☐ SHELTER-IN-PLACE: ____ Mile radius 360° and ____ Miles downwind in the following sectors:

_____.

☑ EVACUATE: 2 Mile radius 360° and 5 Miles downwind in the following sectors:

R, A, B.

☐ BEYOND 10 MILE EPZ:

☐ Evacuate Area: _____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☐ Shelter-in-place: ____ Centerline in degrees; _____Distance in Miles; _____ Width in feet

☐ POTASSIUM IODIDE:

Recommend implementation of Potassium Iodide (KI) strategies for the general public.
The projected dose at the site boundary is ≥ 5 Rem Thyroid CDE.

The time is _____ (24-hr time).

This is _____ / Emergency Communicator.

Message received by: Virginia EOC Watch Officer (name) _____.

This is Surry Power Station out at _____ (24-hr time) on _____ (date).

REMARKS (OPTIONAL) / APPROVAL INFORMATION [DO NOT READ]

NOTE: Shelter-in-Place may be recommended as a result of controlled releases, evacuation impediments or other known conditions which make evacuation dangerous.

REMARKS: _____

APPROVED BY: _____ Today / Now
Station Emergency Manager or Recovery Manager **Date** **Time**

Evaluator's Summary

CLASSIFY AN EVENT AND DETERMINE THE REQUIRED PAR ACTIONS

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER)

Directions

The evaluator will explain the initial conditions of the task to be performed and will provide the initiating cue. Ensure you indicate to the evaluator when you understand your assigned task.

Initial Conditions

- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
- The station has experienced a loss of offsite power due to grid collapse. The system operator reports 16 hours for power restoration to Surry's switchyard.
- Both units are currently at Hot Shutdown.
- When attempting to load the AAC diesel on the 1J bus, the 1J bus faulted and electricians have determined that extensive damage has occurred to the buswork with repairs estimated to take 4 days.
- #1 EDG tripped on overspeed during start-up. Mechanics reset the overspeed, and when started, the diesel experienced extremely high vibrations and casing penetration by a piston, and was subsequently tripped locally.
- All radiation monitors indicate pre-event radiation levels.
- Unit 1 team is currently performing the actions of ECA-0.0, Loss of All AC power.
- Unit 2 team is completing the actions of ES-0.1, Reactor Trip Response.

Initiating Cues

- Here is a copy of EPIP 1.01, you are directed to classify this event in accordance with EPIP-1.01 and inform me of your classification as soon as it has been made.
- **This JPM is TIME CRITICAL.**

Operator Directions Handout
(TO BE READ TO APPLICANT BY EXAMINER <u>after completion of Classification</u>)

Initial Conditions

- EPIP-1.05, Response to General Emergency, Step 3 has been completed.
- The State and Local Communicator has determined wind direction to be 180° and speed to be 17 mph.
- There are no known impediments making evacuation dangerous.
- A dose assessment has not been made.
- All available radiation monitors indicate pre-event trends.

Initiating Cues

- Here's a copy of EPIP-1.06, Protective Action Recommendations. You are to **complete** EPIP-1.06, Protective Action Recommendations in its entirety.
- When you finish the actions necessary to accomplish this, please inform me.
- **This JPM is TIME CRITICAL.**

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- EPIP-1.05, Response to General Emergency, Step 3 has been completed.
- The State and Local Communicator has determined wind direction to be 180° and speed to be 17 mph.
- There are no known impediments making evacuation dangerous.
- A dose assessment has not been made.
- All available radiation monitors indicate pre-event trends.

Initiating Cues

- Here's a copy of EPIP-1.06, Protective Action Recommendations. You are to **complete** EPIP-1.06, Protective Action Recommendations in its entirety.
- When you finish the actions necessary to accomplish this, please inform me.
- **This JPM is TIME CRITICAL.**

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
- The station has experienced a loss of offsite power due to grid collapse. The system operator reports 16 hours for power restoration to Surry's switchyard.
- Both units are currently at Hot Shutdown.
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- All radiation monitors indicate pre-event radiation levels.
- Unit 1 team is currently performing the actions of ECA-0.0, Loss of All AC power.
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Initiating Cues

- Here is a copy of EPIP 1.01, you are directed to classify this event in accordance with EPIP-1.01 and inform me of your classification as soon as it has been made.
- **This JPM is TIME CRITICAL**