U.S. Nuclear Regulatory Commission
Surry Power Station

SR15301
Administrative Job Performance Measure 2.1.37

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

COMPLETE A REACTIVITY SUMMARY SHEET

K/A: G2.1.37 – Knowledge of procedures, guidelines, or limitations associated with reactivity management. (4.3/4.6)

Applicability	**Est Completion Time**	**Actual Time**
RO/SROI/SROU	45 Minutes	_____

Initial Conditions

- Task is to be PERFORMED in the CLASSROOM.
- Performance of 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations, is required.

Standards

- Completes the calculations, within tolerances, that allow for completion of the Reactivity Summary Sheet located in 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations.

Initiating Cues

- Given simulated plant conditions, perform 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations and complete Attachment 2 of 2-OP-RX-010, Reactivity Summary Sheet.

Initial Conditions

- It is mid shift on Saturday. Unit 2 power is 100 percent.
- 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations is scheduled to be completed on this shift.

- The following is reactivity information was supplied by the Reactor Engineer today:
  - Core burnup: 12147 MWD/MTU
  - Isothermal temperature coefficient: -25.81 pcm/°F
  - Target delta flux: -0.5%

- The following are the Unit conditions:
  - Reactor power: 100% and stable for last 7 days
  - RCS boron concentration: 529 ppm
  - Control Bank 'D' is at 225 steps
  - 'C' BAST is in-service on Unit 2 with a boron concentration of 13772 ppm.
  - A power reduction has not occurred and is not planned.

- Here is a copy of 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations. I need you to perform 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations, through Step 5.2.4, and I will have another Operator complete the procedure.

- When you are ready to have your work independently verified, please inform me, as this will end the JPM.

Terminating Cues

- Reactivity Summary Sheet calculations performed and the candidate is ready for their work to be independently verified.

Procedures

- 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations (Revision 10).
- 2-DRP-003R, Curve Book, Revision 27.

Tools and Equipment

- Calculator

Safety Considerations

- None

Notes

Performance Checklist

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words “Critical Step” at the end of the step.
- **START TIME:**

STEP 1: 3.0 INITIAL CONDITIONS 3.1 Unit 2 is operating at greater than 50% power (see P&L 4.1). 4.0 PRECAUTIONS AND LIMITATIONS 4.1 The Unit should be at steady state conditions, i.e., constant power (+/- 5%) for 48 hours. If the unit is not stable or not above 50% power, then this procedure should be carried daily on the PT schedule until the Unit is at equilibrium condition. 4.2 This procedure should be performed every two weeks as directed by the Operations PT schedule. If RCS boron concentration is less than 200 ppm, this procedure should be done weekly. **STANDARD:** (a) Acknowledges Initial Conditions and Precautions and Limitations. **EVALUATOR’S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 2: Note prior to Step 5.1.1: • The items listed in Step 5.1.1 will be updated every 2 weeks by Reactor Engineering. **STANDARD:** (a) Acknowledges the Note. **EVALUATOR’S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Step 5.1.1 5.1.1 The following items have been provided by Reactor Engineering, and will be used for calculations: • Core burn-up • Isothermal Temperature Coefficient (ITC) **STANDARD:** (a) Acknowledges that this information was provided by Reactor Engineering in the initial conditions. **EVALUATOR'S NOTE**: • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 4: Notes prior to Step 5.2.1: • The following guidelines should be used when performing calculations: o Do no round numbers until the final value. Then round Boric Acid calculations to the nearest tenth of a gallon and round PG calculations to the nearest gallon. Review Attachment 4 before performing calculations. o Use the last known reported boron from Chemistry. It is not necessary to interpolate or obtain a sample if one has not been taken for the day. • The following form is located on the Operations network drive in S:/Surry Power Station/3/Data1/OPS/Forms/Reactivity • Reactivity2, Unit 2 Form • Once calculated, this procedure will remain in effect for two weeks if RCS boron concentration is greater than or equal to 200 ppm. If RCS boron concentration is less than 200 ppm, this calculation should be performed weekly. • The Unit 2 Reactor Operator will have the results of this procedure verified by either the Shift Technical Advisor or another licensed Reactor Operator. **STANDARD:** (a) Acknowledges the Notes. **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 5: Step 5.2.1 5.2.1 Perform Attachment 1 to calculate reactivity parameters. **STANDARD:** (a) Proceeds to Attachment 1 to commence reactivity calculations. **EVALUATOR'S NOTE**: • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: Note prior to Step 1 of Attachment 1: • Unless a specific value is given, the most recent Core Burn-up value from the Reactor Engineers should be used. This value is listed on the bench board. Do not interpolate for daily burn-up. **STANDARD:** (a) Acknowledges the Note. **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7

Attachment 1, Step 1:

1. Using data from Reactor Engineering, the Curve Book, and Chemistry, determine the following parameters:

   a. Core Burn-up: _____ (MWD/MTU)

   b. ITC: _____ (PCM/°F)

   c. Differential Boron Worth (DBW): _____ (PCM/PPM)

   d. Boron Concentration of in-service BAST (Cb BAST): _____ppm

STANDARD:

Completes Step 1 as indicated below:

1. Using data from Reactor Engineering, the Curve Book, and Chemistry, determine the following parameters:

   a. Core Burn-up: **12147** (MWD/MTU)

   b. ITC: **-25.81** (PCM/°F)

   c. Differential Boron Worth (DBW): **-8.15** (PCM/PPM)

   d. Boron Concentration of in-service BAST (Cb BAST): **13772** ppm

EVALUATOR'S NOTE:

a. Core Burn-up was provided as an initial condition.
b. ITC was provided as an initial condition.
c. Is read from a graph in DRP-0003, Curve Book.
   The curve is located at Attachment 27 (page 54) of DRP-0003.
   Answer: -8.15 pcm/ppm
   ACCEPTABLE RANGE: [-8.13 to -8.17]

d. BAST Boron Concentration was provided as an initial condition.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 8:

Attachment 1, Step 2:

2. Calculate the amount of boron to make a +1 ppm change.

-50813 x LN(1 + 1 / (Current Boron – Step 1d))

-50813 x LN(1 + 1 / (____– ____)) = _____ gal (Reactivity Summary Line 7)

STANDARD:

Completes Step 2 as indicated below:

2. Calculate the amount of boron to make a +1 ppm change.

a. -50813 x LN(1 + 1 / (529 – 13772))

b. -50813 x LN(1 + 1 / (-13243))

c. -50813 x LN(1 + (-0.000075511) [may round to -0.00008]

d. -50813 x LN(0.999924488) [based on previous rounding 0.99992]

e. -50813 x -0.000075514 [based on previous rounding -0.00008]

f. 3.837 gals [based on previous rounding 4.06 gals]

g. **Answer: 3.8 gallons [acceptable range: 3.7 – 4.1 gallons]**
This is a critical step.

EVALUATOR'S NOTE:

- Candidate may transfer this value to Attachment 2 (Reactivity Summary Sheet) line #7 at this time (or may wait until all calculations are complete).

COMMENTS:

_____ SAT

_____ UNSAT

STEP 9: Note prior to Step 3 of Attachment 1: • When RCS Boron Concentration is less than 12 ppm, the equation in Step 3 will yield invalid results. By decreasing the assumed charging line Boron concentration at low RCS Boron Concentration, a value of 35221 gallons of dilution is obtained. **STANDARD:** (a) Acknowledges the Note. **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 10:

Attachment 1, Step 3:

3. IF RCS Boron concentration is greater than or equal to 12 ppm, THEN calculate the amount of dilution to make a -1 ppm change in accordance with the following. Otherwise, enter N/A

   -50813 x LN(1 - 1 / (Current Boron – 10))

   -50813 x LN(1 - 1 / (_____ – 10)) = _____ gal (Reactivity Summary Line 8)

STANDARD:

Completes Step 3 as indicated below:

3. Calculate the amount of PG to make a +1 ppm change.

   a. -50813 x LN(1 - 1 / (529 – 10))

   b. -50813 x LN(1 - 1 / (519))

   c. -50813 x LN(1 – (0.001926782)) [may round to 0.00193]

   d. -50813 x LN(0.998073217) [based on previous rounding 0.99807]

   e. -50813 x -0.00192864 [based on previous rounding -0.00193]

   f. 98.00003 gals [based on previous rounding 98.164 gals]

   g. **Answer: 98 gallons [acceptable range: 97.9 – 98.2 gallons]**
   This is a critical step.

EVALUATOR'S NOTE:

- Candidate may transfer this value to Attachment 2 (Reactivity Summary Sheet) line #8 at this time (or may wait until all calculations are complete).

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 11: Attachment 1, Step 4: 4. IF RCS Boron concentration is less than or equal to 12 ppm, THEN the amount of dilution to make a -1 ppm change is calculated by the following. Otherwise, enter N/A -50813 x LN(1 – (1 / 2)) = 35221 gal (Reactivity Summary Line 8) **STANDARD:** 4. Marks Step as Not Applicable (N/A). **EVALUATOR'S NOTE:** • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 12: Attachment 1, Step 5: 5. Calculate the boron concentration change to cause a 1 °F temperature change. _____ / _____ = _____ ppm / °F (ITC, Step 1b) (DBW, Step 1c) **STANDARD:** Completes Step 5 as indicated below: 5. Calculate the boron concentration change to cause a 1 °F temperature change. -25.81 / -8.15 = 3.16687 ppm / °F (ITC, Step 1b) (DBW, Step 1c) a. ITC was provided as an initial condition. b. DBW was read from a graph in DRP-0003, Curve Book. c. **Answer: 3.16687 ppm/°F** **ACCEPTABLE RANGE: [3.317466@ 8.13 DBW; 3.15912@ 8.17 DBW]** **This is a critical step.** **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 13:

Attachment 1, Step 6:

6. Calculate the amount of boron to make a -1 °F Tave change.

-50813 x LN(1 + Step 5 / (Current Boron – Step 1d))

-50813 x LN(1 + _____ / (_____– _____)) = _____ gal (Reactivity Summary Line 4)

STANDARD:

Completes Step 6 as indicated below:

6. Calculate the amount of boron to make a +1 ppm change.

a. -50813 x LN(1 + 3.16687 / (529 – 13772))

b. -50813 x LN(1 + 3.16687 / (-13243))

c. -50813 x LN(1 + (-0.000239135) [may round to -0.00024]

d. -50813 x LN(0.999760864) [based on previous rounding 0.999767]

e. -50813 x -0.000239163 [based on previous rounding -0.00024]

f. 12.15264 gals [based on previous rounding 12.05 gals]

g. **Answer: 12.15264 gallons [acceptable range: 12.18254@ 8.13 DBW to 12.1229@ 8.17 DBW]**
This is a critical step.

EVALUATOR'S NOTE:

- Candidate may transfer this value to Attachment 2 (Reactivity Summary Sheet) line #4 at this time (or may wait until all calculations are complete).
- Range incorporates rounding and bounding values from previous step.

COMMENTS:

_____ SAT

_____ UNSAT

STEP 14: Notes prior to Step 7 of Attachment 1: • When RCS Boron Concentration is less than 16 ppm, the equation in Step 7 will yield invalid results. • When RCS Boron Concentration is less than 16 ppm, the amount of dilution to make a 1 °F Tave change will be greater than 50,000 gallons. **STANDARD:** (a) Acknowledges the Notes. **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 15:

Attachment 1, Step 7:

7. IF RCS Boron concentration is greater than or equal to 16 ppm, THEN calculate the amount of dilution to make a +1 °F Tave change. Otherwise, enter N/A for this step and Step 5 on Attachment 2.

-50813 x LN(1 – Step 5 / (Current Boron – 10))

-50813 x LN(1 - ____ / (_____– 10)) = _____ gal (Reactivity Summary Line 5)

STANDARD:

Completes Step 7 as indicated below:

7. Calculate the amount of dilution to make a +1 °F change.

a. -50813 x LN(1 – 3.16687 / (529 – 10))

b. -50813 x LN(1 – 3.16687 / (519))

c. -50813 x LN(1 – (0.006101868)) [may round to 0.00610]

d. -50813 x LN(0.993898131) [based on previous rounding 0.9939]

e. -50813 x -0.006120561 [based on previous rounding -0.00612]

f. 311.004089 gals [based on previous rounding 310.918 gals]

g. **Answer: 311.004089 gallons [acceptable range: 311.77@ 8.13 DBW, 310.24@ 8.17 DBW]**
This is a critical step.

EVALUATOR'S NOTE:

- Candidate may transfer this value to Attachment 2 (Reactivity Summary Sheet) line #5 at this time (or may wait until all calculations are complete).
- Range incorporates rounding and bounding values from previous steps

COMMENTS:

_____ SAT

_____ UNSAT

STEP 16: Notes prior to Step 8 of Attachment 1: • If the value of ITC is between rod steps listed in the Curve Book, select the rod height with the highest rod worth. Interpolation to an unlisted rod height is not necessary. **STANDARD:** (a) Acknowledges the Notes. **EVALUATOR'S NOTE:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 17

Attachment 1, Step 8:

8. Determine the number of rod steps from the fully withdrawn position that equates to a 1 °F Tave change by performing the following calculations:

   a. Current Rod Height: _____ Steps

   b. Value of ITC: (+)_____ pcm (record as + value)

   c. Rod height associated with b: _____ Steps

   d. Subtract a - c: _____Steps (Reactivity Summary line 6)

STANDARD:

Completes Step 8 as indicated below:

8. Determine the number of rod steps from the fully withdrawn position that equates to a 1 °F Tave change by performing the following calculations:

   a. Current Rod Height: 225 Steps

   b. Value of ITC: (+) 25.81 pcm (record as + value)

   c. Rod height associated with b: 217 Steps

   d. Subtract a - c: 8 Steps

EVALUATOR'S NOTE:

a. Current Rod Height was provided as an initial condition.
b. ITC was provided as an initial condition.
c. Is read from a table in DRP-0003, Curve Book.
   The curve is located at Attachment 29 (page 63) of DRP-0003.
   Answer: 217 steps
d. 225 – 217 = 8 Steps [8 - 9 Steps].
   Answer: 8 Steps [7 - 8 steps]
   This is a critical step.

Candidate may transfer this value to Attachment 2 (Reactivity Summary Sheet) line #6 at this time (or may wait until all calculations are complete).

The candidate may sign step 5.2.1 as complete at this time.

COMMENTS:

_____ **SAT**

_____ **UNSAT**

STEP 18

Step 5.2.2 Transfer appropriate values to Attachment 2, Reactivity Summary Sheet.

_____ SAT

_____ UNSAT

STANDARD:

Transfer appropriate values to Attachment 2, Reactivity Summary Sheet, as indicated below:

1. Reactor Operators will discuss Items 4 – 8 with the Unit SRO following turnover.
2. See Subsection 5.2 for directions to complete Items 4 through 8.

3.	Reactor Power	100	%
4.	Boron for 1 °F decrease	**12.1 – 12.3**	GAL BA
5.	Dilution for 1 °F increase	**310 - 312**	GAL PG
6.	Rod steps for 1 °F change	**7 - 8**	Steps
7.	Gallons of boric acid for 1 ppm change	**3.7 – 4.1**	GAL BA
8.	Gallons of PG for 1 ppm change	**97.9 – 98.2**	GAL PG

EVALUATOR'S NOTE:

This is a summary sheet for easy reference. Critical Steps (4 – 8) are bolded and the details on the calculation are provided earlier in the JPM.

The candidate may sign step 5.2.2 as complete and 5.2.3 as not applicable at this time.

COMMENTS:

STEP 5: Reports completion of 2-OP-RX-010 through Step 5.2.4. **STANDARD:** (a) Verbal or written status report that a 2-OP-RX-010 is ready to be independently verified. **EVALUATOR'S NOTE:** • Acknowledge the completion of the task. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

SRO Only Follow-up Question
(2-OP-RX-010)
KEY

Current Unit 2 RWST parameters are as follows:

- Boron, by sample, is 2248 ppm.
- RWST NR level 97.7% (392, 950 gallons).
- REST Temperature 43 °F.

Please provide the answers to the following questions in the space below.

1) What are the Technical Specification requirements for RWST volume, boron concentration, and solution temperature?

   Per TS 3.2.B.1.b.1., TS 3.3.A.1., and TS 3.4.A.4.:
   (Any One of the above specifications is acceptable).

   RWST minimum volume 387,100 gallons; maximum solution temperature 45°F, boron concentration 2300 to 2500 ppm.

2) Based on the current RWST parameters, is there a Technical Specification clock in effect for Unit 2? If so, what are the actions required to clear the clock?

   Per TS 3.2.C.2a., TS 3.3.B.1.a., and TS 3.4.B.4.a.:
   (Any One of the above specifications is acceptable).

   Yes.

   For conditions where the RWST is inoperable due to boron concentration or solution temperature not being within the limits specified, **restore the parameters to within specified limits in 8 hours**. Boron concentration must be raised to at least 2300 ppm within 8 hours.

3) What is the Basis for the minimum RWST volume and boron concentration?
   (**Either** of the following is acceptable).

   TS 3.2 Basis (Page 3.2-4): The quantity of boric acid in storage from either the boric acid tanks or the r**efueling water storage tank** is sufficient to borate the reactor coolant in order to reach COLD SHUTDOWN at any time during core life.

   TS-3.4 Basis Page 3.4-4: In addition to supplying water to the Containment Spray System, the refueling water storage tank is also a source of water for safety injection following an accident. This water is borated to a concentration which assures reactor shutdown by approximately 5 percent Δk/k when all control rods assemblies are inserted and when the reactor is cooled down for refueling.

SRO Only Follow-up Questions

Current Unit 2 RWST parameters are as follows:

- Boron, by sample, is 2248 ppm.
- RWST NR level 97.7% (392, 950 gallons).
- REST Temperature 43 °F.

Please provide the answers to the following questions in the space below.

1) What are the Technical Specification requirements for RWST volume, boron concentration, and solution temperature?

2) Based on the Chemistry report, is there a Technical Specification clock in effect for Unit 2? If so, what are the actions required to clear the clock?

3) What is the Basis for the minimum RWST volume and boron concentration?

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

Task

- Task is to be PERFORMED in the SIMULATOR or CLASSROOM.
- Performance of 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations, is required.

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 mid shift on Saturday. Unit 2 power is 100 percent.
- 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations is scheduled to be completed on this shift.

- The following is reactivity information was supplied by the Reactor Engineer today:
  - Core burnup: 12147 MWD/MTU
  - Isothermal temperature coefficient: -25.81 pcm/°F
  - Target delta flux: -0.5%

- The following are the Unit conditions:
  - Reactor power: 100% and stable for last 14 days
  - RCS boron concentration: 529 ppm
  - Control Bank 'D' is at 225 steps
  - 'C' BAST is in-service on Unit 2 with a boron concentration of 13772 ppm.
  - A power reduction has not occurred and is not planned.

Initiating Cues:

- Here is a copy of 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations. I need you to perform 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations, through Step 5.2.4, and I will have another Operator complete the procedure.

- When you have completed Step 5.2.4, please inform me, as this will end the JPM.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

Initial Conditions

- It is mid shift on Saturday. Unit 2 power is 100 percent.
- 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations is scheduled to be completed on this shift.

- The following is reactivity information was supplied by the Reactor Engineer today:
  - Core burnup: 12147 MWD/MTU
  - Isothermal temperature coefficient: -25.81 pcm/°F
  - Target delta flux: -0.5%

- The following are the Unit conditions:
  - Reactor power: 100% and stable for last 14 days
  - RCS boron concentration: 529 ppm
  - Control Bank 'D' is at 225 steps
  - 'C' BAST is in-service on Unit 2 with a boron concentration of 13772 ppm.
  - A power reduction has not occurred and is not planned.

Initiating Cues:

- Here is a copy of 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations. I need you to perform 2-OP-RX-010, Documentation of Reactivity Parameters during Power Operations, through Step 5.2.4, and I will have another Operator complete the procedure.

- When you have completed Step 5.2.4, please inform me, as this will end the JPM.

U.S Nuclear Regulatory Commission
Surry Power Station

SR15301
Administrative Job Performance Measure G2.1.23

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Determine Primary to Secondary Leakrate in accordance with 0-OSP-RC-002 and Determine Ramp Rate IAW 0-OSP-RC-002.

K/A: G.2.1.23 – Ability to perform specific system and integrated plant procedures during all modes of plant operation. RO: 4.3 / SRO: 4.7

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

Initial Conditions

- Task is to be PERFORMED in the CLASSROOM.
- Performance of 0-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, Attachment 1, Hand Calculation of Primary-to-Secondary Leakage Using the Condenser Air Ejector Radiation Monitor is required.

Standards

- Calculate primary to secondary leakrate (RO/SRO) and Ramp Requirements (SRO Only).

Initiating Cues

- Given simulated plant conditions, calculate primary to secondary leakrate in accordance with 0-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, Attachment 1, Hand Calculation of Primary-to-Secondary Leakage Using the Condenser Air Ejector Radiation Monitor.

Initiating Cues

- Unit 1 was at 100% power when RM-G8, CNDSR AIR EJCTR Alert/Failure received, with an indicated count rate of 1.45 E3 cpm on 1-SV-RI-111, Air Ejector Rad Monitor.
- The operating team implemented 0-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, but the PCS failed to respond when attempting to retrieve the associated data.
- You are to perform O-OSP-RC-002, Steam Generator Steam Generator Primary to Secondary Leakage, Attachment 1, Steps 1 through 7, to determine primary to secondary leakrate for Unit 1.
- The following data is provided:
    - Air Ejector Flowrate is "A": 3.3 scfm; "B": 4.4 scfm.
    - Chemistry Data:
        - AR-41 Concentration: 7.45 E-03
        - Xe-135 Concentration: 1.19 E-04
        - All Other Nuclides Concentration: Non Detectable

- When you have completed the calculation, inform your examiner.

Terminating Cues

- Primary to secondary leakrate successfully calculated (RO/SRO) and Ramp Requirements Determined (SRO Only).

Tools and Equipment

- Calculator
- O-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, Att. 1.

Safety Considerations

- None

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded.
- **START TIME:**

0-OSP-RC-002, Att. 1, Step 1 STEP 1: Acknowledges **NOTE** prior to Step 1: Multiple copies of this Attachment should be made as necessary. **STANDARD:** Candidate Reviews and acknowledges NOTE. **EVALUATOR NOTES:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 1 STEP 2 Record the current time and date. **STANDARD:** a) Candidate records current time and date in appropriate blank. b) Candidate initials Step 1. **EVALUATOR NOTES:** • **If asked**: Provide Date and Time. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

0-OSP-RC-002, Att. 1, Step 2 STEP 3: Calculates Total Air Ejector flowrate. **STANDARD:** a) Candidate enters Air Ejector data from initial conditions for "A" and "B" in the appropriate blank. b) Candidate totals flowrate and enters **7.7** in Total Flow blank. c) Candidate initials Step 2. **EVALUATOR NOTES:** • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 3 STEP 4: Records Air Ejector reading. **STANDARD:** a) Candidate records Air ejector reading in appropriate blank (**1.45E+3**). b) Candidate initials Step 3. **EVALUATOR NOTES:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 4 STEP 5: Enters Data for AR-41 and Xe-135 Concentrations on Step 4 Data Table **STANDARD:** a) Candidate enters Data into table (AR-41, **7.45E-03**; Xe-135, **1.19E-04**). b) Candidate Initials Step 4. **EVALUATOR NOTES:** • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

0-OSP-RC-002, Att. 1, Step 5 STEP 6: Multiplies Data given for AR-41 and Xe-135 concentrations by Isotopic Efficiency in Step4 Table. **STANDARD:** a) Candidate multiplies AR-41 concentration by Efficiency Factor and writes this value in Table 4 Column 4 (**4.45E+05**). b) Candidate multiplies Xe-135 concentration by Efficiency Factor and writes this value in Table 4 Column 4 (**5.45E+05**). c) Candidate initials Step 5. **EVALUATOR NOTES:** • None. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 6 STEP 7: Calculate R_C (total AE RM response factor). **STANDARD:** a) Candidate Adds the products of Column 4, Table 4, and enters this value in the R_C blank of Step 6 (**9.90E+05**). b) Candidate initials Step 6. **EVALUATOR NOTES: N/A** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 7 STEP 8: Calculate Unit 1 primary-to-secondary leak rate in gallons per day (Q_L) **STANDARD:** a) Acknowledges NOTE prior to Step 7 defining terms used in calculation. **b) Calculates Unit 1 QL and places results in Step 7 Blank (114.6).** **EVALUATOR NOTES:** • **This is the Critical Step**, acceptable Range **110 – 115**, based on significant digits used). **COMMENTS:**	

STEP 9: Reports task complete. **STANDARD:** • Informs evaluator of task completion. **EVALUATOR NOTES:**. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
0-OSP-RC-002, Att. 1, Step 8 STEP 10: *** SRO Only *** Using Primary-to-Secondary Leakage calculated in Steps 1 – 7 of Attachment 1, Determine the Unit 1 Ramping Requirements in accordance with Attachments 2 through 8 of 0-OSP-RC-002. **STANDARD:** a) Candidate reviews Attachments 2 through 8, as appropriate. **b) Candidate Determines Unit 1 must be less than or equal to 50% within 1 hour, and be in Hot Shutdown within the next two hours (three hours total).** **EVALUATOR NOTES: Provide Candidate with complete copy of 0-OSP-RC-002.** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 11: *** SRO Only*** Reports task complete. **STANDARD:** • Informs evaluator of Unit Ramping requirements. **EVALUATOR NOTES:** • None **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME: _____

Comments

_____

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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 was at 100% power.

Initiating Cues

- RM-G8, CNDSR AIR EJCTR Alert/Failure received, with an indicated count rate of 1.45 E3 cpm on 1-SV-RI-111, Air Ejector Rad Monitor.
- The operating team implemented 0-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, but the PCS failed to respond when attempting to retrieve the associated data.
- You are to perform O-OSP-RC-002, Steam Generator Steam Generator Primary to Secondary Leakage, Attachment 1, Steps 1 through 7, to determine primary to secondary leakrate for Unit 1.
- The following data is provided:
    - Air Ejector Flowrate is "A": 3.3 scfm; "B": 4.4 scfm.
    - Chemistry Data:
        - AR-41 Concentration: 7.45 E-03
        - Xe-135 Concentration: 1.19 E-04
        - All Other Nuclides Concentration: Non Detectable

- When you have completed the calculation, inform your examiner.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

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 was at 100% power.

Initiating Cues

- RM-G8, CNDSR AIR EJCTR Alert/Failure received, with an indicated count rate of 1.45 E3 cpm on 1-SV-RI-111, Air Ejector Rad Monitor.
- The operating team implemented 0-OSP-RC-002, Steam Generator Primary to Secondary Leakage Monitoring, but the PCS failed to respond when attempting to retrieve the associated data.
- You are to perform O-OSP-RC-002, Steam Generator Steam Generator Primary to Secondary Leakage, Attachment 1, Steps 1 through 7, to determine primary to secondary leakrate for Unit 1.
- The following data is provided:
    - Air Ejector Flowrate is “A”: 3.3 scfm; “B”: 4.4 scfm.
    - Chemistry Data:
        - AR-41 Concentration: 7.45 E-03
        - Xe-135 Concentration: 1.19 E-04
        - All Other Nuclides Concentration: Non Detectable

- When you have completed the calculation, inform your examiner.

(Page 1 of 2)

Attachment 1

HAND CALCULATION OF PRIMARY-TO-SECONDARY LEAKAGE USING THE CONDENSER AIR EJECTOR RADIATION MONITOR

NOTE: Multiple copies of this Attachment should be made as necessary.

_____ 1. Record the current time and date. _____ / _____

_____ 2. Obtain flow rates from both Air Ejectors and record total flow rate below:

- Air Ejector A flow _____ scfm +
- Air Ejector B flow _____ scfm =
- Total Flow _____ scfm

_____ 3. Record the current reading from ( )-SV-RI-( )11. _____ cpm

_____ 4. Obtain the most recent RCS activity for the isotopes listed in the table below from Chemistry and record in the Table. (This data is normally kept in the Radiation Monitor setpoint book and is updated weekly.)

Isotope in RCS	Concentration in RCS (*u*Ci/mL) (C)	AE Rad Mon Isotopic Efficiency (CPM/*u*Ci/cc) (k)	C x k
Ar-41		5.97 E+07	
Kr-85		3.22 E+06	
Kr-85m		1.29 E+10	
Kr-87		7.28 E+08	
Kr-88		2.99 E+09	
Xe-131m		2.86 E+08	
Xe-133		2.32 E+07	
Xe-133m		6.19 E+08	
Xe-135		4.58 E+09	
Xe-135m		5.65 E+08	
Xe-138		2.97 E+09	

(Page 2 of 2)

Attachment 1

HAND CALCULATION OF PRIMARY-TO-SECONDARY LEAKAGE USING THE CONDENSER AIR EJECTOR RADIATION MONITOR

_____ 5. Multiply the isotopic concentrations (C) times the AE Rad Monitor Isotopic Efficiency (k) and record in the Table in column 4.

_____ 6. Add the products obtained in Step 5, column 4, and record below. (This sum is R_c, Total AE RM response factor.)

R_c _____(total AE RM response factor)

NOTE:
- The terms in the formula below are as follows:
  - R = Current AE RM reading from Step 3
  - 90 = Background AE RM reading (Unit 1)
  - 138 = Background AE RM reading (Unit 2)
  - F_{AE} = Total AE flow from Step 2
  - R_c = Total AE RM response factor from Step 6

_____ 7. Determine primary-to-secondary leak rate in gallons per day (Q_L) IAW the following formula.

- For Unit 1, $Q_L = 1.084E4 \times (R - 90) \times F_{AE} / R_c =$ _____ gpd
- For Unit 2, $Q_L = 1.084E4 \times (R - 138) \times F_{AE} / R_c =$ _____ gpd

_____ 8. Initiate Attachment 2 through Attachment 7 as appropriate for existing leak rate.

_____ 9. Log leakrate in the unit Narrative Log.

_____ 10. Reperform Steps 1 through 8 of this Attachment as necessary based on any of the following:

- Plant management direction
- Adverse trend in AE reading
- Step change in AE reading
- AE alert or high alarm received

U.S. Nuclear Regulatory Commission
Surry Power Station

SR15301
Administrative Job Performance Measure GEN2.2.37 (3.6/4.6)

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Periodic Test Review 1-OPT-CH-002 (REV 47), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B

K/A: GEN2.2.37 Ability to determine operability and/or availability of safety related equipment.

Applicability	**Estimated Time**	**Actual Time**
SRO(I)	45 Minutes	

Initial Conditions
- Task is to be PERFORMED in the classroom.

Standards
- Reviews completed 1-OPT-CH-002 (REV 47), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, for accuracy and determines operability.

Initiating Cues

- I am the Shift Manager and you are the Unit Supervisor. Here is a copy of 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, which has just been completed.

- No maintenance has been performed on the Charging system.
- This was a quarterly test.

- Review 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, for completeness and accuracy.

- List ALL discrepancies noted on the ANSWER SHEET provided.

- When you are finished, inform your examiner of ALL problems noted in the procedure and any Technical Specification operability concerns if applicable.

Terminating Cues

- Applicant has completed the procedure review and discussed problems with examiner.

Tools and Equipment

- Calculator
- Copy of completed 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B.

Safety Considerations

- None

Notes

PERFORMANCE CHECKLIST

Notes to the Evaluator

- Task critical elements are bolded and noted at the end of the step as CRITICAL STEP.
- **START TIME:**

STEP 1: ***STEP 1 -*** Review the purpose of the procedure (Section 1.0) **STANDARD:** • Reviews purpose of procedure steps 1.1 - 1.9. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 2: ***STEP 2*** - Review the References section (Section 2.0) **STANDARD:** • Reviews section 2.1, Source Documents, 2.2 Technical Specifications, 2.3 Technical References, and 2.4 Commitment Documents. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: ***STEP 3*** - Reviews the Initial Conditions section (Section 3.0) **STANDARD:** • Reviews Initial Conditions steps 3.1 - 3.4. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 4: ***STEP 4*** - Reviews the Precautions and Limitations section (Section 4.0) **STANDARD:** • Reviews precautions and limitations steps 4.1 - 4.15. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 5: ***STEP 5*** - Reviews the Special Tools and Equipment section (Section 5.0) **STANDARD:** • Reviews Special Tools and Equipment section steps 5.1 - 5.8. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: ***STEP 6.1*** - Reviews Work Preparation section (Section 6.1). **STANDARD:** • Verifies proper place keeping on all steps, notes, and cautions. • Verifies step 6.1.1 substeps a and b are initialed and Attachment 9 is properly filled out. • Verifies step 6.1.2 is initialed and SQC numbers and Cal Due Dates are recorded on Attachment 1. **CANDIDATE IDENTIFIES THAT ONE STOPWATCH USED IS NOT IN CAL – THIS IS A CRITICAL STEP** • Verifies step 6.1.3 is initialed. • Verifies step 6.1.4 is initialed and blocks are correctly checked off. The 6th block should be checked off which is "1-CH-P-1B needs the Quarterly Test (1-CH-P-1B must be stopped), Perform Subsection 6.5 and Subsection 6.6" • Goes to subsection 6.5. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: ***STEPS 6.2-6.4*** - Reviews Steps 6.2 - 6.4 of 1-OPT-CH-002 **STANDARD:** • Verifies all steps in 6.2 - 6.4 are N/A'd. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 8: ***STEP 6.5***- Reviews Discharge Check Valve Close Test, MOV Timing, Lube Oil TCV Timing and Starting 1-CH-P-1B section of procedure (Section 6.5.1 - 6.5.20). **STANDARD:** • Verifies proper placekeeping on all steps, notes, and cautions. • Verifies step 6.5.1 – 6.5.20 are properly initialed. • Verifies open and close stroke times are recorded on Attachment 4 for 1-CH-MOV-1286B, 1287B and 1275B. • Verifies discharge pressure recorded on Attachment 1 IAW step 6.5.1.f, 6.5.1g, 6.5.1.h and that differential is < 7.5 psid IAW 6.5.1.g. • Verifies box checked in step 6.5.4 indicating that 1-SW-TCV-108B was closed and goes to step 6.5.5. • Verifies step 6.5.6 is N/A'd. • Verifies step 6.5.8.a is N/A'd. • Verifies step 6.5.9 is N/A'd. • Verifies the open and closed stroke times, test position, and the as left position for 1-SW-TCV-108B are recorded on Attachment 4. • Verifies lube oil temperature recorded in step 6.5.8.d is between 60-120 °F. • Verifies step 6.5.15.b is N/A'd. • Verifies lube oil pressure recorded in step 6.5.19 is between 8-35 psig. • Verifies step 6.5.20 is N/A'd • Verifies pump and damper checks were sat IAW step 6.5.22 on non-running charging pumps. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 9: ***STEP 6.6***- Reviews 1-CH-P-1B Performance Test section of procedure (Section 6.6.1 - 6.6.26). **STANDARD:** • Verifies proper place keeping on all steps, notes, and cautions. • Verifies step 6.6.1 – 6.6.26 are properly initialed. • Verifies step 6.6.3 is N/A'd. • Verifies data is recorded in step 6.6.5 - 6.6.7. • Verifies step 6.6.10.b is N/A'd. • Verifies data recorded on Attachments 1 and 2 IAW steps 6.6.12 - 6.6.16. • Verifies step 6.6.17 and step 6.6.18 are N/A'd. • Verifies data is recorded in step 6.6.22. • Verifies step 6.6.26 N/A'd. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 10: ***STEPS 6.7-6.8*** - Reviews Steps 6.7 - 6.8 of 1-OPT-CH-002 **STANDARD:** • Verifies all steps in 6.7 - 6.8 are N/A'd. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 11: ***STEP 6.9-*** Reviews Obtaining Oil Samples section of procedure Section 6.9.1-6.9.2). **STANDARD:** • Verifies proper placekeeping on all steps, notes, and cautions. • Verifies steps in 6.9.1 are properly initialed and steps in 6.9.2 are N/A'd. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 12: ***STEP 6.10*** - Reviews Step 6.10 of 1-OPT-CH-002. **STANDARD:** • Verifies all steps of 6.10 are N/A'd. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 12: ***STEP 7.0***- Reviews Follow-On section of procedure (Section 7.1 – 7.4). **STANDARD:** • Verifies proper placekeeping on all steps, notes, and cautions. • Evaluates the acceptance criteria in step 7.1.1 by reviewing attachment data referenced for each bulleted item. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 13: ***Attachment 1***- Reviews Attachment 1 Data. **STANDARD:** • Review attachment 1 data and verifies all are within the acceptance criteria. • Step 6.1.3 - **CANDIDATE IDENTIFIES THAT ONE STOPWATCH USED IS NOT IN CAL – THIS IS A CRITICAL STEP** **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 14: ***Attachment 2***- Reviews Attachment 2 Data. **STANDARD:** • Review attachment 2 data and verifies all are within the acceptance criteria. • **Notes that the outboard horizontal vibration (pt 22) on the pump bearing is in the INOPERABLE RANGE and that OPT was checked as SAT.** • **This is a critical step.** **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 15: ***Attachment 4***- Reviews Attachment 4 Data. **STANDARD:** • Review attachment 4 data and verifies all are within the acceptance criteria. • **Notes that 1-CH-MOV-1287B OPEN stroke test time is not in the ACCEPTABLE range and that OPT was checked as SAT.** • **This is a critical step.** **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 16: ***Attachment 9***- Reviews Attachment 9. **STANDARD:** • Verifies proper placekeeping on all steps, notes, and cautions. • Verifies all steps in attachment 9 are properly initialed or N/A'd as applicable. **EVALUATOR'S NOTE: N/A** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

_____

_____

_____

_____

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ANSWER KEY
1-OPT-CH-002 REVIEW

1. **Attachment 1, Step 6.1.2 – Listed stopwatch is out of CAL. (CRITICAL TASK)**

2. **Attachment 2, outboard horizontal vibration (pt 22) on the pump exceeds the inoperable range limit given. (CRITICAL TASK)**

3. **Attachment 4, 1-CH-MOV-1287B exceeds open stroke time limits. (CRITICAL TASK)**

4. Step 7.1.1, Charging pump delta-p and vibration status determinations are checked as NOT being inoperable. 1-CH-MOV-1287B is checked as meeting the acceptance criteria.

5. **7.1.2, PT is marked as SAT versus UNSAT. (CRITICAL TASK)**

6. Step 7.2.1, step marked N/A when notifications to engineering should be made and Condition Reports/Work Requests should be submitted.

7. No comments made in the Operator Comments section.

8. **They are in violation of Tech Spec 3.2 because they do not have two boron injection subsystems due to 1-CH-P-1B being inoperable. They are in a 72 hour clock to be in at least HOT SHUTDOWN within the next 6 hours. (CRITICAL TASK)**

9. **They are in violation of Tech Spec 3.3 because they do not have two operable Safety Injection subsystems due to 1-CH-P-1B being inoperable. They are in a 72 hour clock to be in at least HOT SHUTDOWN within the next 6 hours. (CRITICAL TASK)**

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

Task

- Task is to be performed in the classroom.
- Review 1-OPT-CH-002 (REV 47), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, for completeness and accuracy.

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 is at 100% power.
- 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, has just been completed.

Initiating Cues

- I am the Shift Manager and you are the Unit Supervisor. Here is a copy of 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, which has just been completed.
- No maintenance has been performed on the Charging system.
- This was a quarterly test.
- Review 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, for completeness and accuracy.
- List ALL discrepancies noted on the ANSWER SHEET provided.
- When you are finished, inform your examiner of ALL problems noted in the procedure and any Technical Specification operability concerns if applicable.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- Unit 1 is at 100% power.
- 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, has just been completed..

Initiating Cues

- I am the Shift Manager and you are the Unit Supervisor. Here is a copy of 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, which has just been completed.
- No maintenance has been performed on the Charging system.
- This was a quarterly test.
- Review 1-OPT-CH-002 (REV 56), CHARGING PUMP OPERABILITY AND PERFORMANCE TEST FOR 1-CH-P-1B, for completeness and accuracy.
- List ALL discrepancies noted on the ANSWER SHEET provided.
- When you are finished, inform your examiner of ALL problems noted in the procedure and any Technical Specification operability concerns if applicable.

ANSWER SHEET
1-OPT-CH-002 REVIEW

U.S. Nuclear Regulatory Commission
Surry Power Station

SR15301
Administrative Job Performance Measure G2.4.39
TIME CRITICAL

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Complete EPIP-2.01

K/A: G.2.4.39 – Knowledge of RO responsibilities in emergency plan implementation. (3.9/3.8)

Applicability	**Estimated Time**	**Actual Time**
RO only.	15 Minutes	____ Minutes

Conditions

- Task is to be PERFORMED in the simulator.

Standards

- EPIP-2.01, Report of Emergency to State and Local Governments, Attachment 2 completed and transmitted.

Initiating Cues

- EPIP-1.01, Emergency Manager Controlling Procedure
- EPIP-2.01, Report of Emergency to State and Local Governments.

Terminating Cues

- All State and Local Governments notified and EPIP-2.01 complete through step 9.

Procedures

- EPIP-2.01, Notification of State and Local Governments, Rev. 44.

Tools and Equipment

- None

Safety Considerations

- None

Simulator Setup

- Call up 100% power IC and initialize (IC 269). Place simulator in RUN.
- Initiate a Small Break LOCA.
- Perform Immediate actions for E-0.
- When RCS subcooling lowers to less than 30 degrees Fahrenheit, secure RCPs and place Simulator in FREEZE.

Initial Conditions

- **This JPM is Time Critical**.
- I am the Station Emergency Manager (SEM) and you are the State and Local Communicator. A Small Break LOCA has occurred and the team is responding IAW the EOP network. I have declared an ALERT FA1.1 due to a Loss of Reactor Coolant System Barrier when RCS subcooling went less than 30 degrees Fahrenheit.

Initiating Cues

- I need you to initiate EPIP-2.01 and notify state and local governments of our emergency.
- There are no releases in progress, and site access is available.
- When you finish the actions necessary to accomplish this task, please inform me.

Notes to the Evaluator

- **This JPM is Time Critical. 15 minutes.** Time starts from the JPM start time until contact initiated with the first agency.
- Task critical elements are bolded and denoted by an asterisk (*****).
- Critical step sequencing requirements: Steps 4 and 5 before Step 6.
- **Role play as the Station Emergency Manager. Approve Attachment 2 when given to you by student.**
- **Time declared for the ALERT will be the JPM start time. Use TODAY'S date.**

START TIME: _____:

STEP 1: INITIATES PROCEDURE. **STANDARD:** Fills in name, date, time, and location in step 1 of EPIP-2.01. **EVALUATOR'S NOTE:** • **If asked:** Use today's date. Time should be current time. Location is Surry Power Station Control Room (simulated). • A partial copy of EPIP-2.01 is included for the Evaluator. The candidate should use the copy provided in the State & Local Communicator binder in the MCR. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 2: CHECKS FIRST REPORT OF EMERGENCY FOR EVENT REQUIRED **STANDARD:** Answers yes to step 2 based on direction to perform EPIP-2.01. **EVALUATOR'S NOTE:** **If asked:** First report of emergency for event is required. A complete copy **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Reviews notes prior to step 3: • The initial notification of any emergency classification must be made (meaning contact initiated with the first agency) within 15 minutes of declaring the emergency class. • Attachment 1, Instructions for Completing Report of Emergency to State and LocalGovernments, may be referenced as needed. • Items 5 through 9 on the Report of Emergency to State and Local Governments are optional for a message reporting initial entry into the Emergency Plan or an emergency class change. **STANDARD:** Acknowledges notes. **EVALUATOR'S NOTE:** **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 4: CHECKS EMERGENCY REMAINS IN EFFECT *(Step 3)* **STANDARD:** Determines emergency still in effect. **EVALUATOR'S NOTE:** **If asked:** The emergency does remain in effect. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 5: RECORDS INFORMATION ON REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNEMNTS (ATTACHMENT 2). *(Step 4)* **STANDARD:** a) Records message #1 on page 1 and 2 of attachment 2. b) Checks box for Drill Message. c) Item 1, Emergency Classification: ****ALERT checked, FA 1.1, Declared at time (given to trainee) and date (given to trainee).** Writes name in space for Emergency Communicator. d) Item 2, MET Data: Obtains MET Data from PCS or MCR Indications**.** e) Item 3, Release of Radioactive Material. No radiological release: Will NOT transmit Report of Radiological conditions to Virginia EOC block is checked. f) Item 4, Site Access: Available block is checked. g) Item 5, Protective Action Recommendation: Is not required block is checked. h) Item 6, Update Schedule: 60 minutes recommended block is checked. i) Items 7-11, Excluded from message block is checked. **EVALUATOR'S NOTE:** • **If asked:** Drill should be marked. • **If asked:** Item 1; **Declaration time is the JPM start time that you recorded. Use today's date. Item 1 must be filled in completely after notification made.** • **If asked:** No release in progress. • **If asked:** Use MET Data available in MCR like they normally would do. PCS EMCOMM should be accessed and data recorded from that screen. • **If asked:** MET data has been verified. • **If asked:** There are no PAR recommendations. RE Items 7-11 may be excluded from initial message. • **If asked:** Site Access is available. **COMMENTS:**	**_____ SAT** **_____ UNSAT**
STEP 6: HAVE SEM APPROVE REPORT. *(Step 5)* **STANDARD:** SEM reviews and approves report. **EVALUATOR'S NOTE:** • Sign the report at top of the page as SEM. • Inform the candidate that they have permission to transmit report to State and Local governments. • Two copies of Attachment 2 showing: 1) Just before SEM approves, and 2) After transmission is included after the JPM. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 7: SEND REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNMENTS. *(Step 6)* **STANDARD:** a) Acknowledges Note prior to step 6. b) Check Instaphone clear of conflicting message or traffic. c) Contacts State and Local governments. d) Reads item 1. e) Perform acknowledgement roll-call (check boxes) as EOC answers. f) Check Virginia EOC acknowledged message. g) Check all local EOC(s) answered acknowledgement roll call. **h)** Record date and time transmittal of item 1 completed. **** The TIME CRITICAL clock stops after transmittal of step 1 is completed. STOP TIME_____.** **i)** Read Items 2 through 5. **j)** Consult with Virginia EOC Watch officer to determine desired update schedule. **k)** Completes item 6, Update Schedule. l) Read Items 7 through 11. m) Repeat any items upon request. n) Record time and date transmittal of items 2 – 11 completed. o) Go to step 9. **EVALUATOR'S NOTE:** • Booth instructor: will role-play the State and Local governments and will acknowledge all information. • Booth instructor: will request a 60 minute update. • Booth instructor: Virginia EOC duty officer's name is John Smith. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 8: NOTIFY SEM TRANSMITTAL WAS SENT *(Step 9)* **STANDARD:** Notifies SEM transmittal was sent. **EVALUATOR'S NOTE:** . **COMMENTS:** ** **JPM COMPLETE** **	**_____ SAT** **_____ UNSAT**

STOP TIME: _____

Comments:

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Attachment 2 Before SEM Approval

NUMBER EPIP-2.01	ATTACHMENT TITLE REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNMENTS	ATTACHMENT 2
REVISION 44		PAGE 1 of 1

REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNMENTS

ROE MESSAGE # 01 APPROVAL: _____
(Station Emergency Manager or Recovery Manager)

ATTENTION ALL STATIONS. This is Surry Power Station.
Standby for a(n) ☑ Drill Message ☐ Emergency Message ☐ Drill Termination Message ☐ Emergency Termination Message.
Use the Report of Emergency form to copy message. **(READ SLOWLY)**

Item 1. EMERGENCY CLASSIFICATION: ☐ NOUE ☑ Alert ☐ Site Area Emergency ☐ General Emergency
In accordance with EAL F A 1 . 1 Declared at NOW (24-hr time) on TODAY (date).
This is (name) Name / Emergency Communicator.

Please acknowledge receipt of this message: **(Conduct roll-call and check boxes as each party answers.)**
☐ VA EOC ☐ Surry County ☐ Isle of Wight County ☐ James City County ☐ Williamsburg ☐ Newport News ☐ York County

Notification completed at _____ (24-hr time) on _____ (date).

Item 2. METEOROLOGICAL DATA: Based on: ☑ On-site Measurements ☐ Off-site Measurements ☐ Not Available
Time: XXXX (24-hr time) AVE Wind Speed XX mph ; AVE Wind Direction from XX degrees (0° to 360°)

Item 3. RELEASE OF RADIOACTIVE MATERIAL:
Routine releases ongoing due to plant operations. Additional radiological releases associated with the event:
☑ A. No radiological release. Will NOT transmit Report of Radiological Conditions to Virginia EOC.
☐ B. Radiological release in progress. Will transmit Report of Radiological Conditions to Virginia EOC.
☐ C. Radiological release now terminated. Will transmit Report of Radiological Conditions to Virginia EOC.
☐ D. Radiological release projected to occur. Will transmit Report of Radiological Conditions to Virginia EOC.

Item 4. SITE ACCESS: ☑ Available ☐ Not Available

Item 5. PROTECTIVE ACTION RECOMMENDATION: ☑ is NOT required ☐ will be transmitted to VEOC ☐ has been transmitted to VEOC.

Item 6. UPDATE SCHEDULE: ☑ 60 minutes (recommended); ☐ Other _____; EOC Watch Officer: _____

NOTE: Items 7 – 11 optional for message reporting initial Emergency Plan entry, emergency classification change or PAR changes and "Excluded from message" may be checked. **"Items 7 – 11 are excluded from message"** may be read in lieu of reading each item.

Item 7. EMERGENCY RESPONSE ACTIONS UNDERWAY: ☑ Excluded from message
☐ None ☐ Station emergency personnel called in
☐ Station monitoring teams dispatched off-site ☐ Other _____

Item 8. EVACUATION OR COMPANY DISMISSAL OF SITE PERSONNEL: ☑ Excluded from message
☐ No
☐ Evacuation to **Primary** Remote Assembly Area: ☐ Planned ☐ In progress ☐ Completed ☐ Released from RAA
☐ Evacuation to **Secondary** Remote Assembly Area: ☐ Planned ☐ In progress ☐ Completed ☐ Released from RAA
☐ Company Dismissal: ☐ Planned ☐ In progress ☐ Completed
☐ Other _____

Item 9. PROGNOSIS OF SITUATION SINCE LAST REPORT: ☑ Excluded from message
☐ Stable ☐ Worsening
☐ Improving ☐ Other _____

Item 10. ASSISTANCE REQUESTED OR BEING PROVIDED: ☑ Excluded from message
☐ None
_____ (#) Fire Units from _____ _____ (#) Police Units from _____
_____ (#) Rescue Units from _____ _____ (#) Other _____

Item 11. ADDITIONAL INFORMATION (Do not use abbreviations, mark numbers or acronyms.): ☑ Excluded from message
_____
_____

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

Item 12. TERMINATION INFORMATION (Complete ONLY for termination message):
Event Terminated at: _____ (24-hr time) on _____ (date).
Please acknowledge receipt of this message: **(Conduct roll-call and check boxes as each party answers.)**
☐ VA EOC ☐ Surry County ☐ Isle of Wight County ☐ James City County ☐ Williamsburg ☐ Newport News ☐ York County
This is Surry Power Station out at _____ (24-hr time) on _____ (date).

Form No. 730860(Mar 2014)

Attachment 2 After Transmittal to State & Local

NUMBER EPIP-2.01	ATTACHMENT TITLE REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNMENTS	ATTACHMENT 2
REVISION 44		PAGE 1 of 1

REPORT OF EMERGENCY TO STATE AND LOCAL GOVERNMENTS

ROE MESSAGE # 01 APPROVAL: Evaluator Signature
(Station Emergency Manager or Recovery Manager)

ATTENTION ALL STATIONS. This is Surry Power Station.
Standby for a(n) ☑ Drill Message ☐ Emergency Message ☐ Drill Termination Message ☐ Emergency Termination Message.
Use the Report of Emergency form to copy message. **(READ SLOWLY)**

Item 1. EMERGENCY CLASSIFICATION: ☐ NOUE ☑ Alert ☐ Site Area Emergency ☐ General Emergency

In accordance with EAL F A 1 . 1 Declared at NOW (24-hr time) on TODAY (date).

This is (name) Name / Emergency Communicator.

Please acknowledge receipt of this message: **(Conduct roll-call and check boxes as each party answers.)**
☑ VA EOC ☑ Surry County ☑ Isle of Wight County ☑ James City County ☑ Williamsburg ☑ Newport News ☑ York County

Notification completed at XXXX (24-hr time) on TODAY (date).

Item 2. METEOROLOGICAL DATA: Based on: ☑ On-site Measurements ☐ Off-site Measurements ☐ Not Available

Time: XXXX (24-hr time) AVE Wind Speed XX mph ; AVE Wind Direction from XX degrees (0° to 360°)

Item 3. RELEASE OF RADIOACTIVE MATERIAL:
Routine releases ongoing due to plant operations. Additional radiological releases associated with the event:
☑ A. No radiological release. Will NOT transmit Report of Radiological Conditions to Virginia EOC.
☐ B. Radiological release in progress. Will transmit Report of Radiological Conditions to Virginia EOC.
☐ C. Radiological release now terminated. Will transmit Report of Radiological Conditions to Virginia EOC.
☐ D. Radiological release projected to occur. Will transmit Report of Radiological Conditions to Virginia EOC.

Item 4. SITE ACCESS: ☑ Available ☐ Not Available

Item 5. PROTECTIVE ACTION RECOMMENDATION: ☑ is NOT required ☐ will be transmitted to VEOC ☐ has been transmitted to VEOC.

Item 6. UPDATE SCHEDULE: ☑ 60 minutes (recommended); ☐ Other _____; EOC Watch Officer: John Smith

NOTE: Items 7 – 11 optional for message reporting initial Emergency Plan entry, emergency classification change or PAR changes and "Excluded from message" may be checked. **"Items 7 – 11 are excluded from message"** may be read in lieu of reading each item.

Item 7. EMERGENCY RESPONSE ACTIONS UNDERWAY: ☑ Excluded from message
☐ None ☐ Station emergency personnel called in
☐ Station monitoring teams dispatched off-site ☐ Other _____

Item 8. EVACUATION OR COMPANY DISMISSAL OF SITE PERSONNEL: ☑ Excluded from message
☐ No
☐ Evacuation to **Primary** Remote Assembly Area: ☐ Planned ☐ In progress ☐ Completed ☐ Released from RAA
☐ Evacuation to **Secondary** Remote Assembly Area: ☐ Planned ☐ In progress ☐ Completed ☐ Released from RAA
☐ Company Dismissal: ☐ Planned ☐ In progress ☐ Completed
☐ Other _____

Item 9. PROGNOSIS OF SITUATION SINCE LAST REPORT: ☑ Excluded from message
☐ Stable ☐ Worsening
☐ Improving ☐ Other _____

Item 10. ASSISTANCE REQUESTED OR BEING PROVIDED: ☑ Excluded from message
☐ None
_____ (#) Fire Units from _____ _____ (#) Police Units from _____
_____ (#) Rescue Units from _____ _____ (#) Other _____

Item 11. ADDITIONAL INFORMATION (Do not use abbreviations, mark numbers or acronyms.): ☑ Excluded from message

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

Item 12. TERMINATION INFORMATION (Complete ONLY for termination message):
Event Terminated at: _____ (24-hr time) on _____ (date).
Please acknowledge receipt of this message: **(Conduct roll-call and check boxes as each party answers.)**
☐ VA EOC ☐ Surry County ☐ Isle of Wight County ☐ James City County ☐ Williamsburg ☐ Newport News ☐ York County
This is Surry Power Station out at _____ (24-hr time) on _____ (date).

Form No. 730860(Mar 2014)

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

Initial Conditions

- **This JPM is Time Critical**.
- I am the Station Emergency Manager (SEM) and you are the State and Local Communicator. A Small Break LOCA has occurred and the team is responding IAW the EOP network. I have declared an ALERT FA1.1 due to a Loss of Reactor Coolant System Barrier when RCS subcooling went less than 30 degrees Fahrenheit.

Initiating Cues

- I need you to initiate EPIP-2.01 and notify state and local governments of our emergency.
- There are no releases in progress, and site access is available.
- When you finish the actions necessary to accomplish this task, please inform me.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions

- **This JPM is Time Critical**.
- I am the Station Emergency Manager (SEM) and you are the State and Local Communicator. A Small Break LOCA has occurred and the team is responding IAW the EOP network. I have declared an ALERT FA1.1 due to a Loss of Reactor Coolant System Barrier when RCS subcooling went less than 30 degrees Fahrenheit.

Initiating Cues

- I need you to initiate EPIP-2.01 and notify state and local governments of our emergency.
- There are no releases in progress, and site access is available.
- When you finish the actions necessary to accomplish this task, please inform

U.S. Nuclear Regulatory Commission
Surry Power Station

SR10301
Administrative Job Performance Measure 2.4.41
TIME CRITICAL

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

CLASSIFY AN EVENT

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	15 Minutes (Time Critical)	_____

Conditions

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

Standards

- Declares a Site Area Emergency using EAL Identifier SS1.2 in accordance with EPIP-1.01/EAL Table.

Initiating Cues

- Given simulated plant conditions, utilize EPIP-1.01 and determine if classification is warranted.

Initial Conditions

- **This JPM is TIME CRITICAL.**

- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
  - The AAC DG is tagged out for governor valve replacement and will be returned to service next weekend.
  - Both Units were initially at 100% power when a severe thunderstorm passed through the area.
  - Approximately 50 minutes ago, the station experienced a loss of the 'D' Transfer bus as the 'A' Reserve Station Service Transformer was struck and damaged by lightning (no fire).
    - At that time, #3 EDG tripped on overspeed during start-up, and the casing was penetrated by a connecting rod.
  - Approximately 35 minutes ago, Unit 1 reactor tripped due to a fault on the 'A' DC bus that damaged the 'A' Station Battery. Due to the significant amount of damage to the 'A' Station Battery, the electricians are estimating 2 – 3 days before the 'A' DC bus is restored.
  - At this time, while performing 1-AP-10.06, Loss of DC Power, the BOP has just reported that the 1B DC bus is 102 Volts and lowering.

Initiating Cues:

- Here is a copy of EPIP-1.01, Emergency Manager Controlling Procedure. I need you to perform EPIP-1.01 and determine if this event should be classified.
- When you finish the actions necessary to accomplish this, please inform me of your results.

Terminating Cues

- Report of classification determination.

Procedures

- EPIP-1.01, Emergency Manager Controlling Procedure (Revision 57).
- Surry EAL Technical Basis (Revision 4) – if asked.

Tools and Equipment

- None

Safety Considerations

- None

Notes

Performance Checklist

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words "Critical Step" at the end of the step.
- **START TIME _____:**

STEP 1: 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. **STANDARD:** (a) Acknowledges CAUTION and NOTE **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 the classification is determined regardless of determination method.*** • Provide copy of EPIP-1.01, Emergency Manager Controlling Procedure. • Provide copy of SEAL TB – if asked. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 2:

Step1 - 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

STANDARD:

(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 Identifier SS1.2 conditions are met and declares a Site Area Emergency on this Identifier.
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.

COMMENTS:

STOP CRITICAL TASK TIME: _____

TIME CRITICAL- 15 minutes

_____ SAT

_____ UNSAT

STEP 3:

Step 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			

STANDARD:

(a) Completes the table as indicated below:

Emergency Classification	EAL Identifier	Time Declared	SM /SEM Name
Notification of Unusual Event			
Alert			
Site Area Emergency	SS1.2	TBD	TBD
General Emergency			

EVALUATOR'S NOTE:

- Completion of this table is not required for successful completion of the JPM.

COMMENTS:

_____ SAT

_____ UNSAT

STEP 5: Reports declaration of the event in progress. **STANDARD:** **(a) Verbal or written status report that a Site Area Emergency should be declared on Tab SS1.2. This is a Critical Step if not already performed.** **EVALUATOR'S NOTE:** • Acknowledge the completion of the task. **COMMENTS:** **STOP CRITICAL TASK TIME: _____** **TIME CRITICAL- 15 minutes**	**_____ SAT** **_____ UNSAT**

STOP TIME:

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

Task

- Task may be PERFORMED in the simulator or classroom.
- Classify an event in accordance with EPIP-1.01, Emergency Manager Controlling Procedure.

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

- **This JPM is TIME CRITICAL.**

- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
    - The AAC DG is tagged out for governor valve replacement and will be returned to service next weekend.
    - Both Units were initially at 100% power when a severe thunderstorm passed through the area.
    - Approximately 50 minutes ago, the station experienced a loss of the 'D' Transfer bus as the 'A' Reserve Station Service Transformer was struck and damaged by lightning (no fire).
        - At that time, #3 EDG tripped on overspeed during start-up, and the casing was penetrated by a connecting rod.
    - Approximately 35 minutes ago, Unit 1 reactor tripped due to a fault on the 'A' DC bus that damaged the 'A' Station Battery. Due to the significant amount of damage to the 'A' Station Battery, the electricians are estimating 2 – 3 days before the 'A' DC bus is restored.
- At this time, while performing 1-AP-10.06, Loss of DC Power, the BOP has just reported that the 1B DC bus is 102 Volts and lowering.

Initiating Cues:

- Here is a copy of EPIP-1.01, Emergency Manager Controlling Procedure. I need you to perform EPIP-1.01 and determine if this event should be classified.

- When you finish the actions necessary to accomplish this, please inform me of your classification, if necessary.

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- **This JPM is TIME CRITICAL.**
- You are the Nuclear Shift Manager. An event is in progress with plant conditions as follows:
    - The AAC DG is tagged out for governor valve replacement and will be returned to service next weekend.
    - Both Units were initially at 100% power when a severe thunderstorm passed through the area.
    - Approximately 50 minutes ago, the station experienced a loss of the 'D' Transfer bus as the 'A' Reserve Station Service Transformer was struck and damaged by lightning (no fire).
        - At that time, #3 EDG tripped on overspeed during start-up, and the casing was penetrated by a connecting rod.
    - Approximately 35 minutes ago, Unit 1 reactor tripped due to a fault on the 'A' DC bus that damaged the 'A' Station Battery. Due to the significant amount of damage to the 'A' Station Battery, the electricians are estimating 2 – 3 days before the 'A' DC bus is restored.
    - At this time, while performing 1-AP-10.06, Loss of DC Power, the BOP has just reported that the 1B DC bus is 102 Volts and lowering.

Initiating Cues:

- Here is a copy of EPIP-1.01, Emergency Manager Controlling Procedure. I need you to perform EPIP-1.01 and determine if this event should be classified.
- When you finish the actions necessary to accomplish this, please inform me of your classification, if necessary.

- **Record classification and EAL identifier (if any):**

_____ _____

Dominion

SURRY POWER STATION

EMERGENCY PLAN IMPLEMENTING PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
EPIP-1.01	EMERGENCY MANAGER CONTROLLING PROCEDURE (WITH 3 ATTACHMENTS)	57
		PAGE 1 of 9

I

PURPOSE

To initially assess a potential emergency condition and initiate corrective actions.

ENTRY CONDITIONS

Any one of the following:

1. Another station procedure directs initiation of this procedure.
2. A potential emergency condition is reported to the Shift Manager.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

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.

____ 1 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

d) IF basis for EAL no longer exists when discovered AND no other reasons exist for an emergency declaration, THEN do the following:

☐ • RETURN TO procedure in effect.

☐ • GO TO VPAP-2802, NOTIFICATIONS AND REPORTS, to make one-hour, non-emergency reports for classification without declaration.

☐ IF EAL - NOT EXCEEDED, THEN RETURN TO procedure in effect.

☐ e) Initiate a chronological log of events

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

____ 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			

____ 3 ANNOUNCE THE FOLLOWING DECLARATIONS:

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

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: Normal implementation of assembly, accountability and/or initiation of facility staffing may not be desired during certain situations (e.g., security event or condition, localized severe weather, anticipated grid disturbance) or may not be possible due to a loss of public address system (i.e. loss of Gai-Tronics due to a widespread natural disaster). These activities should be implemented as quickly as achievable given the specific situation.

____ 4 CHECK - CONDITIONS ALLOW FOR NORMAL IMPLEMENTATION OF EMERGENCY RESPONSE ACTIONS

IF deviation from normal emergency response actions warranted, THEN do the following:

☐ a) Refer to Attachment 1, Considerations for Operations Response Under Abnormal Conditions.

☐ b) Consider applicability of 50.54(x).

☐ c) IF classification/assembly announcement deferred, THEN GO TO Step 6.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____	5 NOTIFY PLANT STAFF OF ALERT OR HIGHER CLASSIFICATION:	
	☐ a) Check classification - ALERT OR HIGHER	☐ a) GO TO Step 6.
	☐ b) Check if emergency assembly and accountability - PREVIOUSLY CONDUCTED	b) Do the following: ☐ 1) Sound emergency alarm and make announcement on station Gai-Tronics system as follows: "(Emergency classification) has been declared due to _____". "All emergency response personnel report to your assigned stations. All other personnel report to your Emergency Assembly Area". ☐ 2) Repeat RNO Step 5.b.1. ☐ 3) GO TO Step 6.
	☐ c) Sound emergency alarm and make announcement on station Gai-Tronics system as follows: "(Emergency classification) has been declared due to _____"	
	☐ d) Repeat Step 5.c	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION: All further instructions should be continued unless otherwise directed to hold.

* *

____ 6 INITIATE SUPPORTING PROCEDURES:

a) Determine if a radiological release is in progress:

☐ Radioactive material not attributable to normal plant operations detected beyond the protected area

OR

☐ Radioactive material not attributable to normal plant operations suspected of migrating beyond the protected area

Response Not Obtained: ☐ a) IF radiological release NOT in progress, THEN GO TO Step 6.b.

b) Inform Emergency Communicators of the following:

☐ • Emergency Classification

☐ • Emergency Action Level

☐ • Time of Declaration

☐ • Radiological release status

☐ • PARs, if applicable

c) Direct Emergency Communicators to initiate the following:

☐ 1) EPIP-2.01, NOTIFICATION OF STATE AND LOCAL GOVERNMENTS

☐ 2) EPIP-2.02, NOTIFICATION OF NRC

(STEP 6 CONTINUED ON NEXT PAGE)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6	INITIATE SUPPORTING PROCEDURES: (Continued)	
	☐ d) Check if classification announcement made using Gai-Tronics system	d) Notify the following to initiate controlling procedures: ☐ • HP Shift Supervisor: EPIP-4.01, RADIOLOGICAL ASSESSMENT DIRECTOR CONTROLLING PROCEDURE ☐ • Security Shift Supervisor: EPIP-5.09, SECURITY TEAM LEADER CONTROLLING PROCEDURE
	☐ e) Check if additional Operations Shift coverage needed	☐ e) GO TO Step 7.
	☐ f) Notify Security Team Leader (x2349) which Operations Shift is designated for coverage	
____	7 CHECK TSC - ACTIVATED	IF TSC - NOT ACTIVATED, THEN do the following: ☐ a) Have STA report to the Control Room. ☐ b) Notify Operations Manager On Call (OMOC) or Manager Nuclear Operations. ☐ c) Evaluate having Radiological Assessment Director report to the Control Room. ☐ d) WHEN relief SEM arrives, THEN perform turnover using EPIP-1.01, Attachment 2, Turnover Checklist.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

____ 8 INITIATE EPIP FOR EMERGENCY CLASSIFICATION IN EFFECT:

- ☐ • **Notification of Unusual Event** - EPIP-1.02, RESPONSE TO NOTIFICATION OF UNUSUAL EVENT
- ☐ • **Alert** - EPIP-1.03, RESPONSE TO ALERT
- ☐ • **Site Area Emergency** - EPIP-1.04, RESPONSE TO SITE AREA EMERGENCY
- ☐ • **General Emergency** - EPIP-1.05, RESPONSE TO GENERAL EMERGENCY

____ 9 NOTIFY OFF-SITE AUTHORITIES OF EMERGENCY TERMINATION:

- ☐ a) State and local governments (made by LEOF or CEOF when activated)
- ☐ b) NRC

____ 10 NOTIFY STATION PERSONNEL ABOUT THE FOLLOWING:

- ☐ • Emergency termination
- ☐ • Facility de-activation
- ☐ • Selective release of personnel
- ☐ • Completion and collection of procedures
- ☐ • Recovery

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 11	TERMINATE EPIP-1.01:	
	☐ • Give completed EPIPs, forms and other applicable records to the Emergency Procedures Coordinator in the TSC	☐ • Give to STA AND ☐ • Notify Nuclear Document Management that used EPIPs require replacement.
	☐ • Completed By: _____ Date: _____ Time: _____	
	- END -	

CONTINUOUS ACTION PAGE FOR EPIP-1.01

STATION EMERGENCY MANAGER PAR CRITERION

IF responsibility for Protective Action Recommendations (PAR) has been transferred to the LEOF/CEOF, THEN notify the Recovery Manager of plant conditions indicating a General Emergency as soon as possible, not to delay declaration of the event.

This attachment provides guidance for selected emergency response actions when normal implementation cannot be performed or would have adverse effects on personnel safety. Station Emergency Manager (SEM) approval is required before any required action is postponed, suspended or modified. The guidance below is not all-inclusive.

UNANTICIPATED HAZARD EXISTS (e.g., security event, widespread natural disaster, localized severe weather, or toxic release):

IF notifying off-duty augmentation could create a safety hazard for personnel coming to the station, THEN consider the following alternatives:

- Station Security (if available) can be directed to notify off-duty personnel to report to the remote mustering area (Surry County Administration Building).
- Corporate Security, at 804-771-3161 (Tie Line 8-736-3161) or 804-771-3158 (Tie Line 8-736-3158), can be directed to notify off-duty personnel to report to the remote mustering area (Surry County Administration Building).
- Corporate Security, at 804-771-3161 (Tie Line 8-736-3161) or 804-771-3158 (Tie Line 8-736-3158), can be directed to notify corporate emergency response organization only using CPIP-3.4, CORPORATE SECURITY SUPPORT.
- Notifications can be deferred until hazardous conditions are resolved.

IF implementation of emergency response actions could compromise Security Plan response strategies, THEN consider postponing or suspending emergency response actions until threat has been resolved, e.g., on-site announcement directing assembly and emergency response facility activation, pager activation and call-out per EPIP-3.05, AUGMENTATION OF EMERGENCY RESPONSE ORGANIZATION and implementation of EPIP-5.04, ACCESS CONTROL.

IF assembling on-site personnel for accountability or activation of emergency response facilities could endanger plant personnel, THEN consider postponing emergency assembly until hazardous conditions are resolved. Corporate Security, at 804-771-3161 (Tie Line 8-736-3161) or 804-771-3158 (Tie Line 8-736-3158), can be directed to notify corporate emergency response organization only using CPIP-3.4, CORPORATE SECURITY SUPPORT. Personnel in unaffected areas on-site can be notified selectively.

IF TSC and LEOF NOT available due to Hazardous Event, THEN GO TO Attachment 3, CEOF TURNOVER CHECKLIST.

IF unable to make announcement(s) on station Gai-Tronics, THEN have Security initiate EPIP-5.09, Attachment 5, BACK-UP NOTIFICATION.

ANTICIPATED SITUATION (e.g., forecasted severe weather or grid disturbance):

IF all or part of the ERO has been staged in anticipation of a predicted event, THEN notify Security to omit performance of augmentation notification (as described in EPIP-3.05, AUGMENTATION OF EMERGENCY RESPONSE ORGANIZATION).

IF adequate controls have been established to continually account for personnel staged in anticipation of a
predicted event, THEN notify Security to omit performance of initial accountability (as described in EPIP-5.03, PERSONNEL ACCOUNTABILITY).

IF environmental conditions are hazardous, THEN consult with Security Team Leader about suspending procedural requirements for implementing EPIP-5.04, ACCESS CONTROL.

Conduct a turnover between the onshift and relief SEM in accordance with the following checklist. Use place-keeping aid at left of item, "____", to track completion.

____ 1. Determine the status of emergency response organization augmentation (initiated by Security).

____ 2. Determine the status of "Report of Emergency to State and Local Governments," EPIP-2.01. Get completed copies if available.

____ 3. Determine status of the "Report of Radiological Conditions to the State," EPIP-2.01, Attachment 3. Get completed copy if available.

____ 4. Determine status of Emergency Notification System (ENS) communications and completion status of "NRC Event Notification Worksheet", EPIP-2.02 Attachment 1.

____ 5. Review classification and initial PAR status.

____ 6. Review present plant conditions and status.

____ 7. Review status of station firewatches and re-establish if conditions allow.

____ 8. Review status of In-Vessel Effects Monitoring and Evaluation attachment in ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

____ 9. Determine readiness of TSC for activation.

IF the TSC is functional, THEN relocate State and Local Communicator in the Control Room to the TSC with the SEM.

____10. Call the Control Room and assess any changes that may have occurred during transition to the TSC.

____11. When sufficient personnel are available, the relief SEM is to assume the following responsibilities from the onshift Station Emergency Manager:

a. Reclassification.

b. Protective Action Recommendations until LEOF activated.

c. Notifications (i.e., state, local, & NRC). Upon LEOF activation, transfer notification responsibilities except for the NRC ENS.

d. Site evacuation authorization.

e. Emergency exposure authorization.

f. Command/control of onsite response.

____12. Direct the Shift Manager to notify the TSC of any personnel dispatched by the Control Room (including name, destination and purpose).

____13. Formally relieve the Interim SEM and assume control in the TSC. Announce name and facility activation status to facility.

Conduct a turnover between the onshift SEM and CEOF Recovery Manager in accordance with the following checklist.

____ 1. Contact the CEOF Recovery Manager at:

- (804) 273-3781

  OR

- (804) 273-3782

  OR

- SPS x 3060

  OR

- Section 7 of the Emergency Telephone Directory

____ 2. Provide the following information:

- Current plant status
  - Status of Units
  - Status of Critical Safety Function
- Emergency conditions
  - Status of ongoing Security Event
  - Near-site Protection Actions for the general public due to the Security Event
- Mitigating actions (planned and underway)
- Emergency Class
  - Status of Off-site Notifications
    - State & Local (EPIP-2.01, NOTIFICATION OF STATE AND LOCAL GOVERNMENTS)
    - NRC (EPIP-2.02, NOTIFICATION OF NRC)
  - Status of Off-site Protection Action (EPIP-1.06, PROTECTIVE ACTION RECOMMENDATIONS)
    - Known impediments to off-site evacuation

(STEP 2 CONTINUED ON NEXT PAGE)

2. Provide the following information: (continued)

- Staff Availability
  - Operations Support
  - Technical Support
  - Radiological Protection Support
  - Maintenance Support (Electrical, Instrumentation & Control, Mechanical)
- Habitability of emergency response facilities
  - Control Room (CR)
  - Technical Support Center (TSC)
  - Operations Support Center (OSC)
  - Local Emergency Operations Facility (LEOF)

NOTE:
- ReadyTalk conference calls established by individuals in CEOF.
- SEM can direct responding Security, RP, and available Operations personnel to establish and/or join calls in progress.

____ 3. Join or establish the ReadyTalk conference calls:

a. Locate available landline phone

OR

Use cellular or satellite phone.

b. Dial 866-740-1260 and follow prompts.

WHEN seven-digit access code requested, THEN enter the applicable access code for affected station liaison position:

- Operations Liaison - 379-9759 (Chairperson passcode, if needed, 4909)
- Security Liaison - 740-2427 (Chairperson passcode, if needed, 8130)
- Radiological Protection Liaison - 715-7559 (Chairperson passcode, if needed, 5798)
- Management Liaison - 675-0572 (Chairperson passcode, if needed, 9860)

____ 4. Prepare to transfer the following key response functions:

- Off-site State & Local Notifications
- PAR
- Dose Assessment
- Radiological Monitoring Team Control
- HPN Notifications

____ 5. Keep the following key response functions:

- Emergency Classification
- NRC Communications
- Emergency Exposure Authorization
- Site Evacuation Authorization (consult with Incident Command)
- Command/Control of On-site response (consult with Incident Command)

____ 6. RETURN TO procedure step in effect.

U.S. Nuclear Regulatory Commission
Surry Power Station

SR15301
Administrative Job Performance Measure 2.3.4

Applicant_____ Start Time_____

Examiner_____

Date _____ Stop Time_____

Title

Determine the Stay Time of an Operator in a Radiological Area without Exceeding Administrative Limits.

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

Applicability	**Est Completion Time**	**Actual Time**
RO/SRO(I)	20 Minutes	_____

Conditions

- Task is to be PERFORMED in the SIMULATOR or CLASSROOM.

Standards

- Determines if an operator can spend in a radiological area without exceeding administrative dose limits and also determines how long an operator can remain in the radiological area assuming extensions are authorized.

Initiating Cues

- Given simulated plant conditions, determine how long an operator can work in a radiological are without exceeding administrative dose limits. Also, assuming the maximum dose limit extension is authorized, how long can an operator perform work in a radiological area.

Initial Conditions:

- I am the Nuclear Shift Manager. I need you to perform work in an area with a general dose rate of 400 mrem/hour. I anticipate that the work I need you to perform will take approximately 6 hours.

- It is currently the fourth quarter of the year and the dose you have received during the year is as follows:

    - Quarter #1 (January – March): 0.68 Rem
    - Quarter #2 (April – June): 0.43 Rem
    - Quarter #3 (July – September): 0.59 Rem
    - Quarter #4 (October – **Today**): 0.10 Rem

- Based on the dose that you have received this year, you have already been authorized to receive 3,000 mrem for the current year.

Initiating Cues:

- I need you to answer the following questions regarding the work:

    1. Assuming the job will take 6 hours can you completed the job without requiring another dose extension, and how long you will be able to perform work in that area?

    2. Assuming that I am able to receive the maximum dose limit extension for you, up to the federal limit, inform me of how long you will be able to perform work in that area and if you will be able to complete the job without assistance.

Record your answers on the attached page and inform me when you have completed.

Terminating Cues

- Determination that work in the RCA cannot be performed without an extension and accurate stay time determination following maximum dose limit extension.

Procedures

- VPAP-2101, Radiological Protection Program
- RP-AA-105, External Radiation Exposure Control Program

Tools and Equipment

- Calculator
- Computer with only access to Webtop

Safety Considerations

- None

Notes

Performance Checklist

Notes to the Evaluator.

- Task critical elements are bolded and noted by the words "Critical Step" at the end of the step.
- **START TIME:**

STEP 1: Answer to first question by the Shift Manager: Based on the dose that you have received this year, I need you to tell me how long you can perform work in that area without requiring a dose limit extension and if you will be able to complete the job without assistance (assuming no dose extensions to the administrative limits). **STANDARD:** (a) Calculates dose received year to date as follows: 680 mrem + 430 mrem + 590 mrem + 100 mrem = 1800 mrem. (b) Notes that the authorized dose limit is 3000 mrem (c) Determines margin to limit: 3000 – 1800 = 1200 mrem **(d) Calculates Stay Time: 1200 mrem / 400 mrem/hour = 3.0 hours.** **This is a Critical Step** **(e) Notes that the 6 hour task cannot be performed without assistance.** **This is a Critical Step.** **EVALUATOR'S NOTE:** • Currently authorized to 3 Rem/Year. • Can get extended to 5 Rem/year with worker, manager, RP Manager and Site VP approval. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 2: Answer to second question by the Shift Manager: Finally, assuming that I am able to receive the maximum dose limit extension for you, up to the federal limit, inform me of how long you will be able to perform work in that area and if you will be able to complete the job without assistance. **STANDARD:** (a) Calculates dose received year to date as follows: 680 mrem + 430 mrem + 590 mrem + 100 mrem = 1800 mrem. (b) Notes that the maximum yearly dose limit with extension is 5000 mrem (c) Determines margin to yearly limit: 5000 – 1800 = 3200 mrem **(d) Calculates Stay Time: 3200 mrem / 400 mrem/hour = 8 hours.** **This is a Critical Step** **(e) Notes that the 6 hour task can be performed without assistance.** **This is a Critical Step.** **EVALUATOR'S NOTE:** • Authorized to receive 3 Rem/Year. • Can get extended to 5 Rem/year with worker, manager, RP Manager and Site VP approval. • ***A candidate may state 6 hours for part (d), as this is the projected time to complete the job. Follow-up question concerning how the candidate arrived at 6 hours may be necessary to determine if the candidate is documenting actual stay time vice job completion time.*** **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STEP 3: Reports task is complete. **STANDARD:** (a) Verbal or written status report that the work cannot be done without assistance if a dose limit extension is not given and that with the extension the work can be performed without assistance. **EVALUATOR'S NOTE:** • Acknowledge the completion of the task. **COMMENTS:**	**_____ SAT** **_____ UNSAT**

STOP TIME:

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

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

Task

- Task may be PERFORMED in the simulator or classroom.
- Correctly determines the ability of an operator to perform a job in the RCA with or without an extension and the time the operator can perform that job without an extension.

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:

- I am the Nuclear Shift Manager. I need you to perform work in an area with a general dose rate of 400 mrem/hour. I anticipate that the work I need you to perform will take approximately 6 hours.

- It is currently the fourth quarter of the year and the dose you have received during the year is as follows:

    - Quarter #1 (January – March): 0.68 Rem
    - Quarter #2 (April – June): 0.43 Rem
    - Quarter #3 (July – September): 0.59 Rem
    - Quarter #4 (October – **Today**): 0.10 Rem

- Based on the dose that you have received this year, you have already been authorized to receive 3,000 mrem for the current year.

Initiating Cues:

- I need you to answer the following questions regarding the work:

    1. Assuming the job will take 6 hours can you completed the job without requiring another dose extension, and how long you will be able to perform work in that area?

    2. Assuming that I am able to receive the maximum dose limit extension for you, up to the federal limit, inform me of how long you will be able to perform work in that area and if you will be able to complete the job without assistance.

- Record your answers on the attached page and inform me when you have completed.

SRO ONLY ANSWER KEY

NOT FOR TRAINEE

Calculate Stay Time FOLLOW-UP Question

Conditions have changed, and a General Emergency has been declared. The worker is needed to perform the task to limit the off-site release, and will exceed his Federal TEDE dose limit. Radiation Protection estimates the worker will receive a dose of 12,000 mrem.

You are the Station Emergency Manager. EPIP 4.04, Emergency Personnel Radiation Exposure has been initiated.

1) Can the worker perform the task?

2) What is the maximum dose the worker is authorized to receive to perform this task?

3) Whose authorization is required for final approval of the dose extension?

ANSWER:

1) No (Dose estimate > Dose allowed)
2) 10 Rem.
3) Station Emergency Manager (SEM).

Dominion

SURRY POWER STATION

EMERGENCY PLAN IMPLEMENTING PROCEDURE

NUMBER	PROCEDURE TITLE	REVISION
EPIP-4.04	EMERGENCY PERSONNEL RADIATION EXPOSURE (WITH 4 ATTACHMENTS)	9
		PAGE 1 of 7

PURPOSE

Provide an evaluation of the need for emergency exposure authorization to the Station Emergency Manager.

ENTRY CONDITIONS

Any one of the following:

1) Activation by another EPIP.

2) Survey results indicate 10CFR20 annual limits may be exceeded.

STEP	ACTION/ EXPECTED RESPONSE	RESPONSE NOT OBTAINED

____ 1 INITIATE PROCEDURE:

- By: _____

Date: _____

Time: _____

____ 2 REVIEW EMERGENCY EXPOSURE LIMITS LISTED ON ATTACHMENT 1

NOTE:
- Exposure to monitoring personnel should be minimized when obtaining data for estimation of emergency dose.
- The Emergency Worker Exposure authorization process and associated requirements must be followed, but may be tracked as Planned Special Exposures.

____ 3 ESTIMATE DOSE:

a) Determine the following:
- Destination of workers
- Name(s) of workers
- Estimated duration of exposure

b) Check dose rate in affected area - KNOWN OR OBTAINABLE:
- Area radiation monitors
- Survey data - Assign EPIP-4.14, IN-PLANT MONITORING

b) IF dose rate unknown, THEN use best estimate of dose rate. (An overly conservative dose rate estimate may delay response actions.)

c) Determine estimated TEDE dose (in Rem) using Attachment 2

d) Check estimated TEDE dose - GREATER THAN 5 Rem

d) IF estimated TEDE dose LESS THAN 5 Rem, THEN GO TO Step 18.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____ 4	EVALUATE OPTIONS TO REDUCE EXPOSURE: • Compare consequences of attempted rescue to total exposure of injured individual(s) when authorization is for lifesaving actions • Use "mock-up" or "dry run" for damage control activities prior to entry • Wait to allow for radiation decay • Vent radioactive gases from area • Establish shielding • Do a TEDE ALARA evaluation to determine respiratory protection requirements	
____ 5	CHECK ESTIMATED TEDE DOSE - GREATER THAN 25 REM	GO TO Step 8.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: The following criteria should be considered as guidance in selecting volunteers for emergency exposure.

____ 6 ASSESS VOLUNTEER EMERGENCY WORKER SELECTION CRITERIA:

- Personnel should be volunteers or professional rescue personnel (i.e., fire fighters, first aid or rescue personnel)
- Volunteers should be in good physical health
- Volunteers should be familiar with consequences of exposure
- The following criteria are preferable, though not mandatory:
  - Volunteers capable of reproduction should not be used
  - Volunteers should be above 45 years of age

____ 7 VERIFY VOLUNTEERS - AVAILABLE

IF volunteers NOT available for emergency exposure, THEN ask SEM for guidance.

____ 8 GIVE (FEMALE) WORKER OPPORTUNITY TO DECLARE PREGNANCY:

a) Check pregnancy - DECLARED

b) Select another worker

c) RETURN TO Step 6

IF worker is NOT a declared pregnant worker or does NOT wish to declare pregnancy, THEN GO TO Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

____ 9 RECOMMEND EMERGENCY EXPOSURE:

a) Review alternatives and dose limits in Attachment 1 with SEM

b) Give recommendation to SEM

NOTE: Attachment 3, EMERGENCY WORKER RADIOLOGICAL EXPOSURE RECORD, requires entry of the RAD's and SEM's names and the date and time of authorization. Signatures are not required.

____10 COMPLETE ATTACHMENT 3, EMERGENCY WORKER RADIOLOGICAL EXPOSURE RECORD, PART 1 FOR EACH WORKER

____11 SEND COPY OF ATTACHMENT 3 TO RPS (Information may be conveyed verbally)

____12 REVIEW ATTACHMENT 4, RADIATION EFFECTS VERSUS EXPOSURE, WITH EMERGENCY WORKER(s)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:
- Station Emergency Manager may, at his discretion, waive requirements for RWP prior to entry and give verbal authorization.
- Unless considered necessary, monitoring personnel should not remain in high exposure area.
- The DAD reader may be manually reprogrammed to allow a higher alarm threshold if exposure is expected to exceed 10 Rem.

____ 13 IMPLEMENT PROTECTIVE ACTIONS:

a) Implement RWP (unless waived by SEM)

b) Provide workers with the following equipment:
- Protective clothing appropriate for situation
- Dosimetry capable of measuring expected dose
- Respiratory protection, if necessary
- Instrumentation capable of reading radiation levels of up to 1000 R/hr

c) Assign HP coverage

d) Direct workers to entry route of lowest exposure

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
____14	DO FOLLOW-UP ASSESSMENT: a) Check if individual received GREATER THAN emergency exposure limits (Refer to Attachment 1, EMERGENCY EXPOSURE LIMITS) b) Recommend transport to VCU Medical Center for evaluation	a) IF large portion (> 80%) of individual's emergency exposure limit received, THEN do the following: 1) Limit individual from further exposure. 2) GO TO Step 15.
____15	COMPLETE ATTACHMENT 3, EMERGENCY WORKER RADIOLOGICAL EXPOSURE RECORD, PART 2	
____16	SEND COPY OF ATTACHMENT 3 TO SEM	
____17	PUT ORIGINAL ATTACHMENT 3 IN INDIVIDUAL'S EXPOSURE CONTROL FILE	
____18	TERMINATE EPIP-4.04: • Give completed EPIP-4.04, forms and other applicable records to Emergency Procedures Coordinator in the TSC • Completed by: _____ Date: _____ Time: _____	

- END -

TABLE 1: EPA-400 EMERGENCY EXPOSURE LIMITS			
ACTIVITY	TEDE (Rem)	LDE (Rem)	SDE, THY, CDE, OR OTHER ORGAN (Rem)
GENERAL EMERGENCY EXPOSURE ACTIVITIES	5	15	50
PROTECTING VALUABLE PROPERTY (1)	10	30	100
LIFESAVING OR PROTECTION OF LARGE POPULATIONS (2)	25	75	250
LIFESAVING OR PROTECTION OF LARGE POPULATIONS (3)	> 25	> 75	> 250
	Only on a voluntary basis to persons fully aware of the risks involved.		

(1) Protecting Valuable Property:

- To save valuable equipment.
- To limit off-site releases.

(2) Lifesaving Activity:

- For search and rescue, first aid, and removal of injured personnel where there is reasonable expectation that the individual(s) is alive within the affected area.
- For entry to correct conditions which, if left uncorrected, could result in on-site or off-site injury.

(3) No limit given in extreme case because loss of thyroid may be acceptable to save a life. This may not be necessary if respirators and/or blocking agents are available for rescue personnel.

TABLE 2: NRC 10CFR20 ANNUAL LIMITS	
TEDE	5 Rem
LDE	15 Rem
SDE	50 Rem

NUMBER EPIP-4.04	ATTACHMENT TITLE DETERMINATION OF TEDE/DDE RATIO AND DDE LIMIT	ATTACHMENT 2
REVISION 9		PAGE 1 of 1

NOTE: TEDE = DDE + CEDE, when applied to emergency worker dose.

____ 1. Get Ratio TEDE/DDE from MIDAS report AND GO TO Step 3 of this attachment

OR

IF MIDAS results NOT available, THEN continue this instruction.

____ 2. Use default TEDE/DDE ratio:

Accident Type	Default TEDE/DDE Ratio with cleanup	 without cleanup
LOCA in Containment with sprays	2 (filtered)	4 (unfiltered)
LOCA in Containment without sprays	2 (filtered)	20 (unfiltered)
LOCA outside Containment	2 (filtered)	25 (unfiltered)
MSLB	2 (wet generator)	5 (dry generator)
Primary-to-Secondary Steam release	2 (thru CAE)	5 (other)
FHA < 100 days	2 (filtered)	3 (unfiltered)
FHA > 100 days	1	1
RCS leak (VCT, WGDT, etc.)	1	1
Radwaste Facility	1	1

____ 3. Calculate estimated TEDE dose:

$$\text{Exposure time} \times \text{Dose rate} \times \text{Ratio } \frac{\text{TEDE}}{\text{DDE}} = \text{Estimated TEDE dose}$$

NOTE: DAD or SRD readings are equivalent to DDE.

____ 4. Calculate DDE limit:

$$\frac{\text{TEDE limit, Rem from Attachment 1} - \text{Estimated TEDE, Rem from Step 3 above}}{\text{Ratio TEDE/DDE}} = \text{DDE limit, Rem}$$

____ 5. RETURN TO procedure step in effect.

NUMBER EPIP-4.04	ATTACHMENT TITLE	ATTACHMENT 3
REVISION 9	EMERGENCY WORKER RADIOLOGICAL EXPOSURE RECORD	PAGE 1 of 1

PART 1

NAME:_____, _____, _____ AGE: _____ (YEARS)
Last, First, Middle Initial

Plant I.D. #: _____

Authorized Emergency Exposure Limit (TEDE): _____ (Rem)

Authorized by Radiological Assessment Director:

Name:_____; Date: _____; Time:_____

Authorized by Station Emergency Manager:

Name:_____; Date: _____; Time:_____

DAD/SRD ISSUE

DOSIMETER # _____
Reading (Rem) _____
Date: _____
Time: _____

Issued By: _____

SECONDARY TLD, if required

TLD # _____

Date/Time Issued:_____/_____
Date/Time Returned:_____/_____

PART 2

DAD/SRD RETURN

DOSIMETER # _____
Reading (Rem) _____
Date: _____
Time: _____

Received By:_____

DDE Dose (Rem) _____
(Return - Issue)
TEDE Dose (Rem)* _____
(*TEDE Dose (Rem) = DDE x TEDE/DDE ratio from Attachment 2)

EXPOSURE	EFFECTS
0 to 25 REM	No measurable effects.
25 to 100 REM	Slight blood changes but no other observable effects.
100 to 200 REM	Vomiting in 5 to 50 percent within 3 hours, with fatigue and loss of appetite. Moderate blood changes. Except for the blood-forming system, recovery will occur in essentially all cases within a few weeks.
200 to 600 REM	Vomiting, fatigue and loss of appetite in 50 to 100 percent within 3 hours. For doses over 300 REM, these effects will appear in all cases within 2 hours. Loss of hair after 2 weeks. Severe blood changes, accompanied by hemorrhage and infection. Death in 0 to 80 percent within 2 months; for survivors, recovery period of 1 month to a year.
600 to 1000 REM	Vomiting within 1 hour. Severe blood changes, hemorrhage, infection, and loss of hair. Death of 80 to 100 percent within 2 months; survivors convalescent over a long period.

The above effects are based on:

- Exposure to the entire body;
- Exposures to the entire population;
- No medical treatment, and acute exposure.

Adapted from: Handbook of Health Physics and Radiological Health, 3rd Edition, 1998.

SRO ONLY Candidate

Calculate Stay Time FOLLOW-UP Question

Conditions have changed, and a General Emergency has been declared. The worker is needed to perform the task to limit the off-site release, and will exceed his Federal TEDE dose limit. Radiation Protection estimates the worker will receive a dose of 12,000 mrem.

You are the Station Emergency Manager. EPIP 4.04, Emergency Personnel Radiation Exposure has been initiated.

1) Can the worker perform the task?

2) What is the maximum dose the worker is authorized to receive to perform this task?

3) Whose authorization is required for final approval of the dose extension?

Operator Directions Handout
(TO BE GIVEN TO APPLICANT)

Initial Conditions:

- I am the Nuclear Shift Manager. I need you to perform work in an area with a general dose rate of 400 mrem/hour. I anticipate that the work I need you to perform will take approximately 6 hours.

- It is currently the fourth quarter of the year and the dose you have received during the year is as follows:

    - Quarter #1 (January – March): 0.68 Rem
    - Quarter #2 (April – June): 0.43 Rem
    - Quarter #3 (July – September): 0.59 Rem
    - Quarter #4 (October – **Today**): 0.10 Rem

- Based on the dose that you have received this year, you have already been authorized to receive 3,000 mrem for the current year.

Initiating Cues:

- I need you to answer the following questions regarding the work:

    1. Assuming the job will take 6 hours can you completed the job without requiring another dose extension, and how long you will be able to perform work in that area?

    2. Assuming that I am able to receive the maximum dose limit extension for you, up to the federal limit, inform me of how long you will be able to perform work in that area and if you will be able to complete the job without assistance.

- Record your answers on the attached page and inform me when you have completed.

Shift Manager Questions and Operator Answers
(TO BE GIVEN TO APPLICANT)

Question #1:

- Assuming the job will take 6 hours can you completed the job without requiring another dose extension, and how long you will be able to perform work in that area.

Can be in the radiation area for: _____ minutes / hours (circle one)

Can complete the job without a dose extension in the allotted time: YES / NO (circle one)

Question #2:

- Assuming that I am able to receive the maximum dose limit extension for you, up to the federal limit, inform me of how long you will be able to perform work in that area and if you will be able to complete the job without assistance.

Can be in the radiation area for: _____ minutes / hours (circle one)

After receiving the maximum extension can complete the job in the allotted time: YES / NO (circle one)