

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM SRO A1-1  
Rev 0**

**Determine Power Distribution Flux Limits**

<b>Concurred By:</b>	<u>Greg Danbury</u> Operations	<b>Date:</b> <u>5/15/13</u>
<b>Approved By:</b>	<u>James Conder</u> Superintendent/Supervisor - Training	<b>Date:</b> <u>6/5/13</u>

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**Task:** 01083100401, Determine Operator Actions if the ERFIS Computer Becomes Inoperable IAW OMM-001-11.  
02110104001, Apply Technical Specifications for Safety limits and Limiting Conditions for Operation IAW ITS.

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM SRO A1-1

**Candidate**

SRO

**K/A                      Rating (RO/SRO):**

G 2.1.7

4.7

**Task Standard:**

Perform a MANUAL Calculation of Penalty Points IAW FMP-009, Power Distribution Control and determine any ITS Surveillance requirements and LCOs (if applicable).

**Preferred Evaluation Location:**Simulator \_\_\_\_\_ Classroom   X  **Preferred Evaluation Method:**Perform   X   Simulate \_\_\_\_\_**References:**

FMP-009, Power Distribution Control

ITS Books

**Validation Time: 25 Minutes Time Critical: NO Time Critical Time: N/A**

**Candidate:**

(N/A if not time critical)

Name \_\_\_\_\_

**Overall  
Time****Critical  
Time**

SSN \_\_\_\_\_

-

-

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**  
circle one

SAT

UNSAT

**Performance  
Time (min):**

**Examiner:**

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

Calculator  
FMP-009, Power Distribution Control  
FMP-009, Attachment 10.5 filled out  
ITS Books

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant is at 70% RTP with power ascension halted due to the Xenon transient in progress.
2. ERFIS is OOS.
3. FMP-009, Power Distribution Control, Attachment 10.5 has been provided.
4. 100% Target Value is + 2%
5. Target Band = +/- 5%

**INITIATING CUES:**

1. Perform a MANUAL Calculation of Penalty Points IAW FPM-009, Power Distribution Control. (Assume that you are performing the calculations at the time the data was recorded.)
2. Determine if any ITS LCOs are applicable based on Initial Conditions and Calculation of Penalty Points.



START TIME: \_\_\_\_\_

**STEP 1:**

Candidate will calculate the corrected target value for the reduced power levels provided in Attachment 10.5 (FMP-009, Step 8.4.3 and Att. 10.1, second box (included in Examiner's Note))

**STANDARD:**

Candidate calculates the target value as a percentage of power level as follows: (Target Value = +2% at 100% RTP)

$$24\% = 2 \times 0.24 = 0.48\%$$

$$36\% = 2 \times 0.36 = 0.72\%$$

$$44\% = 2 \times 0.44 = 0.88\%$$

$$49\% = 2 \times 0.49 = 0.98\%$$

$$59\% = 2 \times 0.59 = 1.18\%$$

$$68\% = 2 \times 0.68 = 1.36\%$$

$$70\% = 2 \times 0.70 = 1.40\%$$

**EXAMINER'S NOTE:** The candidate will take the above calculated target values and establish a target band by adding +/- 5%.

**EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET VALUES**

$$\text{Target Value (P)} = \text{Target Value}_{\text{ref}} * P/P_{\text{ref}}$$

where: Target Value (P) = Target Value at power P;  
Target Value<sub>ref</sub> = Target Value during flux map;  
P = Current power level; and,  
P<sub>ref</sub> = Power level during flux map.

Parameter	N41	N42	N43	N44
Target Value (P)	N/A	N/A	N/A	N/A
Target Value <sub>ref</sub>	NPK1603	NPK1604	NPK1605	NPK1606
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
P <sub>ref</sub>	NPK1608	NPK1609	NPK1610	NPK1611

**COMMENTS:** The Critical Steps are to correctly calculate the Target Values AND the Target Band based on the Target Values.

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 2:**

Determine the Power Range Channels that are outside of the target band for the data given. (Target bands are +/- 5%) (FMP-009, Step 8.4.3)

**Critical Step****STANDARD:**

24% RTP, All indications are inside of the target band. (-4.52 to +5.48). (CS)

\_\_\_ SAT

36% RTP, NI-41 is outside of the target band. (-4.28 to +5.72) (CS)

\_\_\_ UNSAT

44% RTP, NI-41 and NI-42 are outside of the target band and penalty point accumulation began at 0.5 minute penalty for each minute of power operation with AFD outside the target band. (-4.12 to +5.88) **Per the Note in ITS SR 3.3.3.2 the candidate is to assume logged values of AFD exist during the preceding time interval. Therefore penalty point accumulation began immediately following the previously recorded values. 15 penalty points have been accumulated. (CS)**

49% RTP, NI-41 and NI-42 are outside of the target band and 15 penalty points have been accumulated. (-4.02 to +5.98) (CS)

59% RTP, NI-41 and NI-42 are outside of the target band and 15 penalty points have been accumulated. (-3.82 to +6.18) (CS)

68% RTP (1430 reading), NI-41 and NI-42 are outside of the target band and penalty point accumulation continues at 1 penalty point for every minute outside the target band. 30 penalty points have been accumulated. (-3.64 to +6.36) (CS)

70% RTP (1500 reading), NI-41 and NI-42 are outside of the target band and penalty point accumulation continues at 1 penalty point for every minute outside the target band. 30 penalty points have been accumulated. (-3.6 to +6.4) (CS)

**EXAMINER'S NOTE:            NONE**

**COMMENTS:**

**STEP 3:**

Determine the penalty points accumulated during each 30 minute interval and the cumulative total penalty points. (FMP-009, Step 8.4.4)

**Critical Step****STANDARD:**

At 1200 hours, 0 penalty points for the interval and 0 total penalty points. No NI is currently outside the target band. (CS)

\_\_\_ SAT

At 1230 hours, 0 penalty points for the interval and 0 total penalty points. NI-41 is the only NI outside of the target band. Requires two NIs outside of target band to collect penalty points. (CS)

\_\_\_ UNSAT

At 1300 hours, 15 penalty points for the interval and 15 total penalty points. NI-41 and NI-42 are outside of the target band. Penalty point accumulation has begun at 0.5 minute penalty points for every 1 minute of power operation outside of the target band while reactor power is less than 50%. (CS)

At 1330 hours, 15 penalty points for the interval and 30 total penalty points. NI-41 and NI-42 outside of Target Band. 15 penalty points have been accumulated between 1300 and 1330 due to point accumulation at 0.5 minute penalty points for every 1 minute outside of target band for 30 minutes and reactor power <50%. (CS)

At 1400 hours, 30 penalty points for the interval and 60 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1330 and 1400 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

At 1430 hours, 30 penalty points for the interval and 90 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1400 and 1430 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

At 1500 hours, 30 penalty points for the interval and 120 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1430 and 1500 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

<p><b><u>STEP 4:</u></b> Determine any operational restrictions or ITS requirements due to the information provided and calculated data.</p> <p><b><u>STANDARD:</u></b> Candidate determines that the maximum allowed accumulation of penalty points in accordance with <b>ITS 3.2.3 Condition C</b> was met at time 1400 due to reaching 1 hour of cumulative penalty points. (At 1400 a total of 60 penalty points had been accumulated.) (CS)</p> <p>Candidate determines that <b>ITS 3.2.3 Condition D</b> was met at time 1430 due to required Action and associated Completion Time for Condition C not met. (Condition C required that Thermal Power be reduced to less than 50% within 30 minutes.) (CS)</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue: Penalty points have been manually calculated and applicable ITS LCO actions have been identified.</b></p>	

**TIME STOP:** \_\_\_\_\_

# ANSWER KEY

**\*\* Shaded Items denote Critical Steps \*\***

This revision is the latest revision available and has been verified against the Document Management System.

J. L. Smith (Print)

Today

Name

Signature

Date

Date/Time	Power %RTP	N41 AFD	N42 AFD	N43 AFD	N44 AFD	Penalty Points This Interval	Total Penalty Points	Comments	Initials
1200	24	5.4	5.4	5.3	5.3	0	0	Target = 0.48 (-4.52 to +5.48)	
1230	36	5.8	5.6	5.5	5.5	0	0	Target = 0.72 (-4.28 to +5.72)	
1300	44	6.1	6.0	5.7	5.6	15	15	Target = 0.88 (-4.12 to +5.88)	
1330	49	6.3	6.1	5.8	5.7	15	30	Target = 0.98 (-4.02 to +5.98)	
1400	59	6.7	6.5	6.1	6.0	30	60	Target = 1.18 (-3.82 to +6.18)	
1430	68	7.1	6.9	6.3	6.2	30	90	Target = 1.36 (-3.64 to +6.36)	
1500	70	6.6	6.5	5.9	5.8	30	120	Target = 1.4 (-3.6 to +6.4)	

SSO Review:

Date:

**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant is at 70% RTP with power ascension halted due to the Xenon transient in progress.
2. ERFIS is OOS
3. FMP-009, Power Distribution Control, Attachment 10.5 has been provided.
4. 100% Target Value is + 2%
5. Target Band = +/- 5%

**INITIATING CUES:**

1. Perform a MANUAL Calculation of Penalty Points IAW FPM-009, Power Distribution Control. (Assume that you are performing the calculations at the time the data was recorded.)
2. Determine if any ITS LCOs are applicable based on Initial Conditions and Calculation of Penalty Points.

**ATTACHMENT 10.5**  
**Page 1 of 1**  
**MANUAL AFD MONITORING LOG**

This revision is the latest revision available and has been verified against the Document Management System.

J. L. Smith (Print)                      Today                      Date                     

Name                      Signature                     

Date/Time	Power %RTP	N41 AFD	N42 AFD	N43 AFD	N44 AFD	Penalty Points This Interval	Total Penalty Points	Comments	Initials
1200	24	5.4	5.4	5.3	5.3				
1230	36	5.8	5.6	5.5	5.5				
1300	44	6.1	6.0	5.7	5.6				
1330	49	6.3	6.1	5.8	5.7				
1400	59	6.7	6.5	6.1	6.0				
1430	68	7.1	6.9	6.3	6.2				
1500	70	6.6	6.5	5.9	5.8				

SSO Review:                      Date:

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 6  
PART 5

**FMP-009**  
***POWER DISTRIBUTION CONTROL***

REVISION 17



**SUMMARY OF CHANGES  
PRR 207424**

<b>REVISION #</b>	<b>REVISION COMMENTS</b>
17	Convert to WORD XP Change CP&L to Progress Energy Format to current procedure format Change NRCS to Document Management System

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**1.0 PURPOSE**

- 1.1 To provide instructions and guidance to ensure that the core axial power distribution is maintained within the limits established in Technical Specifications (ITS) LCO 3.2.3, SR 3.2.3.1 and SR 3.2.3.2
- 1.2 To provide instructions for identifying, monitoring and controlling divergent axial oscillations.
- 1.3 To satisfy Technical Specification (ITS) SR 3.2.3.2

**2.0 REFERENCES**

- 2.1 Technical Specifications (ITS) 1.1, LCO 3.2.3, SR 3.2.3.1, SR 3.2.3.2, SR 3.2.3.3
- 2.2 FMP-001, Core Operating Limits Report (COLR)
- 2.3 XN-76-40(A), Exxon Nuclear Power Distribution Control For Pressurized Water Reactors, September 1976
- 2.4 XN-NF-77-57 and XN-NF-77-57 Supplement 1 (A), Exxon Nuclear Power Distribution Control for Pressurized Water Reactors Phase II, May 1981
- 2.5 XN-NF-77-57 Supplement 2(A) and XN-NF-77-57 Supplement 2 Addendum 1 (A), Exxon Nuclear Power Distribution Control for Pressurized Water Reactors Phase II, October 1982
- 2.6 ANF-88-054(P), PDC-3: Advanced Nuclear Fuels Corporation Power Distribution Control for Pressurized Water Reactors and Application of PDC-3 to H.B. Robinson Unit 2, July 1988
- 2.7 EST-003, Incore/Excore Detector Calibration
- 2.8 SCM-003, Plant Computer Systems Database Control Procedure
- 2.9 UFSAR 1.5.3, 3.1.1.2.2, 3.1.2.7, 4.3.1.6, 4.3.2.2, 4.3.2.6, 4.3.3.3, 4.4.3.1, 7.2.1.1.2, 7.2.1.1.7, 7.7.1.5, 7.7.1.6
- 2.10 EC 47211 ERFIS Data Concentrator replacement.
- 2.11 EC 47160 NSS and BOP Analysis to Support Appendix K Uprate

### 3.0 RESPONSIBILITIES

- 3.1 Reactor Engineering is responsible for performing flux maps every 31 Effective Full Power Days (EFPDs) to determine the Target Axial Flux Difference (AFD) values, the Target Band values and the Allowable Power Level (APL) value in accordance with Technical Specifications (ITS) SR 3.2.3.3 and LCO 3.2.3. Reactor Engineering is also responsible for ensuring that the Control Room Status Board and the ERFIS CAOC software is updated to reflect the correct Target AFD values, Target Band values and APL value. Reactor Engineering is also responsible for ensuring the ERFIS CAOC software is updated to reflect the correct Incore/Excore calibration constants.
- 3.2 The Control Operator is responsible for maintaining the AFD within the limits specified in Technical Specifications (ITS) LCO 3.2.3 and SR 3.2.3.1 and the COLR. The Control Operator is also responsible for logging the AFD in accordance with Technical Specification (ITS) SR 3.2.3.2 when the AFD Alarms are inoperable.
- 3.3 The Superintendent - Shift Operations is responsible for reviewing the Manual AFD Monitoring Log.

### 4.0 PREREQUISITES

N/A

### 5.0 PRECAUTIONS AND LIMITATIONS

- 5.1 Any Technical Specification Required Action regarding reactor power limitations, including the setting of trip setpoints, should be based on a Rated Thermal Power (RTP) of 2339 MW<sub>th</sub>. A trip setpoint based on a 2300 MW<sub>th</sub> would satisfy Technical Specification requirements; however, if a trip setpoint is based on an RTP of 2300 MW<sub>th</sub>, then the actual trip would occur at a lower indicated power when operating based on a 2339 MW<sub>th</sub> RTP.

### 6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

### 7.0 ACCEPTANCE CRITERIA

N/A

## 8.0 PROCEDURE

### 8.1 Definitions

#### 8.1.1 Axial Flux Difference (AFD)

The Axial Flux Difference (AFD) is defined as the difference in normalized flux signals between the top and bottom halves of a two section excore neutron detector (ITS 1.1). This parameter is synonymous with Delta Flux, Indicated Flux Difference,  $\Delta I$ ,  $\% \Delta I$ ,  $\% \Delta$  Flux and  $\Delta q$ . AFD can also be related to core Axial Offset (AO) using the following equation:

$$AFD = AO * \text{Power Level/Rated Thermal Power.}$$

AFD relates the power in the top of the core to the power in the bottom of the core as seen by the excore NIS Power Range detectors. A separate AFD value is calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating AFD for each of the four Power Range channels are shown in ATTACHMENT 10.1. It should be noted that the ERFIS AFD is calculated once per minute and is based on 1 minute average values for V(top), V(bottom) and P.

#### 8.1.2 Target Value (TV)

The Target Value, also known as the Target Flux Difference, is the value of AFD determined in conjunction with the measurement of  $F_Q^V(Z)$  under equilibrium conditions within 31 EFPD after each refueling and every 31 EFPD thereafter (ITS SR 3.2.3.3). During startup and power ascension following each refueling, the Target Value may be based on design predictions until equilibrium conditions for long term operation are reached. Like AFD, the Target Value is power dependent (examples of the variation of Target Value with power are provided in ATTACHMENT 10.2). A separate Target Value is calculated for each NIS Power Range channel. The Target Value for a Power Range channel is generally the average ERFIS AFD value recorded for that channel during the course of the flux map. The equations and ERFIS Point IDs used in calculating the power dependent Target Value for each of the four Power Range channels are shown in ATTACHMENT 10.1.

8.1.3 Allowable Power Level (APL)

The Allowable Power Level is the limit placed on reactor power due to the  $F_Q^V(Z)$  peaking factor. The APL is used in applying the AFD target flux and operational limit curves (ITS LCO 3.2.3). The equation for determining the APL is provided in Technical Specification (ITS) LCO 3.2.3. The effect of APL on the Target Bands and Operating Bands can be seen in ATTACHMENT 10.2

8.1.4 Target Bands (TB)

The Target Bands establish a region of operation around the Target Value in which the AFD may vary without adversely affecting the axial power distribution or the axial xenon distribution. The allowable values of the Target Band are provided in the COLR for each cycle. The allowable Target Band values are currently  $\pm 3\%$  and  $\pm 5\%$ . If the APL is less than 90% RTP, then the values of the Target Bands are reduced to account for the effects of the reduced APL; however, they are still referred to as the  $\pm 3\%$  and  $\pm 5\%$  Target Bands in order to maintain a consistent nomenclature under all operating conditions. Since the Target Band moves with the Target Value, separate Upper and Lower Target Bands are calculated for each NIS Power Range channel (examples of the variation of the Target Bands with power and with APL are provided in ATTACHMENT 10.2). The equations and ERFIS Point IDs used in calculating the Target Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

#### 8.1.5 Operating Bands (OB)

The Operating Bands establish a region of acceptable operation outside of the Target Bands in which the AFD may vary for a short time period without adversely affecting the axial power distribution or the axial xenon distribution. The Operating Bands are only applicable to operation at power levels between 50% RTP and 90% RTP (or 90% APL if the APL is less than 100% RTP). The allowable values of the Operating Bands are provided in the COLR for each cycle. The Operating Bands use the same nomenclature as the Target Bands (i.e.  $\pm 3\%$  and  $\pm 5\%$  Operating Bands). The  $\pm 3\%$  Operating Bands are used with the  $\pm 3\%$  Target Bands and the  $\pm 5\%$  Operating Bands are used with the  $\pm 5\%$  Target Bands. If the APL is less than 90% RTP, then the values of the Operating Bands are reduced to account for the effects of the reduced APL; however, they are still referred to as the  $\pm 3\%$  and  $\pm 5\%$  Operating Bands in order to maintain a consistent nomenclature under all operating conditions. If  $0.9 \times \text{APL}$  is less than 90% RTP, then the top of the Operating Bands is limited to  $0.9 \times \text{APL}$ . The Operating Bands, like Target Bands, move with the Target Value (examples of the variation of the Operating Bands with power and APL are provided in ATTACHMENT 10.2). Separate Upper and Lower Operating Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Operating Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

#### 8.1.6 Penalty Points

Penalty Points are used to track the amount of time that operation outside of the Target Bands has occurred. Penalty point accumulation only occurs when two or more operable Power Range channels indicate that AFD is outside of the Target Bands. Penalty points are related to time of operation outside of the Target Bands through the following relations:

$\geq 50\%$  RTP: 1 Penalty Point= 1 minute outside the Target Bands

$< 50\%$  RTP: 1 Penalty Point= 2 minutes outside the Target Bands

Penalty points are eliminated by operation within the Target Bands at the same rates at which they were accumulated. The ERFIS Point ID used to track penalty point accumulation is shown in ATTACHMENT 10.1.

8.1.7 Target Warning Bands (TWB)

The Target Warning Bands are provided to alert the Operator that the AFD for one or more NIS Power Range channels is approaching the Target Bands (examples of the Target Warning Bands are provided in ATTACHMENT 10.2). Separate upper and lower Target Warning Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Target Warning Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

8.1.8 Operating Warning Band (OWB)

The Operating Warning Bands are provided to alert the Operator that the AFD for one or more NIS Power Range channels is approaching the Operating Bands (examples of the Operating Warning Bands are provided in ATTACHMENT 10.2). Separate upper and lower Operating Warning Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Operating Warning Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

8.2 Power Distribution Control Methodology

8.2.1 The Power Distribution Control (PDC) methodology for controlling the core axial power distribution tries to avoid the "building-in" of adverse axial power distributions during plant operations by maintaining a relatively constant power shape based on the equilibrium conditions encountered throughout a given core cycle. Maintaining a relatively constant axial power shape ensures that the  $F_Q^V(Z)$  peaking factor limit will not be exceeded. Since the "building-in" of adverse power shapes is a function of power level, the restrictions on deviation from the Target Value also vary with power level.

8.2.2 The Operator can use the RTGB AFD meters or the ERFIS AFD point IDs to monitor the status of AFD. Spurious alarms and any other applicable comments relating to AFD monitoring should be entered in the Control Operator's narrative log, when necessary.



- 8.2.3 The AFD is considered to be outside of the Target Bands or Operating Bands when the AFD for two operable Power Range channels exceed their Target Bands or Operating Bands.
- 8.2.4 At power levels  $\geq 90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less), the AFD must be maintained within the Target Bands. If the AFD is outside of the Target Bands then the AFD must be returned to within the Target Bands within 15 minutes or power must be reduced below  $90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less) within 30 minutes (Technical Specification (ITS) LCO 3.2.3 Conditions A and B). Penalty Points are accumulated while the AFD is outside the Target Bands.
- 8.2.5 At power levels  $< 90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less) but  $\geq 50\%$  RTP, the AFD may deviate from the Target Bands as long as the total number of Penalty Points incurred over the previous 24 hours does not exceed 60 Penalty Points. The AFD must be maintained within the Operating Bands. If the number of accumulated Penalty Points exceeds 60 or if the AFD is outside of the Operating Bands then power must be reduced below  $50\%$  RTP within 30 minutes (Technical Specification (ITS) LCO 3.2.3 Condition C). If power is not reduced below  $50\%$  RTP within 30 minutes then power must be reduced below  $15\%$  RTP within 9 hours (ITS LCO 3.2.3 Condition D)
- 8.2.6 At power levels  $< 50\%$  RTP, the AFD may deviate from the Target Bands since adverse power shapes at lower power levels are sufficiently accounted for by the  $F(\Delta I)$  input to the Overtemperature  $\Delta T$  ( $\text{OT}\Delta T$ ) and Overpower  $\Delta T$  ( $\text{OP}\Delta T$ ) Reactor Protection setpoints. A power increase to  $\geq 50\%$  RTP is permitted only if the accumulation of Penalty Points within the previous 24 hour period does not exceed 60 points.
- 8.2.7 At power levels  $< 15\%$  RTP, AFD monitoring is not required by the Technical Specifications (ITS LCO 3.2.3). The ERFIS CAOC program does not perform any AFD calculations below  $15\%$  power in order to prevent extraneous alarms during periods when the instrumentation noise levels are significant and power operations is minimal.

- 8.2.8 Certain evolutions such as Incore/Excore calibrations require the AFD to be outside of the Target Bands. Deviation from the Target Bands for a limited amount of time is permitted by the Technical Specifications provided the AFD is maintained within the Operating Bands (Technical Specifications (ITS) LCO 3.2.3).

### 8.3 ERFIS Monitoring of AFD

#### 8.3.1 Normal Operation

During normal operation above 15% power, the ERFIS CAOC software program calculates the following values for each of the four NIS Power Range channels once per minute:

1. AFD;
2. Target Value for the current power level;
3. Upper and Lower Target Bands for the current power level;
4. Upper and Lower Operating Bands for the current power level;
5. Upper and Lower Target Warning Bands for the current power level; and,
6. Upper and Lower Operating Warning Bands for the current power level.

The CAOC software program compares the calculated AFD for each Power Range channel to that channel's Target Warning Bands, Target Bands, Operating Warning Bands and Operating Bands. If a Power Range channel crosses one or more of the bands, the ERFIS CAOC program informs the Operator of the condition by providing a message on the ERFIS alarm screen and a report on the Control Room printer and if necessary by actuating the appropriate annunciators on the RTGB (APP-005-D6,  $\Delta$  FLUX WARNING/STATUS and APP-005-E4,  $\Delta$  FLUX ALARM). The ERFIS CAOC reports that are printed on the Control Room printer are retained as part of the operating logs.

### 8.3.1 (Continued)

The ERFIS CAOC software program automatically accumulates Penalty Points at the appropriate rate based on power level if two or more operable Power Range channels are outside of their Target Bands. The program also automatically subtracts penalty points at the appropriate rate if the AFD is within the Target Band and the required time since the points were accumulated (24 hours) has elapsed.

#### 8.3.2 ERFIS CAOC Alarms

If the calculated AFD for any channel is outside of any of the bands for that channel then an alarm is generated via annunciators APP-005-D6 and/or APP-005-E4. The specific cause of the alarm (i.e. the identification of the channel and the band that has been exceeded) is displayed on the ERFIS alarm screen and a report is printed on the Control Room printer. Examples of the types of warning/status/alarms messages are shown in ATTACHMENT 10.3.

#### 8.3.3 ERFIS CAOC Shift Summary Report

A Shift Summary Report is printed on the Control Room printer at 0730, 1530, and 2330 hours. The Shift Summary Report is intended to provide information on the change in AFD with time to allow the Operator or Reactor Engineer to easily detect axial oscillations or instrument calibration problems.

The Shift Summary Report lists the AFD for each of the four channels at the time of the report as well as the Minimum AFD and Maximum AFD each of the channels reached during the eight hour period preceding the report. The report also lists the values for the Target Bands, Target Warning Bands, Operating Bands and Operating Warning Bands for each channel at the time of the report. The report has blanks for the Operator to record the AFD indication from the RTGB meters in order to verify that the RTGB indicated AFD is within 2% of the ERFIS calculated AFD. A deviation between the RTGB indicated AFD and the ERFIS calculated AFD of greater than 2% is not expected and would warrant further investigation to determine if an ERFIS or NIS problem exists. The Shift Summary Report is retained as part of the normal operating logs.

#### 8.3.4 Removing a Channel From Service in CAOC

A NIS Power Range channel may be removed from service in the ERFIS CAOC program by removing that channel's instantaneous % power point from scan. This will generate an APP-005-D6,  $\Delta$  FLUX WARNING, alarm with the following description displayed on the CAOC alarm report:

CHANNEL #\_\_ NOW OUT OF SERVICE.

A Power Range channel may be returned to service in the ERFIS CAOC program by restoring that channel's instantaneous % power point to scan. This will generate an APP-005-D6, FLUX STATUS, alarm with the following description displayed on the CAOC alarm report:

CHANNEL #\_\_ JUST RETURNED TO SERVICE.

The ERFIS point IDs used in removing channels from service and restoring channels to service are as follows:

NIS CHANNEL	CAOC CHANNEL	ERFIS POINT ID
N41	#1	NIN0041A
N42	#2	NIN0042A
N43	#3	NIN0043A
N44	#4	NIN0044A

- 8.3.5 Demand AFD Report Disabling Alarms and Penalty Logging  
During certain activities such as Incore/Excore calibrations or other maintenance or calibration activities involving the Power Range channels, it may be necessary to demand an AFD printout, disable the alarm function and/or Penalty Point logging function of the ERFIS CAOC computer program to provide immediate information or to prevent extraneous alarms and/or inadvertent accumulation of Penalty Points.

To initiate any of these ERFIS functions select TOC AFD4. The current state of these functions is reflected in the "Current State" column in the lower part of the display. Select the button appropriate for the desired function to toggle the desired state in the "New State" column. The "New State" indication will update in the lower part of the screen to reflect the selected condition. Toggle the buttons as appropriate to enable or disable logging and alarming or to demand an AFD printout. Once the desired states have been input, select the "Update". Button to execute the new states. The AFD demand print will only print once and the CAOC program will set the "Current State" to Off automatically. The Alarm and logging states will remain until new states are input and Update Button is selected. Disabling of the Alarm or Penalty Point Logging functions is treated as removing the AFD monitoring program from service and manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2. An alternative to disabling the Alarm and Penalty Point Logging functions during Incore/Excore calibrations and other maintenance activities is to allow the Penalty Points to be accumulated and remove any invalid points after completion of the calibration as described in 8.3.7.

- 8.3.6 ERFIS Out Of Service  
If the ERFIS computer, the CAOC software program or the RTGB annunciators which provide AFD monitoring (APP-005-D6 or APP-005-E4) are inoperable then manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2. Manual monitoring is described in Section 8.4.

### 8.3.7 ERFIS Computer Restart

Whenever the ERFIS computer is restarted, the Operator should verify that the Penalty Point "file" is accurate and should manually update the file if necessary. Several options are available to perform this verification/updating.

1. If no Penalty Points had been accumulated prior to ERFIS being out of service and no Penalty Points were accumulated while ERFIS was out of service, then check that ERFIS Point ID NPU0941 reflects 0 Penalty Points or, if desired, perform the following to view the contents of the Penalty Time Buffer:
  - a. Type in the turn on code "CAOCEDIT" or select the TOC from the ERFIS NSSS menu.
  - b. Enter the desired beginning time to start browsing at the selected time in the Penalty Point Buffer.;
  - c. Use the "-Time", "+Time", "-1 hour", "+1 hour" buttons to sequence forward and backward through the Penalty Point Buffer;
  - d. Select "Exit" when finished.
2. If invalid Penalty Point data is present in the Penalty Point buffer and no valid Penalty Points have been accumulated in the previous 24 hours then the entire 24 hour Penalty Point buffer may be initialized to "No Penalty" by performing the following:
  - a. Type in the turn on code "AFD1"; or select the TOC from the ERFIS NSSS menu.
  - b. Click on the initialization box and then select the "initialize" button to begin clearing the penalty point buffer.
  - c. When the confirmation message is displayed select "yes" to continue or "no". If "yes" is selected, a confirmation message that the penalty point buffer has been cleared will be displayed and the program will automatically exit. If "no" then select "Exit" to close the window.

### 8.3.7 (Continued)

3. If valid Penalty Points had been accumulated prior to ERFIS being out of service but no Penalty Points were accumulated while ERFIS was out of service and ERFIS was out of service for less than 24 hours then perform the following to retain the earlier valid Penalty Point data and insert "No Penalty" into the buffer for the period of time that ERFIS was out of service:
  - a. Type in the turn on code "AFD2"; or select the TOC from the ERFIS NSSS menu
  - b. Enter the time that ERFIS went out of service as the "Restart Begin Time"
  - c. Enter "0" in the "Restart penalty rate" and then select the "Restart" button.
  - d. When the confirmation message is displayed select "yes" to continue or "no". If "yes" is selected, a confirmation message that the Penalty point Buffer" has been restarted will be displayed and the program will automatically exit. If "no" then select "Exit" to close the window.
4. If valid Penalty Points were accumulated while ERFIS was out of service then perform the following to manually update any or all of the 24 hour Penalty Time buffer:
  - a. Type in the turn on code "CAOCEDIT"; or select the TOC from the ERFIS NSSS menu.
  - b. Using data from ATTACHMENT 10.5, enter the time at which the penalty update block is to begin;
  - c. Using data from ATTACHMENT 10.5, enter the time the penalty update block is to end;

#### 8.3.7.4 (Continued)

- d. Using data from ATTACHMENT 10.5, enter the appropriate penalty rate for the update block from the following choices:

PENALTY VALUE	PENALTY RATE	POWER
0	No Penalty	Any
1	½ Penalty Point per minute	<50%
2	1 Penalty Point per minute	>50%

- e. If desired, the penalty buffer can be updated on a minute by minute basis with the "CAOCEDIT" TOC, ELSE go to step f.
- 1) Type in the turn on code "CAOCEDIT" or select the TOC from the ERFIS NSSS menu.
  - 2) Enter the desired beginning time to start browsing at the selected time in the penalty point buffer;
  - 3) Use the "-Time", "+Time", "- hour" "+ hour" buttons to sequence forward and backward through the penalty point buffer.
  - 4) Enter the desired penalty rate for the desired hour/minute as needed using data from Attachment 10.5 and the above penalty point value table used in step d.
- f. When finished with a block or individual hour/minute update, validate the updated penalty time entries by browsing through the buffer as described in step g above. If the penalty point data is correct, then select the "Update Buffer" button to incorporate the update.
- g. Select the "Exit" button to close the window

#### 8.3.8 ERFIS CAOC Program Constants

Except for the ERFIS Point IDs described above which are provided for the Operator's use, all changes to CAOC program constants should be performed in accordance with SCM-003.



#### 8.4 Manual Monitoring of AFD

8.4.1 If the ERFIS computer, the CAOC software program or the RTGB annunciators which provide AFD monitoring (APP-005-D6 or APP-005-E4) are inoperable then manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2.

8.4.2 If the Thermal Power is  $\geq 90\%$  RTP or  $0.9 \times \text{APL}$ , whichever is less, then the AFD indicated on the RTGB meters must be verified to be within limits and must be logged on ATTACHMENT 10.5 within 15 minutes of the alarms becoming inoperable and every 15 minutes thereafter.

8.4.3 If the Thermal Power is  $< 90\%$  RTP or  $0.9 \times \text{APL}$ , whichever is less, then the AFD indicated on the RTGB meters must be verified to be within limits and must be logged on ATTACHMENT 10.5 within 1 hour of the alarms becoming inoperable and every 1 hour thereafter.

8.4.4 If two or more operable excore channels indicate that AFD is outside of the Target Band then the applicable Actions of Technical Specifications (ITS) LCO 3.2.3 must be completed and the resultant Penalty Points must be logged on ATTACHMENT 10.5 in accordance with the following rates:

POWER LEVEL	PENALTY POINT RATE
$\geq 50\%$ RTP	1 Point/minute
$< 50\%$ RTP	1/2 Point/minute

8.4.5 If the total number of Penalty Points exceeds 60 in a 24 hour period, then the applicable Actions of Technical Specifications (ITS) LCO 3.2.3 must be completed.

- 8.4.6 Penalty point are eliminated 24 hours after accumulation by operation within the Target Bands at the same rate at which they were accumulated. Elimination of penalty points is denoted by a negative (-) value on ATTACHMENT 10.5.

## 8.5 Divergent Axial Oscillation Control

**NOTE:** UFSAR Sections 1.5.3, 3.1.2.7 and 7.7.1.6 state that procedures are available for the Operator to control axial oscillations. This section provides those procedures.

- 8.5.1 Axial oscillations can be induced by changes in power level, control rod movement, or a combination of both. A sudden change in either will cause some change in flux shape with a resulting redistribution of xenon concentrations in the core. This will invariably start a xenon oscillation in the axial direction.
- 8.5.2 Axial oscillations are easily started by control rod motion. The flux shape is very dependent on control rod position due to the high neutron absorption of the control rods. Improper use of the control rods at any time can create very serious oscillations. On the other hand, control rods are the best method for manually controlling a xenon oscillation; therefore, use extreme care when making extensive control rod movement. The control bank should be moved slowly and action taken prior to reaching any limit. Attempt to maintain the control rods retracted as far as is practical during steady-state and power ramp conditions to minimize the "pinching" effect of the control bank.
- 8.5.3 Depending on the core conditions and Operator actions, an axial oscillation can be dampened out or amplified until it becomes divergent. The most serious axial oscillation is the divergent oscillation. Its amplitude increases with each cycle if left to oscillate naturally and can be increased in size by control rod motion if not carefully applied.

- 8.5.4 The most important factor in control of a divergent oscillation is the timing of the oscillation. The core oscillates axially with a period of 26 hours; that is, it takes 26 hours for the same point on the sinusoidal wave to reoccur (see ATTACHMENT 10.4). The wave may be halved and quartered down to 6.5 hour intervals where the oscillation goes from maximum AFD to Target Value, Target Value to minimum AFD, etc. Once the timing of the oscillation has been determined, the following control procedure may be used to stop or reduce the oscillation to a minimum:

**NOTE:** ATTACHMENT 10.4 provides an illustration of the control procedure.

If the oscillation has just begun, an accurate timing determination may be difficult. If the Target Value is known accurately, the control rods should be inserted 5 hours after crossing the Target Value in the positive direction since the equilibrium AFD to peak AFD time is 6.5 hours.

If sufficient rod worth is present, the procedure may be performed in reverse by withdrawing control rods 1.5 hours before the minimum AFD.

The control rod insertion is best done slightly early rather than late since if the insertion is done late an amplification might result which is undesirable.

If after returning the control rods to the initial position the oscillation continues upward, then the control rods were returned to normal too soon. If a downward swing starts, then the control rods were left in too long.

A way of approximating the proper insertion time is to consider it 11.5 hours after the last minimum AFD.

Do not allow the power level to change during the control rod maneuvers since this may induce additional unwanted oscillations which will eventually have to be dampened.

If the core is divergent, the least disturbance may become significant after 1 or 2 periods of oscillation. Therefore, if the control procedure does not work effectively, additional control measures should be taken as soon as practical.

The procedure for control of divergent oscillations can also be effectively applied to very large convergent oscillations where there is a possibility of exceeding control rod insertion limits if normal methods were used.

#### 8.5.4 (Continued)

1. At 1.5 hours before the most positive peak, determine the AFD from ERFIS or the AFD meters and insert the control rods using dilution until the AFD reaches the Target Value;
2. Determine the change in AFD caused by the control rod insertion (AFD before insertion - Target Value);
3. Maintain a constant control rod position and allow AFD to decrease;
4. When AFD is lower than the Target Value by the amount determined in Step 8.5.4.2, withdraw control rods to their original position using boration.

### 9.0 RECORDS

ATTACHMENT 10.5 must be sent to the vault as a QA record

### 10.0 ATTACHMENTS

10.1 ERFIS CAOC Software And AFD Related Parameters

10.2 Target and Operating Band Examples

10.3 ERFIS CAOC Warning/Status/Alarm Messages

10.4 Divergent Axial Oscillation

10.5 Manual AFD Monitoring Log

**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS****EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
AXIAL FLUX DIFFERENCE (AFD)**

$$AFD = \frac{V(top) - V(bottom)}{V(top) + V(bottom)} * K * P$$

where: V(top) = Voltage representing the core power as seen by a NIS Power Range channel top detector;  
V(bottom)= Voltage representing the core power as seen by a NIS Power Range channel bottom detector;  
K = Incore/Excore calibration constant determined in accordance with EST-003.  
P = Power Level (%) at the time of the calculation.

Parameter	N41	N42	N43	N44
AFD	NPU0900	NPU0901	NPU0902	NPU0903
V(top)	NIN0051M	NIN0053M	NIN0055M	NIN0057M
V(bottom)	NIN0052M	NIN0054M	NIN0056M	NIN0058M
K	NPK1612	NPK1613	NPK1614	NPK1615
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M

**EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET VALUES**

$$\text{Target Value (P)} = \text{Target Value}_{ref} * P/P_{ref}$$

where: Target Value (P) = Target Value at power P;  
Target Value<sub>ref</sub> = Target Value during flux map;  
P = Current power level; and,  
P<sub>ref</sub> = Power level during flux map.

Parameter	N41	N42	N43	N44
Target Value (P)	N/A	N/A	N/A	N/A
Target Value <sub>ref</sub>	NPK1603	NPK1604	NPK1605	NPK1606
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
P <sub>ref</sub>	NPK1608	NPK1609	NPK1610	NPK1611

# ATTACHMENT 10.1

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## ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS

### EQUATIONS AND ERFIS POINTS USED TO CALCULATE TARGET BAND VALUES

APL  $\geq$  90% RTP      TB Low Limit = TV - TB Value  
                                  TB High Limit = TV + TB Value

APL < 90% RTP      TB Low Limit = TV - [TB Value \* (APL/100)]  
                                  TB High Limit = TV + [TB Value \* (APL/100)]  
 where: TV(P) =Target Value  
          TB Value = Selected Target Band value ( $\pm$ 3% or $\pm$ 5%)  
          APL = Allowable Power Level

Parameter	N41	N42	N43	N44
Target Band Low Limit	NPU0905	NPU0906	NPU0907	NPU0908
Target Band High Limit	NPU0909	NPU0910	NPU0911	NPU0912
Target Band Value	NPK1620	NPK1620	NPK1620	NPK1620
APL	NPK0320	NPK0320	NPK0320	NPK0320

### EQUATIONS AND ERFIS POINTS USED TO CALCULATE TARGET WARNING BAND VALUES

TWB Low Limit = TB Low Limit + TWB Value  
 TWB High Limit = TB High Limit - TWB Value

where:      TWB = Target Warning Band; and,  
          TB = Target Band.

Parameter	N41	N42	N43	N44
TWB Low Limit	NPU0913	NPU0914	NPU0915	NPU0916
TWB High Limit	NPU0917	NPU0918	NPU0919	NPU0920
TB Low Limit	NPU0905	NPU0906	NPU0907	NPU0908
TB High Limit	NPU0909	NPU0910	NPU0911	NPU0912
TWB Value	NPK1622	NPK1622	NPK1622	NPK1622

ATTACHMENT 10.1  
Page 3 of 4  
**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS**

EQUATIONS AND ERFIS POINTS USED TO CALCULATE OPERATING BAND VALUES				
5% OB, APL $\geq$ 90% RTP:      Upper OB = TV + 0.5 * [110 - (P/PL * 100)] Lower OB = TV - 0.4 * [110 - (P/PL * 100)]  5% OB, APL<90% RTP:      Upper OB=TV+ {0.5 * [110 -(P/PL*100)]*(APL/100)} Lower OB= TV - {0.4 * [110 - (P/PL*100)]*(APL/100)}  3% OB, APL $\geq$ 90% RTP:      Upper OB = TV + 0.5 * [106 - (P/PL * 100)] Lower OB = TV - 0.4 * [105 - (P/PL * 100)]  3% OB, APL<90% RTP:      Upper OB=TV + {0.5*[106-(P/PL*100)]*(APL/100)} Lower OB= TV - {0.4 * [105 -(P/PL*100)]*(APL/100)}  where:      OB = Operating Band; TV =Target Value; P = Average NIS Power Range power expressed as % RTP; PL = The lesser of 100% RTP or APL; and, APL = Allowable Power Level				
Parameter	N41	N42	N43	N44
Operating Band Low Limit	NPU0921	NPU0922	NPU0923	NPU0924
Operating Band High Limit	NPU0925	NPU0926	NPU0927	NPU0928
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
APL	NPK0320	NPK0320	NPK0320	NPK0320

EQUATIONS AND ERFIS POINTS USED TO CALCULATE OPERATING WARNING BAND VALUES				
OWB Low Limit = OB Low Limit + OW Envelope Value OWB High Limit = OB High Limit - OW Envelope Value  where:      OWB = Operating Warning Band; and, OB = Operating Band.				
Parameter	N41	N42	N43	N44
OWB Low Limit	NPU0929	NPU0930	NPU0931	NPU0932
OWB High Limit	NPU0933	NPU0934	NPU0935	NPU0936
OB Low Limit	NPU0921	NPU0922	NPU0923	NPU0924
OB High Limit	NPU0925	NPU0926	NPU0927	NPU0928
OW Envelope Value	NPK1616	NPK1616	NPK1616	NPK1616

ATTACHMENT 10.1

Page 4 of 4

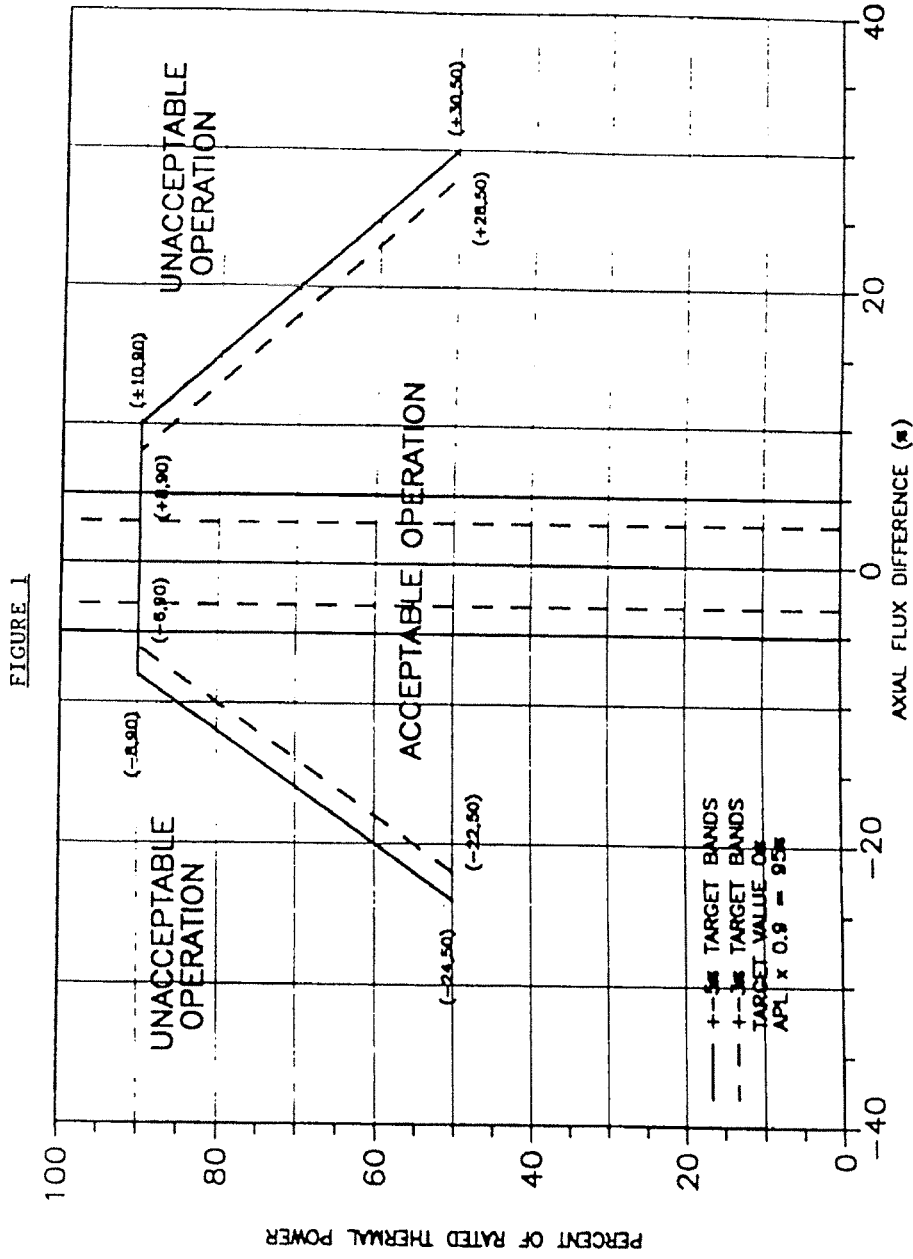
**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS**

	N41	N42	N43	N44
Minimum AFD over Previous 8 hours	NPU0950	NPU0951	NPU0952	NPU0953
Maximum AFD over Previous 8 hours	NPU0954	NPU0955	NPU0956	NPU0957

Accumlated 24 Hour Penalty Points	NPU0904
Penalty Points at Last Execution of Program	NPU0941
Power Level at Last Execution of Program	NPU0939

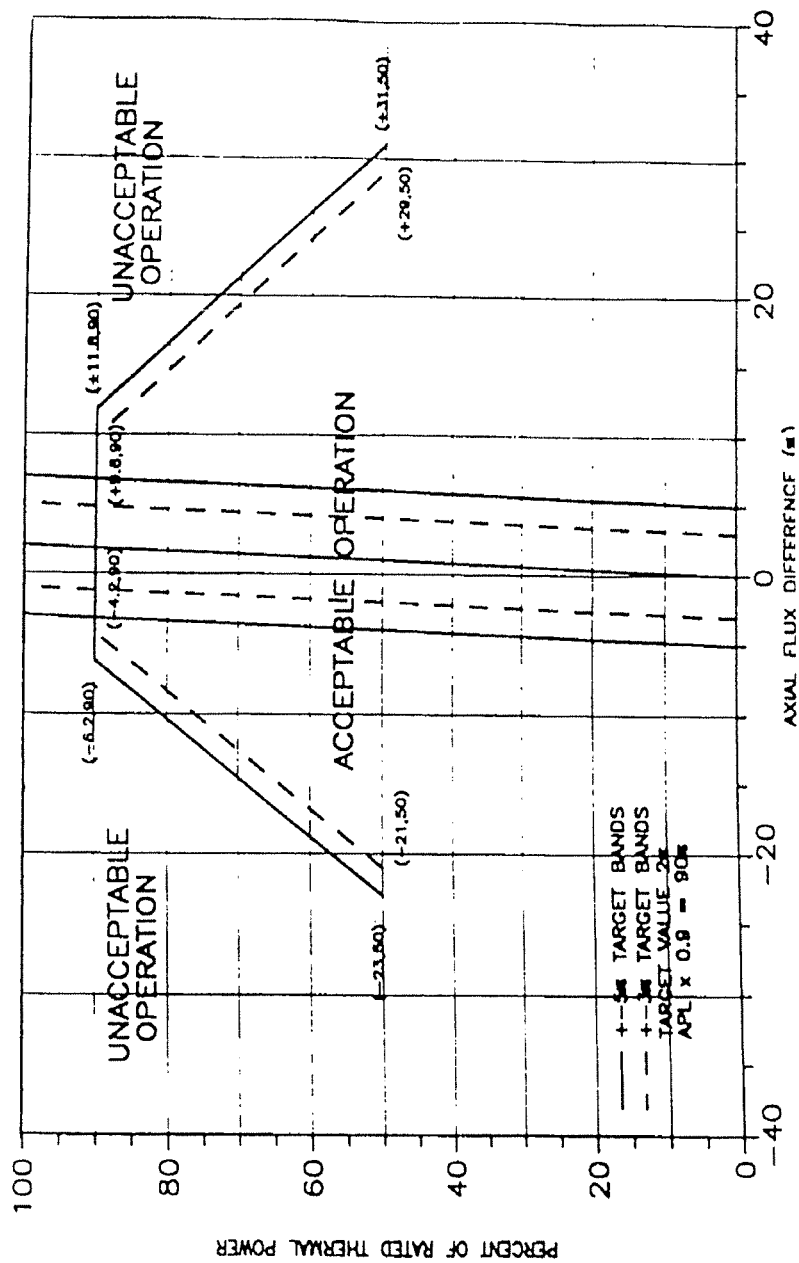


ATTACHMENT 10.2  
Page 1 of 5  
TARGET AND OPERATING BAND EXAMPLES



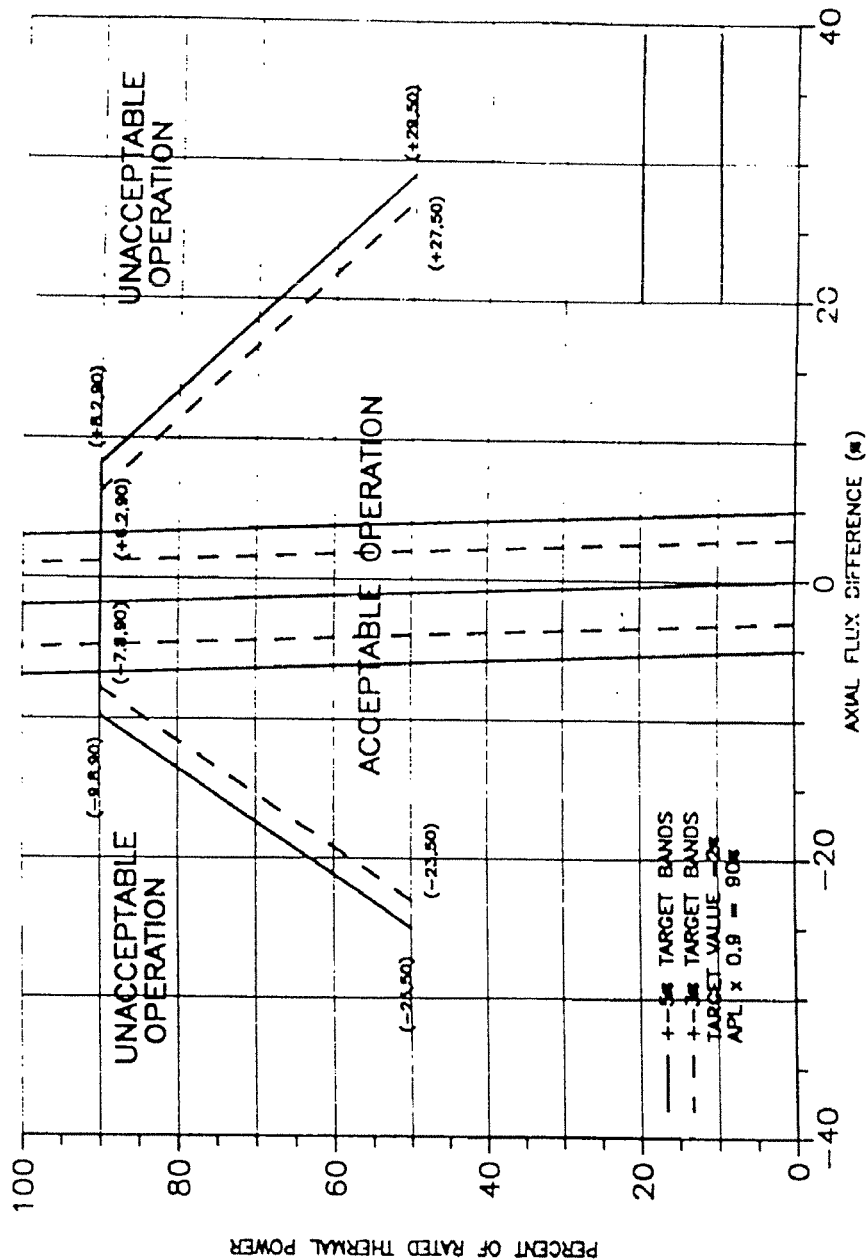
## TARGET AND OPERATING BAND EXAMPLES

FIGURE 2

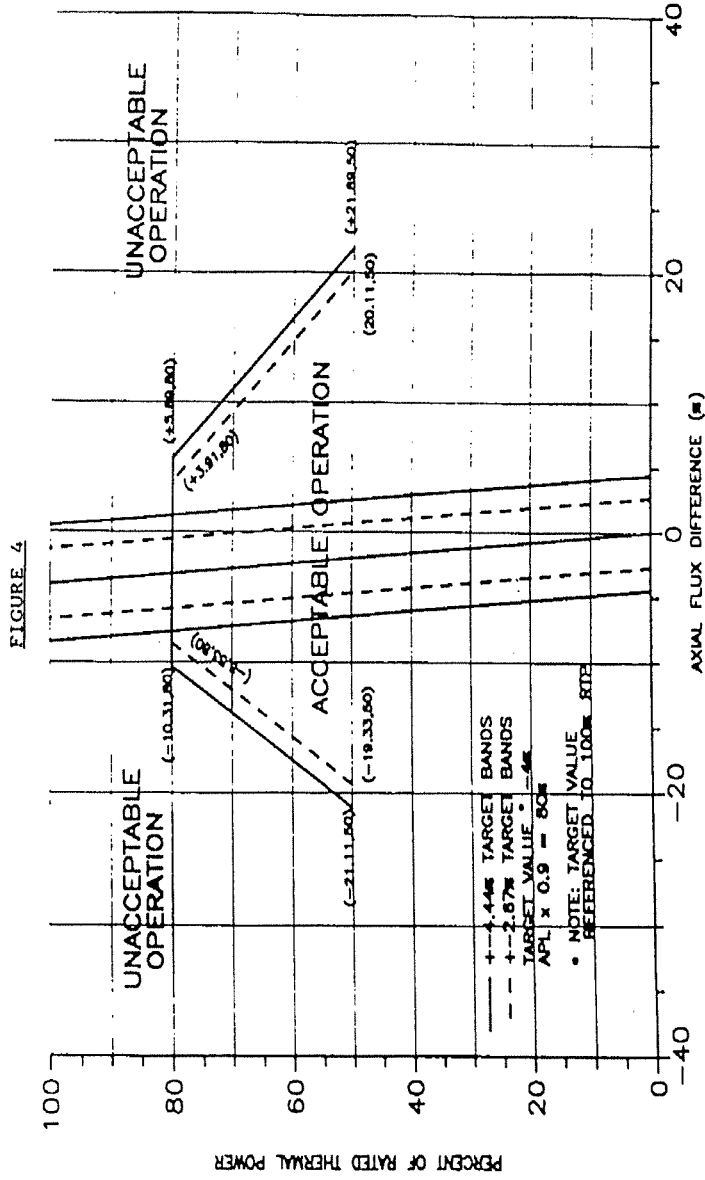


ATTACHMENT 10.2  
Page 3 of 5  
TARGET AND OPERATING BAND EXAMPLES

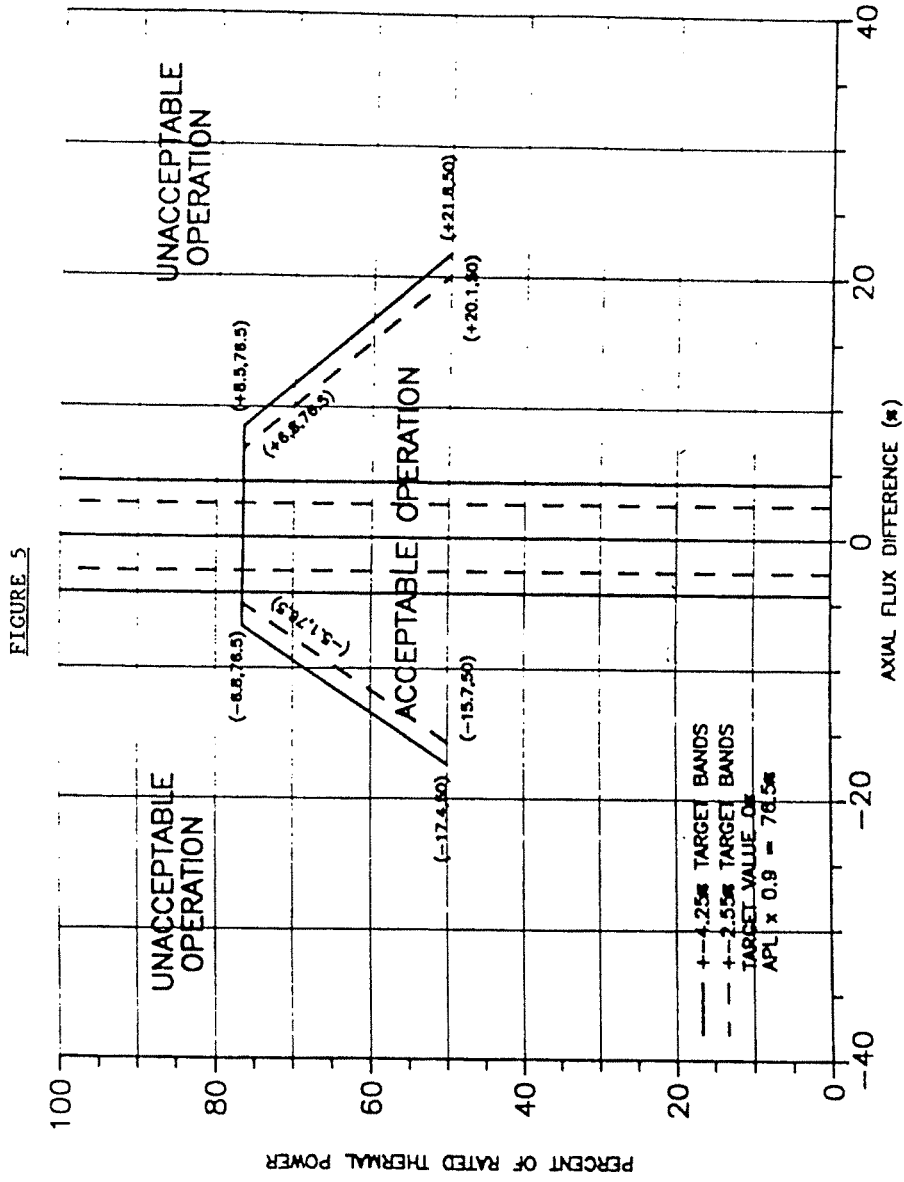
FIGURE 3



ATTACHMENT 10.2  
Page 4 of 5  
TARGET AND OPERATING BAND EXAMPLES



ATTACHMENT 10.2  
Page 5 of 5  
TARGET AND OPERATING BAND EXAMPLES



## ATTACHMENT 10.3

Page 1 of 1

### ERFIS CAOC WARNING/STATUS/ALARM MESSAGES

STATUS Messages - Denote a condition or message regarding a condition of interest to the Operator.

These may include:

- POWER LEVEL CROSSED 15% - INCREASING - PENALTY ENABLED
- POWER LEVEL CROSSED 15% - DECREASING - PENALTY DISABLED
- POWER LEVEL CROSSED 50% - INCREASING - PENALTY RATE IS FULL
- POWER LEVEL CROSSED 50% - DECREASING - PENALTY RATE IS HALF -OPER BANDS DISABLED
- POWER LEVEL CROSSED 90%APL - INCREASING - OPER BANDS EQUAL TARGET BANDS
- POWER LEVEL CROSSED 90%APL - DECREASING - OPER BANDS RESTORED TO NORMAL
- CHANNEL #\_\_\_ NOW OUT OF SERVICE
- CHANNEL #\_\_\_ JUST RETURNED TO SERVICE
- CHANNEL #\_\_\_ JUST CROSSED THE TARGET WARNING BAND. (decreasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPER WARNING BAND. (decreasing)
- PENALTY POINT ACCUMULATION HAS BEGUN.
- PENALTY POINT ACCUMULATION HAS ENDED.

WARNING Messages - Denote a condition or message regarding a condition of impending Technical Specification violation. These may include:

- CHANNEL #\_\_\_ JUST CROSSED THE TARGET WARNING BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE TARGET BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPER WARNING BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPERATING BAND. (increasing)
- ALARM WHEN PENALTY LEVEL CROSSES 15 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 30 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 45 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 50 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 55 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 60 EITHER DIRECTION.

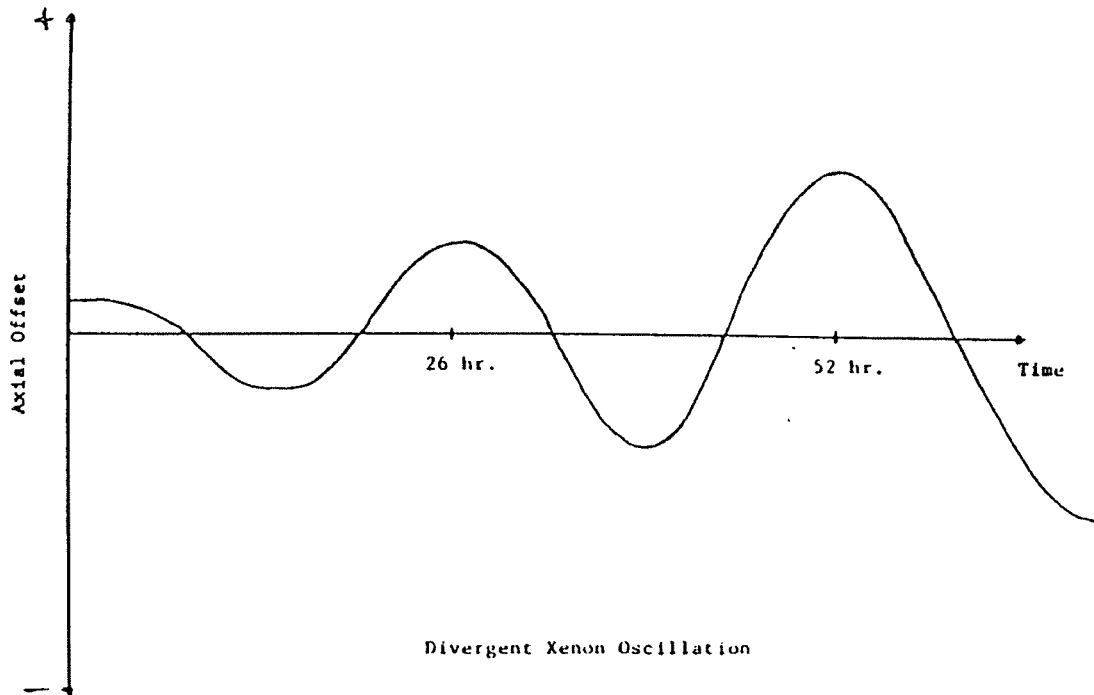
ALARM Messages - Denote a condition which violates PDC limits as set forth in plant Technical Specifications, namely:

- ALARM DUE TO 2 OR MORE CHANNELS OUTSIDE OF THE TARGET BAND WITH POWER ABOVE 90%FP OR 90%APL.
- ALARM DUE TO 2 OR MORE CHANNELS OUTSIDE OF THE OPERATING BAND WITH CORE POWER BETWEEN 50%FP AND 90%FP.
- ALARM DUE TO GREATER THAN 60 PENALTY POINTS AND CORE POWER ABOVE 50%FP.

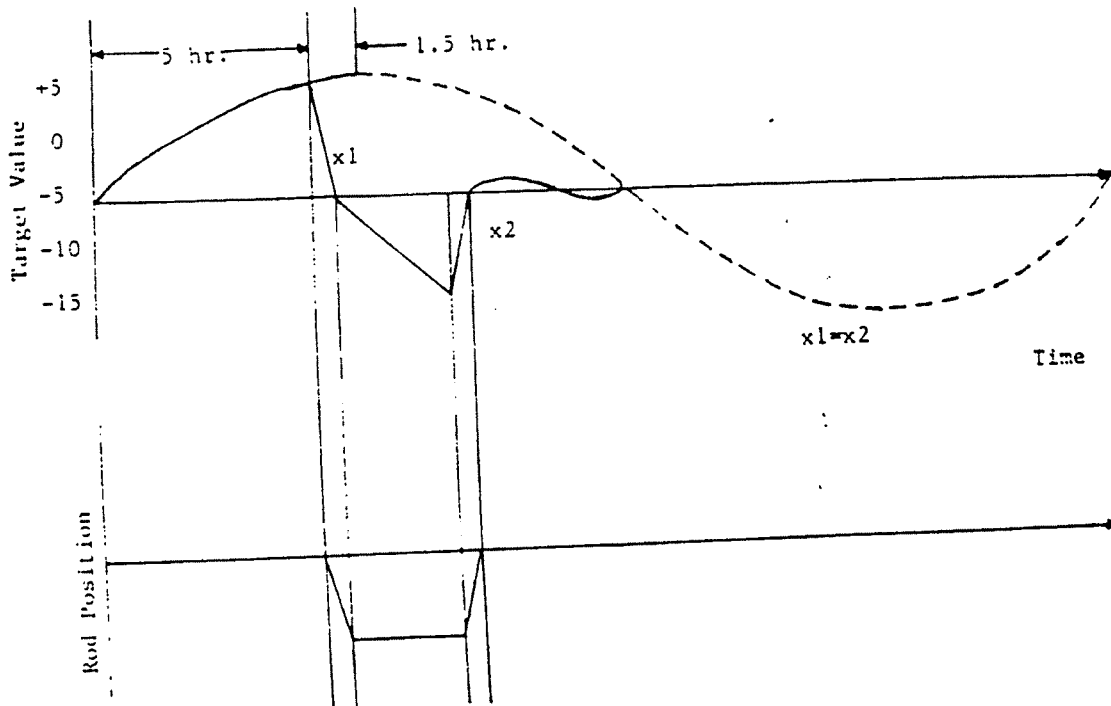
The following special symbols are printed immediately after the AFD value for a channel, if applicable:

- \*\*\*\* The AFD value for the channel has just crossed a band.
- \* The AFD value for the channel has not crossed a band, but is still outside of at least one.
- ?? The channel is inoperable.

ATTACHMENT 10.4  
Page 1 of 2  
**DIVERGENT AXIAL OSCILLATION**



ATTACHMENT 10.4  
Page 2 of 2  
**DIVERGENT AXIAL OSCILLATION**



**NOTE:** To apply numbers to the above control maneuver, assume that the Target Value is -5%, the reactor power is 75% RTP and the APL is >100% RTP. The first peak is at +5 (the dotted line representing a natural divergent oscillation). At the point the control rods are inserted, the AFD is +4%, therefore,  $X1 = 9\%$  [ $+4\% - (-5\%)$ ]. Stop inserting control rods at -5% and allow the AFD to go to -14% [ $-5\% - (-9\%)$ ] with no control rod motion. When the AFD reaches -14%, pull the control rods back to their original position.



## Page 1 of 1

This revision is the latest revision available and has been verified against the Document Management System.

\_\_\_\_\_  
Name (Print) Signature Date

[illegible]

SSO Review \_\_\_\_\_ Date: \_\_\_\_\_

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM SRO A1-2  
Rev 0**

**Review a set of Hot Ops Logs**

**Concurred By:** Patrick Lathrop **Date:** 5/15/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:** 02110114401, Interpret and Ensure Compliance with Plant Administrative Procedures during Normal and Off Normal Plant Operations IAW OPS-NGGC-1000

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM SRO A1-1

**Candidate**

SRO

**K/A**                      **Rating (RO/SRO):**

G 2.1.25                      4.2

G2.1.18                      3.8

**Task Standard:**

Correctly reviews Hot Ops Log, identifying all deficiencies. Initiates required actions IAW Tech. Specs, TRM, etc.

**Preferred Evaluation Location:**

Simulator \_\_\_\_\_ Classroom   X  

**Preferred Evaluation Method:**

Perform   X   Simulate \_\_\_\_\_

**References:**

Hot Operations Log  
ITS Books  
OPS-NGGC-1000, Fleet Conduct of Operations

**Validation Time:** 20 Minutes **Time Critical:** NO **Time Critical Time:** N/A

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN

- -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**    SAT    UNSAT  
circle one

**Performance  
Time (min):** \_\_\_\_\_

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

Hot Ops Logs

ITS / TRM Books

Station Curve Book

OPS-NGGC-1000, Fleet Conduct of Operations

OST-051, Reactor Coolant System Leakage Evaluation (as requested)

OP-202, Safety Injection and CV Spray System (as requested)

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. You are on-shift as the CRS.

**INITIATING CUES:**

The RO has just completed his 1600 Hot Ops Log readings. The SM has directed you to review the logs in accordance with OMM-01-011, Logkeeping, and OPS-NGGC-1000, Fleet Conduct of Operations.

START TIME: \_\_\_\_\_

**EXAMINER'S NOTE: ONLY GIVE THE CANDIDATE CUE SHEET #1. CUE SHEET #2 WILL BE DISTRIBUTED AS NEEDED.**

**STEP 1:** Candidate obtains copy of Hot Ops Log.

**STANDARD:** Obtains Log

**EXAMINER'S NOTE:** Evaluator will provide a completed Hot Ops Log to the candidate.

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 2:** Reviews readings as applicable on log.

**STANDARD:** Correctly determines parameter to required specification.

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

**Evaluator Note: The following Critical Steps may be performed in any order.**

**STEP 3:**

Identifies readings on Accumulator “B” level indicators LI-924 / 926 that are greater than or equal to 74%.

**STANDARD:**

Informs evaluator of readings OR annotates with a note that the readings are greater than or equal to 74% due to Note (1) which states the following “If accumulator volume increases to 74% AND IS NOT the result of addition from the RWST, then refer to ITS SR 3.5.1.4.” The candidate places a note identifying the deficiency in the “Comment” section of log or notifies evaluator that he would require the RO to make a note.

The candidate will refer to ITS SR 3.5.1.4. Further evaluation will be required to determine if  $\geq 70$  gallons increase has occurred that is not the result of addition from the refueling water storage tank. **(Provide Candidate with Cue Sheet #2)** Candidate determines that Accumulator Boron sample will be required to verify concentration is between 1950 and 2400 ppm. Contacts E&RC to perform a sample of “B” SI Accumulator.

**EXAMINER’S NOTE:** Only provide candidate(s) with Cue sheet #2 if they ask for additional information concerning the “B” SI Accumulator level rise.

Candidate may request a copy of OST-051 and / or OP-202 to determine the conversion of % level change to gallons for the “B” SI accumulator.

**COMMENTS:****Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

<p><b><u>STEP 4:</u></b> Identifies Out of Spec reading on BAST “A” level indicator LI-106.</p> <p><b><u>STANDARD:</u></b> Informs evaluator of OOS reading OR places a circle around OOS readings (or places a number with circle beside the OOS reading). Places a note identifying the deficiency in the “Comments” section of log or notifies the evaluator that he would require the RO to make a note.</p> <p>Refers to TRM 3.6 and Station Curve Book (Curve 8.18). Determines that the actual volume in “A” BAST is greater than the TRM requirement of 3080 gallons. (Actual volume is <math>41(52.36) + 1024 = 3170.8</math> gallons) Candidate may also determine that the combine volume is approximately 7000 to 7100 gallons.</p> <p><b>EXAMINER’S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 5:</u></b> Identifies Out of Spec reading on PWST Level indicator LI-1941.</p> <p><b><u>STANDARD:</u></b> Informs evaluator of OOS reading OR places a circle around OOS readings (or places a number with circle beside the OOS reading). Places a note identifying the deficiency in the “Comments” section of log or notifies the evaluator that he would require the RO to make a note.</p> <p>Candidate reviews Note (2) and determines that the level is less than 45% and reviews Station Curve 8.9 to evaluate TRM 3.6 applicability. Candidate identifies a note on Station Curve 8.9 that states a level of 39.2% is the Minimum Allowable Level to Meet Technical Specification 3.2.2.e. Candidate must realize that this is referencing old CTS that are now a requirement of TRM 3.6. Candidate determines that that at 41% the PWST contains greater than 30,000 gallons of water and thus the TRM 3.6 requirement is met.</p> <p><b>EXAMINER’S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue: When the candidate completes review of a set of Hot Ops Logs and initiates required action.</b></p>	

**TIME STOP:** \_\_\_\_\_



# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

## HOT OPERATIONS LOG

This Revision has been verified to be the latest revision available. (@ V:\Operations\Ops-Logs OR the original in the log notebook in the Control Room)

Date: Today

Name Jeff Jones (Print) Jeff Jones Signature Today Date

00-07 CO Jeff Jones BOP Scott Hovven STA Bob Wilkins SM (2) T.B. Mann  
 07-19 CO John Calman BOP Bill Brown STA Joe Kalle SM (2)  
 19-24 CO Jeff Jones BOP Bill Brown STA Joe Kalle SM (2)

KEY

HOURLY LOG REVIEW			DEMAND HOURS REPORT		ON LINE HOURS	OFF LINE IN DEMAND	OFF LINE NO DEMAND	OIL REPORT (Ending 2400 of Log Date)	
INIT	1300	1400	1500	1600	1700	1800	1900	2000	2100
0100	TC	TC	TC	TC	TC	TC	TC	TC	TC
0200	TC	TC	TC	TC	TC	TC	TC	TC	TC
0300	TC	TC	TC	TC	TC	TC	TC	TC	TC
0400	TC	TC	TC	TC	TC	TC	TC	TC	TC
0500	TC	TC	TC	TC	TC	TC	TC	TC	TC
0600	TC	TC	TC	TC	TC	TC	TC	TC	TC
0700	TC	TC	TC	TC	TC	TC	TC	TC	TC
0800	TC	TC	TC	TC	TC	TC	TC	TC	TC
0900	TC	TC	TC	TC	TC	TC	TC	TC	TC
1000	TC	TC	TC	TC	TC	TC	TC	TC	TC
1100	TC	TC	TC	TC	TC	TC	TC	TC	TC
1200	TC	TC	TC	TC	TC	TC	TC	TC	TC

(1) Record actual gallons in DFOST.  
 (2) Includes verification that ALL hourly logs for this shift are printed and reviewed (CR 98-01984)

Approved for use: D. Foster 05/30/2012 05/31/2012  
 Manager - Operations Date Effective Date

KEY

TIME	REACTOR VESSEL LEAKOFF TEMP.	SAFETY INJECTION ACCUMULATOR LEVELS (1)								CV TEMP	BORIC ACID TANK LEVELS (2)	
		A		B		C					A	B
		LI-920 MIN 64 MAX 78 %	LI-922 MIN 64 MAX 78 %	LI-924 MIN 64 MAX 78 %	LI-926 MIN 64 MAX 78 %	LI-928 MIN 64 MAX 78 %	LI-930 MIN 64 MAX 78 %					
	TI-401								TI-950B	LI-106 MAX 90% MIN 42% %	LI-108 MAX 90% MIN 42% %	
0400	88.0	70	71	73	72	71	71	71	95	42	55	
0800	88.0	70	71	74 <sup>0</sup>	73	71	71	71	95	42	55	
1200	88.0	70	71	74 <sup>0</sup>	73	71	71	71	96	41 <sup>2</sup>	55	
1600	87.5	71	71	75 <sup>0</sup>	74 <sup>0</sup>	71	71	71	96	41 <sup>2</sup>	55	
2000												
2400												

(1) If Accumulator volume increases to 74% AND IS NOT the result of addition from the RWST, then refer to ITS SR 3.5.1.4.

(2) Maintain an administrative MAX of 80%. Sustained level above 80% but less than 90% is permissible, but may result in spurious level alarms.

Comments: ① ADD NOTE Concerning 'B' SI Accum. Level Rise. ITS SR 3.5.1.4  
Requires sample within 6 hrs.

② ADD NOTE Concerning 'A' BIST Level. Determines Adequate Volume  
is Avail. to meet TRM 3.6.

KEY

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

## KEY

TIME	PRIMARY WATER TOTALIZER	BORIC ACID TOTALIZER	HOTWELL LEVEL (1)	PWST LEVEL (2)	GEN. HYDROGEN PRESSURE (3)	GEN. HYDROGEN PURITY	HAGAN ROOM TEMP (4a&b)	BOP CHECK OPS WATCH LIST SPREADSHEET (V:\Shared\Operations\ Ops-logst Ops Watch List.xlsx)
	YIC-114	YIC-113	LI-1417A MAX 56 MIN 49 INCHES	LI-1941 MAX 93 MIN 45 %	MAX 75 MIN 71 PSIG	MIN 90	MAX 78	(5)
0400	GAL 40374	GAL 2735.5	50	47	73	97	69	INIT
0800	40414	2735.5	50	46	73	96	69	99
1200	40430	2735.5	51	41	73	96	68	7C
1600	40430	2735.5	51	41	73	96	69	7C
2000								
2400								

(1) ESR 98-00358 recommends Hotwell level be normally maintained at 49" to 52" to minimize Condensate dissolved oxygen.

(2) 45% MIN will maintain greater than 30K gal available. (Ref. Plant Curve 8.9)

(3) Reference Curve 7.3, MAX. AND MIN. LIMITS IAW APP-018.

(4a) If temperature reaches 78°F, ensure proper operation of HVA-2 AND ACC-2A AND ACC-2B, if HVA-2 AND ACC-2A AND ACC-2B are not available INITIATE operation of HVA-4 AND ACC-4 IAW OP-906.

(4b) If ACC-2A AND ACC-2B AND HVA-4 AND ACC-4 are not available NOTIFY Engineering AND EVALUATE the need for installation of Temporary Hagan Room cooling per SPP-045.

(4c) If temperature reaches 82°F, THEN INITIATE an NCR to address potential operability concern of Hagan Room equipment AND NOTIFY Engineering.

(5) Investigate, report, and resolve abnormal trends.

Comments: ① ADD NOTE CONCERNING PWST LEVEL LOW OUT OF SPEC.

## KEY

KEY

TIME	CONTROL ROOM ERFIS SCREENS: CORRECT DATE AND TIME (1)	CONTROL ROOM INDICATOR REVIEW (2)	LPMS CHECKS (3)	FR-154A		
	INIT	INIT	INIT	PEN 1 MAX 3.2 GPM (4)	PEN 2 MAX 3.2 GPM (4)	PEN 3 MAX 3.2 GPM (4)
0400	QA	QA		1.83	1.85	1.94
0800	TC	TC		2.10	2.13	2.21
1200	TC	TC		1.91	1.93	1.97
1600	TC	TC		1.91	1.92	1.98
2000						
2400						

- (1) Reference ACR's 94-00085 and 94-01148. The ERFIS Clock is updated via the LAN. The LAN clock is updated via the National Institute of Science and Technology (NIST). ALL ERFIS Screens should show the same time. The ERFIS Clock is the official time, by which the Control Room Clock should be set when needed.
- (2) STA Review once per shift, RO OR BOP review at all other times. Check every RTGB indicator for proper indication and adverse trends (ENHN 243140). The STA walkdown includes a switch Position Check referencing the "Shiftly Control Room Switch Position Check" Log.
- (3) Notify STA to monitor LPMS IAW OP-007. (CR 95-01471)
- (4) If leakoff exceeds 3.2 gpm, then refer to OP-101.

Comments:

KEY

KEY

END OF SHIFT CHECKS (1)

TIME	OP-925, COLD WEATHER OPERATION, IN EFFECT				PAPER CHART RECORDERS: MARK TIME, INITIAL AND DATE INIT	NON-ERFIS CRT RECORDERS OPERATIONAL INIT	RO OR BOP PERFORM COMPARISON OF ERFIS PRINTOUTS TO RTGB (2) INIT	KEYS INSERTED IN PCV-455C AND PCV 456 PWR ISOL SWITCHES INIT	ERFIS PRINTOUT QUALITY CODE REVIEW (3) INIT
	< 42°F	< 35°F	< 22°F	< 18°F					
19-07	N/A	N/A	N/A	N/A	gg	gg	gg	gg	gg
07-19	N/A	N/A	N/A	N/A	gg	gg	gg	gg	gg

- (1) Initial for each applicable check when it is completed. Mark as "N/A" those checks not applicable.  
 (2) Reference OMM-001-11.  
 (3) Notify SM/CRS of any UNEXPLAINED "BAD" Quality Codes. SM/CRS will decide whether the "BAD" Quality Code should be reported to IT Plant Section immediately or during normal business hours. Call Ext. 1883 to connect to IT Plant Section on-call pager.

COMMENTS:

KEY

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

## HOT OPERATIONS LOG

This Revision has been verified to be the latest revision available. (@ V:\Operations\Ops-Logs OR the original in the log notebook in the Control Room)

Date: Today

Jeff Jones (Print) Jeff Jones Signature Today Date

00-07 CO Jeff Jones BOP Scott Brown STA Bob Wilkins SM (2) T.B. Mann  
 07-19 CO John Calman BOP Bill Brown STA Joe Kall SM (2)  
 19-24 CO Jeff Jones BOP Bill Brown STA Joe Kall SM (2)

KEY

HOURLY LOG REVIEW			DEMAND HOURS REPORT		ON LINE HOURS	OFF LINE IN DEMAND	OFF LINE NO DEMAND	OIL REPORT (Ending 2400 of Log Date)	
INIT	1300	1400	1500	1600	1700	1800	1900	2000	2100
0100	TC	TC	TC	TC	TC	TC	TC	TC	TC
0200	TC	TC	TC	TC	TC	TC	TC	TC	TC
0300	TC	TC	TC	TC	TC	TC	TC	TC	TC
0400	TC	TC	TC	TC	TC	TC	TC	TC	TC
0500	TC	TC	TC	TC	TC	TC	TC	TC	TC
0600	TC	TC	TC	TC	TC	TC	TC	TC	TC
0700	TC	TC	TC	TC	TC	TC	TC	TC	TC
0800	TC	TC	TC	TC	TC	TC	TC	TC	TC
0900	TC	TC	TC	TC	TC	TC	TC	TC	TC
1000	TC	TC	TC	TC	TC	TC	TC	TC	TC
1100	TC	TC	TC	TC	TC	TC	TC	TC	TC
1200	TC	TC	TC	TC	TC	TC	TC	TC	TC

- (1) Record actual gallons in DFOST.
- (2) Includes verification that ALL hourly logs for this shift are printed and reviewed (CR 98-01984)

Approved for use:

D. Foster

Manager - Operations

05/30/2012

Date

05/31/2012

Effective Date

**CANDIDATE CUE SHEET #2**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CUE:**

**Review of previous shift narrative logs identified that approximately 72 hours ago "B" SI Accumulator had been drained in accordance with OP-202, Safety Injection and CV Spray System, to a level of 65%. No additions from the RWST have been made since the draining evolution.**

**CANDIDATE CUE SHEET #1**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. You are on-shift as the CRS.

**INITIATING CUES:**

The RO has just completed his 1600 Hot Ops Log readings. The SM has directed you to review the logs in accordance with OMM-01-011, Logkeeping, and OPS-NGGC-1000, Fleet Conduct of Operations.



# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

## HOT OPERATIONS LOG

This Revision has been verified to be the latest revision available. (@ V:\Operations\Ops-Logs OR the original in the log notebook in the Control Room)

Date: Today

Jeff Jones (Print) Jeff Jones Signature Today Date

Name

Signature

Date

00-07 CO Jeff Jones BOP Scott Flouren STA Bob White SM (2)  
 07-19 CO Jeff Jones BOP Bill Brown STA Joe Hand SM (2)  
 19-24 CO Jeff Jones BOP Bill Brown STA Joe Hand SM (2)

HOURLY LOG REVIEW			DEMAND HOURS REPORT		ON LINE HOURS	OFF LINE IN DEMAND	OFF LINE NO DEMAND	OIL REPORT (Ending 2400 of Log Date)	
INIT	1300	INIT							
0100	TC	TC	#2 GENERATOR					1-NO. TIMES RX CRITICAL	
0200	TC	TC	#2 REACTOR					2-NO. TIMES RX SHUTDOWN	
0300	TC	TC	A DIESEL ENGINE					3-DFOST LEVEL PREV MIDNIGHT	23320 GAL
0400	TC	TC	A DIESEL GENERATOR					4-OIL BURNED TODAY A&B EDG	GAL
0500	TC	TC	B DIESEL ENGINE					5-BALANCE (3 - 4)	GAL
0600	TC	TC	B DIESEL GENERATOR					6-OIL RECEIVED TODAY DFOT	GAL
0700	TC	TC						7-FINAL 2400 DFOT LEVEL (1)	GAL
0800	TC	TC						8-OIL BURNED TODAY DSDG	GAL
0900	TC	TC						9-OIL RECEIVED TODAY DSDG	GAL
1000	TC	TC							
1100	TC	TC							
1200	TC	TC							

(1) Record actual gallons in DFOT.

(2) Includes verification that ALL hourly logs for this shift are printed and reviewed (CR 98-01984)

Approved for use:

D. Foster

05/30/2012

05/31/2012

Manager - Operations

Date

Effective Date

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

TIME	REACTOR VESSEL LEAKOFF TEMP.  °F	SAFETY INJECTION ACCUMULATOR LEVELS (1)								CV TEMP	BORIC ACID TANK LEVELS (2)	
		A				B		C			A	B
		LI-920 MIN 64 MAX 78 %	LI-922 MIN 64 MAX 78 %	LI-924 MIN 64 MAX 78 %	LI-926 MIN 64 MAX 78 %	LI-928 MIN 64 MAX 78 %	LI-930 MIN 64 MAX 78 %					
0400	88.0	70	71	73	72	71	71	95	42	55		
0800	88.0	70	71	74	73	71	71	95	42	55		
1200	88.0	70	71	74	73	71	71	96	41	55		
1600	87.5	71	71	75	74	71	71	96	41	55		
2000												
2400												

- (1) If Accumulator volume increases to 74% AND IS NOT the result of addition from the RWST, then refer to ITS SR 3.5.1.4.  
 (2) Maintain an administrative MAX of 80%. Sustained level above 80% but less than 90% is permissible, but may result in spurious level alarms.

Comments:

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

TIME	PRIMARY WATER TOTALIZER	BORIC ACID TOTALIZER	HOTWELL LEVEL (1)	PWST LEVEL (2)	GEN. HYDROGEN PRESSURE (3)	GEN. HYDROGEN PURITY	HAGAN ROOM TEMP (4a&b)	BOP CHECK OPS WATCH LIST SPREADSHEET (V:\Shared\Operations\ Ops-logs\ Ops Watch List.xlsx) (5)
	YIC-114	YIC-113	LI-1417A MAX 56 MIN 49 INCHES	LI-1941 MAX 93 MIN 45 %	MAX 75 MIN 71 PSIG	MIN 90	MAX 78	
0400	GAL 40374	GAL 2735.5	50	47	73	97	69	INIT
0800	40414	2735.5	50	46	73	96	69	TC
1200	40430	2735.5	51	41	73	96	68	TC
1600	40430	2735.5	51	41	73	96	69	TC
2000								
2400								

(1) ESR 98-00358 recommends Hotwell level be normally maintained at 49" to 52" to minimize Condensate dissolved oxygen.

(2) 45% MIN will maintain greater than 30K gal available. (Ref. Plant Curve 8.9)

(3) Reference Curve 7.3, MAX. AND MIN. LIMITS IAW APP-018.

(4a) If temperature reaches 78°F, ensure proper operation of HVA-2 AND ACC-2A AND ACC-2B, if HVA-2 AND ACC-2A AND ACC-2B are not available INITIATE operation of HVA-4 AND ACC-4 IAW OP-906.

(4b) If ACC-2A AND ACC-2B AND HVA-4 AND ACC-4 are not available NOTIFY Engineering AND EVALUATE the need for installation of Temporary Hagan Room cooling per SPP-045.

(4c) If temperature reaches 82°F, THEN INITIATE an NCR to address potential operability concern of Hagan Room equipment AND NOTIFY Engineering.

(5) Investigate, report, and resolve abnormal trends.

Comments:

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

TIME	CONTROL ROOM ERFIS SCREENS: CORRECT DATE AND TIME (1)	CONTROL ROOM INDICATOR REVIEW (2)	LPMS CHECKS (3)	FR-154A		
	INIT	INIT	INIT	PEN 1 MAX 3.2 GPM (4)	PEN 2 MAX 3.2 GPM (4)	PEN 3 MAX 3.2 GPM (4)
0400	99	99		1.83	1.85	1.94
0800	TC	TC		2.10	2.13	2.21
1200	TC	TC		1.91	1.93	1.97
1600	TC	TC		1.91	1.92	1.98
2000						
2400						

(1) Reference ACR's 94-00085 and 94-01148. The ERFIS Clock is updated via the LAN. The LAN clock is updated via the National Institute of Science and Technology (NIST). ALL ERFIS Screens should show the same time. The ERFIS Clock is the official time, by which the Control Room Clock should be set when needed.

(2) STA Review once per shift, RO OR BOP review at all other times. Check every RTGB indicator for proper indication and adverse trends (ENHN 243140). The STA walkdown includes a switch Position Check referencing the "Shiftly Control Room Switch Position Check" Log.

(3) Notify STA to monitor LPMS IAW OP-007. (CR 95-01471

(4) If leakoff exceeds 3.2 gpm, then refer to OP-101.

Comments:

# H.B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

## END OF SHIFT CHECKS (1)

TIME	OP-925, COLD WEATHER OPERATION, IN EFFECT			PAPER CHART RECORDERS: MARK TIME, INITIAL AND DATE INIT	NON-ERFIS CRT RECORDERS OPERATIONAL INIT	RO OR BOP PERFORM COMPARISON OF ERFIS PRINTOUTS TO RTGB (2) INIT	KEYS INSERTED IN PCV-455C AND PCV 456 PWR ISOL SWITCHES INIT	ERFIS PRINTOUT QUALITY CODE REVIEW (3) INIT
	<42°F	<35°F	<22°F	<18°F				
19-07	N/A	N/A	N/A	N/A	QA	QA	QA	QA
07-19	N/A	N/A	N/A	N/A	TC	TC	TC	

- (1) Initial for each applicable check when it is completed. Mark as "N/A" those checks not applicable.  
 (2) Reference OMM-001-11.  
 (3) Notify SM/CRS of any UNEXPLAINED "BAD" Quality Codes. SM/CRS will decide whether the "BAD" Quality Code should be reported to IT Plant Section immediately or during normal business hours. Call Ext. 1883 to connect to IT Plant Section on-call pager.

COMMENTS:

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM SRO A2  
Rev 0**

**Determine Proper Equipment Boundaries and Post  
Maintenance Test Requirements**

**Concurred By:** Laura Basta **Date:** 6/4/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:** 01110115901 Verify proper clearance boundaries and tag sequencing IAW OPS-NGGC-1301.  
01006103802 Perform the SI System Annual Integrity Test IAW OST-155

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM SRO A2

**Candidate**

SRO

**K/A**                      **Rating (RO/SRO):**

G 2.2.41                      3.9

G 2.2.13                      4.3

G 2.2.21                      4.1

**Task Standard:**

Determine the pump boundaries and power supply necessary to isolate the leakage from drain valve SI-888M and identify the required Post Maintenance Testing Requirements.

**Preferred Evaluation Location:**

Simulator \_\_\_\_\_ Classroom   X  

**Preferred Evaluation Method:**

Perform   X   Simulate \_\_\_\_\_

**References:**

P&ID 5379-01082 Sheet 2 of 5  
OPS-NGGC-1301

EDP- 002  
PLP-033

TMM-004  
PLP-111

**Validation Time:** 30 Minutes **Time Critical:** NO **Time Critical Time:** N/A

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN    -    -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**    SAT    UNSAT  
circle one

**Performance  
Time (min):** \_\_\_\_\_

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:



**Tools/Equipment/Procedures Needed:**

P&ID 5379-01082 Sheet 2 of 5, Safety Injection System Flow Diagram

EDP- 002, 480V AC Busses

OPS-NGGC-1301, Equipment Clearance

PLP-033, Post-Maintenance Testing (PMT) Program

PLP-111, Leak Reduction Program

TMM-004, Inservice Testing Program

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. During rounds the IAO identified that SI-888M, SI Pump C Drain, is experiencing excessive seat leakage.
3. A Work Order is being prepared to replace SI-888M with a new valve. The Work Order requests a clearance for SI-888M. The Clearance Request states that the component will need to be isolated, depressurized and drained.

**INITIATING CUES:**

Using the provided references only, identify the Minimum pump boundary valves and motor breaker to replace the valve in accordance with the Work Order.

The Manager of Shift Operations has authorized Single Valve isolation for the work on SI-888M.

The Shift Manager has also directed you to determine the required Post Maintenance Testing requirements (PMT) for the replacement valve including the specific procedure number(s), if applicable, that will be used to document the test results. (Identify PMT for Valve ONLY.)

START TIME: \_\_\_\_\_

<p><b>EXAMINER'S NOTE:</b> This JPM consists of identifying the boundaries necessary to isolate the seat leakage path from SI-888M, SI Pump C Drain. The sequence of the component isolation is NOT required for performance of this JPM</p>	
<p><b><u>STEP 1:</u></b> Review P&amp;ID to determine component boundary valves.</p> <p><b><u>STANDARD:</u></b> Candidate will use the provided plant drawing to identify the component boundary valves.</p> <p><b>EXAMINER'S NOTE:</b> P&amp;ID 5379-01082 Sheet 2 of 5, EDP-002 and OPS-NGGC-1301 will be provided to the candidate to use to identify the component boundary valves.</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 2:</u></b> Identify the pump boundary valves.</p> <p><b><u>STANDARD:</u></b> The following valves are required to be verified in the selected positions to ensure that SI-888M is isolated such that it can be removed from the system with single valve isolation:</p> <ul style="list-style-type: none"> <li>• SI-886C, RWST TO SI PUMP "C" SUCTION - CLOSED</li> <li>• SI-898J, SI PUMP "C" MINIFLOW ISOLATION - CLOSED</li> <li>• SI-888C, SI PUMP "C" DISCHARGE - CLOSED</li> <li>• SI-938, SI PUMP "C" FULL FLOW TEST LINE ROOT ISOLATION - CLOSED</li> <li>• SI-886E, RHR HX OUTLIET TO SI PUMP "C" – CLOSED</li> </ul> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

**STEP 3:** Identify valves that can be utilized to depressurize and drain the section of SI piping to support the replacement of SI-888M.

**STANDARD:** At least one of the listed vent valves and at least one of the listed drain valves is identified as needing to be opened to depressurize and drain the section of piping to support replacement of SI-888M.

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

Acceptable Vent Valves	Acceptable Drain Valves
SI-992C, SI PUMP "C" RECIRCULATION LINE STRAINER VENT	SI-888P, SI PUMP "C" DRAIN
SI-888W, SI Pump "C" Vent	SI-888L, SI PUMP "C" DRAIN <b><u>AND</u></b> SI-888V, SI PUMP "C" DRAIN (Need both since valves are in series.)
SI-888N, SI Pump "C" Vent	SI-921C, SI PUMP "C" RECIRCULATION LINE STRAINER DRAIN
SI-838G, SI PUMP "C" SUCTION END SEAL WATER VENT	SI-838I, SI PUMP "C" TEST POINT ISOLATION <b><u>AND</u></b> PX-956C Drain Valve (Need both since valves are in series.)
SI-838H, SI PUMP "C" DISCH END SEAL WATER VENT	SI-888M, SI PUMP "C" DRAIN (Could be used as a drain, however no tag could be placed on valve since it is being replaced.)

EXAMINER'S NOTE: NONE

COMMENTS:

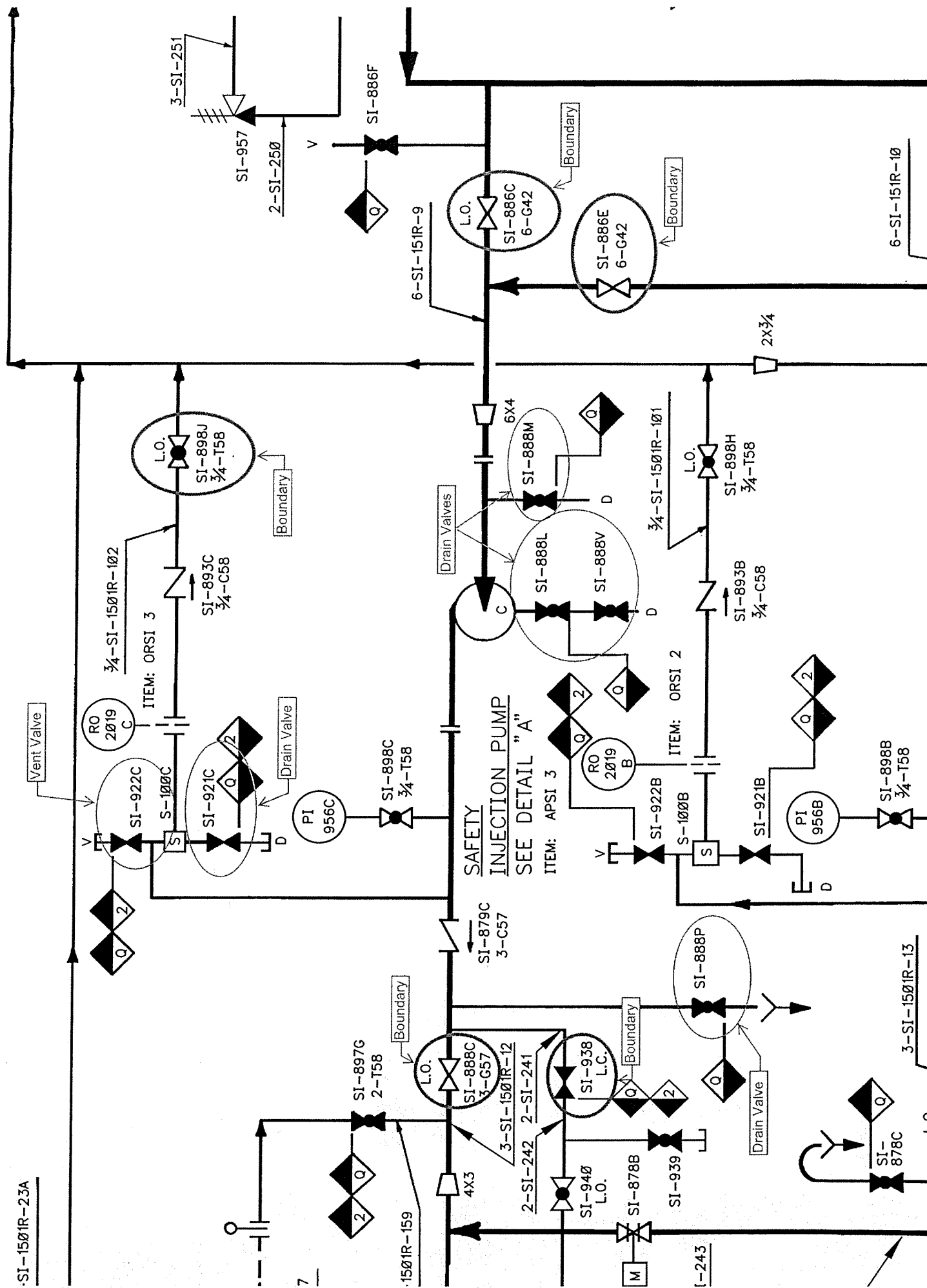
<p><b><u>STEP 4:</u></b> Determine the power supply to SI Pump “C”</p> <p><b><u>STANDARD:</u></b> Candidate determines that SI Pump “C” power supply is breaker 52/23B – RACKED OUT</p> <p><b>Not required for credit.</b> Switch that can be included is as follows:</p> <ul style="list-style-type: none"><li>• RTGB Control Switch for SI Pump “C” - CAPPED</li></ul> <p><b>EXAMINER’S NOTE:</b> SI Pump “C” power supply is located in EDP-002, Section 9.0, 480V-E2, Breaker 52/23B.</p> <p><b>Power supply is also available on the RTGB on the pump control switch.</b></p> <p><b>EDP-002 was provided to candidate at beginning of JPM.</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
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<p><b><u>STEP 4:</u></b> Determine the required Post Maintenance Test requirements for the replacement valve.</p> <p><b><u>STANDARD:</u></b> Candidate refers to PLP-033 and determines the following PMT is required:</p> <ul style="list-style-type: none"> <li>• <b>Exercise (stroke) check</b></li> <li>• <b>Seat leakage test</b></li> </ul> <p>Since the valve is in a system listed in PLP-111, then the candidate should specify that the valve leakage will be documented in <b>PLP-111</b>.</p> <p>The stroke check can be documented in the applicable maintenance procedure, included in the work task's written instructions, or a separate PMT work order task.</p> <p><b>Not required for credit.</b> Addition PMT that may be listed.</p> <ul style="list-style-type: none"> <li>• Visually observe the valve to verify proper operation and positive isolation</li> </ul> <p><b>EXAMINER'S NOTE:</b> As requested, provide the candidates with PLP-033, Post-Maintenance Testing (PMT) Program, PLP-111, Leak Reduction Program, and TMM-004, Inservice Testing Program</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<b><u>END OF TASK</u></b>	
<p><b>Terminating Cue:</b> Safety Injection Pump "C" valve boundaries and power supply have been identified and PMT identified.</p>	

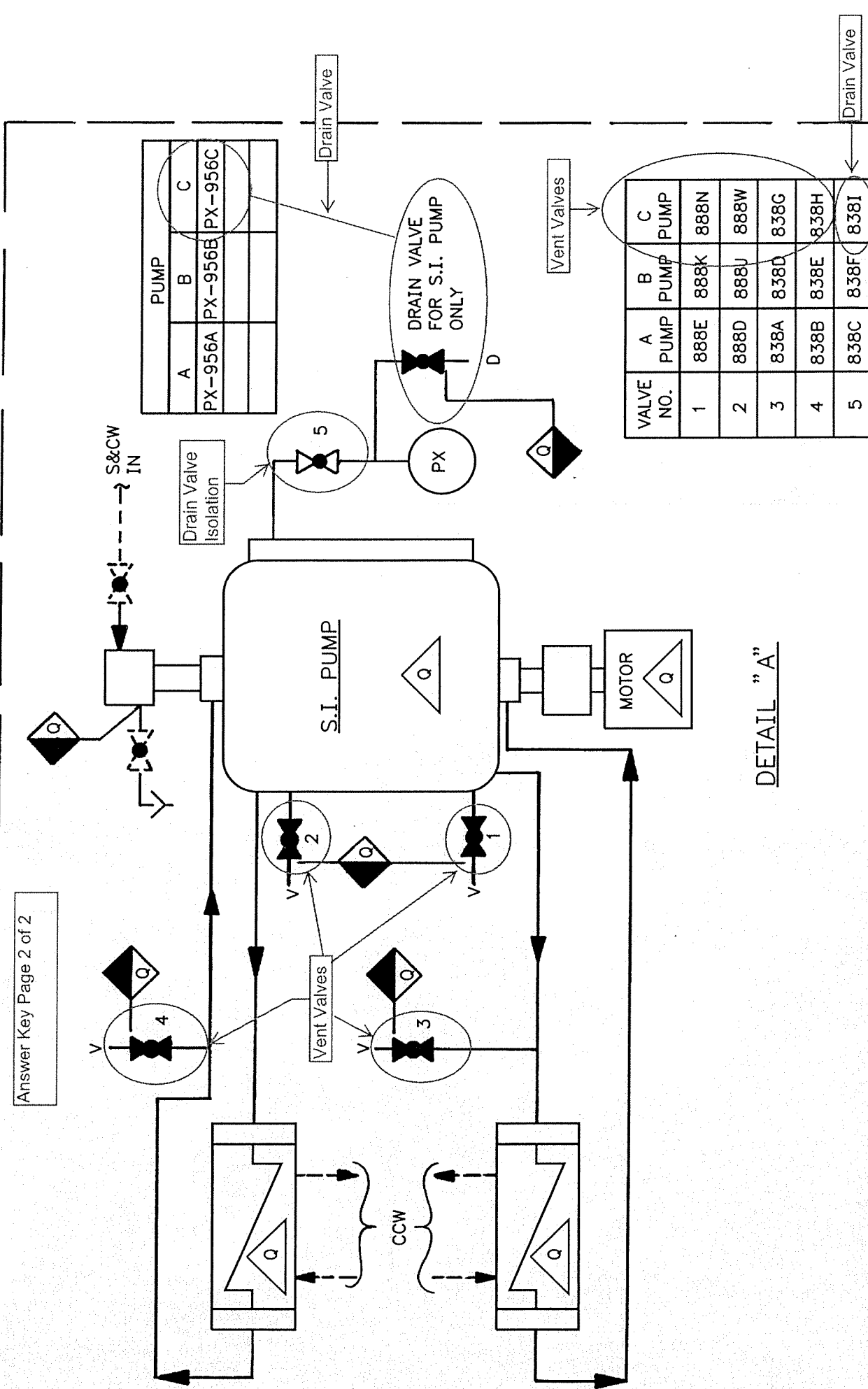
**TIME STOP:** \_\_\_\_\_

## Answer Sheet

Boundary Valves	Power Supply	Acceptable Vent Valves
SI-886C, RWST TO SI PUMP "C" SUCTION - CLOSED	480V-E2, Breaker 52/23B – Racked Out	SI-992C, SI PUMP "C" RECIRCULATION LINE STRAINER VENT
SI-898J, SI PUMP "C" MINIFLOW ISOLATION - CLOSED		SI-888W, SI Pump "C" Vent
SI-888C, SI PUMP "C" DISCHARGE - CLOSED		SI-888N, SI Pump "C" Vent
SI-938, SI PUMP "C" FULL FLOW TEST LINE ROOT ISOLATION - CLOSED		SI-838G, SI PUMP "C" SUCTION END SEAL WATER VENT
SI-886E, RHR HX OUTLIET TO SI PUMP "C" – CLOSED		SI-838H, SI PUMP "C" DISCH END SEAL WATER VENT
		<b>Acceptable Drain Valves</b>
		SI-888P, SI PUMP "C" DRAIN
		SI-888L, SI PUMP "C" DRAIN <b>AND</b> SI-888V, SI PUMP "C" DRAIN (Need both since valves are in series.)
		SI-921C, SI PUMP "C" RECIRCULATION LINE STRAINER DRAIN
		SI-838I, SI PUMP "C" TEST POINT ISOLATION <b>AND</b> PX-956C Drain Valve (Need both since valves are in series.)
		SI-888M, SI PUMP "C" DRAIN (Could be used as a drain, however no tag could be placed on valve since it is being replaced.)
<b>Required PMT</b>		
<b>PMT</b>	<b>Documentation</b>	
Exercise (stroke) Check	Applicable maintenance procedure, included in the work task's written instructions, or a separate PMT work order task.	
Seat leakage test	PLP-111, Leak Reduction Program	



Answer Key Page 2 of 2



DETAIL "A"

25/03	43	M	2	6/04	44	IAM	2	16/04	45	AM	2	12/05	46	SIGNED	47	SIGNED	48	SIGNED	49	SIGNED	22	3-12-86	23	22
-------	----	---	---	------	----	-----	---	-------	----	----	---	-------	----	--------	----	--------	----	--------	----	--------	----	---------	----	----



**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. During rounds the IAO identified that SI-888M, SI Pump C Drain, is experiencing excessive seat leakage.
3. A Work Order is being prepared to replace SI-888M with a new valve. The Work Order requests a clearance for SI-888M. The Clearance Request states that the component will need to be isolated, depressurized and drained.

**INITIATING CUES:**

**Using the provided references only, identify the Minimum pump boundary valves and motor breaker to replace the valve in accordance with the Work Order.**

**The Manager of Shift Operations has authorized Single Valve isolation for the work on SI-888M.**

**The Shift Manager has also directed you to determine the required Post Maintenance Testing requirements (PMT) for the replacement valve including the specific procedure number(s), if applicable, that will be used to document the test results. (Identify PMT for Valve ONLY.)**

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM SRO A3  
Rev 0**

## **Calculate Low Dose Path**

<b>Concurred By:</b>	<u>Patrick Lathrop</u> Operations	<b>Date:</b> <u>5/15/13</u>
<b>Approved By:</b>	<u>James Conder</u> Superintendent/Supervisor - Training	<b>Date:</b> <u>6/5/13</u>

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:****Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM SRO A3

**Candidate**

SRO

**K/A**

G 2.3.4

**Rating (RO/SRO):**

3.7

**Task Standard:**

Determine the appropriate path and number of workers to keep dose ALARA and determine if any dose limits are exceeded.

**Preferred Evaluation Location:**Simulator \_\_\_\_\_ Classroom   X  **Preferred Evaluation Method:**Perform   X   Simulate \_\_\_\_\_**References:**

DOS-NGGC-0004, Administrative Dose Limits

**Validation Time: 20 Minutes** **Time Critical: NO** **Time Critical Time: N/A****Candidate:**

(N/A if not time critical)

Name \_\_\_\_\_

SSN

- -

**Overall  
Time****Critical  
Time**

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**

circle one

SAT

UNSAT

**Performance****Time (min):**

\_\_\_\_\_

\_\_\_\_\_

**Examiner:**

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

Calculator and Paper

DOS-NGGC-0004, Administrative Dose Limits (if requested)

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant shutdown 24 hours ago for a Forced Outage.
2. HVH-9A motor has failed and must be replaced prior to plant startup.
3. A team has been assembled to determine options for successful job performance while maintaining overall dose ALARA
4. Only two personnel are available that are qualified to perform the necessary work. They are Duke Energy Employees and have received NO dose from Non-Duke Energy plants. Worker A has a current annual dose of 1895 mrem and Worker B has a current annual dose of 1845 mrem.

SELECTION	PATH – A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people - 4	1 person - 18 2 people - 10

**INITIATING CUES:**

Using the data given, determine the recommended path to the job site, the number of workers necessary to effectively complete the job and keep radiation dose ALARA, the dose each worker will receive and if any dose limits will be exceeded.

START TIME: \_\_\_\_\_

**EXAMINER'S NOTE:** Performance Steps may be performed in any order.

<p><b><u>STEP 1:</u></b> Determine Transit dose to the job site for 1 worker via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH A will receive 75 mRem entering the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} = 75 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 2:</u></b> Determine Transit dose to the job site for 2 workers via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH A will receive 60 mRem entering the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 4 \text{ min.} \times 2 \text{ people} = 60 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 3:</u></b> Determine work site dose for 1 worker.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker performing job will receive 120 mrem.  <math>(120 \text{ mR/hr}) \times (1\text{hr}/60\text{min}) \times 60 \text{ min.} = 120 \text{ mrem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 4:</u></b> Determine work site dose for 2 workers.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers performing job will receive 100 mrem.  <math>(120 \text{ mR/hr}) \times (1\text{hr}/60\text{min}) \times 25 \text{ min.} \times 2 \text{ people} = 100 \text{ mrem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 5:</u></b> Determine dose received by 1 worker to exit work site via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH A will receive 75 mRem exiting the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} = 75 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 6:</u></b> Determine dose received by 2 workers to exit work site via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH A will receive 60 mRem exiting the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 4 \text{ min.} \times 2 \text{ people} = 60 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 7:</u></b> Determine dose received for entire job if PATH A is used.</p> <p><b><u>STANDARD:</u></b> Determines that to perform job using PATH A will result in 270 mrem for 1 worker and 220 mrem for 2 workers.</p> <p>1 worker: <math>75 + 120 + 75 = 270</math> mrem</p> <p>2 workers: <math>60 + 100 + 60 = 220</math> mrem (110 mRem to each worker)</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 8:</u></b> Determine Transit dose to the job site for 1 worker via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH B will receive 72 mRem entering the job site.</p> <p><math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 18 \text{ min.} = 72 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 9:</u></b> Determine Transit dose to the job site for 2 workers via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH B will receive 80 mRem entering the job site.</p> <p><math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} \times 2 \text{ people} = 80 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>



<p><b><u>STEP 10:</u></b> Determine dose received by 1 worker to exit work site via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH B will receive 72 mRem exiting the job site.  <math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 18 \text{ min.} = 72 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 11:</u></b> Determine dose received by 2 workers to exit work site via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH B will receive 80 mRem exiting the job site.  <math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} \times 2 \text{ people} = 80 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 12:</u></b> Determine dose received for entire job if PATH B is used.</p> <p><b><u>STANDARD:</u></b> Determines that to perform job using PATH B will result in 264 mrem for 1 worker and 260 mrem for 2 workers.</p> <p>1 worker: <math>72 + 120 + 72 = 264 \text{ mrem}</math></p> <p>2 workers: <math>80 + 100 + 80 = 260 \text{ mrem}</math> (130 mRem to each worker)</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 13:</u></b> Determine the recommended path taken and number of workers utilized to keep radiation dose ALARA and the dose each worker will receive.</p> <p><b><u>STANDARD:</u></b> Candidate determines that the lowest dose is received by using <b>2 workers</b> transiting to and from the job site using <b>PATH A</b>. Using this PATH the workers will receive <b>110 mrem</b> each.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 14:</u></b> Determine if any dose limits will be exceeded.</p> <p><b><u>STANDARD:</u></b> YES, the Duke Energy Administrative Dose Limit of 2 Rem will be exceeded by Worker A.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue:</b> Candidate determines lowest dose received, PATH used and if any dose limits will be exceeded.</p>	

**TIME STOP:** \_\_\_\_\_

## ANSWER KEY

SELECTION	PATH – A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Recommended PATH	PATH – A	
Number of Workers	2	
Dose Received by each worker	110 mrem	
Worker(s) that will exceed any dose limit	Worker A will exceed the Duke Energy (Legacy Progress Energy) Administrative Annual Dose Limit of 2 Rem.	

*Excerpt from DOS-NGGC-0004, Administrative Dose Limits*

**9.3 Progress Energy Annual Administrative Dose Limits**

9.3.1 0.5 rem Progress Energy dose if non-Progress Energy dose for the current year has not been determined. No dose extension is permitted.

9.3.2 2 rem Progress Energy dose not to exceed 4 rem total dose if non-Progress Energy dose for the current year has been determined.

**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant shutdown 24 hours ago for a Forced Outage.
2. HVH-9A motor has failed and must be replaced prior to plant startup.
3. A team has been assembled to determine options for successful job performance while maintaining overall dose ALARA
4. Only two personnel are available that are qualified to perform the necessary work. They are Duke Energy Employees and have received NO dose from Non-Duke Energy plants. Worker A has a current annual dose of 1895 mrem and Worker B has a current annual dose of 1845 mrem.

SELECTION	PATH – A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people - 4	1 person - 18 2 people - 10
Recommended PATH		
Number of Workers		
Dose Received by each worker		
Worker(s) that will exceed any dose limit		

**INITIATING CUES:**

Using the data given, determine the recommended path to the job site, the number of workers necessary to effectively complete the job and keep radiation dose ALARA, the dose each worker will receive and if any dose limits will be exceeded.

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

## **ILC-13 NRC JPM SRO A4 Rev 0**

### **Perform an Emergency Action Level Classification and Recommended Protective Actions**

**Concurred By:** Greg Danbury **Date:** 5/15/13  
Operations

**Concurred By:** Matthew Nelson **Date:** 6/3/13  
EP

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**Task:** 02109100201, Analyze Indications to Determine That an Emergency Plan Event is in Progress and Classify the Event IAW EAL Matrix for Cold, Hot, and All Conditions.

**Alternate Path:**

No

**JPM #:**

ILC-13 NRC JPM SRO A4

**Candidate**

SRO

**K/A**                      **Rating (RO/SRO):**

G 2.4.41                      4.6

G 2.4.44                      4.4

**Task Standard:**

Identifies GENERAL EMERGENCY status (Loss of 3 FPBs) and PARs completed satisfactorily.

**Preferred Evaluation Location:**

Simulator \_\_\_\_\_ Classroom   X  

**Preferred Evaluation Method:**

Perform   X   Simulate \_\_\_\_\_

**References:**

EMERGENCY-ACTION-LEVEL-MATRIX-SH1 (ALL CONDITIONS MATRIX)  
EMERGENCY-ACTION-LEVEL-MATRIX-SH3 (COLD CONDITIONS MATRIX)  
EPCLA-04  
EPCLA-01

**Validation Time:** 30 Minutes. **Time Critical:** Yes **Time Critical Time:** 15 Minutes (For EAL Classification Only)

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN

- -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**  
circle one

SAT

UNSAT

**Performance  
Time (min):** \_\_\_\_\_

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed: Provide the candidates with the following:**

EMERGENCY-ACTION-LEVEL-MATRIX-SH1 (ALL CONDITIONS MATRIX)  
EMERGENCY-ACTION-LEVEL-MATRIX-SH2 (HOT CONDITIONS MATRIX)  
EMERGENCY-ACTION-LEVEL-MATRIX-SH3 (COLD CONDITIONS MATRIX)  
EPCLA-04 and EPCLA-01  
EP Sector Map

**DIRECTIONS TO CANDIDATE:**

When I tell you to begin, you are to classify an event IAW the EAL MATRIX. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you and report the EAL to be declared if any.

**CANDIDATE INFORMATION:**

Inform the Operator that this is a time critical JPM.

**INITIAL CONDITIONS:**

1. The "A" CV Spray Pump is under clearance for motor replacement.
2. The Reactor tripped with an Auto Safety Injection Actuation signal present.
3. The BOP just announced that Breaker 52/28B, Station Service Transformer 2G to 480V Bus E-2, has tripped and "B" EDG has failed to Auto-Start.
4. Radiation monitors as follows:
  - R-2 Containment Area Radiation Monitor 75 R/hr (ALARMING)
  - R-7 In-Core Room Area Radiation Monitor 66 R/hr (ALARMING)
  - R-32A Containment High Range 105 R/hr (ALARMING)
  - R-32B Containment High Range 110 R/hr (ALARMING)
  - R-11 Containment Particulate Process Monitor 25K CPM (Aligned to CV)
  - R-12 Containment Gas Process Monitor 1K CPM (Aligned to CV)
  - All other radiation monitors reading normal
5. Core Exit Thermocouples reading approximately 320°F and stable.
6. RCS Wide Range Pressure is 37 psig and stable.
7. Containment pressure is 30 psig and stable.
8. Containment water level 250 inches and rising.
9. All plant equipment and systems operable and functioning correctly unless otherwise noted above.

**INITIATING CUES:**

You are the CRS and the SM is not available. Classify this event IAW the EAL MATRIX. Mark the EAL MATRIX appropriately.

# Time Critical



START TIME: \_\_\_\_\_

TIME CRITICAL START TIME: \_\_\_\_\_

**EXAMINER'S NOTE: ONLY PROVIDE THE CANDIDATE(S) WITH HANDOUT A FOR THIS PORTION OF THE JPM.**

**STEP 1:** Obtain the EAL Matrixes

**STANDARD:** Candidate states where to obtain the copies.

**EXAMINER'S CUE:** If the Matrixes are normally available where this JPM is being performed, provide the Matrixes, otherwise allow the candidate to use the controlled copy Matrixes.

**EXAMINER'S NOTE:** NONE

COMMENTS:

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 2:** The "A" CV Spray Pump is tagged out of service for motor replacement

**STANDARD:** Candidate determines the single CV Spray pump OOS does not affect the EAL.

**EXAMINER'S CUE:** Table F-1 Fission Product Barrier Matrix, Containment Barrier Potential Loss DOES NOT apply.  
Containment pressure >10psig with <one full train of depressurization equipment operating  
Note: One Containment Spray System train and one Containment Cooling System train comprise one full train of depressurization equipment.

**EXAMINER'S NOTE:** NONE

COMMENTS:

\_\_\_ SAT

\_\_\_ UNSAT

<p><b><u>STEP 3:</u></b> Plant tripped with a safety injection in progress.</p> <p><b><u>STANDARD:</u></b> Candidate determines SI in-progress post reactor trip does not provide enough information to make an EAL declaration.</p> <p><b>EXAMINER'S CUE:</b> NONE</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 4:</u></b> The BOP just announced that Breaker 52/28B, Station Service Transformer 2G to 480V Bus E-2, has tripped and "B" EDG has failed to Auto-Start.</p> <p><b><u>STANDARD:</u></b> Candidate determines that E-2 deenergized removes 2<sup>nd</sup> train of CV Spray and only one train CV HVAC running with CV pressure &gt;10 PSIG</p> <p><b>EXAMINER'S CUE:</b> Table F-1 Fission Product Barrier Matrix, Containment Barrier Potential Loss Does Apply Containment Pressure &gt;10 PSIG with &lt; one full train of depressurization equipment operating</p> <p><b>EXAMINER'S NOTE:</b> 1 Containment Barrier Potential Loss</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 5:</u></b> R-2 Containment Area Radiation Monitor 75 R/hr (ALARMING) R-7 In-Core Room Area Radiation Monitor 66 R/hr (ALARMING)</p> <p><b><u>STANDARD:</u></b> Candidate determines R-2 and R-7 do not exceed EAL setpoints.</p> <p><b>EXAMINER'S CUE:</b> NONE</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

<b><u>STEP 6:</u></b>	R-32A Containment High Range R-32B Containment High Range	105 R/hr (ALARMING) 110 R/hr (ALARMING)	<b><u>Critical Step</u></b>
<b><u>STANDARD:</u></b>	Candidate determines this indicates a Potential Loss of Containment Barrier		___ SAT
<b>EXAMINER'S CUE:</b>	Table F-1 Fission Product Barrier Matrix, Reactor Coolant System Barrier, Loss <b>DOES</b> apply.  Containment High Range Radiation Monitor R-32A or R-32B > 5 Rem/Hr  Table F-1 Fission Product Barrier Matrix, Fuel Cladding Barrier, Loss <b>DOES</b> apply.  Containment High Range Radiation Monitor R-32A or R-32B > 100 Rem/Hr		___ UNSAT
<b>EXAMINER'S NOTE:</b>	1 RCS Barrier Loss 1 Fuel Cladding Barrier Loss		
<b><u>COMMENTS:</u></b>			
<b><u>STEP 9:</u></b>	Declare the highest EAL classification identified within 15 minutes		<b><u>Critical Step</u></b>
<b><u>STANDARD:</u></b>	Candidate declares <b>General Emergency: FG1.1</b> . Loss of any two barriers and potential loss of third barrier within 15 minutes of start time.		___ SAT
<b>EXAMINER'S CUE:</b>	NONE		
<b>EXAMINER'S NOTE:</b>	RCS Barrier Loss Fuel Clad Barrier Loss Containment Barrier Potential Loss		___ UNSAT
<b><u>COMMENTS:</u></b>			
<b>TIME CRITICAL STOP TIME:</b> _____			
<p><b>EXAMINER'S CUE: IF CANDIDATE <u>DOES</u> DETERMINE EAL CLASSIFICATION TO BE A GENERAL EMERGENCY, GIVE THE CANDIDATE HANDOUT B AND DIRECT THE CANDIDATE TO NOW DETERMINE PROTECTIVE ACTION RECOMMENDATIONS BASED ON THIS EVENT.</b></p> <p><b>IF CANDIDATE <u>DOES NOT</u> DETERMINE EAL CLASSIFICATION TO BE A GENERAL EMERGENCY, INFORM THE CANDIDATE THE JPM IS TERMINATED.</b></p>			

<p><b><u>STEP 10:</u></b> Candidate determines that Protective Action Recommendations are determined in accordance with EPCLA-01, Attachment 10.1, Protective Action Recommendations.</p> <p><b><u>STANDARD:</u></b> Candidate utilizes EPCLA-01, Attachment 10.1, Protective Action Recommendations, to determine PARs</p> <p><b>EXAMINER'S CUE:</b> NONE</p> <p><b>EXAMINER'S NOTE:</b> Candidate was be provided with EPCLA-01 prior to beginning the JPM.</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 11:</u></b> Candidate determines that the required PARs based on information given.</p> <p><b><u>STANDARD:</u></b> Candidate determines to evacuate 2 miles around and 5 miles downwind AND advise the remaining sectors to shelter and listen to EAS.</p> <p><b>EXAMINER'S CUE:</b> NONE</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 12:</u></b> Based on wind direction candidate determines which sectors are potentially affected.</p> <p><b><u>STANDARD:</u></b> Candidate determines that sectors A-0, A-1, A-2, B-1, B-2, E-1 and E-2 are potentially affected.</p> <p><b>EXAMINER'S CUE:</b> NONE</p> <p><b>EXAMINER'S NOTE:</b> Page 5 of EPCLA-01 Att. 10.1</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

**STEP 13:** Determine which sectors are to be evacuated and which are to be sheltered.

**STANDARD:** Using the table on Page 6 of EPCLA-01 Att. 10.1 the candidate determines the following.

Place a $\checkmark$ in the appropriate block for each sector.			
Radius	Sector	Evacuate	Shelter
2-Mile	A-0	$\checkmark$	
5-Mile	A-1	$\checkmark$	
10-Mile	A-2		$\checkmark$
5-Mile	B-1	$\checkmark$	
10-Mile	B-2		$\checkmark$
5-Mile	C-1		$\checkmark$
10-Mile	C-2		$\checkmark$
5-Mile	D-1		$\checkmark$
10-Mile	D-2		$\checkmark$
5-Mile	E-1	$\checkmark$	
10-Mile	E-2		$\checkmark$

Evacuate Sectors: A-0, A-1, B-1, E-1

Shelter Sectors: A-2, B-2, C-1, C-2, D-1, D-2, E-2

**EXAMINER'S CUE:** NONE

**EXAMINER'S NOTE:** Page 6 of EPCLA-01 Att. 10.1

COMMENTS:

**END OF TASK**

**Terminating Cue:** Candidate has determined the Protective Action Recommendations.

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**TIME STOP:** \_\_\_\_\_

**HANDOUT B**

**CANDIDATE CUE SHEET  
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

**Inform the Candidate that this portion of the JPM is NOT time critical.**

**INITIAL CONDITIONS:**

- All conditions from Handout A remain in effect.
- Wind Direction is 220°.
- Wind Speed is 18 mph.
- Core damage assessments are not yet available.
- Emergency Dose Projections are not yet available.
- CV Hydrogen gas concentration is less than 1%.
- Release is in progress and duration cannot be determined at this time.

**INITIATING CUES:**

**Determine the Protective Action Recommendations based on this event in accordance with EPCLA-01.**

## HANDOUT A

### CANDIDATE CUE SHEET (TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

#### CANDIDATE INFORMATION:

Inform the Operator that **this IS a time critical JPM.**

#### INITIAL CONDITIONS:

1. The "A" CV Spray Pump is under clearance for motor replacement.
2. The Reactor tripped with an Auto Safety Injection Actuation signal present.
3. The BOP just announced that Breaker 52/28B, Station Service Transformer 2G to 480V Bus E-2, has tripped and "B" EDG has failed to Auto-Start.
4. Radiation monitors as follows:
  - R-2 Containment Area Radiation Monitor 75 R/hr (ALARMING)
  - R-7 In-Core Room Area Radiation Monitor 66 R/hr (ALARMING)
  - R-32A Containment High Range 105 R/hr (ALARMING)
  - R-32B Containment High Range 110 R/hr (ALARMING)
  - R-11 Containment Particulate Process Monitor 25K CPM (Aligned to CV)
  - R-12 Containment Gas Process Monitor 1K CPM (Aligned to CV)
  - All other radiation monitors reading normal
5. Core Exit Thermocouples reading approximately 320°F and stable.
6. RCS Wide Range Pressure is 37 psig and stable.
7. Containment pressure is 30 psig and stable.
8. Containment water level 250 inches and rising.
9. All plant equipment and systems operable and functioning correctly unless otherwise noted above.

#### INITIATING CUES:

You are the CRS and the SM is not available. Classify this event IAW the EAL MATRIX. Mark the EAL MATRIX appropriately.

# Time Critical

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2

PART 5

**EPCLA-01**

***EMERGENCY CONTROL***

REVISION 35



SUMMARY OF CHANGES	
PRR 563481	
SECTION	REVISION COMMENTS
2.32	Added EPRAD-03, Dose Projections to the Reference Section.
2.33	Added NRC RIS Issue Summary 2008-26, Clarified Requirements of Title 10CFR50.54(y) When Implementing 10CFR50.54(x) to Depart From a License Condition or Technical Specification to the Reference Section to provide clarification of step 5.4.2.
5.10.3	Added "Actions that have been completed by the previous SEC are not required to be repeated when the emergency classification changes or the SEC position is transferred to a different qualified individual." to prevent duplication of effort when classifications or personnel change.
Att 10.1	This attachment, which is a flowchart for Protective Action Recommendations (PARs), was revised to relocate detailed information associated with decision blocks in the second part of the PAR flowchart (old page 4 of 7) to the appropriate decision block at the beginning of the flowchart (new page 2 of 6). The verbiage has not changed, only the location of the information. This will improve the decision process and user-friendliness by having the needed information on a single page rather than on multiple pages without changing intent. (PRRs 563481 and 564867) (NCR 562180)
Att 10.2	Attachment deleted and information was relocated to the Emergency Classification Attachments. (10.4 – 10.7). Remaining attachments renumbered.

**SUMMARY OF CHANGES**

PRR 563481

SECTION	REVISION COMMENTS
Att 10.5 (old) Att 10.4 (new) Unusual Event	<p>This attachment, which provides guidance for actions necessary to support emergency classification of an Unusual Event, has been overhauled and streamlined. These changes include editorial corrections; relocating the instructions to activate the Emergency Response Data System (ERDS) to a new attachment; adding a step to direct dose projections be performed if a release is in progress; inclusion of the Emergency Notification Form; changes to the selection of information to include in the site announcements; providing alternate locations for the Emergency Communicator (EC) to report if unable to reach the Control Room; providing the Site Emergency Coordinator – Control Room with options for a substitute Emergency Communicator if the assigned EC is not available or able to report to the Control Room, for clarification; and deleting information describing staffing the emergency response facilities to assist with backfeed logistics if the Start-up transformer is lost, backfeed through the auxiliary transformer is possible, and only one emergency diesel is powering it's respective diesel, because this information is no longer applicable due to transition to the NEI 99-01 EAL Scheme.</p> <p>In addition to the changes to the Unusual Event Attachment, the information from the previous Att 10.2, SEC Checklist was added to this attachment. The attachment was modified for each specific classification and updated as follows: 1) added a Note to direct the user to page 3 if the checklist had been completed previously, 2) moved the table with activation requirements to the top and deleted information related to the other classification, 3) added the option to direct the CR-EC to an alternate location if needed, 4) deleted the Event Classification line, 5) added the requirement to activate ERDS within 1 hour, if needed and referenced the new attachment for ERDS activation, 6) relocated the information concerning time requirements for accountability into a NOTE, 7) removed reference to PARs since that is required only in a General Emergency, 8) separated the evacuation location options for improved readability, 9) added a title line "Referenced Procedures" prior to the list of procedures; and 10) deleted checkbox referencing Emergency Communicator Forms in EPNOT-01, because this information is located in EPNOT-01. Sections were reformatted, as necessary, to streamline actions required by the SEC to improve user-friendliness.</p> <p>(PRRs 542585, 548387, 553173, and 563481) (NCRs 537496, 542583 and 542877)</p>

## SUMMARY OF CHANGES

PRR 563481

SECTION	REVISION COMMENTS
Att 10.6 (old) Att 10.5 (new) Alert	<p>This attachment, which provides guidance for actions necessary to support emergency classification of an Alert, has been overhauled and streamlined. These changes include editorial corrections; relocating the instructions to activate the Emergency Response Data System (ERDS) to a new attachment; adding a step to direct dose projections be performed if a release is in progress; inclusion of the Emergency Notification Form; changes to the selection of information to include in the site announcements; providing alternate locations for the Emergency Communicator (EC) to report if unable to reach the Control Room; and providing the Site Emergency Coordinator – Control Room with options for a substitute Emergency Communicator if the assigned EC is not available or able to report to the Control Room, for clarification.</p> <p>In addition to the changes to the Alert Attachment, the information from the previous Att 10.2, SEC Checklist was added to this attachment. The attachment was modified for each specific classification and updated as follows: 1) added a Note to direct the user to page 3 if the checklist had been completed previously, 2) moved the table with activation requirements to the top and deleted information related to the other classification, 3) added the option to direct the CR-EC to an alternate location if needed, 4) deleted the Event Classification line, 5) added the requirement to activate ERDS within 1 hour, if needed and referenced the new attachment for ERDS activation, 6) relocated the information concerning time requirements for accountability into a NOTE, 7) removed reference to PARs since that is required only in a General Emergency, 8) separated the evacuation location options for improved readability, 9) added a title line "Referenced Procedures" prior to the list of procedures; and 10) deleted checkbox referencing Emergency Communicator Forms in EPNOT-01, because this information is located in EPNOT-01. Sections were reformatted, as necessary, to streamline actions required by the SEC to improve user-friendliness.</p> <p>(PRRs 542585, 548387, 553173, and 563481) (NCRs 537496, 542583 and 542877)</p>

## SUMMARY OF CHANGES

PRR 563481

SECTION	REVISION COMMENTS
Att 10.7 (old) Att 10.6 (new) Site Area Emergency	<p>This attachment, which provides guidance for actions necessary to support emergency classification of a Site Area Emergency, has been overhauled and streamlined. These changes include editorial corrections; relocating the instructions to activate the Emergency Response Data System (ERDS) to a new attachment; adding a step to direct dose projections be performed if a release is in progress; inclusion of the Emergency Notification Form; changes to the selection of information to include in the site announcements; providing alternate locations for the Emergency Communicator (EC) to report if unable to reach the Control Room; and providing the Site Emergency Coordinator – Control Room with options for a substitute Emergency Communicator if the assigned EC is not available or able to report to the Control Room, for clarification.</p> <p>In addition to the changes to the Site Area Emergency Attachment, the information from the previous Att 10.2, SEC Checklist was added to this attachment. The attachment was modified for each specific classification and updated as follows: 1) added a Note to direct the user to page 3 if the checklist had been completed previously, 2) moved the table with activation requirements to the top and deleted information related to the other classification, 3) added the option to direct the CR-EC to an alternate location if needed, 4) deleted the Event Classification line, 5) added the requirement to activate ERDS within 1 hour, if needed and referenced the new attachment for ERDS activation, 6) relocated the information concerning time requirements for accountability into a NOTE, 7) removed reference to PARs since that is required only in a General Emergency, 8) separated the evacuation location options for improved readability, 9) added a title line "Referenced Procedures" prior to the list of procedures; and 10) deleted checkbox referencing Emergency Communicator Forms in EPNOT-01, because this information is located in EPNOT-01. Sections were reformatted, as necessary, to streamline actions required by the SEC to improve user-friendliness.</p> <p>(PRRs 542585, 548387, 553173, and 563481) (NCRs 537496, 542583 and 542877)</p>

## SUMMARY OF CHANGES

PRR 563481

SECTION	REVISION COMMENTS
Att 10.8 (old) Att 10.7 (new) General Emergency	<p>This attachment, which provides guidance for actions necessary to support emergency classification of a General Emergency, has been overhauled and streamlined. These changes include editorial corrections; relocating the instructions to activate the Emergency Response Data System (ERDS) to a new attachment; adding a step to direct dose projections be performed if a release is in progress; inclusion of the Emergency Notification Form; changes to the selection of information to include in the site announcements; providing alternate locations for the Emergency Communicator (EC) to report if unable to reach the Control Room; and providing the Site Emergency Coordinator – Control Room with options for a substitute Emergency Communicator if the assigned EC is not available or able to report to the Control Room, for clarification.</p> <p>In addition to the changes to the General Emergency Attachment, the information from the previous Att 10.2, SEC Checklist was added to this attachment. The attachment was modified for each specific classification and updated as follows: 1) added a Note to direct the user to page 3 if the checklist had been completed previously, 2) moved the table with activation requirements to the top and deleted information related to the other classification, 3) added the option to direct the CR-EC to an alternate location if needed, 4) deleted the Event Classification line, 5) added the requirement to activate ERDS within 1 hour, if needed and referenced the new attachment for ERDS activation, 6) relocated the information concerning time requirements for accountability into a NOTE, 7) separated the evacuation location options for improved readability, 8) added a title line "Referenced Procedures" prior to the list of procedures; and 9) deleted checkbox referencing Emergency Communicator Forms in EPNOT-01, because this information is located in EPNOT-01. Sections were reformatted, as necessary, to streamline actions required by the SEC to improve user-friendliness.</p> <p>(PRRs 542585, 548387, 553173, and 563481) (NCRs 537496, 542583 and 542877)</p>
Att 10.9 (old) Att 10.8 (new)	<p>Added "IF a radiological release is in progress, <b>THEN DIRECT</b> the performance of dose projections using EPRAD-03, Dose Projections.</p> <p>(NCR 537496)</p>

SUMMARY OF CHANGES	
PRR 563481	
SECTION	REVISION COMMENTS
Att 10.10 (old)	Deleted the attachment because the actions to take in the event of an airborne threat are located in AOP-034, Security Events. Reference to AOP-034 is included in each of the Emergency Classification attachments (10.4 – 10.7). Renumbered the following attachments.
Att 10.10 (new)	This is a new attachment that provides instructions on the activation of the Emergency Response Data System (ERDS). This section was created to support the changes made to Att 10.4 – 10.7. The instructions for the activation of ERDS were previously located in each of these attachments. As a result, each classification attachment contained duplicate information. As part of the streamlining process these instructions were removed from each classification attachment and located in a new attachment. PRR 552078

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## 1.0 PURPOSE

- 1.1 To provide consolidated guidance for classifying emergencies from the Control Room or Technical Support Center (TSC).
- 1.2 To implement and direct site response to emergency situations, as required by the Robinson Emergency Plan.

## 2.0 REFERENCES

- 2.1 NUREG-0654 II.D
- 2.2 10CFR50.47(b)(4)
- 2.3 10CFR72.32 (d)
- 2.4 ALL Conditions EAL Matrix
- 2.5 HOT Conditions EAL Matrix
- 2.6 COLD Conditions EAL Matrix
- 2.7 EAL Technical Bases Document
- 2.8 OMM-003, Fire Protection Pre-Plans
- 2.9 FP-001, Fire Emergency
- 2.10 SEC-NGGC-2141, Fitness For Duty, Unscheduled Work Call Outs
- 2.11 PLP-007, Robinson Emergency Plan
- 2.12 EPNOT-01, CR/EOF Emergency Communicator
- 2.13 EPSPA-02, First Aid and Medical Care
- 2.14 AOP-034, Security Events
- 2.15 EPSPA-01, Evacuation and Accountability
- 2.16 EPSPA-03, Administration of Potassium Iodide
- 2.17 EPOSC-01, Operational Support Center Leader
- 2.18 EPOSC-04, Emergency Work Control
- 2.19 AOP-030, NRC Reporting Requirements
- 2.20 RNP-RA/98-0014, Response to NRC Inspection Report No. 50-261/97-13



- 2.21 RNP-RA/05-0082, Response to NRC Bulletin 2005-02, Emergency Preparedness and Response Actions for Security-Based Events
- 2.22 NUREG-0654, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants
- 2.23 EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, U.S. Environmental Protection Agency, Washington, D.C., May 1992
- 2.24 NRC Regulatory Issue Summary 2005-08, Range of Protective Actions For Nuclear Power Plant Incidents
- 2.25 NRC Interim Compensatory Measures Order, Section B.5.b
- 2.26 NRC Regulatory Issue Summary 2007-02, Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events
- 2.27 NEI 99-01 Revision 4, Methodology for Development of Emergency Action Levels
- 2.28 CAPR 258209, GE Declaration during Graded Exercise
- 2.29 EMG-NGGC-0005, Activation Of The Emergency Response Organization Notification System
- 2.30 EPEOF-10, Recovery Manager And Recovery Operations
- 2.31 NSIR/DPR-ISG-01, Interim Staff Guidance
- 2.32 EPRAD-03, Dose Projections
- 2.33 NRC RIS Issue Summary 2008-26, Clarified Requirements of Title 10CFR50.54(y) When Implementing 10CFR50.54(x) to Depart From a License Condition or Technical Specification

### 3.0 **RESPONSIBILITIES**

- 3.1 The Site Emergency Coordinator (SEC) has immediate and unilateral authority to implement this procedure.
- 3.2 The SEC may not delegate:
  - 3.2.1 The decision to notify offsite authorities;
  - 3.2.2 Making offsite Protective Action Recommendations (PAR);
  - 3.2.3 Classifying or terminating the emergency;
  - 3.2.4 Authorizing exposures in excess of 10 CFR 20 limits during a declared emergency.

- 3.3 The Shift Manager will:
- 3.3.1 Classify events, in accordance with the EALs.
- 3.4 The SEC will:
- 3.4.1 Implement this procedure upon recognizing off normal conditions.
- 3.4.2 Coordinate combined response, until relieved by another qualified SEC.
- 3.5 The responsibility to notify offsite authorities, make offsite Protective Action Recommendations and terminate an emergency transfers to the Emergency Response Manager (ERM) upon activation of the Emergency Operations Facility (EOF).
- 3.6 The SEC may authorize exposure in excess of routine yearly limits for saving of life or protecting valuable equipment, per EPOSC-04, Emergency Work Control.
- 3.7 The SEC is the decision maker to determine if an **Emergency Release** (radioactive) is in progress. An Emergency Release affects or has the potential to affect offsite environments. To assist in this determination, the definition of a gaseous **Emergency Release** (radioactive) is any of the below:
- 3.7.1 An approved monitored release was occurring, **AND** the reading on the radiation monitor designated to monitor this release increases due to the event.
- 3.7.2 Any release due to the event that was not previously approved.
- 3.7.3 Anytime a primary-to-secondary leak causes an emergency declaration, a release should be considered "in progress".
- A liquid Emergency Release is any of the following:
- 3.7.4 An approved monitored release was in progress and the reading on the radiation monitor designated to monitor this release increases but does not isolate on an alarm signal.
- 3.7.5 The rupture of a system which releases radioactive liquids into an area that affects or has the potential to affect an offsite environment.
- 4.0 **PREREQUISITES**
- 4.1 In the judgment of the Shift Manager or CRS, an off-normal condition exists.

## 5.0 PRECAUTIONS AND LIMITATIONS

- 5.1 Procedure steps which have been previously implemented as the result of earlier classifications need not be repeated, unless warranted by changing conditions, for example, sounding of the site evacuation alarm for both Site Area Emergency and General Emergency.
- 5.2 To the extent practical, emergency response activities should be accomplished in parallel to expedite notification of offsite agencies.
- 5.2.1 Notifications should be made per EPNOT-01, CR/EOF Emergency Communicator.
- 5.3 Time is of the essence when conducting and approving dose projections. Dose projection results may escalate or preclude emergency declarations. [CAPR 258209]
- 5.4 Dynamic situations which arise in an emergency condition may require that steps be performed out of sequence or alternate methods devised to accomplish the intent of the step.
- 5.4.1 Deviations which do not violate license requirements may be approved by the SEC or ERM.
- 5.4.2 Deviations which violate license requirements shall be implemented, per 10 CFR 50.54 (x, y, and z). This requires approval, as a minimum, by a licensed Senior Reactor Operator (SRO). Approval may be obtained by a person in a position of authority greater than the licensed SRO.
- 5.5 **IF** electronic documents are not available, **THEN** use manual methods.
- 5.6 Only valid indications should be used for determination of EALs. **IF** the validity of instrumentation is suspect, **THEN** attempts should be made to ensure the information used is accurate.
- 5.7 Dose projections are used during the evaluation of EALs. They are to be reviewed and approved by the Radiological Control Manager (RCM) upon activation of the EOF and then immediately communicated to the SEC.
- 5.8 Emergency Classifications
- 5.8.1 It is the expectation that the time between when indications exist that an EAL threshold has been exceeded and declaration of the event will not exceed 15 minutes, unless extraordinary conditions prevail.
- 5.8.2 For EAL thresholds that specify duration of the off-normal condition, the declaration process shall run concurrently with the specified threshold duration. Once the off-normal condition has existed for the duration specified in the EAL, no further effort on this declaration is necessary - the EAL has been exceeded. (NSIR/DPR-ISG-01)

- 5.8.3 Although the majority of the EALs provide very specific thresholds, the SEC must remain alert to events or conditions that lead to the conclusion that exceeding the EAL threshold is imminent.
- 5.8.4 **IF** in the judgment of the SEC, an imminent situation is at hand, **THEN** the classification should be made as if the threshold has been exceeded.
- 5.9 **IF** conditions warrant the issuance of offsite Protective Action Recommendations (PARs), **THEN** the classification of General Emergency is required.
- 5.10 While In a Classified Emergency:
- 5.10.1 Emergency response personnel shall continuously review the Emergency Action Levels and Fission Product Barrier Thresholds to ensure appropriate event classification.
- 5.10.2 If an Emergency Action Level threshold is exceeded for an emergency classification higher than currently declared, the Site Emergency Coordinator shall re-classify the event to the appropriate level and initiate all required notifications.
- 5.10.3 Actions that have been completed by the previous SEC are not required to be repeated when the emergency classification changes or the SEC position is transferred to a different qualified individual.
- 5.11 Transitory Events, Spikes and Spurious Indications
- 5.11.1 There may be cases in which a plant condition that exceeded an EAL threshold was not recognized at the time of occurrence, but is identified well after the condition has occurred (e.g., as a result of routine log or record review), and the condition no longer exists. In these cases, an emergency should not be declared. Reporting requirements of 10 CFR 50.72 are applicable, and the guidance of NUREG-1022 should be applied.
- 5.11.2 In the case of a "spike" in a plant indication or event which rapidly exceeds and then decreases below an Emergency Action Level threshold, entry into the Emergency Plan or escalation to a higher classification "in retrospect" is not appropriate, unless the "spike" is indicative of continuing degrading conditions which will lead to an escalated emergency classification level. Examples include momentary steam generator level shrink following reactor trip or brief wind gusts in excess of classifiable levels.
- 5.11.3 Spurious alarms or parameters, which are known to be invalid indicators of actual plant conditions or of the emergency classification, should not be used to declare emergency classifications.

## 5.12 Downgrading an Emergency

5.12.1 Downgrading of an emergency can be accomplished by declaring the lower emergency class whenever the plant conditions improve to satisfy the affected emergency action levels.

5.12.2 The following guidelines apply when downgrading an Emergency:

1. **IF** the Position of Emergency Response Manager is activated, **THEN** the ERM should be consulted before downgrading occurs, although the final decision rests with the Site Emergency Coordinator.
2. **IF** the NRC Director of Site Operations position is activated, **THEN** this individual should be consulted before downgrading occurs, although the final decision rests with the Site Emergency Coordinator
3. **IF** offsite protective action recommendations have been made, **THEN** the Site Emergency Coordinator shall consult with the Emergency Response Manager if the position is activated, **AND** consult with state and county authorities, prior to downgrading. It is recommended that any offsite protective action recommendations be completed prior to downgrading of a General Emergency.
4. For Alert **OR** higher classifications, unless the conditions causing emergency action levels are very quickly resolved (less than approximately 30 minutes), downgrading should not occur until after the Technical Support Center is activated.
5. **IF** the process of activating the TSC is in progress, **THEN** downgrading should NOT occur until after TSC activation.

5.13 Recovery actions should follow guidance provided within PLP-007, Robinson Emergency Plan and EPEOF-10, Recovery Manager and Recovery Operations, on Recovery.

## 6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

## 7.0 ACCEPTANCE CRITERIA

N/A

## 8.0 INSTRUCTIONS

### 8.1 Declarations

#### CAUTION

Time is of the essence when conducting and approving dose projections. Dose projection results may escalate or preclude emergency declarations. [CAPR 258209]

8.1.1 **IF** at any time a General Emergency declaration is warranted, **THEN** the Site Emergency Coordinator/ Shift Manager is to immediately declare a General Emergency **AND** carry out the actions specified by the procedure.

8.1.2 **IF** an event is recognized warranting other than a General Emergency, **THEN** the SEC/Shift Manager is to continue evaluating all applicable EALs to ensure the highest level of emergency warranted is declared.

#### NOTE:

All classifications are to be based upon VALID indications, reports or conditions. Indications, reports or conditions are considered VALID when they are verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Blanks are provided for place keeping only, logs are the official record.

8.2 **WHEN** indications of abnormal conditions or events exist, **THEN VERIFY** the symptoms/indications **AND COMPARE** the Emergency Action Levels and Fission Product Barrier Thresholds.

8.3 **IDENTIFY** the highest applicable emergency classification level (if multiple EALs are exceeded) for which an EAL has been met or exceeded considering the following:

8.3.1 **EVALUATE** ALL Conditions EAL Matrix under all conditions. \_\_\_\_\_

8.3.2 **IF** Reactor Coolant temperature is  $> 200$  °F, **THEN EVALUATE** HOT Conditions EAL Matrix. \_\_\_\_\_

8.3.3 **IF** Reactor Coolant temperature is  $\leq 200$  °F, **THEN EVALUATE** COLD Conditions EAL Matrix. \_\_\_\_\_

8.3.4 **ANNOUNCE** to Control Room personnel that you are assuming the position of SEC. \_\_\_\_\_

8.3.5 IF the EOF is activated, **THEN** review and complete Attachment 10.3. \_\_\_\_\_

8.3.6 IF an Unusual Event has been declared, **THEN PROCEED** to Attachment 10.4 for an Unusual Event. \_\_\_\_\_

8.3.7 IF an Alert has been declared, **THEN PROCEED** to Attachment 10.5 for an Alert. \_\_\_\_\_

8.3.8 IF a Site Area Emergency has been declared, **THEN PROCEED** to Attachment 10.6 for a Site Area Emergency. \_\_\_\_\_

8.3.9 IF a General Emergency has been declared, **THEN PROCEED** to Attachment 10.7 for a General Emergency. \_\_\_\_\_

## 9.0 RECORDS

9.1 Records generated during a declared emergency should be forwarded to the Emergency Preparedness Unit.

## 10.0 ATTACHMENTS

10.1 PROTECTIVE ACTION RECOMMENDATIONS

10.2 EMERGENCY NOTIFICATION FORM DATA

10.3 TURNOVER/BRIEFING CHECKLIST

10.4 UNUSUAL EVENT

10.5 ALERT

10.6 SITE AREA EMERGENCY

10.7 GENERAL EMERGENCY

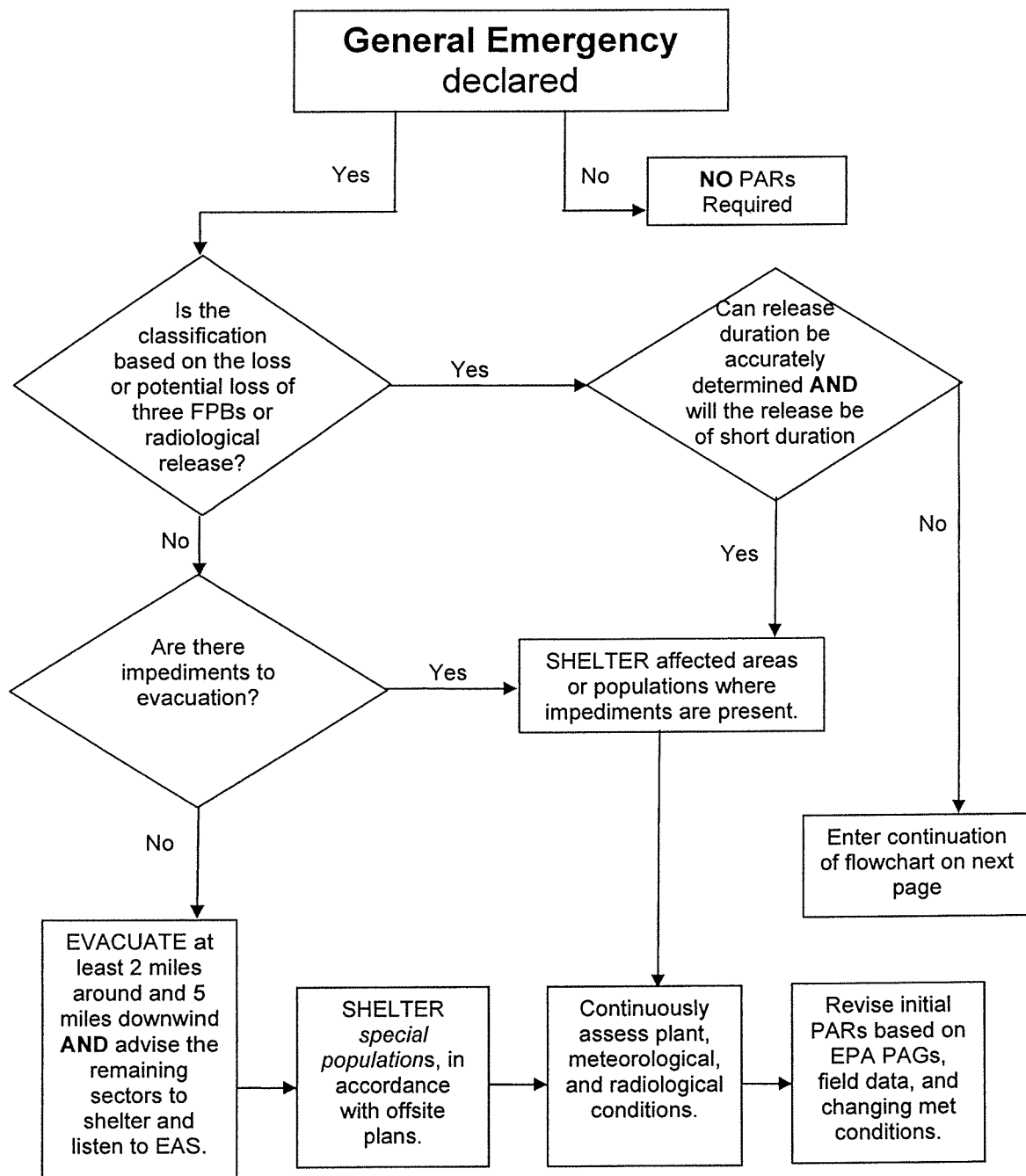
10.8 CR EMERGENCY CONTROL QUICK START GUIDE

10.9 LIST OF TOXIC, ASPHYXIAN and FLAMMABLE GASES

10.10 ERDS ACTIVATION

ATTACHMENT 10.1  
Page 1 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**

FLOWCHART

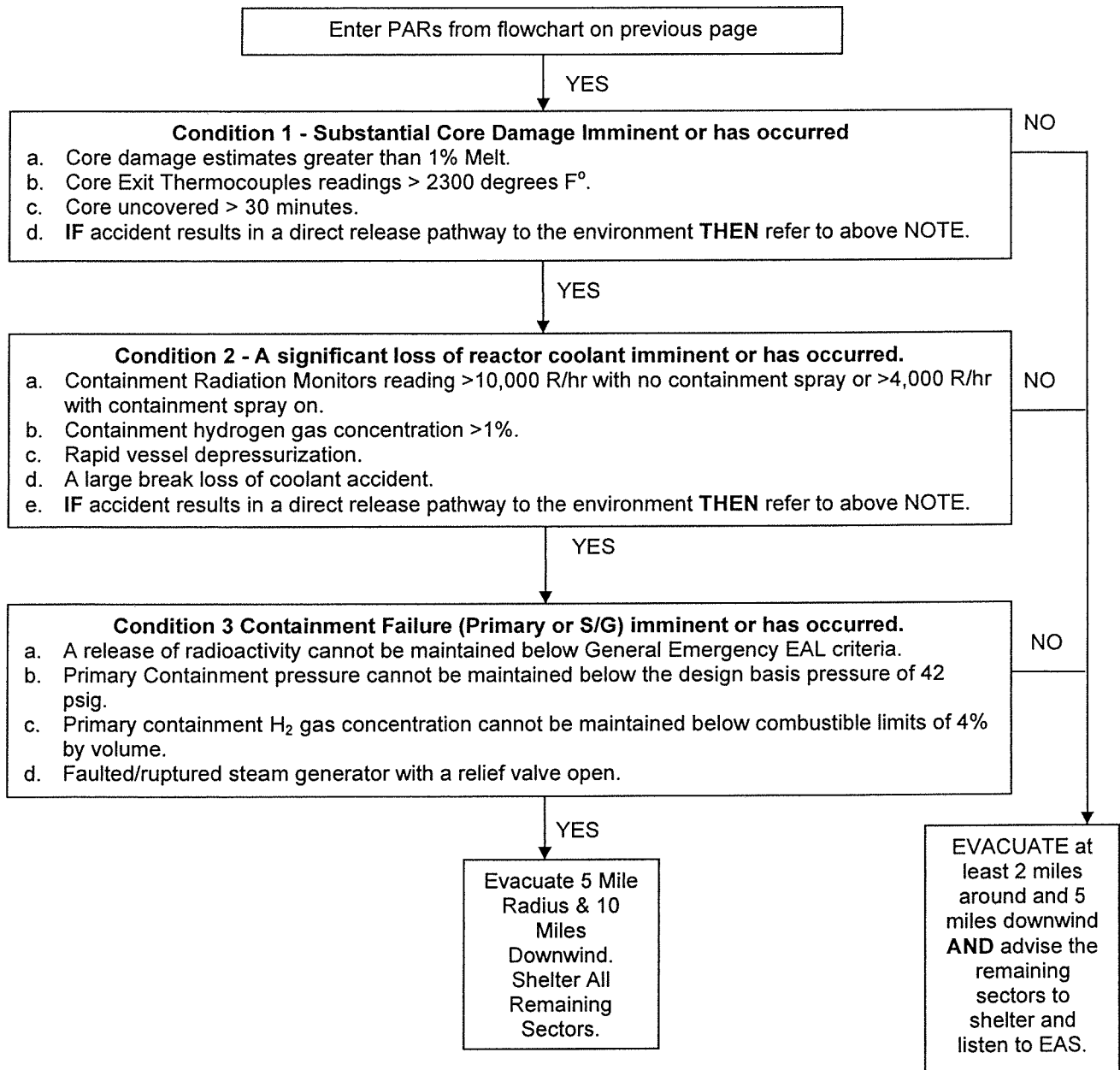




ATTACHMENT 10.1  
Page 2 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**

**NOTE:** Accidents which result in a direct release pathway to the environment (for example, a faulted and ruptured S/G with water level below the tube bundles, S/G Narrow Range < 25% normal containment conditions or < 40% adverse containment conditions, and a relief valve open would provide such a pathway) will most likely be thyroid dose limiting. For circumstances involving this type of accident sequence:

- a. Consider **any** Fuel Cladding Barrier loss sufficient to warrant the determination that substantial core damage has occurred.
- b. Consider **any** RCS Barrier loss sufficient to warrant the determination that a significant loss of reactor coolant has occurred



ATTACHMENT 10.1  
Page 3 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**

GUIDANCE

1. The remaining sectors should be advised to go indoors and monitor the Emergency Alert System (EAS).
2. Sheltering of all sectors should be considered if evacuation poses a higher risk to the public health and safety. The following are examples of these conditions: A General Emergency has been declared and inclement weather is imminent, or a security event with no emergency release.
3. Sheltering should be considered for short term releases. **IF** the release duration cannot be readily or accurately determined, **AND** dose or plant conditions warrant, **THEN** evacuation should be recommended.
4. The offsite agencies are ultimately responsible for making PAR decisions. However when known impediments, i.e. weather conditions, known route restrictions, etc., will hamper evacuation recommendations, then sheltering should be considered.
5. Maximizing the effectiveness of sheltering should be considered. An example of this is:
  - a. The use of qualitative methods for determining the effectiveness of sheltering (certain plant or radiological conditions exist that may increase or decrease dose) **OR**
  - b. The use of quantitative methods for determining the effectiveness of sheltering (comparison of sheltering versus evacuation doses).
6. A protective action recommendation may not be reduced from the initial recommendation for any sector until the release is terminated, and the decision is coordinated with the state and counties.
7. A protective action required for any portion of a sector requires that action be implemented for the entire sector.
8. Containment monitors can provide indication of both core damage and RCS Barrier loss. Monitor values used to determine a specific amount of core damage are dependent on plant conditions, power history and time after shutdown. Monitor readings used to quantify an amount of damage or coolant leakage should be complimented by other indications and engineering judgment.

ATTACHMENT 10.1  
Page 4 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**  
**EPA PROTECTIVE ACTION GUIDE (PAGS)**

FOR THE EARLY PHASE\*

**NOTE:** Protective Action Recommendations (PARs) should be extended to the point (**beyond the 10 mile EPZ**, as necessary) where protective action guideline doses (i.e.,  $\geq 1$  Rem TEDE or  $\geq 5$  Rem CDE (thyroid)) **WILL NOT** be exceeded.

<u>PROTECTIVE ACTION</u>	<u>PAG</u>	<u>COMMENTS</u>
Evacuate	1 Rem TEDE	IF the Total Effective Dose Equivalent (TEDE) dose within a sector whose PAR is Shelter exceeds the PAG, <b>THEN</b> change the PAR for that sector to evacuate. (NCR 00144287)
Evacuate	5 Rem CDE	IF the Committed Dose Equivalent (CDE) dose to the thyroid within a sector whose PAR is Shelter exceeds the PAG, <b>THEN</b> change the PAR for that sector to evacuate. (NCR 00144287)

\*The Early Phase is the time between the beginning of an incident and when the incident source and releases have been brought under control.

ATTACHMENT 10.1  
Page 5 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**

**NOTE:** Conditions identified represent most limiting conditions. For determining sectors to Shelter / Evacuate, either the table below or the sector map may be used.

<u>WIND FROM</u>	<u>POTENTIALLY AFFECTED SECTORS</u>	(EVACUATION TIME IN MINUTES) <sup>2</sup>			
		<u>WINTER WEEKDAY, FAIR WEATHER</u>	<u>WINTER WEEKNIGHT, FAIR WEATHER</u>	<u>SUMMER WEEKDAY, FAIR WEATHER</u>	<u>WINTER WEEKDAY, ADVERSE WEATHER</u>
North (>328° - ≤ 015°)	A-0, B-1, B-2, C-1, C-2, D-1, D-2	225	180	210	295
Northeast (>015° - ≤ 078°)	A-0, C-1, C-2, D-1, D-2, E-1, E-2	225	180	210	295
East (>078° - ≤ 112°)	A-0, D-1, D-2, E-1, E-2	225	180	210	295
Southeast (>112° - ≤ 157°)	A-0, A-1, A-2, D-1, E-1, E-2	225	180	210	295
South (>157° - ≤ 202°)	A-0, A-1, A-2, B-1, B- 2, E-1, E-2	225	180	210	295
Southwest (>202° - ≤ 247°)	A-0, A-1, A-2, B-1, B- 2, E-1, E-2	225	180	210	295
West (>247° - ≤ 292°)	A-0, A-1, A-2, B-1, B- 2, C-1, C-2	225	180	210	295
Northwest (>292° - ≤ 328°)	A-0, B-1, B-2, C-1, C-2, D-2	225	180	210	295
	ALL ZONES (10 MILE RADIUS)	240	180	215	315

1. Minimum recommendation for General Emergency is A-0 (2 mile radius) and affected (downwind) 5 mile radius sectors. The remaining sectors should be advised to shelter and monitor the Emergency Alert System (EAS).
2. Times listed are estimates based on evacuation times listed in the Emergency Plan.

ATTACHMENT 10.1  
Page 6 of 6  
**PROTECTIVE ACTION RECOMMENDATIONS**

(ENF Line 5 B & C)

Place a ✓ in the appropriate block for each sector.			
Radius	Sector	Evacuate	Shelter
2-Mile	A-0		
5-Mile	A-1		
10-Mile	A-2		
5-Mile	B-1		
10-Mile	B-2		
5-Mile	C-1		
10-Mile	C-2		
5-Mile	D-1		
10-Mile	D-2		
5-Mile	E-1		
10-Mile	E-2		

(ENF Line 5 D) **Consider the use of KI (Potassium Iodide) in accordance with State plans and policy.** (circle one) **YES NO**

(ENF Line 5 E) **Other** (specify): \_\_\_\_\_  
\_\_\_\_\_

Recommended By / Date / Time: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
RCD OR RCM

Approved By / Date / Time: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
SEC OR ERM

**EMERGENCY NOTIFICATION FORM DATA**

The following data needs to be provided to the Emergency Operations Facility (EOF) for all emergency classification changes, release status changes, release significance changes, plant condition changes, reactor trips, and during each briefing between facilities. See following page for assistance in determining the categorization of ENF Lines 6 - 8.

**(ENF LINE)**

• **EMERGENCY CLASSIFICATION:**

☐A- UNUSUAL EVENT ☐B- ALERT ☐C- SITE AREA EMERGENCY  
☐D- GENERAL EMERGENCY

BASED ON EAL # \_\_\_\_\_ EAL DESCRIPTION: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. EMERGENCY RELEASE:** ☐A- None ☐B- Is Occurring ☐C- Has Occurred

**7. RELEASE SIGNIFICANCE:**

☐A- Not applicable ☐B- Within normal operating limits  
☐C- Above normal operating limits ☐D- Under evaluation

**8. EVENT PROGNOSIS:** ☐A- Improving ☐B- Stable ☐C- Degrading

**10.** ☐A- DECLARATION ☐B\_ TERMINATION Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**12. Unit Status:** U2 \_\_\_\_\_% Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**EMERGENCY NOTIFICATION FORM DATA****“Emergency Release is Occurring OR has Occurred”**

Emergency release is defined as:

- An approved monitored release was occurring, and the reading on the radiation monitor designated to monitor this release increases due to the event.
- Any release due to the event that was not previously approved.
- Anytime a primary to secondary leak causes an emergency declaration, a release should be considered “is occurring”.

**“Release Significance”**

- IF no emergency release has occurred, THEN select Not Applicable.
- IF an emergency release is in progress or has occurred, AND the release significance has not been determined (no dose projection completed), THEN select *Under Evaluation*.
- IF a dose projection has been completed; THEN IF the projected dose rate at the site boundary is below 25 mRem TEDE AND 75 mRem Thyroid CDE, THEN mark Line 7 as *Within Normal Operating Limits*. Otherwise mark Line 7 as *Above Normal Operating Limits*.

**“Event Prognosis”**

- *Degrading* – There is a probable escalation of the emergency classification, continued deterioration of plant conditions, or an increase in protective action recommendations.
- *Stable* – There are no expected changes in emergency classifications, plant conditions, or protective action recommendations.
- *Improving* – There is a probable downgrade in emergency classification; plant systems are being returned to service; or a probable reduction in protective action recommendations.

## TURNOVER / BRIEFING CHECKLIST

Date/Time: \_\_\_\_\_ (Use ERFIS time)

**A) Emergency Classification**

Time Declared: \_\_\_\_\_ (24 hr)

- ☐ Unusual Event      ☐ Alert  
☐ Site Area      ☐ General

Provide a brief summary of the event and mitigating actions in progress:

EAL: \_\_\_\_\_

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**B) Fission Product Barrier Status**

	<u>Fuel</u>	<u>RCS</u>	<u>Cnmt</u>
Intact:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Potential Loss:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C) Plant Conditions**

- ☐ On-Line      ☐ At Power: \_\_\_\_\_ %  
☐ Off-Line      ☐ Cooling Down  
☐ Cold Shutdown

Time of Rx Shutdown: \_\_\_\_\_ (24 hr)

Prognosis

- ☐ Stable    ☐ Improving    ☐ Degrading

Describe plant and recent activities \_\_\_\_\_

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Describe equipment, instrument, or other problems including equipment that is out of service due to clearance, failures or other conditions:

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ERDS Status: ☐ On-Line    ☐ Off-LineERFIS Status: ☐ On-Line    ☐ Off-Line**D) Radiological Release**

- ☐ None      ☐ Controlled  
☐ Is Occurring      ☐ Uncontrolled  
☐ Has Occurred      ☐ Below PAGs  
☐ Above PAGs

Time Started: \_\_\_\_\_ (24 hr)

Time Stopped: \_\_\_\_\_ (24 hr)

Noble Gas: \_\_\_\_\_ Ci/sec

Iodines: \_\_\_\_\_ Ci/sec

Projected Duration: \_\_\_\_\_ hours

Environmental Monitoring Team activities:

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**E) Personnel Status**Missions in plant: ☐ No    ☐ Yes

Location of in-plant teams/personnel: \_\_\_\_\_

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Injuries (No. \_\_\_\_\_): ☐ No    ☐ YesContamination(s): ☐ No    ☐ YesOver Exposure(s): ☐ No    ☐ Yes☐ Minor    ☐ Major

Details (names of injured, status of family notification):

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**F) Offsite Assistance Requested**

- ☐ None  
☐ Medical \_\_\_\_\_ (24 hr)  
☐ Ambulance  
☐ Darlington Fire Department \_\_\_\_\_ (24 hr)  
☐ Shaw AFB Fire Department \_\_\_\_\_ (24 hr)  
☐ Darlington County Sheriff \_\_\_\_\_ (24 hr)  
☐ S.L.E.D. \_\_\_\_\_ (24 hr)  
☐ F.B.I. \_\_\_\_\_ (24 hr)  
☐ Non-RNP Progress Energy support. \_\_\_\_\_ (24 hr)



**TURNOVER / BRIEFING CHECKLIST**

Date/Time: \_\_\_\_\_ (Use ERFIS time)

**G) Onsite Protective Actions**

- ☐ None
- ☐ Assembly/Accountability \_\_\_\_\_
- ☐ Local Area(s) Evacuated \_\_\_\_\_
- ☐ Protected Area Evacuated \_\_\_\_\_
- ☐ Site Evacuated \_\_\_\_\_
- ☐ Potassium Iodide Issued \_\_\_\_\_
- ☐ Employee Info Phone #: (800) 858-0036

**H) Offsite Notifications (last issued)**

State/County Time: \_\_\_\_\_ (24 hr)

NRC (TSC after T/O) Time: \_\_\_\_\_ (24 hr)

News Release Time: \_\_\_\_\_ (24 hr)

Hospital Time: \_\_\_\_\_ (24 hr)

INPO Time: \_\_\_\_\_ (24 hr)

ANI Time: \_\_\_\_\_ (24 hr)

**I) Security/Fire (this section only required for security events or large scale fires)**

- ☐ N/A    ☐ Security Event    ☐ Fire Event
- ☐ Ground                   ☐ Aircraft
- ☐ Air                           ☐ Explosion
- ☐ Water                   ☐ Other \_\_\_\_\_

Area Threatened: \_\_\_\_\_

Command Post Location: \_\_\_\_\_

Incident Commander: \_\_\_\_\_

Off-site Agency Support: \_\_\_\_\_

Personnel Staging: \_\_\_\_\_

Equipment Staging: \_\_\_\_\_

**J) PARs**

- ☐ None
- (Circle the affected sectors)
- ☐ Evacuate:    A-0 A-1 B-1 C-1 D-1 E-1  
                  A-2 B-2 C-2 D-2 E-2
- ☐ Shelter:      A-0 A-1 B-1 C-1 D-1 E-1  
                  A-2 B-2 C-2 D-2 E-2
- ☐ Consideration of the use of KI

**K) Offsite Facility Activation Status**

- ☐ Darlington County EOC: \_\_\_\_\_ (24 hr)
- ☐ Chesterfield County EOC: \_\_\_\_\_ (24 hr)
- ☐ Lee County EOC: \_\_\_\_\_ (24 hr)
- ☐ State EOC: \_\_\_\_\_ (24 hr)
- ☐ NRC Incident Response Center: \_\_\_\_\_ (24 hr)

**L) Offsite Actions/Response**

- ☐ None
- ☐ Evacuations (Circle the affected sectors)
- ☐ A-0 A-1 B-1 C-1 D-1 E-1 A-2 B-2 C-2  
                  D-2 E-2
- ☐ Schools                   ☐ Daycares
- ☐ Hospitals               ☐ Assisted Living
- ☐ Lake
- ☐ Other: \_\_\_\_\_
- ☐ Shelter: (Circle the affected sectors)
- ☐ A-0 A-1 B-1 C-1 D-1 E-1 A-2 B-2 C-2  
                  D-2 E-2
- ☐ KI administered to the General Public
- ☐ Sirens Activated: \_\_\_\_\_ (24 hr)
- ☐ EAS Activated: \_\_\_\_\_ (24 hr)

**M) Facility Activation Status**

If TSC is not ready for activation, can the TSC accept responsibility for:

Notification to NRC: ☐ N/A    ☐ No

☐ Yes

If EOF is not yet ready for activation, can the EOF accept responsibility for:

Emergency Communicator Communications to State and Counties (ENF must still be approved by SEC)

☐ No                                   ☐ Yes

Dose Assessment               ☐ No               ☐ Yes

- ☐ EOF Fully Activated: \_\_\_\_\_ (24 hr)
- ☐ TSC Fully Activated: \_\_\_\_\_ (24 hr)
- ☐ OSC Fully Activated: \_\_\_\_\_ (24 hr)
- ☐ JIC Fully Activated: \_\_\_\_\_ (24 hr)
- ☐ RERF Fully Activated: \_\_\_\_\_ (24 hr)

Additional comments should be recorded on the reverse side or in electronic logging.

**UNUSUAL EVENT****CONTROL ROOM SEC CHECKLIST**

**NOTE:** Proceed to page 3 of this attachment if the checklist was completed previously

Classification	Facility Activation	Site Evacuation	ERDS Activation
Unusual Event	SEC Decision	SEC Decision	SEC Decision

- ☐ Time Event Declared: \_\_\_\_\_ Notification Due By: \_\_\_\_\_
- ☐ Direct the CR-EC to report to the Control Room or alternate location to support emergency notification activities.
- ☐ Make site-wide PA Announcement about the event.
- ☐ WebEOC – User = SSO/SEC-CR – No Password – Select EN form – Select Create Draft
- ☐ If conditions warrant, call the Shift RC Tech to the Main Control Room to perform Habitability analyses.
- ☐ Activate ERDS within 1 hour, if needed, using Attachment 10.10.

**NOTE:** To meet regulatory requirements, accountability for personnel inside the protected area is required within 30 minutes of the declaration of a SAE or GE. This includes names of missing personnel. If accountability is delayed due to adverse site conditions (e.g., hostile action), accountability must be completed as promptly as is practical once the site is secure.

- ☐ For Site Evacuation;
  - Wind from 135 to 340 evacuate to Admin Building Lower Level,
  - Wind from 341 to 134 evacuate to the South End of Building 110 next to the lake.
- ☐ Complete Emergency Notification Form – Approve and Fax.
- ☐ Emergency Communicator Performs ENF and NRC Notifications.
- ☐ Prepare for facility turnover to the TSC, using EPCLA-01, Attachment 10.3.

Referenced Procedures

EPNOT-01 – CR/EOF Emergency Communicator

EPSPA-01 – Evacuation and Accountability

EPSPA-02 – First Aid and Medical Care

EPSPA-03 – Administration of Potassium Iodine

EPCLA-04 – Emergency Action Level Technical Bases Document

EPOSC-04 – Emergency Work Control

ATTACHMENT 10.4  
Page 2 of 11  
**UNUSUAL EVENT**

**Emergency Notification Form Information**

**“Emergency Release is Occurring OR has Occurred”**

Emergency release is defined as:

- An approved monitored release was occurring, and the reading on the radiation monitor designated to monitor this release increases due to the event.
- Any release due to the event that was not previously approved.
- Anytime a primary to secondary leak causes an emergency declaration, a release should be considered “is occurring”.

**“Release Significance”**

- IF no emergency release has occurred, THEN select Not Applicable.
- IF an emergency release is in progress or has occurred, AND the release significance has not been determined (no dose projection completed), THEN select *Under Evaluation*.
- IF a dose projection has been completed; THEN IF the projected dose rate at the site boundary is below 25 mRem TEDE AND 75 mRem Thyroid CDE, THEN mark Line 7 as *Within Normal Operating Limits*. Otherwise mark Line 7 as *Above Normal Operating Limits*.

**“Event Prognosis”**

- *Degrading* – There is a probable escalation of the emergency classification, continued deterioration of plant conditions, or an increase in protective action recommendations.
- *Stable* – There are no expected changes in emergency classifications, plant conditions, or protective action recommendations.
- *Improving* – There is a probable downgrade in emergency classification; plant systems are being returned to service; or a probable reduction in protective action recommendations.

ATTACHMENT 10.4  
Page 3 of 11  
**UNUSUAL EVENT**

**NOTE:** The steps in this attachment may be performed in any order or concurrently.

**CAUTION**

The Shift Manager/SEC may NOT direct other individuals to perform the following actions:

- The decision to notify offsite authorities;
- Classifying or terminating the emergency
- Authorizing exposures in excess of 10CFR20 limits during a declared emergency

1. **DIRECT** the Emergency Communicator (EC) to immediately report to the Control Room or alternate location if access to the Control Room is not possible. Options may include the WCC, TSC or EOF.
2. **IF** the EC is not available, **THEN DESIGNATE** an alternate qualified individual such as another AO, the CRS or SM.
3. **INFORM** the crew that an UNUSUAL EVENT has been declared.

**NOTE:** PA announcements will remain the responsibility of the Control Room.

4. **DIRECT** the "VLC" switch be placed in "Emergency".

**NOTE:** Assembly of non-essential personnel is not required at an UNUSUAL EVENT. Consider hazards that may exist onsite to determine if assembly is needed or personnel should shelter in place. Safety of plant personnel is the priority. If the ERO will be activated, then activations should occur within five (5) minutes of the emergency classification. The SEC **OR** the EC can contact Security for activation of the ERO.

5. **IF** activation of the ERO is necessary, **THEN INITIATE** actions to activate the ERO, using EMG-NGGC-0005 and EPNOT-01.
  - a. **IF** the emergency is a Security event, **THEN DIRECT** the EC to activate the ERO.
  - b. **IF** the emergency is for other reasons, **THEN DIRECT** Security to activate the ERO.

**UNUSUAL EVENT**

6. **PROVIDE** the following to be used for activation.
- a. Emergency Classification: **UNUSUAL EVENT**
  - b. **IF** facility activation is desired, **THEN DESIGNATE** the location the ERO will report to by circling
    - i. Onsite (Normal) Facility
    - ii. Remote (Rail Road Avenue) Facility
  - c. **DESIGNATE** the type of Notification by circling
    - i. Emergency
    - ii. Drill/Training
7. **OBTAIN** wind direction.

**NOTE:** Shift Manager/Site Emergency Coordinator may select any of the announcement options or create a message at his/her discretion.

**CAUTION**

Consider hazards on-site, such as toxic gas, when deciding an assembly location.

During a security event, delaying the announcement to staff the facilities and moving non-essential personnel until movement is safe will provide an additional measure of protection for site personnel.

8. **PREPARE** site wide announcement **AND SELECT** an assembly area if needed.
- a. **DETERMINE** the appropriate Emergency Response Facilities based on habitability and accessibility **AND SELECT** in step 10.
  - b. **IF** assembly of non-essential personnel is desired, **THEN DETERMINE** the location based on wind direction **AND SELECT** in Step 10.
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.
  - c. **DETERMINE** if non-essential personnel should shelter in place.

ATTACHMENT 10.4  
Page 5 of 11  
**UNUSUAL EVENT**

**NOTE:** To avoid confusion, a site evacuation should only be initiated once.

This announcement can be made by the SEC or EC.

9. IF assembly is desired, **THEN DIRECT** the site evacuation alarm to be sounded for 5 seconds and repeated as necessary.

10. **ANNOUNCE:**

***Attention all personnel, attention all personnel, at \_\_\_\_\_ (state time of declaration) an UNUSUAL EVENT has been declared.***

a. ***No facility activation is required.***

b. ***All Emergency Response personnel report to:***

- ☐ ***the normal ERO facilities.***
- ☐ ***the Remote Emergency Response Facility.***
- ☐ ***All non-essential personnel remain clear of the emergency response facilities (and, if necessary, the areas near the event location)."***
- ☐ ***All non-essential Personnel report to\_***
  - ☐ ***Interior Lower Level of the Unit 2 Administrative Building***
  - ☐ ***South End of Building 110 next to Lake Robinson immediately."***
- ☐ ***All non-essential Personnel shelter in place***

***Use of the Public Address System is restricted to emergency communications only"***

11. IF assembly of non-essential personnel was directed, **THEN REPEAT** the sounding of the site evacuation alarm.
12. **REPEAT** the announcement created in Step 10.
13. IF a radiological release is in progress, **THEN DIRECT** the performance of dose projections using EPRAD-03, Dose Projections.

ATTACHMENT 10.4  
Page 6 of 11  
**UNUSUAL EVENT**

**NOTE:** A copy of the ENF is provided at the end of this attachment should WebEOC become unavailable.

14. **OPEN** electronic Emergency Notification Form (ENF) in WebEOC.
  - a. **SELECT** Start/Programs/Emergency Preparedness/RNP/WebEOC.
  - b. **SELECT** "SSO/SEC-CR" as the user.
  - c. Password is not required.
  - d. **SELECT** "OK".
  - e. **SELECT** "HBR Actual" for an emergency.
  - f. **SELECT** "EN Form" under "Plugins".
  - g. **SELECT** "Create Draft".

**NOTE:** A peer check of the completed ENF is recommended prior to distribution to the offsite agencies.

15. **COMPLETE** the ENF.
16. **DIRECT** EC to review ENF with the offsite agencies.
17. **IF** requested, **THEN DIRECT** the activation of ERDS within 1 hour of the classification in accordance with Attachment 10.10.
18. **PREPARE** for the Facility Turnover, using EPCLA-01, Attachment 10.3.

## ATTACHMENT 10.4

Page 7 of 11

### UNUSUAL EVENT

#### Guidance

1. Determine if there are any personnel injuries.
  - a. Give priority to lifesaving activities over radiological exposure control; authorize exposures in excess of normal limits, if required.
  - b. Refer to EPSPA-02, "First Aid and Medical Care", for additional guidance on first aid and transportation of contaminated injured personnel.
2. Determine if onsite protective actions are necessary by evaluating radiological, chemical, and other situations which may require evacuation or sheltering.
  - a. For events involving an offsite toxic OR flammable hazard, additional information and suggested protective actions for onsite personnel can be obtained from the state/county emergency management/response agencies responding to the hazardous incident, i.e., contact Darlington's 911 Dispatch Center or Emergency Management Division for additional information on accidents in their area. (NCR 00140579)
  - b. For events involving an offsite toxic gas, when sheltering in place is warranted, ensure a Site-Wide PA announcement is made to secure ventilation systems IAW EPSPA-01.

<b>NOTE:</b> Reference AOP-034, "Security Events" for guidance and the actions to take for aircraft threats.
--

3. For security events consider the following:
  - a. Local Evacuation of personnel from target sets (including Security personnel).
  - b. Site Evacuation by opening (while continuing to defend) security gates.
  - c. Dispersal of Licensed Operators.
  - d. Sheltering personnel in structures away from potential site targets.
  - e. Arrangements for accounting for personnel after the threat.
  - f. ERO Augmentation at the Remote Emergency Response Facility.
  - g. Evaluate possible severe weather protective actions. (NCR # 22292)
4. If evacuation or sheltering is necessary, then implement EPSPA-01, "Evacuation and Accountability."



## ATTACHMENT 10.4

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### UNUSUAL EVENT Guidance

5. If administration of potassium iodide is necessary, then implement EPSPA-03, "Administration of Potassium Iodide."
6. Request any offsite assistance necessary;
  - a. The Unit 2 Control Room OR Security should contact Darlington County 911 Center for fire, police, or ambulance service. Logistics personnel may contact the 911 Center, if Control Room staff is unable to request assistance.
  - b. Contact other agencies, as necessary; selected offsite agency numbers are maintained in the Emergency Response Organization (ERO) Phone Book.
7. Activate the appropriate Emergency Response Facilities (ERFs).
  - a. For an UNUSUAL EVENT, no activation is required. Facilities may be activated at the discretion of the SEC.
  - b. Select the location based on habitability and accessibility
    - i. The EOF, TSC, OSC, and JIC are the normal ERFs
    - ii. The back-up TSC and EOF is the Remote Emergency Response Facility (RERF) in Hartsville.
    - iii. The back-up OSC, as defined in EPOSC-01, "Operational Support Center Leader", is the TSC or it may be the RERF.
  - c. The Remote Facility may be activated for any event, but normally would be activated for Security Events where reporting to the site may not be safe for the ERO.
  - d. If an assembly of non-essential personnel is requested, or if hazards require sheltering onsite and it will not jeopardize the safety of plant personnel, then pick a location to assemble personnel based on appropriate upwind direction. (see EPSPA-01, "Evacuation and Accountability" for alternate shelter locations).
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.

ATTACHMENT 10.4

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**UNUSUAL EVENT  
Guidance**

8. Follow up notifications to offsite agencies are required at least every 30-60 minutes.
9. Initiate electronic logging.
10. Direct shift personnel to mitigate the emergency conditions.
11. If the dispatch of personnel may cause excessive exposure due to unknown or elevated radiological conditions, then refer to EPOSC-04, "Emergency Work Control", for additional guidance regarding personnel emergency exposure control and team dispatch.
12. Continue to assess the plant status against the EALs to confirm, upgrade, or downgrade the emergency classification.
13. Additional information for completion of the Emergency Notification Form is located in EPNOT-01, "CR/EOF Emergency Communicator."
14. If the state or county facilities have been activated, then they shall be consulted prior to any downgrade of emergency classification.
15. If not previously completed, then using the EPCLA-01, Attachment 10.3, perform a turnover with the TSC SEC and the EOF.
16. Perform PA announcements periodically to update personnel in the field of any changing plant conditions.
17. If plant conditions permit, then coordinate with any offsite agencies, which have activated, and terminate the emergency.

<b>NOTE:</b> Termination is a change in classification and has a 15 minute notification time requirement.
---

- a. If the event is being terminated, then direct the Emergency Communicator to make termination notifications to all agencies.

<b>NOTE:</b> The following step is not required if ERDS has not been activated.
---

- b. If NOT previously terminated by the Nuclear Regulatory Commission (NRC), then coordinate the termination of ERDS.
- c. Termination of the event should be communicated by Everbridge using termination codes in EMG-NGGC-0005 or EPNOT-01.
- d. Perform PA announcement that the event has been terminated.
- e. Notify EP staff to clear WEBEOC ENF queue as soon as practical.

## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

1. ☒ DRILL ☐ ACTUAL EVENT MESSAGE # \_\_\_\_\_
2. ☒ INITIAL ☐ FOLLOW-UP NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_ AUTHENTICATION # \_\_\_\_\_
3. SITE: \_\_\_\_\_ Confirmation Phone # (\_\_\_\_) \_\_\_\_\_

4. EMERGENCY CLASSIFICATION: ☒ UNUSUAL EVENT EMERGENCY ☐ ALERT ☐ SITE AREA EMERGENCY ☐ GENERAL  
 BASED ON EAL # \_\_\_\_\_ EAL DESCRIPTION: \_\_\_\_\_

5. PROTECTIVE ACTION RECOMMENDATIONS: ☒ NONE  
☐ EVACUATE \_\_\_\_\_  
☐ SHELTER \_\_\_\_\_  
☐ CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH STATE PLANS AND POLICY.  
☐ OTHER \_\_\_\_\_

6. EMERGENCY RELEASE: ☒ None ☐ Is Occurring ☐ Has Occurred
7. RELEASE SIGNIFICANCE: ☒ Not applicable ☐ Within normal operating limits ☐ Above normal operating limits ☐ Under evaluation
8. EVENT PROGNOSIS: ☒ Improving ☐ Stable ☐ Degrading
9. METEOROLOGICAL DATA: Wind Direction\* from \_\_\_\_\_ degrees Wind Speed\* \_\_\_\_\_ mph  
 (\*May not be available for Initial Notifications) Precipitation\* \_\_\_\_\_ Stability Class\* ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

10. ☒ DECLARATION ☐ TERMINATION Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_
11. AFFECTED UNIT(S): ☒ 1 ☐ 2 ☐ 3 ☒ All
12. UNIT STATUS: U1 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 (Unaffected Unit(s) Status Not Required for Initial Notifications) U2 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 U3 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

13. REMARKS: \_\_\_\_\_

## FOLLOW-UP INFORMATION (Lines 14 through 16 Not Required for Initial Notifications)

## EMERGENCY RELEASE DATA. NOT REQUIRED IF LINE 6 A IS SELECTED.

14. RELEASE CHARACTERIZATION: TYPE: ☒ Elevated ☐ Mixed ☐ Ground UNITS: ☒ Ci ☐ Ci/sec ☐  $\mu$ Ci/sec  
 MAGNITUDE: Noble Gases: \_\_\_\_\_ Iodines: \_\_\_\_\_ Particulates: \_\_\_\_\_ Other: \_\_\_\_\_  
 FORM: ☒ Airborne Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
☐ Liquid Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_
15. PROJECTION PARAMETERS: Projection period: \_\_\_\_\_ Hours Estimated Release Duration \_\_\_\_\_ Hours  
 Projection performed: Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_
16. PROJECTED DOSE: DISTANCE TEDE (mRem) Adult Thyroid CDE (mRem)  
 Site boundary \_\_\_\_\_  
 2 Miles \_\_\_\_\_  
 5 Miles \_\_\_\_\_  
 10 Miles \_\_\_\_\_
17. APPROVED BY: \_\_\_\_\_ Title \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 NOTIFIED BY: \_\_\_\_\_ RECEIVED BY: \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

ATTACHMENT 10.4  
Page 11 of 11  
**NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM**

MESSAGE NUMBER \_\_\_\_\_

**GOVERNMENT AGENCIES NOTIFIED**

NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_\_  AUTHENTICATION# \_\_\_\_\_

10.1.1.1 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County EOC**

10.1.1.2 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County WP**

10.1.1.3 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County EOC**

10.1.1.4 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County WP**

10.1.1.5 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County EOC**

10.1.1.6 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County WP**

10.1.1.7 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC Resident Inspector**

10.1.1.8 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC (via ETS or Bell Phone)**

10.1.1.9 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC BWP**

10.1.1.10 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC WP**

## ATTACHMENT 10.5

Page 1 of 11

## ALERT

## CONTROL ROOM SEC CHECKLIST

**NOTE:** Proceed to page 3 of this attachment if the checklist was completed previously

Classification	Facility Activation	Site Evacuation	ERDS Activation
Alert	Mandatory	Encouraged	Mandatory

Time Event Declared: \_\_\_\_\_ Notification Due By: \_\_\_\_\_

- ☐ Direct the CR-EC to report to the Control Room or alternate location to support emergency notification activities.
- ☐ Make site-wide PA Announcement about the event.
- ☐ WebEOC – User = SSO/SEC-CR – No Password – Select EN form – Select Create Draft
- ☐ If conditions warrant, call the Shift RC Tech to the Main Control Room to perform Habitability analyses.
- ☐ Activate ERDS within 1 hour, if needed, using Attachment 10.10.

**NOTE:** To meet regulatory requirements, accountability for personnel inside the protected area is required within 30 minutes of the declaration of a SAE or GE. This includes names of missing personnel. If accountability is delayed due to adverse site conditions (e.g., hostile action), accountability must be completed as promptly as is practical once the site is secure.

- ☐ For Site Evacuation;
  - Wind from 135 to 340 evacuate to Admin Building Lower Level,
  - Wind from 341 to 134 evacuate to the South End of Building 110 next to the lake.
- ☐ Complete Emergency Notification Form – Approve and Fax.
- ☐ Emergency Communicator Performs ENF and NRC Notifications.
- ☐ Prepare for facility turnover to the TSC, using EPCLA-01, Attachment 10.3.

Referenced Procedures

EPNOT-01 – CR/EOF Emergency Communicator

EPSPA-01 – Evacuation and Accountability

EPSPA-02 – First Aid and Medical Care

EPSPA-03 – Administration of Potassium Iodine

EPCLA-04 – Emergency Action Level Technical Bases Document

EPOSC-04 – Emergency Work Control

ATTACHMENT 10.5

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**ALERT**

**Emergency Notification Form Information**

**“Emergency Release is Occurring OR has Occurred”**

Emergency release is defined as:

- An approved monitored release was occurring, and the reading on the radiation monitor designated to monitor this release increases due to the event.
- Any release due to the event that was not previously approved.
- Anytime a primary to secondary leak causes an emergency declaration, a release should be considered “is occurring”.

**“Release Significance”**

- IF no emergency release has occurred, THEN select Not Applicable.
- IF an emergency release is in progress or has occurred, AND the release significance has not been determined (no dose projection completed), THEN select *Under Evaluation*.
- IF a dose projection has been completed; THEN IF the projected dose rate at the site boundary is below 25 mRem TEDE AND 75 mRem Thyroid CDE, THEN mark Line 7 as *Within Normal Operating Limits*. Otherwise mark Line 7 as *Above Normal Operating Limits*.

**“Event Prognosis”**

- *Degrading* – There is a probable escalation of the emergency classification, continued deterioration of plant conditions, or an increase in protective action recommendations.
- *Stable* – There are no expected changes in emergency classifications, plant conditions, or protective action recommendations.
- *Improving* – There is a probable downgrade in emergency classification; plant systems are being returned to service; or a probable reduction in protective action recommendations.

ATTACHMENT 10.5  
Page 3 of 11  
**ALERT**

**NOTE:** The steps in this attachment may be performed in any order or concurrently.

**CAUTION**

The Shift Manager/SEC may NOT direct other individuals to perform the following actions:

- The decision to notify offsite authorities
- Classifying or terminating the emergency
- Authorizing exposures in excess of 10CFR20 limits during a declared emergency

1. **DIRECT** the Emergency Communicator (EC) to immediately report to the Control Room or alternate location if access to the Control Room is not possible. Options may include the WCC, TSC or EOF.
2. **IF** the EC is not available, **THEN DESIGNATE** an alternate qualified individual such as another AO, the CRS or SM.
3. **INFORM** the crew that an ALERT has been declared.

**NOTE:** PA announcements will remain the responsibility of the Control Room.

4. **DIRECT** the "VLC" switch be placed in "Emergency".

**NOTE:** Assembly of non-essential personnel is not required at an ALERT. Consider hazards that may exist onsite to determine if assembly is needed or personnel should shelter in place. Safety of plant personnel is the priority.

If the ERO will be activated, then activations should occur within five (5) minutes of the emergency classification.

The SEC **OR** the EC can contact Security for activation of the ERO.

5. **IF** activation of the ERO is necessary, **THEN INITIATE** actions to activate the ERO, using EMG-NGGC-0005 and EPNOT-01.
  - a. **IF** the emergency is a Security event, **THEN DIRECT** the EC to activate the ERO.
  - b. **IF** the emergency is for other reasons, **THEN DIRECT** Security to activate the ERO.

ATTACHMENT 10.5

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**ALERT**

6. **PROVIDE** the following to be used for activation.
  - a. Emergency Classification: **ALERT**
  - b. **IF** facility activation is desired, **THEN DESIGNATE** the location the ERO will report to by circling
    - i. Onsite (Normal) Facility)
    - ii. Remote (Rail Road Avenue) Facility)
  - c. **DESIGNATE** the type of Notification by circling
    - i. Emergency
    - ii. Drill/Training
7. **OBTAIN** wind direction.

**CAUTION**

Consider hazards on-site, such as toxic gas, when deciding an assembly location. During a security event, delaying the announcement to staff the facilities and moving non-essential personnel until movement is safe will provide an additional measure of protection for site personnel.

8. **PREPARE** site wide announcement
  - a. **DETERMINE** the appropriate Emergency Response Facilities based on habitability and accessibility **AND SELECT** in step 10.
  - b. **IF** assembly of non-essential personnel is desired, **THEN DETERMINE** the location based on wind direction. **AND SELECT** in step 10.
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.
  - c. **DETERMINE** if non-essential personnel should shelter in place.



ATTACHMENT 10.5

Page 5 of 11

**ALERT**

**NOTE:** To avoid confusion, a site evacuation should only be initiated once.

This announcement can be made by the SEC or EC.

9. IF assembly is desired, **THEN DIRECT** the site evacuation alarm to be sounded for 5 seconds and repeated as necessary.

10. **ANNOUNCE:**

***Attention all personnel, attention all personnel, at \_\_\_\_\_ (state time of declaration) an ALERT has been declared. All Emergency Response personnel report to:***

- ☐ **the normal ERO facilities.**
- ☐ **the Remote Emergency Response Facility.**
- ☐ ***All non-essential personnel remain clear of the emergency response facilities.*** (and, if necessary, the areas near the event location)."
- ☐ ***All non-essential Personnel report to***
  - ☐ **The Interior Lower Level of the Unit 2 Administrative Building.**
  - ☐ **The South End of Building 110 next to Lake Robinson**  
immediately.
- ☐ ***All non-essential personnel shelter in place.***

***Use of the Public Address System is restricted to emergency communications only.***

11. IF assembly of non-essential personnel was directed, **THEN REPEAT** the sounding of the site evacuation alarm.

ATTACHMENT 10.5  
Page 6 of 11  
**ALERT**

**NOTE:** A copy of the ENF is provided at the end of this attachment should WebEOC become unavailable.

12. **OPEN** electronic Emergency Notification Form (ENF) in WebEOC.
- ☐ **SELECT** Start/Programs/Emergency Preparedness/RNP/WebEOC.
  - ☐ **SELECT** "SSO/SEC-CR" as the user.
  - ☐ Password is not required.
  - ☐ **SELECT** "OK".
  - ☐ **SELECT** "HBR Actual" for an emergency.
  - ☐ **SELECT** "EN Form" under "Plugins".
  - ☐ **SELECT** "Create Draft".

**NOTE:** A peer check of the completed ENF is recommended prior to distribution to the offsite agencies.

13. **COMPLETE** the ENF.
14. **DIRECT** EC to review ENF with the offsite agencies.
15. **DIRECT** activation of ERDS within 1 hour of the classification in accordance with Attachment 10.10 if needed.
16. **PREPARE** for the Facility Turnover, using EPCLA-01, Attachment 10.3..

ATTACHMENT 10.5

Page 7 of 11

**ALERT**

**Guidance**

1. Determine if there are any personnel injuries.
  - a. Give priority to lifesaving activities over radiological exposure control; authorize exposures in excess of normal limits, if required.
  - b. Refer to EPSPA-02, "First Aid and Medical Care", for additional guidance on first aid and transportation of contaminated injured personnel.
2. Determine if onsite protective actions are necessary by evaluating radiological, chemical, and other situations which may require evacuation or sheltering.
  - a. For events involving an offsite toxic OR flammable hazard, additional information and suggested protective actions for onsite personnel can be obtained from the state/county emergency management/response agencies responding to the hazardous incident, i.e., contact Darlington's 911 Dispatch Center or Emergency Management Division for additional information on accidents in their area. (NCR 00140579)
  - b. For events involving an offsite toxic gas, when sheltering in place is warranted, ensure a Site-Wide PA announcement is made to secure ventilation systems IAW EPSPA-01.

<p><b>NOTE:</b> Reference AOP-034, "Security Events" for guidance and the actions to take for aircraft threats.</p>
---

3. For security events consider the following:
  - a. Local Evacuation of personnel from target sets (including Security personnel).
  - b. Site Evacuation by opening (while continuing to defend) security gates.
  - c. Dispersal of Licensed Operators.
  - d. Sheltering personnel in structures away from potential site targets.
  - e. Arrangements for accounting for personnel after the threat.
  - f. ERO Augmentation at the Remote Emergency Response Facility.
  - g. Evaluate possible severe weather protective actions. (NCR # 22292)
4. If evacuation or sheltering is necessary, then implement EPSPA-01, "Evacuation and Accountability."

## ATTACHMENT 10.5

Page 8 of 11

### ALERT

#### Guidance

5. If administration of potassium iodide is necessary, then implement EPSPA-03, "Administration of Potassium Iodide."
6. Request any offsite assistance necessary;
  - a. The Unit 2 Control Room OR Security should contact Darlington County 911 Center for fire, police, or ambulance service. Logistics personnel may contact the 911 Center, if Control Room staff is unable to request assistance.
  - b. Contact other agencies, as necessary; selected offsite agency numbers are maintained in the Emergency Response Organization (ERO) Phone Book.
7. Activate the appropriate Emergency Response Facilities (ERFs).
  - a. Select the location based on habitability and accessibility.
    - i. The EOF, TSC, OSC, and JIC are the normal ERFs.
    - ii. The back-up TSC and EOF is the Remote Emergency Response Facility (RERF) in Hartsville.
    - iii. The Remote Facility may be activated for any event, but normally would be activated for Security Events where reporting to the site may not be safe for the ERO.
  - b. The back-up OSC, as defined in EPOSC-01, "Operational Support Center Leader", is the TSC, or it may be the RERF.
  - c. If an assembly of non-essential personnel is requested, or if hazards require sheltering onsite, and it will not jeopardize the safety of plant personnel, then pick a location to assemble personnel based on appropriate upwind direction. (see EPSPA-01, "Evacuation and Accountability" for alternate shelter locations).
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson
8. Follow up notifications to offsite agencies are required at least every 30-60 minutes.
9. Initiate electronic logging.

**ALERT****Guidance**

10. Direct shift personnel to mitigate the emergency conditions.
11. If the dispatch of personnel may cause excessive exposure due to unknown or elevated radiological conditions, then refer to EPOSC-04, "Emergency Work Control", for additional guidance regarding personnel emergency exposure control and team dispatch.
12. Continue to assess the plant status against the EALs to confirm, upgrade, or downgrade the emergency classification.
13. Additional information for completion of the Emergency Notification Form is located in EPNOT-01, "CR/EOF Emergency Communicator."
14. Forms for recording data are located in EPNOT-01, "CR/EOF Emergency Communicator."
15. If the State or County facilities have been activated, then they shall be consulted prior to any downgrade of emergency classification.
16. If not previously completed, then using EPCLA-01, Attachment 10.3, perform a turnover with the TSC SEC and the EOF.
17. Perform PA announcements periodically to update personnel in the field of any changing plant conditions.
18. If plant conditions permit, then coordinate with any offsite agencies, which have activated, and terminate the emergency.

<b>NOTE:</b>	Termination is a change in classification and has a 15 minute notification time requirement.
--------------	--

- a. If the event is being terminated, then direct the Emergency Communicator to make termination notifications to all agencies.
- b. If NOT previously terminated by the Nuclear Regulatory Commission (NRC), then coordinate the termination of ERDS.
- c. Termination of the event should be communicated by Everbridge using termination codes in EMG-NGGC-0005 or EPNOT-01.
- d. Perform PA announcement that the event has been terminated.
- e. Notify EP staff to clear WEBEOC ENF queue as soon as practical.

## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

1. ☒ DRILL ☐ ACTUAL EVENT MESSAGE # \_\_\_\_\_  
 2. ☒ INITIAL ☐ FOLLOW-UP NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_ AUTHENTICATION # \_\_\_\_\_  
 3. SITE: \_\_\_\_\_ Confirmation Phone # (\_\_\_\_) \_\_\_\_\_

4. EMERGENCY CLASSIFICATION: ☒ UNUSUAL EVENT ☐ ALERT ☐ SITE AREA EMERGENCY ☐ GENERAL EMERGENCY  
 BASED ON EAL # \_\_\_\_\_ EAL DESCRIPTION: \_\_\_\_\_

5. PROTECTIVE ACTION RECOMMENDATIONS: ☒ NONE

☐ EVACUATE \_\_\_\_\_  
☐ SHELTER \_\_\_\_\_  
☐ CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH STATE PLANS AND POLICY.  
☐ OTHER \_\_\_\_\_

6. EMERGENCY RELEASE: ☒ None ☐ Is Occurring ☐ Has Occurred

7. RELEASE SIGNIFICANCE: ☒ Not applicable ☐ Within normal operating limits ☐ Above normal operating limits ☐ Under evaluation

8. EVENT PROGNOSIS: ☒ Improving ☐ Stable ☐ Degrading  
 9. METEOROLOGICAL DATA: Wind Direction\* from \_\_\_\_\_ degrees Wind Speed\* \_\_\_\_\_ mph  
 (\*May not be available for Initial Notifications) Precipitation\* \_\_\_\_\_ Stability Class\* ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

10. ☒ DECLARATION ☐ TERMINATION Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

11. AFFECTED UNIT(S): ☒ 1 ☐ 2 ☐ 3 ☒ All

12. UNIT STATUS: U1 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 (Unaffected Unit(s) Status Not Required for Initial Notifications) U2 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 U3 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

13. REMARKS: \_\_\_\_\_

## FOLLOW-UP INFORMATION (Lines 14 through 16 Not Required for Initial Notifications)

## EMERGENCY RELEASE DATA. NOT REQUIRED IF LINE 6 A IS SELECTED.

14. RELEASE CHARACTERIZATION: TYPE: ☒ Elevated ☐ Mixed ☐ Ground UNITS: ☒ Ci ☐ Ci/sec ☐  $\mu$ Ci/sec

MAGNITUDE: Noble Gases: \_\_\_\_\_ Iodines: \_\_\_\_\_ Particulates: \_\_\_\_\_ Other: \_\_\_\_\_

FORM: ☒ Airborne Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
☐ Liquid Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

15. PROJECTION PARAMETERS: Projection period: \_\_\_\_\_ Hours Estimated Release Duration \_\_\_\_\_ Hours

Projection performed: Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

16. PROJECTED DOSE: DISTANCE TEDE (mRem) Adult Thyroid CDE (mRem)  
 Site boundary \_\_\_\_\_  
 2 Miles \_\_\_\_\_  
 5 Miles \_\_\_\_\_  
 10 Miles \_\_\_\_\_

17. APPROVED BY: \_\_\_\_\_ Title \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 NOTIFIED BY: \_\_\_\_\_ RECEIVED BY: \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM**

MESSAGE NUMBER \_\_\_\_\_

**GOVERNMENT AGENCIES NOTIFIED**

NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_\_  AUTHENTICATION# \_\_\_\_\_

10.1.1.11 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County EOC**  
\_\_\_\_\_  
10.1.1.12 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County WP**  
\_\_\_\_\_  
10.1.1.13 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County EOC**  
\_\_\_\_\_  
10.1.1.14 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County WP**  
\_\_\_\_\_  
10.1.1.15 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County EOC**  
\_\_\_\_\_  
10.1.1.16 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County WP**  
\_\_\_\_\_  
10.1.1.17 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC Resident Inspector**  
\_\_\_\_\_  
10.1.1.18 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC (via ETS or Bell Phone)**  
\_\_\_\_\_  
10.1.1.19 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC BWP**  
\_\_\_\_\_  
10.1.1.20 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC WP**  
\_\_\_\_\_

ATTACHMENT 10.6  
Page 1 of 11  
**SITE AREA EMERGENCY**

**CONTROL ROOM SEC CHECKLIST**

**NOTE:** Proceed to page 3 of this attachment if the checklist was completed previously

Classification	Facility Activation	Site Evacuation	ERDS Activation
Site Area Emergency	Mandatory	Mandatory	Mandatory

Time Event Declared: \_\_\_\_\_ Notification Due By: \_\_\_\_\_

- ☐ Direct the CR-EC to report to the Control Room or alternate location to support emergency notification activities.
- ☐ Make site-wide PA Announcement about the event.
- ☐ WebEOC – User = SSO/SEC-CR – No Password – Select EN form – Select Create Draft
- ☐ If conditions warrant, call the Shift RC Tech to the Main Control Room to perform Habitability analyses.
- ☐ Activate ERDS within 1 hour, if needed, using Attachment 10.10.

**NOTE:** To meet regulatory requirements, accountability for personnel inside the protected area is required within 30 minutes of the declaration of a SAE or GE. This includes names of missing personnel. If accountability is delayed due to adverse site conditions (e.g., hostile action), accountability must be completed as promptly as is practical once the site is secure.

- ☐ For Site Evacuation;
  - o Wind from 135 to 340 evacuate to Admin Building Lower Level,
  - o Wind from 341 to 134 evacuate to the South End of Building 110 next to the lake.
- ☐ Complete Emergency Notification Form – Approve and Fax.
- ☐ Emergency Communicator Performs ENF and NRC Notifications.
- ☐ Prepare for facility turnover to the TSC, using EPCLA-01, Attachment 10.3.

Referenced Procedures

EPNOT-01 – CR/EOF Emergency Communicator  
EPSPA-01 – Evacuation and Accountability  
EPSPA-02 – First Aid and Medical Care  
EPSPA-03 – Administration of Potassium Iodine  
EPCLA-04 – Emergency Action Level Technical Bases Document  
EPOSC-04 – Emergency Work Control



ATTACHMENT 10.6  
Page 2 of 11  
**SITE AREA EMERGENCY**

**Emergency Notification Form Information**

**“Emergency Release is Occurring OR has Occurred”**

Emergency release is defined as:

- An approved monitored release was occurring, and the reading on the radiation monitor designated to monitor this release increases due to the event.
- Any release due to the event that was not previously approved.
- Anytime a primary to secondary leak causes an emergency declaration, a release should be considered “is occurring”.

**“Release Significance”**

- IF no emergency release has occurred, THEN select Not Applicable.
- IF an emergency release is in progress or has occurred, AND the release significance has not been determined (no dose projection completed), THEN select *Under Evaluation*.
- IF a dose projection has been completed; THEN IF the projected dose rate at the site boundary is below 25 mRem TEDE AND 75 mRem Thyroid CDE, THEN mark Line 7 as *Within Normal Operating Limits*. Otherwise mark Line 7 as *Above Normal Operating Limits*.

**“Event Prognosis”**

- *Degrading* – There is a probable escalation of the emergency classification, continued deterioration of plant conditions, or an increase in protective action recommendations.
- *Stable* – There are no expected changes in emergency classifications, plant conditions, or protective action recommendations.
- *Improving* – There is a probable downgrade in emergency classification; plant systems are being returned to service; or a probable reduction in protective action recommendations.

ATTACHMENT 10.6  
Page 3 of 11  
**SITE AREA EMERGENCY**

**NOTE:** The steps in this attachment may be performed in any order or concurrently.

**CAUTION**

The Shift Manager/SEC may NOT direct other individuals to perform the following actions:

- The decision to notify offsite authorities
- Classifying or terminating the emergency
- Authorizing exposures in excess of 10CFR20 limits during a declared emergency

1. **DIRECT** the Emergency Communicator (EC) to immediately report to the Control Room or alternate location if access to the Control Room is not possible. Options may include the WCC, TSC or EOF.
2. **IF** the EC is not available, **THEN DESIGNATE** an alternate qualified individual such as another AO, the CRS or SM.
3. **INFORM** the crew that an SITE AREA EMERGENCY has been declared.

**NOTE:** PA announcements will remain the responsibility of the Control Room.

4. **DIRECT** the "VLC" switch be placed in "Emergency".

**NOTE:** Evacuation of non-essential personnel is required at a SITE AREA EMERGENCY. Consider hazards that may exist onsite to determine if personnel should assemble at one of the designated locations or shelter in place. Safety of plant personnel is the priority.

If the ERO will be activated, then activations should occur within five (5) minutes of the emergency classification.

The SEC **OR** the EC can contact Security for activation of the ERO.

5. **INITIATE** actions to activate the ERO, using EMG-NGGC-0005 and EPNOT-01.
  - a. **IF** the emergency is a Security event, **THEN DIRECT** the EC to activate the ERO.
  - b. **IF** the emergency is for other reasons, **THEN DIRECT** Security to activate the ERO.

ATTACHMENT 10.6  
Page 4 of 11  
**SITE AREA EMERGENCY**

6. **PROVIDE** the following to be used for activation.
- a. Emergency Classification: SITE AREA EMERGENCY
  - b. **DESIGNATE** the location the ERO will report to by circling
    - i. Onsite (Normal) Facility
    - ii. Remote (Rail Road Avenue) Facility
  - c. **DESIGNATE** the type of Notification by circling
    - i. Emergency
    - ii. Drill/Training

7. **OBTAIN** wind direction.

**CAUTION**

Consider hazards on-site, such as toxic gas, when deciding an assembly location.  
During a security event, delaying the announcement to staff the facilities and moving non-essential personnel until movement is safe will provide an additional measure of protection for site personnel.

8. **PREPARE** site wide announcement
- a. **DETERMINE** the appropriate Emergency Response Facility based on habitability and accessibility **AND SELECT** in step 10.
  - b. **IF** assembly of non-essential personnel is desired, **THEN DETERMINE** the location based on wind direction. **AND SELECT** in Step 10.
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2  
Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson
  - c. **DETERMINE** if non-essential personnel should shelter in place.

ATTACHMENT 10.6  
Page 5 of 11  
**SITE AREA EMERGENCY**

**CAUTION**

Site evacuation is mandatory at the declaration of a Site Area Emergency – unless doing so will jeopardize the safety of personnel.

**NOTE:** To avoid confusion, a site evacuation should only be initiated once.

This announcement can be made by the SEC or EC.

9. **DIRECT** the site evacuation alarm to be sounded for 5 seconds and repeated as necessary.

10. **ANNOUNCE:**

***Attention all personnel, attention all personnel, at \_\_\_\_\_ (state time of declaration) an SITE AREA EMERGENCY has been declared. All Emergency Response personnel report to:***

- ☐ **the normal ERO facilities**
- ☐ **the Remote Emergency Response Facility.**
  
- ☐ ***All non-essential personnel remain clear of the emergency response facilities*** (and, if necessary, the areas near the event location).
- ☐ ***All non-essential Personnel report to***
  - ☐ **Interior Lower Level of the Unit 2 Administrative Building**
  - ☐ **South End of Building 110 next to Lake Robinson** immediately.
- ☐ ***All non-essential personnel shelter in place.***

***Use of the Public Address System is restricted to emergency communications only”***

11. **SOUND** the site evacuation alarm and repeat the announcement created in Step 10.
12. **IF** a radiological release is in progress, **THEN DIRECT** the performance of dose projections using EPRAD-03, Dose Projections.

ATTACHMENT 10.6  
Page 6 of 11  
**SITE AREA EMERGENCY**

**NOTE:** A copy of the ENF is provided at the end of this attachment should WebEOC become unavailable.

13. **OPEN** electronic Emergency Notification Form (ENF) in WebEOC.
- a. **SELECT** Start/Programs/Emergency Preparedness/RNP/WebEOC.
  - b. **SELECT** "SSO/SEC-CR" as the user.
  - c. Password is not required.
  - d. **SELECT** "OK".
  - e. **SELECT** "HBR Actual" for an emergency.
  - f. **SELECT** "EN Form" under "Plugins".
  - g. **SELECT** "Create Draft".

**NOTE:** A peer check of the completed ENF is recommended prior to distribution to the offsite agencies.

14. **COMPLETE** the ENF
15. **DIRECT** EC to review ENF with the offsite agencies.
16. **DIRECT** activation of ERDS with 1 hour in accordance with Attachment 10.10 if needed.
17. **PREPARE** for the Facility Turnover, EPCLA-01, Attachment 10.3.

ATTACHMENT 10.6  
Page 7 of 11  
**SITE AREA EMERGENCY  
Guidance**

1. **DETERMINE** if there are any personnel injuries.
  - a. Give priority to lifesaving activities over radiological exposure control; authorize exposures in excess of normal limits, if required.
  - b. Refer to EPSPA-02, "First Aid and Medical Care", for additional guidance on first aid and transportation of contaminated injured personnel.
2. **DETERMINE** if onsite protective actions are necessary by evaluating radiological, chemical, and other situations which may require evacuation or sheltering.
  - a. For events involving an offsite toxic OR flammable hazard, additional information and suggested protective actions for onsite personnel can be obtained from the state/county emergency management/response agencies responding to the hazardous incident, i.e., contact Darlington's 911 Dispatch Center or Emergency Management Division for additional information on accidents in their area. (NCR 00140579)
  - b. For events involving an offsite toxic gas, when sheltering in place is warranted, ensure a Site-Wide PA announcement is made to secure ventilation systems IAW EPSPA-01.

<b>NOTE:</b> Reference AOP-034, "Security Events" for guidance and the actions to take for aircraft threats.
--

3. For security events consider the following:
  - a. Local Evacuation of personnel from target sets (including Security personnel).
  - b. Site Evacuation by opening (while continuing to defend) security gates.
  - c. Dispersal of Licensed Operators.
  - d. Sheltering personnel in structures away from potential site targets.
  - e. Arrangements for accounting for personnel after the threat.
  - f. ERO Augmentation at the Remote Emergency Response Facility.
  - g. Evaluate possible severe weather protective actions. (NCR # 22292)

ATTACHMENT 10.6  
Page 8 of 11  
**SITE AREA EMERGENCY**  
**Guidance**

4. If evacuation or sheltering is necessary, then implement EPSPA-01, "Evacuation and Accountability."
5. If administration of potassium iodide is necessary, then implement EPSPA-03, "Administration of Potassium Iodide."
6. Request any offsite assistance necessary;
  - a. The Unit 2 Control Room OR Security should contact Darlington County 911 Center for fire, police, or ambulance service. Logistics personnel may contact the 911 Center if Control Room staff is unable to request assistance.
  - b. Contact other agencies, as necessary; selected offsite agency numbers are maintained in the Emergency Response Organization (ERO) Phone Book.
7. Activate the appropriate Emergency Response Facilities (ERFs).
  - a. Select the location based on habitability and accessibility
    - i. The EOF, TSC, OSC, and JIC are the normal ERFs.
    - ii. The back-up TSC and EOF is the Remote Emergency Response Facility (RERF) in Hartsville
    - iii. The Remote Facility may be activated for any event, but normally would be activated for Security Events where reporting to the site may not be safe for the ERO
    - iv. The back-up OSC as defined in EPOSC-01, "Operational Support Center Leader" is the TSC or it may be the RERF.
  - b. Site evacuation is mandatory at the declaration of a Site Area Emergency – unless doing so will jeopardize the safety of personnel. Select a location to assemble personnel based on appropriate upwind direction. (see EPSPA-01, "Evacuation and Accountability", for alternate shelter locations)
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.

ATTACHMENT 10.6  
Page 9 of 11  
**SITE AREA EMERGENCY**  
**Guidance**

8. Follow up notifications to offsite agencies are required at least every 30-60 minutes.
9. Initiate electronic logging.
10. Direct shift personnel to mitigate the emergency conditions.
11. If the dispatch of personnel may cause excessive exposure due to unknown or elevated radiological conditions, then refer to EPOSC-04, "Emergency Work Control", for additional guidance regarding personnel emergency exposure control and team dispatch.
12. Continue to assess the plant status against the EALs to confirm, upgrade, or downgrade the emergency classification.
13. Additional information for completion of the Emergency Notification Form is located in EPNOT-01, "CR/EOF Emergency Communicator."
14. Forms for recording data are located in EPNOT-01, "CR/EOF Emergency Communicator."
15. If the State or County facilities have been activated, then they shall be consulted prior to any downgrade of emergency classification.
16. If not previously completed, then using the EPCLA-01, Attachment 10.3, perform a turnover with the TSC SEC and the EOF.
17. Perform PA announcements periodically to update personnel in the field of any changing plant conditions.
18. If plant conditions permit, then coordinate with any offsite agencies, which have activated, and terminate the emergency.

<b>NOTE:</b> Termination is a change in classification and has a 15 minute notification time requirement.
---

- a. If the event is being terminated, then direct the Emergency Communicator to make termination notifications to all agencies.
- b. If not previously terminated by the Nuclear Regulatory Commission (NRC), then coordinate the termination of ERDS.
- c. Terminate the event should be communicated by Everbridge using termination codes in EMG-NGGC-0005 or EPNOT-01.
- d. Perform PA announcement that the event has been terminated.
- e. Notify EP staff to clear WEBEOC ENF queue as soon as practical



## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

1. ☒ DRILL ☐ ACTUAL EVENT MESSAGE # \_\_\_\_\_
2. ☒ INITIAL ☐ FOLLOW-UP NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_ AUTHENTICATION # \_\_\_\_\_
3. SITE: \_\_\_\_\_ Confirmation Phone # (\_\_\_\_) \_\_\_\_\_

## 4. EMERGENCY

CLASSIFICATION: ☒ UNUSUAL EVENT ☐ ALERT ☐ SITE AREA EMERGENCY ☐ GENERAL EMERGENCY  
 BASED ON EAL # \_\_\_\_\_ EAL DESCRIPTION: \_\_\_\_\_

## 5. PROTECTIVE ACTION RECOMMENDATIONS:

☒ NONE☐ EVACUATE \_\_\_\_\_☐ SHELTER \_\_\_\_\_☐ CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH STATE PLANS AND POLICY.☐ OTHER \_\_\_\_\_

## 6. EMERGENCY RELEASE:

☒ None☐ Is Occurring☐ Has Occurred

## 7. RELEASE SIGNIFICANCE:

☒ Not applicable☐ Within normal operating limits☐ Above normal operating limits☐ Under evaluation

## 8. EVENT PROGNOSIS:

☒ Improving☐ Stable☐ Degrading

## 9. METEOROLOGICAL DATA:

Wind Direction\* from \_\_\_\_\_ degrees

Wind Speed\* \_\_\_\_\_ mph

(\*May not be available for Initial Notifications)

Precipitation\* \_\_\_\_\_

Stability Class\* ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G10. ☒ DECLARATION☐ TERMINATION

Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## 11. AFFECTED UNIT(S):

☒ 1☐ 2☐ 3☒ All

## 12. UNIT STATUS:

(Unaffected Unit(s) Status Not Required for Initial Notifications)

U1 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

U2 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

U3 \_\_\_\_\_ % Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## 13. REMARKS: \_\_\_\_\_

## FOLLOW-UP INFORMATION (Lines 14 Through 16 Not Required for Initial Notifications)

## EMERGENCY RELEASE DATA. NOT REQUIRED IF LINE 6 A IS SELECTED.

## 14. RELEASE CHARACTERIZATION:

TYPE: ☒ Elevated☐ Mixed☐ GroundUNITS: ☒ Ci☐ Ci/sec☐  $\mu$ Ci/sec

MAGNITUDE: Noble Gases: \_\_\_\_\_ Iodines: \_\_\_\_\_ Particulates: \_\_\_\_\_ Other: \_\_\_\_\_

FORM: ☒ Airborne

Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

☐ Liquid

Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## 15. PROJECTION PARAMETERS:

Projection period: \_\_\_\_\_ Hours

Estimated Release Duration \_\_\_\_\_ Hours

Projection performed: Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## 16. PROJECTED DOSE:

DISTANCETEDE (mRem)Adult Thyroid CDE (mRem)

Site boundary \_\_\_\_\_

2 Miles \_\_\_\_\_

5 Miles \_\_\_\_\_

10 Miles \_\_\_\_\_

## 17. APPROVED BY: \_\_\_\_\_

Title \_\_\_\_\_

Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

NOTIFIED BY: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_

Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

MESSAGE NUMBER \_\_\_\_\_

## GOVERNMENT AGENCIES NOTIFIED

NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_\_  AUTHENTICATION# \_\_\_\_\_ 10.1.1.21 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County EOC**10.1.1.22 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County WP**10.1.1.23 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County EOC**10.1.1.24 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County WP**10.1.1.25 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County EOC**10.1.1.26 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County WP**10.1.1.27 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC Resident Inspector**10.1.1.28 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC (via ETS or Bell  
Phone)**10.1.1.29 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC BWP**10.1.1.30 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC WP**

ATTACHMENT 10.7  
Page 1 of 11  
**GENERAL EMERGENCY**

**CONTROL ROOM SEC CHECKLIST**

**NOTE:** Proceed to page 3 of this attachment if the checklist was completed previously

Classification	Facility Activation	Site Evacuation	ERDS Activation
General Emergency	Mandatory	Mandatory	Mandatory

Time Event Declared: \_\_\_\_\_ Notification Due By: \_\_\_\_\_

- ☐ Direct the CR-EC to report to the Control Room or alternate location to support emergency notification activities.
- ☐ Make site-wide PA Announcement about the event.
- ☐ WebEOC – User = SSO/SEC-CR – No Password – Select EN form – Select Create Draft
- ☐ If conditions warrant, call the Shift RC Tech to the Main Control Room to perform Habitability analyses.
- ☐ Activate ERDS within 1 hour, if needed, using Attachment 10.10.

**NOTE:** To meet regulatory requirements, accountability for personnel inside the protected area is required within 30 minutes of the declaration of a SAE or GE. This includes names of missing personnel. If accountability is delayed due to adverse site conditions (e.g., hostile action), accountability must be completed as promptly as is practical once the site is secure.

- ☐ For Site Evacuation;
  - Wind from 135 to 340 evacuate to Admin Building Lower Level,
  - Wind from 341 to 134 evacuate to the South End of Building 110 next to the lake.
- ☐ Complete Emergency Notification Form – Approve and Fax.
- ☐ Emergency Communicator Performs ENF and NRC Notifications.
- ☐ Prepare for facility turnover to the TSC, using EPCLA-01, Attachment 10.3.

Referenced Procedures

EPNOT-01 – CR/EOF Emergency Communicator

EPSPA-01 – Evacuation and Accountability

EPSPA-02 – First Aid and Medical Care

EPSPA-03 – Administration of Potassium Iodine

EPCLA-04 – Emergency Action Level Technical Bases Document

EPOSC-04 – Emergency Work Control

**EMERGENCY NOTIFICATION FORM INFORMATION**

**“Emergency Release is Occurring OR has Occurred”**

Emergency release is defined as:

- An approved monitored release was occurring, and the reading on the radiation monitor designated to monitor this release increases due to the event.
- Any release due to the event that was not previously approved.
- Anytime a primary to secondary leak causes an emergency declaration, a release should be considered “is occurring”.

**“Release Significance”**

- IF no emergency release has occurred, THEN select Not Applicable.
- IF an emergency release is in progress or has occurred, AND the release significance has not been determined (no dose projection completed), THEN select *Under Evaluation*.
- IF a dose projection has been completed; THEN IF the projected dose rate at the site boundary is below 25 mRem TEDE AND 75 mRem Thyroid CDE, THEN mark Line 7 as *Within Normal Operating Limits*. Otherwise mark Line 7 as *Above Normal Operating Limits*.

**“Event Prognosis”**

- *Degrading* – There is a probable escalation of the emergency classification, continued deterioration of plant conditions, or an increase in protective action recommendations.
- *Stable* – There are no expected changes in emergency classifications, plant conditions, or protective action recommendations.
- *Improving* – There is a probable downgrade in emergency classification; plant systems are being returned to service; or a probable reduction in protective action recommendations.

ATTACHMENT 10.7  
Page 3 of 11  
**GENERAL EMERGENCY**

**NOTE:** The steps in this attachment may be performed in any order or concurrently. Protective Action Recommendation (PAR) required for a GENERAL EMERGENCY classification.

**CAUTION**

The Shift Manager/SEC may NOT direct other individuals to perform the following actions:

- The decision to notify offsite authorities
- Making offsite Protective Action Recommendations (PARs)
- Classifying or terminating the emergency
- Authorizing exposures in excess of 10CFR20 limits during a declared emergency

1. **DIRECT** the Emergency Communicator (EC) to immediately report to the Control Room or alternate location if access to the Control Room is not possible. Options may include the WCC, TSC or EOF.
2. **IF** the EC is not available, **THEN DESIGNATE** an alternate qualified individual such as another AO, the CRS or SM.
3. **INFORM** the crew that a GENERAL EMERGENCY has been declared.

**NOTE:** PA announcements will remain the responsibility of the Control Room.

4. **DIRECT** the "VLC" switch be placed in "Emergency".

**NOTE:** Evacuation of non-essential personnel is required at a GENERAL EMERGENCY. Consider hazards that may exist onsite to determine if personnel should assemble at one of the designated locations or shelter in place. Safety of plant personnel is the priority.

If the ERO will be activated, then activations should occur within five (5) minutes of the emergency classification.

The SEC **OR** the EC can contact Security for activation of the ERO.

5. **INITIATE** actions to activate the ERO, using EMG-NGGC-0005 and EPNOT-01.
  - a. **IF** the emergency is a Security event, **THEN DIRECT** the EC to activate the ERO.
  - b. **IF** the emergency is for other reasons, **THEN DIRECT** Security to activate the ERO.

ATTACHMENT 10.7  
Page 4 of 11  
**GENERAL EMERGENCY**

6. **PROVIDE** the following to be used for activation.
- a. Emergency Classification: GENERAL EMERGENCY
  - b. **DESIGNATE** the location the ERO will report to by circling
    - i. Onsite (Normal) Facility
    - ii. Remote (Rail Road Avenue) Facility
  - c. **DESIGNATE** the type of Notification by circling
    - i. Emergency
    - ii. Drill/Training
7. **OBTAIN** wind direction.

**CAUTION**

Consider hazards on-site, such as toxic gas, when deciding an assembly location.

Discretion should be exercised when announcing the cause of the emergency due to a security event.

During a security event, delaying the announcement to staff the facilities and moving non-essential personnel until movement is safe will provide an additional measure of protection for site personnel.

8. **PREPARE** site wide announcement
- a. **DETERMINE** the appropriate Emergency Response Facilities based on habitability and accessibility **AND SELECT** in step 10.
  - b. **IF** assembly of non-essential personnel is desired, **THEN DETERMINE** the location based on wind direction. **AND SELECT** in step 10.
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.
  - c. **DETERMINE** if non-essential personnel should shelter in place.

ATTACHMENT 10.7  
Page 5 of 11  
**GENERAL EMERGENCY**

**CAUTION**

Site evacuation is mandatory at the declaration of a General Emergency – unless doing so will jeopardize the safety of personnel.

**NOTE:** To avoid confusion, a site evacuation should only be initiated once.

This announcement can be made by the SEC or EC.

9. **DIRECT** the site evacuation alarm to be sounded for 5 seconds and repeated as necessary.

10. **ANNOUNCE:**

*Attention all personnel, attention all personnel, at \_\_\_\_\_ (state time of declaration) a GENERAL EMERGENCY has been declared. "All Emergency Response personnel report to: \_*

- ☐ the normal ERO facilities /
- ☐ the Remote Emergency Response Facility.
  
- ☐ *All non-essential personnel remain clear of the emergency response facilities (and, if necessary, the areas near the event location)."*
- ☐ *All non-essential Personnel report to \_*
  - ☐ Interior Lower Level of the Unit 2 Administrative Building /
  - ☐ South End of Building 110 next to Lake Robinson immediately.
- ☐ *All non-essential personnel shelter in place.*

*Use of the Public Address System is restricted to emergency communications only"*

11. **SOUND** the site evacuation alarm and repeat the announcement from step 10.
12. **IF** a radiological release is in progress, **THEN DIRECT** the performance of dose projections using EPRAD-03, Dose Projections.

ATTACHMENT 10.7  
Page 6 of 11  
**GENERAL EMERGENCY**

13. **DETERMINE** the appropriate Protective Action Recommendation (PAR) using the information provided in Attachment 10.1

a. **RECORD** the PAR on the Emergency Notification Form.

**NOTE:** A copy of the ENF is provided at the end of this attachment should WebEOC become unavailable.

14. **OPEN** electronic Emergency Notification Form (ENF) in WebEOC.

- a. **SELECT** Start/Programs/Emergency Preparedness/RNP/WebEOC.
- b. **SELECT** "SSO/SEC-CR" as the user.
- c. Password is not required.
- d. **SELECT** "OK".
- e. **SELECT** "HBR Actual" for an emergency.
- f. **SELECT** "EN Form" under "Plugins".
- g. **SELECT** "Create Draft".

**NOTE:** A peer check of the completed ENF is recommended prior to distribution to the offsite agencies.

15. **COMPLETE** the ENF
16. **DIRECT** Emergency Communicator to review ENF with the offsite agencies.
17. **DIRECT** activation of ERDS within 1 hour of the classification in accordance with Attachment 10.10 if needed.
18. **PREPARE** for the Facility Turnover, using EPCLA-01, Attachment 10.3.



ATTACHMENT 10.7  
Page 7 of 11  
**GENERAL EMERGENCY**  
**Guidance**

1. Determine if there are any personnel injuries;
  - a. Give priority to lifesaving activities over radiological exposure control; authorize exposures in excess of normal limits, if required.
  - b. Refer to EPSPA-02, "First Aid and Medical Care", for additional guidance on first aid and transportation of contaminated injured personnel.
2. Determine if onsite protective actions are necessary by evaluating radiological, chemical, and other situations which may require evacuation or sheltering.
  - a. For events involving an offsite toxic OR flammable hazard, additional information and suggested protective actions for onsite personnel can be obtained from the state/county emergency management/response agencies responding to the hazardous incident, i.e., contact Darlington's 911 Dispatch Center or Emergency Management Division for additional information on accidents in their area. (NCR 00140579)
  - b. For events involving an offsite toxic gas, when sheltering in place is warranted, ensure a Site-Wide PA announcement is made to secure ventilation systems IAW EPSPA-01.

<b>NOTE:</b>	Reference AOP-034, "Security Events" for guidance and the actions to take for aircraft threats.
--------------	---

3. For security events consider the following:
  - a. Local Evacuation of personnel from target sets (including Security personnel).
  - b. Site Evacuation by opening (while continuing to defend) security gates.
  - c. Dispersal of Licensed Operators
  - d. Sheltering personnel in structures away from potential site targets.
  - e. Arrangements for accounting for personnel after the threat.
  - f. ERO Augmentation at the Remote Emergency Response Facility.
  - g. Evaluate possible severe weather protective actions. (NCR # 22292)
4. If evacuation or sheltering is necessary, then implement EPSPA-01, "Evacuation and Accountability."

ATTACHMENT 10.7  
Page 8 of 11  
**GENERAL EMERGENCY  
Guidance**

5. If administration of potassium iodide is necessary, then implement EPSPA-03, "Administration of Potassium Iodide."
6. Request any offsite assistance necessary;
  - a. The Unit 2 Control Room OR Security should contact Darlington County 911 Center for fire, police, or ambulance service. Logistics personnel may contact the 911 Center if Control Room staff is unable to request assistance.
  - b. Contact other agencies, as necessary; selected offsite agency numbers are maintained in the Emergency Response Organization (ERO) Phone Book.
7. Activate the appropriate Emergency Response Facilities (ERFs).
  - a. Select the location based on habitability and accessibility.
    - i. The EOF, TSC, OSC, and JIC are the normal ERFs.
    - ii. The back-up TSC and EOF is the Remote Emergency Response Facility (RERF) in Hartsville.
    - iii. The Remote Facility may be activated for any event, but normally would be activated for Security Events where reporting to the site may not be safe for the ERO.
  - b. The back-up OSC, as defined in EPOSC-01, "Operational Support Center Leader", is the TSC, or it may be the RERF.
  - c. Site evacuation is mandatory at the declaration of a General Emergency. Select a location to assemble personnel based on appropriate upwind direction. (see EPSPA-01, "Evacuation and Accountability" for alternate shelter locations)
    - i. Winds from 135 to 340 degrees - Interior lower level Unit 2 Administrative Building.
    - ii. Winds from 341 to 134 degrees - South end of Building 110 next to Lake Robinson.

ATTACHMENT 10.7  
Page 9 of 11  
**GENERAL EMERGENCY  
Guidance**

8. Follow up notifications to offsite agencies are required at least every 30-60 minutes.
9. INITIATE electronic logging.
10. Direct shift personnel to mitigate the emergency conditions.
  - a. If the dispatch of personnel may cause excessive exposure due to unknown or elevated radiological conditions, then refer to EPOSC-04, "Emergency Work Control", for additional guidance regarding personnel emergency exposure control and team dispatch.
11. Forms for recording data are located in EPNOT-01, "CR/EOF Emergency Communicator."
12. Continue to assess the plant status against the EALs to confirm or downgrade the emergency classification.
13. If the State or County facilities have been activated, then they shall be consulted prior to any downgrade of emergency classification.
14. If not previously completed, then using EPCLA-01, Attachment 10.3, perform a turnover with the TSC SEC and the EOF.
15. Perform PA announcements periodically to update personnel in the field of any changing plant conditions.
16. If plant conditions permit, then coordinate with any offsite agencies, which have activated, and terminate the emergency.

<b>NOTE:</b>	Termination is a change in classification and has a 15 minute notification time requirement.
--------------	--

- a. If the event is being terminated, then direct the Emergency Communicator to make termination notifications to all agencies.
- b. If not previously terminated by the Nuclear Regulatory Commission (NRC), then coordinate the termination of ERDS.
- c. Termination of the event should be communicated by Everbridge using termination codes in EMG-NGGC-0005 or EPNOT-01.
- d. Perform PA announcement that the event has been terminated.
- e. Notify EP staff to clear WEBEOC ENF queue as soon as practical.

## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

1. ☒ DRILL ☐ ACTUAL EVENT MESSAGE # \_\_\_\_\_  
 2. ☒ INITIAL ☐ FOLLOW-UP NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_ AUTHENTICATION # \_\_\_\_\_

3. SITE: \_\_\_\_\_ Confirmation Phone # (\_\_\_\_) \_\_\_\_\_

4. EMERGENCY CLASSIFICATION: ☒ UNUSUAL EVENT ☐ ALERT ☐ SITE AREA EMERGENCY ☐ GENERAL EMERGENCY  
 BASED ON EAL # \_\_\_\_\_ EAL DESCRIPTION: \_\_\_\_\_

5. PROTECTIVE ACTION RECOMMENDATIONS: ☒ NONE  
☐ EVACUATE \_\_\_\_\_  
☐ SHELTER \_\_\_\_\_  
☐ CONSIDER THE USE OF KI (POTASSIUM IODIDE) IN ACCORDANCE WITH STATE PLANS AND POLICY.  
☐ OTHER \_\_\_\_\_

6. EMERGENCY RELEASE: ☒ None ☐ Is Occurring ☐ Has Occurred

7. RELEASE SIGNIFICANCE: ☒ Not applicable ☐ Within normal operating limits ☐ Above normal operating limits ☐ Under evaluation

8. EVENT PROGNOSIS: ☒ Improving ☐ Stable ☐ Degrading

9. METEOROLOGICAL DATA: Wind Direction\* from \_\_\_\_\_ degrees Wind Speed\* \_\_\_\_\_ mph

(\*May not be available for Initial Notifications)

Precipitation\* \_\_\_\_\_

Stability Class\* ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

10. ☒ DECLARATION ☐ TERMINATION Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

11. AFFECTED UNIT(S): ☐ 1 ☐ 2 ☐ 3 ☒ All

12. UNIT STATUS: U1 \_\_\_\_\_% Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 (Unaffected Unit(s) Status Not Required for Initial Notifications) U2 \_\_\_\_\_% Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 U3 \_\_\_\_\_% Power Shutdown at Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

13. REMARKS: \_\_\_\_\_

## FOLLOW-UP INFORMATION (Lines 14 Through 16 Not Required for Initial Notification)

## EMERGENCY RELEASE DATA. NOT REQUIRED IF LINE 6 A IS SELECTED.

14. RELEASE CHARACTERIZATION: TYPE: ☒ Elevated ☐ Mixed ☐ Ground UNITS: ☒ Ci ☐ Ci/sec ☐  $\mu$ Ci/sec

MAGNITUDE: Noble Gases: \_\_\_\_\_ Iodines: \_\_\_\_\_ Particulates: \_\_\_\_\_ Other: \_\_\_\_\_

FORM: ☒ Airborne Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

☐ Liquid Start Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Stop Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

15. PROJECTION PARAMETERS: Projection period: \_\_\_\_\_ Hours Estimated Release Duration \_\_\_\_\_ Hours

Projection performed: Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

16. PROJECTED DOSE: DISTANCE TEDE (mRem) Adult Thyroid CDE (mRem)  
 Site boundary \_\_\_\_\_  
 2 Miles \_\_\_\_\_  
 5 Miles \_\_\_\_\_  
 10 Miles \_\_\_\_\_

17. APPROVED BY: \_\_\_\_\_ Title \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

NOTIFIED BY: \_\_\_\_\_ RECEIVED BY: \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## NUCLEAR POWER PLANT EMERGENCY NOTIFICATION FORM

MESSAGE NUMBER \_\_\_\_\_

## GOVERNMENT AGENCIES NOTIFIED

NOTIFICATION: TIME \_\_\_\_\_ DATE \_\_\_\_\_  AUTHENTICATION# \_\_\_\_\_ 10.1.1.31 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County EOC**10.1.1.32 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Chesterfield County WP**10.1.1.33 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County EOC**10.1.1.34 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Darlington County WP**10.1.1.35 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County EOC**10.1.1.36 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **Lee County WP**10.1.1.37 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC Resident Inspector**10.1.1.38 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **NRC (via ETS or Bell  
Phone)**10.1.1.39 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC BWP**10.1.1.40 Name: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Agency: **State of SC WP**

**CR EMERGENCY CONTROL QUICK START GUIDE**

**NOTE:** This is a summary level guide and does not replace the procedure steps.

1. Implement EALs as necessary. It is the expectation that the time between exceeding an EAL and declaration of event will not exceed 15 minutes, unless extraordinary conditions prevail. Annotate time of the off normal condition. Continue through the Matrix until a General Emergency has been identified, or until the Matrix has been reviewed. \_\_\_\_\_
2. Direct an Emergency Communicator to report to the Control Room at this time. This will support communication activities and augmentation of the ERO. \_\_\_\_\_
3. Proceed to AP-030, "NRC Reporting Requirements", if there is no event classification. \_\_\_\_\_
4. Declare the highest event classification identified by announcing the event to the Control Room and that you are assuming role as the SEC. This ends the 15 minute clock for the event declaration, and starts the 15 minute clock to notify the appropriate State and County agencies. Announce classification to the Site, as directed in this procedure. \_\_\_\_\_
5. **IF** a radiological release is in progress, **THEN DIRECT** the performance of dose projections using EPRAD-03, Dose Projections.
6. Fill out the Emergency Notification Form. Detailed instructions are in EPNOT-01, "CR/EOF Emergency Communicator."
7. Develop, approve, and FAX/communicate the Emergency Notification Form. Notify State and County agencies via Selective Signaling System or an alternate means. The notification clock stops after the first voice contact is established with an approved form. First contact is considered complete after site identification, type of message, and emergency classification is provided to the agency. This is the time entered on the Emergency Notification Form of EPNOT-01, "CR/EOF Emergency Communicator." \_\_\_\_\_
8. Assess EALs for changing plant conditions. \_\_\_\_\_

### LIST OF TOXIC, ASPHYXIAANT AND FLAMMABLE GASES

The following is a list of toxic and flammable gases **AND** asphyxiants that are normally stored in bulk quantities within the Protected **AND** Vital areas. While this list is not all-inclusive, it is provided to aid in classification.

**NOTE:** Oxygen itself is not flammable, but is treated as a flammable gas, because its presence increases the flammability of materials. In the below list, 1 indicates those gasses which are Flammable, and 2 indicates those gasses which are toxic.

#### Flammable Gas (1) or Toxic (2)

Acetylene (1, 2)  
Oxygen (1)  
Propane (1, 2)  
Hydrogen (1)  
Ammonia (1, 2)  
P-10 Gas, used in portal monitors (1)  
Ethanolamine (1, 2)  
Methoxypropylamine (1, 2)  
Dimethylamine (1, 2)

Asphyxiants, such as those listed below, displace oxygen **AND** may become toxic in large quantities.

#### Asphyxiant Gas

Nitrogen  
Argon  
Carbon Dioxide  
Halon  
Helium Freon - Genetron Dichlorodifluoromethane  
Freon - R-22, Chlorodifluoromethane

**NOTE:** The release of all the Freon – Type R-22 Refrigerant from a single train of equipment in the Control Room HVAC Room has been evaluated, per Engineering Calculation RNP-M/HVAC-1016. This evaluation has determined that the release of all the R-22 Refrigerant from a single train does **NOT** represent the release of a toxic gas into a vital area for the purposes of EAL classification.

**ERDS Activation**

1. **DISPLAY** the ERDS activation application, using one of the following methods

i. Using a LAN PC in the Control Room,  
**CHOOSE** *Start > RNP ERDS Activation.* \_\_\_\_\_

**OR**

ii. Using a Business LAN PC outside the Control Room, **CHOOSE** *Start > NGG OSI-PI Displays > RNP Qualified > Operations tab > ERDS Activation.* \_\_\_\_\_

**OR**

iii. Using a Business LAN PC outside the Control Room, **CHOOSE** *Start > Programs > Business Apps > PI System > RNP QPIM > Operations tab > ERDS Activation.* \_\_\_\_\_

2. **IF** the ERDS is not currently transmitting, **THEN PERFORM** the following: \_\_\_\_\_

- a. When presented with the ERDS Status Control Screen, **SELECT** the "*Click to Activate*" button. \_\_\_\_\_
- b. When presented with a confirmation dialog box, **SELECT** "Yes" to activate ERDS. \_\_\_\_\_

<b>NOTE:</b> Contact NIT if the Mode or ERDS Status lights remain yellow for a period exceeding 2 minutes.
--

- c. **VERIFY** the light beside the Mode selection Transitions from red to green. \_\_\_\_\_
- d. **VERIFY** the ERDS status transitions to "*Transmitting*" AND displays a current time/date stamp with a green indicating light. \_\_\_\_\_
- e. **VERIFY** the ERDS Status "*Messages Sent*" parameter has begun to increment. This indicates that data sets are being provided to the NRC. \_\_\_\_\_



**ERDS Activation****CAUTION**

ERDS data must be provided to the NRC either electronically or manually.

3. **MONITOR** ERDS periodically to ensure transmission continues. \_\_\_\_\_
4. After ERDS is transmitting data, buttons at the bottom of the activation screen may be used to close the window or transition to the ERDS Data sheet to view the data. \_\_\_\_\_
5. **IF** either Mode or ERDS Status lights remain yellow for a period exceeding 5 minutes, **THEN** ERDS is not providing data to the NRC.
  - a. **SELECT** "*Click to Deactivate*" button. \_\_\_\_\_
  - b. **IF** ERDS data is NOT transmitting, **THEN INITIATE** measures to send ERDS data manually to the NRC upon activation of the TSC. **USE** the forms in EPNOT-01 designated for recording ERDS data. \_\_\_\_\_

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM RO A1-1  
Rev 0**

**Determine Power Distribution Flux Limits**

**Concurred By:** Kirk Schauer **Date:** 5/15/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:** 01083100401, Determine Operator Actions if the ERFIS Computer Becomes Inoperable IAW OMM-001-11.

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM RO A1-1

**Candidate**

SRO

**K/A                      Rating (RO/SRO):**

G 2.1.7

4.4

**Task Standard:**

Perform a MANUAL Calculation of Penalty Points IAW FMP-009, Power Distribution Control.

**Preferred Evaluation Location:**

Simulator \_\_\_\_\_ Classroom X

**Preferred Evaluation Method:**

Perform X Simulate \_\_\_\_\_

**References:**

FMP-009, Power Distribution Control

ITS Books

**Validation Time: 25 Minutes Time Critical: NO Time Critical Time: N/A**

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN

- -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**  
circle one

SAT

UNSAT

**Performance  
Time (min):**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

Calculator  
FMP-009, Power Distribution Control  
FMP-009, Attachment 10.5 filled out.  
ITS Books

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant is at 70% RTP with power ascension halted due to the Xenon transient in progress.
2. ERFIS is OOS.
3. FMP-009, Power Distribution Control, Attachment 10.5 has been provided.
4. 100% Target Value is + 2%
5. Target Band = +/- 5%

**INITIATING CUES:**

1. Perform a MANUAL Calculation of Penalty Points IAW FMP-009, Power Distribution Control.

START TIME: \_\_\_\_\_

**STEP 1:**

Candidate will calculate the corrected target value for the reduced power levels provided in Attachment 10.5 (FMP-009, Step 8.4.3 and Att. 10.1, second box (included in Examiner's Note))

**STANDARD:**

Candidate calculates the target value as a percentage of power level as follows: (Target Value = +2% at 100% RTP)

$$24\% = 2 \times 0.24 = 0.48\%$$

$$36\% = 2 \times 0.36 = 0.72\%$$

$$44\% = 2 \times 0.44 = 0.88\%$$

$$49\% = 2 \times 0.49 = 0.98\%$$

$$59\% = 2 \times 0.59 = 1.18\%$$

$$68\% = 2 \times 0.68 = 1.36\%$$

$$70\% = 2 \times 0.70 = 1.40\%$$

**EXAMINER'S NOTE:** The candidate will take the above calculated target values and establish a target band by adding +/- 5%.

**EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET VALUES**

$$\text{Target Value (P)} = \text{Target Value}_{\text{ref}} * P/P_{\text{ref}}$$

where: Target Value (P) = Target Value at power P;  
Target Value<sub>ref</sub> = Target Value during flux map;  
P = Current power level; and,  
P<sub>ref</sub> = Power level during flux map.

Parameter	N41	N42	N43	N44
Target Value (P)	N/A	N/A	N/A	N/A
Target Value <sub>ref</sub>	NPK1603	NPK1604	NPK1605	NPK1606
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
P <sub>ref</sub>	NPK1608	NPK1609	NPK1610	NPK1611

**COMMENTS:** The Critical Steps are to correctly calculate the Target Values AND the Target Band based on the Target Values.

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 2:**

Determine the Power Range Channels that are outside of the target band for the data given. (Target bands are +/- 5%) (FMP-009, Step 8.4.3)

**Critical Step****STANDARD:**

24% RTP, All indications are inside of the target band. (-4.52 to +5.48). (CS)

\_\_\_ SAT

36% RTP, NI-41 is outside of the target band. (-4.28 to +5.72) (CS)

\_\_\_ UNSAT

44% RTP, NI-41 and NI-42 are outside of the target band and penalty point accumulation began at 0.5 minute penalty for each minute of power operation with AFD outside the target band. (-4.12 to +5.88) **Per the Note in ITS SR 3.3.3.2 the candidate is to assume logged values of AFD exist during the preceding time interval. Therefore penalty point accumulation began immediately following the previously recorded values. 15 penalty points have been accumulated. (CS)**

49% RTP, NI-41 and NI-42 are outside of the target band and 15 penalty points have been accumulated. (-4.02 to +5.98) (CS)

59% RTP, NI-41 and NI-42 are outside of the target band and 15 penalty points have been accumulated. (-3.82 to +6.18) (CS)

68% RTP (1430 reading), NI-41 and NI-42 are outside of the target band and penalty point accumulation continues at 1 penalty point for every minute outside the target band. 30 penalty points have been accumulated. (-3.64 to +6.36) (CS)

70% RTP (1500 reading), NI-41 and NI-42 are outside of the target band and penalty point accumulation continues at 1 penalty point for every minute outside the target band. 30 penalty points have been accumulated. (-3.6 to +6.4) (CS)

**EXAMINER'S NOTE:            NONE**

**COMMENTS:**

**STEP 3:**

Determine the penalty points accumulated during each 30 minute interval and the cumulative total penalty points. (FMP-009, Step 8.4.4)

**Critical Step****STANDARD:**

At 1200 hours, 0 penalty points for the interval and 0 total penalty points. No NI is currently outside the target band. (CS)

\_\_\_ SAT

At 1230 hours, 0 penalty points for the interval and 0 total penalty points. NI-41 is the only NI outside of the target band. Requires two NIs outside of target band to collect penalty points. (CS)

\_\_\_ UNSAT

At 1300 hours, 15 penalty points for the interval and 15 total penalty points. NI-41 and NI-42 are outside of the target band. Penalty point accumulation has begun at 0.5 minute penalty points for every 1 minute of power operation outside of the target band while reactor power is less than 50%. (CS)

At 1330 hours, 15 penalty points for the interval and 30 total penalty points. NI-41 and NI-42 outside of Target Band. 15 penalty points have been accumulated between 1300 and 1330 due to point accumulation at 0.5 minute penalty points for every 1 minute outside of target band for 30 minutes and reactor power <50%. (CS)

At 1400 hours, 30 penalty points for the interval and 60 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1330 and 1400 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

At 1430 hours, 30 penalty points for the interval and 90 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1400 and 1430 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

At 1500 hours, 30 penalty points for the interval and 120 total penalty points. NI-41 and NI-42 outside of Target Band. 30 penalty points have been accumulated between 1430 and 1500 due to point accumulation at 1 minute penalty point for every 1 minute outside of target band for 30 minutes and reactor power  $\geq$  50%. (CS)

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

**END OF TASK**



**Terminating Cue: Penalty points have been manually calculated.**

**TIME STOP:** \_\_\_\_\_

# ANSWER KEY

**\*\* Shaded Items denote Critical Steps \*\***

This revision is the latest revision available and has been verified against the Document Management System.

J. L. Smith (Print) \_\_\_\_\_ Today \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Date/Time	Power %RTP	N41 AFD	N42 AFD	N43 AFD	N44 AFD	Penalty Points This Interval	Total Penalty Points	Comments	Initials
1200	24	5.4	5.4	5.3	5.3	0	0	Target = 0.48 (-4.52 to +5.48)	
1230	36	5.8	5.6	5.5	5.5	0	0	Target = 0.72 (-4.28 to +5.72)	
1300	44	6.1	6.0	5.7	5.6	15	15	Target = 0.88 (-4.12 to +5.88)	
1330	49	6.3	6.1	5.8	5.7	15	30	Target = 0.98 (-4.02 to +5.98)	
1400	59	6.7	6.5	6.1	6.0	30	60	Target = 1.18 (-3.82 to +6.18)	
1430	68	7.1	6.9	6.3	6.2	30	90	Target = 1.36 (-3.64 to +6.36)	
1500	70	6.6	6.5	5.9	5.8	30	120	Target = 1.4 (-3.6 to +6.4)	

SSO Review: \_\_\_\_\_ Date: \_\_\_\_\_

**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant is at 70% RTP with power ascension halted due to the Xenon transient in progress.
2. EFRIS is OOS.
3. FMP-009, Power Distribution Control, Attachment 10.5 has been provided.
4. 100% Target Value is + 2%
5. Target Band = +/- 5%

**INITIATING CUES:**

1. Perform a MANUAL Calculation of Penalty Points IAW FMP-009, Power Distribution Control.

**ATTACHMENT 10.5**  
**Page 1 of 1**  
**MANUAL AFD MONITORING LOG**

This revision is the latest revision available and has been verified against the Document Management System.

J. L. Smith (Print) \_\_\_\_\_ Today \_\_\_\_\_  
 Name Signature Date

Date/Time	Power %RTP	N41 AFD	N42 AFD	N43 AFD	N44 AFD	Penalty Points This Interval	Total Penalty Points	Comments	Initials
1200	24	5.4	5.4	5.3	5.3				
1230	36	5.8	5.6	5.5	5.5				
1300	44	6.1	6.0	5.7	5.6				
1330	49	6.3	6.1	5.8	5.7				
1400	59	6.7	6.5	6.1	6.0				
1430	68	7.1	6.9	6.3	6.2				
1500	70	6.6	6.5	5.9	5.8				

SSO Review: \_\_\_\_\_ Date: \_\_\_\_\_

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 6  
PART 5

**FMP-009**

***POWER DISTRIBUTION CONTROL***

REVISION 17

**SUMMARY OF CHANGES  
PRR 207424**

REVISION #	REVISION COMMENTS
17	Convert to WORD XP Change CP&L to Progress Energy Format to current procedure format Change NRCS to Document Management System

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1.0 **PURPOSE**

- 1.1 To provide instructions and guidance to ensure that the core axial power distribution is maintained within the limits established in Technical Specifications (ITS) LCO 3.2.3, SR 3.2.3.1 and SR 3.2.3.2
- 1.2 To provide instructions for identifying, monitoring and controlling divergent axial oscillations.
- 1.3 To satisfy Technical Specification (ITS) SR 3.2.3.2

2.0 **REFERENCES**

- 2.1 Technical Specifications (ITS) 1.1, LCO 3.2.3, SR 3.2.3.1, SR 3.2.3.2, SR 3.2.3.3
- 2.2 FMP-001, Core Operating Limits Report (COLR)
- 2.3 XN-76-40(A), Exxon Nuclear Power Distribution Control For Pressurized Water Reactors, September 1976
- 2.4 XN-NF-77-57 and XN-NF-77-57 Supplement 1 (A), Exxon Nuclear Power Distribution Control for Pressurized Water Reactors Phase II, May 1981
- 2.5 XN-NF-77-57 Supplement 2(A) and XN-NF-77-57 Supplement 2 Addendum 1 (A), Exxon Nuclear Power Distribution Control for Pressurized Water Reactors Phase II, October 1982
- 2.6 ANF-88-054(P), PDC-3: Advanced Nuclear Fuels Corporation Power Distribution Control for Pressurized Water Reactors and Application of PDC-3 to H.B. Robinson Unit 2, July 1988
- 2.7 EST-003, Incore/Excore Detector Calibration
- 2.8 SCM-003, Plant Computer Systems Database Control Procedure
- 2.9 UFSAR 1.5.3, 3.1.1.2.2, 3.1.2.7, 4.3.1.6, 4.3.2.2, 4.3.2.6, 4.3.3.3, 4.4.3.1, 7.2.1.1.2, 7.2.1.1.7, 7.7.1.5, 7.7.1.6
- 2.10 EC 47211 ERFIS Data Concentrator replacement.
- 2.11 EC 47160 NSS and BOP Analysis to Support Appendix K Uprate



### 3.0 RESPONSIBILITIES

- 3.1 Reactor Engineering is responsible for performing flux maps every 31 Effective Full Power Days (EFPDs) to determine the Target Axial Flux Difference (AFD) values, the Target Band values and the Allowable Power Level (APL) value in accordance with Technical Specifications (ITS) SR 3.2.3.3 and LCO 3.2.3. Reactor Engineering is also responsible for ensuring that the Control Room Status Board and the ERFIS CAOC software is updated to reflect the correct Target AFD values, Target Band values and APL value. Reactor Engineering is also responsible for ensuring the ERFIS CAOC software is updated to reflect the correct Incore/Excore calibration constants.
- 3.2 The Control Operator is responsible for maintaining the AFD within the limits specified in Technical Specifications (ITS) LCO 3.2.3 and SR 3.2.3.1 and the COLR. The Control Operator is also responsible for logging the AFD in accordance with Technical Specification (ITS) SR 3.2.3.2 when the AFD Alarms are inoperable.
- 3.3 The Superintendent - Shift Operations is responsible for reviewing the Manual AFD Monitoring Log.

### 4.0 PREREQUISITES

N/A

### 5.0 PRECAUTIONS AND LIMITATIONS

- 5.1 Any Technical Specification Required Action regarding reactor power limitations, including the setting of trip setpoints, should be based on a Rated Thermal Power (RTP) of 2339 MW<sub>th</sub>. A trip setpoint based on a 2300 MW<sub>th</sub> would satisfy Technical Specification requirements; however, if a trip setpoint is based on an RTP of 2300 MW<sub>th</sub>, then the actual trip would occur at a lower indicated power when operating based on a 2339 MW<sub>th</sub> RTP.

### 6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

### 7.0 ACCEPTANCE CRITERIA

N/A

## 8.0 PROCEDURE

### 8.1 Definitions

#### 8.1.1 Axial Flux Difference (AFD)

The Axial Flux Difference (AFD) is defined as the difference in normalized flux signals between the top and bottom halves of a two section excore neutron detector (ITS 1.1). This parameter is synonymous with Delta Flux, Indicated Flux Difference,  $\Delta I$ ,  $\% \Delta I$ ,  $\% \Delta$  Flux and  $\Delta q$ . AFD can also be related to core Axial Offset (AO) using the following equation:

$$AFD = AO * \text{Power Level} / \text{Rated Thermal Power}.$$

AFD relates the power in the top of the core to the power in the bottom of the core as seen by the excore NIS Power Range detectors. A separate AFD value is calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating AFD for each of the four Power Range channels are shown in ATTACHMENT 10.1. It should be noted that the ERFIS AFD is calculated once per minute and is based on 1 minute average values for  $V(\text{top})$ ,  $V(\text{bottom})$  and  $P$ .

#### 8.1.2 Target Value (TV)

The Target Value, also known as the Target Flux Difference, is the value of AFD determined in conjunction with the measurement of  $F_Q^V(Z)$  under equilibrium conditions within 31 EFPD after each refueling and every 31 EFPD thereafter (ITS SR 3.2.3.3). During startup and power ascension following each refueling, the Target Value may be based on design predictions until equilibrium conditions for long term operation are reached. Like AFD, the Target Value is power dependent (examples of the variation of Target Value with power are provided in ATTACHMENT 10.2). A separate Target Value is calculated for each NIS Power Range channel. The Target Value for a Power Range channel is generally the average ERFIS AFD value recorded for that channel during the course of the flux map. The equations and ERFIS Point IDs used in calculating the power dependent Target Value for each of the four Power Range channels are shown in ATTACHMENT 10.1.

8.1.3 Allowable Power Level (APL)

The Allowable Power Level is the limit placed on reactor power due to the  $F_Q^V(Z)$  peaking factor. The APL is used in applying the AFD target flux and operational limit curves (ITS LCO 3.2.3). The equation for determining the APL is provided in Technical Specification (ITS) LCO 3.2.3. The effect of APL on the Target Bands and Operating Bands can be seen in ATTACHMENT 10.2

8.1.4 Target Bands (TB)

The Target Bands establish a region of operation around the Target Value in which the AFD may vary without adversely affecting the axial power distribution or the axial xenon distribution. The allowable values of the Target Band are provided in the COLR for each cycle. The allowable Target Band values are currently  $\pm 3\%$  and  $\pm 5\%$ . If the APL is less than 90% RTP, then the values of the Target Bands are reduced to account for the effects of the reduced APL; however, they are still referred to as the  $\pm 3\%$  and  $\pm 5\%$  Target Bands in order to maintain a consistent nomenclature under all operating conditions. Since the Target Band moves with the Target Value, separate Upper and Lower Target Bands are calculated for each NIS Power Range channel (examples of the variation of the Target Bands with power and with APL are provided in ATTACHMENT 10.2). The equations and ERFIS Point IDs used in calculating the Target Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

#### 8.1.5 Operating Bands (OB)

The Operating Bands establish a region of acceptable operation outside of the Target Bands in which the AFD may vary for a short time period without adversely affecting the axial power distribution or the axial xenon distribution. The Operating Bands are only applicable to operation at power levels between 50% RTP and 90% RTP (or 90% APL if the APL is less than 100% RTP). The allowable values of the Operating Bands are provided in the COLR for each cycle. The Operating Bands use the same nomenclature as the Target Bands (i.e.  $\pm 3\%$  and  $\pm 5\%$  Operating Bands). The  $\pm 3\%$  Operating Bands are used with the  $\pm 3\%$  Target Bands and the  $\pm 5\%$  Operating Bands are used with the  $\pm 5\%$  Target Bands. If the APL is less than 90% RTP, then the values of the Operating Bands are reduced to account for the effects of the reduced APL; however, they are still referred to as the  $\pm 3\%$  and  $\pm 5\%$  Operating Bands in order to maintain a consistent nomenclature under all operating conditions. If  $0.9 \times \text{APL}$  is less than 90% RTP, then the top of the Operating Bands is limited to  $0.9 \times \text{APL}$ . The Operating Bands, like Target Bands, move with the Target Value (examples of the variation of the Operating Bands with power and APL are provided in ATTACHMENT 10.2). Separate Upper and Lower Operating Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Operating Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

#### 8.1.6 Penalty Points

Penalty Points are used to track the amount of time that operation outside of the Target Bands has occurred. Penalty point accumulation only occurs when two or more operable Power Range channels indicate that AFD is outside of the Target Bands. Penalty points are related to time of operation outside of the Target Bands through the following relations:

$\geq 50\%$  RTP: 1 Penalty Point = 1 minute outside the Target Bands

$< 50\%$  RTP: 1 Penalty Point = 2 minutes outside the Target Bands

Penalty points are eliminated by operation within the Target Bands at the same rates at which they were accumulated. The ERFIS Point ID used to track penalty point accumulation is shown in ATTACHMENT 10.1.

#### 8.1.7 Target Warning Bands (TWB)

The Target Warning Bands are provided to alert the Operator that the AFD for one or more NIS Power Range channels is approaching the Target Bands (examples of the Target Warning Bands are provided in ATTACHMENT 10.2). Separate upper and lower Target Warning Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Target Warning Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

#### 8.1.8 Operating Warning Band (OWB)

The Operating Warning Bands are provided to alert the Operator that the AFD for one or more NIS Power Range channels is approaching the Operating Bands (examples of the Operating Warning Bands are provided in ATTACHMENT 10.2). Separate upper and lower Operating Warning Bands are calculated for each NIS Power Range channel. The equations and ERFIS Point IDs used in calculating the Operating Warning Bands for each of the four Power Range channels are shown in ATTACHMENT 10.1.

### 8.2 Power Distribution Control Methodology

8.2.1 The Power Distribution Control (PDC) methodology for controlling the core axial power distribution tries to avoid the "building-in" of adverse axial power distributions during plant operations by maintaining a relatively constant power shape based on the equilibrium conditions encountered throughout a given core cycle. Maintaining a relatively constant axial power shape ensures that the  $F_Q^V(Z)$  peaking factor limit will not be exceeded. Since the "building-in" of adverse power shapes is a function of power level, the restrictions on deviation from the Target Value also vary with power level.

8.2.2 The Operator can use the RTGB AFD meters or the ERFIS AFD point IDs to monitor the status of AFD. Spurious alarms and any other applicable comments relating to AFD monitoring should be entered in the Control Operator's narrative log, when necessary.

- 8.2.3 The AFD is considered to be outside of the Target Bands or Operating Bands when the AFD for two operable Power Range channels exceed their Target Bands or Operating Bands.
- 8.2.4 At power levels  $\geq 90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less), the AFD must be maintained within the Target Bands. If the AFD is outside of the Target Bands then the AFD must be returned to within the Target Bands within 15 minutes or power must be reduced below  $90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less) within 30 minutes (Technical Specification (ITS) LCO 3.2.3 Conditions A and B). Penalty Points are accumulated while the AFD is outside the Target Bands.
- 8.2.5 At power levels  $< 90\%$  RTP (or  $0.9 \times \text{APL}$ , whichever is less) but  $\geq 50\%$  RTP, the AFD may deviate from the Target Bands as long as the total number of Penalty Points incurred over the previous 24 hours does not exceed 60 Penalty Points. The AFD must be maintained within the Operating Bands. If the number of accumulated Penalty Points exceeds 60 or if the AFD is outside of the Operating Bands then power must be reduced below  $50\%$  RTP within 30 minutes (Technical Specification (ITS) LCO 3.2.3 Condition C). If power is not reduced below  $50\%$  RTP within 30 minutes then power must be reduced below  $15\%$  RTP within 9 hours (ITS LCO 3.2.3 Condition D).
- 8.2.6 At power levels  $< 50\%$  RTP, the AFD may deviate from the Target Bands since adverse power shapes at lower power levels are sufficiently accounted for by the  $F(\Delta I)$  input to the Overtemperature  $\Delta T$  ( $\text{OT}\Delta T$ ) and Overpower  $\Delta T$  ( $\text{OP}\Delta T$ ) Reactor Protection setpoints. A power increase to  $\geq 50\%$  RTP is permitted only if the accumulation of Penalty Points within the previous 24 hour period does not exceed 60 points.
- 8.2.7 At power levels  $< 15\%$  RTP, AFD monitoring is not required by the Technical Specifications (ITS LCO 3.2.3). The ERFIS CAOC program does not perform any AFD calculations below  $15\%$  power in order to prevent extraneous alarms during periods when the instrumentation noise levels are significant and power operations is minimal.

8.2.8 Certain evolutions such as Incore/Excore calibrations require the AFD to be outside of the Target Bands. Deviation from the Target Bands for a limited amount of time is permitted by the Technical Specifications provided the AFD is maintained within the Operating Bands (Technical Specifications (ITS) LCO 3.2.3).

### 8.3 ERFIS Monitoring of AFD

#### 8.3.1 Normal Operation

During normal operation above 15% power, the ERFIS CAOC software program calculates the following values for each of the four NIS Power Range channels once per minute:

1. AFD;
2. Target Value for the current power level;
3. Upper and Lower Target Bands for the current power level;
4. Upper and Lower Operating Bands for the current power level;
5. Upper and Lower Target Warning Bands for the current power level; and,
6. Upper and Lower Operating Warning Bands for the current power level.

The CAOC software program compares the calculated AFD for each Power Range channel to that channel's Target Warning Bands, Target Bands, Operating Warning Bands and Operating Bands. If a Power Range channel crosses one or more of the bands, the ERFIS CAOC program informs the Operator of the condition by providing a message on the ERFIS alarm screen and a report on the Control Room printer and if necessary by actuating the appropriate annunciators on the RTGB (APP-005-D6,  $\Delta$  FLUX WARNING/STATUS and APP-005-E4,  $\Delta$  FLUX ALARM). The ERFIS CAOC reports that are printed on the Control Room printer are retained as part of the operating logs.

### 8.3.1 (Continued)

The ERFIS CAOC software program automatically accumulates Penalty Points at the appropriate rate based on power level if two or more operable Power Range channels are outside of their Target Bands. The program also automatically subtracts penalty points at the appropriate rate if the AFD is within the Target Band and the required time since the points were accumulated (24 hours) has elapsed.

### 8.3.2 ERFIS CAOC Alarms

If the calculated AFD for any channel is outside of any of the bands for that channel then an alarm is generated via annunciators APP-005-D6 and/or APP-005-E4. The specific cause of the alarm (i.e. the identification of the channel and the band that has been exceeded) is displayed on the ERFIS alarm screen and a report is printed on the Control Room printer. Examples of the types of warning/status/alarms messages are shown in ATTACHMENT 10.3.

### 8.3.3 ERFIS CAOC Shift Summary Report

A Shift Summary Report is printed on the Control Room printer at 0730, 1530, and 2330 hours. The Shift Summary Report is intended to provide information on the change in AFD with time to allow the Operator or Reactor Engineer to easily detect axial oscillations or instrument calibration problems.

The Shift Summary Report lists the AFD for each of the four channels at the time of the report as well as the Minimum AFD and Maximum AFD each of the channels reached during the eight hour period preceding the report. The report also lists the values for the Target Bands, Target Warning Bands, Operating Bands and Operating Warning Bands for each channel at the time of the report. The report has blanks for the Operator to record the AFD indication from the RTGB meters in order to verify that the RTGB indicated AFD is within 2% of the ERFIS calculated AFD. A deviation between the RTGB indicated AFD and the ERFIS calculated AFD of greater than 2% is not expected and would warrant further investigation to determine if an ERFIS or NIS problem exists. The Shift Summary Report is retained as part of the normal operating logs.



#### 8.3.4 Removing a Channel From Service in CAOC

A NIS Power Range channel may be removed from service in the ERFIS CAOC program by removing that channel's instantaneous % power point from scan. This will generate an APP-005-D6,  $\Delta$  FLUX WARNING, alarm with the following description displayed on the CAOC alarm report:

CHANNEL #\_\_ NOW OUT OF SERVICE.

A Power Range channel may be returned to service in the ERFIS CAOC program by restoring that channel's instantaneous % power point to scan. This will generate an APP-005-D6, FLUX STATUS, alarm with the following description displayed on the CAOC alarm report:

CHANNEL #\_\_ JUST RETURNED TO SERVICE.

The ERFIS point IDs used in removing channels from service and restoring channels to service are as follows:

NIS CHANNEL	CAOC CHANNEL	ERFIS POINT ID
N41	#1	NIN0041A
N42	#2	NIN0042A
N43	#3	NIN0043A
N44	#4	NIN0044A

- 8.3.5 Demand AFD Report Disabling Alarms and Penalty Logging  
During certain activities such as Incore/Excore calibrations or other maintenance or calibration activities involving the Power Range channels, it may be necessary to demand an AFD printout, disable the alarm function and/or Penalty Point logging function of the ERFIS CAOC computer program to provide immediate information or to prevent extraneous alarms and/or inadvertent accumulation of Penalty Points.

To initiate any of these ERFIS functions select TOC AFD4. The current state of these functions is reflected in the "Current State" column in the lower part of the display. Select the button appropriate for the desired function to toggle the desired state in the "New State" column. The "New State" indication will update in the lower part of the screen to reflect the selected condition. Toggle the buttons as appropriate to enable or disable logging and alarming or to demand an AFD printout. Once the desired states have been input, select the "Update". Button to execute the new states. The AFD demand print will only print once and the CAOC program will set the "Current State" to Off automatically. The Alarm and logging states will remain until new states are input and Update Button is selected. Disabling of the Alarm or Penalty Point Logging functions is treated as removing the AFD monitoring program from service and manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2. An alternative to disabling the Alarm and Penalty Point Logging functions during Incore/Excore calibrations and other maintenance activities is to allow the Penalty Points to be accumulated and remove any invalid points after completion of the calibration as described in 8.3.7.

- 8.3.6 ERFIS Out Of Service  
If the ERFIS computer, the CAOC software program or the RTGB annunciators which provide AFD monitoring (APP-005-D6 or APP-005-E4) are inoperable then manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2. Manual monitoring is described in Section 8.4.

### 8.3.7 ERFIS Computer Restart

Whenever the ERFIS computer is restarted, the Operator should verify that the Penalty Point "file" is accurate and should manually update the file if necessary. Several options are available to perform this verification/updating.

1. If no Penalty Points had been accumulated prior to ERFIS being out of service and no Penalty Points were accumulated while ERFIS was out of service, then check that ERFIS Point ID NPU0941 reflects 0 Penalty Points or, if desired, perform the following to view the contents of the Penalty Time Buffer:
  - a. Type in the turn on code "CAOCEDIT" or select the TOC from the ERFIS NSSS menu.
  - b. Enter the desired beginning time to start browsing at the selected time in the Penalty Point Buffer.;
  - c. Use the "-Time", "+Time", "-1 hour", "+1 hour" buttons to sequence forward and backward through the Penalty Point Buffer;
  - d. Select "Exit" when finished.
2. If invalid Penalty Point data is present in the Penalty Point buffer and no valid Penalty Points have been accumulated in the previous 24 hours then the entire 24 hour Penalty Point buffer may be initialized to "No Penalty" by performing the following:
  - a. Type in the turn on code "AFD1"; or select the TOC from the ERFIS NSSS menu.
  - b. Click on the initialization box and then select the "initialize" button to begin clearing the penalty point buffer.
  - c. When the confirmation message is displayed select "yes" to continue or "no". If "yes" is selected, a confirmation message that the penalty point buffer has been cleared will be displayed and the program will automatically exit. If "no" then select "Exit" to close the window.

### 8.3.7 (Continued)

3. If valid Penalty Points had been accumulated prior to ERFIS being out of service but no Penalty Points were accumulated while ERFIS was out of service and ERFIS was out of service for less than 24 hours then perform the following to retain the earlier valid Penalty Point data and insert "No Penalty" into the buffer for the period of time that ERFIS was out of service:
  - a. Type in the turn on code "AFD2"; or select the TOC from the ERFIS NSSS menu
  - b. Enter the time that ERFIS went out of service as the "Restart Begin Time"
  - c. Enter "0" in the "Restart penalty rate" and then select the "Restart" button.
  - d. When the confirmation message is displayed select "yes" to continue or "no". If "yes" is selected, a confirmation message that the Penalty point Buffer" has been restarted will be displayed and the program will automatically exit. If "no" then select "Exit" to close the window.
4. If valid Penalty Points were accumulated while ERFIS was out of service then perform the following to manually update any or all of the 24 hour Penalty Time buffer:
  - a. Type in the turn on code "CAOCEDIT"; or select the TOC from the ERFIS NSSS menu.
  - b. Using data from ATTACHMENT 10.5, enter the time at which the penalty update block is to begin;
  - c. Using data from ATTACHMENT 10.5, enter the time the penalty update block is to end;

#### 8.3.7.4 (Continued)

- d. Using data from ATTACHMENT 10.5, enter the appropriate penalty rate for the update block from the following choices:

PENALTY VALUE	PENALTY RATE	POWER
0	No Penalty	Any
1	½ Penalty Point per minute	<50%
2	1 Penalty Point per minute	>50%

- e. If desired, the penalty buffer can be updated on a minute by minute basis with the "CAOCEDIT" TOC, ELSE go to step f.
- 1) Type in the turn on code "CAOCEDIT" or select the TOC from the ERFIS NSSS menu.
  - 2) Enter the desired beginning time to start browsing at the selected time in the penalty point buffer;
  - 3) Use the "-Time", "+Time", "- hour" "+ hour" buttons to sequence forward and backward through the penalty point buffer.
  - 4) Enter the desired penalty rate for the desired hour/minute as needed using data from Attachment 10.5 and the above penalty point value table used in step d.
- f. When finished with a block or individual hour/minute update, validate the updated penalty time entries by browsing through the buffer as described in step g above. If the penalty point data is correct, then select the "Update Buffer" button to incorporate the update.
- g. Select the "Exit" button to close the window

#### 8.3.8 ERFIS CAOC Program Constants

Except for the ERFIS Point IDs described above which are provided for the Operator's use, all changes to CAOC program constants should be performed in accordance with SCM-003.

#### 8.4 Manual Monitoring of AFD

- 8.4.1 If the ERFIS computer, the CAOC software program or the RTGB annunciators which provide AFD monitoring (APP-005-D6 or APP-005-E4) are inoperable then manual monitoring of AFD is required in accordance with Technical Specification (ITS) SR 3.2.3.2.
- 8.4.2 If the Thermal Power is  $\geq 90\%$  RTP or  $0.9 \times \text{APL}$ , whichever is less, then the AFD indicated on the RTGB meters must be verified to be within limits and must be logged on ATTACHMENT 10.5 within 15 minutes of the alarms becoming inoperable and every 15 minutes thereafter.
- 8.4.3 If the Thermal Power is  $< 90\%$  RTP or  $0.9 \times \text{APL}$ , whichever is less, then the AFD indicated on the RTGB meters must be verified to be within limits and must be logged on ATTACHMENT 10.5 within 1 hour of the alarms becoming inoperable and every 1 hour thereafter.
- 8.4.4 If two or more operable excore channels indicate that AFD is outside of the Target Band then the applicable Actions of Technical Specifications (ITS) LCO 3.2.3 must be completed and the resultant Penalty Points must be logged on ATTACHMENT 10.5 in accordance with the following rates:

POWER LEVEL	PENALTY POINT RATE
$\geq 50\%$ RTP	1 Point/minute
$< 50\%$ RTP	1/2 Point/minute

- 8.4.5 If the total number of Penalty Points exceeds 60 in a 24 hour period, then the applicable Actions of Technical Specifications (ITS) LCO 3.2.3 must be completed.

- 8.4.6 Penalty points are eliminated 24 hours after accumulation by operation within the Target Bands at the same rate at which they were accumulated. Elimination of penalty points is denoted by a negative (-) value on ATTACHMENT 10.5.

## 8.5 Divergent Axial Oscillation Control

**NOTE:** UFSAR Sections 1.5.3, 3.1.2.7 and 7.7.1.6 state that procedures are available for the Operator to control axial oscillations. This section provides those procedures.

- 8.5.1 Axial oscillations can be induced by changes in power level, control rod movement, or a combination of both. A sudden change in either will cause some change in flux shape with a resulting redistribution of xenon concentrations in the core. This will invariably start a xenon oscillation in the axial direction.
- 8.5.2 Axial oscillations are easily started by control rod motion. The flux shape is very dependent on control rod position due to the high neutron absorption of the control rods. Improper use of the control rods at any time can create very serious oscillations. On the other hand, control rods are the best method for manually controlling a xenon oscillation; therefore, use extreme care when making extensive control rod movement. The control bank should be moved slowly and action taken prior to reaching any limit. Attempt to maintain the control rods retracted as far as is practical during steady-state and power ramp conditions to minimize the "pinching" effect of the control bank.
- 8.5.3 Depending on the core conditions and Operator actions, an axial oscillation can be dampened out or amplified until it becomes divergent. The most serious axial oscillation is the divergent oscillation. Its amplitude increases with each cycle if left to oscillate naturally and can be increased in size by control rod motion if not carefully applied.

- 8.5.4 The most important factor in control of a divergent oscillation is the timing of the oscillation. The core oscillates axially with a period of 26 hours; that is, it takes 26 hours for the same point on the sinusoidal wave to reoccur (see ATTACHMENT 10.4). The wave may be halved and quartered down to 6.5 hour intervals where the oscillation goes from maximum AFD to Target Value, Target Value to minimum AFD, etc. Once the timing of the oscillation has been determined, the following control procedure may be used to stop or reduce the oscillation to a minimum:

**NOTE:** ATTACHMENT 10.4 provides an illustration of the control procedure.

If the oscillation has just begun, an accurate timing determination may be difficult. If the Target Value is known accurately, the control rods should be inserted 5 hours after crossing the Target Value in the positive direction since the equilibrium AFD to peak AFD time is 6.5 hours.

If sufficient rod worth is present, the procedure may be performed in reverse by withdrawing control rods 1.5 hours before the minimum AFD.

The control rod insertion is best done slightly early rather than late since if the insertion is done late an amplification might result which is undesirable.

If after returning the control rods to the initial position the oscillation continues upward, then the control rods were returned to normal too soon. If a downward swing starts, then the control rods were left in too long.

A way of approximating the proper insertion time is to consider it 11.5 hours after the last minimum AFD.

Do not allow the power level to change during the control rod maneuvers since this may induce additional unwanted oscillations which will eventually have to be dampened.

If the core is divergent, the least disturbance may become significant after 1 or 2 periods of oscillation. Therefore, if the control procedure does not work effectively, additional control measures should be taken as soon as practical.

The procedure for control of divergent oscillations can also be effectively applied to very large convergent oscillations where there is a possibility of exceeding control rod insertion limits if normal methods were used.



#### 8.5.4 (Continued)

1. At 1.5 hours before the most positive peak, determine the AFD from ERFIS or the AFD meters and insert the control rods using dilution until the AFD reaches the Target Value;
2. Determine the change in AFD caused by the control rod insertion (AFD before insertion - Target Value);
3. Maintain a constant control rod position and allow AFD to decrease;
4. When AFD is lower than the Target Value by the amount determined in Step 8.5.4.2, withdraw control rods to their original position using boration.

#### 9.0 RECORDS

ATTACHMENT 10.5 must be sent to the vault as a QA record

#### 10.0 ATTACHMENTS

10.1 ERFIS CAOC Software And AFD Related Parameters

10.2 Target and Operating Band Examples

10.3 ERFIS CAOC Warning/Status/Alarm Messages

10.4 Divergent Axial Oscillation

10.5 Manual AFD Monitoring Log

**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS****EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
AXIAL FLUX DIFFERENCE (AFD)**

$$AFD = \frac{V(\text{top}) - V(\text{bottom})}{V(\text{top}) + V(\text{bottom})} * K * P$$

where:  $V(\text{top})$  = Voltage representing the core power as seen by a NIS Power Range channel top detector;  
 $V(\text{bottom})$  = Voltage representing the core power as seen by a NIS Power Range channel bottom detector;  
 $K$  = Incore/Excore calibration constant determined in accordance with EST-003.  
 $P$  = Power Level (%) at the time of the calculation.

Parameter	N41	N42	N43	N44
AFD	NPU0900	NPU0901	NPU0902	NPU0903
$V(\text{top})$	NIN0051M	NIN0053M	NIN0055M	NIN0057M
$V(\text{bottom})$	NIN0052M	NIN0054M	NIN0056M	NIN0058M
K	NPK1612	NPK1613	NPK1614	NPK1615
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M

**EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET VALUES**

$$\text{Target Value (P)} = \text{Target Value}_{\text{ref}} * P/P_{\text{ref}}$$

where: Target Value (P) = Target Value at power P;  
Target Value<sub>ref</sub> = Target Value during flux map;  
P = Current power level; and,  
P<sub>ref</sub> = Power level during flux map.

Parameter	N41	N42	N43	N44
Target Value (P)	N/A	N/A	N/A	N/A
Target Value <sub>ref</sub>	NPK1603	NPK1604	NPK1605	NPK1606
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
P <sub>ref</sub>	NPK1608	NPK1609	NPK1610	NPK1611

**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS****EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET BAND VALUES**

$APL \geq 90\% \text{ RTP}$        $TB \text{ Low Limit} = TV - TB \text{ Value}$   
                                   $TB \text{ High Limit} = TV + TB \text{ Value}$

$APL < 90\% \text{ RTP}$        $TB \text{ Low Limit} = TV - [TB \text{ Value} * (APL/100)]$   
                                   $TB \text{ High Limit} = TV + [TB \text{ Value} * (APL/100)]$   
                                  where:  $TV(P) = \text{Target Value}$   
                                   $TB \text{ Value} = \text{Selected Target Band value } (\pm 3\% \text{ or } \pm 5\%)$   
                                   $APL = \text{Allowable Power Level}$

Parameter	N41	N42	N43	N44
Target Band Low Limit	NPU0905	NPU0906	NPU0907	NPU0908
Target Band High Limit	NPU0909	NPU0910	NPU0911	NPU0912
Target Band Value	NPK1620	NPK1620	NPK1620	NPK1620
APL	NPK0320	NPK0320	NPK0320	NPK0320

**EQUATIONS AND ERFIS POINTS USED TO CALCULATE  
TARGET WARNING BAND VALUES**

$TWB \text{ Low Limit} = TB \text{ Low Limit} + TWB \text{ Value}$   
 $TWB \text{ High Limit} = TB \text{ High Limit} - TWB \text{ Value}$

                                 where:       $TWB = \text{Target Warning Band; and,}$   
                                                        $TB = \text{Target Band.}$

Parameter	N41	N42	N43	N44
TWB Low Limit	NPU0913	NPU0914	NPU0915	NPU0916
TWB High Limit	NPU0917	NPU0918	NPU0919	NPU0920
TB Low Limit	NPU0905	NPU0906	NPU0907	NPU0908
TB High Limit	NPU0909	NPU0910	NPU0911	NPU0912
TWB Value	NPK1622	NPK1622	NPK1622	NPK1622

# ATTACHMENT 10.1

Page 3 of 4

## ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS

EQUATIONS AND ERFIS POINTS USED TO CALCULATE OPERATING BAND VALUES				
5% OB, APL $\geq$ 90% RTP:	Upper OB = TV + 0.5 * [110 - (P/PL * 100)] Lower OB = TV - 0.4 * [110 - (P/PL * 100)]			
5% OB, APL<90% RTP:	Upper OB=TV+ {0.5 * [110 -(P/PL*100)]*(APL/100)} Lower OB= TV - {0.4 * [110 - (P/PL*100)]*(APL/100)}			
3% OB, APL $\geq$ 90% RTP:	Upper OB = TV + 0.5 * [106 - (P/PL * 100)] Lower OB = TV - 0.4 * [105 - (P/PL * 100)]			
3% OB, APL<90% RTP:	Upper OB=TV + {0.5*[106-(P/PL*100)]*(APL/100)} Lower OB= TV - {0.4 * [105 -(P/PL*100)]*(APL/100)}			
where:	OB = Operating Band; TV =Target Value; P = Average NIS Power Range power expressed as % RTP; PL = The lesser of 100% RTP or APL; and, APL = Allowable Power Level			
Parameter	N41	N42	N43	N44
Operating Band Low Limit	NPU0921	NPU0922	NPU0923	NPU0924
Operating Band High Limit	NPU0925	NPU0926	NPU0927	NPU0928
P	NIN0041M	NIN0042M	NIN0043M	NIN0044M
APL	NPK0320	NPK0320	NPK0320	NPK0320

EQUATIONS AND ERFIS POINTS USED TO CALCULATE OPERATING WARNING BAND VALUES				
OWB Low Limit = OB Low Limit + OW Envelope Value OWB High Limit = OB High Limit - OW Envelope Value				
where:	OWB = Operating Warning Band; and, OB = Operating Band.			
Parameter	N41	N42	N43	N44
OWB Low Limit	NPU0929	NPU0930	NPU0931	NPU0932
OWB High Limit	NPU0933	NPU0934	NPU0935	NPU0936
OB Low Limit	NPU0921	NPU0922	NPU0923	NPU0924
OB High Limit	NPU0925	NPU0926	NPU0927	NPU0928
OW Envelope Value	NPK1616	NPK1616	NPK1616	NPK1616

ATTACHMENT 10.1

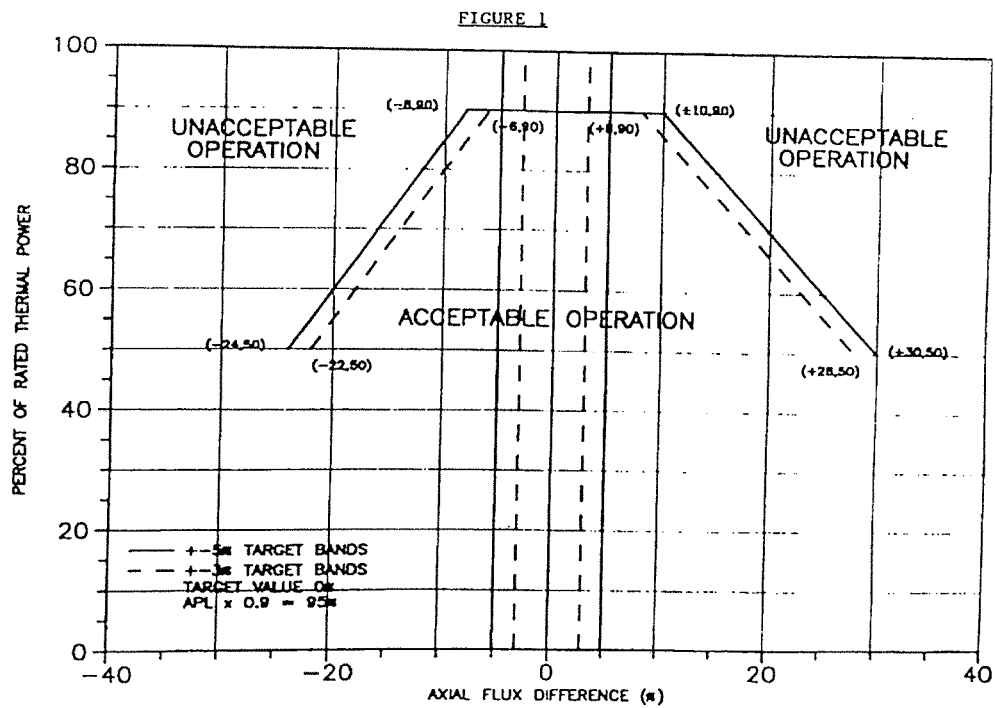
Page 4 of 4

**ERFIS CAOC SOFTWARE AND AFD RELATED PARAMETERS**

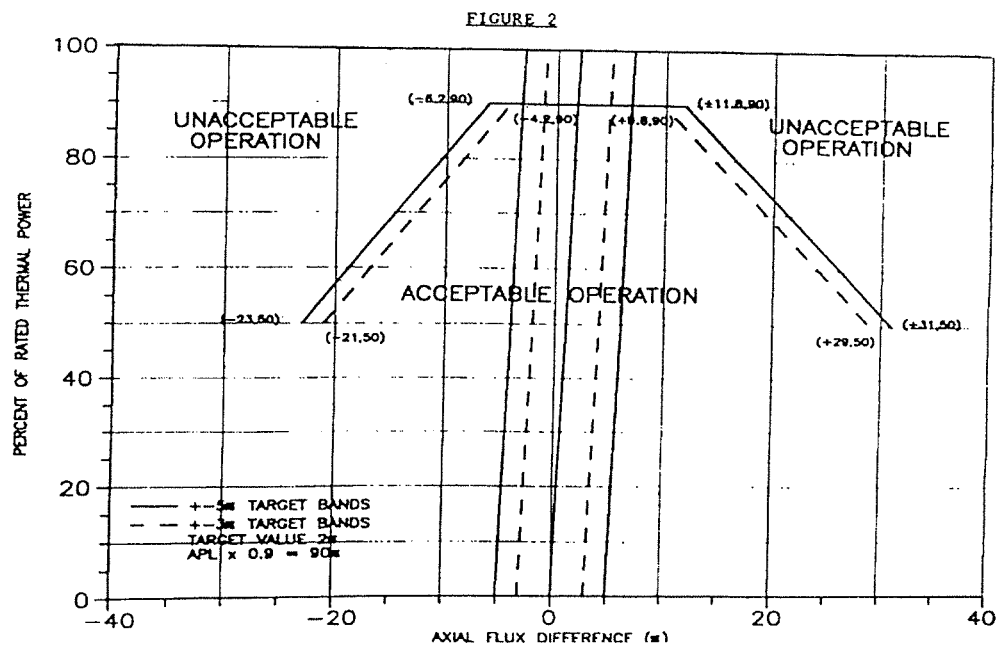
	N41	N42	N43	N44
Minimum AFD over Previous 8 hours	NPU0950	NPU0951	NPU0952	NPU0953
Maximum AFD over Previous 8 hours	NPU0954	NPU0955	NPU0956	NPU0957

Accumlated 24 Hour Penalty Points	NPU0904
Penalty Points at Last Execution of Program	NPU0941
Power Level at Last Execution of Program	NPU0939

ATTACHMENT 10.2  
Page 1 of 5  
TARGET AND OPERATING BAND EXAMPLES



ATTACHMENT 10.2  
Page 2 of 5  
TARGET AND OPERATING BAND EXAMPLES



ATTACHMENT 10.2  
Page 3 of 5  
TARGET AND OPERATING BAND EXAMPLES

FIGURE 3

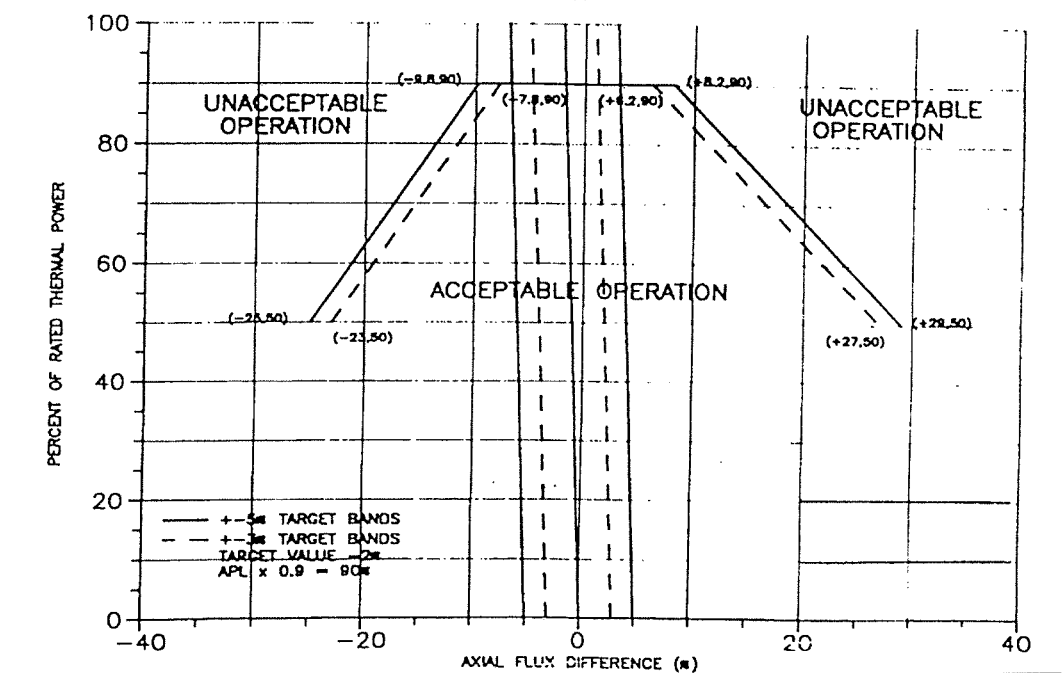




FIGURE 4

PERCENT OF RATED THERMAL POWER

UNACCEPTABLE OPERATION

UNACCEPTABLE OPERATION

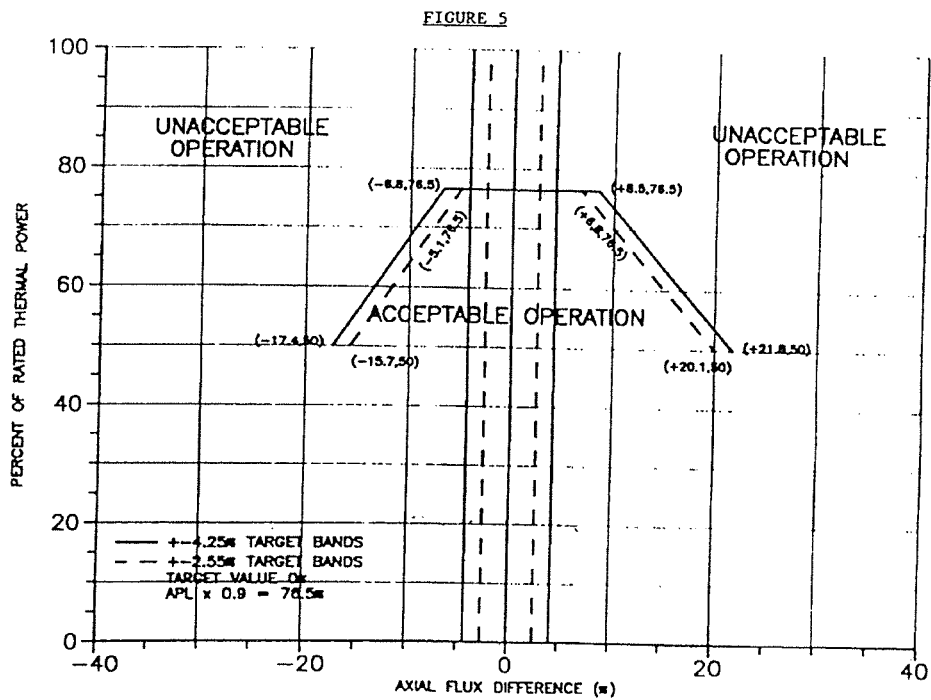
ACCEPTABLE OPERATION

Legend:

- $\pm 4.44\%$  TARGET BANDS
- -  $\pm 2.67\%$  TARGET BANDS
- TARGET VALUE =  $4m$
- APL  $\times 0.9 = 50m$
- NOTE: TARGET VALUE REFERENCED TO 100% RTE

AXIAL FLUX DIFFERENCE (m)

ATTACHMENT 10.2  
Page 5 of 5  
TARGET AND OPERATING BAND EXAMPLES



## ATTACHMENT 10.3

Page 1 of 1

### ERFIS CAOC WARNING/STATUS/ALARM MESSAGES

STATUS Messages - Denote a condition or message regarding a condition of interest to the Operator. These may include:

- POWER LEVEL CROSSED 15% - INCREASING - PENALTY ENABLED
- POWER LEVEL CROSSED 15% - DECREASING - PENALTY DISABLED
- POWER LEVEL CROSSED 50% - INCREASING - PENALTY RATE IS FULL
- POWER LEVEL CROSSED 50% - DECREASING - PENALTY RATE IS HALF -OPER BANDS DISABLED
- POWER LEVEL CROSSED 90%APL - INCREASING - OPER BANDS EQUAL TARGET BANDS
- POWER LEVEL CROSSED 90%APL - DECREASING - OPER BANDS RESTORED TO NORMAL
- CHANNEL #\_\_\_ NOW OUT OF SERVICE
- CHANNEL #\_\_\_ JUST RETURNED TO SERVICE
- CHANNEL #\_\_\_ JUST CROSSED THE TARGET WARNING BAND. (decreasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPER WARNING BAND. (decreasing)
- PENALTY POINT ACCUMULATION HAS BEGUN.
- PENALTY POINT ACCUMULATION HAS ENDED.

WARNING Messages - Denote a condition or message regarding a condition of impending Technical Specification violation. These may include:

- CHANNEL #\_\_\_ JUST CROSSED THE TARGET WARNING BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE TARGET BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPER WARNING BAND. (increasing)
- CHANNEL #\_\_\_ JUST CROSSED THE OPERATING BAND. (increasing)
- ALARM WHEN PENALTY LEVEL CROSSES 15 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 30 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 45 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 50 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 55 GOING UP.
- ALARM WHEN PENALTY LEVEL CROSSES 60 EITHER DIRECTION.

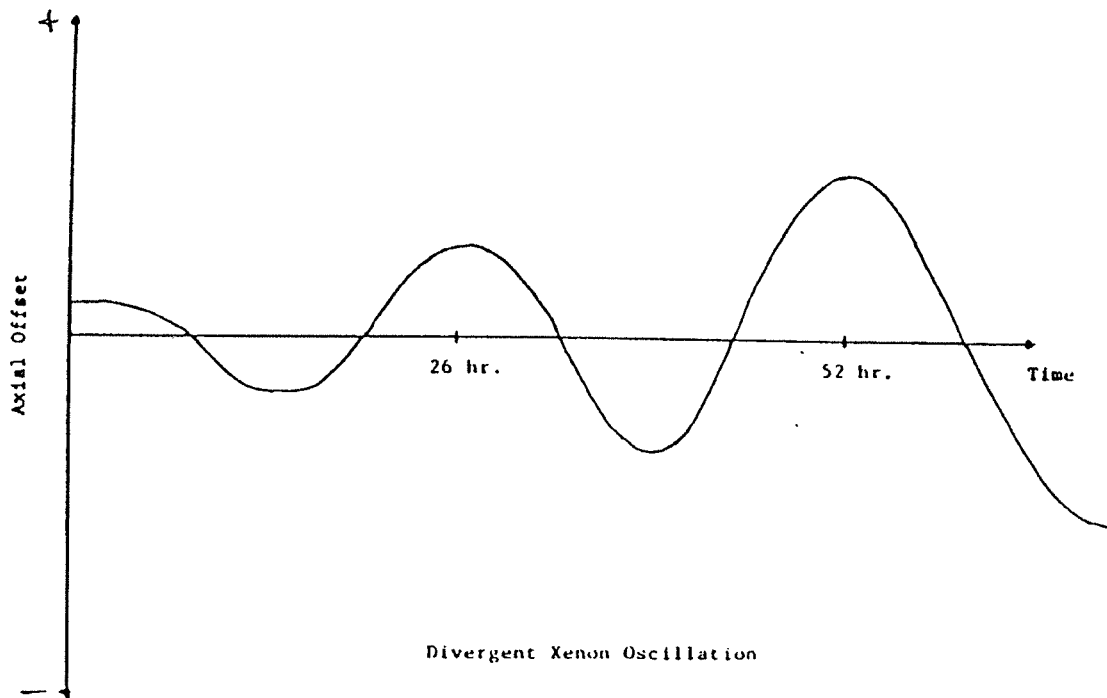
ALARM Messages - Denote a condition which violates PDC limits as set forth in plant Technical Specifications, namely:

- ALARM DUE TO 2 OR MORE CHANNELS OUTSIDE OF THE TARGET BAND WITH POWER ABOVE 90%FP OR 90%APL.
- ALARM DUE TO 2 OR MORE CHANNELS OUTSIDE OF THE OPERATING BAND WITH CORE POWER BETWEEN 50%FP AND 90%FP.
- ALARM DUE TO GREATER THAN 60 PENALTY POINTS AND CORE POWER ABOVE 50%FP.

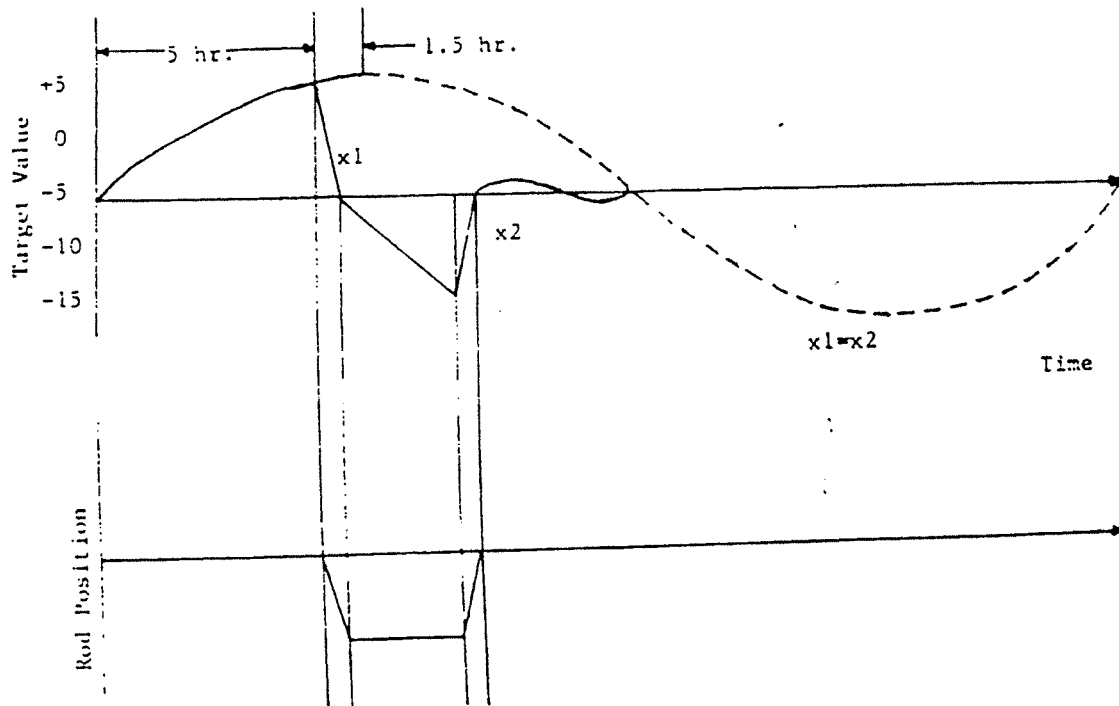
The following special symbols are printed immediately after the AFD value for a channel, if applicable:

- \*\*\*\* The AFD value for the channel has just crossed a band.
- \* The AFD value for the channel has not crossed a band, but is still outside of at least one.
- ?? The channel is inoperable.

ATTACHMENT 10.4  
Page 1 of 2  
**DIVERGENT AXIAL OSCILLATION**



ATTACHMENT 10.4  
Page 2 of 2  
**DIVERGENT AXIAL OSCILLATION**



**NOTE:** To apply numbers to the above control maneuver, assume that the Target Value is -5%, the reactor power is 75% RTP and the APL is >100% RTP. The first peak is at +5 (the dotted line representing a natural divergent oscillation). At the point the control rods are inserted, the AFD is +4%, therefore,  $X1 = 9\% [+4\% - (-5\%)]$ . Stop inserting control rods at -5% and allow the AFD to go to -14%  $[-5\% - (-9\%)]$  with no control rod motion. When the AFD reaches -14%, pull the control rods back to their original position.

ATTACHMENT 10.5  
Page 1 of 1  
**MANUAL AFD MONITORING LOG**

This revision is the latest revision available and has been verified against the Document Management System.

\_\_\_\_\_(Print)\_\_\_\_\_  
Name Signature Date

Date/Time	Power %RTP	N41 AFD	N42 AFD	N43 AFD	N44 AFD	Penalty Points This Interval	Total Penalty Points	Comments	Initials

SSO Review \_\_\_\_\_ Date: \_\_\_\_\_

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM RO A1-2  
Rev 0**

**Power Range Calorimetric During Power Operation**

**Concurred By:** Kirk Schauer **Date:** 5/15/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:** 01015102002, Perform a Power Range Calorimetric During Power Operation IAW OST-010

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM RO A1-1

**Candidate**

RO

**K/A**                      **Rating (RO/SRO):**

G 2.1.19                      3.9

G 2.1.20                      4.6

**Task Standard:**

Correctly performs a Power Range Calorimetric during Power Operation IAW OST-010 and adjust NI-44 to 100% power.

**Preferred Evaluation Location:**

Simulator   X        Classroom       

**Preferred Evaluation Method:**

Perform   X        Simulate       

**References:**

OST-010

OPS-NGGC-1306

**Validation Time: 20 Minutes** **Time Critical: NO** **Time Critical Time: N/A**

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN

-      -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**

circle one

SAT

UNSAT

**Performance**

**Time (min):**

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**SIMULATOR OPERATOR INSTRUCTIONS:**

1. Initialize the simulator to IC-911
2. Go to RUN for a **minimum of 5 minutes** to allow the Calorimetric Program to update the four minute average and to ensure plant conditions are stable and then go to FREEZE.
3. Place simulator in RUN when directed by the examiner.

**Tools/Equipment/Procedures Needed:**

OST-010 with all Section 5.0, Prerequisites, signed off.

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To facilitate the examination and better enable me to assess your level of understanding, verbalize your actions and observations while performing the JPM. To indicate that you have completed your assigned task return the Candidate Cue Sheet I provided you.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. You are on-shift as the BOP
3. No equipment is out of service.

**INITIATING CUES:**

The following AUTOLOG Alarm has been received: "PERFORM OST-010"

START TIME: \_\_\_\_\_

<p><b><u>STEP 1:</u></b> Candidate obtains copy of OST-010.</p> <p><b><u>STANDARD:</u></b> Obtains copy of OST-010.</p> <p><b>EXAMINER'S NOTE:</b> Evaluator will provide a copy of OST-010 with Section 5.0, Prerequisites, signed off.</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b>NOTE:</b> This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be outside the bounds of an Infrequently Performed Test or Evolution.</p>	
<p style="text-align: center;"><b>CAUTION</b></p> <p>The instrument uncertainties associated with OST-012, Power Range Calorimetric During Power Operation (Manual) Daily (If OST-010 Is Not Performed), limit calculated reactor power to <math>\leq 2300</math> MWth.</p>	
<p><b><u>STEP 2:</u></b> IF no ERFIS terminal is available OR ERFIS is not capable of obtaining data automatically, THEN PERFORM the calorimetric IAW OST-012. (Step 9.1.1)</p> <p><b><u>STANDARD:</u></b> Candidate determines that step is N/A and places a "N/A" in the initial block.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

**CAUTION**

To satisfy the Calorimetric Uncertainty Calculations, all loops must have at least two Steam Generator Pressure Transmitters in service. (Reference: Precaution & Limitation 6.9.)

**STEP 3:**      **IF** any loop has only one Steam Generator Pressure transmitter in service,  
**THEN CONTACT** Engineering prior to proceeding. (Step 9.1.2)

\_\_\_ SAT

**STANDARD:** Candidate determines that step is N/A and places a "N/A" in the initial block.

\_\_\_ UNSAT

**EXAMINER'S NOTE:**      **NONE**

**COMMENTS:**

**NOTE:** The Continuous Calorimetric Program can be selected through the Nuclear Steam Supply System Menu on ERFIS. The direct entry ERFIS turn on code is CALO.

### CAUTION

ERFIS simultaneously calculates calorimetrics using FWUFM, Feedwater Flow and Steam Flow. Logic built into the Continuous Calorimetric program (CALO) will cause the calculation to halt and the result to be "0" and labeled NCAL for most situations not allowed by the uncertainty calculations. The items below are not included in this logic check and must be verified by the operator.

- FWUFM CALO should be used whenever it is available.
- When FWUFM CALO is NOT available, then use the highest reading CALO with the following restriction:
- If all blowdown is NOT measured by operable Blowdown Bartons, then the Steam Flow CALO cannot be used.
- No more than TWO Feedwater Flow channels, one per Steam Generator, may be Out of Service (OOS) for the Feedwater Flow Calorimetric to be valid. (NCR 460369)

**STEP 4:**        **VERIFY** the Continuous Calorimetric Program is being displayed on an ERFIS terminal. (Step 9.1.3)

**STANDARD:** Candidate displays the Continuous Calorimetric Program through the Nuclear Steam Supply System Menu on ERFIS **OR** enters CALO directly into the ERFIS Turn On Code field.

**EXAMINER'S NOTE:**        **NONE**

**COMMENTS:**

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 5:**        **CLICK** on the INPUT INFORMATION button. This will display the CALORIMETRIC INPUT INFORMATION page. (Step 9.1.4.1)

**STANDARD:** Candidate clicks on the Input Information button.

**EXAMINER'S NOTE:**        **NONE**

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

**NOTE:** ERFIS Points are expected to indicate a quality code of "OK." For quality codes that are SUSPECT, redundant indications should be viewed prior to removing an ERFIS point from scan.

It is possible for an ERFIS Calorimetric input point to have a high or low warning (HWRN or LWRN) OR a high or low alarm (HALM or LALM) quality code when at low power levels. When these conditions exist, it is still possible for the Continuous Calorimetric Program to provide valid and acceptable results. Engineering should be consulted in these conditions prior to removing ERFIS points from service.

Reference 2.3.6, TMM-113, includes a list of calorimetric input

**STEP 6:**      **REVIEW** the quality codes for the displayed ERFIS points on page 1 and page 2. (Step 9.1.4.2)

**STANDARD:**    Candidate reviews the quality codes on page 1 and page 2.

**EXAMINER'S NOTE:**      **NONE**

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 7:**      **CHECK** the operability of the Feedwater Flow channels as follows (NCR 460369):

- **NO MORE THAN** two Feedwater Flow channels are OOS.

(Step 9.1.4.3)

**STANDARD:**    Candidate determines that NO feedwater flow channels are OOS.

**EXAMINER'S NOTE:**      **NONE**

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

<p><b><u>STEP 8:</u></b> IF more than two Feedwater Flow channels are OOS <b>OR IF</b> any combination of OOS calorimetric related instrumentation is causing suspect ERFIS data, <b>THEN</b> contact Engineering prior to proceeding. (Step 9.1.4.4)</p> <p><b><u>STANDARD:</u></b> Candidate determines that step is N/A and places a “N/A” in the initial block.</p> <p><b>EXAMINER’S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b>NOTE:</b> Deviation and warning messages are intended to alert the Control Room of off-normal conditions and/or potentially suspect instrumentation. Valid plant conditions such as low power operation, bypassing feedwater heaters, etc. can cause deviation and warning messages which do not cause the calorimetric to be invalid.</p>	
<p><b><u>STEP 9:</u></b> IF any deviations <b>OR</b> warning messages are received that can be attributed to valid plant conditions, <b>THEN DOCUMENT</b> the cause in the Comments section on the Certification and Review Form <b>AND CONTINUE</b> with this procedure. (Step 9.1.4.5)</p> <p><b><u>STANDARD:</u></b> Candidate determines that step is N/A and places a “N/A” in the initial block.</p> <p><b>EXAMINER’S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>



**NOTE:** OMM-007, Equipment Inoperable Record, contains an attachment entitled “EIR – Continuous Calorimetric Program Instrumentation.” This attachment can serve as a useful checklist if multiple ERFIS points must be removed from CALO processing.

**STEP 10:** IF any of the ERFIS points with input to the Calorimetric to be performed have a quality code that is **NOT OK AND** the reason is not due to Low Power Operation, **THEN REMOVE** from scan as follows: (Step 9.1.4.6)

\_\_\_ SAT

**STANDARD:** Candidate determines that step is N/A and places a “N/A” in the 6.a. – 6.e. initial blocks.

\_\_\_ UNSAT

**EXAMINER’S NOTE:** NONE

**COMMENTS:**

**STEP 11:** IF any deviation or warning messages are received which can **NOT** be attributed to valid plant conditions **OR** invalid instrumentation, **THEN DISCONTINUE** use of the Continuous Calorimetric Program until the status of these points is resolved. (Step 9.1.4.7)

\_\_\_ SAT

**STANDARD:** Candidate determines that step is N/A and places a “N/A” in the initial block.

\_\_\_ UNSAT

**EXAMINER’S NOTE:** NONE

**COMMENTS:**

**CAUTION**

The instrument uncertainties associated with OST-012, Power Range Calorimetric During Power Operation (Manual) Daily (If OST-010 Is Not Performed), limit calculated reactor power to  $\leq 2300$  MWth. (Reference 2.3.6, TMM-113)

<p><b><u>STEP 12:</u></b>      <b>IF</b> the results of the calorimetric program are suspect, <b>THEN PERFORM</b> OST-012 <b>AND COMPARE</b> results with continuous calorimetric calculations. (Step 9.1.4.8)</p> <p><b><u>STANDARD:</u></b>    Candidate determines that step is N/A and places a “N/A” in the initial block.</p> <p><b>EXAMINER’S NOTE:</b>            <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 13:</u></b>      <b>CLICK</b> on the EXIT button. (Step 9.1.4.9)</p> <p><b><u>STANDARD:</u></b>    Candidate clicks on the EXIT button.</p> <p><b>EXAMINER’S NOTE:</b>            <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

**NOTE:** This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be outside the bounds of an Infrequently Performed Test or Evolution.

**STEP 13:**      **SELECT** the desired calorimetric as follows:

**NOTE:** The VIEW button is used to swap the display between the three calorimetrics.

**CLICK** on the ENTER DATA button. This will display the  
CALORIMETRIC OPERATOR ENTRY page. (Step 9.2.1.1)

**STANDARD:**    Candidate clicks on the ENTER DATA button.

**EXAMINER'S NOTE:**      **NONE**

**COMMENTS:**

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 14:**      **SELECT** the type of calorimetric to use as follows:  
**a.    IF** FWUFM is available, **THEN SELECT** FWUFM.  
 (Step 9.2.1.2.a)

Refer to Precaution & Limitation 6.20 IF **ANY** Feed Flow Calorimetric input instrumentation is OOS. (NCR 315316 and NCR 460369)

- STANDARD:** Candidate verifies that FWUFM is selected. Determines that step 9.2.1.2.b is N/A and places N/As in the appropriate initial blocks.

COMMENTS:

UNSAT

**NOTE:** Target Power does not affect CALO calculation. The target power level is an operator aide that will cause power limit warning alarms to actuate when this level is exceeded.

The normal Target Power level with FWUFM in service is 2339 MWth.

The normal Target Power level when using either the Feed Flow or Steam Flow Calorimetric program is 2300 MWth.

**STEP 15:**

**ENTER** Target Power in MWth as follows:

- a. **IF** FWUFM is in service, **THEN** enter the number 2339.
- b. **IF** the Continuous Calorimetric Program to be used is either the Feed Flow Calorimetric **OR** Steam Flow Calorimetric, **THEN** enter the number 2300.
- c. **IF** a Target Power other than 2339 or 2300 MWth is required, **THEN** enter the Target Power.

\_\_\_ SAT

\_\_\_ UNSAT

**EXAMPLE:**

A post-outage review of Main Steam Safety Valve testing documents reveals that Safety Valves SV1-1A, SV1-1B and SV1-1C are all misadjusted; their lift setting is outside the ITS required setting of 1085 PSIG  $\pm 3\%$ . Per ITS LCO 3.7.1.B, the maximum allowed power level is  $\leq 46\%$  power. This equates to a maximum allowed target power of 1075.9 MWth (based on 2339 MWth maximum).

- d. **PEER CHECK** the Target Power number.

(Step 9.2.1.3)

**STANDARD:** Candidate verifies that 2339 is entered for the Target Power and request a PEER CHECK.

**EXAMINER'S NOTE:** When/If requested acknowledge the request for a **PEER CHECK** and concur with actions taken.

**COMMENTS:**

<p><b><u>STEP 16:</u></b> IF Excess Letdown is in service, <b>THEN PERFORM</b> the following:</p> <p>a. <b>SELECT EXCESS LETDOWN IN SERVICE YES</b> Box.</p> <p>b. <b>PEER CHECK</b> the EXCESS LETDOWN selection. (Step 9.2.1.4)</p> <p><b><u>STANDARD:</u></b> Candidate verifies that normal letdown is in service and determines that step is N/A and places a "N/A" in the initial blocks</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b>NOTE:</b> Checking the ALL BLOWDOWN FW BEING MEASURED NO box will cause the Steam Flow Calorimetric to halt (stop calculating).</p>	
<p><b><u>STEP 17:</u></b> IF all Blowdown Flow is not being measured, <b>THEN PERFORM</b> the following:</p> <p>a. <b>CHECK</b> the ALL BLOWDOWN FW BEING MEASURED NO Box.</p> <p>b. <b>PEER CHECK</b> the BLOWDOWN MEASURED selection. (Step 9.2.1.5)</p> <p><b><u>STANDARD:</u></b> Candidate verifies that blowdown flow is being measured and determines that step is N/A and places a "N/A" in the initial blocks</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

**NOTE:** With the MDAFW FEEDING ANY SG YES Box checked, clicking on the ENTER DATA button will halt CALO.

**STEP 18:** IF Motor Driven AFW is providing flow to any SG, **THEN PERFORM** the following:

a. **CHECK** the MDAFW FEEDING ANY SG YES Box.

b. **PEER CHECK** the MDAFW FEED selection.  
(Step 9.2.1.6)

\_\_\_ SAT

\_\_\_ UNSAT

**STANDARD:** Candidate verifies that no MDAFW pump is running and determines that step is N/A and places a "N/A" in the initial blocks

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

**STEP 19:** **CLICK** on the ENTER DATA button.  
(Step 9.2.1.7)

\_\_\_ SAT

**STANDARD:** Candidate clicks on the ENTER DATA button.

**EXAMINER'S NOTE:** NONE

\_\_\_ UNSAT

**COMMENTS:**

**STEP 20:** **CLICK** on the PAGE 2 button. **SELECT** the desired Calorimetric Display.  
(Step 9.2.2.1)

**Critical Step**

\_\_\_ SAT

**STANDARD:** Candidate clicks on the PAGE 2 button and selects FWUFM Display.

**EXAMINER'S NOTE:** NONE

\_\_\_ UNSAT

**COMMENTS:**

**NOTE:** Power Range NI drawer indication readability shall be to half the smallest increment (division) on the meter face. (Example: 99.0, 99.5, 100.0, 100.5). (CR 93-15019)

<p><b><u>STEP 21:</u></b>      <b>VERIFY</b> the values under the OPERATOR ENTERED NI POWERS line are the same as current NI drawer indications. (Step 9.2.2.2)</p> <p><b><u>STANDARD:</u></b>    Candidate reads Power Range NI drawer indications from all four drawers and modifies the data as necessary. NI-41, NI-42 and NI-43 indications are entered as 100% and NI-44 indication is entered as 101%.</p> <p><b>EXAMINER'S NOTE:</b>        <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 22:</u></b>      <b>PEER CHECK</b> the OPERATOR ENTERED NI POWERS. (Step 9.2.2.3)</p> <p><b><u>STANDARD:</u></b>    Candidate requests a PEER CHECK of Operator Entered NI Powers.</p> <p><b>EXAMINER'S NOTE:</b>        <b>When/If requested, acknowledge the request for a PEER CHECK and concur with actions taken.</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 23:</u></b>      <b>CLICK</b> on the ENTER DATA button. (Step 9.2.2.4)</p> <p><b><u>STANDARD:</u></b>    Candidate clicks on the ENTER DATA button.</p> <p><b>EXAMINER'S NOTE:</b>        <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>



<p><b><u>STEP 24:</u></b>      <b>CLICK</b> on the REFRESH button. (Step 9.2.2.5)</p> <p><b><u>STANDARD:</u></b>   Candidate clicks on the REFRESH button.</p> <p><b>EXAMINER'S NOTE:</b>          <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 25:</u></b>      <b>CLICK</b> on the EXIT button. (Step 9.2.2.6)</p> <p><b><u>STANDARD:</u></b>   Candidate clicks on the EXIT button.</p> <p><b>EXAMINER'S NOTE:</b>          <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

**NOTE:** After manual data entry, it is recommended to wait at least five minutes before printing the calorimetric report. Reference to Precaution & Limitation 6.15.

**STEP 26:**      **WHEN** a minimum of five (5) minutes have elapsed since the last manual data entry, **THEN PRINT** the calorimetric as follows:

1.    **CLICK** on the REPORT button.
2.    **SELECT** the desired report. This will cause the report to be printed.  
(Step 9.2.3)

**STANDARD:**    Candidate waits a minimum of 5 minutes and then clicks on the REPORT button. Candidate then **selects the FWUFM Calorimetric Power Report.**

**EXAMINER'S CUE:** After candidate verbalizes the need to wait 5 minutes, inform the candidate that 5 minutes has elapsed.

**COMMENTS:**

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STEP 27:****EVALUATE** the calorimetric results as follows:

1. **REVIEW** the DEVIATION: (SELECTED CALORIMETRIC POWER - ENTERED NI POWER) line on the printed report. **(CS)**
2. **IF** any NI is deviated by greater than or equal to 2%, **THEN PERFORM** the following:
  - **NOTIFY** the SM AND the CRS.
  - **PERFORM** a backup calorimetric.
3. **IF** NI adjustment is required, **THEN GO TO** Section 9.3.
4. **IF** NI adjustment is NOT required, **THEN GO TO** Section 9.4. (Step 9.2.4)

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

**STANDARD:** Candidate reviews the DEVIATION and determines that only NI-44 has a significant deviation. The DEVIATION is not greater than or equal to 2% so step 2 above is marked as N/A. Candidate either determines that step 3 above is applicable due to NI-44 indicating 101% OR acknowledges / verbalizes that NI-44 is 1% above 100%. (See Examiner's Cue below.) Candidate transitions to Section 9.3 and N/As step 4 above.

**EXAMINER'S CUE:** If candidate requests to know if NI adjustment is required OR acknowledges / verbalizes that NI-44 is 1% above 100% THEN inform the candidate to perform OST-010, Section 9.3 to within +/- 0.5%.

**COMMENTS:**

**STEP 28:** This revision has been verified to be the latest revision available.  
(Step 9.3.1)

**STANDARD:** Candidate places the date in appropriate box and initials since procedure  
was previously confirmed to be the latest revision in Section 5.0,  
Prerequisites.

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

\_\_\_ SAT

\_\_\_ UNSAT

**NOTE:** When entry into the Power Range drawer is not required, licensed Operators and I&C Technicians are authorized to make NIS adjustments, with SM approval.

The Bases for ITS SR 3.3.1.2 contains the following statements: "If the Calorimetric exceeds the NIS channel output by > 2% RTP, the NIS is not declared inoperable, but must be adjusted. If the NIS channel output cannot be properly adjusted, the channel is declared inoperable. The NIS channel output shall be adjusted consistent with the calorimetric results if the absolute difference between the NIS channel output and the calorimetric is > 2% RTP.

This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be a Case Three activity. (OPEX 443847)

### CAUTION

When adjusting an NI Power Range gain with another OOS, extreme care must be utilized. Any electronic spiking has the potential of causing a Reactor Protection System actuation. (CR 97-01677)

The inherent inaccuracies in the Continuous Calorimetric Program amplify when power is less than 70%, which magnify the possibility of non-conservative operation. Therefore, adjusting NI's down should be minimized and should only be performed after consulting with Reactor Engineering. (CR 98-01362)

Reactor Engineering and the Manager - Operations should be contacted for assistance prior to adjusting the NI's during any power or Xenon transient.

**STEP 29:** IF it is desired to perform an NIS adjustment, **THEN OBTAIN SM** approval.  
(Step 9.3.2)

\_\_\_ SAT

**STANDARD:** Candidate obtains Shift Manager signature.

\_\_\_ UNSAT

**EXAMINER'S NOTE:** Inform the candidate that you are simulating the actions of the CRS/SM and sign name on the Shift Manager signature line.

**COMMENTS:**

<p><b><u>STEP 30:</u></b> The Reactivity Management requirements of OPS-NGGC-1306 have been reviewed <b>AND</b> the applicable actions taken. (OPEX 443847) (Step 9.3.3)</p> <p><b><u>STANDARD:</u></b> Candidate reviews OPS-NGGC-1306 and determines that no additional actions need to be taken.</p> <p><b>EXAMINER'S NOTE:</b> Inform the candidate that the CRS and SM reviewed the requirements of OPS-NGGC-1306 and have determined that NO additional actions are necessary.</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 31:</u></b> <b>IF</b> any Power Range NI needs to be adjusted by more than 2%, <b>THEN CONTACT</b> Reactor Engineering <b>AND</b> the Manager - Operations prior to the adjustment. (Step 9.3.4)</p> <p><b><u>STANDARD:</u></b> Candidate determines that adjustment is less than 2% and N/As this step.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 32:</u></b> IF Reactor power is less than 70% AND it is desired to adjust NIS DOWN, <b>THEN CONTACT</b> Reactor Engineering for guidance regarding the amount of adjustment to make. (Step 9.3.5)</p> <p><b><u>STANDARD:</u></b> Candidate determines that reactor power is greater than 70% and N/As this step.</p> <p><b>EXAMINER'S NOTE: NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 33:</u></b> IF entry into a Power Range drawer is required to accomplish the NIS adjustment, <b>THEN ADJUST</b> NIS using PIC-107, Power Level Indication at the Power Range. (Step 9.3.6)</p> <p><b><u>STANDARD:</u></b> Candidate determines that this step will remain open until it is determined whether adequate adjustment can be performed exterior to the drawer.</p> <p><b>EXAMINER'S NOTE: NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

**NOTE:** Diverse and redundant indications of Reactor Power should be monitored IAW OMM-001-2 while adjusting the Power Range indications. (OPEX 443847)

**STEP 34:** IF entry into a Power Range drawer is required to accomplish the NIS adjustment, **THEN** N/A the step(s) associated with the drawer(s) entered.  
(Step 9.3.7.1)

\_\_\_ SAT

**STANDARD:** Candidate will determine that this step is N/A.

\_\_\_ UNSAT

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

**NOTE:** ERFIS indication should be used to monitor the Power Range adjustment when matching the indicated power level to the calorimetric's calculated value. The accuracy of ERFIS provides better indication when making small adjustments to indicated power levels.

**STEP 35:** **ADJUST** gain potentiometer until power level meter agrees with target value.  
(Step 9.3.7.2)

**Critical Step**

\_\_\_ SAT

**STANDARD:** Candidate adjusts the gain potentiometer on NI-44 while monitoring ERFIS Power Range indication. Candidate adjusts NI-44 indication to approximately FWUFM 4 MINUTE AVERAGE POWER +/- 0.5%.

\_\_\_ UNSAT

**EXAMINER'S NOTE:** The **FWUFM 4 MINUTE AVERAGE POWER** should indicate approximately 99.92% to 99.96% Power.

**COMMENTS:**



<p><b><u>STEP 36:</u></b>      <b>PEER CHECK</b> that the adjusted power level meter agrees with the target value. (Step 9.3.7.3)</p> <p><b><u>STANDARD:</u></b>    Candidate requests a PEER CHECK of adjusted power level.</p> <p><b>EXAMINER'S NOTE:</b> <b>When / If requested, acknowledge request for PEER CHECK and concur with actions taken.</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 37:</u></b>      <b>WHEN</b> each gain potentiometer adjustment is complete, <b>THEN PEER CHECK</b> each potentiometer properly locked. (OMM-001-2 and OPEX 443847) (Step 9.3.7.4)</p> <p><b><u>STANDARD:</u></b>    Candidate requests a PEER CHECK of locked potentiometer.</p> <p><b>EXAMINER'S NOTE:</b> <b>When / If requested, acknowledge request for PEER CHECK and concur with actions taken.</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 38:</u></b>      Candidate signs in the "Adjustment Performed by:" space provided.</p> <p><b><u>STANDARD:</u></b>    Candidate signs in the "Adjustment Performed by:" space provided.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 39:</u></b> IF any ERFIS points were recorded with Quality Codes other than OK <b>OR</b> had warning or deviation messages noted, <b>THEN</b> either <b>VALIDATE</b> the suspect values are appropriate through comparison with redundant information <b>OR REMOVE</b> the ERFIS point from scan. (Step 9.4.1)</p> <p><b><u>STANDARD:</u></b> Candidate determines that this step is N/A.</p> <p><b>EXAMINER'S NOTE: NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 40:</u></b> IF Section 9.2 was performed, <b>THEN INITIAL</b> the appropriate lines on the CALORIMETRIC POWER REPORT, <b>AND COMPLETE</b> the Certification and Review Form. (Step 9.4.2)</p> <p><b><u>STANDARD:</u></b> Candidate places initials in appropriate blanks on Page 1 and 2 of the Calorimetric Power Report (ERFIS printout) and completes the Calorimetric Measurement Certification and Review Form (page 3 of ERFIS printout). Candidate ensure his initials, name, date and time are entered in the appropriate spaces. YES is circled for Adjustment Performed with name, title and date information filled in appropriately.</p> <p><b>EXAMINER'S NOTE: The YES for Test Satisfactory should be left for the Shift Technical Advisor to circle on his review, but does not constitute failure of JPM if circled by candidate.</b></p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 41:</u></b> IF the Target Power level used in step 9.2.1.3.c is <b>NOT</b> 2339 <b>OR</b> 2300 MWth, <b>THEN RECORD</b> the Target Power level in the COMMENTS SECTION of the CALORIMETRIC POWER REPORT printout along with the reason for the Target Power level. (Step 9.4.3)</p> <p><b><u>STANDARD:</u></b> Candidate determines that this step is N/A.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 42:</u></b> IF Power Range NIS adjustments were performed <b>THEN ROUTE</b> Section 9.3 with the CALORIMETRIC POWER REPORT for vaulting. (Step 9.4.4)</p> <p><b><u>STANDARD:</u></b> Candidate determines Section 9.3 must be routed for review and approval along with the FWUFM Calorimetric Power Report and Calorimetric Measurement Certification and Review Form.</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue:</b> When the candidate completes adjustment of NI-44 and completes all documentation required IAW OST-010.</p>	

**TIME STOP:** \_\_\_\_\_

**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. You are on-shift as the BOP
3. No equipment is out of service.

**INITIATING CUES:**

The following AUTOLOG Alarm has been received: “PERFORM OST-010”

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3

PART 9

## **OST-010**

### ***POWER RANGE CALORIMETRIC DURING POWER OPERATION DAILY***

REVISION 41

#### **CAUTION**

**Performance of a calorimetric calculation is classified by  
OPS-NGGC-1306 as a Reactivity Related Activity (R3).**

**Power Range NIS Adjustments are classified as a Reactivity Manipulation (R2).**

**Performance of a calorimetric calculation is a PLP-037 CASE N/A activity.  
Power Range NIS Adjustments are a PLP-037 CASE THREE activity. (OPEX 443847)**

**SUMMARY OF CHANGES**  
**PRR 370429**  
**OST-010 Revision 41**

STEP #	REVISION COMMENTS
Cover Page, Sections 9.1, 9.2 & 9.3	Added the appropriate PLP-037 and OPS-NGGC-1306 CASE LEVEL as required by PRO-NGGC-0201, Section 9.4.6. These case determinations are also tied to PRR 374083, PRR 452723 and OPEX 443847.
All Pages	<p>Adjusted format, section numbering and line breaks in preparation for the Procedure Upgrade Project (PUP). This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.</p> <p>Added new Section 3.0, Definitions, IAW PRO-NGGC-0201. This changes the numbering of all subsequent sections. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.</p> <p>Changed management titles to agree with current position titles. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.</p> <p>Replaced the word "increase" with "raise", "adjust up" and "amplify" as is grammatically correct for the sentence context.</p> <p>Added place keeping (check mark) blanks to the various actions steps in the REFERENCE USE sections. This is done in support of HUM-NGGC-0001 and PRO-NGGC-0201 requirements. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.</p> <p>Added peer check action steps where needed and applicable IAW HUM-NGGC-0001, PRO-NGGC-0201 and OMM-001-2. This answers PRR 452723 and OPEX 443847.</p>
Section 2.0, References	<p>Re-structured section into functional groupings to reduce the appearance of clutter and improve cross-reference capabilities.</p> <p>Added the following new references: 2.1.4 – INPO SEN 228, 2.2.2 - HUM-NGGC-0001, 2.2.3 – CAP-NGGC-0200, 2.3.3 – ITS LCO 3.7.1, 2.3.5 – PLP-100, 2.3.9 – OMM-001-2, 2.3.16 – RNP-I/INST-1144, 2.3.17 – RNP-M/MECH-1616, 2.4.8 – NCR 315316, 2.4.9 – OPEX 443847 and 2.4.10 – NCR 460369.</p> <p>NCR's 315316 and 460369 along with OPEX 443847 are the driving force for this revision. The other new references are added in support of the corrective actions tied to these three items. These changes to Section 2.0 are editorial changes as defined in PRO-NGGC-0204, Section 9.4.1.</p>
Section 3.0, Definitions	Defined the term "FWUFM" since it is used extensively in OST-010 but is not listed as an approved abbreviation in AP-007. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
Section 5.0, Prerequisites (old Section 3.0)	<p>New Step 5.1, revision verification, with NOTE. Allows for the use of a laminated "working copy" similar to what is done for OP-301 for manual dilutions and borations.</p> <p>Step 5.3 with NOTE. (This is old step 3.2.) Defined the minimum required power level for performance as listed in ITS SR 3.3.1.2. MODE 1 is entered when &gt;5% power but it is not possible to perform an accurate calorimetric below 15% power.</p>

STEP #	REVISION COMMENTS
Section 6.0, Precautions & Limitations (P&L's) (old Section 5.0)	Moved some P&L's to improve use of paper (less wasted white space) and to place some into a more logical sequence. No change in wording, just change in sequence.
P&L 6.1	New P&L in support of OPS-NGGC-1306 and PRO-NGGC-0201. Defines the Reactivity Management requirements for the various performance sections.
P&L 6.2 (old P&L 5.7)	Redefined the PLP-037 requirements IAW OPEX 443847. Adjustments to a PR NIS drawer are a PLP-037 CASE THREE activity while the performance of the OST-010 data collection and calculation is CASE N/A.
P&L 6.11 (old P&L 5.8)	Adjusted based on inputs from NCR 460369 and NCR 315316.
New P&L 6.19	Defines and describes the requirements for PEER CHECKS as listed in HUM-NGGC-0001 and OMM-001-2. This answers PRR 452723 and OPEX 443847.
New P&L 6.20	Information drawn from NCR 315316 and NCR 460369. Answers PRR 370429. Defines the limitations on the Feedflow CALO along with examples of what can cause the stated problems.
Section 9.1 (old Section 8.1)	Moved some steps to improve the logical flow and sequence. No change in step content, just sequence.
New CAUTION prior to Step 9.1.1	Reminds the users that the performance of OST-012 requires power $\leq 2300$ MWth. While not likely, it is possible that OST-010 is being attempted when ERFIS is functioning but not able to collect all data <b>AND</b> Unit 2 is still at $\approx 2339$ MWth. Intent is to prevent a human performance error or ITS limit violation. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
New CAUTION prior to Step 9.1.2 (old step 8.1.2)	CAUTION is a restatement of P&L 6.9. Intent is to remind the users of the basis for the step. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
NOTE before Step 9.1.4.2	The first part of this NOTE was before old Step 8.1.4.3, this is a more logical place for this information. New materials added to the NOTE to assist with decision making during postulated low power or off-normal conditions. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
Step 9.1.4.3	Check that no more than TWO Feedwater Flow instrument are OOS. This answers NCR 460369.
New NOTE before Step 9.1.4.6	OMM-007, Attachment 10.7, contains all the various instrument inputs to the CALO program. Use of this attachment as a check list will help reduce the potential for human errors IF more than one CALO point is to be removed from processing. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
New CAUTION before Step 9.1.4.8 (old step 8.1.4.6)	Similar to the CAUTION before Step 9.1.1; reminds the users of the power limits within OST-012. Reminds the users of the power limits while FWUFM is OOS and references to P&L 6.2. Answers NCR 315316 and 460369. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.

STEP #	REVISION COMMENTS
New CAUTION before Step 9.2.1.2.b (old step 8.2.1.2.b)	<p>1<sup>st</sup> new caution reminds the users of the Reactor Thermal Power limits when FWUFM is OOS <b>AND</b> a calorimetric is required to be performed.</p> <p>2<sup>nd</sup> new caution reminds the users to refer to P&amp;L 6.20 if any Feed Flow Calorimetric input instrumentation is OOS. The answers NCR's 315316 and 460369.</p> <p>These are editorial changes as defined in PRO-NGGC-0204, Section 9.4.1.</p>
Step 9.2.1.3 with NOTE before step and an EXAMPLE after the step (old step 8.2.1.3)	Expanded guidance and actions on the use of TARGET POWER. Intent is to minimize the potential for a human error trap if numbers other than 2339 or 2300 must be entered.
New NOTE before Step 9.2.1.5 (old step 8.2.1.5)	NOTE reminds the users of the expected response when not all SGBD is being measured; Steam Flow CALO will HALT. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
Step 9.2.3 with NOTE (old step 8.2.3)	Old NOTE was an action step stated as a NOTE. Reworded the step to ensure that 5 minutes is waited after manual data entry.
Step 9.3.3	New step driven by OPEX 443847 and OPS-NGGC-1306 concerning an R2 Reactivity Evolution.
New NOTE before Step 9.3.7.1 (old step 8.3.6.1)	Reminds the users to use diverse and redundant power indications while making NIS adjustments. This answers OPEX 443847. This is an editorial change as defined in PRO-NGGC-0204, Section 9.4.1.
New Step 9.4.3	Direction to record the TARGET POWER LEVEL used in Step 9.2.13.c IF the number was not 2339 or 2300 MWth. Ensure proper configuration control and documentation of off-normal situations.
New Step 9.4.5 with NOTE and new Step 9.4.6	Answers OPEX 443847. Direction to initiate an NCR for off-normal conditions. Ensure proper tracking, trending and evaluation of reactivity related problems.



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## 1.0 PURPOSE

- 1.1 This test is to ensure an accurate power range neutron indication by comparing the Power Range channel instrument readings to the calculated thermal power and to satisfy Improved Technical Specifications SR 3.3.1.2 TBL 3.3.1-1 Item 2a.
- 1.2 The procedure provides the steps needed to make minor instrument adjustments.

## 2.0 REFERENCES

### 2.1 NRC, INPO and Other Related Industry Documents

- 2.1.1 ASME Steam Tables
- 2.1.2 Technical Manual 728-790-18 - Westinghouse P.W.R. Systems, Nuclear Instrumentation System, Technical Manual
- 2.1.3 SOER 90-03, Nuclear Instrument Miscalibration
- 2.1.4 INPO SEN 228, Recurring Event, Reactor Overpower Condition – Improper Adjustment of Excore Power Range Channels During Power Increase

### 2.2 Nuclear Generation Group (NGG) Procedures and Documents

- 2.2.1 OPS-NGGC-1306, Reactivity Management Program
- 2.2.2 HUM-NGGC-0001, Human Performance Program
- 2.2.3 CAP-NGGC-0200, Condition Identification and Screening Process

### 2.3 Robinson Plant Procedures and Documents

- 2.3.1 H. B. Robinson Updated FSAR, Section 7
- 2.3.2 ITS LCO 3.3.1, Reactor Protection System (RPS) Instrumentation
- 2.3.3 ITS LCO 3.7.1, Main Steam Safety Valves (MSSVs)
- 2.3.4 PLP-037, Conduct of Infrequently Performed Tests or Evolutions and Pre-Job Briefs
- 2.3.5 PLP-100, Technical Requirements Manual, Section 3.25, Plant Calorimetric Measurement
- 2.3.6 TMM-113, Control of the Calorimetric
- 2.3.7 PIC-107, Power Level Indication At The Power Range
- 2.3.8 SD-010, Nuclear Instrumentation Systems
- 2.3.9 OMM-001-2, Shift Routines and Operating Practices
- 2.3.10 OMM-007, Equipment Inoperable Record
- 2.3.11 OMM-015, Operations Surveillance Testing

- 2.3.12 OST-012, Power Range Calorimetric During Power Operation (Manual)
- 2.3.13 SP-1359, Feedwater Flow and Steam Generator Moisture Carryover Lithium Tracer Test, 08-03095
- 2.3.14 RNP-I/INST-1124, ERFIS Steam Flow Automatic Calorimetric Uncertainty Calculation
- 2.3.15 RNP-I/INST-1125, ERFIS Feed Flow Automatic Calorimetric Uncertainty Calculation
- 2.3.16 RNP-I/INST-1144, ERFIS Feed Flow Secondary Calorimetric (Ultrasonic) Uncertainty Calculation
- 2.3.17 RNP-M/MECH-1616, Calculation Basis for the Continuous Calorimetric for H. B. Robinson Unit 2
- 2.4 Adverse Condition Reports (ACR's), Nuclear Condition Reports (NCR's) and Other Related Documents
  - 2.4.1 Action Item No. 90-13; SER 89-23
  - 2.4.2 CR 93-15019, OST-051 and OST-010 violate OMM-040 Readability Requirements
  - 2.4.3 CR 96-01991, When Feeding The SG With The MDAPW Pumps
  - 2.4.4 CR 96-01631, CT-494 for "C" S/G Pressure Channel
  - 2.4.5 CR 97-01677, OE Evaluation of HLER 97-016 - Reactor Trip Auxiliary Feedwater Actuation
  - 2.4.6 CR 98-01362, OE Evaluation of Westinghouse Technical Bulletin ESBU-TB-92-14-R1, Decalibration Effects Of Calorimetric Power Measurements On The NIS High Power Reactor Trip At Power Levels Less Than 70% RTP
  - 2.4.7 CR 98-01570, NIS Calibration Improvement
  - 2.4.8 NCR 315316, Inconsistent S/G Blowdown Flow Uncertainty Calculations
  - 2.4.9 OPEX 443847, SEN 228, Recurring Event, Reactor Overpower Condition – Improper Adjustment of Excore Power Range Channels During Power Increase
  - 2.4.10 NCR 460369, Revision Identifies Non-conservative Input in Calculation
- 2.5 Modifications (MOD's), Engineering Changes (EC's) and Other Related Documents
  - 2.5.1 EC 47152, Ultrasonic Feedwater Flow Measurement
  - 2.5.2 EC 48706, Develop Changes to ERFIS Calorimetric to Support FWUFM
  - 2.5.3 EC 51454, Develop Changes to ERFIS Calorimetric to Implement Revision 2 of RNP-M/MECH-1616

### 3.0 DEFINITIONS

- 3.1 **FWUFM:** Feedwater Ultrasonic Flow Monitoring also known as Feedwater Ultrasonic Flow Meter. A precision process for continuous calculation of the calorimetric.
- 3.2 All other abbreviations and acronyms are consistent with those listed in AP-007, Generic Procedure Writer's Instructions.

### 4.0 RESPONSIBILITIES

CHK (✓)

- 4.1 Operations is responsible for the performance, review and approval of this procedure.

### 5.0 PREREQUISITES

**NOTE:** Section 9.3 is a CONTINUOUS USE section with required signatures that must be vaulted as directed in Section 10.2. All other sections of this procedure are REFERENCE USE sections with placekeeping check mark blanks. A laminated "working copy" may be used as long as the revision is verified as current prior to each use.

- 5.1 This procedure has been verified to be the most current revision available. \_\_\_\_\_

- 5.2 The Shift Manager has given permission to conduct this test. \_\_\_\_\_

**NOTE:** A note in ITS SR 3.3.1.2 allows for up to 12 hours from the time of increasing Reactor Power above 15% until the first calorimetric is required.

- 5.3 Reactor Plant is operating at power (MODE 1)  $\geq 15\%$  Rated Thermal Power (RTP). \_\_\_\_\_

- 5.4 An ERFIS terminal is available. \_\_\_\_\_

## 6.0 PRECAUTIONS AND LIMITATIONS

- 6.1 Performance of a calorimetric calculation is classified by OPS-NGGC-1306 as a **Reactivity Related Activity (R3)**. The use of Section 9.3 to perform a Power Range NIS Adjustment is classified as a **Reactivity Manipulation (R2)**. The requirements of OPS-NGGC-1306 concerning a pre-job briefing and oversight should be reviewed prior to the performance of any NIS adjustments.
- 6.2 This procedure has been screened IAW PLP-037. The performance of the Calorimetric Calculations in Sections 9.1 and 9.2 are classified as CASE N/A. The performance of a Power Range NIS gain adjustment is classified as a CASE THREE activity. (OPEX 443847)
- 6.3 Steam Flow, Feed Flow, and Reactor Power should be held as constant as possible during data collection.
- 6.4 Any steps not applicable shall be marked N/A and the reason(s) noted in the Comments Section of the Certification and Review Form.
- 6.5 The Calorimetric Program has inherent inaccuracies that amplify in magnitude when less than 70% power. Reactor Engineering should be notified prior to adjusting any power range channel DOWN when less than 70% power to prevent the possibility of non-conservative indication. It is allowable to raise (adjust UP) indicated power to match calculated power. (CR 98-01362)
- 6.6 Reactor Engineering and the Manager - Operations will be notified prior to making any adjustments of  $\geq 2\%$  to a NI channel. (CR 98-01362)
- 6.7 Reactor Engineering or the Manager - Operations will be contacted for assistance prior to adjusting the NI's during any power or Xenon transient.
- 6.8 Rounding off the readings taken on the PR nuclear instruments shall be IAW the following guidelines: (CR 93-15019)
- 6.8.1 If indicated power is less than 100%, then round down to the nearest 0.5% increment (EXAMPLES: a reading of 99.7 would be recorded as 99.5, and 99.3 would be recorded as 99.0).
- 6.8.2 If indicated power is greater than 100%, then round up to the nearest 0.5% increment (EXAMPLES: a reading of 100.2 would be recorded as 100.5, and 100.6 would be recorded as 101).
- 6.9 To satisfy the Calorimetric Uncertainty Calculations, all loops must have at least two Steam Generator Pressure Transmitters in service.
- 6.10 TMM-113 includes a list of calorimetric inputs. If the validity of any point on this list is suspect, it should be removed from the calculation.

- 6.11 ERFIS simultaneously calculates calorimetrics using FWUFM, Feedwater Flow and Steam Flow. Logic built into the Continuous Calorimetric program (CALO) will cause the calculation to halt and the result to be "0" and labeled NCAL for most situations not allowed by the uncertainty calculations. The items below are not included in this logic check and must be verified by the operator.
- FWUFM CALO should be used whenever it is available.
  - When FWUFM CALO is **NOT** available, then use the highest reading CALO with the following restriction :
  - If all blowdown is **NOT** measured by operable Blowdown Bartons, then the Steam Flow CALO cannot be used.
  - No more than two Feedwater Flow channel, one per Steam Generator for a maximum of two Steam Generators, may be Out of Service (OOS) (NCR 460369).
  - Refer to Precautions & Limitation (P&L) 6.20 for additional information concerning the Steam Generator Blowdown Flow instrumentation and the Feed Flow Automatic Calorimetric.
- 6.12 If ERFIS indicates an error or gives a warning regarding the validity of any calorimetric data and the message can not be confirmed to be the result of valid plant conditions, Engineering should be contacted and the point removed from the calculation. ERFIS inputs deleted from calorimetric processing should not be restored to processing until the problem(s) requiring point deletion are corrected. Record results in Comments Section of Certification and Review Form.
- 6.13 Operation of any MDAFW Pump with AFW flow to an S/G will cause the calorimetric calculations to be non-conservative. Do not use the continuous calorimetric program when a MDAFW Pump is in service and flowing to an S/G. (CR 96-01991)
- 6.14 When adjusting an NI Power Range gain with another OOS, extreme care must be utilized. Any electronic spiking has the potential of causing a Reactor Protection System actuation. (CR 97-01677)
- 6.15 The continuous calorimetric program provides steady state calculations only and does not account for changing volumes or a change in stored energy. Additionally averaging routines built into the continuous calorimetric calculations will require as much as 5 minutes following a change in an input value for that change to be fully reflected in the display.
- 6.16 Removing blowdown flow transmitters from the calorimetric results in 0 being used for that loop blowdown flow and has the effect of instantaneously converting all actual blowdown flow to steam flow in the Feed Flow and FWUFM calorimetric calculations. This will make the FWUFM and Feed Flow Calorimetric programs to calculate a conservative, higher than actual, value for power. The Steam Flow calorimetric will STOP.

- 6.17 Indicating that all blowdown flow is not measured by checking the box: ALL BLOWDOWN FLOW BEING MEASURED-NO has no effect upon the FWUFM or the Feedwater Flow calorimetric. The Steam Flow Calorimetric will STOP. FWUFM Calorimetric and Feed Flow Calorimetric calculations will be conservative; the calculated power will be higher than actual power. Refer to Precautions & Limitation (P&L) 6.20 for additional information concerning the Steam Generator Blowdown Flow instrumentation and the Feed Flow Automatic Calorimetric.
- 6.18 When the letdown flow point CHF0134A is deleted from scan or CALO, it will read -9999.00 gallons per minute on the ERFIS CALO printout.
- 6.19 Steps requiring a manual data entry and the actions to adjust a Power Range NIS Gain potentiometer should be peer checked IAW HUM-NGGC-0001, Human Performance Program, and OMM-001-2, Shift Routines and Operating Practices. (OPEX 443847)
- 6.20 Reference 2.3.15, RNP-I/INST-1125, ERFIS Feed Flow Automatic Calorimetric Uncertainty Calculation, requires that the following instrumentation remain in an operable condition in order for the ERFIS Feed Flow Automatic Calorimetric (also known as the "Classic Calorimetric") to remain operable (References: NCR 315316 and NCR 460369):
- 6.20.1 Feedwater Temperature Elements TE-3004, Feedwater To Stm Gen A Temperature Element, TE-3005, Feedwater To Stm Gen B Temperature Element, and TE-3006, Feedwater To Stm Gen C Temperature Element. These are ERFIS points FWT0418A, FWT0438A and FWT0458A respectfully. **IF** any one of these temperature elements **OR** ERFIS points are OOS, the Feed Flow Automatic Calorimetric is OOS.
- 6.20.2 Steam Generator Blowdown (SGBD) flow instruments FIT-1328A, SGBD HTX "A" Flow Indicating Transmitter, FIT-1328B, SGBD HTX "B" Flow Indicating Transmitter, FIT-1328C, SGBD HTX "C" Flow Indicating Transmitter. These are ERFIS points MSF1407A, MSF1427A and MSF1447A respectively. **IF** any one of these flow indicating transmitter **OR** ERFIS points is not reading ALL SGBD for that respective Steam Generator, the Steam Flow Calorimetric is OOS while the FWUFM and Feedflow Calorimetrics are conservative in their calculations.

**EXAMPLE 1:** Due to problems with Steam Generator Chemistry, SGBD flow is split with 50 GPM per S/G going to the Condenser and an additional 50 GPM per S/G going to the Flash Tank. The flow to the Flash Tank is not monitored flow, thus, the Steam Flow Automatic Calorimetric is OOS.

**EXAMPLE 2:** ERFIS point MSF1407A is OOS due to a failed isolator power supply. SGBD flow on S/G "A" is being maintained at 35 GPM. FIT-1328A is still operable. The Steam Flow Automatic Calorimetric is OOS until MSF1407A is returned to service.

6.20.3 Feedwater Flow Transmitters FT-476, FW SG A Flow Transmitter (ERFIS Point FWF0403A), FT-477, FW SG A Flow Transmitter (FWF0404A), FT-486, FW SG B Flow Transmitter (FWF0423A), FT-487, FW SG B Flow Transmitter (FWF0424A), FT-496, FW SG C Flow Transmitter (FWF0443A), and FT-497, FW SG C Flow Transmitter (FWT0444A). No more than two channels, one per Steam Generator on a maximum of two Steam Generators, may be removed from service and still leave the Feed Flow Automatic Calorimetric operable.

**EXAMPLE:** Feed Flow Transmitter FT-476 is OOS for scheduled calibrations. An unexpected power supply failure in an ERFIS MUX Cabinet has caused FWF0423A to read NCAL. The RTGB indications are not affected by the ERFIS failure. The Feed Flow Calorimetric would still be considered operable in this condition. Any other failures of any other Feed Flow instruments will cause the Feed Flow Calorimetric to go OOS.

## 7.0 SPECIAL TOOLS AND EQUIPMENT

7.1 None Applicable

## 8.0 ACCEPTANCE CRITERIA

8.1 This test is acceptable if the indicated power level of each instrument channel is within 2% of calculated power. If the indicated power cannot be adjusted to within 2% of calculated power, the affected channel(s) shall be declared INOPERABLE.

8.2 The reviewing and approving authority may accept this test IAW provisions set forth in OMM-015.



## REFERENCE USE

### 9.0 PROCEDURE

CHK (✓)

#### BEGIN R3 REACTIVITY EVOLUTION

#### 9.1 Initial Conditions

**NOTE:** This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be outside the bounds of an Infrequently Performed Test or Evolution.

#### CAUTION

The instrument uncertainties associated with OST-012, Power Range Calorimetric During Power Operation (Manual) Daily (If OST-010 Is Not Performed), limit calculated reactor power to  $\leq 2300$  MWth.

- 9.1.1 IF no ERFIS terminal is available **OR** ERFIS is not capable of obtaining data automatically, **THEN PERFORM** the calorimetric IAW OST-012. \_\_\_\_\_

#### CAUTION

To satisfy the Calorimetric Uncertainty Calculations, all loops must have at least two Steam Generator Pressure Transmitters in service. (Reference: Precaution & Limitation 6.9.)

- 9.1.2 IF any loop has only one Steam Generator Pressure transmitter in service, **THEN CONTACT** Engineering prior to proceeding. \_\_\_\_\_

CHK (✓)

**NOTE:** The Continuous Calorimetric Program can be selected through the Nuclear Steam Supply System Menu on ERFIS. The direct entry ERFIS turn on code is CALO.

**CAUTION**

ERFIS simultaneously calculates calorimetrics using FWUFM, Feedwater Flow and Steam Flow. Logic built into the Continuous Calorimetric program (CALO) will cause the calculation to halt and the result to be "0" and labeled NCAL for most situations not allowed by the uncertainty calculations. The items below are not included in this logic check and must be verified by the operator.

- FWUFM CALO should be used whenever it is available.
- When FWUFM CALO is **NOT** available, then use the highest reading CALO with the following restriction:
- If all blowdown is **NOT** measured by operable Blowdown Bartons, then the Steam Flow CALO cannot be used.
- No more than **TWO** Feedwater Flow channels, one per Steam Generator, may be Out of Service (OOS) for the Feedwater Flow Calorimetric to be valid. (NCR 460369)

9.1.3 **VERIFY** the Continuous Calorimetric Program is being displayed on an ERFIS terminal.

CHK (✓)

9.1.4 **CHECK** the ERFIS point quality codes as follows:

1. **CLICK** on the INPUT INFORMATION button. This will display the CALORIMETRIC INPUT INFORMATION page. \_\_\_\_\_

**NOTE:** ERFIS Points are expected to indicate a quality code of "OK." For quality codes that are SUSPECT, redundant indications should be viewed prior to removing an ERFIS point from scan.

It is possible for an ERFIS Calorimetric input point to have a high or low warning (HWRN or LWRN) OR a high or low alarm (HALM or LALM) quality code when at low power levels. When these conditions exist, it is still possible for the Continuous Calorimetric Program to provide valid and acceptable results. Engineering should be consulted in these conditions prior to removing ERFIS points from service.

Reference 2.3.6, TMM-113, includes a list of calorimetric inputs. If the validity of any point in this list is suspect, it should be removed from the calculation.

2. **REVIEW** the quality codes for the displayed ERFIS points on page 1 and page 2. \_\_\_\_\_
3. **CHECK** the operability of the Feedwater Flow channels as follows (NCR 460369):
  - **NO MORE THAN** two Feedwater Flow channels are OOS. \_\_\_\_\_
4. **IF** more than two Feedwater Flow channels are OOS **OR IF** any combination of OOS calorimetric related instrumentation is causing suspect ERFIS data, **THEN** contact Engineering prior to proceeding. \_\_\_\_\_

**NOTE:** Deviation and warning messages are intended to alert the Control Room of off-normal conditions and/or potentially suspect instrumentation. Valid plant conditions such as low power operation, bypassing feedwater heaters, etc. can cause deviation and warning messages which do not cause the calorimetric to be invalid.

5. **IF** any deviations **OR** warning messages are received that can be attributed to valid plant conditions, **THEN DOCUMENT** the cause in the Comments section on the Certification and Review Form **AND CONTINUE** with this procedure. \_\_\_\_\_

9.1.4 (Continued)

CHK (✓)

**NOTE:** OMM-007, Equipment Inoperable Record, contains an attachment entitled "EIR – Continuous Calorimetric Program Instrumentation." This attachment can serve as a useful checklist if multiple ERFIS points must be removed from CALO processing.

6. **IF** any of the ERFIS points with input to the Calorimetric to be performed have a quality code that is **NOT OK AND** the reason is not due to Low Power Operation, **THEN REMOVE** from scan as follows:
  - a. **CLICK** on the DELETE INPUTS button. This will display the DELETE INPUT FROM CALORIMETRIC page. \_\_\_\_\_
  - b. **SELECT** all of the ERFIS points which have a Quality Code other than OK **AND** the points that had warning or deviation messages due to invalid instrumentation. \_\_\_\_\_
  - c. **PEER CHECK** that only the ERFIS points specified above are selected. \_\_\_\_\_
  - d. **CLICK** on the ENTER DATA button. \_\_\_\_\_
  - e. **IMPLEMENT** applicable OMM-007 EIR(s) as directed by SM/CRS. \_\_\_\_\_
7. **IF** any deviation or warning messages are received which can **NOT** be attributed to valid plant conditions **OR** invalid instrumentation, **THEN DISCONTINUE** use of the Continuous Calorimetric Program until the status of these points is resolved. \_\_\_\_\_

**CAUTION**

The instrument uncertainties associated with OST-012, Power Range Calorimetric During Power Operation (Manual) Daily (If OST-010 Is Not Performed), limit calculated reactor power to  $\leq 2300$  MWth. (Reference 2.3.6, TMM-113)

8. **IF** the results of the calorimetric program are suspect, **THEN PERFORM OST-012 AND COMPARE** results with continuous calorimetric calculations. \_\_\_\_\_
9. **CLICK** on the EXIT button. \_\_\_\_\_

## REFERENCE USE

### 9.2 Calorimetric Performance

CHK (✓)

**NOTE:** This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be outside the bounds of an Infrequently Performed Test or Evolution.

9.2.1 **SELECT** the desired calorimetric as follows:

**NOTE:** The VIEW button is used to swap the display between the three calorimetrics.

1. **CLICK** on the ENTER DATA button. This will display the CALORIMETRIC OPERATOR ENTRY page. \_\_\_\_\_

**NOTE:** Logic built into the Continuous Calorimetric program will cause the calculation to halt **AND** the result to be "0" and labeled NCAL for most situations **NOT** allowed by the uncertainty calculations. The selection of the Calorimetric type is not included in this logic check and must be verified by the operator.

2. **SELECT** the type of calorimetric to use as follows:

- a. **IF** FWUFM is available, **THEN SELECT** FWUFM. \_\_\_\_\_

#### CAUTION

TRM Section 3.25, Plant Calorimetric Measurement, Condition "B," limits Reactor Power to  $\leq 2300$  MWth when ITS SR 3.3.1.2 is required while FWUFM is OOS.

Refer to Precaution & Limitation 6.20 **IF ANY** Feed Flow Calorimetric input instrumentation is OOS. (NCR 315316 and NCR 460369)

- b. **IF** FWUFM is **NOT** available, **THEN PERFORM** the following:

- 1) **IF** all Blowdown is measured by operable Bartons, **THEN SELECT** the highest of Feed Flow **OR** Steam Flow. \_\_\_\_\_
- 2) **IF** all Blowdown is **NOT** measured by operable Bartons, **THEN SELECT** the Feed Flow Calorimetric. \_\_\_\_\_

9.2.1 (Continued)

CHK (✓)

**NOTE:** Target Power does not affect CALO calculation. The target power level is an operator aide that will cause power limit warning alarms to actuate when this level is exceeded.

The normal Target Power level with FWUFM in service is 2339 MWth.

The normal Target Power level when using either the Feed Flow or Steam Flow Calorimetric program is 2300 MWth.

3. **ENTER** Target Power in MWth as follows:

- a. **IF** FWUFM is in service, **THEN** enter the number 2339. \_\_\_\_\_
- b. **IF** the Continuous Calorimetric Program to be used is either the Feed Flow Calorimetric **OR** Steam Flow Calorimetric, **THEN** enter the number 2300. \_\_\_\_\_
- c. **IF** a Target Power other than 2339 or 2300 MWth is required, **THEN** enter the Target Power. \_\_\_\_\_

**EXAMPLE:** A post-outage review of Main Steam Safety Valve testing documents reveals that Safety Valves SV1-1A, SV1-1B and SV1-1C are all misadjusted; their lift setting is outside the ITS required setting of 1085 PSIG  $\pm 3\%$ . Per ITS LCO 3.7.1.B, the maximum allowed power level is  $\leq 46\%$  power. This equates to a maximum allowed target power of 1075.9 MWth (based on 2339 MWth maximum).

d. **PEER CHECK** the Target Power number. \_\_\_\_\_

4. **IF** Excess Letdown is in service, **THEN PERFORM** the following:

- a. **SELECT EXCESS LETDOWN IN SERVICE YES** Box. \_\_\_\_\_
- b. **PEER CHECK** the EXCESS LETDOWN selection. \_\_\_\_\_

9.2.1 (Continued)

CHK (✓)

**NOTE:** Checking the ALL BLOWDOWN FW BEING MEASURED NO box will cause the Steam Flow Calorimetric to halt (stop calculating).

5. **IF** all Blowdown Flow is not being measured, **THEN PERFORM** the following:
  - a. **CHECK** the ALL BLOWDOWN FW BEING MEASURED NO Box. \_\_\_\_\_
  - b. **PEER CHECK** the BLOWDOWN MEASURED selection. \_\_\_\_\_

**NOTE:** With the MDAFW FEEDING ANY SG YES Box checked, clicking on the ENTER DATA button will halt CALO.

6. **IF** Motor Driven AFW is providing flow to any SG, **THEN PERFORM** the following:
  - a. **CHECK** the MDAFW FEEDING ANY SG YES Box. \_\_\_\_\_
  - b. **PEER CHECK** the MDAFW FEED selection. \_\_\_\_\_
7. **CLICK** on the ENTER DATA button. \_\_\_\_\_

9.2.2 **ENTER** NI drawer indications as follows:

1. **CLICK** on the PAGE 2 button. **SELECT** the desired Calorimetric Display. \_\_\_\_\_

**NOTE:** Power Range NI drawer indication readability shall be to half the smallest increment (division) on the meter face. (Example: 99.0, 99.5, 100.0, 100.5). (CR 93-15019)

2. **VERIFY** the values under the OPERATOR ENTERED NI POWERS line are the same as current NI drawer indications. \_\_\_\_\_
3. **PEER CHECK** the OPERATOR ENTERED NI POWERS. \_\_\_\_\_
4. **CLICK** on the ENTER DATA button. \_\_\_\_\_
5. **CLICK** on the REFRESH button. \_\_\_\_\_
6. **CLICK** on the EXIT button. \_\_\_\_\_

CHK (✓)

**NOTE:** After manual data entry, it is recommended to wait at least five minutes before printing the calorimetric report. Reference to Precaution & Limitation 6.15.

9.2.3 **WHEN** a minimum of five (5) minutes have elapsed since the last manual data entry, **THEN PRINT** the calorimetric as follows:

1. **CLICK** on the REPORT button. \_\_\_\_\_
2. **SELECT** the desired report. This will cause the report to be printed. \_\_\_\_\_

9.2.4 **EVALUATE** the calorimetric results as follows:

1. **REVIEW** the DEVIATION: (SELECTED CALORIMETRIC POWER - ENTERED NI POWER) line on the printed report. \_\_\_\_\_

**NOTE:** OPS-NGGC-1306 requires the verification of the validity of Thermal Power Calculations requiring a change greater than 2% before their use in adjusting gains on the excore detectors IAW OST-010.

2. **IF** any NI is deviated by greater than or equal to 2%, **THEN PERFORM** the following:
  - **NOTIFY** the SM AND the CRS. \_\_\_\_\_
  - **PERFORM** a backup calorimetric. \_\_\_\_\_
3. **IF** NI adjustment is required, **THEN GO TO** Section 9.3. \_\_\_\_\_
4. **IF** NI adjustment is **NOT** required, **THEN GO TO** Section 9.4. \_\_\_\_\_

**END R3 REACTIVITY EVOLUTION**



## CONTINUOUS USE

9.3 Power Range NIS Adjustments (CR 98-01570)

INIT

### BEGIN R2 REACTIVITY EVOLUTION

9.3.1 This revision has been verified to be the latest revision available. \_\_\_\_\_  
Date

**NOTE:** When entry into the Power Range drawer is not required, licensed Operators and I&C Technicians are authorized to make NIS adjustments, with SM approval.

The Bases for ITS SR 3.3.1.2 contains the following statements: "If the Calorimetric exceeds the NIS channel output by > 2% RTP, the NIS is not declared inoperable, but must be adjusted. If the NIS channel output cannot be properly adjusted, the channel is declared inoperable. The NIS channel output shall be adjusted consistent with the calorimetric results if the absolute difference between the NIS channel output and the calorimetric is > 2% RTP.

This section of OST-010 has been screened in accordance with PLP-037 criteria and determined to be a Case Three activity. (OPEX 443847)

### CAUTION

When adjusting an NI Power Range gain with another OOS, extreme care must be utilized. Any electronic spiking has the potential of causing a Reactor Protection System actuation. (CR 97-01677)

The inherent inaccuracies in the Continuous Calorimetric Program amplify when power is less than 70%, which magnify the possibility of non-conservative operation. Therefore, adjusting NI's down should be minimized and should only be performed after consulting with Reactor Engineering. (CR 98-01362)

Reactor Engineering and the Manager - Operations should be contacted for assistance prior to adjusting the NI's during any power or Xenon transient.

9.3.2 IF it is desired to perform an NIS adjustment, **THEN OBTAIN** SM approval.

\_\_\_\_\_  
Shift Manager (signature)

INIT

9.3.3 The Reactivity Management requirements of OPS-NGGC-1306 have been reviewed **AND** the applicable actions taken. (OPEX 443847) \_\_\_\_\_

9.3.4 **IF** any Power Range NI needs to be adjusted by more than 2%, **THEN CONTACT** Reactor Engineering **AND** the Manager - Operations prior to the adjustment. \_\_\_\_\_

9.3.5 **IF** Reactor power is less than 70% **AND** it is desired to adjust NIS DOWN, **THEN CONTACT** Reactor Engineering for guidance regarding the amount of adjustment to make. \_\_\_\_\_

\_\_\_\_\_  
Engineer Contacted (Print Name)

9.3.6 **IF** entry into a Power Range drawer is required to accomplish the NIS adjustment, **THEN ADJUST** NIS using PIC-107, Power Level Indication at the Power Range. \_\_\_\_\_

9.3.7 **PERFORM** the following for each NI channel to be adjusted:

<b>NOTE:</b> Diverse and redundant indications of Reactor Power should be monitored IAW OMM-001-2 while adjusting the Power Range indications. (OPEX 443847)
--

1. **IF** entry into a Power Range drawer is required to accomplish the NIS adjustment, **THEN N/A** the step(s) associated with the drawer(s) entered. \_\_\_\_\_

9.3.7 (Continued)

INIT

**NOTE:** ERFIS indication should be used to monitor the Power Range adjustment when matching the indicated power level to the calorimetric's calculated value. The accuracy of ERFIS provides better indication when making small adjustments to indicated power levels.

- |   | <u>N-41</u> | <u>N-42</u> | <u>N-43</u> | <u>N-44</u> |
|---|-------------|-------------|-------------|-------------|
| 2. <b>ADJUST</b> gain potentiometer until power level meter agrees with target value.   | _____       | _____       | _____       | _____       |
| 3. <b>PEER CHECK</b> that the adjusted power level meter agrees with the target value.  | _____       | _____       | _____       | _____       |
| 4. <b>WHEN</b> each gain potentiometer adjustment is complete, <b>THEN PEER CHECK</b> each potentiometer properly locked. (OMM-001-2 and OPEX 443847) | _____       | _____       | _____       | _____       |

**END R2 REACTIVITY EVOLUTION**

Adjustment Performed by:

	Title	Date

Reviewed By: _____		_____
Shift Technical Advisor		Date

Approved By: _____		_____
Shift Manager		Date

## REFERENCE USE

- 9.4 Post-Test Review and Documentation. CHK (✓)
- 9.4.1 IF any ERFIS points were recorded with Quality Codes other than OK OR had warning or deviation messages noted, **THEN** either **VALIDATE** the suspect values are appropriate through comparison with redundant information **OR REMOVE** the ERFIS point from scan. \_\_\_\_\_
- 9.4.2 IF Section 9.2 was performed, **THEN INITIAL** the appropriate lines on the CALORIMETRIC POWER REPORT, **AND COMPLETE** the Certification and Review Form. \_\_\_\_\_
- 9.4.3 IF the Target Power level used in step 9.2.1.3.c is **NOT** 2339 **OR** 2300 MWth, **THEN RECORD** the Target Power level in the COMMENTS SECTION of the CALORIMETRIC POWER REPORT printout along with the reason for the Target Power level. \_\_\_\_\_
- 9.4.4 IF Power Range NIS adjustments were performed **THEN ROUTE** Section 9.3 with the CALORIMETRIC POWER REPORT for vaulting. \_\_\_\_\_

CHK (✓)

**NOTE:** An NCR initiated due to problems with the Calorimetric should be evaluated IAW TMM-113, Control of the Calorimetric, for a possible non-conservative condition **AND** IAW OPS-NGGC-1306, Reactivity Management Program, as a potential Reactivity Management Event. (OPEX 443847)

9.4.5 **IF ANY** of the following conditions were identified or encountered:

- A FWUFM Calorimetric could not be performed resulting in a unit load reduction in support of TRM Section 3.25, Plant Calorimetric Measurement;

**OR**

- Calorimetric data input points were removed from service IAW Step 9.1.4.6 or Step 9.4.1 (data input problems not identified prior to the initiation of the test);

**OR**

- Calorimetric deviation and/or warning messages were encountered **AND** the messages were not due to low power operation;

**OR**

- OST-012 was required to be performed as directed by this procedure (unscheduled performance of the manual calorimetric);

**OR**

- Engineering assistance was needed to help resolve suspect data;

**THEN** initiate an NCR IAW CAP-NGGC-0200, Condition Identification and Screening Process. \_\_\_\_\_

9.4.6 **IF** an NCR was initiated in Step 9.4.5, **THEN RECORD** the NCR number in the COMMENTS SECTION of the CALORIMETRIC POWER REPORT printout **AND** in the Control Room Log (AutoLog). \_\_\_\_\_

## 10.0 RECORDS

- 10.1 Performance of this procedure generates a CALORIMETRIC POWER REPORT which includes a Certification and Review Form for vaulting.
- 10.2 Performance of Section 9.3, Power Range NIS Adjustments, when performed, will be attached to the CALORIMETRIC POWER REPORT for vaulting.

## 11.0 ATTACHMENTS

None Applicable

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM RO A2  
Rev 0**

**Determine Proper Equipment Boundaries**

**Concurred By:** Mike Smith **Date:** 6/4/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:** 01110115901 Verify proper clearance boundaries and tag sequencing IAW OPS-NGGC-1301.

**Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM RO A2

**Candidate**

RO

**K/A                      Rating (RO/SRO):**

G 2.2.41                      3.5

G 2.2.13                      4.1

**Task Standard:**

Determine the pump boundaries and power supply necessary to isolate the leakage from drain valve SI-888M.

**Preferred Evaluation Location:**

Simulator \_\_\_\_\_ Classroom   X  

**Preferred Evaluation Method:**

Perform   X   Simulate \_\_\_\_\_

**References:**

P&ID 5379-01082 Sheet 2 of 5  
EDP- 002  
OPS-NGGC-1301

**Validation Time: 30 Minutes Time Critical: NO Time Critical Time: N/A**

**Candidate:**

(N/A if not time critical)

\_\_\_\_\_  
Name

**Overall  
Time**

**Critical  
Time**

SSN

- -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**  
circle one

SAT

UNSAT

**Performance  
Time (min):**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Examiner:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

P&amp;ID 5379-01082 Sheet 2 of 5, Safety Injection System Flow Diagram

EDP- 002, 480V AC Busses

OPS-NGGC-1301, Equipment Clearance

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. During rounds the IAO identified that SI-888M, SI Pump C Drain, is experiencing excessive seat leakage.
3. A Work Order is being prepared to replace SI-888M with a new valve. The Work Order requests a clearance for SI-888M. The Clearance Request states that the component will need to be isolated, depressurized and drained.

**INITIATING CUES:**

Using the provided references only, identify the Minimum pump boundary valves and motor breaker to replace the valve in accordance with the Work Order.

The Manager of Shift Operations has authorized Single Valve isolation for the work on SI-888M.

START TIME: \_\_\_\_\_

<p><b>EXAMINER'S NOTE:</b> This JPM consists of identifying the boundaries necessary to isolate the seat leakage path from SI-888M, SI Pump C Drain. The sequence of the component isolation is NOT required for performance of this JPM</p>	
<p><b><u>STEP 1:</u></b> Review P&amp;ID to determine component boundary valves.</p> <p><b><u>STANDARD:</u></b> Candidate will use the provided plant drawing to identify the component boundary valves.</p> <p><b>EXAMINER'S NOTE:</b> P&amp;ID 5379-01082 Sheet 2 of 5 and EDP-002 will be provided to the candidate to use to identify the component boundary valves.</p> <p><b><u>COMMENTS:</u></b></p>	<p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 2:</u></b> Identify the pump boundary valves.</p> <p><b><u>STANDARD:</u></b> The following valves are required to be verified in the selected positions to ensure that SI-888M is isolated such that it can be removed from the system with single valve isolation:</p> <ul style="list-style-type: none"> <li>• SI-886C, RWST TO SI PUMP "C" SUCTION - CLOSED</li> <li>• SI-898J, SI PUMP "C" MINIFLOW ISOLATION - CLOSED</li> <li>• SI-888C, SI PUMP "C" DISCHARGE - CLOSED</li> <li>• SI-938, SI PUMP "C" FULL FLOW TEST LINE ROOT ISOLATION - CLOSED</li> <li>• SI-886E, RHR HX OUTLIET TO SI PUMP "C" – CLOSED</li> </ul> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

**STEP 3:** Identify valves that require verification post-maintenance that are not part of the boundary isolation.

**STANDARD:** At least one of the listed vent valves and at least one of the listed drain valves is identified as needing to be opened to depressurize and drain the section of piping to support replacement of SI-888M.

Acceptable Vent Valves	Acceptable Drain Valves
SI-992C, SI PUMP "C" RECIRCULATION LINE STRAINER VENT	SI-888P, SI PUMP "C" DRAIN
SI-888W, SI Pump "C" Vent	SI-888L, SI PUMP "C" DRAIN <b><u>AND</u></b> SI-888V, SI PUMP "C" DRAIN (Need both since valves are in series.)
SI-888N, SI Pump "C" Vent	SI-921C, SI PUMP "C" RECIRCULATION LINE STRAINER DRAIN
SI-838G, SI PUMP "C" SUCTION END SEAL WATER VENT	SI-838I, SI PUMP "C" TEST POINT ISOLATION <b><u>AND</u></b> PX-956C Drain Valve (Need both since valves are in series.)
SI-838H, SI PUMP "C" DISCH END SEAL WATER VENT	SI-888M, SI PUMP "C" DRAIN (Could be used as a drain, however no tag could be placed on valve since it is being replaced.)

**EXAMINER'S NOTE:** NONE

**COMMENTS:**

**Critical Step**

\_\_\_ SAT

\_\_\_ UNSAT

<p><b><u>STEP 4:</u></b> Determine the power supply to SI Pump “C”</p> <p><b><u>STANDARD:</u></b> Candidate determines that SI Pump “C” power supply is breaker 52/23B – RACKED OUT</p> <p><b>Not required for credit.</b> Switch that can be included is as follows:</p> <ul style="list-style-type: none"> <li>• RTGB Control Switch for SI Pump “C” - CAPPED</li> </ul> <p><b>EXAMINER’S NOTE:</b> SI Pump “C” power supply is located in EDP-002, Section 9.0, 480V-E2, Breaker 52/23B.</p> <p><b>Power supply is also available on the RTGB on the pump control switch.</b></p> <p><b>EDP-002 was provided to candidate at beginning of JPM.</b></p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue:</b> Safety Injection Pump “C” valve boundaries and power supply have been identified as directed.</p>	

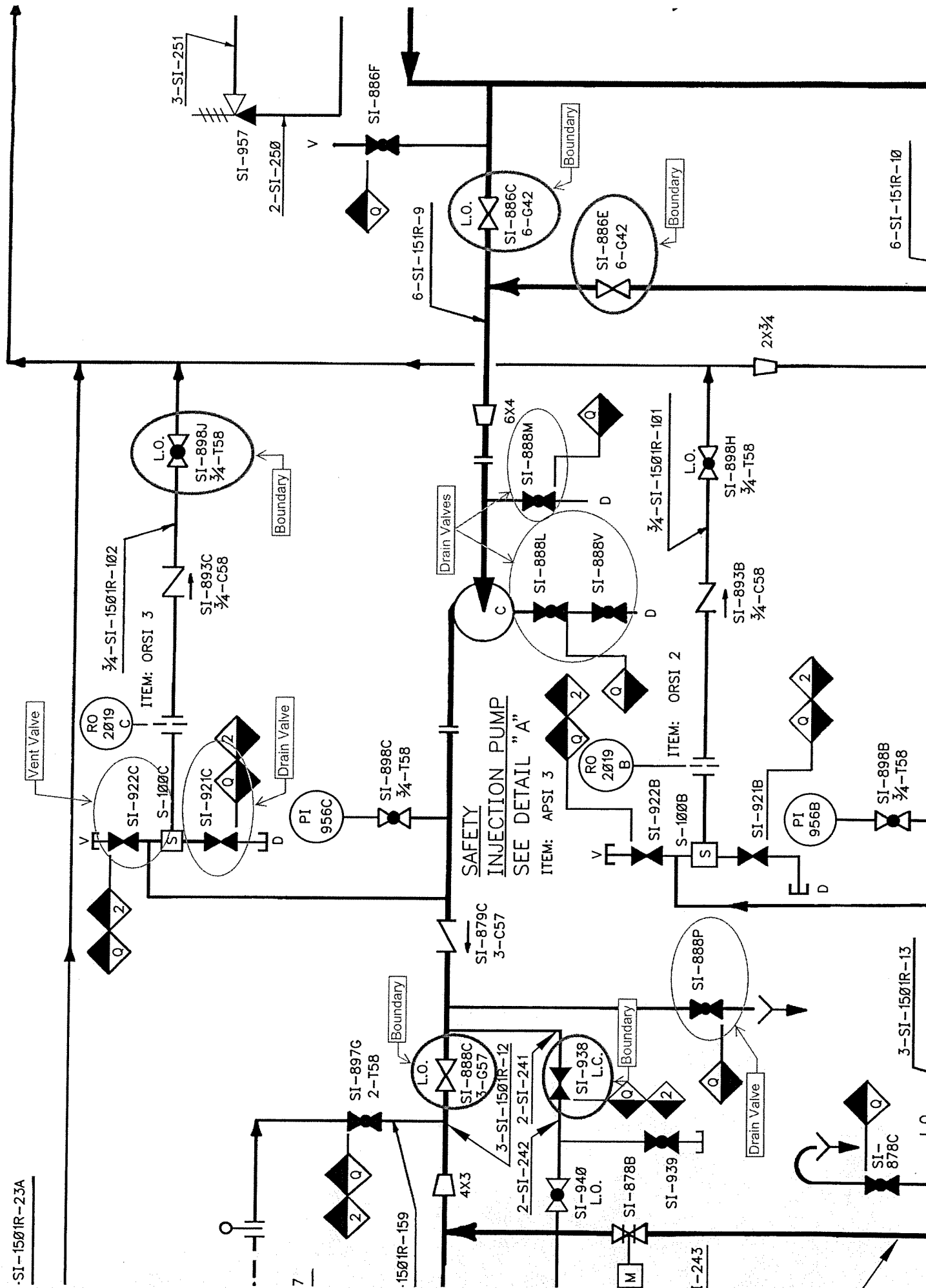
**TIME STOP:** \_\_\_\_\_

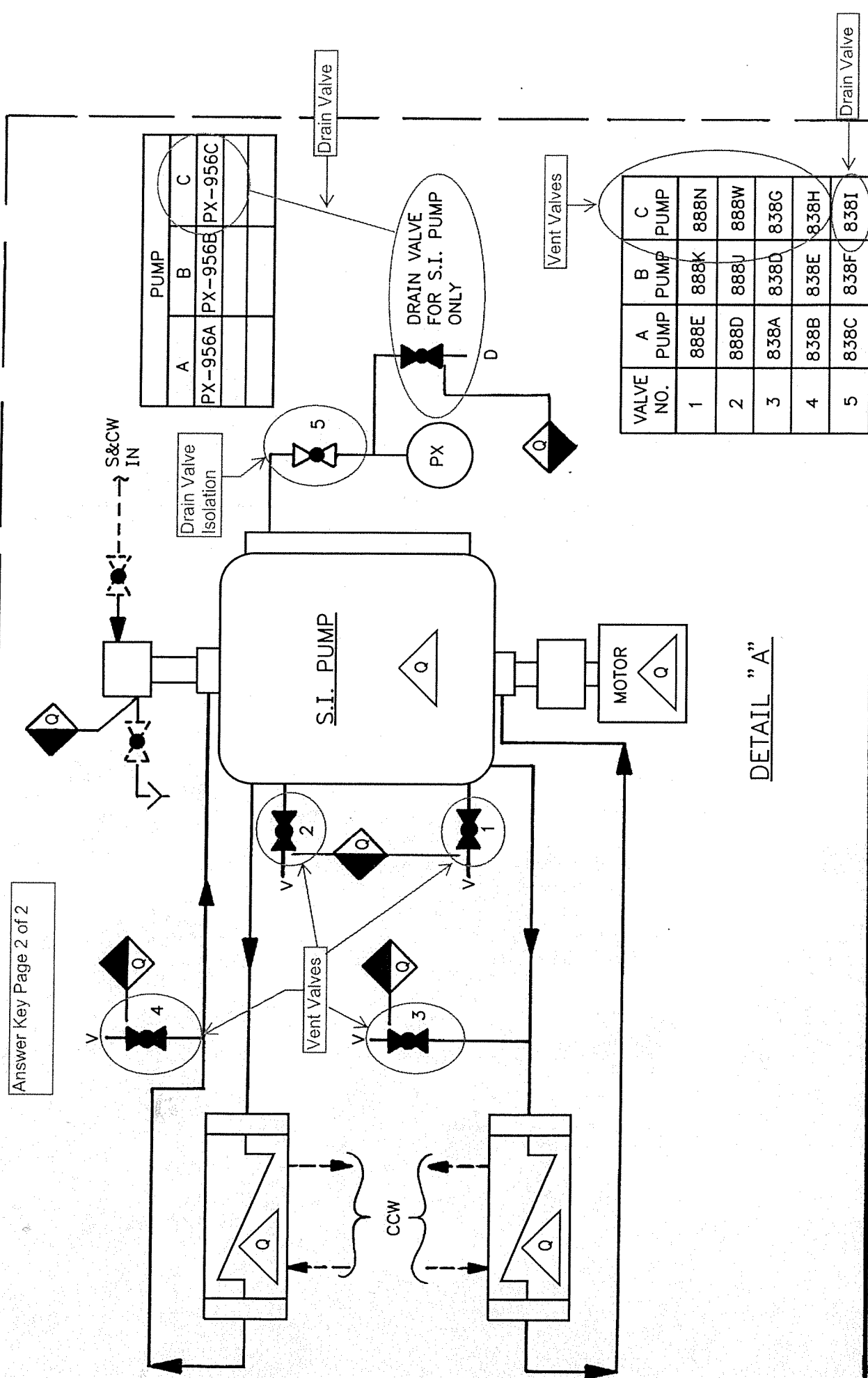
## Answer Sheet

Boundary Valves	Power Supply	Acceptable Vent Valves
SI-886C, RWST TO SI PUMP "C" SUCTION - CLOSED	480V-E2, Breaker 52/23B – Racked Out	SI-992C, SI PUMP "C" RECIRCULATION LINE STRAINER VENT
SI-898J, SI PUMP "C" MINIFLOW ISOLATION - CLOSED		SI-888W, SI Pump "C" Vent
SI-888C, SI PUMP "C" DISCHARGE - CLOSED		SI-888N, SI Pump "C" Vent
SI-938, SI PUMP "C" FULL FLOW TEST LINE ROOT ISOLATION - CLOSED		SI-838G, SI PUMP "C" SUCTION END SEAL WATER VENT
SI-886E, RHR HX OUTLIET TO SI PUMP "C" – CLOSED		SI-838H, SI PUMP "C" DISCH END SEAL WATER VENT
		<b>Acceptable Drain Valves</b>
		SI-888P, SI PUMP "C" DRAIN
		SI-888L, SI PUMP "C" DRAIN <u>AND</u> SI-888V, SI PUMP "C" DRAIN (Need both since valves are in series.)
		SI-921C, SI PUMP "C" RECIRCULATION LINE STRAINER DRAIN
		SI-838I, SI PUMP "C" TEST POINT ISOLATION <u>AND</u> PX-956C Drain Valve (Need both since valves are in series.)
		SI-888M, SI PUMP "C" DRAIN (Could be used as a drain, however no tag could be placed on valve since it is being replaced.)

SI-1501R-23A

Answer Key Page 1 or 2





DETAIL "A"

Answer Key Page 2 of 2

VALVE NO.	A PUMP	B PUMP	C PUMP
1	888E	888K	888N
2	888D	888J	888W
3	838A	838D	838G
4	838B	838E	838H
5	838C	838F	838I

PUMP		
A	B	C
PX-956A	PX-956B	PX-956C



**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. Unit 1 is at 100 % RTP.
2. During rounds the IAO identified that SI-888M, SI Pump C Drain, is experiencing excessive seat leakage.
3. A Work Order is being prepared to replace SI-888M with a new valve. The Work Order requests a clearance for SI-888M. The Clearance Request states that the component will need to be isolated, depressurized and drained.

**INITIATING CUES:**

**Using the provided references only, identify the Minimum pump boundary valves and motor breaker to replace the valve in accordance with the Work Order.**

**The Manager of Shift Operations has authorized Single Valve isolation for the work on SI-888M.**

**LICENSE EXAMINATION  
JOB PERFORMANCE MEASURE**

**ILC-13 NRC JPM RO A3  
Rev 0**

**Calculate Low Dose Path**

**Concurred By:** Kirk Schauer **Date:** 5/15/13  
Operations

**Approved By:** James Conder **Date:** 6/5/13  
Superintendent/Supervisor - Training

# **LICENSE EXAMINATION JOB PERFORMANCE MEASURE**

**Task:****Alternate Path:**

NO

**JPM #:**

ILC-13 NRC JPM RO A3

**Candidate**

RO

**K/A**                      **Rating (RO/SRO):**

G 2.3.4

3.2

**Task Standard:**

Determine the appropriate path and number of workers to keep dose ALARA and determine if any dose limits are exceeded.

**Preferred Evaluation Location:**Simulator \_\_\_\_\_ Classroom   X  **Preferred Evaluation Method:**Perform   X   Simulate \_\_\_\_\_**References:**

DOS-NGGC-0004, Administrative Dose Limits

**Validation Time: 20 Minutes Time Critical: NO Time Critical Time: N/A****Candidate:**

(N/A if not time critical)

Name \_\_\_\_\_

**Overall  
Time****Critical  
Time**

SSN

- -

Start: \_\_\_\_\_

Start: \_\_\_\_\_

Finish: \_\_\_\_\_

Finish: \_\_\_\_\_

**Performance Rating:**

circle one

SAT

UNSAT

**Performance****Time (min):**

\_\_\_\_\_

\_\_\_\_\_

**Examiner:**

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

**COMMENTS:**

**QUESTION DOCUMENTATION:**

Question:

Response:

**Tools/Equipment/Procedures Needed:**

Calculator and Paper

DOS-NGGC-0004, Administrative Dose Limits (if requested)

**READ TO OPERATOR****DIRECTIONS TO CANDIDATE:**

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the Operator Cue Sheet I provided you along with completed JPM material.

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant shutdown 24 hours ago for a Forced Outage.
2. HVH-9A motor has failed and must be replaced prior to plant startup.
3. A team has been assembled to determine options for successful job performance while maintaining overall dose ALARA
4. Only two personnel are available that are qualified to perform the necessary work. They are Duke Energy Employees and have received NO dose from Non-Duke Energy plants. Worker A has a current annual dose of 1895 mrem and Worker B has a current annual dose of 1845 mrem.

SELECTION	PATH – A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people - 4	1 person - 18 2 people - 10

**INITIATING CUES:**

Using the data given, determine the recommended path to the job site, the number of workers necessary to effectively complete the job and keep radiation dose ALARA, the dose each worker will receive and if any dose limits will be exceeded.

START TIME: \_\_\_\_\_

**EXAMINER'S NOTE:** Performance Steps may be performed in any order.

<p><b><u>STEP 1:</u></b> Determine Transit dose to the job site for 1 worker via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH A will receive 75 mRem entering the job site.  <math>(450 \text{ mR/hr}) \times (1 \text{ hr}/60 \text{ min.}) \times 10 \text{ min.} = 75 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 2:</u></b> Determine Transit dose to the job site for 2 workers via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH A will receive 60 mRem entering the job site.  <math>(450 \text{ mR/hr}) \times (1 \text{ hr}/60 \text{ min.}) \times 4 \text{ min.} \times 2 \text{ people} = 60 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 3:</u></b> Determine work site dose for 1 worker.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker performing job will receive 120 mrem.  <math>(120 \text{ mR/hr}) \times (1 \text{ hr}/60 \text{ min}) \times 60 \text{ min.} = 120 \text{ mrem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 4:</u></b> Determine work site dose for 2 workers.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers performing job will receive 100 mrem.  <math>(120 \text{ mR/hr}) \times (1\text{hr}/60\text{min}) \times 25 \text{ min.} \times 2 \text{ people} = 100 \text{ mrem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 5:</u></b> Determine dose received by 1 worker to exit work site via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH A will receive 75 mRem exiting the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} = 75 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 6:</u></b> Determine dose received by 2 workers to exit work site via PATH A.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH A will receive 60 mRem exiting the job site.  <math>(450 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 4 \text{ min.} \times 2 \text{ people} = 60 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 7:</u></b> Determine dose received for entire job if PATH A is used.</p> <p><b><u>STANDARD:</u></b> Determines that to perform job using PATH A will result in 270 mrem for 1 worker and 220 mrem for 2 workers.</p> <p>1 worker: <math>75 + 120 + 75 = 270</math> mrem</p> <p>2 workers: <math>60 + 100 + 60 = 220</math> mrem (110 mRem to each worker)</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 8:</u></b> Determine Transit dose to the job site for 1 worker via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH B will receive 72 mRem entering the job site.</p> <p><math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 18 \text{ min.} = 72 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 9:</u></b> Determine Transit dose to the job site for 2 workers via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH B will receive 80 mRem entering the job site.</p> <p><math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} \times 2 \text{ people} = 80 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><u>COMMENTS:</u></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>



<p><b><u>STEP 10:</u></b> Determine dose received by 1 worker to exit work site via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 1 worker transiting via PATH B will receive 72 mRem exiting the job site.  <math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 18 \text{ min.} = 72 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 11:</u></b> Determine dose received by 2 workers to exit work site via PATH B.</p> <p><b><u>STANDARD:</u></b> Determines that 2 workers transiting via PATH B will receive 80 mRem exiting the job site.  <math>(240 \text{ mR/hr}) \times (1\text{hr}/60 \text{ min.}) \times 10 \text{ min.} \times 2 \text{ people} = 80 \text{ mRem}</math></p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 12:</u></b> Determine dose received for entire job if PATH B is used.</p> <p><b><u>STANDARD:</u></b> Determines that to perform job using PATH B will result in 264 mrem for 1 worker and 260 mrem for 2 workers.</p> <p>1 worker: <math>72 + 120 + 72 = 264 \text{ mrem}</math></p> <p>2 workers: <math>80 + 100 + 80 = 260 \text{ mrem}</math> (120 mRem to each worker)</p> <p><b>EXAMINER'S NOTE:</b> NONE</p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>

<p><b><u>STEP 13:</u></b> Determine the recommended path taken and number of workers utilized to keep radiation dose ALARA and the dose each worker will receive.</p> <p><b><u>STANDARD:</u></b> Candidate determines that the lowest dose is received by using <b>2 workers</b> transiting to and from the job site using <b>PATH A</b>. Using this PATH the workers will receive <b>110 mrem</b> each.</p> <p><b>EXAMINER'S NOTE:</b>           <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b><u>STEP 14:</u></b> Determine if any dose limits will be exceeded.</p> <p><b><u>STANDARD:</u></b> YES, the Duke Energy Administrative Dose Limit of 2 Rem will be exceeded by Worker A.</p> <p><b>EXAMINER'S NOTE:</b>           <b>NONE</b></p> <p><b><u>COMMENTS:</u></b></p> <p style="text-align: center;"><b><u>END OF TASK</u></b></p>	<p><b><u>Critical Step</u></b></p> <p>___ SAT</p> <p>___ UNSAT</p>
<p><b>Terminating Cue:</b> Candidate determines lowest dose received, PATH used and if any dose limits will be exceeded.</p>	

**TIME STOP:** \_\_\_\_\_

## ANSWER KEY

SELECTION	PATH – A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Recommended PATH	PATH – A	
Number of Workers	2	
Dose Received by each worker	110 mrem	
Worker(s) that will exceed any dose limit	Worker A will exceed the Duke Energy (Legacy Progress Energy) Administrative Annual Dose Limit of 2 Rem.	

*Excerpt from DOS-NGGC-0004, Administrative Dose Limits*

**9.3 Progress Energy Annual Administrative Dose Limits**

9.3.1 0.5 rem Progress Energy dose if non-Progress Energy dose for the current year has not been determined. No dose extension is permitted.

9.3.2 2 rem Progress Energy dose not to exceed 4 rem total dose if non-Progress Energy dose for the current year has been determined.

**CANDIDATE CUE SHEET**  
**(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)**

**CANDIDATE INFORMATION:**

Inform the candidate there are NO time critical steps in this JPM.

**INITIAL CONDITIONS:**

1. The plant shutdown 24 hours ago for a Forced Outage.
2. HVH-9A motor has failed and must be replaced prior to plant startup.
3. A team has been assembled to determine options for successful job performance while maintaining overall dose ALARA
4. Only two personnel are available that are qualified to perform the necessary work. They are Duke Energy Employees and have received NO dose from Non-Duke Energy plants. Worker A has a current annual dose of 1895 mrem and Worker B has a current annual dose of 1845 mrem.

SELECTION	PATH - A	PATH - B
Pathway Dose Rate	450 mR/hr	240 mR/hr
Pathway Transit Time to Job Site (minutes)	1 person – 10 2 people – 4	1 person – 18 2 people – 10
Job Site Dose Rate	120 mR/hr	
Job Site Work Duration (minutes)	1 person – 60 2 people – 25	
Pathway Transit Time from Job Site (minutes)	1 person – 10 2 people - 4	1 person - 18 2 people - 10
Recommended PATH		
Number of Workers		
Dose Received by each worker		
Worker(s) that will exceed any dose limit		

**INITIATING CUES:**

Using the data given, determine the recommended path to the job site, the number of workers necessary to effectively complete the job and keep radiation dose ALARA, the dose each worker will receive and if any dose limits will be exceeded.