WATTS BAR NUCLEAR PLANT
A.1-1 RO

A.1-1 RO Calculate Shutdown Margin

WATTS BAR NUCLEAR PLANT
A.1-1 RO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Calculate Shutdown Margin

Alternate Path: N/A

Facility JPM #: 3-OT-JPMADA-1.3

K/A Rating(s): 001A4.11 [3.5/4.1] 2.1.7 [3.7/4.4] 2.1.25 [2.8/3.1]

Task Standard: Performer completes a Conservative SDM Hand Calculation per 1-SI-0-10 Section 6.2. Determines Required RCS Boron Concentration, determines present boron concentration is inadequate for cooldown

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X___ Simulate _____

References: 1-SI-0-10, "Shutdown Margin", Rev. 21; NUPOP, "Nuclear Parameters and Operating Package for Watts Bar Unit 1, Cycle 9", Rev 2; NOB, "Unit 1 Nuclear Operating Book, Sheet A-3" Rev 59.

Task Number: RO-085-SI-0-10-001 APPLICABLE FOR: RO/SRO

10CFR55.45: 1, 5, 12

Validation Time: 20 min. **Time Critical:** No

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Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

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_____

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Tools/Equipment/Procedures Needed:

Latest revision of 1-SI-0-10
NUPOP for WBN Unit 1 Cycle 9
NOB for WBN Unit 1
Ruler or straight edge.
Calculator

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC or provide performer with procedure).

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit has tripped and requires a cooldown to 160 °F.**
2. **ICS Point U7981 indicates core average burnup is 7500 MWD/MTU.**
3. **All control rods have fully inserted into the core.**
4. **At least one reactor coolant pump will remain in operation until cooldown is complete. RCP #2 is running and is desired to remain running for the entire cooldown.**
5. **RCS boron concentration is 1500 ppm.**
6. **You are an extra Unit Operator.**

INITIATING CUES:

The SM/Unit SRO has directed you to perform a Conservative SDM Hand Calculation per 1-SI-0-10 "Shutdown Margin", Section 6.2 based on the conditions stated above.

1. **Determine the Required RCS Boron concentration.**
2. **Determine if acceptance criteria are met.**
3. **Notify SM/Unit SRO of the Required RCS Boron Concentration.**

START TIME: _____

STEP 1: Obtain a copy of the instruction. STANDARD: A copy of 1-SI-0-10 has been obtained. **EXAMINER'S CUE: Provide the Performer a copy of the instruction.** COMMENTS:	___ SAT ___ UNSAT
NOTE **Due to the amount of conservatism factored into this calculation, this instruction may NOT pass acceptance criteria if performed in MODES 1 or 2. During MODES 1 or 2, perform Sections 6.3 or 6.4.**	
STEP 2: **[1]** **ENSURE** precautions and limitations in Section 3.0 have been reviewed. STANDARD: Performer reviews Section 3.0 Precautions and Limitations. COMMENTS:	___ SAT ___ UNSAT
STEP 3: **[2]** **ENSURE** prerequisite actions in Section 4.0 have been met. **EVALUATOR CUE: State that Section 4.0 actions have been met.** STANDARD: Performer proceeds to the next step COMMENTS:	___ SAT ___ UNSAT

STEP 4: **[3]** **OBTAIN** the NuPOP for the applicable cycle AND **RECORD**: A. The WCAP number and cycle number: WCAP - _____ Cycle _____ B. The Maximum Stuck Rod Worth. Table D1, (Mode 2 below nuclear heating through Mode 5): _____pcm STANDARD: Performer records WCAP- **16880-P** and Cycle **9.** Performer records **1242** pcm. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

NOTES
1) It is permissible to use a conservative RCS temperature to bound a potential plant cooldown. Remember that Mode 4 is more limiting than Mode 5.

2) Number of immovable/untrippable rods refers to the actual number of immovable/untrippable rods, NOT the one that is assumed to be untripped from the definition of SDM

STEP 5: **[4]** **DETERMINE** the following plant conditions: A. Core average burnup: _____MWD/MTU *(ICS computer point U7981)* and check the applicable core life below as defined in NuPOP Section 8.3. Beginning of Life Middle of Life End of Life B. Number of immovable/untrippable rods: _____ C. Minimum Tcold for the desired condition: _____°F D. RCS Boron Concentration CB: _____ppm	**CRITICAL STEP** ___ SAT ___ UNSAT
STANDARD: Performer records the following: A. Core average burnup: **7500**MWD/MTU. From Section 8.3, Performer checks Middle of Life box. B. Number of immovable/untrippable rods: **0** C. Minimum Tcold for the desired condition: **160** °F D. RCS Boron Concentration Cb: **1500** ppm	
COMMENTS:	

STEP 6: **[5]** **IF** there are immovable/untrippable rods, **THEN** A. **RECORD** the differential Boron Worth using burnup from Step 6.2[4]A and RCS Boron Concentration from Step 6.2[4]D: Differential Boron Worth: _____pcm/ppm (See NuPOP Figure 6-22) _____ B. **CALCULATE** the absolute value stuck rod correction _____ × _____ pcm ÷ _____ pcm / ppm (Step 6.2[4]B) (Step 6.2[3]B) (Step 6.2[5]A) Stuck rod correction (absolute value) = _____ ppm STANDARD: Performer enters N/A for this step, since the Cue Sheet stated that there were NO UNTRIPPABLE RODS. If the Performer completes the calculation, the value entered will still be ZERO. ____**0**_____ x __**1242**__pcm ÷ __**-6.5**___ pcm/ppm (Step [4] B) (Step [3] B) (Step [4] E) Stuck rod correction = __**0**___ ppm. COMMENTS: Performer may enter a 0 for the stuck rod correction without looking up data since there are no additional stuck rods, and the step is CONDITIONAL (IF..THEN)	___ SAT ___ UNSAT
STEP 7: **[6]** **RECORD** the $(M-P)_{SDM}$ from NOB Sheet A-3. $(M-P)_{SDM}$ = _____ppm. STANDARD: Performer obtains the required value by referring to the NOB sheet A-3. records it in the procedure blank. $(M-P)_{SDM}$ = **__90__** ppm. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 8: **[7]** **CALCULATE** required RCS C_B **[a]** **DETERMINE** UNCORRECTED Maximum Required C_B, from NuPOP Table 7-4 using burnup of Step [4] A and temperature of Step [4] C: UNCORRECTED Max Required CB = _____ ppm STANDARD: Performer obtains the required value by referring to the NuPOP Table 7-4 for 2500 MWD/MTU and 160 °F records value in the procedure blank. UNCORRECTED Max Required CB = **1563** ppm COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 9: **[7b]** **CALCULATE** required RCS C_B **[b]** **CALCULATE** the Required C_B _____ + _____ + _____ (Step [5]) (Step [6]) (Step [7] [a]) Required C_B = _____ ppm STANDARD: Performer calculates the sums from Step [5], Step [6] and Step 7a, and enters the valve calculated in the Required Cb blank. **0** + **90** + **1563** (Step [5]) (Step [6]) (Step [7] [a]) Required C_B = **1653** ppm COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 10: **[8]** **VERIFY** That RCS C_B in Step [4] D is greater than or equal to the Required C_B in Step [7}[b] (Acc Crit. A & B).	**CRITICAL STEP**
STANDARD: Performer determines that the acceptance criteria are **NOT MET**. Value in step [4] D is less than Value in Step [7][b] and reports to the Unit Supervisor.	___ SAT
EVALUATOR CUE: Role play as SM/Unit supervisor and acknowledge report.	___ UNSAT
COMMENTS:	

END OF TASK

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit has tripped and will require a Unit Cooldown to 160 °F.**
2. **ICS Point U7981 indicates core average burnup is 7500 MWD/MTU.**
3. **All control rods have fully inserted into the core.**
4. **At least one reactor coolant pump will remain in operation until cooldown is complete. #2 RCP is running and is desired to remain running for the entire cooldown.**
5. **RCS boron concentration is 1500 ppm.**
6. **You are an extra Unit Operator.**

INITIATING CUES:

The SM/Unit SRO has directed you to perform a Conservative SDM Hand Calculation per 1-SI-0-10 "Shutdown Margin", Section 6.2 based on the conditions stated above.

1. **Determine the Required RCS Boron concentration.**
2. **Determine if acceptance criteria are met.**
3. **Notify SM/Unit SRO of the Required RCS Boron Concentration.**

WATTS BAR NUCLEAR PLANT
A.1-1SRO

A.1-1SRO Perform Technical Review of Shutdown Margin Calculation

WATTS BAR NUCLEAR PLANT
A.1-1SRO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Perform Technical Review of Shutdown Margin Calculation

Alternate Path: N/A

Facility JPM #: New

K/A Rating(s): 001A4.11 [3.5/4.1] 2.1.7 [3.7/4.4] 2.1.25 [2.8/3.1]

Task Standard: Performer completes a Technical Review of Shutdown Margin Calculation Conservative SDM Hand Calculation per 1-SI-0-10 Section 6.2. Determines Required RCS Boron Concentration, determines present boron concentration is inadequate for cooldown, due to multiple errors made in transposing data and performing calculations.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X___ Simulate ____

References: 1-SI-0-10, "Shutdown Margin", Rev. 21; NUPOP, "Nuclear Parameters and Operating Package for Watts Bar Unit 1, Cycle 9", Rev 2; NOB, "Unit 1 Nuclear Operating Book, Sheet A-3" Rev 59.

Task Number: RO-085-SI-0-10-001 APPLICABLE FOR: RO/SRO

10CFR55.45: 1, 5, 12

Validation Time: 15 min. **Time Critical:** No

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Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

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_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

Latest revision of 1-SI-0-10
NUPOP for WBN Unit 1 Cycle 9
NOB for WBN Unit 1
Ruler or straight edge.
Calculator

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC or provide performer with procedure).

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit has tripped and requires a cooldown to 160 °F.**
2. **ICS Point U7981 indicates core average burnup is 7500 MWD/MTU.**
3. **All control rods have fully inserted into the core.**
4. **At least one reactor coolant pump will remain in operation until cooldown is complete. #2 RCP is running and is desired to remain running for the entire cooldown.**
5. **RCS boron concentration is 1500 ppm.**
6. **You are the Unit SRO.**

INITIATING CUES:

The SM has directed you to perform a technical review of the Conservative SDM Hand Calculation per 1-SI-0-10 “Shutdown Margin”, Section 6.2 which was calculated based on these conditions.

START TIME: _____

STEP 1: Obtain a copy of the instruction. STANDARD: A copy of 1-SI-0-10 has been obtained. **EXAMINER'S CUE: Provide the Performer a copy of the completed 1-SI-0-1, Section 6.2.** COMMENTS:	___ SAT ___ UNSAT
NOTE **Due to the amount of conservatism factored into this calculation, this instruction may NOT pass acceptance criteria if performed in MODES 1 or 2. During MODES 1 or 2, perform Sections 6.3 or 6.4.**	
STEP 2: **[1]** **ENSURE** precautions and limitations in Section 3.0 have been reviewed. STANDARD: Performer reviews Section 3.0 Precautions and Limitations. COMMENTS:	___ SAT ___ UNSAT
STEP 3: **[2]** **ENSURE** prerequisite actions in Section 4.0 have been met. STANDARD: Performer determines that Section 4.0 is complete. COMMENTS:	___ SAT ___ UNSAT

STEP 4: **[3]** **OBTAIN** the NuPOP for the applicable cycle AND **RECORD**: A. The WCAP number, unit, and cycle number *(front cover of NuPOP)*:WCAP-_____ Unit ____ Cycle_____ B. The Maximum Stuck Rod Worth. Table D1, (Mode 2 below nuclear heating through Mode 5): _____pcm STANDARD: Performer verifies that the information associated with A is correct. (WCAP- **16880-P** Unit **1** and Cycle **9**.) Performer determines that an incorrect value of **1020** was entered from Table D-1 and notes **1242** pcm is the correct value. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

NOTES
1) It is permissible to use a conservative RCS temperature to bound a potential plant cooldown. Remember that Mode 4 is more limiting than Mode 5.

2) Number of immovable/untrippable rods refers to the actual number of immovable/untrippable rods, NOT the one that is assumed to be untripped from the definition of SDM

STEP 5: **[4]** **DETERMINE** the following plant conditions: A. Core average burnup: _____MWD/MTU *(ICS computer point U7981)* and check the applicable core life below as defined in NuPOP Section 8.3. Beginning of Life Middle of Life End of Life B. Number of immovable/untrippable rods: _____ C. Minimum Tcold for the desired condition: _____°F D. RCS Boron Concentration CB: _____ppm	**CRITICAL STEP** ___ SAT ___ UNSAT
STANDARD: Performer determines the following data was entered correctly: A. Core average burnup: **7500**MWD/MTU. From Section 8.3, Performer checks Middle of Life box. B. Number of immovable/untrippable rods: **0** C. Minimum Tcold for the desired condition: **160** °F D. RCS Boron Concentration Cb: **1500** ppm	
COMMENTS:	

STEP 6: **[5]** **IF** there are immovable/untrippable rods, **THEN**
A. **RECORD** the differential Boron Worth using burnup from Step 6.2[4]A and RCS Boron Concentration from Step 6.2[4]D:
Differential Boron Worth: _____pcm/ppm
(See NuPOP Figure 6-22) _____
B. **CALCULATE** the absolute value stuck rod correction
_____ × _____ pcm ÷ _____ pcm / ppm
(Step 6.2[4]B) (Step 6.2[3]B) (Step 6.2[5]A)
Stuck rod correction (absolute value) = _____ ppm

___ SAT

___ UNSAT

STANDARD: This step should have an N/A entered, since the Cue Sheet stated that there were NO UNTRIPPABLE RODS.
If the Performer completes the calculation, the value entered will still be ZERO.

0 x **1242** pcm ÷ **-6.5** pcm/ppm
(Step 6.2[4] B) (Step 6.2[3] B) (Step 6.2[5] A)
Stuck rod correction = **0** ppm.

COMMENTS:

STEP 7: **[6]** **RECORD** the $(M-P)_{SDM}$ from NOB Sheet A-3. $(M-P)_{SDM}$ = _____ppm.	**CRITICAL STEP**
STANDARD: Performer determines that the value entered is incorrect, in that a negative sign was entered. Performer obtains the required value by referring to the NOB sheet A-3. records it in the procedure blank. $(M-P)_{SDM}$ = **-90** ppm. **CORRECT VALUE** $(M-P)_{SDM}$ = **90** ppm.	___ SAT ___ UNSAT
COMMENTS:	

STEP 8: **[7]** **CALCULATE** required RCS C_B **[a]** **DETERMINE** UNCORRECTED Maximum Required C_B, from NuPOP Table 7-4 using burnup of Step [4] A and temperature of Step [4] C: UNCORRECTED Max Required CB = _____ ppm	**CRITICAL STEP** ___ SAT
STANDARD: Performer determines that the value entered is incorrect, Performer obtains the required value by referring to the NuPOP Table 7-4 for 7500 MWD/MTU and 160 °F records value in the procedure blank. UNCORRECTED Max Required CB = **1558** ppm **CORRECT VALUE** UNCORRECTED Max Required CB = **1563** ppm	___ UNSAT
COMMENTS:	

STEP 9: **[7b] CALCULATE** required RCS C_B

CRITICAL STEP

[b] CALCULATE the Required C_B

_____ + _____ + _____
(Step [5]) (Step [6]) (Step [7] [a])

Required C_B = _____ ppm

___ SAT

___ UNSAT

STANDARD: Performer determines that the value entered is incorrect. Performer calculates the sums from Step [5], Step [6] and Step 7a, and enters the value calculated in the Required C_B blank.

__**0**___ + ___-**90**___ + ___**1558**_____
(Step [5]) (Step [6]) (Step [7] [a])

Required C_B = __**1468**____ ppm

NOTE TO EVALUATOR: CORRECT VALUE

__**0**___ + ___**90**___ + ___**1563**_____
(Step [5]) (Step [6]) (Step [7] [a])

Required C_B = __**1653**____ ppm

COMMENTS:

STEP 10: **[8]** **VERIFY** That RCS C_B in Step [4] D is greater than or equal to the Required C_B in Step [7][b] (Acc Crit. A & B).	**CRITICAL STEP**
STANDARD: Performer determines that the acceptance criteria is **NOT MET**, which was not initially reported. Actual corrected value in step [4] D is less than Value in Step [7] [b]. Informs the SM that multiple errors were made in the calculation and that the Acceptance Criteria which was initially indicated as **MET** was **NOT MET** based on the corrected calculation.	___ SAT ___ UNSAT
COMMENTS:	
END OF TASK	

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit has tripped and requires a cooldown to 160 °F.**
2. **ICS Point U7981 indicates core average burnup is 7500 MWD/MTU.**
3. **All control rods have fully inserted into the core.**
4. **At least one reactor coolant pump will remain in operation until cooldown is complete. RCP #2 is running and is desired to remain running for the entire cooldown.**
5. **RCS boron concentration is 1500 ppm.**
6. **You are the Unit SRO.**

INITIATING CUES:

The SM has directed you to perform a technical review of the Conservative SDM Hand Calculation per 1-SI-0-10 "Shutdown Margin", Section 6.2 which was calculated based on these conditions.

Data Package: Page 1 of 4 Date 5/18/09

6.2 Conservative SDM Hand Calculation

NOTE

Due to the amount of conservatism factored into this calculation, this instruction may NOT pass acceptance criteria if performed in MODES 1 or 2. During MODES 1 or 2, perform Sections 6.3 or 6.4.

[1] **ENSURE** Precautions and Limitations in Section 3.0 have been reviewed. DAH

[2] **ENSURE** Prerequisite Actions in Section 4.0 have been met. DAH

[3] **OBTAIN** the NuPOP for the applicable fuel cycle AND **RECORD**: DAH

A. The WCAP number, unit, and cycle number *(front cover of NuPOP)*:

WCAP- 16880-P Unit 1 Cycle 9

B. The Maximum Stuck Rod Worth.
Appendix D Table D-1, (Mode 2 below nuclear heating through Mode 5):

1020 pcm DAH

NOTES

1) It is permissible to use a conservative RCS temperature to bound a potential plant cooldown. Remember that Mode 4 is more limiting than Mode 5.

2) Number of immovable/untrippable rods refers to the actual number of immovable/untrippable rods, NOT the one that is assumed to be untripped from the definition of SDM

[4] **DETERMINE** the following plant conditions:

A. Core average burnup: 7500 MWD/MTU *(ICS computer point U7981)* and check the applicable core life below as defined in NuPOP Section 8.3.

- ☐ Beginning of Life
- ☑ Middle of Life
- ☐ End of Life

B. Number of immovable/untrippable rods: Ø

Data Package: Page 2 **of** 4 **Date** 5/18/09

6.2 Conservative SDM Hand Calculation (continued)

C. Minimum T_{cold} for the desired condition: 160 °F

D. RCS Boron Concentration C_B: 1500 ppm

DAA

[5] **IF** there are immovable/untrippable rods, **THEN**

A. **RECORD** the differential Boron Worth using burnup from Step 6.2[4]A and RCS Boron Concentration from Step 6.2[4]D:

Differential Boron Worth: -6.4 pcm/ppm
(See NuPOP Figure 6-22)

DAA

B. **CALCULATE** the absolute value stuck rod correction

$\frac{\phi}{\text{(Step 6.2[4]B)}} \times \frac{1020 \text{ pcm}}{\text{(Step 6.2[3]B)}} \div \frac{|-6.4 \text{ pcm/ppm}|}{\text{(Step 6.2[5]A)}}$

Stuck rod correction (absolute value) = ϕ ppm DAA

Data Package: Page 3 of 4 Date 5/18/09

6.2 Conservative SDM Hand Calculation (continued)

[6] **RECORD** the $(M-P)_{SDM}$ from NOB Sheet A-3.

$(M-P)_{SDM}$ = -90 ppm

DAH

[7] **CALCULATE** required RCS C_B

A. **DETERMINE** UNCORRECTED Maximum Required C_B, from NuPOP Table 7-4 using burnup of Step 6.2[4]A and temperature of Step 6.2[4]C:

UNCORRECTED Max Required C_B = 1558 ppm

B. **CALCULATE** the Required C_B:

ϕ	+	-90	+	1558
(Step 6.2[5]B)		(Step 6.2[6])		(Step 6.2[7]A)

Required C_B = 1468 ppm

DAH

[8] **VERIFY** that RCS C_B in Step 6.2[4]D is greater than or equal to the Required C_B in Step 6.2[7]B (**Acc Crit. A & B**).

DAH

CAUTION

It is the responsibility of Operations to ensure that dilution protection is adequate for plant conditions. Dilution protection is assured by either 1) the performance of 1-SI-62-1, Uncontrolled Boron Dilution, 2) Stopping ALL Primary Water pumps and issuing a HOLD ORDER as administrative controls, or 3) performing the calculations within this procedure and verifying that the RCS boron concentration is adequate to allow the operator time to recognize the presence of a dilution.

NOTE

Dilution protection calculations are NOT needed when RHR is NOT in service or when one or more RCP's will be maintained in operation along with RHR or when dilution protection will be accomplished via valve alignment or primary water pump hold order.

[9] **IF** dilution protection is needed via boron analysis, **THEN**

PERFORM Appendix A.

N/A

Data Package: Page 4 **of** 4 **Date** 5/18/09

6.2 Conservative SDM Hand Calculation (continued)

[10] **OBTAIN** Technical Review of results by STA, Senior Reactor Operator or Reactor Engineer.

STA/SRO/RXE

WATTS BAR NUCLEAR PLANT
A.1-2 RO

A.1-2 RO Calculate Target Boron Cb for Load Escalation Using Appendix E of SOI-62.02

WATTS BAR NUCLEAR PLANT
A.1-2 RO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Calculate Target Boron Cb for Load Escalation Using Appendix E of SOI-62.02

Alternate Path: N/A

Facility JPM #: 3-OT-JPMADA.1-2R

K/A Rating(s): G2.1.25 [2.8/3.1]

Task Standard: Performer completes a calculation for Target Boron Concentration per SOI-62.02, Appendix E "Reactivity balance calculation". Target RCS Boron Concentration is determined.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X___ Simulate ____

References: SOI-62.02, "Boron Concentration Control", Rev. 47; NUPOP, WCAP-16880-P, "Nuclear Parameters and Operating Package for Watts Bar Unit 1, Cycle 9", Rev 2.

Task Number: RO-062-SOI-62-016 APPLICABLE FOR: RO/SRO

10CFR55.45: 1, 5, 12

Validation Time: 20 min. **Time Critical:** No

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Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

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Tools/Equipment/Procedures Needed:

Latest revision of SOI-62.02
NUPOP for WBN Unit 1 Cycle 9
NOB for WBN Unit 1
Ruler or straight edge.
Calculator

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC or provide performer with procedure).

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is operating at 75% rated thermal Power.**
2. **Core average burnup is 12000 MWD/MTU.**
3. **Control Bank "D" rods are at 190 steps.**
4. **RCS Boron Concentration is 750 ppm**
5. **Target Rod Position at 100% RTP will be 220 Steps on Control Bank "D"**
6. **Power will be raised 3% per hour.**
7. **Xenon printout from REACTINW has been performed by an STA.**
8. **You are an extra Unit Operator.**

INITIATING CUES:

Using the information provided, the SM/Unit SRO has directed you to calculate Target Boron Concentration for raising power to 100% per SOI-62.02 Appendix E "Reactivity Balance Calculation"

- **Determine the RCS Target Boron concentration.**
- **Notify SM/Unit SRO of the RCS Target Boron Concentration.**

START TIME: _____

STEP 1: Obtain a copy of the instruction. STANDARD: A copy of SOI-62.02 Appendix E "Reactivity Balance Calculation" has been obtained. **EXAMINER'S CUE: Provide the Performer a copy of the instruction.** COMMENTS:	___ SAT ___ UNSAT
NOTE 1 One calculation is required for each major change. Calculation is an approximation of Final Target Boron C_B. Rough interpolation of NuPop figures is acceptable and expected. NOTE 2 Dilution or Boration value for power change from P_1 % to P_2 % power in the time period T with rods moving from step position R_1 to R_2. (Subscript convention: 1 = current point, 2 = target point)	
Evaluator Note. JPM Steps 2 through 6 evaluate performers completion of the first page of Appendix E.	
STEP 2: **[1] CALCULATE** target boron concentration by performing the following: Obtains: Current RCS Boron C_B: _____PPM. **CUE: When CHEM LAB notified, acknowledge request, then report current RCS Boron Concentrations is 750 ppm.** STANDARD: Performer contacts Chem Lab for current boron concentration (Value provided on task assignment sheet.) COMMENTS:	___ SAT ___ UNSAT

STEP 3: Obtains: Core Burnup: _____MWD/MTU STANDARD: Performer determines current core burnup from task assignment sheet. **12000 MWD/MTU**. (ICS point display U7981 or Other ICS displays that indicate core burnup i.e., Xenon (Core burnup is provided on task assignment sheet). COMMENTS:	___ SAT ___ UNSAT
STEP 4: Obtains: Current Reactor power = P1: _____ % Target Reactor power = P2: _____ % Calculates: Total Reactor power change: _____Δ% STANDARD: Performer determines current reactor power and target power from information provided on assignment sheet. P1 = **76%**. P2 = **100%.** Target reactor power was given on task assignment. Performer determines total power change to be **24%**. COMMENTS:	___ SAT ___ UNSAT

STEP 5:	Obtains: Rate of Reactor Power change: _____ %/hr Number of hours to change power: _____ hr(s)	___ SAT
STANDARD:	Performer determines rate of reactor power change from task assignment to be **3% per hour**. Performer calculates number of hours projected to reach target power as **8 hrs**.	___ UNSAT
COMMENTS:		
STEP 6:	Obtains: Current Rod Position: _____ steps Final Rod Position: _____ steps	___ SAT
STANDARD:	Performer determines final rod position from task assignment as **220 Steps**. Performer determines current rod position from ICS or Control Board Step Counters (Value provided on task assignment sheet). Value for current position is **190 steps**.	___ UNSAT
COMMENTS:		

CAUTION Follow sign conventions explicitly. **Evaluator Note. JPM Steps 7 through 11 evaluate performer's completion of the second page of Appendix E steps for Reactivity Balance.**	
STEP 7: **Determines $\Delta\rho$ Power Defect:** From NUPOP, Figure 6-18, 19, or 20 (or from Table 7-17, 7-18, or 7-19 Must multiply value from these tables by (-1) to maintain sign convention. The figures are correct as shown). STANDARD: Performer determines the PD_1 for current power level is **-1594 pcm** from Table 7-18, and determines PD_2 for target power level as **-2088 pcm** from Table 7-18, and enters the values in appropriate table locations. Performer then calculates $\Delta\rho$ Power Defect by subtracting algebraically PD_2 from PD_1. The value determined is **494 pcm**. If using Performer determines the PD_1 for current power level is Figure 6-19 accept **-1570 to -1600 pcm for the 76% power level and** accept **-2050 to -2100 pcm for the 100% power level.** Acceptable Range is **450 to 530pcm.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 8: **Determines Δρ Xenon:** $Xenon_1$: From REACTW (either current conditions or projection to initial condition). _____ **pcm** XE_1. $Xenon_2$: From REACTW (projected over time period T). _____ pcm XE2. **NOTE: Xenon Values must be negative.** Performer than calculates Δρ Xenon by subtracting algebraically XE2 from XE_1. **-2644.7 pcm** XE_1 **- -2508.1 pcm** XE_2 = **-136.6 pcm** (current) (Target) Δρ Xenon STANDARD: Performer determines the XE_1 for current power level is **-2644.7 pcm** from Xenon REACTW printout, and determines XE_2 for target power level as **-2508.1 pcm** from the same printout, and enters the values in appropriate table locations. Performer then calculates Δρ Xenon by subtracting algebraically XE_2 from XE_1. The value determined is **-136.6 pcm.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 9 **Determines $\Delta\rho$ rods:**

Rods $_{1, 2}$: From NUPOP, Figure 6-24, or 25.

_____ pcm $Rods_1$ - _____ pcm $Rods_2$ = _____ pcm

(current) (Target) $\Delta\rho$ Rods

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD: Performer determines the $Rods_1$ for current rod position as **150** pcm **(accept 175 – 125)** from NUPOP Figure 6-25, and determines $Rods_2$ for target as **0** **(accept 0 – 40)** pcm from the same figure, and enters the values in appropriate table locations. Performer then calculates $\Delta\rho$ Rods by subtracting algebraically $Rods_2$ from $Rods_1$. The value determined is **150** pcm. Acceptable Range is **85 to 175 pcm.**

Performer may adjust values based on interpretation of NUPOP Figure 6-25. Values entered that are within the stated acceptable range may be used.

COMMENTS:

STEP 10: **Determines ρ boron$_1$:**
Current RCS Boron X 1000 ÷ Inverse Boron Worth NUPOP, Figure 6-21).

_____ Boron X (1000 ÷ _____pcm/%Δρ) = _____pcm
(current) ρ BORON$_1$

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD: Performer enters **750** ppm for current boron concentration. Performer determines the inverse boron worth is **-159** pcm/%Δρ (accept **-158 to -160**) from NUPOP Figure 6-21 for the current boron concentration, and enters the values in appropriate table location. Performer then calculates ρ BORON$_1$ by multiplying RCS boron concentration by the product of 1000 pcm divided by current inverse boron worth boron worth determined from figure 6-21 for the current RCS boron concentration. ρ boron 1 value is calculated is **minus -4717** pcm.

Performer must adjust value based on interpretation of NUPOP Figure 6-21. Values entered that are within the stated acceptable range may be used.

COMMENTS:

STEP 11: **Determines ρ boron$_2$:**
Calculates ρ boron$_2$ by

_____ Δρ Power Defect + _____ pcm Δρ Xenon - ____ pcm +
_____ pcm (ρ BORON$_{1)}$ = _____ pcm
ρ BORON$_2$

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD: Performer calculates ρ boron$_2$ by algebraically adding/subtracting the change in power defect, change in Xenon reactivity, change in reactivity due to rods and current worth of RCS boron. The result of the calculation in reactivity required by boron at the target power level. The values previously calculated are entered into the table observing proper signs.

+ 494 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 150 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4510 pcm
ρ BORON$_2$

+ 450 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 85 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4635 pcm
ρ BORON$_2$

+ 530 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 175 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4498 pcm
ρ BORON$_2$

Performer must adjust value based on errors previously identified. The new calculated value must be within the stated acceptable range.

COMMENTS:

Evaluator Note. JPM Steps 12 evaluate performers completion of the second page of Appendix E steps for Target PPM.

STEP 12: (-4510) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **717** ppm (-4635) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **736** ppm (-4498) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **715** ppm STANDARD: Performer determines Target Boron Concentration by taking ρ $BORON_2$ times born worth and conversion factor. The target boron concentration is calculated to be 725 ppm ±12 ppm. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 13: **NOTIFY** SM/Unit SRO of RCS Target Boron Concentration calculated. **EVALUATOR CUE: Role play as SM/Unit supervisor and acknowledge report. Acknowledge request for independent verification, State that this Admin JPM has been completed. We will stop here.** STANDARD: Performer informs the SM/Unit Supervisor of the Target RCS boron concentration that was calculated. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is operating at 76% rated thermal Power.**
2. **Core average burnup is 12000 MWD/MTU.**
3. **Control Bank "D" rods are at 190 steps.**
4. **RCS Boron Concentration is 750 ppm**
5. **Target Rod Position at 100% RTP will be 220 Steps on Control Bank "D"**
6. **Power will be raised 3% per hour.**
7. **Xenon printout from REACTINW has been performed by an STA.**
8. **You are an extra Unit Operator.**

INITIATING CUES:

Using the information provided, the SM/Unit SRO has directed you to calculate Target Boron Concentration for raising power to 100% per SOI-62.02 Appendix E "Reactivity Balance Calculation"

- **Determine the RCS Target Boron concentration.**

Notify SM/Unit SRO of the RCS Target Boron Concentration

[REACTW - VERS WB3.3]

XENON CALCULATION
WATTS BAR UNIT 1 CYCLE 9
MOL NIX XENON DATA

TIME (HRS)	POWER (%)	XE (% EQ)	I (% EQ)	XE WORTH (PCM)	DEL XE WORTH (PCM)
.0	76.0	91.2	76.0	-2644.7	.0
1.0	79.0	90.8	76.3	-2634.6	10.1
2.0	82.0	90.2	76.9	-2618.1	16.5
3.0	85.0	89.6	77.7	-2598.2	19.9
4.0	88.0	88.8	78.7	-2577.1	21.1
5.0	91.0	88.1	79.9	-2556.5	20.6
6.0	94.0	87.5	81.3	-2537.7	18.8
7.0	97.0	86.9	82.9	-2521.3	16.4
8.0	100.0	86.5	84.6	-2508.1	13.2

WATTS BAR NUCLEAR PLANT
A.1-2 SRO

A.1-2 SRO Perform Independent Verification of Appendix E of SOI-62.02, REACTIVITY BALANCE CALCULATION

WATTS BAR NUCLEAR PLANT
A.1-2 SRO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Perform Independent Verification of Appendix E of SOI-62.02, REACTIVITY BALANCE CALCULATION

Alternate Path: N/A

Facility JPM #: 3-OT-JPMADA.1-5

K/A Rating(s): G2.1.25 [2.8/3.1]

Task Standard: Performer completes an independent verification of the SOI-62.02, Appendix E "Reactivity balance calculation". Target RCS Boron Concentration is corrected based upon errors found. Performer notifies SM of the results.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X___ Simulate _____

References: SOI-62.02, "Boron Concentration Control", Rev. 47; NUPOP, WCAP-16880-P, "Nuclear Parameters and Operating Package for Watts Bar Unit 1, Cycle 9", Rev 2.

Task Number: RO-062-SOI-62-016 APPLICABLE FOR: RO/SRO

10CFR55.45: 1, 5, 12

Validation Time: 20 min. **Time Critical:** No

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Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

Latest revision of SOI-62.02
NUPOP for WBN Unit 1 Cycle 9
NOB for WBN Unit 1
Ruler or straight edge.
Calculator

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC or provide performer with procedure).

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is operating at 75% rated thermal Power.**
2. **Core average burnup is 12000 MWD/MTU.**
3. **Control Bank "D" rods are at 190 steps.**
4. **RCS Boron Concentration is 750 ppm**
5. **Target Rod Position at 100% RTP will be 220 Steps on Control Bank "D"**
6. **Power will be raised 3% per hour.**
7. **Xenon printout from REACTINW has been performed by an STA.**
8. **The Unit Operator has just completed SOI-62.02 Appendix E "Reactivity Balance Calculation" for this power change.**

INITIATING CUES:

The SM/Unit SRO has directed you to perform an independent verification of SOI-62.02 Appendix E "Reactivity Balance Calculation" performed by the Unit Operator

START TIME: _____

STEP 1: Obtain a copy of the completed instruction. STANDARD: A copy of SOI-62.02 Appendix E "Reactivity Balance Calculation" has been obtained. **EXAMINER'S CUE: Provide the Performer a copy of the completed instruction.** COMMENTS:	___ SAT ___ UNSAT
NOTE 1 One calculation is required for each major change. Calculation is an approximation of Final Target Boron C_B. Rough interpolation of NuPop figures is acceptable and expected. NOTE 2 Dilution or Boration value for power change from P_1 % to P_2 % power in the time period T with rods moving from step position R_1 to R_2. (Subscript convention: 1 = current point, 2 = target point)	
Evaluator Note. JPM Steps 2 through 6 evaluate performers completion of the first page of Appendix E.	
STEP 2: **[1] CALCULATE** target boron concentration by performing the following: Obtains: Current RCS Boron C_B: _____PPM. **CUE: If the CHEM LAB notified to confirm value that was entered is correct, acknowledge request, then report current RCS Boron Concentrations is 750 ppm.** STANDARD: Performer ensures correct RCS Boron Concentration is entered in the Table associated with Step 1. COMMENTS:	___ SAT ___ UNSAT

STEP 3:	Obtains: Core Burnup: _____MWD/MTU	
STANDARD:	Performer ensures correct current core burnup from task assignment sheet. 12000 MWD/MTU.	___ SAT
COMMENTS:		___ UNSAT
STEP 4:	Obtains: Current Reactor power = P1: _____ % Target Reactor power = P2: _____ % Calculates: Total Reactor power change: _____Δ%	___ SAT
STANDARD:	Performer ensures correct current reactor power and target power from information provided on assignment sheet. P1 = 76%. P2 = 100 % Target reactor power was given on task assignment. Performer ensures correct total power change to be 24%.	___ UNSAT
COMMENTS:		

STEP 5: Obtains: Rate of Reactor Power change: _____ %/hr Number of hours to change power: _____ hr(s) STANDARD: Performer ensures correct rate of reactor power change from task assignment to be 3 % per hour. Performer ensures correct number of hours projected to reach target power as 8 hrs. COMMENTS:	___ SAT ___ UNSAT
STEP 6: Obtains: Current Rod Position: _____ steps Final Rod Position: _____ steps STANDARD: Performer ensures correct final rod position from task assignment as 220 Steps. Performer ensures correct current rod position from ICS or Control Board Step Counters (Value provided on task assignment sheet). Value for current position is 190 steps. COMMENTS:	___ SAT ___ UNSAT

CAUTION Follow sign conventions explicitly. **Evaluator Note. JPM Steps 7 through 11 evaluate performer's completion of the second page of Appendix E steps for Reactivity Balance.**	
STEP 7: **Determines $\Delta\rho$ Power Defect:** From NUPOP, Figure 6-18, 19, or 20 (or from Table 7-17, 7-18, or 7-19 Must multiply value from these tables by (-1) to maintain sign convention. The figures are correct as shown). STANDARD: Performer determines the PD_1 for current power level is **-1594 pcm** from Table 7-18, and determines PD_2 for target power level as **-2088 pcm** from Table 7-18, and enters the values in appropriate table locations. Performer then calculates $\Delta\rho$ Power Defect by subtracting algebraically PD_2 from PD_1. The value determined is **494 pcm**. If using Performer determines the PD_1 for current power level is Figure 6-19 accept **-1570 to -1600 pcm for the 76% power level and** accept **-2050 to -2100 pcm for the 100% power level.** Acceptable Range is **450 to 530pcm.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 8: **Determines Δρ Xenon:** $Xenon_1$: From REACTW (either current conditions or projection to initial condition). _____ pcm XE_1. $Xenon_2$: From REACTW (projected over time period T). _____ pcm XE2. **NOTE: Xenon Values must be negative.** Performer than calculates Δρ Xenon by subtracting algebraically XE2 from XE_1. **-2644.7** pcm XE_1 **- -2508.1** pcm XE_2 = **-136.6 pcm** (current) (Target) Δρ Xenon STANDARD: Performer determines the XE_1 for current power level is **-2644.7** pcm from Xenon REACTW printout, and determines XE_2 for target power level as **-2508.1** pcm from the same printout, and enters the values in appropriate table locations. Performer then calculates Δρ Xenon by subtracting algebraically XE_2 from XE_1. The value determined is **-136.6** pcm. **Performer identifies the lack of a minus sign applied to the Xenon worth and makes correction.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 9 **Determines $\Delta\rho$ rods:** Rods $_{1, 2}$: From NUPOP, Figure 6-24, or 25. _____ pcm $Rods_1$ - _____ pcm $Rods_2$ = _____ pcm (current) (Target) $\Delta\rho$ Rods STANDARD: Performer determines the $Rods_1$ for current rod position as **150** pcm **(accept 175 – 125)** from NUPOP Figure 6-25, and determines $Rods_2$ for target as **0** **(accept 0 – 40)** pcm from the same figure, and enters the values in appropriate table locations. Performer then calculates $\Delta\rho$ Rods by subtracting algebraically $Rods_2$ from $Rods_1$. The value determined is **150** pcm. Acceptable Range is **85 to 175 pcm.** **Performer may adjust values based on interpretation of NUPOP Figure 6-25. Values entered that are within the stated acceptable range may be used.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 10: **Determines ρ boron$_1$:** Current RCS Boron X 1000 ÷ Inverse Boron Worth NUPOP, Figure 6-21). _____ Boron X (1000 ÷ _____pcm/%Δρ) = _____pcm (current) ρ BORON$_1$ STANDARD: Performer enters **750** ppm for current boron concentration. Performer determines the inverse boron worth is **-159** pcm/%Δρ (accept **158 -160**) from NUPOP Figure 6-21 for the current boron concentration, and enters the values in appropriate table location. Performer then calculates ρ BORON$_1$ by multiplying RCS boron concentration by the product of 1000 pcm divided by current inverse boron worth boron worth determined from figure 6-21 for the current RCS boron concentration. ρ boron 1 value is calculated is minus **-4717** pcm. **Performer must adjust value based on interpretation of NUPOP Figure 6-21. Values entered that are within the stated acceptable range may be used.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 11: **Determines ρ boron$_2$:**
Calculates ρ boron$_2$ by

_____ Δρ Power Defect + _____ pcm Δρ Xenon - ____ pcm +
_____ pcm (ρ BORON$_{1)}$ = _____ pcm
ρ BORON$_2$

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD: Performer calculates ρ boron$_2$ by algebraically adding/subtracting the change in power defect, change in Xenon reactivity, change in reactivity due to rods and current worth of RCS boron. The result of the calculation in reactivity required by boron at the target power level. The values previously calculated are entered into the table observing proper signs.

+ 494 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 150 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4510 pcm
ρ BORON$_2$

+ 450 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 85 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4635 pcm
ρ BORON$_2$

+ 530 pcm (Δρ Power Defect)
+ -136.6pcm (Δρ Xenon)
- 175 pcm (Δρ Rods)
+ -4717 pcm (ρ BORON$_{1)}$ = -4498 pcm
ρ BORON$_2$

Performer must adjust value based on errors previously identified. The new calculated value must be within the stated acceptable range.

COMMENTS:

Evaluator Note. JPM Steps 12 evaluate performer's completion of the second page of Appendix E steps for Target PPM.

STEP 12: (-4510) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **717** ppm (-4635) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **736** ppm (-4498) pcm ρ $BORON_2$ X (-159 ppm/%Δρ Inverse Boron Worth ÷ 1000 pcm/%Δρ) = **715** ppm STANDARD: Performer determines Target Boron Concentration by taking ρ $BORON_2$ times born worth and conversion factor. The target boron concentration is calculated to be 725 ppm ±12 ppm. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 13: **NOTIFY** SM/Unit SRO of RCS Target Boron Concentration independently verified. . **EVALUATOR CUE: Role play as SM/Unit supervisor and acknowledge report. Acknowledge request for independent verification, State that this Admin JPM has been completed**. **We will stop here.** STANDARD: Performer informs the SM/Unit Supervisor of the Target RCS boron concentration that was calculated and of the errors discovered during the independent verification process. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is operating at 75% rated thermal Power.**
2. **Core average burnup is 12000 MWD/MTU.**
3. **Control Bank "D" rods are at 190 steps.**
4. **RCS Boron Concentration is 750 ppm**
5. **Target Rod Position at 100% RTP will be 220 Steps on Control Bank "D"**
6. **Power will be raised 3% per hour.**
7. **Xenon printout from REACTINW has been performed by an STA.**
8. **The Unit Operator has just completed SOI-62.02 Appendix E "Reactivity Balance Calculation" for this power change.**

INITIATING CUES:

The SM/Unit SRO has directed you to perform an independent verification of SOI-62.02 Appendix E "Reactivity Balance Calculation" performed by the Unit Operator

[REACTW - VERS WB3.3]

XENON CALCULATION
WATTS BAR UNIT 1 CYCLE 9
MOL NIX XENON DATA

TIME (HRS)	POWER (%)	XE (% EQ)	I (% EQ)	XE WORTH (PCM)	DEL XE WORTH (PCM)
.0	76.0	91.2	76.0	-2644.7	.0
1.0	79.0	90.8	76.3	-2634.6	10.1
2.0	82.0	90.2	76.9	-2618.1	16.5
3.0	85.0	89.6	77.7	-2598.2	19.9
4.0	88.0	88.8	78.7	-2577.1	21.1
5.0	91.0	88.1	79.9	-2556.5	20.6
6.0	94.0	87.5	81.3	-2537.7	18.8
7.0	97.0	86.9	82.9	-2521.3	16.4
8.0	100.0	86.5	84.6	-2508.1	13.2

Appendix E
(Page 1 of 3)

REACTIVITY BALANCE CALCULATION

1.0 REACTIVITY BALANCE CALCULATION

NOTES

1) One calculation is required for each major change. Calculation is an approximation of Final Target Boron C_B. Rough interpolation of NuPop figures is acceptable and expected.
2) Dilution or Boration value for power change from P_1 % to P_2 % power in time period T with rods moving from step position R_1 to R_2. (Subscript convention: 1 = current point, 2 = target point)

[1] **CALCULATE** target boron concentration by performing the following:

~~DAA~~ Initials

2/2/09 date

DATA REQUIRED	DATA		Where To Get
Current RCS Boron C_B	750	ppm	Chem Lab
Core Burnup	12000	MWD/MTU	ICS U7981
Current Reactor power = P_1	76	%	NIS
Target Reactor power = P_2	100	%	As required for plant conditions
Total Reactor Power change	24	Δ%	Δ Current and final Reactor power
Rate of Reactor power change	3	%/hr	As required for plant conditions
Number of hours to change power	8	hr(s)	As required for plant conditions
Current Rod Position	190	steps	ICS or MCR Board
Final Rod Position	220	steps	Estimate number of rod steps required to control ΔI and rod withdrawal requirements for power change.

Appendix E
(Page 2 of 3)

1.0 REACTIVITY BALANCE CALCULATION (continued)

CAUTION

Follow sign conventions explicitly. When using values from Table 7-17, 7-18, or 7-19, they must be corrected as indicated in below.

REACTIVITY BALANCE

REACTIVITY BALANCE			
Parameter	**Where To Get**	**Calculation**	**Value**
$\Delta\rho$ POWER DEFECT	Power Defect $_{1,2}$: From NUPOP, Figure 6-18, 19, or 20 (or from Table 7-17, 7-18, or 7-19 Must multiply value from these tables by (-1) to maintain sign convention. The figures are correct as shown).	-1594 pcm PD_1 (current) − -2088 pcm PD_2 (Target) =	494 pcm $\Delta\rho$ POWER DEFECT
$\Delta\rho$ XENON	$Xenon_1$: From REACTW (either current conditions or projection to initial condition). $Xenon_2$: From REACTW (projection over time period T). NOTE Xenon values must be negative.	NOTE: Xenon values must be negative. -2644.7 pcm XE_1 (current) − -2508.1 pcm XE_2 (Target) =	136.6 pcm $\Delta\rho$ XENON
$\Delta\rho$ RODS	$Rods_{1,2}$ From NUPOP, Figure 6-24 or from Figure 6-25.	170 pcm $Rods_1$ (current) − 10 pcm $Rods_2$ (Target) =	160 pcm $\Delta\rho$ RODS
ρ BORON	Current RCS Boron X (1000 + Inverse Boron Worth NUPOP, Figure6-21)	750 ppm Boron X (current) (1000 + -161 ppm/%$\Delta\rho$) =	-4658 pcm ρ $BORON_1$
494 pcm $\Delta\rho$ POWER DEFECT + 136.6 pcm $\Delta\rho$ XENON − 160 pcm $\Delta\rho$ RODS + -4658 pcm (ρ $BORON_1$) =			-4187 pcm ρ $BORON_2$
continued on next page			

Appendix E
(Page 3 of 3)

Date_____ INITIALS

1.0 REACTIVITY BALANCE CALCULATION (continued)

TARGET PPM

(-4187 pcm ρ $Boron_2$) X (-161 ppm/%Δρ Inverse Boron Worth + 1000 pcm/%Δρ) = (NUPOP Figure 6-21)	674 ppm Target Boron C_B

NOTE

IV is **NOT** required if appendix is performed by an SRO to verify data provided by Rx. Eng.

[2] **ENSURE** independently verified by SRO. _____IV

WATTS BAR NUCLEAR PLANT
A.2-RO

A.2-RO CALCULATE QPTR USING 1-SI-0-21

EVALUATION SHEET

Task: CALCULATE QPTR USING 1-SI-0-21

Alternate Path: N/A

Facility JPM #: 3-OT-JPMADA.2-1

K/A Rating(s): 2.1.12 [2.9/4.0]

Task Standard: Quadrant Power Tilt Ratio has been determined per 1-SI-0-21 Section 6.1 and Attachment 1. Acceptance criteria are determined to be not met due for N-42 Upper Detector, N-44 Upper Detector and N-42 Lower Detector.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X__ Simulate _____

References: 1-SI-0-21 "Excore QPTR & Axial Flux Difference" Rev. 15; Nuclear Operating Book (NOB) A-2 Sheet 1 Rev. 89, Sheet 2 Rev. 88, Sheet 3 Rev. 89, Sheet 4 Rev 87.

Task Number: RO-092-SI-2-001 APLICABLE FOR: RO/SRO

10CFR55.45:

Validation Time: 13 min. **Time Critical:** No

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Applicant: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

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_____

Tools/Equipment/Procedures Needed:

Applicant Data Sheet
Latest revision of 1-SI-0-21
Attached NOB Sheets A-2 (all four PR detector channels)
Calculator

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC, etc.).

NOTE TO EVALUATOR: Hand out the Applicant Data Sheet along with the Applicant's Cue Sheet.

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The unit is operating at 100% power**
2. **AFD Monitor Alarm and QPTR alarms are out of service due to card problem in the annunciator system.**
3. **1-SI-0-21 "Excore QPTR & Axial Flux Difference SI is required to be performed every 12 hours since both QPTR alarms are inoperable.**
4. **Plant computer is not available for performing this SI.**
5. **You are a support CRO.**

INITIATING CUES:

1. **Given the data that was just obtained from each power range channel upper and lower detector currents, the Unit Supervisor directs you to perform Section 6.1 "Excore QPTR Determination" of 1-SI-0-21. M&TE will not be utilized for data measurements.**
2. **Report the results to the Unit Supervisor when 1-SI-0-21, Section 6.1 and Attachment 1 have been completed.**

START TIME: _____

STEP 1: Obtain a copy of the instruction. STANDARD: A copy of 1-SI-0-21 has been obtained. **EXAMINER'S CUE: After the performer identified correct instruction, the evaluator can provide a copy of the instruction.** COMMENTS:	___ SAT ___ UNSAT
NOTE TO EVALUATOR: The following steps are from Section 6.1 of 1-SI-0-21	
NOTE 1 Obtaining QPTR calculated values from the Process Computer is the preferred method to check that the QPTR is within Technical Specification limits. QPTR values are obtained from Process Computer calculated computer points for upper and lower radial flux tilt. These points are available on the "Tilting Factors" display. The report may be printed with turn on code TFREP. **NOTE 2 Up to one inoperable excore channel can be marked N/A if THERMAL POWER is < 75% RTP.**	
STEP 2: [Step 1] **IF** performing. STANDARD: Performer goes to attachment 1 and commences performance of attachment 1. COMMENTS:	___ SAT ___ UNSAT

STEP 3: [Step 2] **IF** the process Computer is available, **THEN PRINT** the Tilting Factors Report **AND/OR PERFORM** the QPTR calculations using Attachment 1. STANDARD: Performer goes to attachment 1 and commences performance of attachment 1. COMMENTS:	___ SAT ___ UNSAT

NOTE TO EVALUATOR: The following steps are from Attachment 1 of 1-SI-0-21	
NOTE 1 **Determining detector currents by measuring the voltage across the detector's meter test points, using DVM, is the most accurate method for measuring QPTR and for determining the validity of a QPTR alarm.** **NOTE 2** **Using detector current meter readings is another method to quickly check that QPTR is within limits. These meters are not as accurate as the DVM readings and may produce unacceptable results because: 1) the meters on the 'B' drawer may be scaled too high or (2) the meter may be unstable due to drift or noise. When unacceptable results are obtained DVM readings should be obtained, otherwise, Step [1] and [2] may be marked N/A if DVM not used.** **NOTE 3** **Up to one inoperable excore channel can be marked N/A if THERMAL POWER is < 75% RTP.**	
STEP 3: **[Step 1] RECORD** DVM information: A. TVA M&TE ID: _____ B. Cal Due Date: _____ STANDARD: Performer determine step in N/A based on initial conditions for task performance and proceeds to the next step. COMMENTS:	___ SAT ___ UNSAT
STEP 4: **[Step 2]** ENSURE require M&TE is within its current calibration. STANDARD: Performer determines step is N/A based on initial conditions for task performance and proceeds to the next step. COMMENTS:	___ SAT ___ UNSAT

CAUTION **An inadvertent reactor trip may be prevented by ensuring that no power range neutron high flux rate or power range high flux channels are in the tripped condition prior to taking EACH measurement in the NIS Power Range Drawer B.**

NOTE **The following determination may be made by measuring the voltage across the 1000 ohm precision resistor in NIS power range drawer B. When using this method the Ohm's Law conversion from a millivolt measurement to a microamp measurement only requires changing the unit designator (e.g., 280 millivolts converts to 280 microamps).**

NOTE **Detector A is the TOP or UPPER Detector and Detector B is the BOTTOM or LOWER detector on the NIS drawer B.**

STEP 4: **[Step 3] DETERMINE** the microamps for each upper and lower excore detector on each NIS power range drawer B, **AND RECORD** below:

	UPPER DETECTOR	LOWER DETECTOR
NIS Channel	I_t Detector Current (microamps)	I_b Detector Current (microamps)
N-41A	(369)	(384)
N-42A	(364)	(386)
N-43A	(369)	(385)
N-44A	(371)	(386)

STANDARD: Performer obtains the detector current microamp readings from the handout given during task assignment and enters the appropriate data into Attachment 1 step 3.

NOTE TO EVALUATOR: Values above in ( ) are detector currents from handout.

COMMENTS:

___ SAT

___ UNSAT

NOTE: R_t and R_b (detector calibration data) changes periodically throughout the cycle. Current values are on NOB Sheet A-2, NIS Calibration Data.

NOTE TO EVALUATOR: The NOB Sheets attached to this JPM are are to be given to the Performer when the Performer refers to the NOB. The data sheets attached are the basis for the calculations in the JPM>

STEP 5: **[Step 4] OBTAIN** and **RECORD** current values of R_t and R_b (volts/microamps).

	UPPER DETECTOR	LOWER DETECTOR
NIS Channel	R_t (volts/microamps)	R_b (volts/microamps)
N-41A	(0.03774)	(0.03833)
N-42A	(0.04439)	(0.04492)
N-43A	(0.03770)	(0.03713)
N-44A	(0.04198)	(0.03813)

STANDARD: Performer obtains the detector current values from NOB Sheets A-2 for the respective NIS Power Range Detectors and records them in appropriate blocks on Attachment 1 Step 4.

NOTE TO EVALUATOR: Values above in ( ) are detector currents from respective NOB Sheets A-2 which are attached to this JPM.

COMMENTS:

___ SAT

___ UNSAT

STEP 6: **[Step 5] CALCULATE** calibrated output voltages by multiplying the uncalibrated detector output currents by R_t or R_b (as applicable).

A. $V_t = I_t \times R_t$

B. $V_b = I_b \times R_b$

NIS Channel	UPPER DETECTOR V_t Calib. Output Voltage	LOWER DETECTOR V_b Calib. Output Voltage
N-41A	(369) (0.03774)=13.926	(384) (0.03833)=14.719
N-42A	(364) (0.04439)=16.158	(386) (0.04492)=17.339
N-43A	(369) (0.03770)=13.911	(385) (0.03713)=14.295
N-44A	(371) (0.04198)=15.575	(386) (0.03813)=14.718

STANDARD: Performer calculates the calibrated output voltages **[Step 3]** by multiplying the respective detector's current reading times resistance values **[step 4]** and records the results in appropriate blocks on Attachment 1 Step 5.

___ SAT

___ UNSAT

COMMENTS:

STEP 7: **[Step 6] CALCULATE** average calibrated output voltage for the upper and lower detectors.

	UPPER V_t	LOWER V_b
AVERAGE	(13.926+16.158+13.911+ 15.575)/4 =14.893	(14.719+17.339+14.295+ 14.718)/4 = 15.268

STANDARD: Performer calculates the average output voltages for the upper detector by adding the respective upper detector's calibrated output voltage readings **[from Step 5]** and dividing the result by the number of channels in service. This process is repeated for the lower detector using the lower detector calibrated voltages. The results recorded in appropriate blocks on Attachment 1 Step 6.

___ SAT

___ UNSAT

COMMENTS:

STEP 8: **[Step 7] CALCULATE** QPTR values by dividing each detector's (upper or lower) Calibration Output Voltage by the average (upper or lower) Calibrated Output Voltage.

A. $QPTR_t = V_t \div Avg\ V_t$

B. $QPTR_b = V_b \times Avg\ V_b$

	UPPER DETECTOR	LOWER DETECTOR
NIS Channel	$QPTR_t$ Value	$QPTR_b$ Value
N-41A	(13.926/14.893)= 0.935	(14.719/15.268)= 0.964
N-42A	(16.158/14.893) **1.085**	(17.339/15.268)= **1.136**
N-43A	(13.911/14.893) 0.934	(14.295/15.268)= 0.936
N-44A	(15.575/14.893) **1.046**	(14.718/15.268)= 0.964

STANDARD: Performer calculates QPTR values by dividing the respective Calibrated Output Voltage **[from step 5]** by the Average Calibrated Output Voltage for each NIS channel **detector [from step 6]**. The results recorded in appropriate blocks on Attachment 1. Performer returns to Section 6.1 Step 7.

___ SAT

___ UNSAT

COMMENTS:

NOTE TO EVALUATOR **The following steps are from Section 6.1 of 1-SI-0-21.**

STEP 9: [Step 2] **REVIEW** the Upper (A) and Lower (B) QPTR values.

STANDARD: Performer reviews QPTR values from Attachment 1 Step 7.

___ SAT

COMMENTS:

___ UNSAT

STEP 10: [Step 3] **CHECK** (√) Acceptance Criteria. **ACCEPTANCE CRITERIA**: All operable excore channels (upper and lower) indicate a QPTR ≤ 1.02. **YES NO** STANDARD: Performer determines that N-42 Upper Detector, N44 Upper Detector, and N-42A Lower Detectors exceed 1.02 QPTR. Performer then checks **NO** statement. COMMENTS:	___ SAT ___ UNSAT
STEP 11: Inform the Unit Supervisor that Attachment 1 and Section 6.1 of 1-SI-0-21 has been completed and the results of the QPTR. STANDARD: Performer informs the Unit Supervisor of the completion of Attachment 1 and Section 6.1 of 1-SI-0-21 and reports that acceptance criteria have not been satisfied. QPTR for N-42 Upper Detector is **1.114**, N-44 Upper detector is **1.037** and N-42 Lower Detector is **1.131, ALL** exceeding the QPTR limit of 1.02. **EXAMINER'S CUE: Acknowledge report as Unit Supervisor, then state We will stop here.** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **The unit is operating at 100% power**
2. **AFD Monitor Alarm and QPTR alarms are out of service due to card problem in the annunciator system.**
3. **1-SI-0-21 "Excore QPTR & Axial Flux Difference is required to be performed every 12 hours since both QPTR alarms are inoperable.**
4. **Plant computer is not available for performing this Surveillance Instruction.**
5. **You are a support CRO.**

INITIATING CUES:

1. **Given the data that was just obtained from each power range channel upper and lower detector currents, the Unit Supervisor directs you to perform Section 6.1 "Excore QPTR Determination" of 1-SI-0-21. M&TE will not be utilized for data measurements.**
2. **Report the results to the Unit Supervisor when 1-SI-0-21, Section 6.1 and Attachment 1 have been completed.**

APPLICANT DATA SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

The following microampere readings were taken from the Power Range NIS detectors:

	UPPER DETECTOR	LOWER DETECTOR
NIS Channel	I_t Detector Current (microamps)	I_b Detector Current (microamps)
N-41A	369	384
N-42A	364	386
N-43A	369	385
N-44A	371	386

NIS CALIBRATION DATA
N-41 POWER RANGE DETECTOR CALIBRATION DATA

Q_{REF} = 100% RTP

1-SI-92-3 / 3/3/09
Date

PRESTARTUP ALIGNM. ☐	INCORE-EXCORE X CAL. ■	SINGLE POINT ALIGNM. ☐

NC305 LOW POWER TRIP			**NC306 HIGH POWER TRIP**		
0 - 120% FULL POWER		0 - 10 Vdc	0 - 120% FULL POWER		0 - 10 Vdc
25%	TRIP	2.083 Vdc	105%	TRIP	8.750 Vdc
23%	RESET	1.917 Vdc	103%	RESET	8.583 Vdc

TOP (A) DETECTOR		**BOTTOM (B) DETECTOR**
	N = 17.503 %/VOLT	
R_T = 0.03774 V/μA		R_B = 0.03833 V/μA
b_T = +1.433 μA/%Δϕ	G = 1.8	b_B = -1.57 μA/%Δϕ
$I^{\#}_T$ = 220.79 μA		$I^{\#}_B$ = 217.43 μA

NI301 DWR B **TOP (A) DETECTOR**			NI302 DWR B **BOTTOM (B) DETECTOR**		
% FULL POWER	Desired (mVdc)	Desired (μA)	% FULL POWER	Desired (mVdc)	Desired (μA)
0%	0	0	0%	0	0
30%	66.24	66.24	30%	65.23	65.23
60%	132.47	132.47	60%	130.46	130.46
90%	198.71	198.71	90%	195.69	195.69
120%	264.95	264.95	120%	260.92	260.92

DESIRED % Δ FLUX 1-NI-41C	**TOP (A) DETECTOR** (mVdc)	DESIRED % Δ FLUX 1-NI-41C	**BOTTOM (B) DETECTOR** (mVdc)
+30.0	263.78	+30.0	170.33
0.0	220.79	0.0	217.43
-30.0	177.80	-30.0	264.53

NOTE: N = Plant Computer AFD Calibration Factor = K0554
R = NIS Calibration (i.e. Conversion) Factors
b = Slopes of Current versus Δϕ
I# = Full Power Calibration Currents at Δϕ = 0.0% (i.e. Intercepts)
G = Eagle-21 Scal Flux Calib

NIS CALIBRATION DATA
N-42 POWER RANGE DETECTOR CALIBRATION DATA

Q_{REF} = 100% RTP 1-SI-92-3 / 3/3/09 (Date)

PRESTARTUP ALIGNM. ☐	INCORE-EXCORE X CAL. ■	SINGLE POINT ALIGNM. ☐

NC305 LOW POWER TRIP			**NC306 HIGH POWER TRIP**		
0 - 120% FULL POWER		0 - 10 Vdc	0 - 120% FULL POWER		0 - 10 Vdc
25%	TRIP	2.083 Vdc	105%	TRIP	8.750 Vdc
23%	RESET	1.917 Vdc	103%	RESET	8.583 Vdc

TOP (A) DETECTOR		**BOTTOM (B) DETECTOR**
	N = 16.957 %/VOLT	
R_T = 0.04439 V/μA		R_B = 0.04492 V/μA
b_T = +1.333 μA/%Δϕ	G = 1.8	b_B = -1.309 μA/%Δϕ
$I^{\#}_T$ = 187.72 μA		$I^{\#}_B$ = 185.52 μA

NI301 DWR B **TOP (A) DETECTOR**			NI302 DWR B **BOTTOM (B) DETECTOR**		
% FULL POWER	Desired (mVdc)	Desired (μA)	% FULL POWER	Desired (mVdc)	Desired (μA)
0%	0	0	0%	0	0
30%	56.32	56.32	30%	55.66	55.66
60%	112.63	112.63	60%	111.31	111.31
90%	168.95	168.95	90%	166.97	166.97
120%	225.26	225.26	120%	222.62	222.62

DESIRED % Δ FLUX 1-NI-42C	**TOP (A) DETECTOR** (mVdc)	DESIRED % Δ FLUX 1-NI-42C	**BOTTOM (B) DETECTOR** (mVdc)
+30.0	227.71	+30.0	146.25
0.0	187.72	0.0	185.52
-30.0	147.73	-30.0	224.79

NOTE:
- N = Plant Computer AFD Calibration Factor = K0552
- R = NIS Calibration (i.e. Conversion) Factors
- b = Slopes of Current versus Δϕ
- I# = Full Power Calibration Currents at Δϕ = 0.0% (i.e. Intercepts)
- G = Eagle-21 Scal Flux Calib

NIS CALIBRATION DATA
N-43 POWER RANGE DETECTOR CALIBRATION DATA

Q_{REF} = 100% RTP 1-SI-92-3 / 3/3/09 (Date)

PRESTARTUP ALIGNM. ☐ | INCORE-EXCORE X CAL. ■ | SINGLE POINT ALIGNM. ☐

NC305 LOW POWER TRIP			**NC306 HIGH POWER TRIP**		
0 - 120% FULL POWER		0 - 10 Vdc	0 - 120% FULL POWER		0 - 10 Vdc
25%	TRIP	2.083 Vdc	105%	TRIP	8.750 Vdc
23%	RESET	1.917 Vdc	103%	RESET	8.583 Vdc

TOP (A) DETECTOR		**BOTTOM (B) DETECTOR**
	N = 16.968 %/VOLT	
R_T = 0.03770 V/μA		R_B = 0.03713 V/μA
b_T = +1.539 μA/%Δϕ	G = 1.8	b_B = -1.613 μA/%Δϕ
$I^{\#}_T$ = 221.06 μA		$I^{\#}_B$ = 224.46 μA

NI301 DWR B **TOP (A) DETECTOR**			NI302 DWR B **BOTTOM (B) DETECTOR**		
% FULL POWER	Desired (mVdc)	Desired (μA)	% FULL POWER	Desired (mVdc)	Desired (μA)
0%	0	0	0%	0	0
30%	66.32	66.32	30%	67.34	67.34
60%	132.64	132.64	60%	134.68	134.68
90%	198.95	198.95	90%	202.01	202.01
120%	265.27	265.27	120%	269.35	269.35

DESIRED % Δ FLUX 1-NI-43C	**TOP (A) DETECTOR** (mVdc)	DESIRED % Δ FLUX 1-NI-43C	**BOTTOM (B) DETECTOR** (mVdc)
+30.0	267.23	+30.0	176.07
0.0	221.06	0.0	224.46
-30.0	174.89	-30.0	272.85

NOTE:
- N = Plant Computer AFD Calibration Factor = K0551
- R = NIS Calibration (i.e. Conversion) Factors
- b = Slopes of Current versus Δϕ
- I# = Full Power Calibration Currents at Δϕ = 0.0% (i.e. Intercepts)
- G = Eagle-21 Scal Flux Calib

NIS CALIBRATION DATA
N-44 POWER RANGE DETECTOR CALIBRATION DATA

Q_{REF} = 100% RTP 1-SI-92-3 / 3/3/09 (Date)

PRESTARTUP ALIGNM. ☐	INCORE-EXCORE X CAL. ■	SINGLE POINT ALIGNM. ☐

NC305 LOW POWER TRIP			NC306 HIGH POWER TRIP		
0 - 120% FULL POWER		0 - 10 Vdc	0 - 120% FULL POWER		0 - 10 Vdc
25%	TRIP	2.083 Vdc	105%	TRIP	8.750 Vdc
23%	RESET	1.917 Vdc	103%	RESET	8.583 Vdc

TOP (A) DETECTOR		BOTTOM (B) DETECTOR
	N = 17.54 %/VOLT	
R_T = 0.04198 V/μA		R_B = 0.03813 V/μA
b_T = +1.347 μA/%Δϕ	G = 1.8	b_B = -1.507 μA/%Δϕ
I^*_T = 198.53 μA		I^*_B = 218.57 μA

NI301 DWR B TOP (A) DETECTOR			NI302 DWR B BOTTOM (B) DETECTOR		
% FULL POWER	Desired (mVdc)	Desired (μA)	% FULL POWER	Desired (mVdc)	Desired (μA)
0%	0	0	0%	0	0
30%	59.56	59.56	30%	65.57	65.57
60%	119.12	119.12	60%	131.14	131.14
90%	178.68	178.68	90%	196.71	196.71
120%	238.24	238.24	120%	262.28	262.28

DESIRED % Δ FLUX 1-NI-44C	TOP (A) DETECTOR (mVdc)	DESIRED % Δ FLUX 1-NI-44C	BOTTOM (B) DETECTOR (mVdc)
+30.0	238.94	+30.0	173.36
0.0	198.53	0.0	218.57
-30.0	158.12	-30.0	263.78

NOTE:
- N = Plant Computer AFD Calibration Factor = K0553
- R = NIS Calibration (i.e. Conversion) Factors
- b = Slopes of Current versus Δϕ
- I# = Full Power Calibration Currents at Δϕ = 0.0% (i.e. Intercepts)
- G = Eagle-21 Scal Flux Calib

WATTS BAR NUCLEAR PLANT
A.2-SRO

A.2-SRO Review and Approve a Disable Alarm Checklist, per OPDP-4

WATTS BAR NUCLEAR PLANT
A.2-SRO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Review and Approve a Disable Alarm Checklist, per OPDP-4

Alternate Path: N/A

Facility JPM #: New

K/A Rating(s): G2.2.43 [3.0/3.3]

Task Standard: Performer identifies that the OPDP-4-1 Disabled Alarm Checklist is NOT filled out correctly for Annunciator 85-F. Performer DOES NOT sign package at Step 7 as approved.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator ____ In-Plant _____ Perform __X___ Simulate ____

References: . OPDP-4, "Annunciator Disablement", Rev. 4.

Task Number: SRO-055-PAI-208-001 APPLICABLE FOR: SRO

10CFR55.45: 13

Validation Time: 15 min. **Time Critical:** No

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Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

OPDP-4-1 Attachment 1, Disabled Alarm Checklist.
GO-6, Unit Shutdown from Hot Standby to Cold Shutdown
ARI-85-F, RVLIS SYS MALFUNCTION

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **A plant shutdown is in progress.**

2. **Mode 3 has just been entered.**

3. **The Operator-at-the-Controls has informed you that Annunciator 85-F, RVLIS SYS MALFUNCTION has been received on multiple occasions, and that OPDP-4-1 Disabled Alarm Checklist has been filled out to disable the alarm.**

4. **You are the Unit SRO.**

INITIATING CUES:

Review the OPDP-4-1 Disabled Alarm Checklist for approval. Note any and all discrepancies found during your review.

START TIME: _____

STEP 1: Obtain a copy of the completed instruction. STANDARD: A copy of OPDP-4-1 Attachment 1, Disabled Alarm Checklist. **EXAMINER'S CUE: Provide the Performer a copy of the completed instruction.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: DISABLED ALARM CHECKLIST block reviewed STANDARD: Performer determines that the **incorrect Panel Number is entered in the block.** COMMENTS:	___ SAT ___ UNSAT
STEP 3: ALARM LOCATION block is reviewed. STANDARD: Performer determines **incorrect information is entered in the Node/Mux/Pt or SER** COMMENTS:	___ SAT ___ UNSAT
STEP 4: Reviews entry into 1. Description of the alarm that is being defeated. STANDARD: .Performer determines that an adequate description of the alarm function has been entered. COMMENTS:	___ SAT ___ UNSAT

STEP 4: Reviews entry into 2. Reason for disabling the alarm that is being defeated. STANDARD: .Performer determines that an **inaccurate description of the reason for disabling the alarm is entered**. The data entered should describe that the alarm has been deemed a nuisance. COMMENTS:	___ SAT ___ UNSAT
STEP 6: Reviews entry into 3. Description of how alarm will be disabled. STANDARD: Performer determines that the description is adequate. COMMENTS:	___ SAT ___ UNSAT
STEP 7: Reviews to 4. Determine if a 10CFR50.59 Review is required. STANDARD: Performer determines that a **10CFR50.59 review is required,** since the alarm is NOT being disabled per GO-6. COMMENTS:	**Critical Step** ___ SAT ___ UNSAT
STEP 8: Reviews to 5. Determine if a 10CFR50.59 Review is required prior to exceeding 90 days. STANDARD: Performer determines that a 10CFR50.59 review is not required, since the alarm is NOT being for a maintenance evolution. COMMENTS:	___ SAT ___ UNSAT

STEP 9: Reviews to 6. Determine if a Technical Evaluation (Form OPDP-4-5) is required. STANDARD: Performer determines that a **10CFR50.59 review is a Technical Evaluation (Form OPDP-4-5) is required**. COMMENTS:	**Critical Step** ___ SAT ___ UNSAT
STEP 8: Performs Step 7, and determines that the form cannot be approved as presented. STANDARD: Performer states that the **package cannot be signed as approved until after the errors have been corrected.** COMMENTS: **END OF TASK**	**Critical Step** ___ SAT ___ UNSAT

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **A plant shutdown is in progress.**

2. **Mode 3 has just been entered.**

3. **The Operator-at-the-Controls has informed you that Annunciator 85-F, RVLIS SYS MALFUNCTION has been received on multiple occasions, and that OPDP-4-1 Disabled Alarm Checklist has been filled out to disable the alarm.**

4. **You are the Unit SRO.**

INITIATING CUES:

Review the OPDP-4-1 Disabled Alarm Checklist for approval. Note any and all discrepancies found during your review.

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Attachment 1
(Page 1 of 2)

OPDP-4-1 - Disabled Alarm Checklist

DISABLED ALARM CHECKLIST

DISABLED ALARM CHECKLIST

Site: WBN Unit: 1

1-XA-55-4D
Panel Number

ALARM LOCATION

85-F
Window Number

Microprocessor TRAIN-A
Node/Mux/Pt or SER/Sensor

1. Describe the function of this alarm (e.g. provide indication of abnormal operation, equipment failure, indication of an automatic trip, indication of loss of function)
Provides indication of failure of the microprocessor

2. Describe reason for disabling alarm/input. (Include procedure or WO number, if applicable)
Not required, per GO-6.

3. Describe how this alarm/alarm input will be disabled:
Defeat at the microprocessor, per WO 09-816541-000

		Yes	No
4.	Is a 10CFR50.59 Review required prior to disabling alarm? (Refer to Appendix A)	☐	☒
5.	Is a 10CFR50.59 Review required prior to exceeding 90 days (alarm disabled for maintenance)?	☐	☒
6.	Is a Technical Evaluation (Form OPDP-4-5) required prior to disabling alarm? (Refer to Appendix A).	☐	☒

Prepared By: Dale Hoffman (Signature) | Dale Hoffman (Print Name) | 5/15/09 (Date)

7. Approval for annunciator disablement:

	Yes	No	N/A
If required, is 10CFR50.59 Review attached?	☐	☐	☐
If required, is Technical Evaluation (Form OPDP-4-5) attached?	☐	☐	☐
If a Technical Evaluation was performed, is Compensatory Monitoring required and acceptable?	☐	☐	☐
Are steps to enable the alarm provided in the controlling work document?	☐	☐	☐

Signature (SM/US) | Print Name | Date

This alarm must be returned to service by: _____ Date _____ Time N/A if not an LCO

Attachment 1
(Page 2 of 2)

OPDP-4-1 - Disabled Alarm Checklist

DISABLED ALARM CHECKLIST

DISABLED ALARM CHECKLIST	ALARM LOCATION
Site _____ Unit _____ _____ Panel Number	_____ Window Number _____ Node/Mux/Pt or SER/Sensor

8. This alarm has been disabled as described in Item 1 of this form and Disabled Alarm Indicators have been placed on affected alarm window(s).

	Signature	Print Name	Date	Time
Performed by:				
Verified By:				

9. Describe actions necessary to restore annunciator to normal including post-restoration testing.

_____
_____
_____
_____

	Signature	Print Name	Date	Time
Prepared by:				
Reviewed & Approved by:	SM/US Signature			

10. This alarm has been restored to normal and tested in accordance with Item 8 of this form and Disabled Alarm Indicator(s) associated with this alarm have been removed.

	Signature	Print Name	Date	Time
Performed by:				
Verified By:				

11. Compensatory Monitoring of this alarm is terminated and Unit Supervisor notified. N/A if no Compensatory Monitoring required.

Signature	Print Name	Date	Time

SOURCE

Microprocessor TRAIN-A

RVLIS SYS MALFUNCTION

NOTE 1 The most probable cause of alarm would be from errors detected by the microprocessor during system internal diagnostics checks.

NOTE 2 During plant shutdown, after entering Mode 4 when RVLIS is not required, this alarm may be disabled (See GO-6).

Probable Cause:

1. Microprocessor system error(s) detected
2. Loss of Power Supply, 120 VAC Vital Instrument Power Board 1-I
3. Loss of A Train RVLIS SYSTEM Power Supply, Breaker 1-BKR-235-2/47D open ON 120 VAC Vital Instrument Power Board 1-I supplying 1-R-148
4. Fuse Blown 120 VAC Vital Instrument Power Board 1-I, 1-FU-235-47A/ 47B
5. Transmitter delta-p overranged due to four RCPs in service with RCS below 250°F

Corrective Action:

[1] **CHECK** other train for operability (124-E).

[2] **DISPATCH** Operator to check power supplies at 125 Vital Battery Board Room I.

[3] IF alarm continues, **THEN**
NOTIFY MIG to initiate corrective actions.

References:

3D20465 Series
1-45W706-1
1-45W1623-5
GO-6
GO-1

Date_____ INITIALS

5.5 Unit Cooldown to Between 170 and 180°F

CAUTION

Adequate heat removal via natural circulation requires the RCS be pressurized. Both Trains of RHR must be maintained operable whenever the RCS is open to containment atmosphere.[21]

[1] **CONTINUE** RCS cooldown to between 170 and 180°F while maintaining Pzr pressure between 330 and 350 psig by performing the following:

NOTE

Shutdown margin calculations shall be calculated using Xenon Free conditions. Emergency cooldowns may take credit for Xenon.[4]

[1.1] **ENSURE** RCS C_B is acceptable for continuing RCS cooldown by performing the following (**N/A** if RCS C_B is adequate for a temperature of 200.1°F):

A. **RUN** the REACT shutdown margin program to determine boron requirements for 200.1°F, **AND**

ATTACH a copy of the results to this procedure. _____

B. **BORATE** the RCS to the applicable C_B target USING desired method from Appendix E to meet or exceed the required RCS C_B calculated in 5.5[1.1]A above (as a minimum). _____

NOTE

Calculated C_B may be used in lieu of sample for Emergency cooldowns.

C. **ENSURE** RCS and Pzr C_B are acceptable by Chemistry sample or calculated C_B. _____

[1.2] **INITIATE** applicable Sections of 1-SI-68-44. **AND**

ACCESS ICS screens HC and HCRGRPH to monitor RCS and Pzr Temperature/Pressure Limits. _____

WATTS BAR NUCLEAR PLANT
A.3-SRO

A.3-SRO Authorize a Radioactive Liquid Release

WATTS BAR NUCLEAR PLANT
A.3-SRO

ADMINISTRATIVE JOB PERFORMANCE MEASURE

Task: Authorize a Radioactive Liquid Release

Alternate Path: N/A

Facility JPM #: New

K/A Rating(s): G2.3.6 [2.0/3.8]

Task Standard: Performer identifies that the release permit is for the wrong tank/release point, and the voltage setpoint for 0-RE-90-122 is not within the 0.101VDC limit established in 0-ODI-90-1, Section 6.1, Step 15. Performer DOES NOT sign package as approved.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator _____ In-Plant _____ Perform __X___ Simulate _____

References: . 0-ODI-90-1 Liquid Radwaste Tank Release, Rev. 31

Task Number: SRO-077-SOI-77-001 APPLICABLE FOR: SRO

10CFR55.45: 9

Validation Time: 15 min. **Time Critical:** No

==========

Performer: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

Marked up copy of 0-ODI-90-1 Liquid Radwaste Tank Release, Rev. 31.
Batch Liquid Permit, Dated 3-18-09
Monitor Tank Sample Report DKB600

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **A release of the Monitor Tank is scheduled for this shift.**
2. **Chemistry has prepared a 0-ODI-90-1 Liquid Radwaste Tank Release Package for the release.**
3. **You are the Unit SRO.**
4. **The DATES on the documentation are CORRECT.**

INITIATING CUES:

Review the 0-ODI-90-1 package for release approval. Note any and all discrepancies found during your review.

START TIME: _____

STEP 1: Obtain a copy of the completed instruction. STANDARD: Marked up copy of the Release Package including 0-ODI-90-1 "Liquid Radwaste Tank Release" is acquired by the performer. **EXAMINER'S CUE: Provide the Performer a copy of the completed instruction.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: Performer reviews package for correct tank to be released. STANDARD: **Error** - The Batch Liquid Effluent Permit is for the **Cask Decon Collector Tank, NOT** the **Monitor Tank** as described in the 0-ODI-90-1 Appendix A Pre-Release Permit Data COMMENTS:	**Critical Step** ___ SAT ___ UNSAT
STEP 3: Performer reviews package to verify radioanalysis values are less than the limits provided on the Batch Liquid Effluent Permit. STANDARD: Performer determines that all values are less than limits (III. RADIOANALYSIS - LIQUID). COMMENTS:	___ SAT ___ UNSAT

STEP 4:	Performer reviews package to verify the EXP. RESPONSE VALUE is less than the 0-RE-90-122 SETPOINT.	___ SAT
STANDARD:	Performer determines the EXP. RESPONSE VALUE is less than the 0-RE-90-122 SETPOINT given in IV. RADIATION MONITOR(S) section of the Batch Liquid Effluent Permit.	___ UNSAT
COMMENTS:		
STEP 5:	Performer reviews package to verify the volume, flow, and dilution values are within limits.	___ SAT
STANDARD:	Performer determines the volume, flow, and dilution values are within limits given in V. AUTHORIZATION section of the Batch Liquid Effluent Permit.	___ UNSAT
COMMENTS:		
STEP 6:	Performer reviews package verify the radiation monitor voltage is within limits.	**Critical Step** ___ SAT
STANDARD:	**Error** - The 0-RE-90-122 Setpoint voltage of **5.84 Vdc** recorded on 0-ODI-90-1, Appendix A is more than **0.101 Vdc** higher than the setpoint of **5.262 Vdc** provided in the Batch Liquid Effluent Permit.	___ UNSAT
COMMENTS:		

STEP 7: Performer reviews 0-ODI-90-1 for correct step sign-off. STANDARD: **Error** - The 0-RE-90-122 Setpoint voltage of **5.84 Vdc** recorded on 0-ODI-90-1, Appendix A is more than **0.101 Vdc** higher than the setpoint of **5.262 Vdc** provided in the Batch Liquid Effluent Permit. Step 15 of Section 6.1 should have been N/A, and Steps 16 and 17 should have been performed. COMMENTS:	___ SAT ___ UNSAT
STEP 8: Performer determines that the package cannot be approved as written **EVALUATOR CUE: When the two errors have been identified and the performer addresses the fact that the package cannot be approved with these errors state "We will stop here".** STANDARD: Performer states that the package cannot be signed as approved until after the errors have been corrected. COMMENTS: **END OF TASK**	**Critical Step** ___ SAT ___ UNSAT

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

1. **A release of the Monitor Tank is scheduled for this shift.**
2. **Chemistry has prepared a 0-ODI-90-1 Liquid Radwaste Tank Release Package for the release.**
3. **You are the Unit SRO.**

INITIATING CUES:

Review the 0-ODI-90-1 package for release approval. Note any and all discrepancies found during your review.

SURVEILLANCE TASK SHEET (STS)

Work Order	N/A
SI Key	N/A
Procedure No.	**0-ODI-90-1**
Title	LRW Release
Perf. Section	Chemistry(CEM)
Test Reason	Conditional Performance
Data Sheets	N/A
Due	N/A
Extension	N/A
Max. Extension	N/A
Frequency	Conditional
EQ	N/A
ASME XI	N/A
APP Mode	1234567
Performance Mode	1234567
Operational Condition	N/A
Dry Cask Storage	☐ Yes x No
Subsequent Reviews	N/A
Instruction	Conditional Performance

Page _____ of _____

N/A	N/A	N/A
Authorization to Begin: SRO	Date	Time
	3/16/09	0800
	Start Date	Time
	Completion Date	Time

Name	Test Performer's Signature	Initial	Section
[illegible]		DM	CHEM

Was this a complete or partial performance? (Explain "Partial" in Remarks) Complete ☐ Partial ☐

	Yes	No	N/A
Were all Tech Spec/Tech Req./ ISFSI CoC/ODCM/Fire Protection Req. acceptance criteria satisfied?	☐	☐	☐
Were all other acceptance criteria satisfied?	☐	☐	☐
If all Tech Spec/Tech Req./ISFSI CoC/ODCM/Fire Protection Req. were not satisfied, was an LCO/ TR/ODCM/OR action required? (Explain in Remarks)	☐	☐	☐
Alert Scheduling Required	☐	☐	☐

Test Director/Lead Performer _____ Date _____

Acceptance Criteria Review: SRO (ASME XI SIs require review within 96 hours) Date _____ Time _____

Independent Reviewer _____ Date _____

ANII (If required) _____ Date _____

Remark:

Copy of STS sent to Scheduling _____ / _____ Initials _____ Date

Section _____ No. Men _____ Dur. Hrs _____

Tennessee Valley Authority
Watts Bar Nuclear Plant

90034.010.007.L
Unit # 1
Allocation 100.%

BATCH LIQUID EFFLUENT PERMIT

I. REQUEST

X NORMAL	RELEASE POINT	ESTIMATED START:
UNPLANNED	CASK DECON COLLECTOR TANK	18-mar-2009 16:00:00
RELEASE VOLUME (ESTIM.)		ESTIMATED STOP:
1.5190E+04 GAL		18-mar-2009 17:48:30
DILUTION FLOW AVAIL.	DISCHARGE POINT	
2.0000E+04 GPM	COOLING TOWER BLOWDOWN	

II. SAMPLE IDENTIFICATION

NUMBER	COLLECTION DATE/TIME	ANALYSIS DATE/TIME
71	06-mar-2009 02:38:00	06-mar-2009 02:51:23

CONFIGURATION FILE NAME: CAS_SAM:090306_0434_C.CNF

III. RADIOANALYSIS - LIQUID

ECL FRACTION SUM	CUM. TOT-BODY DOSE(Q)	CUM. ORGAN DOSE(Q)
0.67 < 10.00	3.88E-03 mrem < 1.50	3.89E-03 mrem < 5.00
DIS. GAS SUM	CUM. TOT-BODY DOSE(A)	CUM. ORGAN DOSE(A)
0.00E+00uCi/ml < 2.0E-04	3.88E-03 mrem < 3.00	3.89E-03 mrem < 10.00

IV. RADIATION MONITOR(S)

NUMBER	SETPOINT	EFFECTIVE GAIN	EXP. RESPONSE
0-RE-90-122	1.43E+04 CPM	2.27E-09 uCi/ml/CPM	7.17E+03 CPM
	0.00E+00 CPM	0.00E+00 uCi/ml/CPM	0.00E+00 CPM

V. AUTHORIZATION

MAX. VOLUME	MAX. WASTE FLOW	MIN. DILUTION FLOW
1.5190E+04 GAL	7.6896E+02 GPM	2.0000E+04 GPM

The above-named source has been sampled and analyzed and is in compliance with the Offsite Dose Calculation Manual. Release is authorized for the volume and flow rates specified.

3/17/09 1000

Performed by / Date Time

Review and Approval (Unit SRO) / Date Time

The voltage for radiation monitor
0-RE-90-122
should be set to: 5.262 (Volts)

Liquid Radioactive Waste Release Permit 90034.010.007.L
Pre-Release Supplementary Data

PART I: PRE-RELEASE DATA

RELEASE POINT (10): CASK DECON COLLECTOR TANK
DISCHARGE POINT (1): COOLING TOWER BLOWDOWN
Dilution Stream (1): ERCW

Permit Issued: 17-mar-2009 09:59:10 Release Type: Batch

Waste Tank Volume: 1.5190E+04 GAL Recirc. Rate: 0.0000E+00 GPM
Recirc. Start: Min Recirc Time: 0 MIN
Sample After: Agitator Used:

Rad Monitor: (1) 0-RE-90-122
Rad Monitor Bckgrnd: 6.2100E+03 CPM

Estim. Dilution Flow: 2.0000E+04 GPM Estim. Waste Flow: 1.4000E+02 GPM
Estim. Dilution Vol.: 2.1700E+06 GAL Estim. Waste Vol.: 1.5190E+04 GAL
Dilution Factor (Act): 1.4386E+02 Estim. Duration: 108.50 MIN
Estim. Release Start: 18-mar-2009 16:00:00
Estim. Release End: 18-mar-2009 17:48:30

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 71
Sample time: 06-mar-2009 02:38:00 Sampled by: DJH
Configuration File Name: CAS_SAM:090306_0434_C.CNF

Total Waste Activity: 5.5036E+00 Curies Total Waste Conc: 9.5715E-02 uCi/ml
Total Waste Conc/ECL: 9.6033E+01 Total Monit Conc: 2.1851E-06 uCi/ml
Dilution Allocation: 7.0000E-01 Concurrent Releases: 1
Min Dilution Flow: 3.6413E+03 GPM Max Waste Flow: 7.6896E+02 GPM
Dilution Strm Sample: 0 Dilution Conc/ECL: 6.6756E-01
Max Monitor Setpoint: 4.3702E-06 uCi/ml Flag:
1.4343E+04 CPM Rqrd Dilution Fct: 1.9207E+01

Flags: C-Release Curies > Local Limit F-Waste Flow > Max Allowable
R-Expected Response > Max Setpoint F-Dilution Flow < Min Allowable
A-Setpoint Adjustment Factor < 1.0

Liquid Radioactive Waste Release Permit
Pre-Release Supplementary Data
90034.010.007.L

ISOTOPIC IDENTIFICATION - Unit 1

Isotope		Pre-Dilut. Measured uCi/ml	Pre-Dilut. Measured Conc/ECL	Pre-Dilut. Measured Conc/Total	Post Dilution uCi/ml	Post Dilution Conc/ECL	Estimated Curies Released
CO-60	P:	7.31E-07	2.44E-01	7.64E-06	5.08E-09	1.69E-03	4.20E-05
FE-55	O:	2.27E-06	2.27E-02	2.37E-05	1.58E-08	1.58E-04	1.31E-04
H-3	O:	9.57E-02	9.57E+01	1.00E+00	6.65E-04	6.65E-01	5.50E+00
SB-125	P:	1.45E-06	4.85E-02	1.52E-05	1.01E-08	3.37E-04	8.36E-05
SR-89	O:	6.23E-08	7.79E-03	6.51E-07	4.33E-10	5.41E-05	3.58E-06
Totals		9.57E-02	9.60E+01		6.65E-04	6.68E-01	5.50E+00

****
17-MAR-2009 09:56:40.68
TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT
****

SAMPLE TITLE : 0-ODI-90-1 MONITOR TANK
FILE IDENT : DKB600:[TVA.SAMPLE.CHEM.NEW]090306_0434_C.CNF;1

SAMPLE ID : 090306_0434_C
SAMPLE TIME : 6-MAR-2009 02:38:
SAMPLE TYPE : 1L LIQ. MARIN.
* OPERATOR : DJHUTCHISON
* SAMPLE GEOMETRY : LM1K
* SHELF HEIGHT : 0
* EFFICIENCY FILE : LM1K0
* SAMPLE QUANTITY : 1.00000E+03 ML

ACQ DATE & TIME : 6-MAR-2009 02:51:
PRESET LIVE TIME : 0 00:15:00
ELASPED REAL TIME : 0 00:15:00
ELAPSED LIVE TIME : 0 00:15:00
* DEADTIME (%) : 0.0%
* SENSITIVITY : 4.00000
* GAUSSIAN SEN : 10.00000
* NBR ITERATIONS : 10

DETECTOR : DET #4, GSS-3850
EFFIC CAL DATE : 14-APR-2003 08:32
DCAL DATE & TIME : 5-MAR-2009 20:47:
KEV/CHAN : 5.00794E-01
OFFSET : -1.48231E-01 keV
Q COEFFICIENT : -3.28672E-07
PEAK START CHAN : 140
* LIBRARY : LIQUID
* EFFIC CERT DATE : 14-APR-2003 08:32
* ENERGY TOLER : 1.25
* HALF LIFE RATIO : 8.00000
* ABUNDANCE LIMIT : 80.0%
* CORRECTION FACTOR : 1.00000E+00
* PEAK END CHAN : 4096

ANALYSES : PEAK V16.9 NID V3.3 MINACT V2.8 WTMEAN/KEY V1.8

COUNTED ON : LION
COLLECTED BY :
COUNTED BY : DJHUTCHISON
REVIEWED BY :
COMMENTS :

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	81.53	30	59	1.00	163.11	158	9	48.9		XE-133
0	176.59	90	105	1.04	353.00	348	11	24.4		SB-125
0	381.29	19	26	0.67	762.05	757	9	54.1		SB-125
0	428.01	205	63	1.35	855.44	847	16	11.2		SB-125
0	463.48	78	22	1.34	926.35	920	11	16.2		SB-125
0	510.59	74	20	3.35	1020.54	1013	16	17.9		ANNIL
0	600.56	110	18	1.81	1200.45	1192	13	12.3		SB-125
0	636.07	70	7	1.46	1271.49	1265	14	14.4		SB-125
0	810.82	180	22	1.79	1621.08	1613	14	9.2		CO-58
0	1173.03	147	3	2.01	2346.25	2338	14	8.7		CO-60
0	1332.19	114	2	2.22	2665.12	2659	11	9.8		CO-60

Sample ID : 090306_0434_C Acquisition date : 6-MAR-2009 02:51:23

Nuclide Type: AP

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/ML	Decay Corr uCi/ML	1-Sigma %Error	Status
CO-58	810.76	99.40*	8.330E-01	6.521E-07	6.522E-07	9.23	OK
	863.94	0.74	7.882E-01	----- Line Not Found		-----	Absent
	1674.00	0.54	4.519E-01	----- Line Not Found		-----	Absent
	Final Mean for 1 Valid Peaks = 6.522E-07+/- 6.021E-08 (9.23%)						
CO-60	1173.22	100.00*	6.044E-01	7.310E-07	7.310E-07	8.66	OK
	1332.49	100.00	5.426E-01	6.285E-07	6.285E-07	9.79	OK
	Final Mean for 2 Valid Peaks = 7.310E-07+/- 6.329E-08 (8.66%)						

Nuclide Type: FP

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/ML	Decay Corr uCi/ML	1-Sigma %Error	Status
SB-125	176.33	6.89	2.679E+00	1.465E-06	1.465E-06	24.39	OK
	380.43	1.50	1.591E+00	2.390E-06	2.390E-06	54.12	OK
	427.89	29.33*	1.443E+00	1.454E-06	1.454E-06	11.17	OK
	463.38	10.35	1.349E+00	1.678E-06	1.678E-06	16.24	OK
	600.56	17.80	1.080E+00	1.714E-06	1.714E-06	12.25	OK
	606.64	5.02	1.071E+00	----- Line Not Found		-----	Absent
	635.89	11.32	1.028E+00	1.806E-06	1.806E-06	14.39	OK
	671.41	1.81	9.812E-01	----- Line Not Found		-----	Absent
	Final Mean for 6 Valid Peaks = 1.454E-06+/- 1.625E-07 (11.17%)						

Nuclide Type: FG

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/ML	Decay Corr uCi/ML	1-Sigma %Error	Status
XE-133	81.00	37.32*	1.793E+00	1.364E-07	1.366E-07	48.89	OK
	Final Mean for 1 Valid Peaks = 1.366E-07+/- 6.680E-08 (48.89%)						

Nuclide Type: OTHER

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/ML	Decay Corr uCi/ML	1-Sigma %Error	Status
ANNIL	511.00	0.00*	1.241E+00	0.000E+00	0.000E+00	0.00	OK
	Final Mean for 1 Valid Peaks = 0.000E+00+/- 0.000E+00 (0.00%)						

Flag: "*" = Keyline

None

Flags: "T" = Tentatively associated

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/ML)	1-Sigma %Error	Rejected by
I-131	8.04D	0.00	80.18	2.62	--- Not Found ---		Abun.
			284.29	6.05	--- Not Found ---		
			364.48*	81.20	--- Not Found ---		
			636.97	7.26	2.823E-06	14.39	
			722.89	1.08	--- Not Found ---		
		% Abundances Found =		7.39			
I-132	2.30H	0.15	262.70	1.44	--- Not Found ---		Abun.
			505.90	5.03	--- Not Found ---		
			522.65	16.10	--- Not Found ---		
			630.20	13.70	--- Not Found ---		
			650.60	2.66	--- Not Found ---		
			667.69*	98.70	--- Not Found ---		
			671.60	5.23	--- Not Found ---		
			727.00	5.33	--- Not Found ---		
			772.61	76.20	--- Not Found ---		
			809.80	5.63	1.278E-05	9.23	
			954.55	18.10	--- Not Found ---		
			1136.00	2.96	--- Not Found ---		
			1295.30	1.97	--- Not Found ---		
			1372.10	2.47	--- Not Found ---		
			1398.60	7.11	--- Not Found ---		
		% Abundances Found =		2.14	(Abn. Limit = 75.00%)		
TE-134	41.80M	0.50	180.89	18.00	--- Not Found ---		Abun.
			201.24	8.70	--- Not Found ---		
			210.47	21.90	--- Not Found ---		
			277.95	21.30	--- Not Found ---		
			435.06	18.60	--- Not Found ---		
			460.99	10.80	--- Not Found ---		
			464.64	5.10	4.814E-06	16.24	
			565.99	18.90	--- Not Found ---		
			636.26	1.71	1.687E-05	14.39	
			665.85	1.20	--- Not Found ---		
			712.97	4.20	--- Not Found ---		
			742.59	14.70	--- Not Found ---		
			767.20*	30.00	--- Not Found ---		
			844.06	1.20	--- Not Found ---		
			925.55	1.65	--- Not Found ---		
		% Abundances Found =		3.83			
CS-136	13.16D	0.00	86.29	6.30	--- Not Found ---		Abun.
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	7.453E-07	24.39	
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.64			

Sample ID : 090306_0434_C Acquisition date : 6-MAR-2009 02:51:23

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/ML)	1-Sigma %Error	Rejected by
CS-138	32.20M	0.65	138.10	1.49	--- Not Found ---		Abun.
			227.76	1.51	--- Not Found ---		
			408.98	4.66	--- Not Found ---		
			462.79	30.70	8.822E-07	16.24	
			546.94	10.80	--- Not Found ---		
			871.80	5.11	--- Not Found ---		
			1009.78	29.80	--- Not Found ---		
			1147.22	1.24	--- Not Found ---		
			1343.59	1.14	--- Not Found ---		
			1435.86*	76.30	--- Not Found ---		
		% Abundances	Found =	18.86			
PM-148M	41.30D	0.00	98.48	2.47	--- Not Found ---		Abun.
			189.63	1.10	--- Not Found ---		
			288.11	12.56	--- Not Found ---		
			311.63	3.92	--- Not Found ---		
			414.07	18.66	--- Not Found ---		
			432.78	5.35	--- Not Found ---		
			501.26	6.75	--- Not Found ---		
			550.27*	94.90	--- Not Found ---		
			599.74	12.54	2.430E-06	12.25	
			611.26	5.48	--- Not Found ---		
			629.97	89.00	--- Not Found ---		
			725.70	32.80	--- Not Found ---		
			915.33	17.17	--- Not Found ---		
			1013.81	20.30	--- Not Found ---		
		% Abundances	Found =	3.88			
RA-228	5.75Y	0.00	99.45	1.30	--- Not Found ---		Abun.
			129.08	2.80	--- Not Found ---		
			209.28	4.40	--- Not Found ---		
			270.23	3.60	--- Not Found ---		
			327.64	3.20	--- Not Found ---		
			409.51	2.13	--- Not Found ---		
			463.00	4.40	3.944E-06	16.24	
			755.18	1.05	--- Not Found ---		
			772.17	1.55	--- Not Found ---		
			794.70	4.60	--- Not Found ---		
			835.50	1.75	--- Not Found ---		
			911.07*	27.70	--- Not Found ---		
			969.11	16.60	--- Not Found ---		
			1459.30	1.00	--- Not Found ---		
			1495.80	1.00	--- Not Found ---		
			1588.00	3.50	--- Not Found ---		
			1630.40	1.86	--- Not Found ---		
		% Abundances	Found =	5.34			

Flag: "*" = Keyline

Sample ID : 090306_0434_C Acquisition date : 6-MAR-2009 02:51:23

No interference correction performed

Sample ID : 090306_0434_C Acquisition date : 6-MAR-2009 02:51:23

Total number of lines in spectrum 11
Number of unidentified lines 0
Number of lines tentatively identified by NID 11 100.00%

Nuclide Type : AP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/ML	Wtd Mean Decay Corr uCi/ML	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-58	70.80D	1.00	6.521E-07	6.522E-07	0.602E-07	9.23	
CO-60	5.27Y	1.00	7.310E-07	7.310E-07	0.633E-07	8.66	
Total Activity :			1.383E-06	1.383E-06			

Nuclide Type : FP

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/ML	Wtd Mean Decay Corr uCi/ML	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
SB-125	2.77Y	1.00	1.454E-06	1.454E-06	0.162E-06	11.17	
Total Activity :			1.454E-06	1.454E-06			

Nuclide Type : FG

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/ML	Wtd Mean Decay Corr uCi/ML	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
XE-133	5.24D	1.00	1.364E-07	1.366E-07	0.668E-07	48.89	
Total Activity :			1.364E-07	1.366E-07			

Nuclide Type : OTHER

Nuclide	Hlife	Decay	Wtd Mean Uncorrected uCi/ML	Wtd Mean Decay Corr uCi/ML	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
ANNIL	100.00D	1.00	0.000E+00	0.000E+00	0.000E+00	0.00	
Total Activity :			0.000E+00	0.000E+00			

Grand Total Activity : 2.974E-06 2.974E-06

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : 090306_0434_C Acquisition date : 6-MAR-2009 02:51:23

Nuclide	Activity (uCi/ML)	1-Sigma % Error	MPC (uCi/ML)	Fractional MPC
CO-58	6.522E-07	9.2	9E-05	7.247E-03
CO-60	7.310E-07	8.7	3E-05	2.437E-02
SB-125	1.454E-06	11.2	1E-04	1.454E-02
XE-133	1.366E-07	48.9	- 0 -	- 0 -
ANNIL	0.000E+00	0.0	- 0 -	- 0 -
Totals:	2.974E-06			4.615E-02

WATTS BAR NUCLEAR PLANT
A.4-RO

A.4-RO Respond To Medical Emergency

WATTS BAR NUCLEAR PLANT
A.4-RO

EVALUATION SHEET

Task: Respond To a Medical Emergency

Alternate Path: N/A

Facility JPM #: 3-0T-JPMADA.4-1

K/A Rating(s): 2.4.39 [3.3/3.1]

Task Standard: Performer performs actions of Appendix A of EPIP-10, "Medical Emergency Response".

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X__ In-Plant _____ Perform __X___ Simulate _____

References: EPIP-10, "Medical Emergency Response", Rev. 20.

Task Number: RO-100-SOI-100-011 APPLICABLE FOR: RO/SRO

10CFR55.45: 11

Validation Time: 10 min. **Time Critical:** No

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Applicant: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

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WATTS BAR NUCLEAR PLANT
A.4-RO

SIMULATOR OPERATOR INSTRUCTIONS:

This JPM may be performed either on the simulator or in another location. If performed on the simulator refer to the following.

1. Initialize to any IC.

2. Acknowledge all alarms.

3. Freeze simulator for duration of task performance.

5. NOTE: This JPM may be performed using a console booth instructor who acts as personnel outside the main control room. Cues may be made by him as indicated by the JPM.

SIMULATOR OPERATOR INSTRUCTIONS:

When directed by the evaluator, place phone call to the “Horseshoe” to initiate the medical emergency:

Call the “Horseshoe” and state the following:

“I want to report a medical emergency.”

WATTS BAR NUCLEAR PLANT
A.4-RO

Tools/Equipment/Procedures Needed:

Latest revision of EPIP-10

NOTE: START THIS JPM AT A LOCATION WHERE PERFORMER HAS ACCESS TO PROCEDURES (Simulator, Main Control Room, TIC or provide performer with procedure).

WATTS BAR NUCLEAR PLANT
A.4-RO

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

You are the Control Room Operator (CRO) on shift.

You have received a telephone call reporting an onsite medical emergency.

INITIATING CUES:

- **Respond to the medical emergency in accordance with EPIP-10.**

START TIME: _____

STEP 1: Obtain a copy of the instruction. STANDARD: A copy of EPIP-10 has been obtained. **EXAMINER'S CUE: After the performer locates and obtains correct instruction, the evaluator can provide a copy of the instruction.** COMMENTS:	___ SAT ___ UNSAT
NOTE TO EVALUATOR: The following steps are from EPIP-10, Appendix A	
STEP 2: [Step A] Obtain NAME of caller. STANDARD: CRO requests name of caller and records on Appendix A. ***CUE:*** ***State to the performer that your name is John Doe.*** COMMENTS:	___ SAT ___ UNSAT
STEP 3: [Step B] LOCATION of caller. STANDARD: Performer requests the location of the caller and records on Appendix A. ***CUE:*** ***State to the performer that you are just south of the station air compressors on elevation 708' in the Turbine Building.*** COMMENTS:	___ SAT ___ UNSAT

STEP 4: [Step C] Type of Medical Emergency. STANDARD: Performer requests the type of Medical Emergency and records on Appendix A. ***CUE:*** ***State to the performer that you found a male victim lying on the floor unconscious. The victim has a heartbeat and is breathing.*** COMMENTS:	___ SAT ___ UNSAT
STEP 5: [Step D] Number of personnel Involved. STANDARD: Performer requests how many people involved and records on Appendix A. ***CUE:*** ***State to the performer: "No other individuals are involved".*** COMMENTS:	___ SAT ___ UNSAT
STEP 6: [Step E] Immediate Area Hazards (Radiological, Safety). STANDARD: Requests if immediate hazards exist and records on Appendix A. ***CUE:*** ***State to the performer: "No hazards exist in the area".*** COMMENTS:	___ SAT ___ UNSAT

STEP 7: [Step F] Telephone number of the caller. STANDARD: Request the telephone number of the caller and records on Appendix A. ***CUE:*** ***State to the performer that the phone number of the phone you are calling from is 5555.*** COMMENTS:	___ SAT ___ UNSAT
NOTE TO EVALUATOR: The sequence of actions to initiate the Fire Alarm is taken from AOI-30.1, Step 1. These steps appear as un-numbered steps.	
STEP 8: INITIATE the fire alarm. STANDARD: Performer describes how to initiate the Fire Alarm. **EXAMINER'S CUE:** COMMENTS:	
STEP 9: RESET the fire alarm. STANDARD: **EXAMINER'S CUE:** COMMENTS:	

STEP 10: [Step G] ALERT and DISPATCH MERT PERSONNEL STANDARD: Performer alerts and dispatches MERT personnel using a plant radio set to Channel 3. ***CUE:*** ***As MERT personnel, acknowledge performer's communication.*** COMMENTS:	___ SAT ___ UNSAT
STEP 11: [Step H] Make the following plant announcement with public address: **"ATTENTION ALL SITE PERSONNEL."** **"ATTENTION ALL SITE PERSONNEL."** **"A MEDICAL emergency has been reported. The MERT is to ACTIVATE and RESPOND to the following LOCATION:** _____**"** STANDARD: Performer makes public address announcement and has MERT respond to Turbine Building elevation 708', just south of the station air compressors. **EXAMINER'S CUE: DO NOT allow performer to actually perform this announcement. Ensure it is simulated.** COMMENTS:	

STEP 12: INITIATE the fire alarm. STANDARD: **EXAMINER'S CUE:** COMMENTS:	
STEP 13: [Step l] CONFIRM that the Shift Manager (SM) has been notified. STANDARD: Performer ensures the SM has been notified. (may make phone call or announce to the control crew that a medical emergency is in progress) ****CUE:** ***Acknowledge report as Shift Manager.*** COMMENTS:	

STEP 11: [Step J] CONFIRM that the Fire Protection Section Duty Shift Supervisor (Fire Brigade Leader) was notified by: Radio or Telephone (extension 3311 or 3355) or Pocket Pager 40566 STANDARD: Performer ensures the Fire Protection Section Duty Shift Supervisor was notified by radio, telephone, or pocket pager. **EXAMINER'S CUE: Do NOT allow performer to actually perform this notification. Ensure it is simulated.** **CUE: Acknowledge report as Fire Protection Section Duty Shift Supervisor.** COMMENTS:	___ SAT ___ UNSAT
STEP 12: [Step K] CONFIRM/COORDINATE MERT response (via radio or phone) until Incident Commander assumes control. STANDARD: Performer confirms/coordinate the MERT response until the Incident Commander assumes control. **CUE: As Incident Commander, notify the performer that you have assumed control of the emergency. We will stop here.** COMMENTS: **END OF TASK**	

TIME STOP: _____

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

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the administrative 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 handout sheet I provided you.

INITIAL CONDITIONS:

You are the Control Room Operator (CRO) on shift.

You have received a telephone call reporting an onsite medical emergency.

INITIATING CUES:

- **Respond to the medical emergency in accordance with EPIP-10.**

WATTS BAR NUCLEAR PLANT
D.1 - SRO

D.1-SRO CLASSIFY THE EVENT PER THE REP (HIGH RCS ACTIVITY, SGTR AND FAULTED SG)

WATTS BAR NUCLEAR PLANT
D.1 - SRO

EVALUATION SHEET

Task: Classify the Event per the REP (HIGH RCS ACTIVITY, SGTR AND FAULTED SG)

Alternate Path: N/A

Facility JPM #: 3-OT-JPMS081A

K/A Rating(s): 2.1.14 [2.5/3.3] 2.4.30 [2.2/3.6] 2.4.38 [2.2/4.0
035A2.01 [4.5/4.6

Task Standard: The event is classified as a GENERAL EMERGENCY based on "Loss of Any Two Barriers and Potential Loss of Third Barrier" Notifications are made per EPIP-5.

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator __X___ In-Plant _____ Perform __X____
Simulate _____ **This JPM will be simulated.**

References: EPIP-1 "Emergency Plan Classification Flowpath", Rev. 30; EPIP-5 "GENERAL EMERGENCY", Rev. 37

Task Number: SRO-113-EPIP-001 APPLICABLE FOR: SRO

10CFR55.45: 11, 12

Validation Time: 26 min. **Time Critical:** Yes

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Applicant: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Performance Time ____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

_____

_____

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WATTS BAR NUCLEAR PLANT
D.1 - SRO

EVALUATOR INFORMATION SHEET

SIMULATOR SETUP INSTRUCTIONS:

NONE: THIS JPM IS SIMULATED and the simulator will not be used to reflect the conditions.

REQUIRED MATERIALS:

EPIP-1 and EPIP-5

SPECIALCONSIDERATIONS:

TO PRESERVE EXAM SECURITY:

- **DO NOT allow actual call to ODS. If a call is made, ensure call is to simulator instructor**
- **UNDER NO CIRCUMSTANCES IS THE PERFORMER TO OPERATE THE FAX IN THE "ODS" or "ODS DRILL" MODES.**

Tools/Equipment/Procedures Needed:

Ensure clean copy of EPIP-5 in all copies of Emergency Instructions on the Simulator Floor and in the file drawer of Unit Supervisor's desk.

SIMULATOR OPERATOR INSTRUCTIONS:

1. Obtain copy of EPIP-5 to facilitate role plays for contacts made by the performer.
2. Performer must use NRC ring down phone.

WATTS BAR NUCLEAR PLANT
D.1 - SRO

READ TO OPERATOR

DIRECTION TO TRAINEE:

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 indicate that you have completed your assigned task return the handout sheet I provided you.

THE CURRENT SIMULATOR CONDITIONS ARE NOT REPRESENTATIVE OF THIS JPM.

INITIAL CONDITIONS:

1. **The unit was at 90% RTP when the crew manually initiated a Reactor Trip and Safety Injection due to a SGTR on SG #1 of greater than 140 gpm.**
2. **The crew has entered E-3, Steam Generator Tube Rupture.**
3. **Subsequently, a Safety Valve on SG #1 OPENED and FAILED to RECLOSE and the crew transitioned to E-2, Faulted Steam Generator.**
4. **Currently, the Status Trees are GREEN except for FR-H.5, Steam Generator Low Level, which is YELLOW due to level in SG #1 at 50% wide range.**
5. **Chem Lab reports RCS activity is 340 uCi/gram dose equivalent I-131.**
6. **Wind is from 90 degrees, at 8 mph.**
7. **You are the SM/SRO**

INITIATING CUES:

1. **The Unit Supervisor has informed you of the above conditions.**
2. **The operators are taking actions per the emergency instructions (currently in E-3 and transitioning from E-2 and will be transitioning to ES-3.1).**
3. **You are to make the initial classification of the event per the REP EPIPs and make required initial notifications.**
4. **Portions of this JPM are time critical.**

WATTS BAR NUCLEAR PLANT
D.1 - SRO

START TIME: _____

STEP 1:	Refers to EPIP-1 to determine level of event.	**CRITICAL STEP**
STANDARD:	Performer refers to EPIP-1 and declares a GENERAL EMERGENCY based on "Loss Of Three Barriers" (1.1.2 Loss, 1.2.3 Loss, 1.3.4 Loss). This must be completed within **15 minutes** of task assignment. **This step is critical to ensure proper activation of TVA resources for event in progress.**	___ SAT ___ UNSAT
COMMENTS:	**RECORD time that declaration was made:**_____	
STEP 2:	Implements EPIP-5, GENERAL EMERGENCY	___ SAT
STANDARD:	EPIP-5, GENERAL EMERGENCY, is implemented.	
COMMENTS:		___ UNSAT

WATTS BAR NUCLEAR PLANT
D.1 - SRO

NOTE 1 Steps not required to be performed may be marked N/A.	
NOTE 2 Steps with NLO ➡ in the margin may be performed by Non-Licensed Operator phone talker.	
STEP 3: **[STEP 1]** Upon determining that existing conditions are classified as a GENERAL EMERGENCY according to EPIP-1 (independent evaluations by crew members may be beneficial), the SED, or designee, will: . STANDARD: *****CUE:*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE 1	**IF ongoing onsite Security events may present risk to the emergency responders, THEN… CONSULT with Security to determine if site access is dangerous to the life and health of emergency responders.**
NOTE 2	**IF ongoing events makes activating EPS and site access dangerous to the life and health of emergency responders, THEN the STAGING AREA button on the EPS terminal should be used INSTEAD of the EMERGENCY button. This will direct off-site personnel to Training Center Classroom 19 (LNC). Responders within the Protected Area will monitor Plant Announcements and report to the TSC or OSC as conditions permit.**
NOTE 3	**The Emergency Paging System (EPS) provides a printed report every 10 minutes during the 90 minutes duration after activation. Printouts are available in the TSC, OSC and the MCR**
NOTE	**4 When initiating Appendix A or C ensure that only the applicable EAL(s) for which the classification is declared are documented. Example: When using the fission product barrier matrix, document three digits including P or L(1.1.1 P, 1.2.2 L, & 1.3.2 L) When initiating Appendix D only the additional EAL(s) need to be listed.**

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 4:	**[STEP 1]** IF the onsite emergency centers are not staffed, **THEN DIRECT** Shift Personnel to activate the Emergency Paging System (EPS) to staff the TSC and Operations Support Center (OSC). Shift Personnel should confirm activation and provide the 20 minute printed report to the SM for review. A IF the EPS system fails, call the ODS, ringdown or (5-751-1700) and have him activate the EPS. B IF the above methods of activating the EPS fail, Shift Personnel must use the Radiological Emergency Response Call Lists to staff the TSC and OSC. This list is located in the EPS Manual near the terminal.	**CRITICAL STEP** ___ SAT ___ UNSAT
STANDARD:	Performer directs the NLO to perform Step 1 to activate the emergency paging system (EPS) to staff the TSC and Operations Support Center (OSC) or EPS is activated in the control room. **This step is critical to ensure proper activation of TVA resources for event in progress.**	
	*****CUE:** After the NLO is notified, acknowledge the request to activate the Emergency Paging System.*	
COMMENTS:		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 5:	**[STEP 2] IF** the TSC has not been activated**, THEN** **a. INITIATE** Appendix A and B, Initial Notification Information for GENERAL EMERGENCY and Protective Action Recommendations.	**CRITICAL STEP**
STANDARD:	Appendix A is accurately completed with Appendix B **RECOMMENDATION 2 SELECTED.** Performer notifies the ODS, and then assigns the NLO to FAX Appendix A to the ODS.	___ SAT ___ UNSAT
NOTE TO EVALUATOR: Underlined portion is the **critical part**.		
COMMENTS:		
NOTE ODS should be notified within 5 minutes after declaration of the event.		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 6:	**b. NOTIFY** the ODS direct by ODS Ringdown or 5-751-1700 or 5-751-2495 **1) PROVIDE** the information from Appendices A and B.	**CRITICAL STEP** ___ SAT
STANDARD:	Appendix A is accurately completed with Appendix B **RECOMMENDATION 2 SELECTED.** The ODS is notified and provided the information on Appendix A. This notification must be made within **5 minutes** of event declaration. Performer notifies the ODS, and then assigns the NLO to FAX Appendix A to the ODS.	___ UNSAT
EVALUATOR NOTE:	**TO PRESERVE EXAM SECURITY, DO NOT allow actual call to ODS. If a call is made, ensure call is to simulator instructor**	
NOTE TO EVALUATOR:	**TO PRESERVE EXAM SECURITY, UNDER NO CIRCUMSTANCES IS THE PERFORMER TO OPERATE THE FAX IN THE "ODS" or "ODS DRILL" MODES.**	
	*****CUE: EVALUATOR (or Booth Operator) Role play as the ODS and repeat back the report.***	
COMMENTS: **RECORD time that ODS was notified:**_____		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 7:	**c. IF** the ODS cannot be contacted within 10 minutes, then **NOTIFY** Rhea County, Meigs County, McMinn County, and the Tennessee Emergency Management Agency (TEMA) of the classification USING the contact information in Appendix E.	___ SAT ___ UNSAT
STANDARD:	The ODS is notified and provided the information on Appendix A. This notification must be made within **5 minutes** of event declaration. The conditions of this step are not met, so the step is N/A.	
COMMENTS:		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 8: **d** ANNOUNCE to the crew: "A GENERAL EMERGENCY is being declared based on Primary Coolant Activity Level, SGTR on SG #1/Faulted SG #1 Outside Containment. I will be the Site Emergency Director." STANDARD: The above announcement is made to the crew. Wording describing the event may vary. **Step is critical to alert crew to the declaration of the GENERAL EMERGENCY and provide for tracking personnel.** *****CUE: After the crew is notified, acknowledge the report.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 9: **e. TRACK** dispatched personnel by name, and **PERFORM** one of the following**.** **IF** OSC is not staffed, **THEN INFORM** Rotating Maintenance Organization Supervisor of names for team tracking. **WHEN** OSC is staffed, **THEN INFORM** OSC manager of names for team tracking. STANDARD: Performer addresses the fact that the OSC has not been staffed and that until it is, dispatched personnel will be provided to the RMOS for team tracking. *****CUE: If the Rotating Maintenance Organization Supervisor is contacted, acknowledge the report.*** COMMENTS:	___ SAT ___ UNSAT

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 10:	**f. GO TO** Step 5.	___ SAT
STANDARD:	Performer advances to Step 5.	___ UNSAT
COMMENTS:		
STEP 10:	**[Step 5] ANNOUNCE** to the plant: "ATTENTION ALL SITE PERSONNEL. ATTENTION ALL SITE PERSONNEL. A GENERAL EMERGENCY has been declared based on _____." (Repeat)	___ SAT
STANDARD:	Performer provides NLO with the following information in order to make the Plant announcement : "ATTENTION ALL SITE PERSONNEL. ATTENTION ALL SITE PERSONNEL. A GENERAL EMERGENCY has been declared based on Primary Coolant Activity Level, SGTR on SG #1/Faulted SG #1 Outside Containment." (Repeat**)**	___ UNSAT
COMMENTS:		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

CAUTION	**If there is any possibility of a radiological release, A severe weather condition (such as a Tornado) or security adversary attack, HOLD assembly and accountability actions until these conditions have been resolved. Do not send personnel into areas of unknown radiological conditions or security risk without first contacting Radiological Control (RADCON) or Security.**	
NOTE 1	The following action is N/A if assembly and accountability actions have already been initiated.	
NOTE 2	EPIP-8, Personnel Accountability and Evacuation, Appendix D initiates Site Security actions and Radiation Protection actions (as necessary).	
STEP 11 :	**[STEP 6] INITIATE** EPIP-8, Personnel Accountability and Evacuation	**CRITICAL STEP**
STANDARD:	The performer determines that assembly and accountability should be performed and assigns Steps 6 to the NLO for completion. **This step is critical in that specific guidance is given with regard to assembly & accountability.**	___ SAT ___ UNSAT
COMMENTS:		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 12:	**[STEP 7] CONTACT** Radiation Protection (x7865), and **PROVIDE the following:** **a. ANNOUNCE** "We are in a GENERAL EMERGENCY**.**" **(Repeat)** **b. DIRECT** Radiation Protection to IMPLEMENT EPIP-14, Radiological Control Response, and CECC EPIP-9, Emergency Environmental Radiological Monitoring Procedures. **c. EVALUATE** the need to implement EPIP-13, Initial Dose Assessment for Radiological Emergencies, for a dose projection if radioactivity is being released through normal plant release paths.	**CRITICAL STEP** ___ SAT ___ UNSAT
STANDARD:	The performer assigns completion of this step to the NLO. **This step is critical to ensure Radiation Protection implements the proper procedures in response to the GENERAL EMERGENCY.**	
COMMENTS:		

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 13: **[STEP 8] IF** there are personnel injuries, **IMPLEMENT** WBN EPIP-10, "Medical Emergency Response." STANDARD: Performer determines that it is **NOT** necessary to implement EPIP-10. ****CUE: Inform the performer that there are NO personnel injuries.** COMMENTS:	___ SAT ___ UNSAT
STEP 14: **[STEP 9] CONTACT** Site Security (x8464 or x8495), and REQUEST Security to IMPLEMENT EPIP-11, Security and Access Control. STANDARD: The performer assigns completion of this step to the NLO. **This step is critical to ensure Radiation Protection implements the proper procedures in response to the GENERAL EMERGENCY.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

WATTS BAR NUCLEAR PLANT
D.1 - SRO

STEP 15: **[STEP 10]** INFORM TVA Management by PERFORMING the following: NOTIFY Duty Plant Manager in accordance with SPP-3.5. PROVIDE Duty Plant Manager GENERAL EMERGENCY information from one of the following (as applicable). ● The information recorded on Appendix A, Initial Notification form for GENERAL EMERGENCY, or ● The information recorded on Appendix C, Initial Classification form for GENERAL EMERGENCY**.** STANDARD: Duty Plant Manager is provided the Appendix A information. **This step is critical as it alerts plant management to REP activation.** *****CUE:*** ***(Booth Operator) Role play as the Duty Plant Manager and acknowledge the report.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE: The following step is not applicable if the state was contacted directly.	
STEP 16: **[STEP 11] CONFIRM** with the ODS or CECC that the State of Tennessee has been notified. . STANDARD: ODS is contacted to confirm that the State of Tennessee has been notified of REP activation. *****CUE:*** ***(Booth Operator) Role play as the ODS and report that the State of Tennessee has been Notified of REP Activation at Watt Bar Nuclear Plant.*** COMMENTS:	___ SAT ___ UNSAT
NOTE: NRC notification should be made as soon as practicable **but within one hour** of **GENERAL EMERGENCY** declaration. Whenever NRC requests, a qualified person must be provided for a continuous update to NRC Operations Center.	

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EVALUATOR NOTE: DO NOT allow actual call to NRC. Ensure call is to simulator instructor.	
STEP 22: **[STEP 12] NOTIFY** the NRC, using designated NRC phone (ENS), of plan activation. The following commercial numbers are for the NRC Operations Center. 9-1-301-816-5100 (MAIN) 9-1-301-951-0550 (BACKUP) 9-1-301-816-5151 (FAX) STANDARD: The performer assigns completion of this step to the NLO. **This step is critical as it alerts NRC to REP activation.** **EVALUATOR NOTE: DO NOT allow actual call to NRC. Ensure call is to simulator instructor.** *****CUE: (Booth Operator) Role play the NRC and acknowledge the report.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

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STEP 23: **[STEP 13] NOTIFY** the NRC Resident Inspector (x1776) and **PROVIDE** one of the following (as applicable). ● The information recorded on Appendix A , **or** ● The information recorded on Appendix C. STANDARD: The NRC Resident Inspector is provided Appendix A information. **This step is critical as it alerts NRC to REP activation.** EVALUATOR NOTE: **DO NOT allow actual call to NRC Resident. Ensure call is to simulator instructor.** *****CUE: (Booth Operator) Role play the NRC Resident and acknowledge the report.*** EVALUATOR NOTE*:* Give the following cue to performer when the performer completes the call to the NRC Resident Inspector: *****CUE: Role play and report that the TSC is staffed, and that the SED will be coming to the control room for a turnover of SED duties. We will stop here.*** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

TIME STOP: _____

PERFORMER HANDOUT SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

DIRECTION TO TRAINEE:

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 indicate that you have completed your assigned task return the handout sheet I provided you.

THE CURRENT SIMULATOR CONDITIONS ARE NOT REPRESENTATIVE OF THIS JPM.

INITIAL CONDITIONS:

1. **The unit was at 90% RTP when the crew manually initiated a Reactor Trip and Safety Injection due to a SGTR on SG #1 of greater than 140 gpm.**

2. **The crew has entered E-3, Steam Generator Tube Rupture.**

3. **Subsequently, a Safety Valve on SG #1 OPENED and FAILED to RECLOSE and the crew transitioned to E-2, Faulted Steam Generator.**

4. **Currently, the Status Trees are GREEN except for FR-H.5, Steam Generator Low Level, which is YELLOW due to level in SG #1 at 50% wide range.**

5. **Chem Lab reports RCS activity is 340 uCi/gram dose equivalent I-131.**

6. **Wind is from 90 degrees, at 8 mph.**

7. **You are the SM/SRO**

INITIATING CUES:

The Unit Supervisor has informed you of the above conditions.

The operators are taking actions per the emergency instructions (currently in E-3 and transitioning from E-2 and will be transitioning to ES-3.1).

You are to make the initial classification of the event per the REP EPIPs and make required initial notifications.

Portions of this JPM are time critical.