CRYSTAL RIVER UNIT 3
JPM COVER SHEET

ADMIN JPM #CO1

NRC 2011

RO / SRO

PERFORM AN RCS BORON CHANGE CALCULATION

PREPARED/REVIEWED BY: Jim Gregitis Date: 07/10/11

VALIDATED BY: B. Wooten / B. Webster / R. Virgin Date: 07/10/11

APPROVAL BY: Mark VanSicklen Date: 07/27/11
(Nuclear Training Supervisor)

CONCURRED BY: Mike Kelly Date: 07/28/11
(Operations Representative)

Validation is not required for minor enhancements, procedure revisions that do not affect the JPM or individual step changes that do not affect the flow of the JPM.

Operations concurrence is required for new JPMs and changes that affect the flow, critical steps or time critical steps of the JPM. Operations concurrence is not required for changes that are required due to a procedure revision.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

JPM #: Admin CO1 - NRC 2011

Task: Determine a reactor coolant boron change calculation.

Alternate Path: ☐ **YES** ☒ **NO**

PRA Top Critical Action: ☐ **YES** ☒ **NO**

Safety Function: NA

K/A Rating/Importance: G2.1.37 RO 4.3 SRO 4.6

Task Number: 0020102029 – RO

Position: ☐**SRO ONLY** ☒**RO/SRO** ☐**NLO/RO/SRO**

Task Standard: Perform a reactor coolant boron change calculation using OP-304.

Preferred Evaluation Location:

☐ **SIM** ☐ **PLANT** ☒ **ADMIN**

Preferred Evaluation Method:

☒ **PERFORM** ☐ **SIMULATE**

References:

OP-304, Rev 33
OP-103C, Rev 31

Validation Time: 30 minutes **Time Critical**: ☐ **YES** ☒ **NO**

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Candidate: _____
Printed Name

Time Start: _____

Time Finish: _____

Performance Rating: ☐ **SAT** ☐ **UNSAT** **Performance Time:** _____

Examiner: _____ _____/_____
Printed Name Signature Date

Comment: _____

_____

_____

SIMULATOR OPERATOR SETUP INSTRUCTIONS

1. None

SIMULATOR OPERATOR INSTRUCTIONS

1. None

TOOLS/EQUIPMENT/PROCEDURES NEEDED

1. Consumable copies of OP-304, Rev 33
2. Consumable copies of OP-103C, Rev 31
3. Calculators

READ TO THE OPERATOR

INITIAL CONDITIONS

You are the Reactor Operator.

The following plant conditions exist:

Rx power:	80%
Initial rod index:	280%
EFPD:	300

INITIATING CUES

The CRS has directed you to perform the boron change required to achieve the following final plant conditions:

Rx power:	100%
Final rod index:	280%

Do NOT consider the effects of Xenon.

SWQL B OP304.XLS is NOT available.

Document your answer below.

ANSWER

RCS boron concentration must be **raised / lowered** by _____ ppm (ΔB).
(circle one)

***EXAMINER'S NOTE*: FOR STEPS DENOTED AS "CRITICAL STEP", WHICH HAVE MULTIPLE ACTIONS, THE INDIVIDUAL REQUIRED ACTION WILL BE DENOTED "CS". IF NO INDIVIDUAL ACTIONS ARE DENOTED AS SUCH THEN ALL ACTIONS WITHIN THE STEP ARE DEEMED "CRITICAL".**

TIME START _____

STEP 1: Obtain copy of appropriate procedure. STANDARD: Candidate obtains a copy of OP-304. **EXAMINER NOTE:** **Provide candidate with a copy of OP-304. When candidate asks for OP-103C, provide him/her a copy at that time.** COMMENTS:	SAT_____ UNSAT_____
STEP 2: (OP-304 Enclosure 4 Step 1) Record initial plant data. STANDARD: Candidate accurately transfers data to Enclosure 4. Rx Power 80% Rod Index 280% EFPD 300 COMMENTS:	SAT_____ UNSAT_____

STEP 3: (OP-304 Enclosure 4 Step 2) Record final plant data. STANDARD: Candidate accurately transfers data to Enclosure 4. Rx Power 100% Rod Index 280% COMMENTS:	SAT_____ UNSAT_____
STEP 4: (OP-304 Enclosure 4 Step 3) Determine Reactivity for reactor power $R1_{RP}$ (Initial) and $R2_{RP}$ (Final). STANDARD: Using OP-103C curve 15, candidate determines $R1_{RP}$ to be 0.2056% Δk/k and $R2_{RP}$ to be 0% Δk/k. Candidate accurately transfers data to Enclosure 4. **EXAMINER NOTE:** **Acceptable range for $R1_{RP}$ is 0.19% Δk/k to 0.21% Δk/k due to readability of curve 15.** COMMENTS:	**Critical Step** **Basis: Reactivity Management** SAT_____ UNSAT_____

STEP 5: (OP-304 Enclosure 4 Step 4) Determine Reactivity for rod index $R1_{RI}$ (Initial) and $R2_{RI}$ (Final). STANDARD: Using OP-103C curve 14, candidate determines $R1_{RI}$ and $R2_{RI}$ to be -0.1349% Δk/k. Candidate accurately transfers data to Enclosure 4. **EXAMINER NOTE:** **Acceptable range for $R1_{RI}$ and $R1_{RI}$ is -0.15% Δk/k to -0.1% Δk/k due to readability of curve 14.** **Step is not critical since there is no change in rod height; however, candidate should still determine this reactivity per Operations Management expectations.** COMMENTS:	SAT_____ UNSAT_____

STEP 6: (OP-304 Enclosure 4 Step 5) Determine total reactivity $R1_T$ (Initial) and $R2_T$ (Final). STANDARD: Candidate accurately calculates $R1_T$ (Initial) and $R2_T$ (Final) and transfers to Enclosure 4. $R1_T = R1_{RP} + R1_{RI} = 0.2056\% \Delta k/k - 0.1349\% \Delta k/k = 0.0707\% \Delta k/k$ $R2_T = R2_{RP} + R2_{RI} = 0\% \Delta k/k - 0.1349\% \Delta k/k = -0.1349\% \Delta k/k$ **EXAMINER NOTE:** **Acceptable range for $R1_T$ is .04% Δk/k to 0.11% Δk/k due to previous acceptability ranges.** **Acceptable range for $R2_T$ is -.15% Δk/k to -0.1% Δk/k due to previous acceptability ranges.** **Step is not critical since reactivity due to rod index equally affects both terms and will offset in next step.** COMMENTS:	SAT_____ UNSAT_____

STEP 7: (OP-304 Enclosure 4 Step 6) Determine ΔR (Change in reactivity). STANDARD: Candidate accurately calculates ΔR and transfers to Enclosure 4. $\Delta R = R2_T - R1_T$ = -0.1349% Δk/k – (0.0707% Δk/k) = - 0.2056% Δk/k **EXAMINER NOTE:** **Acceptable range for $R1_{RP}$ is 0.19% Δk/k to 0.21% Δk/k due to previous acceptability ranges.** COMMENTS:	**Critical Step** **Basis: Reactivity Management** SAT_____ UNSAT_____
STEP 8: (OP-304 Enclosure 4 Step 7) Determine IB (Inverse Boron worth). STANDARD: Using OP-103C curve 4, candidate determines IB to be 157.2 ppm/%Δk/k. Candidate accurately transfers data to Enclosure 4. **EXAMINER NOTE:** **Acceptable range for IB is 156.2 ppm/%Δk/k to 158.2 ppm/%Δk/k due to readability of curve 4.** COMMENTS:	**Critical Step** **Basis: Reactivity Management** SAT_____ UNSAT_____

STEP 9: (OP-304 Enclosure 4 Step 8) Determine ΔB (Change in RCS boron). Raise boron if positive, lower boron if negative. STANDARD: Candidate accurately calculates ΔB and transfers to Enclosure 4. ΔB = (ΔR)(IB) = (-0.2056% Δk/k)(157.2 ppm/%Δk/k) = -32.32 ppm Candidate determines boron must be lowered by 32.32 ppm. **EXAMINER NOTE:** **Acceptable range for ΔB is -29 ppm to -34 ppm due to previous acceptability ranges and rounding errors (i.e Lower boron by 29 ppm to 34 ppm).** COMMENTS:	**Critical Step** **Basis: Reactivity Management** SAT_____ UNSAT_____
TERMINATION CUE: OP-304 Enclosure 4 complete.	
END OF TASK	

TIME STOP _____

ANSWER KEY

ON-LINE REACTIVITY MANAGEMENT

1. Record initial plant data.

Rx POWER	ROD INDEX	$R1_{XE}$ Saxon	EFPD Saxon
80 %	280 %	N/A %Δk/k	300

2. Record final plant data.

Rx POWER	ROD INDEX	USE CAUTION TO ENSURE PROPER SIGNS ARE MAINTAINED DURING ALL CALCULATIONS.	$R2_{XE}$ Saxon
100 %	280 %		N/A %Δk/k

3. Determine Reactivity for reactor power $R1_{RP}$ (Initial) and $R2_{RP}$ (Final)

	$R1_{RP}$	$R2_{RP}$
Use OP-103C curve 15	0.2056 %Δk/k	0 %Δk/k

4. Determine Reactivity for rod index $R1_{RI}$ (Initial) and $R2_{RI}$ (Final)

	$R1_{RI}$	$R2_{RI}$
Use OP-103C curve 14	-0.1349 %Δk/k	-0.1349 %Δk/k

5. Determine total reactivity $R1_T$ (Initial) and $R2_T$ (Final)

	$R1_T$	$R2_T$
$R1_T = R1_{RP} + R1_{RI} + R1_{XE}$ $R1_T = \_\_ \frac{\%\Delta k}{k} + \_\_ \frac{\%\Delta k}{k} + \_\_ \frac{\%\Delta k}{k}$ $R2_T = R2_{RP} + R2_{RI} + R2_{XE}$ $R2_T = \_\_ \frac{\%\Delta k}{k} + \_\_ \frac{\%\Delta k}{k} + \_\_ \frac{\%\Delta k}{k}$	0.0707 %Δk/k	-0.1349 %Δk/k

6. Determine Δ R (Change in reactivity)

	ΔR
$\Delta R = R2_T - R1_T$ $\Delta R = \_\_\_ \frac{\%\Delta k}{k} - \_\_\_ \frac{\%\Delta k}{k}$	-0.2056 %Δk/k

Continue calculation on next page

ANSWER KEY

ON-LINE REACTIVITY MANAGEMENT

7.	Determine IB (Inverse Boron worth)	
	Use OP-103C curve 4 for current EFPD If reactor power is >18%, use HFP values.	**IB** **157.2000 ppm / %Δk/k**
8.	Determine Δ B (Change in RCS boron). Raise boron if positive, lower boron if negative.	
	$\Delta B = (\Delta R) (IB)$ $\Delta B = (\_\_\_\_ \frac{\%\Delta k}{k})(\_\_\_\_ \frac{ppm}{\frac{\%\Delta k}{k}})$	**ΔB** **-32.32 ppm**

PERFORMED BY _____ DATE _____

VERIFIED BY _____ DATE _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

You are the Reactor Operator.

The following plant conditions exist:

Rx power:	80%
Initial rod index:	280%
EFPD:	300

INITIATING CUES

The CRS has directed you to perform the boron change required to achieve the following final plant conditions:

Rx power:	100%
Final rod index:	280%

Do NOT consider the effects of Xenon.

SWQL B OP304.XLS is NOT available.

Document your answer below.

ANSWER

RCS boron concentration must be **raised / lowered** by _____ ppm (ΔB).
(circle one)

CRYSTAL RIVER UNIT 3
JPM COVER SHEET

ADMIN JPM #CO2

NRC 2011

RO / SRO

CALCULATE SDM WITH A MISALIGNED CONTROL ROD

PREPARED/REVIEWED BY: Jim Gregitis Date: 05/24/11

VALIDATED BY: B. Wooten / B. Webster / R. Virgin Date: 07/10/11

APPROVAL BY: Mark VanSicklen Date: 07/27/11
(Nuclear Training Supervisor)

CONCURRED BY: Mike Kelly Date: 07/28/11
(Operations Representative)

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Operations concurrence is required for new JPMs and changes that affect the flow, critical steps or time critical steps of the JPM. Operations concurrence is not required for changes that are required due to a procedure revision.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

JPM #: Admin CO2 - NRC 2011

Task: Determine Shutdown Margin (SDM).

Alternate Path: ☐ **YES** ☒ **NO**

PRA Top Critical Action: ☐ **YES** ☒ **NO**

Safety Function: NA

K/A Rating/Importance: G2.1.7 RO 3.7 SRO 4.4
G2.2.40 SRO 4.7

Task Number: 1150202005 – RO 1190201006 – SRO

Position: ☐**SRO ONLY** ☒**RO/SRO** ☐**NLO/RO/SRO**

Task Standard: Determine SDM using SP-421, Reactivity Balance Calculations.

Preferred Evaluation Location:

☐ **SIM** ☐ **PLANT** ☒ **ADMIN**

Preferred Evaluation Method:

☒ **PERFORM** ☐ **SIMULATE**

References:

OP-103C, Rev 31
SP-421, Rev 61
TS 3.1.4

Validation Time: 15 minutes **Time Critical**: ☐ **YES** ☒ **NO**

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Candidate: _____ **Time Start:** _____
Printed Name

Time Finish: _____

Performance Rating: ☐ **SAT** ☐ **UNSAT** **Performance Time:** _____

Examiner: _____ _____/_____
Printed Name Signature Date

Comment: _____

_____

SIMULATOR OPERATOR SETUP INSTRUCTIONS

1. None

SIMULATOR OPERATOR INSTRUCTIONS

1. None

TOOLS/EQUIPMENT/PROCEDURES NEEDED

1. Consumable copies of OP-103C, Rev 31
2. Consumable copies of SP-421, Rev 61
3. Copies of ITS
4. Calculators

READ TO THE OPERATOR

INITIAL CONDITIONS

You are the Balance of Plant Operator.
With the plant initially at 100% power, control rod 6-6 dropped from its group average height of 80% to the 60% withdrawn position and has been determined to be untrippable.
The plant is now stable at 60% power.
RCS boron is 1109 ppmB.
210 EFPD
Xenon value from current Saxon is -2.13% Δk/k. **(This value must be used for calculation.)**
Boron-10 atom percent is 19.8.
RCS temperature is 579° F.

INITIATING CUES

The Control Room Supervisor has directed you to verify if adequate SDM exists using SP-421, Reactivity Balance Calculations. Enter SDM below and document additional actions, if any, you would perform.

_____

_____

_____

_____

SROs only: After calculating SDM, determine if any TS actions are required. Include applicable time requirements. Document your answer below.

_____

_____

_____

_____

***EXAMINER'S NOTE*: FOR STEPS DENOTED AS "CRITICAL STEP", WHICH HAVE MULTIPLE ACTIONS, THE INDIVIDUAL REQUIRED ACTION WILL BE DENOTED "CS". IF NO INDIVIDUAL ACTIONS ARE DENOTED AS SUCH THEN ALL ACTIONS WITHIN THE STEP ARE DEEMED "CRITICAL".**

TIME START _____

STEP 1: Locate procedures. STANDARD: Candidate obtains a copy of SP-421 and OP-103C. **EXAMINER NOTE:** **Provide candidate with a copy of SP-421. When the candidate asks for OP-103C, provide it to him/her at that time.** COMMENTS:	SAT_____ UNSAT_____

STEP 2: Determine correct enclosure to use. STANDARD: Candidate determines that Enclosure 1B, One Hour Misaligned Rod Shutdown Margin Calculation, is the enclosure to be used. **EXAMINER NOTE:** **If candidate determines that Enclosure 1, Shutdown Margin – Normal Conditions, is to be used, allow the candidate to complete the JPM since both enclosures will result at the same endpoint. Make a note of this and during the final exam review point out to the candidate that Enclosure 1B was created just for this type of plant condition.** COMMENTS:	SAT_____ UNSAT_____

STEP 3: (SP-421 Enclosure 1B Step 1) Enter core burnup. STANDARD: Candidate accurately transfers data from Cue Sheet to enclosure. COMMENTS:	SAT_____ UNSAT____

STEP 4: (SP-421 Enclosure 1B Step 2) Determine Boron Reactivity. 1. Enter RCS Boron Concentration. (Cue Sheet) 2. Enter B-10 atom percent. (Cue Sheet) 3. Calculate B-10 adjusted value. 4. Enter RCS temperature. (Cue Sheet) 5. Use Curve 19 to determine boron concentration required for Shutdown Margin. **(CS)** 6. Use Curve 3 to determine differential boron worth. **(CS)** 7. Perform calculation to determine boron reactivity. **(CS)** STANDARD: Candidate accurately transfers data from Cue Sheet, determines correct curves to use and accurately calculates the value for boron reactivity. **EXAMINER NOTE:** **Values must be within limits on attached key.** COMMENTS:	**Critical Step** **Basis: Accurate curve selection and calculation required to determine adequate SDM.** SAT_____ UNSAT____

STEP 5: (SP-421 Enclosure 1B Step 3) Determine Control Rod Group Reactivity. STANDARD: Candidate notes that no credit will be taken for APSR position in shutdown margin calculations. COMMENTS:	SAT_____ UNSAT_____
STEP 6: (SP-421 Enclosure 1B Step 4) Determine Xenon Reactivity. STANDARD: Candidate accurately transfers data from Cue Sheet to enclosure. COMMENTS:	SAT_____ UNSAT_____

STEP 7: (SP-421 Enclosure 1B Step 5) Determine SDM. 1. Calculate SDM. 2. If SDM is determined to be less negative than -1.0% Δk/k then SDM is unacceptable. Immediately notify the CRS and refer to TS 3.1.1. 3. If SDM is determined to be equal to or more negative than -1.0% Δ k/k then SDM is acceptable. STANDARD: Candidate determines that SDM is unacceptable and notifies the CRS. **EXAMINER NOTE:** **Value must be within limits on attached key.** COMMENTS:	**Critical Step** **Basis: Accurate calculation and immediate notification of the CRS is required to comply with TS.** SAT_____ UNSAT____
TERMINATION CUE: SDM calculation complete and unacceptability determined.	
***RO* - END OF TASK**	

STEP 8: **(SRO Only)** Refer to TS 3.1.4, Control Rod Group Alignment Limits, and determine required actions. STANDARD: Candidate determines that the following actions are required (TS 3.1.4 Condition D): 1. Initiate boration to restore SDM within 1 hour. 2. Be in Mode 3 within 6 hours. **EXAMINER'S NOTE:** **TS 3.1.1, Shutdown Margin (SDM), is only applicable in Modes 3, 4, and 5. Per the Cue Sheet, the plant is in Mode 1.** COMMENTS:	**Critical Step** **Basis: TS required actions** SAT_____ UNSAT_____
TERMINATION CUE: TS required actions determined.	
***SRO* - END OF TASK**	

TIME STOP _____

ONE HOUR MISALIGNED ROD SHUTDOWN MARGIN CALCULATION

NOTES

For this enclosure the following applies:

(1) It is permissible to round EFPD, boron, %wd, and ºF to the nearest Integer.

(2) For RCS > 532 degrees F, 532 degrees F data may be used.

(3) Two decimal place accuracy is required for reactivity terms in calculations.

1. Core Burnup

   Core Burnup = EFPD (from SAXON) = **210** EFPD

2. Boron Reactivity

   a. Measured RCS Boron Concentration = **1109** ppmB

NOTE

The reference Boron-10 (B-10) atom percent (a/o) is 19.8 for all calculations used in deriving the reactivity curves in OP-103C.

   b. B-10 atom percent of RCS Boron = **19.8** a/o
   supplied by an approved Reactor Engineering Operational Communication (ROC).

   c. B-10 adjusted Boron Concentration is
   Step 2(a) * Step 2(b) / 19.8 = **1109** ppmB

   d. RCS temperature = **579** ° F.

   e. Using RCS temperature from 2(d) and core burnup from Step 1, determine the Boron concentration required for shutdown from appropriate Curve 18 or Curve 19 of OP-103C.

   = **1602** ppmB
   (LIMIT 1590 to 1610)

   f. Differential boron worth from Curve 3 of OP-103C, Reactivity Worth Curves.

   = **0.6984** % Δk/k /100 ppm
   (LIMIT 0.69 to 0.71)

   g. Reactivity During Modes 1,2,3,4, and 5
   Reactivity = [(e-c) x f/100] - 1.0

   = [(**1602** - **1109**) x **0.6984** / 100] - 1.0 = + / - **+ 2.44** % Δk/k
   (LIMIT + 2.32 to + 2.51)

ONE HOUR MISALIGNED ROD SHUTDOWN MARGIN CALCULATION (Cont'd)

3. Control Rod Group 8 Reactivity

No credit will be taken for APSR position in shutdown margin calculations.

NOTE

(1) For the one hour misaligned rod calculation ONLY, the value for xenon calculated prior to the misaligned rod for this hour may still be used provided that:

- the existing SAXON printout accurately reflects the core conditions prior to the misaligned rod, and
- the maximum post-misaligned rod power level is less than, or equal to, the power level used on the existing SAXON printout for calculating this hour's xenon.

(2) Using a xenon value of 0.0% Δk/k is conservative and may be used at any time.

4. Xenon Reactivity

a. Obtain Xenon reactivity from Saxon code (submit printout).

OR

b. IF the Saxon code is unavailable,
THEN use 0.0% Δk/k or contact Reactor Engineering for a value (0.0% Δk/k is conservative and therefore preferred). **- 2.13** % Δk/k

5. Shutdown Margin

Determine the shutdown margin by adding Items 2 and 4 above, and round to the nearest hundredth

+ 2.44 + **- 2.13** = + / - **+ 0.31** % Δk/k

(LIMIT + 0.19 to + 0.38)

Item 2 Item 4

a. IF the shutdown margin determined in Step 5, rounded to tenths, is less negative than -1.0% Δk/k (i.e., zero, positive or between 0.0 and -1.0).
THEN the shutdown margin is unacceptable. **IMMEDIATELY** inform the Control Room Supervisor and refer to ITS 3.1.1.

b. IF the shutdown margin determined in Step 5, rounded to tenths, is equal to or more negative than -1.0% Δk/k,
THEN the shutdown margin is acceptable.

Calculated By:_____ Date/Time:_____

Checked By:_____ Date/Time;_____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

You are the Balance of Plant Operator.
With the plant initially at 100% power, control rod 6-6 dropped from its group average height of 80% to the 60% withdrawn position and has been determined to be untrippable.
The plant is now stable at 60% power.
RCS boron is 1109 ppmB.
210 EFPD
Xenon value from current Saxon is -2.13% Δk/k. **(This value must be used for calculation.)**
Boron-10 atom percent is 19.8.
RCS temperature is 579° F.

INITIATING CUES

The Control Room Supervisor has directed you to verify if adequate SDM exists using SP-421, Reactivity Balance Calculations. Enter SDM below and document additional actions, if any, you would perform.

SROs only: After calculating SDM, determine if any TS actions are required. Include applicable time requirements. Document your answer below.

CRYSTAL RIVER UNIT 3
JPM COVER SHEET

ADMIN JPM #EC1

NRC 2011

RO / SRO

PERFORM A QPTR CALCULATION

PREPARED/REVIEWED BY: Jim Gregitis Date: 05/25/11

VALIDATED BY: B. Wooten / B. Webster / R. Virgin Date: 07/07/11

APPROVAL BY: Mark VanSicklen Date: 07/27/11
(Nuclear Training Supervisor)

CONCURRED BY: Mike Kelly Date: 07/28/11
(Operations Representative)

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Operations concurrence is required for new JPMs and changes that affect the flow, critical steps or time critical steps of the JPM. Operations concurrence is not required for changes that are required due to a procedure revision.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

JPM #: Admin EC1 - NRC 2011

Task: Perform a QPTR calculation.

Alternate Path: ☐ **YES** ☒ **NO**

PRA Top Critical Action: ☐ **YES** ☒ **NO**

Safety Function: NA

K/A Rating/Importance: G2.2.12 RO 3.7 SRO 4.1
G2.2.40 SRO 4.7

Task Number: 0150202001 – RO 1190201006 – SRO

Position: ☐**SRO ONLY** ☒**RO/SRO** ☐**NLO/RO/SRO**

Task Standard: Perform a QPTR calculation using SP-303, Tilt Monitoring with an Unavailable Incore System.

Preferred Evaluation Location:

☐ **SIM** ☐ **PLANT** ☒ **ADMIN**

Preferred Evaluation Method:

☒ **PERFORM** ☐ **SIMULATE**

References:

COLR (Cycle 17)
SP-303, Rev 6
TS 3.2.4

Validation Time: 20 minutes **Time Critical**: ☐ **YES** ☒ **NO**

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Candidate: _____ **Time Start:** _____
Printed Name

Time Finish: _____

Performance Rating: ☐ **SAT** ☐ **UNSAT** **Performance Time:** _____

Examiner: _____ _____/_____
Printed Name Signature Date

Comment: _____

_____

SIMULATOR OPERATOR SETUP INSTRUCTIONS

1. None

SIMULATOR OPERATOR INSTRUCTIONS

1. None

TOOLS/EQUIPMENT/PROCEDURES NEEDED

1. Consumable copies of SP-303, Rev 6
2. Copies of COLR (Cycle 17)
3. Copies of ITS
4. Calculators

READ TO THE OPERATOR

INITIAL CONDITIONS

You are the Balance of Plant Operator.
The plant has been stable at this power level for the previous 3 hours.
The Symmetrical Incore Detector System is inoperable.
Current NI values from the control console are:
NI-5 = 62%
NI-6 = 63%
NI-7 = 63%
NI-8 = 68%
ΔTc = 0.3° F
Rod Index is 245%.

INITIATING CUES

The Control Room Supervisor has directed you to calculate current out-of-core QPT using SP-303, Tilt Monitoring with an Unavailable Symmetric Incore System. Enter AOT (adjusted out-of-core tilt) values below and document additional actions, if any, you would perform.

SP-303, Enclosure 1, Table 1 is attached.

NI-5 AOT = NI-6 AOT = NI-7 AOT = NI-8 AOT =

SROs only: After calculating AOT, determine if any TS actions are required. Document your answer below.

***EXAMINER'S NOTE*: FOR STEPS DENOTED AS "CRITICAL STEP", WHICH HAVE MULTIPLE ACTIONS, THE INDIVIDUAL REQUIRED ACTION WILL BE DENOTED "CS". IF NO INDIVIDUAL ACTIONS ARE DENOTED AS SUCH THEN ALL ACTIONS WITHIN THE STEP ARE DEEMED "CRITICAL".**

TIME START _____

STEP 1: Locate procedure. STANDARD: Candidate obtains a copy of SP-303. **EXAMINER NOTE:** **Provide candidate with a copy of SP-303.** COMMENTS:	SAT_____ UNSAT_____
STEP 2: (SP-303 Enclosure 3 Step 1) Record time, current NI power levels, ΔTc and Reg Rod Index in Table 3. STANDARD: Candidate accurately transfers data from Cue Sheet to Table 3. COMMENTS:	SAT_____ UNSAT_____

STEP 3: (SP-303 Enclosure 3 Step 2) Obtain the appropriate normalization constants (N) for each quadrant from Section 4.1 and record in Table 3. STANDARD: Candidate accurately transfers data from Table 1 (provided) to Table 3. COMMENTS:	SAT_____ UNSAT_____

STEP 4: (SP-303 Enclosure 3 Step 3a) Calculate the current average NI power. STANDARD: Candidate accurately calculates an average NI power of 64%. COMMENTS:	**Critical Step** **Basis: Accurate calculation of average NI power.** SAT_____ UNSAT_____
STEP 5: (SP-303 Enclosure 3 Step 3b) Calculate the current out-of-core tilt (OCD) in each quadrant. STANDARD: Candidate accurately calculates OCD tilt for each quadrant. **EXAMINER NOTE:** **Values must be ± 0.1 of values listed on attached key.** COMMENTS:	**Critical Step** **Basis: Accurate calculation of OCD for each quadrant.** SAT_____ UNSAT_____
STEP 6: (SP-303 Enclosure 3 Step 4) Record the current OCD for each Quadrant in Table 3. STANDARD: Candidate accurately transfers data to Table 3. COMMENTS:	SAT_____ UNSAT_____

STEP 7: (SP-303 Enclosure 3 Step 5) Calculate adjusted out-of-core tilt (AOT) for each quadrant. STANDARD: Candidate accurately calculates AOT for each quadrant. **EXAMINER NOTE:** **Values must be ± 0.1 of values listed on attached key.** COMMENTS:	**Critical Step** **Basis: Accurate calculation of AOT for each quadrant.** SAT_____ UNSAT_____
STEP 8: (SP-303 Enclosure 3 Step 6) Record AOT values for each Quadrant in Table 3. STANDARD: Candidate accurately transfers data to Table 3. COMMENTS:	SAT_____ UNSAT_____

STEP 9: (SP-303 Step 4.2.2) Compare the current AOT for each quadrant to the Power Range Channels QPT limit in the COLR. STANDARD: Candidate determines that Quadrant ZW AOT exceeds a COLR Power Range Channel QPT limit (above the Transient Limit and below the Maximum Limit) and notifies the CRS to take appropriate actions of Technical Specification 3.2.4. COMMENTS:	**Critical Step** **Basis: Accurate comparison to the COLR and notification of the CRS is required to comply with TS.** SAT_____ UNSAT_____
TERMINATION CUE: Quadrant AOT calculations and comparison to COLR limits complete.	
RO **- END OF TASK**	

STEP 10: **(SRO Only)** Refer to TS 3.2.4, Quadrant Power Tilt, and determine required actions. STANDARD: Candidate determines that the following actions are required (Condition D): 1. Reduce THERMAL POWER to < 60% of the ALLOWABLE THERMAL POWER within 2 hours. 2. Reduce nuclear overpower trip setpoint to ≤ 65.5% of the ALLOWABLE THERMAL POWER within 10 hours. COMMENTS:	**Critical Step** **Basis: TS required actions** SAT_____ UNSAT_____
TERMINATION CUE: TS required actions determined.	
***SRO* - END OF TASK**	

TIME STOP _____

TABLE 3

Current Out-Of-Core QPT Calculations

Date _____

Time												
Step	1	2	4	6	1	2	4	6	1	2	4	6
Quadrant / NI	NI Pwr	N	OCD	AOT	NI Pwr	N	OCD	AOT	NI Pwr	N	OCD	AOT
WX / NI-5	62	+0.10	-3.13	-3.03								
YZ / NI-6	63	-1.57	-1.56	-3.13								
XY / NI-7	63	+0.10	-1.56	-1.46								
ZW / NI-8	68	+1.37	+6.25	***+7.62***								
ΔTc	0.3 °F				°F				°F			
Reg Rod Index	245 %wd				%wd				%wd			
Performed by:	_____ Initial				_____ Initial				_____ Initial			
Verified by:	_____ Initial				_____ Initial				_____ Initial			

Where:

NI Pwr = Out-of-Core Nuclear Inst Power (%) N = Normalization Factor (%)

OCD = Out-of-Core Detector Tilt (%) AOT = Adjusted Out-of-Core Detector Tilt (%)

ADMINISTRATIVE JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

You are the Balance of Plant Operator.
The plant has been stable at this power level for the previous 3 hours.
The Symmetrical Incore Detector System is inoperable.
Current NI values from the control console are:
NI-5 = 62%
NI-6 = 63%
NI-7 = 63%
NI-8 = 68%
$\Delta Tc = 0.3^\circ$ F
Rod Index is 245%.

INITIATING CUES

The Control Room Supervisor has directed you to calculate current out-of-core QPT using SP-303, Tilt Monitoring with an Unavailable Symmetric Incore System. Enter AOT (adjusted out-of-core tilt) values below and document additional actions, if any, you would perform.

SP-303, Enclosure 1, Table 1 is attached.

NI-5 AOT = NI-6 AOT = NI-7 AOT = NI-8 AOT =

SROs only: After calculating AOT, determine if any TS actions are required. Document your answer below.

Calculation of Normalization Constants

TABLE 1
Normalization Constants

Quadrant/NI	Step 2 NI Power	Step 2 Incore Tilt (IT)	Step 4 Out-of-Core Tilt (OCD)	Step 6 (IT - OCD) Normalization Constant (N)
WX / NI-5	55	+0.10	0	+0.10
YZ / NI-6	56	+0.25	+1.82	-1.57
XY / NI-7	55	+0.10	0	+0.10
ZW / NI-8	54	-0.45	-1.82	+1.37

Step 7:

Normalization calculations from: Control Console (Source) / Yesterday (Date)

ΔTc at the time of the source data: 0 °F

Regulating Rod index at the time of the source data: 240 %wd

Enclosure 1:

Performed by: AK (Initial) / Yesterday (Date) / 0100 (Time)

Verified by: GQ (Initial) / Yesterday (Date) / 0130 (Time)

CRYSTAL RIVER UNIT 3
JPM COVER SHEET

ADMIN JPM #RC1

NRC 2011

RO / SRO

DETERMINE STAY TIMES USING SURVEY MAPS

PREPARED/REVIEWED BY: Jim Gregitis Date: 05/24/11

VALIDATED BY: B. Wooten / B. Webster / R. Virgin Date: 07/07/11

APPROVAL BY: Mark VanSicklen Date: 07/27/11
(Nuclear Training Supervisor)

CONCURRED BY: Mike Kelly Date: 07/28/11
(Operations Representative)

Validation is not required for minor enhancements, procedure revisions that do not affect the JPM or individual step changes that do not affect the flow of the JPM.

Operations concurrence is required for new JPMs and changes that affect the flow, critical steps or time critical steps of the JPM. Operations concurrence is not required for changes that are required due to a procedure revision.

JPM #: Admin RC1 - NRC 2011

Task: Determine stay times using survey maps.

Alternate Path: ☐ **YES** ☒ **NO**

PRA Top Critical Action: ☐ **YES** ☒ **NO**

Safety Function: NA

K/A Rating/Importance: G2.3.4 RO 3.2 SRO 3.7

Task Number: 1190102008 - RO

Position: ☐**SRO ONLY** ☒**RO/SRO** ☐**NLO/RO/SRO**

Task Standard: Determine stay times using survey maps.

Preferred Evaluation Location:

☐ **SIM** ☐ **PLANT** ☒ **ADMIN**

Preferred Evaluation Method:

☒ **PERFORM** ☐ **SIMULATE**

References:

DOS-NGGC-0004, Rev 12

Validation Time: 15 minutes **Time Critical**: ☐ **YES** ☒ **NO**

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Candidate: _____ **Time Start:** _____
Printed Name

Time Finish: _____

Performance Rating: ☐ **SAT** ☐ **UNSAT** **Performance Time:** _____

Examiner: _____ _____/_____
Printed Name Signature Date

Comment: _____

_____

_____

_____

SIMULATOR OPERATOR SETUP INSTRUCTIONS

1. None

SIMULATOR OPERATOR INSTRUCTIONS

1. None

TOOLS/EQUIPMENT/PROCEDURES NEEDED

1. Consumable copies of DOS-NGGC-0004, Rev 12
2. Calculators

READ TO THE OPERATOR

INITIAL CONDITIONS

You are the Primary Plant Operator.

The plant is at full power.

INITIATING CUES

Using the supplied survey map, determine the individual stay times for yourself and another PPO without exceeding the annual administrative dose limit. (Do not consider dose received during transit).

You have an accumulated annual Whole Body dose of 1790 mR (Progress Energy). No additional dose has been received at any other site.

The other PPO has an accumulated annual Whole Body dose of 250 mR (Progress Energy). Additional dose that has been received for the current year at non-Progress Energy sites has not been determined.

You and the other PPO will be supporting maintenance activities on the north side of MUP-1C ("C" Make-up Pump).

Calculations should be based on Progress Energy Administrative Dose Limits. Do not consider ALARA Task requirements. No dose extensions have been approved by the Site Vice President.

EXAMINER'S NOTE: FOR STEPS DENOTED AS "CRITICAL STEP", WHICH HAVE MULTIPLE ACTIONS, THE INDIVIDUAL REQUIRED ACTION WILL BE DENOTED "CS". IF NO INDIVIDUAL ACTIONS ARE DENOTED AS SUCH THEN ALL ACTIONS WITHIN THE STEP ARE DEEMED "CRITICAL".

TIME START _____

STEP 1: Candidate uses survey map to determine stay times. STANDARD: Candidate determines the stay time for him/her is ***3.5 hours*** (based on dose limit of 2 Rem and 60 mR/hr field) and that the stay time for the other PPO is ***4.17 hours*** (based on dose limit of 0.5 Rem and 60 mR/hr field). **EXAMINER NOTE:** **If requested, provide candidate a copy of DOS-NGGC-0004.** **Calculations must be within ± 0.2 hours to pass the JPM.** COMMENTS:	**Critical Step** **Basis: Correct calculation required so dose limit will not be exeeeded.** SAT_____ UNSAT____
TERMINATION CUE: Individual stay times calculated.	
END OF TASK	

TIME STOP _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

You are the Primary Plant Operator.

The plant is at full power.

INITIATING CUES

Using the supplied survey map, determine the individual stay times for yourself and another PPO without exceeding the annual administrative dose limit. (Do not consider dose received during transit).

You have an accumulated annual Whole Body dose of 1790 mR (Progress Energy). No additional dose has been received at any other site.

The other PPO has an accumulated annual Whole Body dose of 250 mR (Progress Energy). Additional dose that has been received for the current year at non-Progress Energy sites has not been determined.

You and the other PPO will be supporting maintenance activities on the north side of MUP-1C ("C" Make-up Pump).

Calculations should be based on Progress Energy Administrative Dose Limits. Do not consider ALARA Task requirements. No dose extensions have been approved by the Site Vice President.

_____

_____

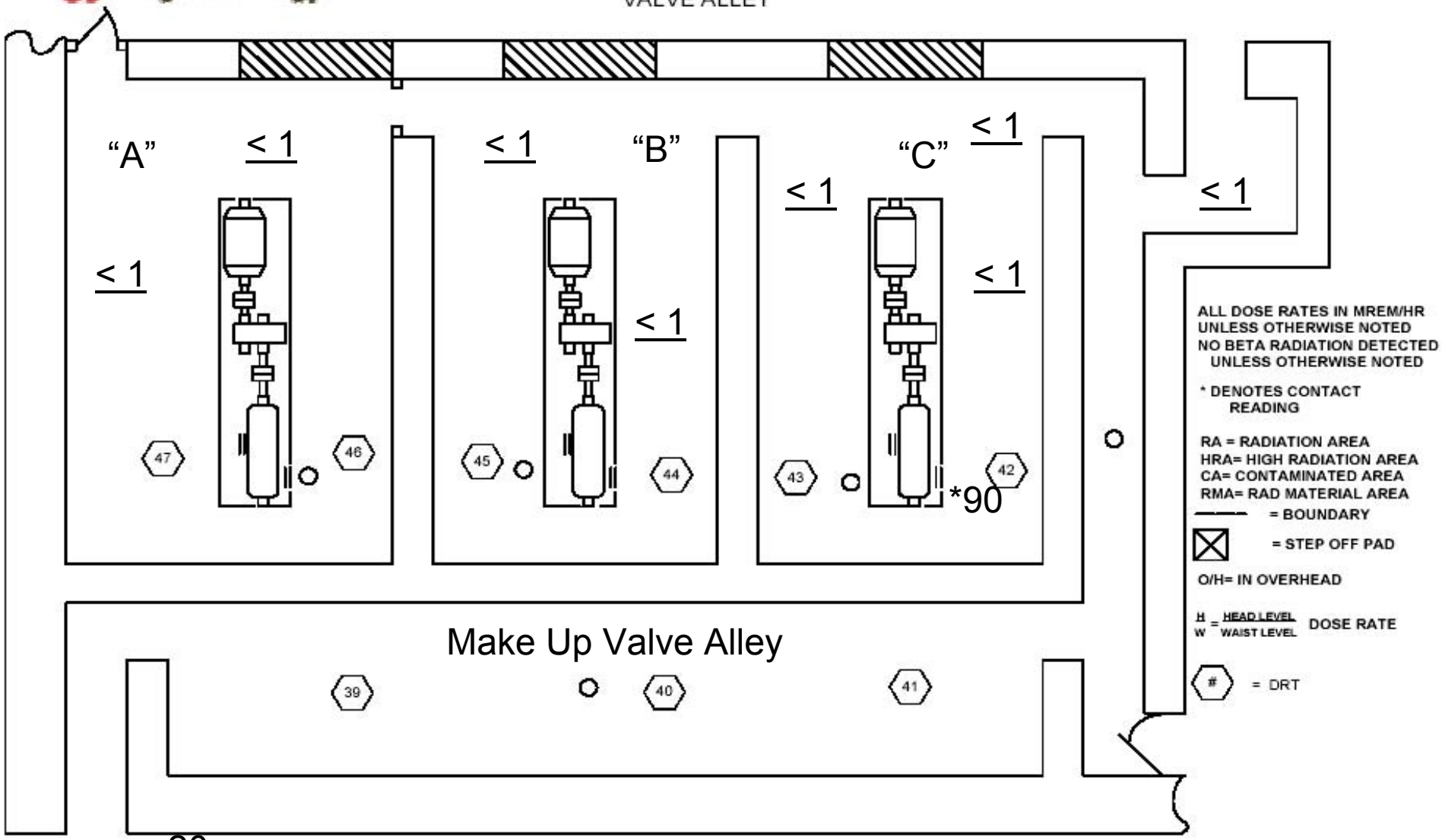
_____

Progress Energy

MAKE UP PUMPS AND VALVE ALLEY

← N

SURVEY # 03-08-22



ALL DOSE RATES IN MREM/HR
UNLESS OTHERWISE NOTED
NO BETA RADIATION DETECTED
UNLESS OTHERWISE NOTED

* DENOTES CONTACT READING

RA = RADIATION AREA
HRA= HIGH RADIATION AREA
CA= CONTAMINATED AREA
RMA= RAD MATERIAL AREA

_____ = BOUNDARY

⊠ = STEP OFF PAD

O/H= IN OVERHEAD

H/W = HEAD LEVEL / WAIST LEVEL DOSE RATE

(#) = DRT

DRT 39 20 MREM/HR
DRT 40 45 MREM/HR
DRT 41 32 MREM/HR

DRT 42 70 MREM/HR
DRT 43 60 MREM/HR
DRT 44 5 MREM/HR

DRT 45 7 MREM/HR
DRT 46 6 MREM/HR
DRT 47 2 MREM/HR

CRYSTAL RIVER UNIT 3
JPM COVER SHEET

ADMIN JPM #EP1

NRC 2011

SRO ONLY

DETERMINE EMERGENCY ACTION LEVEL AND PROTECTIVE ACTION RECOMMENDATIONS

Performed in Classroom

PREPARED/REVIEWED BY: Jim Gregitis Date: 05/24/11

VALIDATED BY: B. Wooten / R. Virgin Date: 07/07/11

APPROVAL BY: Mark VanSicklen Date: 07/27/11
(Nuclear Training Supervisor)

CONCURRED BY: Mike Kelly Date: 07/28/11
(Operations Representative)

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ADMINISTRATIVE JOB PERFORMANCE MEASURE

JPM #: Admin EP1 - NRC 2011

Task: Determine Emergency Actions Level and Protective Action Recommendations.

Alternate Path: ☐ **YES** ☒ **NO**

PRA Top Critical Action: ☐ **YES** ☒ **NO**

Safety Function: NA

K/A Rating/Importance:

G2.4.41	RO 2.9	SRO 4.6
G2.4.44	RO 2.4	SRO 4.4

Task Number: 1150101001 – SRO

Position: ☒**SRO ONLY** ☐**RO/SRO** ☐**NLO/RO/SRO**

Task Standard: Determine Emergency Action Level and Protective Action Recommendations to protect the public.

Preferred Evaluation Location:

☐ **SIM** ☐ **PLANT** ☒ **ADMIN**

Preferred Evaluation Method:

☒ **PERFORM** ☐ **SIMULATE**

References:

EM-202, Rev 94
EOP-03 Figure 2, Rev 16
EOP-07 Figure 1, Rev 16

Validation Time: 10 minutes **Time Critical**: ☒ **YES** ☐ **NO**

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Candidate: _____ **Time Start:** _____
Printed Name

Time Finish: _____

Performance Rating: ☐ **SAT** ☐ **UNSAT** **Performance Time:** _____

Examiner: _____ _____/_____
Printed Name Signature Date

Comment: _____

_____

SIMULATOR OPERATOR SETUP INSTRUCTIONS

1. None

SIMULATOR OPERATOR INSTRUCTIONS

1. None

TOOLS/EQUIPMENT/PROCEDURES NEEDED

1. Consumable copies of EM-202, Rev 94
2. Consumable copies of EOP-03 Figure 2, Rev 16
3. Consumable copies of EOP-07 Figure 1, Rev 16

READ TO THE OPERATOR

INITIAL CONDITIONS

You are the Shift Manager.

See attached plant data sheet.

INITIATING CUES

Determine the highest Emergency Action Level for the time line provided. Also determine the Protective Action Recommendations (PARs) required, *if any*. Document your answers below.

THIS JPM ***IS*** TIME CRITICAL

***EXAMINER'S NOTE*: FOR STEPS DENOTED AS "CRITICAL STEP", WHICH HAVE MULTIPLE ACTIONS, THE INDIVIDUAL REQUIRED ACTION WILL BE DENOTED "CS". IF NO INDIVIDUAL ACTIONS ARE DENOTED AS SUCH THEN ALL ACTIONS WITHIN THE STEP ARE DEEMED "CRITICAL".**

TIME START _____

STEP 1: Obtain a copy of the correct procedure. STANDARD: Candidate obtains a copy of EM-202. **EXAMINER NOTE:** **Provide candidate with copies of EM-202 and EOP figures.** COMMENTS:	SAT_____ UNSAT____

STEP 2: Determine classification for the data provided. STANDARD: Candidate determines the classification using the Fission Product Barrier Matrix: LOSS OF RCS **+4** (RM-G29 or 30 > 10 R/hr for 15 minutes or longer) POTENTIAL LOSS OF CONTAINMENT (RB pressure > 30 psig with no Building Spray available) **+1.5** TOTAL **+5.5** **SITE AREA EMERGENCY** COMMENTS:	**Critical Step** **Basis: Protection of the public** SAT_____ UNSAT_____

STEP 3: Determine "Protective Action Recommendations". STANDARD: The standard for this JPM is that **NO** "Protective Actions Recommendations" for the general public are required based on a Site Area Emergency. **EXAMINER NOTE:** **Candidate may refer to Enclosure 3 of EM-202. Protective Action Recommendations are applicable to General Emergencies only.** **Candidate may refer to Section 9.3 of EM-202, Emergency Coordinator's Guide for Site Area Emergency, Step 9.3.4 and determine using Enclosure 2 that protective actions required for the Energy Complex are to perform assembly and accountability and instruct the fossil control rooms to report results to nuclear security.** COMMENTS:	SAT_____ UNSAT_____
TERMINATION CUE: Emergency Action Level determined and conclusion that NO Protective Action Recommendations for the general public are required.	
END OF TASK	

TIME STOP _____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS

You are the Shift Manager.

See attached plant data sheet.

INITIATING CUES

Determine the highest Emergency Action Level for the time line provided. Also determine the Protective Action Recommendations (PARs) required, *if any*. Document your answers below.

THIS JPM ***IS*** TIME CRITICAL

_____

_____

_____

_____

_____

ADMINISTRATIVE JOB PERFORMANCE MEASURE

PLANT DATA SHEET

At 1330 today, the plant was as 100% power. The plant experiences a transient and the following time line of indications occur:

TIME	1345
RCS PRESSURE	110 PSIG
PRESSURIZER LEVEL	0"
INCORES	370° F
RX BLDG SPRAY FLOW	0 GPM/TRAIN
RX BLDG PRESSURE	48 PSIG
RM - G29 & 30	15 R/HR

TIME	1400
RCS PRESSURE	110 PSIG
PRESSURIZER LEVEL	0"
INCORES	360° F
RX BLDG SPRAY FLOW	0 GPM/TRAIN
RX BLDG PRESSURE	47.3 PSIG
RM - G29 & 30	18 R/HR

The containment is intact and no release is in progress.

Based on the above information, identify the appropriate EAL and PARs, if required.

FOR THIS EXERCISE DO NOT USE ANY EC DISCRETION!