Facility: DC Cook Task No: _____

Task Title: Calculate Shutdown Margin

Job Performance Measure No: RO A1 K/A Reference: 192002.K1.13

Examinee: _____ NRC Examiner: _____

Method of testing:
00
Simulated Performance _____ Actual Performance _____X_____

Classroom _____X_____ Simulator _____X_____ Plant _____

Task Standard: Unit 2 Shutdown Margin has been calculated.

Required Materials:

2-OHP-4021-001-012, Rev. 21, Determination of Reactor Shutdown Margin
Unit 2 Technical Data Book Cycle 21

General References: 2-OHP-4021-001-012

Read to the examinee:

Initial Conditions: Unit 2 is in Hot Standby 3 hours after a trip from 100% power for 3 months. One (1) Control Rod is stuck in the full out position. A cooldown to 360°F will be performed initially.

The following plant conditions exist:

- All RCPs are in service
- PPC burnup from PPC point U0035 is 8,013 MWD/MTU
- Tavg is 547°F
- RCS boron concentration is 1075 ppm and no dilutions are planned. Lab sample was taken one half hour ago and no dilution or boration has been performed.

Initiating Cue: Manually calculate Shutdown Margin using Xenon correction IAW plant procedures. Calculate Shutdown Margin requirements for 360°F.

Time Critical Task: Yes/(No)

Validation Time: 45 minutes

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

1 PURPOSE AND SCOPE

1.1 To provide a method for manually calculating the boron concentration to meet SHUTDOWN MARGIN requirements while in MODE 3, 4, or 5. (Technical Specification 3.1.1)

2 PREREQUISITES

2.1 **IF** a significant boration or dilution has occurred in the RCS since the last recorded RCS Boron sample, **THEN** request Chemistry obtain an RCS Sample. _____

3 PRECAUTIONS AND LIMITATIONS

3.1 All changes in boron concentration, which are performed for SHUTDOWN MARGIN, are to be verified by chemical analysis.

3.2 An Estimated Critical Position (ECP) boron concentration may be used in place of this attachment if RCS T_{avg} is maintained within 547° ± 17°F. [Ref. 7.2.2a]

3.3 Data read from Technical Data Book figures shall NOT be interpolated. Minimum allowable T_{avg} per Technical Data Book is 68°F.

3.4 If a curve for desired plant conditions does NOT exist in the Technical Data Book, the next closer curve in the conservative direction shall be used.

3.5 If SHUTDOWN MARGIN was calculated for MODE 3, a new calculation must be performed and RCS boron concentration adjusted prior to entry into MODE 4.

3.6 **IF** Core burnup is greater than the maximum value listed in the Technical Data Book, **THEN** it is acceptable to use the maximum core burnup value in the Shutdown Margin Calculation or use NERDS because it will predict a conservative Shutdown Margin value.

STANDARD: Determines no new sample is required.
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Reviews Precautions and Limitations.
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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CAUTION: It is essential to use the proper mathematical sign (+ or -) and include proper sign when performing calculations.

NOTE:
- Curves should be read as accurately as possible.
- This procedure is referenced for use in the Emergency Operating Procedures. Use of this procedure as directed by the EOP series is subject to rules of usage found in OHI-4023.

4 DETAILS **INIT**

4.1 Cycle data:

4.1.1 Enter Cycle number from Technical Data Book (TDB):

Unit 2 Cycle _____ _____

STANDARD: Enters 21.
SAT: ☐ UNSAT: ☐
COMMENT:

4.1.2 Enter Date and Time of Shutdown:

Date:_____ Time:_____ _____

STANDARD: Enters date and time of Shutdown (3 hours ago).
SAT: ☐ UNSAT: ☐
COMMENT:

CAUTION: If the optional xenon correction is used, operators must be alert to changes in the required boron concentration to maintain SHUTDOWN MARGIN and take required actions prior to expiration of xenon correction time frame.

SHUTDOWN MARGIN calculations which include optional xenon correction expire 30 hours after shutdown.

4.2 SHUTDOWN MARGIN Expiration:

IF the optional xenon correction is to be used, **THEN** enter date AND time which follows unit shutdown by 30 hours:

SHUTDOWN MARGIN Expiration:

Date:_____ Time:_____ _____

STANDARD: Enters date and time not to exceed 30 hours from shutdown based upon briefing
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 7 of 32
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4.3 Core Burnup:

- **IF** the Plant Process Computer (PPC) is available, **THEN** enter Core Burnup value from Plant PPC point U0035 **AND** divide by 1000 to convert the burnup from MWD/MTU to GWD/MTU:

PPC Point U0035 [ ] MWD/MTU

÷

conversion factor [1000] MWD/GWD

Core Burnup from PPC [=] GWD/MTU _____

STANDARD: Enters 8013 MWD/MTU
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Enters 8.013 GWD/MTU
SAT: ☐ UNSAT: ☐
COMMENT:

-OR-

- **IF** the PPC is **NOT** available, **THEN** obtain Core Burnup value from Reactor Engineering:

Core Burnup from Reactor Engineering [ ] GWD/MTU _____

STANDARD: Enters "N/A"
SAT: ☐ UNSAT: ☐
COMMENT:

4.4 Plant Conditions for which SHUTDOWN MARGIN is being calculated:

Reactor Coolant System (RCS) Temperature [ ] °F _____

STANDARD: Enters 360°F
SAT: ☐ UNSAT: ☐
COMMENT:

Unit in MODE 4 or 5 (Boron Penalty)? (✓) ❑ Yes ❑ No _____

STANDARD: Checks "No" box
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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4.5 **IF** returning to MODE 5 from MODE 6 following refueling with newly configured fuel **AND** no applicable TDB figures are available for the new fuel cycle, **THEN** perform the following:

4.5.1 Review Tech Specs 3.1.1 and 3.9.1 _____

4.5.2 Perform one of the following:

- Contact Reactor Engineering for a determination of the minimum boron concentration for SHUTDOWN MARGIN **AND** enter the value in below. _____

  Minimum RCS Boron [ ] ppm _____

  -OR-

- Enter 2400 ppm for SHUTDOWN MARGIN below. _____

  Minimum RCS Boron [ ] ppm _____

4.5.3 Enter N/A in Steps 4.6, 4.7, 4.8, 4.9, and 4.10. _____

STANDARD: Determines Step 4.5 is N/A
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 9 of 32
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4.6 Uncorrected Minimum Boron Concentration:

NOTE:
- To prevent over boration, identify the RCS temperature you are "remaining in" or "transitioning to" for determining which Technical Data Book (TDB) Figure 4.5 Boron Concentration versus Cycle Burnup curve you are to utilize.
- The '$T_{avg} \geq 68°F$ MODES 4 and 5 with Boron Penalty' curve should be used when there are no RCP's in service.

Using Plant Conditions for which boron concentration for SHUTDOWN MARGIN is being calculated (Step 4.4) and Core Burnup (Step 4.3), obtain the boron concentration and indicate curve on TDB Figure 4.5 used:

- **IF** calculating SDM for an RCS temperature $\geq 541°F$, **THEN** use the '$T_{avg} \geq 541°F$' curve. _____
- **IF** calculating SDM for an RCS temperature $\geq 525°F$ to $< 541°F$, **THEN** use the '$T_{avg} \geq 525°F$' curve. _____
- **IF** calculating SDM for an RCS temperature $\geq 490°F$ to $< 525°F$, **THEN** use the '$T_{avg} \geq 490°F$' curve. _____
- **IF** calculating SDM for an RCS temperature $\geq 400°F$ to $< 490°F$, **THEN** use the '$T_{avg} \geq 400°F$' curve. _____
- **IF** calculating SDM for an RCS temperature $\geq 152°F$ to $< 400°F$, **THEN** use the '$T_{avg} \geq 152°F$' curve. _____

STANDARD: Determines curve to use is RCS Temp. $\geq$ 152°F.
SAT: ☐ UNSAT: ☐
COMMENT:

- **IF** calculating SDM for an RCS temperature $\geq 68°F$ MODE 4 or Mode 5, **THEN** use the '$T_{avg} \geq 68°F$ MODES 4 and 5 with Boron Penalty' curve. _____

Uncorrected Minimum Boron Concentration _____ ppm _____

STANDARD: **(CS)** Enters value of 1500ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

NOTE:
- A Potential Non-Conservatism has been identified for the Shutdown Margin Calculation with regard to Stuck Control Rods which is ONLY applicable when there is One or more Stuck Control Rods. [Ref 7.2.1f]
- The Potential Non-Conservatism is **NOT** an issue if there are no Stuck Rods (ie if there are no Stuck Rods it is **NOT** appropriate to perform step 4.7). [Ref 7.2.1f]

4.7 **IF** rods are stuck out, **THEN** determine the correction for stuck out rods:

4.7.1 Using Core Burnup (Step 4.3) determine the Worth of a Single Stuck Out Rod from TDB Figure 1.3b and enter below:

NOTE: Due to Non-Conservatism with the Shutdown Margin Calculation (specific to Rod Worth for a Stuck Rod), it is required to compensate for this by adding the Rod Worth of an additional Control Rod. [Ref 7.2.1f]

4.7.2 Multiply Worth of Single Stuck Out Rod by the number of stuck out rods.

Number of stuck rods **PLUS 1** [Ref 7.2.1f] _____

x

Worth of a Single Stuck Rod _____ pcm

Total Stuck Out Rod Worth = _____ pcm

STANDARD: Determines Step 4.7 Applicable
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines Step 4.7.2 is 2
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Worth of single rod 680 pcm (670-690)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines PCM is 1360 (1340-1380)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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4.8 **IF** optional Xenon correction is required, **THEN** perform either 4.8.1, 4.8.2, **OR** 4.8.3:

STANDARD: Selects Step 4.8.1
SAT: ☐ UNSAT: ☐
COMMENT:

4.8.1 **IF** Xenon equilibrium has been reached before the Reactor trip, **THEN** use one of the following to determine Xenon reactivity for the 30th hour following the unit shutdown:

NOTE:	The lower Power level curve should be used for conservatism.

NOTE: Uses TDB Figure 1.3a to determine Fig. 8.3.b - MOC

- TDB 2 Figure 8.3.a, Total Xenon Reactivity Worth Following Shutdown, BOC _____
- TDB 2 Figure 8.3.b, Total Xenon Reactivity Worth Following Shutdown, MOC _____

STANDARD: Selects Figure 8.3.b (MOC)
SAT: ☐ UNSAT: ☐
COMMENT:

- TDB 2 Figure 8.3.c, Total Xenon Reactivity Worth Following Shutdown, EOC _____

4.8.2 Run PPC Xenon Predict Program for the 30th hour following the unit shutdown. _____

4.8.3 Contact Reactor Engineering for Predicted Xenon for the 30th hour following the unit shutdown. _____

4.8.4 Enter Xenon Reactivity value from either Step 4.8.1, 4.8.2, or 4.8.3 for the 30th hour following the unit shutdown:

Xenon Reactivity [ ] pcm _____

STANDARD: **(CS)** Enters negative -1875 pcm (-1825 to -1925)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9 **IF** there are corrections for stuck rods or xenon, **THEN** calculate Total Correction for the Minimum Boron Concentration as follows:

4.9.1 Combined Reactivity for Stuck Rods and Xenon:

Add Total Stuck Rod Worth to Xenon Reactivity, include proper mathematical signs in the calculation.

Total Stuck Out Rod Worth (Step 4.7) [ ] pcm

\+

Xenon Reactivity (Step 4.8.4) [ ] pcm

Combined Reactivity [=] pcm ____

STANDARD: Enters 1360 ppm (1340-1380)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Enters -1875 ppm (-1825 to -1925)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters -515 ppm (-445 to -585)
SAT: ☐ UNSAT: ☐
COMMENT:

4.9.2 Boron Worth:

Obtain Boron Worth from TDB Figure 4.1.b, 4.1.c, or 4.1.d using the following parameters **AND** enter the value below.

- Core Burnup (Step 4.3)
- RCS Temperature* (Step 4.4)
- Uncorrected Minimum Boron Concentration (Step 4.6)

***IF** a TDB figure is **NOT** available for the recorded RCS temperature, **THEN** use the following guidance:

- **IF** Combined Reactivity (Step 4.9.1) is GREATER THAN 0, **THEN** the TDB Figure with the nearest HIGHER temperature shall be used.
- **IF** Combined Reactivity (Step 4.9.1) is LESS THAN 0, **THEN** the TDB figure with the nearest LOWER temperature shall be used.

Boron Worth [ ] pcm/ppm ____

STANDARD: **(CS)** Enters -9.925 pcm/ppm (-9.9 to -9.95)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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4.9.3 Delta Boron:

Divide Combined Reactivity by Boron Worth.

Combined Reactivity (Step 4.9.1)		pcm
	÷	
Boron Worth (Step 4.9.2)		pcm/ppm
Delta Boron	=	ppm ____

4.9.4 Adjusted Boron Concentration:

Subtract Delta Boron from Uncorrected Minimum Boron Concentration

Uncorrected Minimum Boron Concentration (Step 4.6)		ppm
	-	
Delta Boron (Step 4.9.3)		ppm
Adjusted Boron Concentration	=	ppm ____

STANDARD: Enters -515 pcm (-445 to -585)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters -9.925 ppm/pcm (-9.9 to -9.95)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 51.9 ppm (44.7-59.1)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Enters 1500 ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Enters 51.9 ppm (44.7-59.1)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 1448.1 ppm (1430.9-1465.3)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9.5 Adjusted Boron Worth:

Obtain Boron Worth from TDB Figure 4.1.b, 4.1.c, or 4.1.d using the following parameters **AND** enter the value below.

- Core Burnup (Step 4.3)
- RCS Temperature* (Step 4.4)
- Adjusted Boron Concentration (Step 4.9.4)

***IF** a TDB figure is **NOT** available for the recorded RCS temperature, **THEN** use the following guidance:

- **IF** Combined Reactivity (Step 4.9.1) is GREATER THAN 0, **THEN** the TDB Figure with the nearest HIGHER temperature shall be used.
- **IF** Combined Reactivity (Step 4.9.1) is LESS THAN 0, **THEN** the TDB figure with the nearest LOWER temperature shall be used.

Adjusted Boron Worth [ ] pcm/ppm ____

4.9.6 Correction for Minimum Boron:

Divide Combined Reactivity by Adjusted Boron Worth.

Combined Reactivity (Step 4.9.1) [ ] pcm

÷

Adjusted Boron Worth (Step 4.9.5) [ ] pcm/ppm

Delta Boron [=] ppm ____

STANDARD: **(CS)** Enters -10.0 ppm (-9.95to -10.05)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters -515 ppm (-445 to – 585)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters -10.0 ppm (-9.95 to -10.05)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 51.5 ppm (44.3-58.8)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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4.9.7 Corrected Minimum Boron Concentration:

Subtract Correction for Minimum Boron from Uncorrected Minimum Boron Concentration.

Uncorrected Minimum Boron Concentration (Step 4.6)		ppm
–		
Correction for Minimum Boron (Step 4.9.6)		ppm
Corrected Minimum Boron Concentration	=	ppm

STANDARD (CS) Enters 1500 ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 51.5 ppm (44.3-58.8)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

4.10 Minimum RCS Boron Required:

4.10.1 **IF** there is NO correction for stuck rods or xenon to Minimum Boron Concentration calculated (Step 4.9 is N/A), **THEN** enter Uncorrected Minimum Boron Concentration (Step 4.6) value below. _____

-OR-

4.10.2 **IF** there is a correction for stuck rods or xenon to Minimum Boron Concentration calculated (Step 4.9), **AND**

NOTE: 2200 ppm is sufficient to ensure that SHUTDOWN MARGIN is maintained with any number of rods failing to be fully inserted. [Ref. 7.2.1d]

- Corrected Minimum Boron Concentration (Step 4.9.7) is GREATER THAN 2200 ppm, **THEN** enter 2200 ppm below. _____

-OR-

- Corrected Minimum Boron Concentration (Step 4.9.7) is LESS THAN 2200 ppm, **THEN** enter the Corrected Minimum Boron Concentration value below. _____

Minimum RCS Boron Required _____ ppm _____

STANDARD: **(CS)** Determines 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.11 Record the most current RCS boron sample result.

RCS Boron Concentration [ ] ppm

Chemistry Sample Date: _____ Time: _____ _____

STANDARD (CS) Enters 1075 ppm
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD Enters lab sample date and time (> one half hour ago)
SAT: ☐ UNSAT: ☐
COMMENT:

4.12 Boration Requirement:

Subtract the Minimum RCS Boron from the RCS Boron Concentration Required:

RCS Boron Concentration (Step 4.11) [ ] ppm

\-

Minimum RCS Boron Required (Step 4.5 **OR** Step 4.10) [ ] ppm

Result [=] ppm _____

STANDARD: **(CS)** Enters 1075 ppm
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Enters 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

- **IF** the result is zero or positive, **THEN** boration is **NOT** required. _____

STANDARD: **(CS)** Enters -373.5 (-356.2 to -390.7)
SAT: ☐ UNSAT: ☐
COMMENT:

- **IF** the result is negative, **THEN** boration is required:
  - **IF** TS required SHUTDOWN MARGIN requirements are **NOT** met for current plant conditions, **THEN** emergency borate per 02-OHP-4021-005-007, Operation of Emergency Boration Flow Paths, to the Minimum RCS Boron Required concentration listed in Step 4.12. _____

-OR-

  - **IF** SHUTDOWN MARGIN requirements are met for current plant conditions, **THEN** borate as directed by the Unit Supervisor (US). _____

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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Comments:

_____
_____
_____
_____

Calculated By: _____ Time: _____ Date: ___/___/___

Calculation Independently Verified By: _____ Time: _____ Date: ___/___/___

Reviewed By: _____ Date: ___/___/___
US/SM/WCC-SRO

STANDARD: Completes paperwork
SAT: ☐ UNSAT: ☐
COMMENT:

TERMINATE JPM: When SDM calculation is complete.

Termination Cue: SDM calculation is complete.

Facility: DC Cook Task No: _____

Task Title: Review Shutdown Margin Calculation

Job Performance Measure No: SRO A1 K/A Reference: 192002.K1.13

Examinee: _____ NRC Examiner: _____

Method of testing:

Simulated Performance _____ Actual Performance _____X_____

Classroom _____X_____ Simulator _____X_____ Plant _____

Task Standard: Unit 2 Shutdown Margin has been reviewed and corrected.

Required Materials:

2-OHP-4021-001-012, Rev. 21, Determination of Reactor Shutdown Margin (COMPLETED COPY)
Unit 2 Technical Data Book Cycle 21

General References: 2-OHP-4021-001-012

Read to the examinee:

Initial Conditions: You are the Unit Supervisor on Unit 2. Per your direction, the extra Control Room Operator completed Attachment 1 of 2-OHP-4021-001-012, Determination of Reactor Shutdown Margin.

Unit 2 is in Hot Standby 3 hours after a trip from 100% power for 3 months. One (1) Control Rod is stuck in the full out position. A cooldown to 360°F will be performed initially.

The following plant conditions exist:

- All RCPs are in service
- PPC burnup from PPC point U0035 is 8,013 MWD/MTU
- Tavg is 547°F
- RCS boron concentration is 1075 ppm and no dilutions are planned. A lab sample was taken one half hour ago and no dilution or boration has been performed.

The RO manually calculated a Shutdown Margin for 360°F using Xenon correction IAW plant procedures. Shutdown Margin is currently met.

Initiating Cue: Perform a Shift Manager review of the completed Attachment 1.

Time Critical Task: Yes/(No)

Validation Time: 45 minutes

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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1 PURPOSE AND SCOPE

1.1 To provide a method for manually calculating the boron concentration to meet SHUTDOWN MARGIN requirements while in MODE 3, 4, or 5. (Technical Specification 3.1.1)

2 PREREQUISITES

2.1 **IF** a significant boration or dilution has occurred in the RCS since the last recorded RCS Boron sample, **THEN** request Chemistry obtain an RCS Sample. TC

3 PRECAUTIONS AND LIMITATIONS

3.1 All changes in boron concentration, which are performed for SHUTDOWN MARGIN, are to be verified by chemical analysis.

3.2 An Estimated Critical Position (ECP) boron concentration may be used in place of this attachment if RCS T_{avg} is maintained within 547° ± 17°F. [Ref. 7.2.2a]

3.3 Data read from Technical Data Book figures shall **NOT** be interpolated. Minimum allowable T_{avg} per Technical Data Book is 68°F.

3.4 If a curve for desired plant conditions does **NOT** exist in the Technical Data Book, the next closer curve in the conservative direction shall be used.

3.5 If SHUTDOWN MARGIN was calculated for MODE 3, a new calculation must be performed and RCS boron concentration adjusted prior to entry into MODE 4.

3.6 **IF** Core burnup is greater than the maximum value listed in the Technical Data Book, **THEN** it is acceptable to use the maximum core burnup value in the Shutdown Margin Calculation or use NERDS because it will predict a conservative Shutdown Margin value.

CUE: NO boration or dilution has occurred since the last sample.

STANDARD: Concurs no new sample is required.
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Reviews Precautions and Limitations.
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

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CAUTION: It is essential to use the proper mathematical sign (+ or -) and include proper sign when performing calculations.

NOTE:
- Curves should be read as accurately as possible.
- This procedure is referenced for use in the Emergency Operating Procedures. Use of this procedure as directed by the EOP series is subject to rules of usage found in OHI-4023.

4 DETAILS **INIT**

4.1 Cycle data:

4.1.1 Enter Cycle number from Technical Data Book (TDB):

Unit 2 Cycle 21 TC

STANDARD: Concurs with 21.
SAT: ☐ UNSAT: ☐
COMMENT:

4.1.2 Enter Date and Time of Shutdown:

Date: TODAY Time: 3 HOURS AGO TC

STANDARD: Concurs with date and time of Shutdown (3 hours ago).
SAT: ☐ UNSAT: ☐
COMMENT:

CAUTION: If the optional xenon correction is used, operators must be alert to changes in the required boron concentration to maintain SHUTDOWN MARGIN and take required actions prior to expiration of xenon correction time frame.

SHUTDOWN MARGIN calculations which include optional xenon correction expire 30 hours after shutdown.

4.2 SHUTDOWN MARGIN Expiration:

IF the optional xenon correction is to be used, **THEN** enter date AND time which follows unit shutdown by 30 hours:

SHUTDOWN MARGIN Expiration:

Date: TOMORROW Time: 30 HOURS FROM SHUTDOWN TC

STANDARD: Concurs with date and time
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 7 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.3 Core Burnup:

- **IF** the Plant Process Computer (PPC) is available, **THEN** enter Core Burnup value from Plant PPC point U0035 **AND** divide by 1000 to convert the burnup from MWD/MTU to GWD/MTU:

PPC Point U0035	8013	MWD/MTU
÷		
conversion factor	1000	MWD/GWD
Core Burnup from PPC	=8.013	GWD/MTU TC

-OR-

- **IF** the PPC is **NOT** available, **THEN** obtain Core Burnup value from Reactor Engineering:

PPC Used TC Today

Core Burnup from Reactor Engineering	N/A	GWD/MTU N/A

4.4 Plant Conditions for which SHUTDOWN MARGIN is being calculated:

Reactor Coolant System (RCS) Temperature	547	°F TC
Unit in MODE 4 or 5 (Boron Penalty)? (✓)	☐ Yes ☑ No	TC

CUE: As required, when candidate identifies an error, ask candidate to make corrections as required.

NOTE: Errors carry through the remainder of the calculation

STANDARD: Concurs with 8013 MWD/MTU
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with 8.013 GWD/MTU
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with "N/A"
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Corrects temperature error, enters 360°F
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with check in "No" box
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 8 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.5 **IF** returning to MODE 5 from MODE 6 following refueling with newly configured fuel **AND** no applicable TDB figures are available for the new fuel cycle, **THEN** perform the following:

4.5.1 Review Tech Specs 3.1.1 and 3.9.1

Shutdown from Full Power. TC today

N/A

4.5.2 Perform one of the following:

- Contact Reactor Engineering for a determination of the minimum boron concentration for SHUTDOWN MARGIN **AND** enter the value in below.

  Minimum RCS Boron [N/A] ppm

-OR-

- Enter 2400 ppm for SHUTDOWN MARGIN below.

  Minimum RCS Boron [N/A] ppm

4.5.3 Enter N/A in Steps 4.6, 4.7, 4.8, 4.9, and 4.10.

STANDARD: Concurs that Step 4.5 is N/A
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 9 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.6 Uncorrected Minimum Boron Concentration:

NOTE:
- To prevent over boration, identify the RCS temperature you are "remaining in" or "transitioning to" for determining which Technical Data Book (TDB) Figure 4.5 Boron Concentration versus Cycle Burnup curve you are to utilize.
- The 'T_{avg} ≥ 68°F MODES 4 and 5 with Boron Penalty' curve should be used when there are no RCP's in service.

Using Plant Conditions for which boron concentration for SHUTDOWN MARGIN is being calculated (Step 4.4) and Core Burnup (Step 4.3), obtain the boron concentration and indicate curve on TDB Figure 4.5 used:

- **IF** calculating SDM for an RCS temperature ≥ 541°F, **THEN** use the 'T_{avg}≥541°F' curve. — TC
- **IF** calculating SDM for an RCS temperature ≥ 525°F to <541°F, **THEN** use the 'T_{avg} ≥525°F' curve. — N/A
- **IF** calculating SDM for an RCS temperature ≥ 490°F to <525°F, **THEN** use the 'T_{avg} ≥490°F' curve. — N/A
- **IF** calculating SDM for an RCS temperature ≥ 400°F to <490°F, **THEN** use the 'T_{avg} ≥400°F' curve. — N/A
- **IF** calculating SDM for an RCS temperature ≥ 152°F to <400°F, **THEN** use the 'T_{avg} ≥152°F' curve. — N/A
- **IF** calculating SDM for an RCS temperature ≥ 68°F MODE 4 or Mode 5, **THEN** use the 'T_{avg} ≥ 68°F MODES 4 and 5 with Boron Penalty' curve. — N/A

Uncorrected Minimum Boron Concentration [1330] ppm — TC

STANDARD: **(CS)** Determines curve to use is RCS Temp. ≥ 152°F (NOT the ≥ 541°F)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines a value of 1500ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 10 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

NOTE:
- A Potential Non-Conservatism has been identified for the Shutdown Margin Calculation with regard to Stuck Control Rods which is **ONLY** applicable when there is One or more Stuck Control Rods. [Ref 7.2.1f]
- The Potential Non-Conservatism is **NOT** an issue if there are no Stuck Rods (ie if there are no Stuck Rods it is **NOT** appropriate to perform step 4.7). [Ref 7.2.1f]

4.7 **IF** rods are stuck out, **THEN** determine the correction for stuck out rods:

4.7.1 Using Core Burnup (Step 4.3) determine the Worth of a Single Stuck Out Rod from TDB Figure 1.3b and enter below:

NOTE: Due to Non-Conservatism with the Shutdown Margin Calculation (specific to Rod Worth for a Stuck Rod), it is required to compensate for this by adding the Rod Worth of an additional Control Rod. [Ref 7.2.1f]

4.7.2 Multiply Worth of Single Stuck Out Rod by the number of stuck out rods.

Number of stuck rods **PLUS 1** [Ref 7.2.1f]	2	
	x	
Worth of a Single Stuck Rod	131.5	pcm
Total Stuck Out Rod Worth	= 263	pcm TC

STANDARD: Concurs Step 4.7 is applicable
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs that Step 4.7.2 is 2
SAT: ☐ UNSAT: ☐
COMMENT:

NOTE: Following error uses Single Misaligned RW Curve from Fig. 1.3b
STANDARD: **(CS)** Determines worth of single rod 680 pcm (670-690)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines PCM is 1360 (1340-1380)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 11 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.8 **IF** optional Xenon correction is required, **THEN** perform either 4.8.1, 4.8.2, **OR** 4.8.3:

4.8.1 **IF** Xenon equilibrium has been reached before the Reactor trip, **THEN** use one of the following to determine Xenon reactivity for the 30th hour following the unit shutdown:

NOTE: The lower Power level curve should be used for conservatism.

- TDB 2 Figure 8.3.a, Total Xenon Reactivity Worth Following Shutdown, BOC — N/A
- TDB 2 Figure 8.3.b, Total Xenon Reactivity Worth Following Shutdown, MOC — TC
- TDB 2 Figure 8.3.c, Total Xenon Reactivity Worth Following Shutdown, EOC — N/A

4.8.2 Run PPC Xenon Predict Program for the 30th hour following the unit shutdown. — N/A

4.8.3 Contact Reactor Engineering for Predicted Xenon for the 30th hour following the unit shutdown. — N/A

4.8.4 Enter Xenon Reactivity value from either Step 4.8.1, 4.8.2, or 4.8.3 for the 30th hour following the unit shutdown:

Xenon Reactivity: -1875 pcm — TC

STANDARD: Selects Step 4.8.1
SAT: ☐ UNSAT: ☐
COMMENT:

NOTE: Uses TDB Figure 1.3a to determine Fig. 8.3.b - MOC

STANDARD: Concurs with use of Figure 8.3.b (MOC)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with negative -1875 pcm (-1825 to -1925)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 12 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9 **IF** there are corrections for stuck rods or xenon, **THEN** calculate Total Correction for the Minimum Boron Concentration as follows:

4.9.1 Combined Reactivity for Stuck Rods and Xenon:

Add Total Stuck Rod Worth to Xenon Reactivity, include proper mathematical signs in the calculation.

Total Stuck Out Rod Worth (Step 4.7)	263	pcm
+		
Xenon Reactivity (Step 4.8.4)	1875	pcm
Combined Reactivity	= 2138	pcm TC

4.9.2 Boron Worth:

Obtain Boron Worth from TDB Figure 4.1.b, 4.1.c, or 4.1.d using the following parameters **AND** enter the value below.

- Core Burnup (Step 4.3)
- RCS Temperature* (Step 4.4)
- Uncorrected Minimum Boron Concentration (Step 4.6)

***IF** a TDB figure is **NOT** available for the recorded RCS temperature, **THEN** use the following guidance:

- **IF** Combined Reactivity (Step 4.9.1) is GREATER THAN 0, **THEN** the TDB Figure with the nearest HIGHER temperature shall be used.
- **IF** Combined Reactivity (Step 4.9.1) is LESS THAN 0, **THEN** the TDB figure with the nearest LOWER temperature shall be used.

Boron Worth	-9.925	pcm/ppm TC

STANDARD: Determines 1360 ppm (1340-1380)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines **NEGATIVE** 1875 ppm (-1825 to -1925)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines -515 ppm (-445 to -585)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with -9.925 pcm/ppm (-9.9 to -9.95)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 13 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9.3 Delta Boron:

Divide Combined Reactivity by Boron Worth.

Combined Reactivity (Step 4.9.1)	2138	pcm
÷		
Boron Worth (Step 4.9.2)	-9.925	pcm/ppm
Delta Boron	=-215.4	ppm TC

4.9.4 Adjusted Boron Concentration:

Subtract Delta Boron from Uncorrected Minimum Boron Concentration

Uncorrected Minimum Boron Concentration (Step 4.6)	1330	ppm
-		
Delta Boron (Step 4.9.3)	-215.4	ppm
Adjusted Boron Concentration	=1545.4	ppm TC

STANDARD: Determines -515 pcm (-445 to -585)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with -9.925 ppm/pcm (-9.9 to -9.95)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines 51.9 ppm (44.7-59.1)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines 1500 ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines 51.9 ppm (44.7-59.1)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines 1448.1 ppm (1430.9-1465.3)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 14 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9.5 Adjusted Boron Worth:

Obtain Boron Worth from TDB Figure 4.1.b, 4.1.c, or 4.1.d using the following parameters **AND** enter the value below.

- Core Burnup (Step 4.3)
- RCS Temperature* (Step 4.4)
- Adjusted Boron Concentration (Step 4.9.4)

***IF** a TDB figure is **NOT** available for the recorded RCS temperature, **THEN** use the following guidance:

- **IF** Combined Reactivity (Step 4.9.1) is GREATER THAN 0, **THEN** the TDB Figure with the nearest HIGHER temperature shall be used.
- **IF** Combined Reactivity (Step 4.9.1) is LESS THAN 0, **THEN** the TDB figure with the nearest LOWER temperature shall be used.

Adjusted Boron Worth [-8.26] pcm/ppm TC

4.9.6 Correction for Minimum Boron:

Divide Combined Reactivity by Adjusted Boron Worth.

Combined Reactivity (Step 4.9.1) [2138] pcm

÷

Adjusted Boron Worth (Step 4.9.5) [-8.26] pcm/ppm

Delta Boron [=-258.8] ppm TC

NOTE: From Figure 4.1b using:
- MOC
- 547°F (error)
- 1545.4 ppm (error)

STANDARD: **(CS)** Determines -10.0 ppm (-9.95to -10.05)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines -515 ppm (-445 to – 585)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines -10.0 ppm (-9.95 to -10.05)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines 51.5 ppm (44.3-58.8)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 15 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.9.7 Corrected Minimum Boron Concentration:

Subtract Correction for Minimum Boron from Uncorrected Minimum Boron Concentration.

Uncorrected Minimum Boron Concentration (Step 4.6)	1330	ppm
- Correction for Minimum Boron (Step 4.9.6)	-258.8	ppm
= Corrected Minimum Boron Concentration	=1588.8	ppm TC

4.10 Minimum RCS Boron Required:

4.10.1 **IF** there is NO correction for stuck rods or xenon to Minimum Boron Concentration calculated (Step 4.9 is N/A), **THEN** enter Uncorrected Minimum Boron Concentration (Step 4.6) value below. N/A

-OR-

4.10.2 **IF** there is a correction for stuck rods or xenon to Minimum Boron Concentration calculated (Step 4.9), **AND**

NOTE: 2200 ppm is sufficient to ensure that SHUTDOWN MARGIN is maintained with any number of rods failing to be fully inserted. [Ref. 7.2.1d]

- Corrected Minimum Boron Concentration (Step 4.9.7) is GREATER THAN 2200 ppm, **THEN** enter 2200 ppm below. N/A

-OR-

- Corrected Minimum Boron Concentration (Step 4.9.7) is LESS THAN 2200 ppm, **THEN** enter the Corrected Minimum Boron Concentration value below. TC

Minimum RCS Boron Required 1588.8 ppm TC

STANDARD: Determines 1500 ppm (1490-1510)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines 51.5 ppm (44.3-58.8)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 16 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

4.11 Record the most current RCS boron sample result.

RCS Boron Concentration: 1075 ppm

Chemistry Sample Date: Today Time: > one half hour ago TC

4.12 Boration Requirement:

Subtract the Minimum RCS Boron from the RCS Boron Concentration Required:

RCS Boron Concentration (Step 4.11)	1075	ppm
Minimum RCS Boron Required (Step 4.5 **OR** Step 4.10)	1588.8	ppm
Result	= -513.8	ppm TC

- **IF** the result is zero or positive, **THEN** boration is **NOT** required. N/A
- **IF** the result is negative, **THEN** boration is required:
  - **IF** TS required SHUTDOWN MARGIN requirements are **NOT** met for current plant conditions, **THEN** emergency borate per 02-OHP-4021-005-007, Operation of Emergency Boration Flow Paths, to the Minimum RCS Boron Required concentration listed in Step 4.12. N/A

-OR-

  - **IF** SHUTDOWN MARGIN requirements are met for current plant conditions, **THEN** borate as directed by the Unit Supervisor (US). TC

STANDARD: Concurs with 1075 ppm
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with lab sample date and time.
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Concurs with1075 ppm
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Determines 1448.5 (1431.2-1465.7)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Determines -373.5 (-356.2 to -390.7)
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	2-OHP-4021-001-012	Rev. 21	Page 17 of 32
Determination of Reactor Shutdown Margin			
Attachment 1	Manual Shutdown Boron Calculation for Mode 3, 4, or 5		Pages: 5 - 17

Comments:

_____
_____
_____
_____

Calculated By: T. Conrad Time: NOW Date: today

Calculation Independently Verified By: _____ Time: _____ Date: ___/___/___

Reviewed By: _____ Date: ___/___/___
US/SM/WCC-SRO

STANDARD: Completes review of paperwork
SAT: ☐ UNSAT: ☐
COMMENT:

TERMINATE JPM: When SDM review is complete.

Termination Cue: SDM calculation is complete.

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility: DC Cook Task No: _____

Task Title: Calculate RCS Time to Boil/Core Uncovery - Loss of RHR

Job Performance Measure No: A2 K/A Reference: APE.025.AA1.02

Examinee: _____ NRC Examiner: _____

Facility Evaluator: _____ Date: _____

Method of testing:

Simulated Performance _____ Actual Performance X

Classroom X Simulator X Plant _____

Task Standard: Time to boil is calculated.

Required Materials: 2-OHP-4022-017-001, Step 15 and Figures 3 & 4

General References: 2-OHP-4022-017-001, "LOSS OF RHR COOLING," Rev. 21
2014 Calendar

Read to the examinee:

Initial Conditions:

Today is July 30, 2014. Unit 2 is in an Outage and has experienced a loss of RHR. Efforts are underway to restore RHR or some other method of core cooling. The Steam Generators have nozzle damns in the loops and are not available. The unit was shut down on May 30, 2014 after operating for 3 months.

Initiating Cue:

- You are an extra RO.
- The Unit Supervisor directs you to determine the amount of time to Core Boiling and the amount of time from Boiling until Core Uncovery per the NOTE prior to Step 15 of 2-OHP-4022-017-001, "Loss of RHR Cooling."
- The Reactor vessel is currently open to Containment (Vessel Head removed) and RCS temperature is approximately 115°F.

Time to Core Boil: _____

Time from Boil to Core Uncovery _____

Give copy of Task Briefing and 2-OHP-4022-017-001, Step 15 and Figures 3 & 4, to examinee.

Time Critical Task: Yes (No)

Validation Time: 10 minutes

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Number:	Title:	Revision Number:
2-OHP-4022 017-001	**LOSS OF RHR COOLING**	21

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- Changes in RCS pressure could result in inaccuracies in both RCS wide range level readings. 2-NLI-122 or 2-NLI-1000 (Mansell instruments on MLMS cart) are unaffected by pressure changes and should be used.
- Boiling in the core is possible within 10 minutes after Loss Of RHR at reduced inventories. Therefore, containment closure must be completed within 30 minutes.

NOTE

- If core boiling occurs, 2-NLI-122 and 2-NLI-1000 indications may be erratic. RVLIS may be used for trending RCS level changes, if available.
- Figure 3, Time To Boil For Liquid At 100°F Subcooling (Page 57) and Figure 4, Time From Onset Of Boiling To Core Uncovery (Page 58) should be used as needed to determine the amount of time prior to core boiling and core uncovery due to a loss of all RHR flow.

15. Check If RHR Pumps Should Be Stopped:

a. RHR pumps - ANY RUNNING

a. **IF** RHR pump was lost due to a fault **AND** RCS level is greater than 614.0' **THEN** align standby RHR pump for start:

1) Verify the following valves are closed:

- 2-IRV-310, East RHR Hx outlet
- 2-IRV-320, West RHR Hx outlet
- 2-IRV-311, RHR Hx bypass

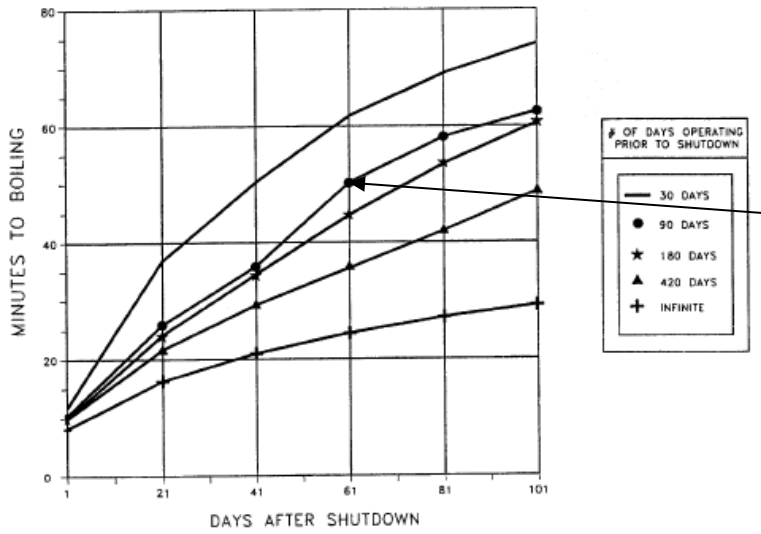
(Step 15 Continued On Next Page)

STANDARD: Operator determines that Figure 3 and 4 must be used
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Number:	Title:	Revision Number:
2-OHP-4022 017-001	**LOSS OF RHR COOLING**	21

Figure 3
Time To Boil For Liquid At 100°F Subcooling



-END OF FIGURE-

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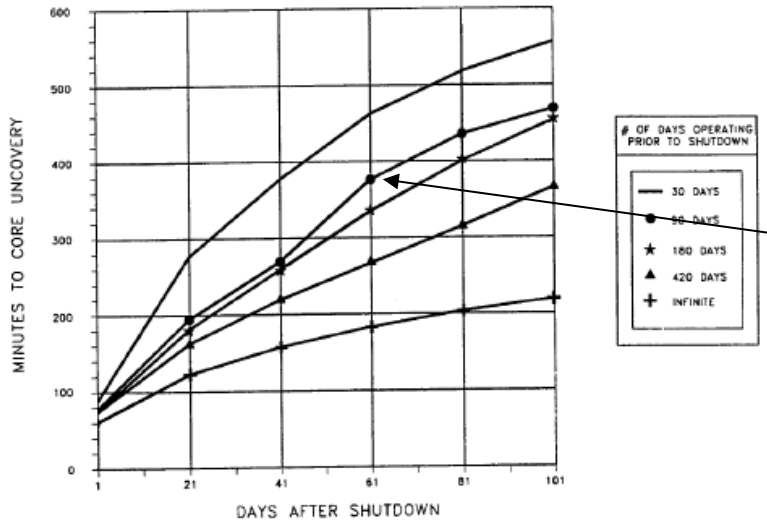
STANDARD: Operator determines that the plant has been shutdown for 61 days after operating for approximately 90 days
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: (CS) Operator reports the calculated Time to Boil is 50 minutes (47.5 to 52.5)
CUE: Acknowledge the Time to Boil is _____ minutes
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Number:	Title:	Revision Number:
2-OHP-4022 017-001	**LOSS OF RHR COOLING**	21

Figure 4
Time From Onset Of Boiling To Core Uncovery



-END OF FIGURE-

STANDARD: (CS) Operator reports the calculated Time to Core Uncovery is 375 minutes (360 - 390) from the onset of boiling
CUE: Acknowledge the Time from Boiling to Core Uncovery is _____ minutes
SAT: ☐ UNSAT: ☐
COMMENT:

Termination Cue: Operator has determined and reported time to boiling and time to core uncovery

Facility: DC Cook Task No: _____

Task Title: Review Completed Surveillance as Second Check

Job Performance Measure No: A3 K/A Reference: 2.2.12

Examinee: _____ NRC Examiner: _____

Facility Evaluator: _____ Date: _____

Method of testing:

Simulated Performance _____ Actual Performance X

Classroom X Simulator X Plant _____

Task Standard: Review completed surveillance as second check and provide recommendation to SRO

Required Materials: 2-OHP-4030-214-031, Rev. 26, Completed copy of Operations Weekly Surveillance Checks, Attachment 2, Bus Voltage Supplement
Technical Specification 3.8.1 and 3.8.2

General References: 2-OHP-4030-214-031: Operations Weekly Surveillance Checks, Rev. 26 (COMPLETED COPY)

Read to the examinee:

Initial Conditions: Unit 2 is at 100% power. All systems are operating normally.

Initiating Cue: The Shift Manager has asked you to peer check Attachment 2 of the Operations Weekly Surveillance Checks (2-OHP-4030-214-031) that was just completed and report your results to him.

M&TE Number is VTM-067; Cal Due Date is 9-10-14.

Time Critical Task: Yes (No)

Validation Time:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Continuous	2-OHP-4030-214-031	Rev. 26	Page 7 of 67
Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

1 PURPOSE AND SCOPE

1.1 Provide a method to obtain accurate measurements of Safeguards Bus voltage when Control Room readings are less than 116V (4160V buses) and/or outside the indicated band of [570] - 630 volts (600V buses).

- This attachment supplements the Safeguards Bus readings obtained by Data Sheet 1 **OR** can be used as directed by 2-OHP-4024-221, Annunciator Response: Generator Drop 67, 68.

2 PREREQUISITES **INIT**

2.1 The working copy of this procedure is the current revision. TC

2.2 A pre-test briefing has been conducted with the Shift manager, Unit Supervisor, or WCC-SRO in accordance with PMP-4010-JOB-001, Pre-Job Briefs and Post-Job Reviews. TC

2.3 PMP-4030-EXE-001, Conduct of Surveillance Testing, Section 3.2, General Expectations for Test Prerequisite Activity, has been reviewed. TC

2.4 Safeguards bus voltage readings are less than 116V (4160V Buses) and/or are outside [570] - 630V (600V Buses). TC

2.5 A FLUKE model 45 multimeter (or equivalent) is available. TC

3 PRECAUTIONS AND LIMITATIONS

3.1 Observe electrical safety precautions while using portable multimeter.

3.2 Instrument uncertainty of ± 3.5 volt (600V level) and ± 0.7 volts (120V level) is included in the specified Acceptance Criteria when using a Fluke 45 multimeter (or equivalent) to verify 600V Safety Bus voltage.

4 DETAILS **INIT**

4.1 Notify MTI to acquire a FLUKE model 45 portable multimeter (or equivalent) for the purpose of obtaining Unit 2 Control Room 600V and 4160V Safeguards Bus Voltage measurements. TC

STANDARD: Reviews Prerequisites, Precautions and Limitations.

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS

Continuous	2-OHP-4030-214-031	Rev. 26	Page 8 of 67
Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

4.2 Record M&TE instrument data for Fluke 45 multimeter, or equivalent:

- M&TE Number: VTM-067
- Cal. Due Date: 10-9-14 TC

4.3 Set up the multimeter as follows:

4.3.1 Set the multimeter to read AC Volts. TC

4.3.2 Turn on the multimeter. TC

4.3.3 Select MEDIUM Rate. TC

4.3.4 Select Auto Mode. TC

4.4 Connect the multimeter to the 600V Safeguards Bus voltmeter terminals (VM 600V bus 21A, 21B for Train B **OR** VM 600V bus 21C, 21D for Train A) on the back of Control Room panel SA using Alligator Clip leads, or equivalent. TC

4.5 Select each phase (1-2, 2-3, 3-1) using the POTENTIAL BUS 21A & 21B, or POTENTIAL BUS 21C & 21D voltmeter selector switch on Control Room Panel SA. Allow the MTI Technician to measure the 600V bus phase voltage using the FLUKE 45 multimeter (or equivalent). Record the reading in the spaces provided (MTI or OPS). TC

4.6 Calculate the average bus phase voltage and record as VM_{AVG} in the right hand column. Calculate the V_{AVG} for comparison with control room panel meter reading – multiply VM_{AVG} by 5 (600V bus Potential Transformer winding ratio). Instrument uncertainty is applied in the Acceptance Criteria. TC

4.7 Disconnect the portable multimeter from the terminals of VM 600V 21A, 21B, **OR** VM 600V 21C, 21D as applicable. TC

CUES/STANDARDS ("**Critical Step in bold**")

STANDARD: Notes Cal Due Date was recorded wrong. (**Should be 9-10-14**)
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Reviews signed-off steps.
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS

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Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

600V Bus Voltages using Fluke 45 (or Equivalent)

- Bus 21A:

1-2	119.7 VAC (FLUKE 45, or equivalent)		
2-3	118.8 VAC (FLUKE 45, or equivalent)		
3-1	118.7 VAC (FLUKE 45, or equivalent)		
Average	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	118.73	VM_{AVG}
	VM_{AVG} X 5 = V_{AVG}	593.65	V_{AVG}

- Bus 21B:

	118.9 VAC (FLUKE 45, or equivalent)		
	119.2 VAC (FLUKE 45, or equivalent)		
1-2	119.0 VAC (FLUKE 45, or equivalent)		
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	119.03	VM_{AVG}
3-1			
Average	VM_{AVG} X 5 = V_{AVG}	595.15	V_{AVG}

- Bus 21C:

	119.8 VAC (FLUKE 45, or equivalent)		
	119.8 VAC (FLUKE 45, or equivalent)		
1-2	119.9 VAC (FLUKE 45, or equivalent)		
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	119.83	VM_{AVG}
3-1			
Average	VM_{AVG} X 5 = V_{AVG}	599.16	V_{AVG}

- Bus 21D:

	119.8 VAC (FLUKE 45, or equivalent)		
	119.9 VAC (FLUKE 45, or equivalent)		
1-2	119.8 VAC (FLUKE 45, or equivalent)		
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	119.83	VM_{AVG}
3-1			
Average	VM_{AVG} X 5 = V_{AVG}	599.15	V_{AVG}

CUES/STANDARDS ("**Critical Step in bold**")

STANDARD: Identify Bus 21D V_{AVG} is incorrect (**should be 599.15**).

Critical Step

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

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Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

4.8 Connect the multimeter to the 4kV Safeguards Bus voltmeter terminals (VM 4160V bus T21A, T21B for Train B **OR** VM 4160V bus T21C, T21D for Train A) on the back of Control Room panel SA using Alligator Clip leads, or equivalent. TC

4.9 Select each phase (1-2, 2-3, 3-1) using the POTENTIAL BUS T21A & T21B, or POTENTIAL BUS T21C & T21D voltmeter selector switch on Control Room Panel SA. Allow the MTI Technician to measure the 4160V bus phase voltage using the FLUKE 45 multimeter (or equivalent). Record the reading in the spaces provided (MTI or OPS). TC

4.10 Calculate the average bus phase voltage and record as VM_{AVG} in the right hand column. Calculate the V_{AVG} for comparison with control room panel meter reading – multiply VM_{AVG} by 35 (4160V bus Potential Transformer winding ratio). Instrument uncertainty is applied in the Acceptance Criteria. TC

4.11 Disconnect the portable multimeter from the terminals of VM 4160V T21A, T21B, **OR** VM 4160V T21C, T21D as applicable. TC

STANDARD: Reviews signed-off steps.
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Continuous	2-OHP-4030-214-031	Rev. 26	Page 11 of 67
Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

4160V Bus Voltages using Fluke 45 (or equivalent)

- Bus T21A:

1-2	118.2 VAC (FLUKE 45, or equivalent)	
2-3	118.4 VAC (FLUKE 45, or equivalent)	
3-1	118.3 VAC (FLUKE 45, or equivalent)	
Average	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	118.30 VM_{AVG}
	VM_{AVG} X 35 = V_{AVG} 4140.50 V_{AVG}	

- Bus T21B:

	118.6 VAC (FLUKE 45, or equivalent)	
	118.8 VAC (FLUKE 45, or equivalent)	
1-2	118.5 VAC (FLUKE 45, or equivalent)	
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	118.63 VM_{AVG}
3-1		
Average	VM_{AVG} X 35 = V_{AVG} 4152.05 V_{AVG}	

- Bus T21C:

	119.7 VAC (FLUKE 45, or equivalent)	
	119.5 VAC (FLUKE 45, or equivalent)	
1-2	119.4 VAC (FLUKE 45, or equivalent)	
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	118.53 VM_{AVG}
3-1		
Average	VM_{AVG} X 35 = V_{AVG} 4148.67 V_{AVG}	

- Bus T21D:

	119.9 VAC (FLUKE 45, or equivalent)	
	119.6 VAC (FLUKE 45, or equivalent)	
1-2	119.8 VAC (FLUKE 45, or equivalent)	
2-3	[(1-2)+(2-3)+(3-1)] / 3 = VM_{AVG}	119.77 VM_{AVG}
3-1		
Average	VM_{AVG} X 35 = V_{AVG} 4191.95 V_{AVG}	

STANDARD: Identify Bus T21C VM_{AVG} and V_{AVG} is incorrect (**VM_{AVG} should be 119.53 and V_{AVG} should be 4183.55**)

Critical Step

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Continuous	2-OHP-4030-214-031	Rev. 26	Page 12 of 67
Operations Weekly Surveillance Checks			
Attachment 2	Bus Voltage Supplement		Pages: 7 - 13

5 ACCEPTANCE CRITERIA

5.1 **IF** in MODE 1 but the generator is NOT synchronized to the grid **OR** in MODES 2-6 or defueled **AND** bus(es) are powered by RATs, **THEN** 4160V Safeguards Bus(es) are ≥ 116.4V to comply with Technical Specification (TS) 3.8.1 and 3.8.2 with regards to power availability. [Ref 8.2.1b]

TC Today

N/A

5.2 **ALL MODES** - 600V Safeguards Bus(es) are ≥ [110.2V] to comply with Technical Specifications TS 3.8.9 and 3.8.10 with regards to power availability. [Ref 8.2.1b]

TC

6 CORRECTIVE MEASURES

6.1 Failure to satisfy the acceptance criteria requires the following:

- Notify the Shift Manager or Unit Supervisor of the failure.
- Applicable Technical Specifications shall be consulted for present operating mode to determine required action.
- Ensure immediate initiation of a corrective action in accordance with PMP-7030-CAP-001, Action Initiation, as applicable.

STANDARD: Reviews signed-off steps.
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: Notifies Shift Manager of the errors in the surveillance.
SAT: ☐ UNSAT: ☐
COMMENT:

Terminating Cue: This completes the JPM

Facility: DC Cook Task No: _____

Task Title: Determine Locked High Radiation Area (LHRA) Entry Requirements

Job Performance Measure No: RO A4 K/A Reference: 2.3.12

Examinee: _____ NRC Examiner: _____

Method of testing:

Simulated Performance _____ Actual Performance _____X_____

Classroom ___X_____ Simulator _____X_____ Plant ____X_____

Task Standard: Determine Locked High Radiation Area (LHRA) entry requirements

Required Materials: Candidate may request:

- PMP-6010-RPP-003, High, Locked High, and Very High Rad. Area Access
- PMP-6010-RPP-006, Radiation Work Permit Program

General References: U1 VCT RWP, U1 VCT Rad. Area Map, PMP-6010-RPP-003, Rev. 23 and PMP-6010-RPP-006, Rev. 17.

Time Critical Task: Yes/(No)

Validation Time:

Read to the examinee:

Initial Conditions:
A worker exiting the plant reports that seepage was observed on the Unit 1 Volume Control Tank (VCT)

Initiating Cue:
You are an Extra RO. The Shift Manager directs you to enter the Unit 1 VCT Room (the Room/area directly surrounding the VCT) and determine the source of the seepage and estimate leak rate if possible.

Performance Information

Denote critical steps with a (CS)

_____ Performance step: 1 **(CS)**

Standard: Obtain the Unit 1 VCT LHRA Key from RP Supervisor.

Reference: PMP-6010-RPP-003, Step 3.6.5.b.

Comment:

_____ Performance step: 2 **(CS)**

Standard: Ensure there is a Radiation Work Permit (RWP) for the activity.

Reference: PMP-6010-RPP-003, Step 3.6.5.a.

Comment:

_____ Performance step: 3

Cue: If step 2 was correctly determined (regarding RWPs), ask: "Which type of RWP can NOT be used for this area?"

Standard: Correct answer is "GENERAL"

Reference: PMP-6010-RPP-006, Step 3.2.1

Comment:

_____ Performance step: 4 **(CS)**

Standard: An RP (LHRA) Briefing must be completed prior to entry.

Reference: PMP-6010-RPP-003, Step 3.6.5.a.

Comment:

_____ Performance step: 5

Cue: If required ask: “What type of RP Support is required for this entry?”

Standard: Correct answers are:

- Continuous RP coverage
- RP shall always enter first; however, remote monitoring or extendable meters may be used in lieu of RP

Reference: PMP-6010-RPP-003, Step 3.3.1.b. and 3.6.6.a.

Comment:

Terminating Cue: Candidate has completed his list of LHRA entry requirements.

Facility: DC Cook Task No: _____

Task Title: Review and Authorize a Waste Gas Release Permit.

Job Performance Measure No: SRO A4 K/A Reference: G.2.3.6

Examinee: _____ NRC Examiner: _____

Facility Evaluator: _____ Date: _____

Method of testing:

Simulated Performance _____ Actual Performance _____X_____

Classroom ____X_____ Simulator _____X_____ Plant _____

Task Standard:

- Identifying conditions that would prevent authorization of a gaseous release in accordance with Step 4.5 of 12-OHP-4021-023-002, Release of Radioactive Waste from Gas Decay Tanks.

Required Materials:

- 12-OHP-4021-023-002, Attachment 2 (COMPLETED)
- 12-OHP-4021-023-002, Data Sheet 1 (COMPLETED)
- 12-OHP-4021-023-002, Figure 1
- Gaseous Waste Release Worksheet (COMPLETED)

General References: 12-OHP-4021-023-002, Rev. 30; PMP-6010-OSD-001, Rev. 24

Read to the examinee:

Initial Conditions:

You are the WCC SRO.

Given the following conditions:

- Both units are operating at 100% power
- Radiation Monitors 1-VRS-1500 and 2-VRS-2500 are OPERABLE
- Meteorological instrumentation is OPERABLE
- Gas Decay Tank # 6 is ready to be released.
- The gas decay tank release package is prepared for your review and authorization.

Initiating Cue:

Review and authorize the gas decay tank release (G-14-04) in accordance with Step 4.5 of 12-OHP-4021-023-002, Release of Radioactive Waste from Gas Decay Tanks.

Time Critical Task: Yes/(No)

Validation Time: 20 minutes

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	12-OHP-4021-023-002	Rev. 30	Page 12 of 72
Release Of Radioactive Waste From Gas Decay Tanks			
Attachment 2	Release of Radioactive Gaseous Waste From Gas Decay Tanks	Pages: 9 - 36	

Gas Decay Tank # 6 Release # G-14-04

4.2.5 **WHEN** Data Sheet 1 is returned, **THEN** perform the following:

a. Check latest procedure revision on all "filed" data sheets. KG

b. Verify release approved in Section 2 of Data Sheet 1. KG

1. **IF** release **NOT** approved by Chemistry/Environmental, **THEN** perform the following:

a) **IF** desired, **THEN** request Plant Manager approve release. N/A KG

b) **IF** release not approved, **THEN** determine disposition of tank contents **AND** stop performance of this attachment.

c. Verify Gas Decay Tank number and release number is entered on each page of this attachment. KG

4.3 Validate Unit Vent flow and enter release setpoint:

4.3.1 Record Unit Vent flow rate used in the High Alarm setpoint Calculation (Chemistry/RP attached Gaseous Waste Release Worksheet to Data Sheet 1):

- Unit Vent flow rate: 93400 scfm (Gaseous Waste Release Worksheet) KG RS IV

4.3.2 Record current Unit Vent flow rate from VFR-1510 or 1-VFR-315:

- Unit Vent flow rate: 87600 scfm (Current) KG RS IV

STANDARD: **(CS)** .Candidate initiates review of Data Sheet 1 and determines "Chemistry Signature" is NOT present.
SAT: ☐ UNSAT: ☐
NOTE: See Data Sheet 1 – Section 2
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Continuous	12-OHP-4021-023-002	Rev. 30	Page 16 of 72
Release Of Radioactive Waste From Gas Decay Tanks			
Attachment 2	Release of Radioactive Gaseous Waste From Gas Decay Tanks		Pages: 9 - 36

Gas Decay Tank # 6 Release # G-14-04

4.4.5 Perform a CHANNEL CHECK on the following:

- VRS-1505 TA / IV
- VRS-2505 TA / IV

4.4.6 Perform a SOURCE CHECK on the following:

- VRS-1505 TA / IV
- VRS-2505 TA / IV

4.5 Obtain S.M. / WCC SRO permission to release appropriate Gas Decay Tank on Section 3 of Data Sheet 1, Gas Decay Tank Release Permit. ____

STANDARD: Candidate reviews Data Sheet 1 information as WCC SRO (see next page).

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Reference	12-OHP-4021-023-002	Rev. 30	Page 37 of 72
Release Of Radioactive Waste From Gas Decay Tanks			
Data Sheet 1	Gas Decay Tank Release Permit		Pages: 37 - 39

GAS DECAY TANK RELEASE PERMIT

NOTE: This Data Sheet must be used in conjunction with Attachment 2.

SECTION 1 – ISOLATION DATA

Gas Decay Tank number 6 was isolated on 05/24/14 1440 (Date/Time) @ 94 psig

( ) This release is requested due to oxygen concentration being out of spec high @ ____ % O_2

Latest revision check has been made prior to forwarding to Chemistry:

J. MONROE

IF the GDT has not decayed at least 45 days, **THEN** document reason for release:

N/A 5/24/14

FORWARD Data Sheet 1 to CHEMISTRY

STANDARD: Candidate verifies sample data in SECTION 1 consistent with GASEOUS WASTE RELEASE WORKSHEET data

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Reference	12-OHP-4021-023-002	Rev. 30	Page 38 of 72
Release Of Radioactive Waste From Gas Decay Tanks			
Data Sheet 1	Gas Decay Tank Release Permit		Pages: 37 - 39

SECTION 2 – CHEMISTRY/ENVIRONMENTAL APPROVAL

Check release in compliance with PMP-6010-OSD-001, Offsite Dose Calculation Manual per 12-THP-6020-CHM-308, Effluent Batch Releases.

If MIDAS is unavailable, Environmental to calculate release setpoints/flow rates per 12-THP-6010-RPP-603, Gaseous Waste Releases (Manual Calculations).

This release is approved provided the following conditions exist:

- At least one Unit One Auxiliary Building exhaust fan must be operating during the entire release.
- Unit Vent Stack flow rate < 1.1 times the alarm setpoint calculation flow.
- Less than 72 hours has elapsed from time of sample analysis AND release dose and dose rate values are within PMP-6010-OSD-001 limits.

- Sample #4-2014-01-22-003 Date 07/25/14 Time 0329
  Gas Decay Tank # 60 has been sampled and may be released at a maximum source flow rate of 125 scfm.
  Release Number G-14-04
- Environmental has performed an ALARA review

approved by: G. Patton Date 7/25/14 Time 0805
Chemistry Signature

approved by: _____ Date ___/___/___ Time _____
Environmental Signature

Special Instructions required (circle one): YES or (NO)

Release NOT approved for the following reason: _____ 7/25/14

NOT approved by: N A Date ___/___/___ Time _____
Signature/Department

IF not approved above, Plant Manager approval is required for release:

Plant Manager approval _____ Date ___/___/___ Time _____

FORWARD to Unit 1 Control Room

STANDARD: Candidate verifies sample data in SECTION 2 is consistent with GASEOUS WASTE RELEASE WORKSHEET data
SAT: ☐ UNSAT: ☐
COMMENT:

STANDARD: **(CS)** Candidate identifies that Environmental (approval) Signature, Date, and Time is missing.
SAT: ☐ UNSAT: ☐
COMMENT:

CUE: "If Chemistry and Environmental do not approve the release, who can?"
STANDARD: **(CS)** Candidate replies, "the Plant Manager."
SAT: ☐ UNSAT: ☐
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**CS**" Indicates Critical Standard)

Reference	12-OHP-4021-023-002	Rev. 30	Page 39 of 72
Release Of Radioactive Waste From Gas Decay Tanks			
Data Sheet 1	Gas Decay Tank Release Permit		Pages: 37 - 39

CUE: "Required signature has been obtained. Proceed with review."

SECTION 3 – RELEASE AUTHORIZATION

- Required approval signature is present on Data Sheet 1, Section 2.

- 72 hours has NOT elapsed since time of sample analysis.

Release of Gas Decay Tank is authorized:

_____ Date ___/___/___ Time _____
S.M./ WCC SRO

STANDARD: **(CS)** Identifies that greater than 24 hours has elapsed since Chemistry approved the release (Data Sheet 1, Section 2, Chemistry approval Date/Time) and/or 72 hours has elapsed since time of sample analysis.
NOTE: Chemistry approval 7/25/14@0805; Exam is some time on the week of July 28th , 2014 (> 24 hours on any day during week).
CUE: If candidate asks, the current date/time is the present date/time (real time).

SAT: ☐ UNSAT: ☐
COMMENT:

SECTION 4 – RELEASE DATA

INITIAL DATA	RELEASE FLOW DATA
Wind Speed _____ mph Wind Direction _____ Temp. Diff (ΔT) or Standard Deviation: _____ °F /Dev. Unit Vent Flow Rate _____ scfm	Source flow rate _____ scfm (MR-57)
	FINAL DATA
Start (time/date) _____/_____ Tank Pressure _____ psig	Stop (time/date) _____/_____ Tank Pressure _____ psig

Release completed by:_____ Date ___/___/___

Comments:

_____
_____
_____
_____

CUE: "JPM is Complete."

Verified Complete By: _____ Date: ___/___/___

Reviewed By: _____ Date: ___/___/___
Supervisor/Manager Signature

Facility: DC Cook Task No: _____

Task Title: Make Classification and PAR

Job Performance Measure No: SRO A5 K/A Reference: G.2.4.44

Examinee: _____ NRC Examiner: _____

Facility Evaluator: _____ Date: _____

Method of testing:

Simulated Performance _____ Actual Performance _____X_____

Classroom _____X_____ Simulator _____X_____ Plant _____

Task Standard: Classify the event as a General Emergency and provide the correct Protective Action Recommendation, document classification and PAR on the correct section of the Accident Notification Form

Required Materials: PMP-2080-EPP-101, Rev 18 and PMP-2080-EPP-100, Rev 27

General References: PMI-2080

Read to the examinee:

Initial Conditions:

Unit 2 was at 100% power with the South SI pump on clearance for pump overhaul when a Loss of Coolant Accident occurred and the Unit automatically tripped.

Both CCPs tripped on overcurrent, CTS actuated automatically with RCPs being secured by the RO shortly thereafter.

The crew was transitioning to 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant when the STA reported a RED CSFST indication on Core Cooling with containment Radiation levels at ~270 R/hr.

The crew then transitioned to 2-OHP-4023-FR-C.1, Response to Inadequate Core Cooling, which has been implemented for 20 minutes without restoring core cooling.

The following conditions exist:

- Containment pressure is 4.2 psig
- Containment area high Rad monitors are reading 6.4E4 R/HR
- Core exit thermocouples are reading 725°F and rising
- A report was received and confirmed that containment penetration CPN-71 is leaking
- Site boundary dose is 2.6 REM TEDE and 4.8 REM Thyroid CDE
- 10 mile dose is 0.78 REM TEDE and 2.7 REM Thyroid
- DAP is **NOT** available
- Winds are steady at 15 MPH from 300 degrees
- Heavy snow and icy conditions exist.

Initiating CUE:

You are the Shift Manager.
Execute the Shift Manager's duties for this event concerning the **Emergency Plan Classification** for this event and any applicable **Protective Action Recommendations**.

This is a time critical JPM

Time Critical Task: **Yes** / No **(15 minutes for classification AND 15 minutes for PAR)**

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Reference	PMP-2080-EPP-101	Rev. 18	Page 11 of 115
Emergency Classification			
Attachment 1	Emergency Condition Categories		Pages: 11 - 23

Page	Emergency Condition Category	
12	Fuel Clad Barrier Loss/Potential Loss Table	
12	RCS Barrier Loss/Potential Loss Table	
13	Containment Barrier Loss/Potential Loss Table	
14	ECC H-1	SEC Judgment
15	ECC H-2	Security Events
15	ECC H-3	Control Room Evacuation
15	ECC H-4	Fire
15	ECC H-5	Toxic or Flammable Gases
15	ECC H-8	Independent Spent Fuel Storage Installation
16	ECC N-1	Seismic Activity
16	ECC N-2	Tornado/High Wind
16	ECC N-3	Visible Structural Damage
16	ECC N-4	Vehicle Collision
16	ECC N-5	Main Turbine Rotating Component Failure
16	ECC N-6	Plant Flooding
16	ECC N-7	Unanticipated Explosion
17	ECC R-1	Radioactive Effluent Release
17	ECC R-2	Increasing In-Plant Radiation Level
17	ECC R-3	Loss of Water Level in Any Area Holding Irradiated Fuel
18	ECC S-1	Failure of Reactor Protection System
18	ECC S-2	Loss of AC Power (Modes 1-4)
18	ECC S-3	Loss of DC Power (Modes 1-4)
18	ECC S-5	Loss of Systems Needed to Achieve/Maintain Hot Shutdown
19	ECC S-6	Loss of Alarms
19	ECC S-7	Fuel Clad Degradation
19	ECC S-8	Excessive RCS Leakage
19	ECC S-9	Tech Spec Compliance
19	ECC S-10	Loss of Communication Systems (Modes 1-4)
20	ECC H-2 – H-5	Hazards and Other Conditions (Modes 5, 6)
21	ECC N-1 – N-7	Natural/Destructive Phenomena (Modes 5, 6)
22	ECC R-1 – R-3	Abnormal Radiation Levels/Effluents (Modes 5, 6)
23	ECC C-3	Cold Shutdown/Refueling/Defueled – Loss of AC Power (Modes 5, 6)
23	ECC C-4	Cold Shutdown/Refueling – Inability to Maintain Cold Shutdown
23	ECC C-5	Cold Shutdown/Refueling – Fuel Clad Degradation (Modes 5, 6)
23	ECC C-6	Cold Shutdown/Refueling – Loss of Communications (Modes 5, 6)
23	ECC C-7	Cold Shutdown/Refueling – Loss of DC Power (Modes 5, 6)

CUE: Give a copy of the EPP-101 to the candidate

STANDARD: Obtain PMP-2080-EPP-101 and refer to Attachment 1, Emergency Condition Categories

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Reference	PMP-2080-EPP-101	Rev. 18	Page 12 of 115
Emergency Classification			
Attachment 1	Emergency Condition Categories		Pages: 11 - 23

FISSION PRODUCT BARRIER MATRIX – Mode 1- 4

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of TWO Fission Product Barriers AND Potential Loss of Third Barrier.	Any TWO of the Following: 1. Loss or Potential Loss of Fuel Clad. 2. Loss or Potential Loss of RCS. 3. Loss of Containment Barrier.	Loss or Potential Loss of Either Fuel Clad or RCS Barrier.	Loss or Potential Loss of Containment Barrier.

1. FUEL CLAD BARRIER	LOSS (L)	POTENTIAL LOSS (P)
.1 Core Cooling CSFST	Core Cooling CSFST - RED	Core Exit Thermocouples > 757° OR RVLIS Level < 46% (Narrow Range) OR Heat Sink CSFST - RED
.2 Containment Radiation	> 200 R/hr.	None
.3 Primary Coolant Activity	> 300 uCi/cc I-131 dose equivalent OR Core Damage > 5.0% clad failure	None
.4 SEC Judgment (p.28)	Any condition in the opinion of the SEC that indicates loss of the Fuel Clad barrier. Σ	Any condition in the opinion of the SEC that indicates potential loss of the Fuel Clad barrier. Σ

2. RCS BARRIER	LOSS (L)	POTENTIAL LOSS (P)
.1 RCS Leak Rate (unisolable)	> available makeup capacity as indicated by complete loss of RCS subcooling	> capacity of one centrifugal charging pump in normal charging line up.
.2 Steam Generator Leakage	Entry into OHP 4023.E-3, SGTR AND A Non-isolable secondary line break or a prolonged release (> 30 minutes) of contaminated secondary coolant resulting in a radioactive release to the environment from the affected SG. [1]	Ruptured SG with leak > capacity of one charging pump in normal charging line up.
.3 Containment Radiation	> 10 R/hr	None
.4 RCS Integrity CSFST	None	RCS Integrity CSFST - RED
.5 Heat Sink CSFST	None	Heat Sink CSFST - RED
.6 SEC Judgment (p.34)	Any condition in the opinion of the SEC that indicates loss of the RCS barrier. Σ	Any condition in the opinion of the SEC that indicates potential loss of the RCS barrier. Σ

[1] Does not include a release through the condenser air ejectors or the gland steam condenser vents for the purpose of declaration of a SITE AREA EMERGENCY.
Σ EAL's in these tables are NOT complete. Refer to referenced basis page (Attachment 3) for complete description.

STANDARD: Compare the initial conditions to the categories and declare a 'General Emergency' based on categories 1.1L, 1.2L, 2.1L, 2.3L, and 3.2L, 3.2P or 3.7P.

Critical Step

SAT: ☐ UNSAT: ☐

COMMENT:

NOTE: The declaration is based on 2 L's and 1 P or on 3 L's in combination using page 12 and 13 of EPP.101

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Reference	PMP-2080-EPP-101	Rev. 18	Page 13 of 115
Emergency Classification			
Attachment 1	Emergency Condition Categories		Pages: 11 - 23

FISSION PRODUCT BARRIER MATRIX – Mode 1 -4

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Loss of TWO Fission Product Barriers AND Potential Loss of Third Barrier.	Any TWO of the Following: 1. Loss or Potential Loss of Fuel Clad. 2. Loss or Potential Loss of RCS. 3. Loss of Containment Barrier.	Loss or Potential Loss of Either Fuel Clad or RCS Barrier.	Loss or Potential Loss of Containment Barrier.

3. CONTAINMENT BARRIER	LOSS (L)	POTENTIAL LOSS (P)
.1 Containment Radiation	None	> 1000 R/hr. OR Core damage > 20% clad failure.
.2 Containment Integrity	Unisolable breach of containment. OR Rapid unexplained containment pressure or sump level drop following pressure rise caused by a LOCA. OR Containment pressure/sump level NOT performing as expected for conditions. OR Entry into ECA-1.2, LOCA Outside Containment.	None
.3 SG Secondary Side Release	Primary to secondary leakage rate greater than technical specification limit. AND Release of secondary coolant from the associated steam generator to the environment is occurring. [1]	None
.4 Containment CSFST	None	Containment CSFST - RED
.5 Containment Hydrogen	None	> 4.0% OR Containment Hydrogen > 0.5% AND any Hydrogen Control equipment inoperable.
.6 Containment Pressure Control	None	BOTH CTS trains OR BOTH containment air recirc fans inoperable OR fail to auto start on their containment pressure setpoint OR containment pressure > 12 psig.
.7 Core Exit Thermocouples	None	Core Cooling CSFST - RED AND Restoration procedures not effective within 15 minutes.
.8 SEC Judgment (p.43)	Any condition in the opinion of the SEC that indicates loss of the Containment barrier. Σ	Any condition in the opinion of the SEC that indicates potential loss of the Containment barrier. Σ

[1] Does not include a release through the condenser air ejectors or the gland steam condenser vents for the purpose of declaration of a SITE AREA EMERGENCY.

STANDARD: SEE PREVIOUS PAGE
COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Reference	PMP-2080-EPP-100	Rev.27	Page 8 of 59
Emergency Response			

3.2.5 Direct the implementation of activities per the checklists below:

NOTE: Actions already taken in SPP-2060-SFI-216, Plant Response to a Validated Security Event, need not be repeated in this procedure (e.g., protective measures such as evacuation).

Activation of the ERONS includes activating the Emergency Response facilities.

a. SEC Checklist – perform each step that applies per the current classification:

1. **IF** at UE or Alert and degrading/hazardous conditions warrant, **THEN** use SEC discretion to Dismiss Non-Essential Personnel from the site per Attachment 3, Dismissal of Non-Essential Personnel (performed only once per event). ____

2. **IF** in a SAE, (or GE, if SAE was not entered), **OR** at a lower threshold per SEC discretion, **THEN** implement Accountability using Attachment 4, Accountability, (performed only once per event). ____

3. **IF** in a SAE (or GE, if SAE was not entered), **AND** non-essential personnel were not dismissed/evacuated under Step 3.2.5.a.1 or 3.2.5.a.2, **THEN** order Site Evacuation using Attachment 5, Evacuation, (performed only once per event). ____

4. **IF** in a GE, **THEN** direct the development of a Protective Action Recommendation (mandatory) using Attachment 1, Protective Action Recommendations. ____

5. **IF** in a UE and conditions warrant **AND** SEC has Command & Control function, **THEN** terminate the UE using Attachment 6, Terminating a UE. ____

6. **IF** in an Alert, or higher **AND** conditions warrant **AND** SEC has Command & Control function, **THEN** terminate the event using RMT-2080-EOF-002, Emergency Termination and Recovery. ____

7. When the TSC-SEC or EOF-ED reports for duty, conduct turnover and transfer of command and control function using Data Sheet 2, Emergency Turnover Checklist. ____

CUE: Candidate obtains a copy of the EPP-100.

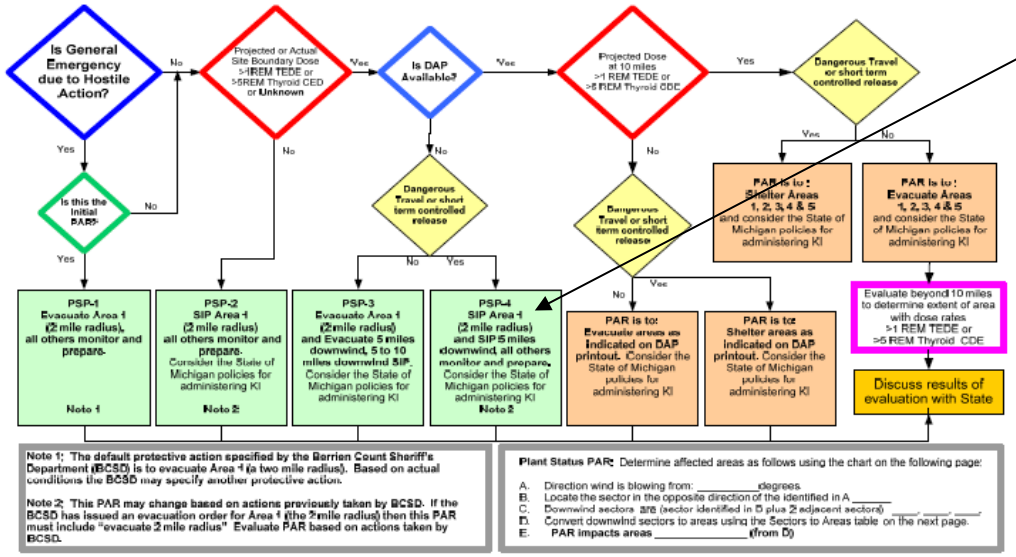
STANDARD: Obtain PMP-2080-EPP-100 and determines that a mandatory PAR applies (step 3,2.5 a 4) and refers to Attachment 1, Protective Action Recommendations.

SAT: ☐ UNSAT: ☐

COMMENT:

EXPECTED ACTIONS	CUES/STANDARDS ("**Critical Step in bold**")

Reference	PMP-2080-EPP-100	Rev.27	Page 13 of 59
Emergency Response			
Attachment 1	Protective Action Recommendations		Pages: 12 - 15



STANDARD: Refers to Attachment 1, Protective Action Recommendations and determines that PSP-4 applies (SIP Area 1 [2 mile radius] and SIP 5 miles downwind – SECTORS E, F, and G)

Critical Step

SAT: ☐ UNSAT: ☐

COMMENT:

Terminating cue: JPM is terminated when the applicant recommends a PAR.