UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

November 3, 1998

NOTE TO: NRC Document Control Desk
Mail Stop 0-5-D-24

FROM: Mary Ann Bies, Licensing Assistant
Operating Licensing Branch, RIII

Mary Ann Bies

SUBJECT: OPERATOR LICENSING EXAMINATION ADMINISTERED THE WEEK OF SEPTEMBER 14, 1998, AT BYRON NUCLEAR POWER STATION, DOCKET NOS. 50-454 AND 50-455

During the week of September 14, 1998, Operator Licensing Examinations were administered at the referenced facility. Attached, you will find the following information for processing through NUDOCS and distribution to the NRC staff, including the NRC PDR:

Item #1 - a) Facility submitted outline and initial exam submittal, designated for distribution under RIDS Code A070.

b) As-given operating examination, designated for distribution under RIDS Code A070.

Item #2 - Examination Report with the as-given written examination attached, designated for distribution under RIDS Code IE42.

Attachments: As stated

FINAL AS-ADMINISTERED OPERATING TEST IN ITS ENTIRETY FOR THE BYRON EXAMINATION - THE WEEK OF SEPTEMBER 14, 1998

0/1

A070

FINAL AS-ADMINISTERED ADMINISTRATIVE JPMS FOR BYRON EXAM - SEP 1998

Facility: Byron 1 & 2 Date of Examination: September 14, 1998
Examination Level: RO Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A1	Plant Parameter Verification / Complete An Estimated Critical Condition Checklist	1. JPM K/A 2.1.7 3.7/4.4
	Performing a Surveillance/ Normal and Alternate Offsite AC Power Availability Weekly Surveillance	1. JPM K/A 2.1.18 2.9/3.0
A2	Clearance And Tagging / Identify And Replace Blown Fuse	1. JPM K/A 2.2.13 3.6/3.8
A.3	Protection From Radiation Exposure / Prepare For Entry Into High Radiation Area > 1000 mr/hr	1. JPM K/A 2.3.10 2.9/3.3
A.4	Emergency Plan / Emergency Plan Directions	2. a. K/A 2.4.39 3.3/3.1 Emergency Exposures
		2. b. K/A 2.4.29 2.6/4.0 Emergency facilities

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Complete Calculation of an Estimated Critical Condition

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.2.36	2.8/3.2*
2.1.25	2.8/3.1

JPM NUMBER	Task Number	Job Position
ADMIN 1.1 RO		NSO

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ______________ Stop Time: ______________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ______________ [ ] Other______________

EXAMINEE: ______________________ EVALUATOR: ______________________

DATE: ______________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

Specific Information:

1. These items were used as reference material in the development of this JPM:
   1BGP 100-7T1 (RRD); 1BGP 100-7T3; Curve Book BCB-1

2. These items are expected to be used by the examinee in the performance of the task:
   1BGP 100-7T3; BCB-1

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Unit 1 is performing a plant startup following a reactor trip 18 hours previous. Operation prior to the trip was for a period of 80 days at 100% power, following initial startup with current core (Cycle 9).

   b. Task Initiating Condition:
      1BGP 100-7T3 is being performed to provide the ESTIMATED CRITICAL CONDITION (ECC) for the plant startup. Current plant conditions and the most recent Reference Reactivity Data (RRD) worksheet are provided. The process computer is currently unavailable. The Critical Rod Position is desired at 138 steps on Control Bank D.

   c. Initiating Cue:
      The US directs you to complete the ECC for the planned startup in 2 hours.

   d. Your Position:
      NSO (ADMIN)

4. Terminal Performance Objective: (TPO)
   Calculate ECC including administrative limits.

5. Critical Steps(*)
   5, 6, 10, 12, 14, 16, 19, 20, 21, 22 (1BGP 100-7T3 Sections A.3, A.4, A.5.d, A.6.b, A.6.d, A.8, A.9.c, A.9.d, A.9.e, A.9.g, A.9.h and A.9.i.)

6. Identification of Impacted Systems:

If this task is performed incorrectly, the following adverse reactions could occur:

The reactor could be taken critical in conditions NOT allowed by the facility license.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

RECORD START TIME ________.

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*************************************************************
*                          NOTE                             *
* The candidate is to be supplied with the completed RRD    *
* (1BGP 100-7T1) and a blank copy of 1BGP 100-7T3.          *
*                                                           *
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PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
1. Refer to 1BGP 100-7T3. (May be done at any time.)	Refer to 1BGP 100-7T3.	☐	☐	☐
2. Record Admin Data. **(CUE: SU # - 98-2-1TEST Startup Date - TODAY Time - 2 HOURS FROM CURRENT TIME Shutdown Date & Time - 18 HOURS BEFORE CURRENT TIME.)**	Record the following information: o Unit 1 SU #: 98-2-1TEST o SU date & time: 2 hrs from current o SD date & time: 18 hrs before current o Time Interval since shutdown: 20 hrs	☐	☐	☐
3. Determine Change in Power Defect.	Enter 100% power value for Power Defect from RRD: -1317 pcm Calculate difference: +1317 pcm.	☐	☐	☐

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*************************************************************
*                          NOTE                             *
* ITC at SU Tave & RCS Boron Conc. may be determined from   *
* BCB-1 Table 2-3 but is NOT required since Tave will NOT   *
* deviate from 557°F.  Value at 1092 ppm (1717 EFPH) = -    *
* 8.8 pcm/°F.                                               *
*                                                           *
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PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
4. Change in RCS Temperature.	Enter 557 from given conditions. Calculate temperature change reactivity: 0 pcm	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
* 5. Change in Samarium. (BCB-1 Table 1-4)	Enter 1700 EFPH and 100% from RRD and 20 hours as elapsed time since shutdown. Determine SU Samarium Worth of -1002 pcm. (20 hours after SD from 100% at 1717 EFPH) Enter -919 pcm from RRD. Calculate Difference Samarium: -83 pcm.	☐	☐	☐
* 6. Change in Xenon. (BCB-1 Table 1-2 or Fig. 8c)	Enter 1700 EFPH and 100% from RRD and 20 hours as elapsed time since shutdown. Determine SU Xenon Worth of -3318 pcm. (20 hours after SD from 100% at 1717 EFPH) Enter -2982 pcm from RRD. Calculate Difference Xenon: -336 pcm.	☐	☐	☐
7. Determine Overall Poisons.	Enter Differences -83 pcm Sm and -336 pcm Xe. Calculate Overall Poisons: -419 pcm.	☐	☐	☐
8. Determine SD integral boron worth for RRD burnup, RRD RCS boron Conc and HZP Tave. (BCB-1 Table 1-5)	Interpolate and determine boron: -9349pcm (-9300 to -9400 pcm).	☐	☐	☐
9. Determine Poison Correction Factor for Integral Boron Worth (BCB-1 Figure 8b calculation)	Calculate Poison Correction factor: +0.888 (+0.887 to +0.889).	☐	☐	☐
* 10. Determine corrected poisons reactivity worths.	Determine/calculate corrected poisons worths: -372 pcm.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
11. Record desired Control Bank position.	Enter 138 steps CB D.	☐	☐	☐
* 12. Determine desired Control Bank Worth. (BCB-1 Table 1-8 or Fig 2D)	Enter 138 steps CBD Bank Worth: -250.1 pcm.	☐	☐	☐
13. Record HFP inserted Rod Worth prior to Shutdown.	Enter -9.5 pcm from RRD.	☐	☐	☐
* 14. Determine change in reactivity due to change in rod position.	Calculate total reactivity of -240.6 pcm.	☐	☐	☐
15. Determine change in burnup correction.	Section is N/A per NOTE. Places N/A in proper sections.	☐	☐	☐
* 16. Determine Reactivity Balance.	Record reactivity worths from appropriate Sections: o Power Defect (A.1) [+1317 pcm] o Isothermal Temp. Defect (A.2) [0 pcm] o Corrected Poisoning Defect (A.5.d) [-372 pcm] o Rod Adjustments (A.6.d) [-240.6 pcm] o Burnup correction (A.7.d) [0 pcm] **AND** Calculate difference of +704.4 pcm (+704 to +705 pcm).	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
17. Determine Differential Boron Worth at assumed critical boron concentration. (BCB-1 Table 2-4, Fig. 10A)	Interpolate and determine Differential Boron Worth at 1100 ppm and 557°F: -8.82 pcm/ppm (-8.80 to -8.90 pcm/ppm).	☐	☐	☐
18. Determine the change in RCS Boron needed.	Calculate the boron concentration change of -80 ppm (-79 to -81 ppm).	☐	☐	☐
* 19. Determine initial critical RCS Boron concentration.	Enter RCS boron concentration from RRD: +1010 ppm. Enter calculated RCS boron change required: -80 ppm. Calculated critical boron concentration: 1090 ppm (1089 to 1091 ppm).	☐	☐	☐

NOTE

If necessary, direct the candidate that it is NOT necessary to re-perform of Section 9.a through 9.c for difference in assumed boron concentration and calculated boron concentration.

NOTE

The following steps combine the steps of calculating the Administrative Limit values and determining the associated Control Bank position. The procedure performs these steps separately: Calculation of each of the three values, the determining the associated Threshold Control Bank position.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
* 20. Calculate +500 pcm inserted rod worth threshold. Determine corresponding Control Bank Upper Administrative Threshold position. (BCB-1 Table 1-8 or Fig 2D)	Enter Desired Rod Worth: -250.1 pcm. Calculate +500 pcm worth: +249.9 pcm. **AND** Determine that maximum allowed value is full out park position on CBD (228 steps) .	☐	☐	☐
* 21. Calculate -500 pcm inserted rod worth threshold. Determine corresponding Control Bank Lower Administrative Threshold position. (BCB-1 Table 1-8 or Fig 2D)	Enter Desired Rod Worth: -250.1 pcm. Calculate -500 pcm worth: -750.1 pcm. **AND** Determine that minimum allowed value is 41 steps on CBD. (37 to 45 steps)	☐	☐	☐
* 22. Calculate -750 pcm inserted rod worth threshold. Determine corresponding Control Bank Upper Administrative Threshold position. (BCB-1 Table 1-8 or Fig 2D)	Enter Desired Rod Worth: -250.1 pcm. Calculate -750 pcm worth: -1000.1 pcm. **AND** Determine that minimum allowed value is 5 steps on CBD [OR 121 steps on CBC]. (1 to 10 steps CBD OR 117 to 125 steps CBC)	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
23. Complete Critical Condition Summary.	Record the following information: o Present boron conc - 1400 ppm o Est. Critical Boron conc - 1090 ppm (or value determined) o Est. Critical Bank position - CB **D** at 138 steps o Upper Admin Limit - CB **D** at 228 steps o Lower Admin Limit - CB **D** at 41 steps (or value determined) o -750 pcm Admin Limit - CB **D** at 5 steps OR CB **C** at 121 steps (or value determined) **AND** Sign & date for ECC performed by.	☐	☐	☐

RECORD STOP TIME ________.

COMMENTS:

DATA SHEET

CURRENT

RCS Boron concentration	-	1400 ppm
RCS temperature	-	557°F
RCS pressure	-	2235 psig
Power level	-	0%
Rod Position	-	All control and shutdown banks inserted
Time since trip	-	18 hours

Startup planned to occur in 2 hours

Desired boron concentration	-	1100 ppm
Desired critical rod position	-	66 steps withdrawn on CBD
Desired critical RCS temp	-	557°F

HISTORY

RRD Data taken at time of trip.

TASK CONDITIONS:

1BGP 100-7T3 "Calculation Of Estimated Critical Condition Based On A Known Rod Position" is being performed to provide the ESTIMATED CRITICAL CONDITION (ECC) for the plant startup. Current plant conditions and the most recent Reference Reactivity Data (RRD) worksheet are provided. The process computer is currently unavailable. The Critical Rod Position is desired at 138 steps on Control Bank D.

INITIATING CUES:

The US directs you to complete the ECC for the planned startup in 2 hours.

DATA SHEET

CURRENT

RCS Boron concentration	-	1400 ppm
RCS temperature	-	557°F
RCS pressure	-	2235 psig
Power level	-	0%
Rod Position	-	All control and shutdown banks inserted
Time since trip	-	18 hours

Startup planned to occur in 2 hours

Desired boron concentration	-	1100 ppm
Desired critical rod position	-	66 steps withdrawn on CBD
Desired critical RCS temp	-	557°F

HISTORY

RRD Data taken at time of trip.

File Location: 1.02.0128

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION

*

> **NOTE**
> IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or, IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by an NSO. Typically, the Systems Engineering Dept. Nuclear Group should perform this procedure.

*, 2.c

Unit 1 Startup Number ________-________-________
YR - SU# - ECC#

Startup Date ______/______/______ Startup Time ____:____

Shutdown Date ______/______/______ Shutdown Time ____:____
(From RRD Step F.2.a) (From RRD Step F.2.a)

Time Interval Since Shutdown __________ Hours

> **NOTE**
> 1BGP 100-7T3, Calculation of Estimated Critical Condition Based on a Known Rod Position, can be used to manually calculate Critical Rod Position based on a known rod position. If a manual ECC for a Critical Rod Position based on a known boron concentration is required, use 1BGP 100-7T2, Calculation of Estimated Critical Condition Based on a Known Boron Concentration. 1BGP 100-7T3, Calculation of Estimated Critical Condition Based on a Known Rod Position, will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Systems Engineering Dept. Nuclear Group for review when no longer required on shift for reference. Upon completion of their review this form will be forwarded to Central File for permanent retention.

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
When referencing graphs or tables, use Hot Full Power (HFP) data prior to shutdown and Hot Zero Power (HZP) data prior to startup. Also, verify data corresponds to the proper core burnup.

A. MANUAL CALCULATIONS

1. Change in Power Defect:

DETERMINE the startup and shutdown Power Defect values and their difference using RRD step F.1.f or equivalent:

____0____ pcm	-	(-)__________ pcm	=	(+)__________ pcm	
Startup Power Defect		Shutdown Power Defect (RRD Step F.1.f)		Difference Power Defect	

2. Change in RCS Temperature:

DETERMINE the startup Isothermal Temperature Defect (ITD) value by multiplying the temperature deviation from program Tave by the Isothermal Temperature Coefficient (ITC) determined at the startup RCS Tave, and at the projected startup RCS Boron concentration with the aid of BCB-1 Table 2-3 or equivalent:

(________°F	-	557°F)	*	________ pcm/°F	=	________ pcm
Expected Tave at Startup		Program Tave at Startup		ITC at Expected Startup Tave and RCS Boron Concentration		Startup ITD

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

> **NOTE**
> During non-equilibrium Samarium conditions, different methods of predicting Samarium Worth should be consulted. If a different method (other than specified in this procedure) for determining Samarium Worth for Step A.3 is used, two QNE's shall concur.

3. Change in Samarium:

DETERMINE the startup and shutdown Samarium worth values and their difference at the applicable burnup, the Samarium Equivalent Power(%) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-4 or equivalent:

	Startup	
Applicable Burnup: (RRD Step F.2.b)	______	EFPH
Samarium Equivalent Power: (RRD Step F.2.c)	______	%
Elapsed Time Since Shutdown:	______	hours

(-) __________ pcm - (-) __________ pcm = (-) __________ pcm

Startup Samarium Worth	Shutdown Samarium Worth (RRD Step F.1.h)	Difference Samarium

*

> **NOTE**
> During nonequilibrium Xenon conditions, different methods of predicting Xenon worth should be consulted. The empirical method of ertimating Xenon Worth of Startup (36 hr weighted average) is only valid beyond approximately 16 hours after shutdown. If a different method (other than specified in this procedure) for determining Xenon Worth for Step A.4 is used, two QNE's shall concur.

*, 2.i

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

*

NOTE

The Systems Engineering Dept. Nuclear Group shall verify that the Process/Prime inputs to the BEACON computer are accurate by performing BVP 500-14, Beacon Operability Verification, and BVP 500-16, Beacon Estimated Critical Condition Calculation, if the BEACON program is used to support ECC calculations.

*, 2.d

4. Change in Xenon:

DETERMINE the startup and shutdown Xenon worth values and their difference at the applicable burnup, the Xenon Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-2, Figure 8c, or equivalent:

	Startup	
Applicable Burnup: (RRD Step F.2.b)	_______	EFPH
Xenon Equivalent Power: (RRD Step F.2.d)	_______	%
Elapsed Time Since Shutdown:	_______	hours

(-) ____________ pcm - (-) ____________ pcm = ( ) ____________ pcm

Startup Xenon Worth	Shutdown Xenon Worth (RRD Step F.1.i)	Difference Xenon

5. Change in Overall Poisons:

DETERMINE the change in poisons by correcting Xenon and Samarium with respect to RCS Boron.

a. DETERMINE the overall sum of poisons by adding the Samarium difference to the Xenon difference:

(-) ____________ pcm + ( ) ____________ pcm = ( ) ____________ pcm

Samarium Difference (A.3)	Xenon Difference (A.4)	Overall Poisons

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

b. **DETERMINE** the shutdown Integral Boron Worth at the RRD Step F.1.g burnup, the RRD Step F.1.d RCS Boron concentration and HZP Tave with the aid of BCB-1 Table 1-5 or equivalent:

Integral Boron Worth: (-)__________ pcm

c. **DETERMINE** the poison correction factor by substituting the Integral Boron Worth from step A.5.b into the equation shown on BCB-1 Figure 8b:

Poison Correction Factor: (+)__________

d. **DETERMINE** the corrected poisons reactivity worth from the original sum of Xenon and Samarium from step A.5.a multiplied by the determined correction factor from step A.5.c:

( )__________ pcm	*	(+)__________ pcm	=	( )__________ pcm
Overall Poisons (A.5.a)		Poison Correction Factor (A.5.c)		Corrected Overall Poisons

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

6. Change in Rods:

DETERMINE the reactivity change due to adjustments in rod position.

*

> **NOTE**
> A control bank position of CBD withdrawn to at least 130 steps should be used as the desired control bank position for all ECCs. This will exchange rod worth for boron worth. There is less uncertainty associated with boron worth as compared with rod worth. Boron worth also changes less throughout core life when compared to rod worth. If plant conditions do not allow a choice of CBD position withdrawn to at least 130 steps, then the reason for the deviation shall be documented in Section D under the remarks. Either way, the CBD position SHALL be within 750 pcm of the fully withdrawn position.

*, 2.c

a. RECORD the desired Control Bank position:

CB __________ at ________ steps.

b. DETERMINE the desired Control Bank position worth recorded in step A.6.a at the RRD Step F.2.b burnup with the aid of BCB-1 Table 1-8, Figure 2D, or equivalent:

Desired Control Bank Worth: (-)____________ pcm

c. RECORD the HFP inserted rod worth prior to shutdown from RRD step F.1.c or equivalent:

HFP Inserted Rod Worth: (-)____________ pcm
(RRD Step F.1.c)

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

d. DETERMINE the change of reactivity due to the change in rod position by subtracting the HFP Inserted Rod Worth (A.6.c) from the Desired Inserted Rod Worth (A.6.b):

(-) ____________	pcm -	(-) ____________	pcm =	( ) ____________	pcm
Desired Rod Worth (A.6.b)		HFP Inserted Rod Worth (A.6.c)		Change in Rod Position	

NOTE
If RRD Steps F.1.g and F.2.b contain the same burnup, step A.7 may be marked "N/A".

7. Change in Burnup:

DETERMINE the calculation for correcting burnup.

a. DETERMINE the RRD Step F.1.g burnup design Boron concentration by using BCB-1 Figure 11 or equivalent:

Stable Reference Design Boron Concentration: __________ ppm

b. DETERMINE the RRD Step F.2.b burnup design Boron concentration by BCB-1 Figure 11 or equivalent:

Final Power Operation Design Boron Concentration: ______ ppm

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

> **NOTE**
>
> If BCB-1 Figure 10a, Table 2-4 does NOT contain HFP data, the FOLLOW code method for determining DBW at HFP would be the preferred method. Using HZP data will result in a DBW value -0.5 to -1.0 pcm/ppm more negative than a HFP value. For purposes of NSO Independent Verification of FOLLOW code output, Figure 10a may be used as a qualitative check against the attached FOLLOW code output.

c. DETERMINE the Differential Boron Worth (DBW) of the RRD Step F.1.g Burnup and RRD Step F.1.d Boron Concentration by one of the following methods (circle method used):

1). Figure 10a, Table 2-4, or equivalent

2). FOLLOW Code Output (attach copy of output)

Differential Boron Worth = (-)__________ pcm/ppm

d. DETERMINE the burnup correction by subtracting the Final Power Operation Design Boron Concentration (A.7.b) from the Stable Reference Design Boron Concentration (A.7.a) and multiplying by the Differential Boron Worth (A.7.c)

[_______ ppm -	_________ ppm] *	______ pcm/ppm =	( )______ pcm
Stable Reference Design Boron Concentration (A.7.a)	Final Power Operation Design Boron Concentration (A.7.b)	DBW (A.7.c)	Burnup Correction

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

8. DETERMINE the Reactivity Balance by summing the following values:

Power Defect (A.1)	(+) ________	pcm
Isothermal Temperature Defect (A.2)	( ) ________	pcm
Corrected Poisoning Defect (A.5.d)	( ) ________	pcm
Rod Adjustments (A.6.d)	( ) ________	pcm
Burnup Correction (A.7.d)	+ ( ) ________	pcm
REACTIVITY BALANCE	( ) ________	pcm

9. Determination of Critical RCS Boron:

NOTE
This section may need to be repeated if the assumed critical Boron Concentration for step A.9.a differs from that determined in step A.9.c.

a. DETERMINE the Differential Boron Worth at the RRD Step F.2.b burnup, assumed critical RCS Boron concentration, and at the startup RCS Tave with the aid of BCB-1 Table 2-4, Figure 10A, or equivalent:

Differential Boron Worth: (-) ________ pcm/ppm

b. DETERMINE the change in RCS Boron needed by dividing the Reactivity Balance in step A.8 by the Differential Boron Worth in step A.9.a:

( ) ________ pcm / (-) ________ pcm/ppm = ( ) ________ ppm

Reactivity Balance (A.8)	Differential Boron Worth (A.9.a)	Change in RCS Boron

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

c. DETERMINE the critical RCS Boron concentration by adding the change in RCS Boron step A.9.b to the RRD step F.1.d Boron Concentration:

( ) __________ ppm - ( ) __________ ppm = __________ ppm
RCS Boron at RRD Step 1.d — Change in RCS Boron (A.9.b) — Critical RCS Boron

* d. CALCULATE the + 500 pcm inserted rod worth threshold:

(-) __________ pcm + 500 pcm = ( ) __________ pcm
Desired Rod worth
(A.6.b)

*, 2.c

* e. CALCULATE the - 500 pcm inserted rod worth threshold:

(-) __________ pcm - 500 pcm = (-) __________ pcm
Desired Rod worth
(A.6.b)

*, 2.c

f. CALCULATE the (-) 750 pcm inserted rod worth limit:

(-) __________ pcm - 750 pcm = (-) __________ pcm
Desired Rod worth
(A.6.b)

* g. DETERMINE the control bank position corresponding to the Upper Administrative Threshold by using BCB-1, Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.d at the RRD Step F.2.b burnup. Do not exceed the full-out park position on Control Bank D:

Upper Administrative Threshold: CB _______ at __________ steps
*, 2.c

* h. DETERMINE the control bank position corresponding to the Lower Administrative Threshold by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.e at the RRD Step F.2.b burnup. Do not use a position below 47 steps on Control Bank C:

Lower Administrative Threshold: CB _______ at __________ steps
*, 2.c

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

i. DETERMINE the control bank position corresponding to the -750 Administrative Limit by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.f at the RRD Step F.2.b burnup. Do not use a position below 47 steps on Control Bank C:

- 750 pcm Administrative Limit: CB _______ at __________ steps

*

> **NOTE**
> Notify the Duty Station Manager if the hand calculated ECC differs by more than 250 pcm from the BEACON generated ECC (if BEACON is used). Station Duty Officer concurrence is required before proceeding with the startup.

*, 2.f

B. ESTIMATED CRITICAL CONDITION SUMMARY

Present Boron Concentration ____________ ppm
Estimated Critical Boron Concentration _________ ppm (A.9.c)
Estimated Critical Bank Position CB _______ at _________ steps (A.6.a)

* Upper Administrative Threshold: CB _______ at __________ steps (A.9.g)

*, 2.c

* Lower Administrative Threshold: CB _______ at __________ steps (A.9.h)

*, 2.c

- 750 pcm Administrative Limit: CB _______ at __________ steps (A.9.i)

ECC performed by ______________________ _________ (NSO, Qualified Nuclear Engineer)
NAME DATE

ECC reviewed by ______________________ _________ (NSO, Qualified Nuclear Engineer)
NAME DATE

* Complete the "ECC parameters" placard and give to the Startup NSO.

*, 2.c

_____/_____
Startup SRO

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CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

C. ESTIMATED CRITICAL POSITION FROM COUNTS INCREASING EIGHTFOLD

*

> **NOTE**
> Any difference between the estimated time and the actual time for criticality could impact the final critical position. Contact Systems Engineering Dept. Nuclear Group to estimate the magnitude of this effect.

*, 2.c

1. Base Count Rate With Shutdown Banks Out _________ cps.

   Source Range Channel N __________.

2. Counts Increase Eightfold at Control Bank _______ at ______steps.

3. Predicted Critical Position From BCB-1, Figure 9.

   Control Bank __________ at ___________ steps.

*

> **NOTE**
> If the eight-fold curve indicates that criticality will be achieved below the -750 pcm Administrative Limit, GO TO 1BGP 100-2A1, ATTACHMENT A, Contingency for Suspended Reactor Startup Due to Unanticipated Reactivity Deviation (Page 16).

*, 2.c

4. VERIFY the predicted Critical Control Bank Position in C.3 is ABOVE the Rod Insertion Limit (i.e. CBC is greater than 47 steps withdrawn) and - 750 pcm Administrative Limit. If not, DO NOT PROCEED WITH APPROACH TO CRITICALITY. The RCS Boron Concentration must be increased and the ECC recalculated.

_____/_____/_____
SRO Date Time

5. VERIFY the predicted Critical Control Bank Position in C.3 is within the ± 500 pcm Administrative Threshold. If not, a PIF shall be generated and ICRR data points shall be obtained at ≤ 20 step intervals until criticality is achieved.

_____/_____/_____
QNE Date Time

APPROVED

MAY 21 1998

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

6. RECORD the following information if criticality is achieved and power is stabilized at 10^{-8} amps on the highest reading IR Channel.

a. Actual Time of Critical Data. ________

b. Actual Critical Bank Position. ______ at ________ steps

c. Actual Critical Boron Concentration. ________ ppm

d. Actual Temperature at time of Criticality. ________ °F

D. REMARKS: ____________________

________ / ________
NUCLEAR GROUP   DATE

APPROVED

MAY 21 1998

(0645VV/WPF/042398)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

E. MARGIN TO CRITICALITY WITH SHUTDOWN BANKS WITHDRAWN

NOTE

The purpose of this section is to ensure:

1. The basis to the BDPS Analysis is met (- 1300 pcm Shutdown), and
2. An inadvertent Mode Change does not occur (K_{eff} < 0.99).

1. DETERMINE the Total Control Bank Worth (CBA @ 0 steps) at the RRD Step F.2.b burnup with the aid of BCB-1 Table 1-8, Figure or equivalent:

   Total Control Bank Worth: (-)________ pcm

NOTE

The following step takes into account 500 pcm uncertainty on the ECC calculation for conservatism.

2. DETERMINE the Required Boron Reactivity to satisfy the Margin to Criticality by completing the following arithmetic:

Total Control Bank Worth (E.1):	+ (-)________	pcm
Control Bank Required Reactivity (A.6.b):	- (-)________	pcm
Bounding Margin to Criticality:	- (-) 1300	pcm
Conservatism:	+ 500	pcm
Required Boron Reactivity	= ( )________	pcm

APPROVED

MAY 21 1998

(0645VV/WPF/042398)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

3. Determination of the Minimum RCS Boron Concentration which satisfies the Margin to Criticality:

a. DETERMINE the difference between the RCS Boron Concentration necessary to meet the Margin to Criticality requirements and the ECC Boron Concentration by dividing the Required Boron Reactivity calculated in Step E.2 by the Differential Boron Worth in Step A.9.a:

( ) ________ ppm	/ (-) ________ pcm/ppm	= ( ) ________ ppm
Required Boron Reactivity (E.2)	Differential Boron Worth (A.9.a)	Difference in RCS Boron Concentration

b. DETERMINE THE Minimum RCS Boron Concentration necessary to meet the Margin to Criticality requirements by subtracting the difference in RCS Boron Concentration calculated in Step E.3.a from the ECC Boron Concentration:

( ) ________ ppm	- ( ) ________ ppm	= ( ) ________ ppm
ECC Boron Concentration (A.9.c)	Difference in RCS Boron Concentration (E.3.a)	Minimum Required RCS Boron Concentration

4. VERIFY Sufficient Margin to Criticality:

a. RECORD the present RCS Boron Concentration from the most recent Boron sample:

____________	____________	___/___/___
Present RCS Boron Concentration	Sample Time	Date

b. Is the present RCS Boron Concentration GREATER THAN OR EQUAL TO the Minimum RCS Boron Concentration calculated in Step E.3.b? (Circle one)

YES NO

APPROVED

MAY 21 1998

(0645VV/WPF/042398)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

5. If the answer in Step E.4.b is "NO", DO NOT withdraw Shutdown Banks until the RCS Boron Concentration is greater than or equal to the Minimum RCS Boron Concentration calculated in Step E.3.b.

______/______/______
SRO Date Time

APPROVED

MAY 21 1998

(Final)

File Location: 1.02.0128

REFERENCE REACTIVITY DATA WORKSHEET

NOTE
This worksheet will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Operating Staff when no longer required on shift for reference.

Unit One Startup Number ______ - ______ - ______
Year - S/U# - RRD#

1. Stable Reference Reactivity Data

NOTE
The data recorded in Step 1 shall be data from a stable core condition. Contact the Nuclear Group for assistance, if necessary. An exception to the stability criteria would be if this RRD were for a recent reactor startup.

(20 hours prior to current time) 1.a. Reference Date: ______ Reference Time: ______

1.b. Control Bank D at 213 steps.

* 1.c. Inserted Control Bank Worth

BCB-1 Table 1-7, Figure 2, Figure 2C, or equivalent (-) 9.5 pcm

* 1.d. Critical Boron Concentration from (CIRCLE mode of analysis used):

1). Accurate sample at a recent known stable condition.

2). Calculated by the Qualified Nuclear Engineer

(Attach calculations, logs, point history used)

C_B = 1010 ppm Time/Date: _____/_____ (24 hours prior to current time)

1.e. Reference power level from BURP:

Stable Power: 100 %

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

1.f. Total Power Defect from:

BCB-1 Figure 17A, Table 2-1, or equivalent (-) 1317 pcm

1.g. RECORD accumulated core average burnup from BURP:

Core Average Burnup: 1700 EFPH

NOTE
If this RRD is being performed to reference a recent reactor sta tup, obtain the Samarium Worth from the applicable ECC Step 3 for Startup Samarium Worth or 1BVS XPT-13, as applicable. N/A the Samarium Equivalent Power.

1.h. Equivalent Power for Samarium Calculation from (BURP and Samarium Worth):

Sm Eq. PWR = Unweighted average power over 5 days (120 hrs)

Sm Eq. PWR = 100 %

Sm Worth from BCB-1 Table 1-4 or equivalent at 0 hrs after shutdown (-) 919 pcm

NOTE
If this RRD is being performed to reference a recent reactor startup, obtain the Xe Worth from the applicable ECC Step 4 for Startup Xenon Worth or 1BVS XPT-13, as applicable.

1.i. Determine the Xenon Worth from power in Step 1.e and BCB-1 Figure 8c, Table 1-2, or equivalent:

Xe Worth (-) 2982 pcm

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

2. Final Power Operation Reference Reactivity Data:

> **NOTE**
> The data recorded in Step 2 shall include the operating history of the reactor until it is shutdown. If the reactor tripped from a stable condition, record the applicable data from Step 1 into Step 2.

(20 hours prior to current time) 2.a. Reference Date: ________ Reference Time: ________

2.b. RECORD accumulated core average burnup from BURP:

Core Average Burnup: 1700 EFPH

2.c. Equivalent Power for Samarium Calculation from BURP:

Sm Eq. PWR = Unweighted average power over 5 days (120 hrs)

Sm Eq. PWR = 100 %

2.d. Determine the Equivalent Power for Xenon Calculation from BURP or equivalent:

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

2.d. (continued)

Hours Prior to Shutdown	Average Power (%)	Multiplier		Product
0 to 1	100	x 6	=	600
1 to 2	100	x 5	=	500
2 to 3	100	x 5	=	500
3 to 4	100	x 5	=	500
4 to 5	100	x 4	=	400
5 to 6	100	x 4	=	400
6 to 7	100	x 4	=	400
7 to 8	100	x 4	=	400
8 to 9	100	x 4	=	400
9 to 10	100	x 3	=	300
10 to 11	100	x 3	=	300
11 to 12	100	x 3	=	300
12 to 13	100	x 3	=	300
13 to 14	100	x 3	=	300
14 to 15	100	x 3	=	300
15 to 16	100	x 3	=	300
16 to 17	100	x 2	=	200
17 to 18	100	x 2	=	200
18 to 19	100	x 2	=	200
19 to 20	100	x 2	=	200
20 to 21	100	x 2	=	200
21 to 22	100	x 2	=	200
22 to 23	100	x 2	=	200
23 to 24	100	x 2	=	200
24 to 25	100	x 2	=	200
25 to 26	100	x 1	=	100
26 to 27	100	x 1	=	100
27 to 28	100	x 1	=	100
28 to 29	100	x 1	=	100
29 to 30	100	x 1	=	100
30 to 31	100	x 1	=	100
31 to 32	100	x 1	=	100
32 to 33	100	x 1	=	100
33 to 34	100	x 1	=	100
34 to 35	100	x 1	=	100
35 to 36	100	x 1	=	100

TOTAL = 9100

RE:ERENCE REACTIVITY DATA WORKSHEET
(continued)

2.d. (continued)

Equivalent Power for Xenon = $\frac{\text{Total}}{91}$ = $\frac{9100}{91}$

Xe Eq. PWR: 100 %

Remarks: None

NOTE
IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or, IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by the NSO. Typically, this procedure should be prepared by the Systems Engineering Dept. Nuclear Group. An independent member of the SED Nuclear Group should review the assumptions and calculations of the RRD for accuracy.

Performed by: ____________________/________ (NSO, Qualified Nuclear Engineer)
Name Date

Reviewed by: ____________________/________ (NSO, Qualified Nuclear Engineer)
Name Date

SRO: ____________________/________
Name Date

(Final)

RO KEY

File Location: 1.02.0128

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION

NOTE
IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or, IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by an NSO. Typically, the Systems Engineering Dept. Nuclear Group should perform this procedure.

*, 2.c

Unit 1 Startup Number ______-______-______
YR - SU# - ECC#

Startup Date ______/______/______ Startup Time ____:____

Shutdown Date ______/______/______ Shutdown Time ____:____
(From RRD Step F.2.a) (From RRD Step F.2.a)

Time Interval Since Shutdown 20 Hours

NOTE
1BGP 100-7T3 can be used to manually calculate Critical Rod Position based on a known rod position. If a manual ECC for a Critical Rod Position based on a known boron concentration is required, use 1BGP 100-7T2. 1BGP 100-7T3 will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Systems Engineering Dept. Nuclear Group for review when no longer required on shift for reference. Upon completion of their review this form will be forwarded to Central File for permanent retention.

RO KEY

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
When referencing graphs or tables, use Hot Full Power (HFP) data prior to shutdown and Hot Zero Power (HZP) data prior to startup. Also, verify data corresponds to the proper core burnup.

A. MANUAL CALCULATIONS

1. Change in Power Defect:

DETERMINE the startup and shutdown Power Defect values and their difference using RRD step 1.f or equivalent:

0 pcm - (-) 1317 pcm = (+) 1317 pcm

Startup Power Defect	Shutdown Power Defect (RRD Step 1.f)	Difference Power Defect

2. Change in RCS Temperature:

DETERMINE the startup Isothermal Temperature Defect (ITD) value by multiplying the temperature deviation from program Tave by the Isothermal Temperature Coefficient (ITC) determined at the startup RCS Tave, and at the projected startup RCS Boron concentration with the aid of BCB-1 Table 2-3 or equivalent.

(557 °F - 557°F) * -4.522 pcm/°F = 0 pcm

Expected Tave at Startup	Program Tave at Startup	ITC at Expected Startup Tave and RCS Boron Concentration	Startup ITD

(0645VV/WPF/110897)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
During non-equilibrium Samarium conditions, different methods of predicting Samarium Worth should be consulted. If a different method (other than specified in this procedure) for determining Samarium Worth for Step A.3 is used, two QNE's shall concur.

3. Change in Samarium:

DETERMINE the startup and shutdown Samarium worth values and their difference at the applicable burnup, the Samarium Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-4 or equivalent:

	Startup	
Applicable Burnup: (RRD Step 2.b)	1700	EFPH
Samarium Equivalent Power: (RRD Step 2.c)	100	%
Elapsed Time Since Shutdown:	20	hours

(-) 1002 pcm - (-) 919 pcm = (-) 83 pcm

Startup Samarium Worth	Shutdown Samarium Worth (RRD Step 1.h)	Difference Samarium

*

NOTE
During nonequilibrium Xenon conditions, different methods of predicting Xenon worth should be consulted. The empirical method of estimating Xenon Worth of Startup (35 hr weighted average) is only valid beyond approximately 16 hours after shutdown. If a different method (other than specified in this procedure) for determining Xenon Worth for Step A.4 is used, two QNE's shall concur.

*, 2.i

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

*

NOTE

The Systems Engineering Dept. Nuclear Group shall verify that the Process/Prime inputs to the BEACON computer are accurate by performing BVP 500-14 and BVP 500-16 if the BEACON program is used to support ECC calculations.

*, 2.d

4. Change in Xenon:

DETERMINE the startup and shutdown Xenon worth values and their difference at the applicable burnup, the Xenon Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-2, Figure 8c, or equivalent:

	Startup	
Applicable Burnup: (RRD Step 2.b)	1700	EFPH
Xenon Equivalent Power: (RRD Step 2.d)	100	%
Elapsed Time Since Shutdown:	20	hours

(-) 3318 pcm - (-) 2982 pcm = (-) 336 pcm

Startup Xenon Worth — Shutdown Xenon Worth (RRD Step 1.i) — Difference Xenon

5. Change in Overall Poisons:

DETERMINE the change in poisons by correcting Xenon and Samarium with respect to RCS Boron.

a. DETERMINE the overall sum of poisons by adding the Samarium difference to the Xenon difference:

(-) 83 pcm + (-) 336 pcm = (-) 419 pcm

Samarium Difference (A.3) — Xenon Difference (A.4) — Overall Poisons

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

b. DETERMINE the shutdown Integral Boron Worth at the RRD Step 1.g burnup, the RRD Step 1.d RCS Boron concentration and HZP Tave with the aid of BCB-1 Table 1-5 or equivalent:

Integral Boron Worth: (-) 9349 pcm

c. DETERMINE the poison correction factor by substituting the Integral Boron Worth from step A.5.b into the equation shown on BCB-1 Figure 8b:

Poison Correction Factor: (+) 0.888

d. DETERMINE the corrected poisons reactivity worth from the original sum of Xenon and Samarium from step A.5.a multiplied by the determined correction factor from step A.5.c:

(-) 419	pcm *	(+) 0.888	pcm =	(-) 372 pcm
Overall Poisons (A.5.a)		Poison Correction Factor (A.5.c)		Corrected Overall Poisons

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

6. Change in Rods:

DETERMINE the reactivity change due to adjustments in rod position.

*

NOTE

A control bank position of CBD withdrawn to at least 130 steps should be used as the desired control bank position for all ECCs. This will exchange rod worth for boron worth. There is less uncertainty associated with boron worth as compared with rod worth. Boron worth also changes less throughout core life when compared to rod worth. If plant conditions do not allow a choice of CBD position withdrawn to at least 130 steps, then the reason for the deviation shall be documented in Section D under the remarks. Either way, the CBD position SHALL be within 750 pcm of the fully withdrawn position.

*, 2.c

a. RECORD the desired Control Bank position:

CB D at 138 steps.

b. DETERMINE the desired Control Bank position worth recorded in step A.6.a at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2D, or equivalent:

Desired Control Bank Worth: (-) 250.1 pcm

c. RECORD the HFP inserted rod worth prior to shutdown from RRD step 1.c or equivalent:

HFP Inserted Rod Worth: (-) 9.5 pcm
(RRD Step 1.c)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

d. DETERMINE the change of reactivity due to the change in rod position by subtracting the HFP Inserted Rod Worth (A.6.c) from the Desired Inserted Rod Worth (A.6.b):

(-) 250.1 pcm	-	(-) 9.5 pcm	=	(-) 240.6 pcm
Desired Rod Worth (A.6.b)		HFP Inserted Rod Worth (A.6.c)		Change in Rod Position

> **NOTE**
> If RRD Steps 1.g and 2.b contain the same burnup, step A.7 may be marked "N/A".

7. Change in Burnup:

DETERMINE the calculation for correcting burnup.

a. DETERMINE the RRD Step 1.g burnup design Boron concentration by using BCB-1 Figure 11 or equivalent:

Stable Reference Design Boron Concentration: N/A ppm

b. DETERMINE the RRD Step 2.b burnup design Boron concentration by BCB-1 Figure 11 or equivalent:

Final Power Operation Design Boron Concentration: N/A ppm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
If BCB-1 Figure 10a, Table 2-4 does NOT contain HFP data, the FOLLOW code method for determining DBW at HFP would be the preferred method. Using HZP data will result in a DBW value -0.5 to -1.0 pcm/ppm more negative than a HFP value. For purposes of NSO Independent Verification of FOLLOW code output, Figure 10a may be used as a qualitative check against the attached FOLLOW code output.

c. DETERMINE the Differential Boron Worth (DBW) of the RRD Step 1.g Burnup and RRD Step 1.d Boron Concentration by one of the following methods (circle method used):

1). Figure 10a, Table 2-4, or equivalent

2). FOLLOW Code Output (attach copy of output)

Differential Boron Worth = (-) N/A pcm/ppm

d. DETERMINE the burnup correction by subtracting the Final Power Operation Design Boron Concentration (A.7.b) from the Stable Reference Design Boron Concentration (A.7.a) and multiplying by the Differential Boron Worth (A.7.c):

[N/A ppm - N/A ppm] * N/A pcm/ppm = ( ) N/A pcm

Stable Reference Design Boron Concentration (A.7.a)	Final Power Operation Design Boron Concentration (A.7.b)	DBW (A.7.c)	Burnup Correction

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

8. DETERMINE the Reactivity Balance by summing the following values:

Power Defect (A.1)	(+) 1317	pcm
Isothermal Temperature Defect (A.2)	( ) 0	pcm
Corrected Poisoning Defect (A.5.d)	(-) 372	pcm
Rod Adjustments (A.6.d)	(-) 240.6	pcm
Burnup Correction (A.7.d)	+ ( ) 0	pcm
REACTIVITY BALANCE	(+) 704.4	pcm

9. Determination of Critical RCS Boron:

> **NOTE**
> This section may need to be repeated if the assumed critical Boron Concentration for step A.9.a differs from that determined in step A.9.c.

a. DETERMINE the Differential Boron Worth at the RRD Step 2.b burnup, assumed critical RCS Boron concentration, and at the startup RCS Tave with the aid of BCB-1 Table 2-4, Figure 10A, or equivalent:

Differential Boron Worth: (-) 8.82 pcm/ppm

b. DETERMINE the change in RCS Boron needed by dividing the Reactivity Balance in step A.8 by the Differential Boron Worth in step A.9.a:

(+) 704.4	pcm /	(-) 8.82	pcm/ppm =	(-) 80	ppm
Reactivity Balance (A.8)		Differential Boron Worth (A.9.a)		Change in RCS Boron	

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

c. DETERMINE the critical RCS Boron concentration by adding the change in RCS Boron step A.9.b to the RRD step 1.d Boron Concentration:

(+) 1010 ppm - (-) 80 ppm = 1090 ppm
RCS Boron at RRD Step 1.d — Change in RCS Boron (A.9.b) — Critical RCS Boron

* d. CALCULATE the + 500 pcm inserted rod worth threshold:

(-) 250.1 pcm + 500 pcm = (+) 249.9 pcm
Desired Rod worth
(A.6.b)

*, 2.c

* e. CALCULATE the - 500 pcm inserted rod worth threshold:

(-) 250.1 pcm - 500 pcm = (-) 750.1 pcm
Desired Rod worth
(A.6.b)

*, 2.c

f. CALCULATE the (-) 750 pcm inserted rod worth limit:

(-) 250.1 pcm - 750 pcm = (-) 1000.1 pcm
Desired Rod worth
(A.6.b)

* g. DETERMINE the control bank position corresponding to the Upper Administrative Threshold by using BCB-1, Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.d at the RRD Step 2.b burnup. Do not exceed the full-out park position on Control Bank D:

Upper Administrative Threshold: CB D at 228 steps
*, 2.c

* i. DETERMINE the control bank position corresponding to the Lower Administrative Threshold by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.e at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

Lower Administrative Threshold: CB D at 41 steps
*, 2.c

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

i. DETERMINE the control bank position corresponding to the -750 Administrative Limit by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.f at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

- 750 pcm Administrative Limit: CB D (C) at 5 (121) steps

*

NOTE
Notify the Duty Station Manager if the hand calculated ECC differs by more than 250 pcm from the BEACON generated ECC (if BEACON is used). Station Duty Officer concurrence is required before proceeding with the startup.

*, 2.f

B. ESTIMATED CRITICAL CONDITION SUMMARY

Present Boron Concentration 1400 ppm
Estimated Critical Boron Concentration 1090 ppm (A.9.c)
Estimated Critical Bank Position CB D at 138 steps (A.6.a)

* Upper Administrative Threshold: CB D at 228 steps (A.9.g) *, 2.c

* Lower Administrative Threshold: CB D at 41 steps (A.9.h) *, 2.c

- 750 pcm Administrative Limit: CB D (C) at 5 (121) steps (A.9.i)

ECC performed by ____________ ________ (NSO, Qualified Nuclear Engineer)
NAME DATE

ECC reviewed by ____________ ________ (NSO, Qualified Nuclear Engineer)
NAME DATE

* Complete the "ECC parameters" placard and give to the Startup NSO. *, 2.c

_____/_____
Startup SRO

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

C. ESTIMATED CRITICAL POSITION FROM COUNTS INCREASING EIGHTFOLD

> **NOTE**
> A 1/M plot shall be maintained during startup.

*

> **NOTE**
> Any difference between the estimated time and the actual time for criticality could impact the final critical position. Contact Systems Engineering Dept. Nuclear Group to estimate the magnitude of this effect.

*, 2.c

1. Base Count Rate With Shutdown Banks Out ________ cps.

   Source Range Channel N __________.

2. Counts Increase Eightfold at Control Bank _______ at ______steps.

3. Predicted Critical Position From BCB-1, Figure 9.

   Control Bank ___________ at ____________ steps.

4. ENSURE the predicted Critical Control Bank Position in C.3 is ABOVE the Rod Insertion Limit (i.e. CBC is greater than 47 steps withdrawn) and - 750 pcm Administrative Limit. If not, DO NOT PROCEED WITH APPROACH TO CRITICALITY. The RCS Boron Concentration must be increased and the ECC recalculated.

   _____/_____/_____
   SRO Date Time

5. ENSURE the predicted Critical Control Bank Position in C.3 is within the ± 500 pcm Administrative Threshold. If not, Shift Manager and Qualified Nuclear Engineer concurrence is required to proceed with the reactor startup.

   _____/_____/_____ _____/_____/_____
   QNE Date Time SRO Date Time

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
If the predicted critical bank position is not above the - 750 pcm administrative limit, then re-insert all Control Bank rods until the Systems Engineering Dept. Nuclear Group documents an evaluation in Section D under remarks and concurs to bring the reactor critical. A new ECC may be performed.

*, 2.c

6. RECORD the following information if criticality is achieved and power is stabilized at 10^{-8} amps on the highest reading IR Channel.

   a. Actual Time of Critical Data. ____________

   b. Actual Critical Bank Position. CB ______ at ________ steps

   c. Actual Critical Boron Concentration. _________ ppm

   d. Actual Temperature at time of Criticality. __________°F

D. REMARKS: ____

____

____

____

____

____

____

____

____

____

___________/_______
NUCLEAR GROUP DATE

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

E. MARGIN TO CRITICALITY WITH SHUTDOWN BANKS WITHDRAWN

> **NOTE**
> The purpose of this section is to ensure:
>
> 1. The basis to the BDPS Analysis is met (- 1300 pcm Shutdown), and
> 2. An inadvertent Mode Change does not occur (K_{eff} < 0.99).

1. DETERMINE the Total Control Bank Worth (CBA @ 0 steps) at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2A, or equivalent:

   Total Control Bank Worth: (-)__________ pcm

> **NOTE**
> The following step takes into account 500 pcm uncertainty on the ECC calculation for conservatism.

2. DETERMINE the Required Boron Reactivity to satisfy the Margin to Criticality by completing the following arithmetic:

Total Control Bank Worth (E.1):	+ (-)__________	pcm
Control Bank Required Reactivity (A.6.b):	- (-)__________	pcm
Bounding Margin to Criticality:	- (-) 1300	pcm
Conservatism:	+ 500	pcm
Required Boron Reactivity	= ( )__________	pcm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

3. Determination of the Minimum RCS Boron Concentration which satisfies the Margin to Criticality:

a. DETERMINE the difference between the RCS Boron Concentration necessary to meet the Margin to Criticality requirements and the ECC Boron Concentration by dividing the Required Boron Reactivity calculated in Step E.2 by the Differential Boron Worth in Step A.9.a:

( )________ ppm /	(-) ________ pcm/ppm =	( )________ ppm
Required Boron Reactivity (E.2)	Differential Boron Worth (A.9.a)	Difference in RCS Boron Concentration

b. DETERMINE THE Minimum RCS Boron Concentration necessary to meet the Margin to Criticality requirements by subtracting the difference in RCS Boron Concentration calculated in Step E.3.a from the ECC Boron Concentration:

( )________ ppm -	( )________ ppm =	( )________ ppm
ECC Boron Concentration (A.9.c)	Difference in RCS Boron Concentration (E.3.a)	Minimum Required RCS Boron Concentration

4. VERIFY Sufficient Margin to Criticality:

a. RECORD the present RCS Boron Concentration from the most recent Boron sample:

________	________	___/___/___
Present RCS Boron Concentration	Sample Time	Date

b. Is the present RCS Boron Concentration GREATER THAN OR EQUAL TO the Minimum RCS Boron Concentration calculated in Step E.3.b? (Circle one)

YES NO

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

5. If the answer in Step E.4.b is "NO", DO NOT withdraw Shutdown Banks until the RCS Boron Concentration is greater than or equal to the Minimum RCS Boron Concentration calculated in Step E.3.b.

_______/_______/_______
SRO Date Time

(Final)

JOB PERFORMANCE MEASURE Rev.7, 11/12/96

TASK TITLE: Perform Offsite AC Power Availability Surveillance. ADMIN 1.2 RO

TPO No: IV.C.AP-06 K&A No.: 062000A305 K&A IMP. 3.5/3.6

TRAINEE: ______________________ DATE: ___/___/___

The Trainee: PASSED ________ this JPM TIME STARTED: ________

FAILED ________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM ______ SIMULATE ______

LOCATION: IN PLANT ______ SIMULATOR ______

MATERIALS:

1BOS 8.1.1.1.a-1, Normal and Alternate Offsite AC Power Availability
Weekly Surveillance.

GENERAL REFERENCES:

1BOS 8.1.1.1.a-1, Normal and Alternate Offsite AC Power Availability
Weekly Surveillance.

TASK STANDARDS:

Correctly perform the steps required to complete the surveillance and
determine Tech Spec. Compliance is met.

TASK CONDITIONS:

1. You are an Extra NSO.
2. Unit 1 is in Mode 1, Steady State Power.

INITIATING CUES:

The 1A DG has been declared inoperable and the Unit Supervisor has directed youto perform 1BOS 8.1.1.1.a-1, Normal and Alternate Offsite AC Power Availability Surveillance.

CRITICAL ELEMENTS: (*)

2 thru10

APPROXIMATE COMPLETION TIME: 15 Minutes

NOTE:

Evaluator should provide candidate with a copy of 1BOS 8.1.1.1.a-1 to be used in completing this JPM.

RECORD START TIME________

NOTE

If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee. If possible, actual indications should be used for all steps.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
1. Check 345 KV Line status. **NOTE: BUS ALIVE light is NOT adequate verification of bus status.** **Cue:** • ***All 345 KV Lines are ENERGIZED.***	Observe Line Amp's & MW's for all 345 KV Lines: • Line 0621 • Line 15501 • Line 0624 • Line 0622 • Circle ENERGIZED for all 345 KV Lines.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*2. Indicate all closed and open disconnects, breakers and SAT link status. Cue: • ***<u>ACB's 2412 & 2422 closed lites are LIT, ACB's 2414 & 2424 open lites are LIT.</u>*** • ***<u>All disconnects</u> and SY breakers <u>indicate closed.</u>*** • ***<u>Both Units SAT x-tie links are REMOVED.</u>*** • ***<u>Both Units SAT disconnect links are INSTALLED.</u>***	Record: • Open disconnects, breakers & removed SAT links with an " O " • Closed disconnects,breakers & installed SAT links with an " X "	❑	❑	❑
*3. Trace single path along dashed lines from any energized offsite power source to Unit <u>ONE</u> SAT bank.	Trace path correctly on data sheet: • Line energized, breakers & disconnects closed.	❑	❑	❑
*4. Trace second path from second independent power source to Unit <u>TWO</u> SAT bank to verify independent paths exist from offsite power thru switchyard to both Units SAT banks.	Trace second path correctly on data sheet: • L0621 & L0622 not BOTH used. • Two paths do not overlap. Enter YES in space for step 5 of data sheet.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*5. Check Normal and Alternate 345 KV Buses energized.	Verify BUS ALIVE Light & voltmeter indications for:	❑	❑	❑
Cue: • ***345 KV Bus 6 indicates it's ENERGIZED.***	• 345 KV Bus 6			
• ***345 KV Bus 13 indicates it's ENERGIZED.***	• 345 KV Bus 13 Enter YES in 6a & 6b space.			
*6. Check Normal and Alternate power SAT's available.	Verify X and Y winding MW and Amp indications for:	❑	❑	❑
Cue: • ***X & Y winding MW and Amp's indicate SAT's 142-1 & 142-2 are ENERGIZED.***	• SAT's 142-1 and 142-2			
• ***X & Y winding MW and Amp's indicate SAT's 242-1 & 242-2 are ENERGIZED.***	• SAT's 242-1 and 242-2 Enter YES in 7a & 7b space.			
*7. Check Normal power to ESF Buses 141 and 142 supplied.	Check BUS ALIVE Lights lit , SAT feed breaker to bus position, and bus voltmeter indication for:	❑	❑	❑
Cue: • ***ACB 1412 closed lite is LIT, Bus 141 indicates it's ENERGIZED.***	• Bus 141 • Bus 142			
• ***ACB 1422 closed lite is LIT, Bus 142 indicates it's ENERGIZED.***	Enter YES in 8a & 8b space.			

PERFORMANCE CHECKLIST		STANDARDS	SAT	UNSAT	N/A
*8.	Check Alternate power to ESF Buses 241 and 242 supplied.	Check BUS ALIVE Lights lit, SAT feed breaker to bus position, and bus voltmeter indication for:	❑	❑	❑
Cue:	• ***ACB 2412 closed lite is LIT, Bus 241 indicates it's ENERGIZED.***	• Bus 241 • Bus 242			
	• ***ACB 2422 closed lite is LIT, Bus 242 indicates it's ENERGIZED.***	Enter YES in 9a & 9b space.			
*9.	Check ESF Crosstie Breakers available.	Verify Control power available and breaker position for:	❑	❑	❑
Cue:	• ***ACB's 1414 & 2414 open lites LIT.***	• ACB 1414 • ACB 2414			
Cue:	• ***ACB's 1424 & 2424 open lites LIT.***	• ACB 1424 • ACB 2424			
		Enter YES in 10a &10b space.			
*10.	Verify acceptance criteria met.	YES has been entered for all spaces with ¢ sign on data sheet.	❑	❑	❑

RECORD STOP TIME________

COMMENTS:

JOB PERFORMANCE MEASURE

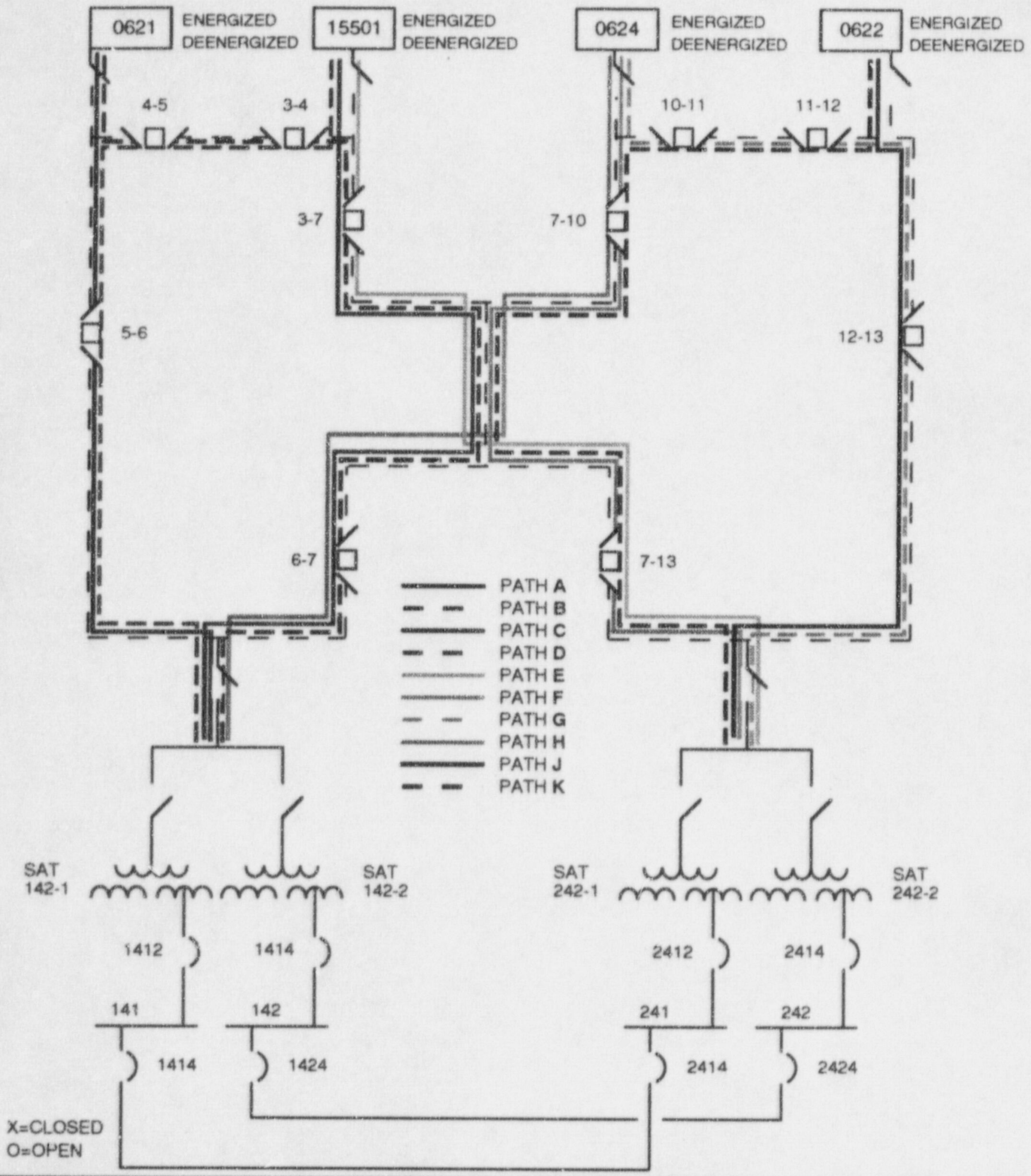
CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are an Extra NSO.
2. Unit 1 is in Mode 1, Steady State Power.

INITIATING CUES:

The 1A DG has been declared inoperable and the Unit Supervisor has directed you to perform 1BOS 8.1.1.1.a-1, Normal and Alternate Offsite AC Power Availability Surveillance.

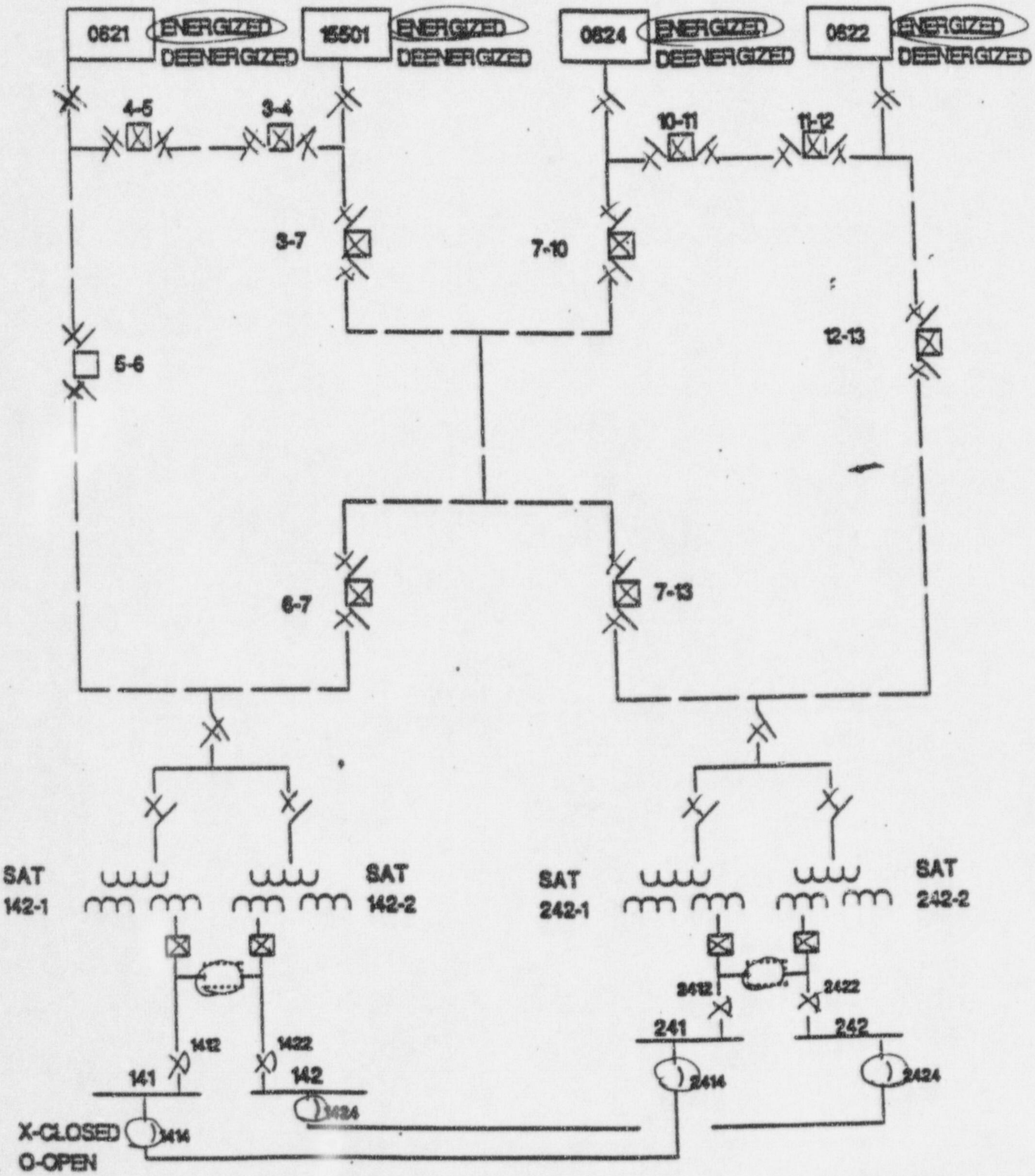


ACCEPTABLE PATHS:

	A	B	C	D	E	F	G	H	J	K
A		NO	NO	NO	YES	YES	YES	NO	NO	NO
B	NO		NO	NO	NO	NO	YES	NO	NO	NO
C	NO	NO		NO	NO	NO	YES	NO	YES	NO
D	NO	NO	NO		NO	YES	YES	NO	YES	YES
E	YES	NO	NO	NO		NO	NO	NO	NO	NO
F	YES	NO	NO	YES	NO		NO	NO	NO	NO
G	YES	YES	YES	YES	NO	NO		NO	NO	NO
H	NO	NO	NO	NO	NO	NO	NO		YES	NO
J	NO	NO	YES	YES	NO	NO	NO	YES		NO
K	NO	NO	NO	YES	NO	NO	NO	NO	NO	

KEY

NOTE
Lines 0621 and 622 cannot be considered independent transmission lines since they are on a common tower.



(1751VV/WPF/070596/5)

APPROVED
JUL 19 1996

KEY

DATA SHEET

5.	Two independent offsite sources to the SATs are available.	YES ¢
6. a.	Normal power 345 KV Bus 6 energized.	YES ¢
b.	Alternate power 345 KV Bus 13 energized.	YES ¢
7. a.	Normal power:	YES ¢
	1). SAT 142-1 and 142-2 energized or,	
	2). U-1 SAT crosstie links installed and either SAT 142-1 or 142-2 energized.	
b.	Alternate power:	YES ¢
	1). SAT 242-1 and 242-2 energized or,	
	2). U-2 SAT crosstie links installed and either SAT 242-1 or 242-2 energized.	
8. a.	Normal power supplied to 4160 volt ESF Bus 141.	YES ¢
b.	Normal power supplied to 4160 volt ESF Bus 142.	YES ¢
9. a.	Alternate power 4160 volt ESF Bus 241 available.	YES ¢
b.	Alternate power 4160 volt ESF Bus 242 available.	YES ¢
10. a.	4160 volt ESF Bus 141-241 crosstie breakers available.	YES ¢
b.	4160 volt ESF Bus 142-242 crosstie breakers available.	YES ¢

(Final)

EXHIBIT A
Page 1 of 1

PREDEFINE DATA PACKAGE COVER SHEET

Procedure # 1BOS 8.1.1.1.a-1 Unit: 1 PM ID: ________
Title NORMAL AND ALTERNATE AC POWER AVAILABILITY WEEKLY SURVEILLANCE

PREDEFINE INFORMATION: Work Request #: N/A
Due Date: TODAY Critical Date: TOMORROW
Tech Spec: NO ____ YES ✓
COMPLETE or PARTIAL Performance
(CIRCLE ONE) if PARTIAL, record step(s) performed in comments

SIGNATURE AUTHORIZATION/APPROVALS

Opposite Train Operable	YES NO N/A		
Authorization to Start Work	Scott A. Frain	:Now	Today
Work Started By		:	
Work Completed By		:	
Surveiliance Found Within Acceptance Criteria	YES NO		
Surveillance Left Within Acceptance Criteria	YES NO		
Supv Review of Work Complete		:	
	Signature	Time	Date

COMMENTS

REVIEW OF RESULTS

Title	Signature	Date

NORMAL AND ALTERNATE OFFSITE
AC POWER AVAILABILITY
WEEKLY SURVEILLANCE

A. STATEMENT OF APPLICABILITY:

This procedure applies to the weekly verification of operability of A.C. Electrical Power Sources in Modes 1-4.

B. REFERENCES:

1. Technical Specification

   a. 4.8.1.1.1.a.

C. PREREQUISITES:

1. Receive permission from the Shift Engineer or designated SRO licensed assistant prior to performing this surveillance by having the Data Package Cover Sheet signed and dated.

D. PRECAUTIONS:

1. None.

E. LIMITATIONS AND ACTIONS:

1. As stated in Technical Specification Limiting Condition for Operation 3.8.1.1.a.

2. In the event the Acceptance Criteria is not met during the performance of this surveillance, immediately notify the Shift Engineer to initiate LCOAR 1BOS 8.1.1-1a, LCOAR - AC Sources - Operating.

3. The normal and alternate AC power system should be considered as having 3 major sections, each of which must provide two physically separate and electrically independent circuit paths between the onsite power system and the transmission network (the transmission network excludes the station switchyard). The three sections are:

   a. The transmission lines entering the station switchyard from the transmission network.

   b. The station switchyard.

E.3. continued

c. The overhead transmission lines, SATs, and buses between the SATs and the onsite power system.

The words "independent transmission circuit" should be interpreted as meaning both electrically independent and physically separate through all 3 sections of the system. When these definitions are not met and only a single "independent transmission circuit" is available Action A of LCO 3.8.1.1 should be entered. No single event such as a breaker failing open, a bus fault in the switchyard, or a transmission tower failure should cause simultaneous loss of both offsite power sources when assuming two independent transmission circuits are available. (LBB is not considered a single failure event).

F. MAIN BODY:

1. On the Data Sheet drawing, circle the appropriate status of the offsite power sources either energized or deenergized by observing BUS ALIVE lights, line amps and MW for all 345 KV lines.

2. On the Data Sheet drawing of 345 KV switchyard SATs and 4160 Volt ESF buses, indicate all closed disconnects and breakers with an X and indicate all open disconnects and breakers with an O. Also, indicate the status of the U-1 and U-2 SAT links. Use an "X" to indicate the links installed and "O" to indicate the links removed.

3. On the Data Sheet drawing, trace a single path along the dashed lines from any energized offsite power source to the Unit 1 SAT banks.

> **NOTE**
> Lines 0621 and 0622 cannot be considered "Independent Transmission Ckts" since they are on a common tower.

4. On the Data Sheet trace a second path from a second independent power source to the Unit 2 SAT Banks. This path cannot retrace over any portion of the path drawn in Step F.3.

F. continued

¢ 5. Verify two independent paths exist from offsite power through the switchyard to the Unit SAT Banks based on completion of Step F.3 and F.4. If two independent sources are available write YES in the space provided on the data sheet.

¢ 6. VERIFY normal and alternate power 345KV buses energized by observing BUS ALIVE light lit and bus voltmeter indication. If bus is energized write YES in space provided on data sheet.

a. Normal power 345 KV bus is Bus 6.

b. Alternate power 345 KV bus is Bus 13.

¢ 7. VERIFY normal and alternate power SAT's available by observing X and Y winding megawatt and ampere indications. If SAT's are energized, write YES in space provided on data sheet.

a. Normal power SAT is:

1). 142-1 and 142-2 or,

2). U-1 SAT crosstie links installed and <u>either</u> 142-1 <u>or</u> 142-2.

b. Alternate power SAT is:

1). 242-1 and 242-2 or,

2). U-2 SAT crosstie links installed and <u>either</u> 242-1 <u>or</u> 242-2.

¢ 8. VERIFY normal power being supplied to 4160 volt ESF Buses 141 and 142 by observing SAT feed breaker to bus position indication, BUS ALIVE light lit and bus voltmeter indication. If normal power is being supplied and bus is energized write YES on data sheet in space provided.

a. Bus 141, ACB 1412 CLOSED.

b. Bus 142, ACB 1422 CLOSED.

F. continued

¢ 9. VERIFY alternate power 4160 volt ESF buses available by observing their normal SAT feed breaker indication, BUS ALIVE light lit and bus voltmeter indication. If alternate power 4160 volt ESF buses are available write YES in space provided on data sheet.

a. Bus 241, ACB 2412 CLOSED.

b. Bus 242, ACB 2422 CLOSED.

¢ 10. VERIFY 4160 volt ESF bus crosstie breakers are OPEN and available by indication of position and control power availability. If crosstie breakers are OPEN and available write YES in space provided on data sheet.

a. 4160 volt Bus 141 to 241 crosstie breakers ACB 1414 and 2414 OPEN.

b. 4160 volt Bus 142 to 242 crosstie breakers ACB 1424 and 2424 OPEN.

G. <u>ACCEPTANCE CRITERIA:</u>

As a minimum the following AC electrical power sources shall be OPERABLE:

1. In Modes 1-4:

a. Each class 1E 4160 volt bus capable of being powered from:

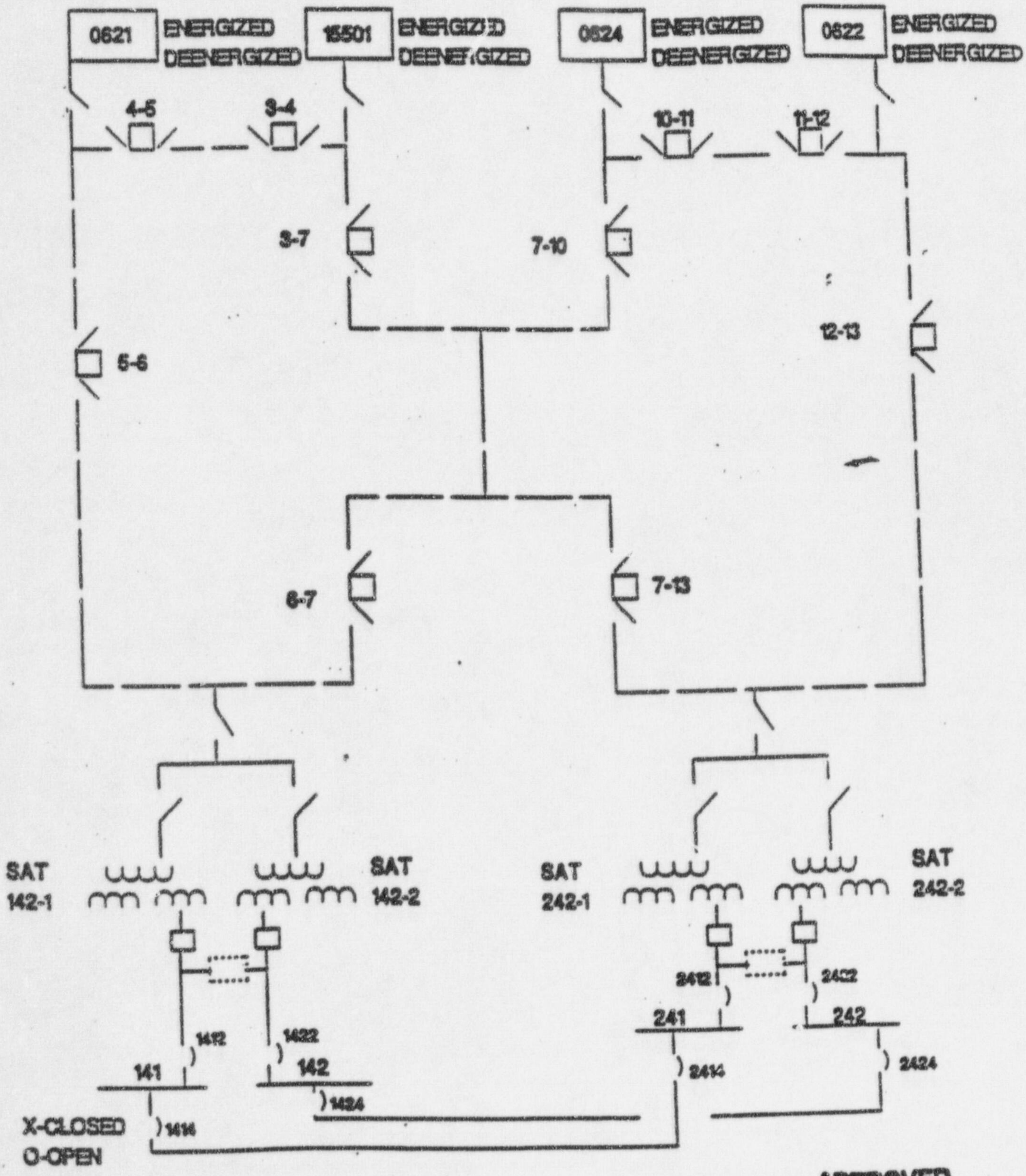
1). Either transformer of the associated units normal System Auxiliary Transformer Bank, and

2). Either transformer of the other units System Auxiliary Transformer Bank, with

Each units System Auxiliary Transformer Bank energized from an independent transmission circuit.

(Final)

NOTE
Lines 0621 and 622 cannot be considered independent transmission lines since they are on a common tower.



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(1751VV/WPF/070596/5)

DATA SHEET

---

5. Two independent offsite sources to the SATs are available. ________ ¢

---

6. a. Normal power 345 KV Bus 6 energized. ________ ¢

   b. Alternate power 345 KV Bus 13 energized. ________ ¢

---

7. a. Normal power: ________ ¢

      1). SAT 142-1 and 142-2 energized or,

      2). U-1 SAT crosstie links installed and either SAT 142-1 <u>or</u> 142-2 energized.

   b. Alternate power: ________ ¢

      1). SAT 242-1 and 242-2 energized or,

      2). U-2 SAT crosstie links installed and either SAT 242-1 <u>or</u> 242-2 energized.

8. a. Normal power supplied to 4160 volt ESF Bus 141. ________ ¢

   b. Normal power supplied to 4160 volt ESF Bus 142. ________ ¢

9. a. Alternate power 4160 volt ESF Bus 241 available. ________ ¢

   b. Alternate power 4160 volt ESF Bus 242 available. ________ ¢

10. a. 4160 volt ESF Bus 141-241 crosstie breakers available. ________ ¢

    b. 4160 volt ESF Bus 142-242 crosstie breakers available. ________ ¢

(Final)

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Identify And Replace Blown Fuse

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.2.13	3.6/3.8

JPM NUMBER	Task Number	Job Position
ADMIN 2 RO		NSO

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ______________ Stop Time: ______________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ______________ [ ] Other ______________

EXAMINEE: ______________ EVALUATOR: ______________
DATE: ______________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

Specific Information:

1. These items were used as reference material in the development of this JPM:
   BAP 350-6

2. These items are expected to be used by the examinee in the performance of the task:
   BAP 350-6; BAP 350-6T1 "Fuse Discrepancy Form"; BAP 350-6T2 "Fuse Discrepancy Document Control"

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Unit 1 is at 100% power. Unit 2 is at 100% power.
      All systems are normal.

   b. Task Initiating Condition:
      A fuse has blown on 1AF013F control power.

   c. Initiating Cue:
      The SM directs you to replace the fuse.

   d. Your Position:
      NSO (ADMIN)

4. Terminal Performance Objective: (TPO)
   Replace fuse with non-like fuse.

5. Critical Steps(*)
   3, 7, & 8

6. Identification of Impacted Systems:
   If this task is performed incorrectly, the following adverse reactions could occur:
   The associated equipment would remain inoperable.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
RECORD START TIME ________.				
1. Refer to BAP 350-6. (May be done at any time.)	Refer to BAP 350-6.	☐	☐	☐
2. Check Byron Station Fuse List. (Center Desk of Control Room)	Determine/record information for fuse to be replaced: • Panel No. - 1AP2SE • Fuse type - BAF 3 • Fuse rating - 3/120 amp/volt	☐	☐	☐
* 3. Determine replacement fuse availability. **(CUE: The only available fuse is as provided)** **(CUE: Emergency replacement is required and authorized.)**	Determine like for like replacement fuse is NOT available. **AND** Check with Fuse Coordinator, SSE Electrical Group or SM for Emergency replacement authorization.	☐	☐	☐

****

NOTE

Provide candidate with <u>blank copy</u> of BAP 350-6T1 Fuse Discrepancy Form.

****

4. Record Part 1 information on BAP 350-6T1.	Record in Part 1 of Fuse Discrepancy Form: • Date [Current] • Originator/phone • System - AF • WR # - N/A • Safety Class - Safety	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
5. Record Part 2 information on BAP 350-6T1.	Fuse Discrepancy Form: • Schematic/WD - 6E-1-4030AF08 / 6E-1-4687B • Panel No. - 1AP28E • Fuse ID - FU • Service 1AF013F • Reason for replacement - Blown • ID on Fuse List - Y • Fuse Manufacturer/type - BAF 3 • Fuse rating - 3/120 amp/volt	☐	☐	☐
6. Record Part 2 information on BAP 350-6T1.	• Is unlike fuse the same physical size as the original - Y • QRI Number - per red tag • Stores item number - XXX • Fuse Manuf. - As per fuse • Fuse Rating - 3/120 amp/volt	☐	☐	☐
* 7. Replace fuse. **(CUE: As SM, Approval for replacement is given.)**	Determine replacement acceptable and obtain replacement fuse. Initial and date in Part 3 of Fuse Discrepancy Form. Obtain SM or designee permission to replace fuse	☐	☐	☐

NOTE

Cue candidate that fuse will be installed in the Electrical Maintenance Shop in the Training Building at the appropriately marked breaker.

should also be in SRO JPM

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
* 8. Install approved fuse.	Replace fuse in proper fuse holder location.	☐	☐	☐
(CUE: Fuse is installed.)	Sign in Part 3 of Fuse Discrepancy Form.			
9. Send completed Fuse Discrepancy Form to Fuse Coordinator	Identifies need to provide Fuse Discrepancy Form to Fuse Coordinator.	☐	☐	☐
(CUE: I will be responsible for forwarding of Form (Accept Form) **This completes this JPM.)**				

RECORD STOP TIME ________.

COMMENTS:

TASK CONDITIONS:

Unit 1 is at 100% power. Unit 2 is at 100% power. All systems are normal.

A fuse has blown on 1AF013F control power.

INITIATING CUES:

The US directs you to replace the fuse.

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SARGENT & LUNDY ENGINEERS

ELECTRICAL DEPARTMENT
FUSE LIST

STATION BYRON UNIT 1
COMPANY COMMONWEALTH EDISON CO.
PROJECT NO 8738-04

DATE 04/27/80 SYSTEM AF
REVISED 12/12/91 PAGE 2 OF 8
REVISION NO C

REV	SYS	SET CLS	SCHEMATIC DRAWING / WIRING DRAWING	CIRCUIT VOLTAGE	PANEL NUMBER / FURTHER PANEL INFORMATION	CMP	FUSE FU	FUSE MFR / TYPE	AMPS DES	AMPS FLD	SERVICE	WIRING IDENTIFICATION	APPLICABLE CALC NO. / STORES ITEM NO.	COMMENTS
			6E-1-4030AF03		1AP24E/132X3						1AF01PB-A	1		
	AF	S	6E-1-4685D	120VAC	COMPT.D3		FU		3A		AF PP 1B LUBE	FUSE BAF 3		
			6E-1-4030AF04		1AP24E/132X3	D1					1AF006B	1		
	AF	S	6E-1-4685A	120VAC	COMPT.A4		FU		3A		AF PP SX VLV	FUSE BAF 3		
			6E-1-4030AF11		1AP24E/132X3	D2					1AF017B	1		
	AF	S	6E-1-4685A	120VAC	COMPT.A5		FU		3A		AF PP SX VLV	FUSE BAF 3		
			6E-1-4030AF07		1AP28E/132X4						1AF013E	1		
	AF	S	6E-1-4687B	120VAC	COMPT.B2		FU		3A		SG1A AF VLV	FUSE BAF 3		
			6E-1-4030AF08		1AP28E/132X4	D1					1AF013F	1		
	AF	S	6E-1-4687B	120VAC	COMPT.B1		FU		3A		SG1B AF VLV	FUSE BAF 3		
			6E-1-4030AF09		1AP28E/132X4	D2					1AF013G	1		
	AF	S	6E-1-4687C	120VAC	COMPT.C1		FU		3A		SG1C AF VLV	FUSE BAF 3		
			6E-1-4030AF10		1AP28E/132X4	D3					1AF013H	1		
	AF	S	6E-1-4687B	120VAC	COMPT.B4		FU		3A		SG1D AF VLV	FUSE BAF 3		
			6E-1-4030AF17		1AP28E/132X4	D4					1AF01PB-C	1		
	AF	S	6E-1-4687H	120VAC	COMPT.H5		FU		3A		AF PP 1B LUBE	FUSE BAF 3		
			6E-1-4030AF14		1HS-AF121						1AF004A	AF4AP		
	AF	S	6E-1-4942B	125VDC	LCP		FU		3A		DSCH TEST VLV	FU		
			6E-1-4030AF14		1HS-AF121	D1					1AF004A	AF4AN		
	AF	S	6E-1-4942B	125VDC	LCP		FU		3A		DSCH TEST VLV	FU		
			6E-1-4030AF14		1HS-AF122						1AF004B	AF4BP		
	AF	S	6E-1-4942B	125VDC	LCP		FU				DSCH TEST VLV	FU		
			6E-1-4030AF14		1HS-AF122	D1					1AF004B	AF4BN		

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FUSE DISCREPANCY FORM

NOTE

NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: ______________________ Discrepancy No: B-_______________

Date: ______________________ FDSR Updated (F.C.): _____/_____

Originator: ______________________ Phone Extension: _______________

System: ______________________ Work Request No.: _______________

Safety Class: _____ Safety _____ Non-Safety _____ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: _______________ Fuse ID on Schematic: _______________

Wiring Drawing: _______________ Fuse ID on Wiring: _______________

Panel No.: ____

Service: ____

____

Reason for Fuse Replacement or Description of Discrepancy:

____

____

____

____

Does the Fuse List Identify the blown/installed fuse? ____ Yes ____ No

Fuse Manufacturer: ______________________________

Fuse Type: _______________

Fuse Rating: _______ Amps _________ Volts

PART 3 - Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

_____ Yes _____ No

* QRI Number: ______________________________ (N/A if not applicable) *, 3.g

Stores Item No.: ____________________________

Fuse Manufacturer: __________________________

Fuse Type: ____________________

Fuse Rating: _______ Amps ________ Volts

F.C., SSE or SM Fuse Approval: _________________________ Date: ________

Fuse Installation:

Shift Manager
(or designee) permission obtained: ______________________ Date: ________

Fuse Replacer: ____ Date: ________

F.C. Approval: ____ Date: ________

Evaluation Complete (F.C.): _____________________________ Date: ________

FUSE DISCREPANCY FORM

NOTE

NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: N/A Discrepancy No: B- N/A

Date: TODAY FDSR Updated (F.C.): N/A / ______

Originator: CANDIDATE Phone Extension: PER DIRECTORY

System: AF Work Request No.: N/A

Safety Class: X Safety ______ Non-Safety ______ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: 6E-1-4030AF08 Fuse ID on Schematic: 1

Wiring Drawing: ______ Fuse ID on Wiring: ______

Panel No.: 1AP28E - 132X4 COMP. 1

Service: CONTROL POWER

Reason for Fuse Replacement or Description of Discrepancy:

BLOWN FUSE

Does the Fuse List Identify the blown/installed fuse? X Yes ____ No

Fuse Manufacturer: ~~BAF 3~~ BUSSMANN

Fuse Type: BAF 3

Fuse Rating: 3 Amps ~~120~~ 250 Volts

EXAM KEY

(9914AA/WPF/011197)

PART 3 - Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

X Yes ____ No

* QRI Number: PER RED TAG (N/A if not applicable)

*, 3.g

Stores Item No.: XXX

Fuse Manufacturer: BUSSMANN

Fuse Type: MOL

Fuse Rating: 3 Amps ~~120~~ 250 AD Volts

F.C., SSE or SM Fuse Approval: SHIFT MANAGER Date: 9/ /98

Fuse Installation:

Shift Manager
(or designee) permission obtained: SHIFT MANAGER Date: 9/ /98

Fuse Replacer: CANDIDATE Date: 9/ /98

F.C. Approval: ____________ Date: ______

Evaluation Complete (F.C.): ____________ Date: ______

FUSE DISCREPANCY FORM

> **NOTE**
> NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: ______________________ Discrepancy No: B-______________

Date: ______________________ FDSR Updated (F.C.): ______/______

Originator: ______________________ Phone Extension: ______________

System: ______________________ Work Request No.: ______________

Safety Class: _____ Safety _____ Non-Safety _____ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: ______________ Fuse ID on Schematic: ______________

Wiring Drawing: ______________ Fuse ID on Wiring: ______________

Panel No.: ____

Service: ____
____

Reason for Fuse Replacement or Description of Discrepancy:

____
____
____
____

Does the Fuse List Identify the blown/installed fuse? _____ Yes _____ No

Fuse Manufacturer: ______________________

Fuse Type: ______________

Fuse Rating: ______ Amps ______ Volts

FUSE DISCREPANCY FORM

> **NOTE**
>
> NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: ______________________ Discrepancy No: B-________________

Date: ______________________ FDSR Updated (F.C.): ______/______

Originator: ______________________ Phone Extension: ________________

System: ______________________ Work Request No.: ________________

Safety Class: _____ Safety _____ Non-Safety _____ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: ________________ Fuse ID on Schematic: ____________

Wiring Drawing: ________________ Fuse ID on Wiring: ____________

Panel No.: ____

Service: ____
____

Reason for Fuse Replacement or Description of Discrepancy:

____
____
____
____

Does the Fuse List Identify the blown/installed fuse? ____ Yes ____ No

Fuse Manufacturer: ______________________________

Fuse Type: ________________

Fuse Rating: ______ Amps ________ Volts

PART 3 - Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

_____ Yes _____ No

* QRI Number: ______________________________ (N/A if not applicable) *, 3.g

Stores Item No.: ____________________________

Fuse Manufacturer: __________________________

Fuse Type: ____________________

Fuse Rating: _______ Amps ________ Volts

F.C., SSE or SM Fuse Approval: _________________________ Date: ________

Fuse Installation:

Shift Manager
(or designee) permission obtained: ______________________ Date: ________

Fuse Replacer: ____ Date: ________

F.C. Approval: ____ Date: ________

Evaluation Complete (F.C.): _____________________________ Date: ________

PART 4 - Other Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

_____ Yes _____ No

* QRI Number: ______________________________ (N/A if not applicable) *, 3.g

Stores Item No.: ____________________________

Fuse Manufacturer: __________________________

Fuse Type: __________________

Fuse Rating: __________ Amps __________ Volts

F.C. or SSE Fuse Approval: ____________________________ Date: ________

Fuse Installation:

Shift Manager
(or designee) permission obtained: ______________________ Date: ________

Fuse Replacer: ____ Date: ________

F.C. Approval: ____ Date: ________

(Final)

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Prepare For Entry Into High Radiation Area Greater Than 1000 mr/hr

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.3.10	2.9/3.3

JPM NUMBER	Task Number	Job Position
ADMIN 3 RO		NSO

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ____________ Stop Time: ____________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ____________ [ ] Other ____________

EXAMINEE: ____________ EVALUATOR: ____________
DATE: ____________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

Specific Information:

1. These items were used as reference material in the development of this JPM:
   BAP 1450-2; BRP 5000-7

2. These items are expected to be used by the examinee in the performance of the task:
   RWP 98-XXX; BRP 6200-5T10

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Unit 1 and Unit 2 are operating at 100% power. The Unit 2 Unit Supervisor has asked that a valve lineup be performed on valve 2CV XXX in the closed position.

   b. Task Initiating Condition:
      Entry into an area with expected dose rates of 1050 mrem/hr is required to check the position of a specific valve and perform a general inspection of the area. Due to staffing restrictions, the entry is to be made by only ONE individual and RPT is NOT in attendance.

   c. Initiating Cue:
      The US directs you to perform the necessary steps to prepare to make the entry into the area.

   d. Your Position:
      IPSS (SRO)

4. Terminal Performance Objective: (TPO)
   Perform actions necessary to allow entry into **HIGH RADIATION AREA >1000 mrem/hr (HRA).**

5. Critical Steps(*)
   1, & 3

6. Identification of Impacted Systems:

If this task is performed incorrectly, the following adverse reactions could occur:

Failure to comply with CFR regulations, NRC Regulatory Guides, and station administrative procedures controlling high radiation areas and access to these areas. Potential for radiation overexposure to self and others.

RECORD START TIME ______

```
*****************************************************************
*                            NOTE                               *
* The first two steps address the required dosimetry and       *
* radiation monitoring required by the individual.  These      *
* items should be obtained prior to entry into RPA and         *
* must be obtained prior to entry into HRA.  The               *
* requirements may be met by single device with multiple       *
* functions.  The candidate may refer to the RWP to ensure     *
* proper monitoring devices are acquired.                      *
*                                                               *
*****************************************************************
```

* 1. Obtains a radiation monitoring device which continuously indicates radiation dose, has alarming capability, and continuously integrates the radiation dose rate. Also obtain radiological requirements for area to be entered.	Obtains and wears electronic dosimetry (and TLD). Obtain information from the RWP.: • Where Highest Dose rate area? 2.5 R/hr contact & 1.2 R/hr at 12" (upper left on survey map) • What does "ANS" stand for by the ladder? Area not Surveyed How long are you allowed into the area? 17 minutes (per BRP 6200-5T10). • What protective clothing is required? Per page ~~1 of~~ the RWP need Class 1. • If ~~asked~~ to wait after the survey mapped area was entered? Per survey map, wait ~~in~~ area by the door (low dose area) • What does 25/8 mean? (see upper right hand corner of the survey map) 25mr/hr contact and 8mr/hr at 12" AND • Review and sign onto RWP 98XXX	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
2. Review current survey of area.	Locate and review survey map(s) of area to be entered.		☐	☐
* 3. Obtain key for access to area.	Obtain proper key from HP Services (RP) Supv or designee.		☐	☐
4. Ensure information on BRP 6200-5T10, "Maximum Stay Time Worksheet For Areas >1000 mrem/hr When RPT is Not in Attendance" is complete. **(CUE: RP SUPV approval provided.)** **CUE: This completes this JPM.)**	Ensure/fill in appropriate information: • RWP # • Date • Work Group Job Desc • Authorized Daily Dose • Working Dose Rate • Maximum Stay Time • RP Supv Initials		☐	☐

RECORD STOP TIME _________.

COMMENTS:

TASK CONDITIONS:

Unit 1 and Unit 2 are operating at 100% power. The Unit 2 Unit Supervisor has asked that a valve lineup be performed on valve 2CV XXX.

INITIATING CUES:

Entry into an area with expected dose rates of 1050 mrem/hr is required to check the position of a specific valve and perform a general inspection of the area. Due to staffing restrictions, the entry is to be made by only ONE individual and RPT is NOT in attendance.

APPROVED 12/06/94

Facsimile

BRP 6200-5T9
Revision 0

RWP 98,XX,XX

RWP ACKNOWLEDGEMENT LOG

I certify that I have read, understand, and will comply with the requiremnts of the RWP. I have reviewed the radiological conditions for my work area, and that I will not exceed the authorized exposure limit for this RWP.

FOR TRAINING USE ONLY

SIGNATURE	DATE	BADGE #	SIGNATURE	DATE	BADGE #

(Final)

(9756SS/WPF/120594)

ALARA ACTION REVIEW *

Cover Sheet

AAR # 06 / 98 [redacted] RWP # [redacted]

Station / Year / Sequence SARC Required if > 30 P/Rem [ ] Y [✓] N

Job Description: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work Location: All RPA's Work Group: ALL

RWP Request #: Various Work Analyst: NA

ALARA walkdowns recommended: [ ] Yes No [✓] Comments:

1. State the condition, from BRP 6200-5T8, that requires this AAR. LHRA entry. Multiple dose field entry.

2. Determine which of the following will contribute to reducing exposure for this work:

a. Shielding in area or equipment? (use historical and/or current surveys to determine needs). [✓] Yes No [ ]
Comments: Review for each application.

b. Portable Ventilation? (Hepa size/type, tent size etc.) [✓] Yes No [ ]
Comments: Review for each application.

c. Mock up training? (Available photos, tapes, etc.) [✓] Yes No [ ]
Comments: Review for each application.

d. Source Term reduction? (Identify flushing, points, valves, systems and procedures. [✓] Yes No [ ]
Comments: Review for each application.

e. Remote handling tools, Robotics? (underwater work, reach rods, cameras: [✓] Yes No [ ]
Comments: Review for each application.

f. Decontamination of area or equipment? (Consider pre/post decon of work area based on historical/current surveys: [✓] Yes No [ ]
Comments:

g. Is Surrogate Tour or video maintenance information available? [✓] Yes No [ ]
Comments:

3. Access to Reactor Cavity Incore Area? [ ] Yes No [✓]

(Approval, if Yes) ____________________ ____________
Station Manager Date

____________________ ____________
Health Physics Supervisor Date

4. Access to whole body dose rates >/= 15 Rem/hour? [ ] Yes No [✓]

(Approval, if Yes) ____________________ ____________
Health Physics Supervisor Date

5. ALARA Brief required for this work? [ ] Yes No [✓]

Initial ___ Shiftly ___ Other ____________________

Completed by: Curt Repass Date: 12/22/97

*454-251-82-01200-07

(1692AA/DOC/120597)

ALARA BRIEF CHECKLIST

AAR # 06 / 98 / [redacted] [redacted] NWR # Various
(or activity description)

Work scope: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work location: All RPA's

Recommended personnel to attend briefing: Work group supervisor __ Work group ✓

RPLS __ RPT ✓ QC __ Shift Manager __ Operations __ Vendor __ SQV __

Others ______

Survey information: Current ✓ Historical ✓ RPT in attendance ✓

Type of Brief: Pre-job ☑ YES ☐ NO (with front desk or Control Point RPT).

ALARA ☐ YES ☑ NO Initial __ Shiftly __ Other ______

Briefing Notes

A. RWP Requirements PC Class ☒1 ☒2 ☒3 ☒4	Daily: 100 Alarm: 80 Rate: 300
Face Shield: Y ☑ N ☐ Respirator: Y ☑ N ☐	Type of waterproof outer layer as needed
Working area dose rates Per surveys	Contamination Levels: per surveys
TEDE ALARA evaluations will determine respiratory needs. .	
B. RPT Coverage Requirements:	Coverage type: Continuous or documented stay times and timekeeping
Surveys needed: Air Samples as needed IRP/Frequency per survey	Other Beta evaluation/confined space
Timekeep/staytime requirements: Stay times documented on RWP and for beta assessment if needed.	
C. Contingency Plan: Dose rates exceed planned or historical information - Stop work, exit area immediately, contact RPLS.	
D. ALARA Brief requirements: Entry into: HRA ✓ LHRA ✓ HCA ✓	A/B ✓ Red Zone ✓
Rad Holdpoints: As per current surveys.	
Areas for shielding: Check each application for shielding needs or potential.	
Contamination Control techniques to consider: see below	
Safety needs and/or exemptions: As per work supervisor.	
Has a TEDE ALARA evaluation been completed, if needed? As needed	Results ______
Insure work area pre/post decon as needed, based on current surveys.	
Insure all hotspot, low & high dose areas are identified as per survey.	

RPT coverage or stay times MUST be in place prior to entry, documented and communicated to workers. Working area dose rates also required. Insure Low dose and high dose areas are identified.
Any maintenance activities require RP review before entry.
Time and exposure should be estimated prior to entry.
RP approval required before entry on this RWP.
NO ACCESS TO AREAS > 15 REM/Hr on this RWP.
Determine entry requirements are IAW BAP 1450-2.

FOR TRAINING

USE ONLY

Additional Comments

TRAINING

USE ONLY

ALARA Brief Information

		Comments						
1	Radiological Hold points identified?	✓	YES		NO		N/A	
2	Shielding of areas and/or equipment.	✓	YES		NO		N/A	
3	Contamination control techniques.	✓	YES		NO		N/A	
4	Safety needs and/or exemptions for work identified.	✓	YES		NO		N/A	
5	TEDE ALARA evaluation needed?	✓	YES		NO		N/A	
6	Decon of areas and/or equipment.	✓	YES		NO		N/A	
7	Hot spots, low and high dose waiting areas identified?	✓	YES		NO		N/A	
8	Airborne concerns	✓	YES		NO		N/A	
9	Hot particle controls needed?	✓	YES		NO		N/A	
10	Procedural requirements # BAP 1450-2	✓	YES		NO		N/A	
11	HEPA Requirements?	✓	YES		NO		N/A	
12	Source Term concerns. Flushing / hydrolazing?	✓	YES		NO		N/A	
13	Use of Remote handling tools?		YES	✓	NO		N/A	
14	Use of high speed tools needed?		YES		NO	✓	N/A	
15	Outside work group interference?		YES	✓	NO		N/A	
16	Ventilation/radiological release concerns? Containment/FHB area rad monitor setpoints reset?	✓	YES		NO		N/A	Determine affect on any area rad monitors
17	Communication needs?	✓	YES		NO		N/A	
18	Use of robotics?	✓	YES		NO		N/A	
19	Lighting / work area concerns?	✓	YES		NO		N/A	
20	Photos, tapes, prints available? Surrogate Tour info?	✓	YES		NO		N/A	
21	Wireless Remote Monitoring?	✓	YES		NO		N/A	
22	Equipment train changes?	✓	YES		NO		N/A	

Completed by [redacted] Date: 12/22/97

(1692AA/DOC/120597)

ALARA REVIEW CONTINUATION/UPDATE

...d # 06 / 98 [redacted] RWP # [redacted]

Work scope: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work location: All RPA's

On the lines below dosument any or all of the following information:

1. Changes to the original AAR.
2. Suggestions, based on job performance, for enhancing this AAR for future work.
3. Additional information for the current AAR.
4. Any other comments or concerns.

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USE ONLY

(Final)

RADIATION WORK PERMIT
ALARA RECOMMENDATIONS CHECKLIST

Date/Time [redacted] / 04:15 RWP# [redacted]

I. Radiation Protection Personnel

> **NOTE**
> If any item(s) listed in section A have been answered yes:
> 1. An ALARA Action Review is required per BAP 700-2.
> 2. A Job Specific RWP is required per BAP 575-9.

		YES	NO
A.	Do any of the following conditions exist?...........	[✔]	[ ]
1.	Total dose equivalent for the planned job is expected to equal or exceed one (1) Rem and job duration to be less than 100 man hours.	[ ]	[✔]
2.	Planned work will involve prolonged [> 1 (one) hour] occupancy in an Airborne Radioactivity Area. (>.3 DAC)........	[ ]	[✔]
* 3.	Entry into either unit's reactor cavity incore area is planned (BAP 1450-3 addresses requirements to access reactor cavity incore space)......................................	[ ]	[✔]
4.	Entry into locked High Radiation Area (>1000 mrem/hr) Ensure RPT in attendance or complete maximum stay time worksheet BRP 6200-5T10...........................	[✔]	[ ]
5.	Items will be removed from the Spent Fuel Pool or flooded Reactor Cavity...........	[ ]	[✔]
6.	Entry inside the containment missile barrier at ≥ 10% Reactor Power................	[ ]	[✔]
7.	Entry to containment 426' el. re-fuel floor cavity area at ≥ 10% Reactor Power......	[ ]	[✔]
8.	Work will include tasks involving the Incore Detector System........................	[ ]	[✔]
9.	Work in areas where Hot Particles have been identified..................................	[ ]	[✔]
10.	Work will involve diver activities in radiologically posted areas.........	[ ]	[✔]
11.	Work will involve radiography.................	[ ]	[✔]
12.	Task will require workers to transient ≥ 15 rem/hr whole body dose fields.............	[ ]	[✔]
** 13.	Work will involve accessing areas adjacent to spent fuel transfer tube where dose rates increase....................................	[ ]	[✔]

* 454-251-91-06000
* 454-251-88-30900
** 454-251-78-00020

(1170SS/WPF/120597)

		YES	NO
B.	Are any of the following conditions expected?........	[ ]	[✔]
1.	Primary or contaminated system work involving system breech. (Hot Particles?).....	[ ]	[✔]
2.	System transfer of high level radioactive fluids/resins, etc. ≥ 100 mrem/hr @ contact....	[ ]	[✔]
3.	Work involves the Waste Gas System............	[ ]	[✔]
C.	Will work include any of the following Fuel <u>Pool/flooded</u> Reactor Cavity area activities?.........	[ ]	[✔]
1.	Items will be <u>moved</u> in the fuel pool/ cavity but <u>not removed</u>........................	[ ]	[✔]
2.	Involves work with tools/equipment that have come in contact with fuel pool/cavity water....	[ ]	[✔]
3.	Involves work with fuel pool/cavity filter changes....................................	[ ]	[✔]
D.	Will work involve containment entry to the following areas?..............................	[ ]	[✔]
1.	Entry into containment, inside missile barrier @ ≥ 10% reactor power..................	[ ]	[✔]
* 2.	Entry into the Steam Generator or Pressurizer Coffin area(s) @ ≥ 10% reactor power....................................	[ ]	[✔]
* 3.	Involves access to the Polar Crane @ ≥ 10% reactor power........................	[ ]	[✔]
E.	Will tasks involve handling of Radioactive Waste/Materials/Sources that include any of the following criteria?........................	[ ]	[✔]
1.	Sorting or transporting trash/rad materials reading ≥ 100 mrem/hr @ <u>contact with the container</u>..................................	[ ]	[✔]
2.	Sorting trash/laundry bags marked as coming from a Hot Particle (Red) zone................	[ ]	[✔]
3.	Processing sludge from drums to HIC...........	[ ]	[✔]

NOTE

<u>If</u> any of the items in sections B through E are anticipated or found during pre-job surveys:

1. A Job Specific RWP is required as described in BAP 575-9.
2. An <u>ALARA Review may be requested</u> at the discretion of Rad Protection Supervision or upon the request of the work supervisor.

AAR Required: [Y ✔] [N]

RPT Sign: [redacted] Date: 12-18-97

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(Final)

ATTACHMENT B

PROTECTIVE CLOTHING CLASSIFICATIONS AND GUIDELINES

CLASS 1 (GREEN)

COTTON GLOVE LINERS
RUBBER GLOVES
CLOTH BOOTIES
RUBBER SHOE COVERS
CAP

CLASS 3 (WHITE)

DOUBLE COVERALLS
DOUBLE CLOTH HOOD
COTTON GLOVE LINERS
DOUBLE RUBBER GLOVES
CLOTH BOOTIES
DOUBLE RUBBER SHOE COVERS

CLASS 2 (BLUE)

ONE PAIR OF COVERALLS
CAP (optional)
CLOTH HOOD
COTTON GLOVE LINERS
RUBBER GLOVES
CLOTH BOOTIES
RUBBER SHOE COVERS

CLASS 4 (RED)

ONE PAIR OF COVERALLS
WATERPROOF OUTER LAYER
CAP (optional)
DOUBLE CLOTH HOOD
COTTON GLOVE LINERS
DOUBLE RUBBER GLOVES
CLOTH BOOTIES
PLASTIC BOOTIES
DOUBLE RUBBER SHOES

<u>Guidelines:</u>

In lieu of a cloth hood, a cap may be substituted unless:

1). The worker will be entering a high contamination area, or

2). The worker will be wearing a face shield or respiratory protection, or

3). The worker will be carrying smearable contaminated items over their shoulder(s), or

4). The worker will be in a congested area, or

5). When specified by Radiation Protection.

For contamination control, hair should be tucked inside the cap or coveralls.

ATTACHMENT B

PROTECTIVE CLOTHING CLASSIFICATIONS AND GUIDELINES, Cont.

Guidelines:

For Class 1 and Class 2 Protective Clothing the following substitutions may be made:

1). Double or multi-layers of surgical gloves may be substituted for rubber gloves for contamination control for the following job evolutions or tasks with prior RP approval:

   a). Performing light work
   b). Inspections/walkdowns
   c). O.O.S. when no climbing is involved
   d). Instrument cals. (yellow tight surgical type gloves may be worn as substitute)
   e). Minor decon of small equipment or parts
   f). Performing routine RP surveys for radiation/contamination
   g). Handling/filling out paperwork during job evolutions
   h). Any activity approved by RP dept.

2). It is acceptable to wear, with prior RP approval, surgical gloves and/or **colored** cotton glove liners in clean (non-contaminated) areas of the RPA for handling of potentially contaminated materials or equipment such as:

   a). Informational radiological smears
   b). Maslin wipes or smears of equipment or floor
   c). Lead Blankets
   d). Bagged equipment coming from a posted contaminated area
   e). Laundry bags from SOPs
   f). Whenever RP gives prior approval

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Byron Station
Radiation Work Permit
Worker Information

RWP #: [redacted] **Rev: 0**

Unit:	Building:	Elevation:	Location:
0	AUX AND RW	ALL	LHRAs

Equipment Name: NA

RWP Description: LHRA ENTRIES: INCLUDING INSPECTIONS / OPS ROUNDS AND OOS / MINOR MAINTENANCE

RWP Dose Approval:	100	mrem/day
Accumulated Dose Alarm:	80	mrem
Dose Rate Alarm:	300	mrem/hr

Exposure Monitoring Requirements

TLD and DIGI (Electronic Dosimeter) required.

Respiratory Protection Required

None

Special Instructions

ALL WORK ON THIS RWP MUST HAVE PRIOR RP APPROVAL.

NO ENTRY INTO AREAS REQUIRING PERSONNEL NEUTRON MONITORING

REVIEW SURVEYS OF RADIATION AND CONTAMINATED AREAS.

CLASS 1 CLOTHING (MINS) REQ. FOR VISUAL INSPECTION / NO CLIMBING.

CLASS 2 CLOTHING (FULL SET) REQ. FOR CLIMBING ABOVE 6 FT. / TIGHT AREAS POSTED CA.

WATERPROOF OUTER LAYER REQ. FOR WORK WITH RUNNING OR SPLASHING WATER.

THIS RWP IS FOR ALL WORK GROUPS, BUT ONLY FOR MINOR ACTIVITIES SUCH AS: STAGING EQUIPMENT / OPER. ROUNDS / INSPECTIONS / MINOR MAINT.

NO ENTRY INTO 15R/HR WHOLE BODY DOSE RATE WITHOUT PRIOR HPSS APPROVAL.

Protective Clothing Required

No PCs required in clean areas.

Class 1 (Mins)
Cloth Booties
Rubber Gloves
Cotton Glove Liners
Rubber Shoe Covers
Cap
Lab Coat

Class 2 (Full Set)
Cloth Booties
Rubber Gloves
Cotton Glove Liners
Rubber Shoe Covers
Cap
Cloth Hood
Coveralls

FOR TRAINING USE ONLY

Byron Station
Radiation Work Permit
Radiation Protection Information

RWP #[redacted] **Rev: 0**

Survey Frequency Requirements

Radiation:	ROUTINE / New work Location
Contamination:	ROUTINE / New Work Location
Airborne:	ROUTINE

Pre-Job Briefing Required Yes

ENTRY INTO R-LOCKED HIGH RAD. AREAS REQ. RPT IN ATTENDANCE OR CALC. STAY TIMES DOCUMENTED AND COMMUNICATED TO WORKERS.

R.T. Coverage / Comments: Intermitent: Yes

Continuous tech coverage required if no current survey available for areas to be entered or if RP Supervision feels it necessary.

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USE ONLY

RP Supervisor		**ALARA Review By**	
BARTON BARRY M	12/31/97 10:02:56 AM	CURT REPASS AAR 06-98-A011	10/20/97 12:00:29 PM
Completed By		**Terminated By**	
ROBERTSON MARTA J	10/20/97 12:00:11 PM	BARTON BARRY M	2/16/98 10:17:19 AM
Job Supervisor			

DATE AND TIME: 01/07/98 09:00

RADIATION WORK PERMIT REQUEST

RWP REQUEST [redacted]

STATION NUMBER: BYR | UNIT NUMBER: 00 | RWP/REV: [redacted] 00

BUILDING: ALL | ELEVATION: ALL | ROOM/AREA: ALL COL: ___ ROW: ___

LOCATION DESCRIPTION: ALL LHRA ENTRIES

EQUIP. NAME: ___

NWR NUMBER:

ACTIVITY LHRA ENTRIES INCL. MISC MINOR WORK

EPN: ___ TASK/DEP ___

DESCRIPTION OF WORK (Be specific or attach clarifying documents):

LHRA ENTRIES : INCL INSPECTIONS / ROUNDS / OOS / MINOR MAINT

CHECK WHICH ITEMS ARE REQUIRED OR APPLY:

- x Checklist N/A
- _ Draining of Vessel or Tank
- _ Component Disassembly
- _ Confined/Enclosed Space Entry
- _ Use of Controlled Rad. Sources
- _ Work > than 6 feet Above Floor
- _ Scaffolding
- _ Surface Preparation Type: ___
- _ Sweeping
- _ Brushing
- _ Weld/Brazing/Solder
- _ Insulation Removal
- _ Radiography
- _ Open Process Lines
- _ Splash/Running Water
- _ Asbestos Removal
- _ Drilling
- _ Robotic Welding
- _ Plasma/Air Arc Cutting
- _ Movement of Shielding
- _ Packing Removal
- _ Cut or Grind Type: ___
- _ Changes in Ventilation
- _ Removal of Equip. from Fuel Pools associated cavities/Pits.
- _ Use of Containment Devices (glove bags)
- _ Work Below Grating

LIST ALL TASKS (Including Support Groups)	PERSON HOURS IN WORK AREA	FOR RAD. PROTECTION USE: WORK AREA DOSE RATE (mR/HR)	PERSON-REM ESTIMATE
1. INSPECTIONS/ ROUNDS / OOS / MINOR MAINT	350.0	.00	.000
2.			
3.			
4.			
5.			
6.			
7.			
8.			
TOTALS	350.0		.000
ALARA Est. :	350.0		.320

FOR TRAINING USE ONLY

EST. START DATE : ___

EST. COMPL DATE: ___

REQUESTOR:
NAME (PRINT) BARTON BARRY DEPARTMENT ___ PHONE 2975

ADDITIONAL RP COMMENTS

REP DATA

RAD PROTECTION REVIEW BY: BARTON BARRY

RAD PROTECTION REV DATE : 01/07/98

RAD PROTECTION REV TIME : 09:00

_ SEE ATTACHED LIST

* * * * END OF REPORT * * * *

RWP INFORMATION LOG

RWP [redacted]

DATE / TIME	INITIALS	RWP INFORMATION

FOR TRAINING USE ONLY

h:\mydocuments\xldata\rinfolog.xls

APPROVED 02/03/94

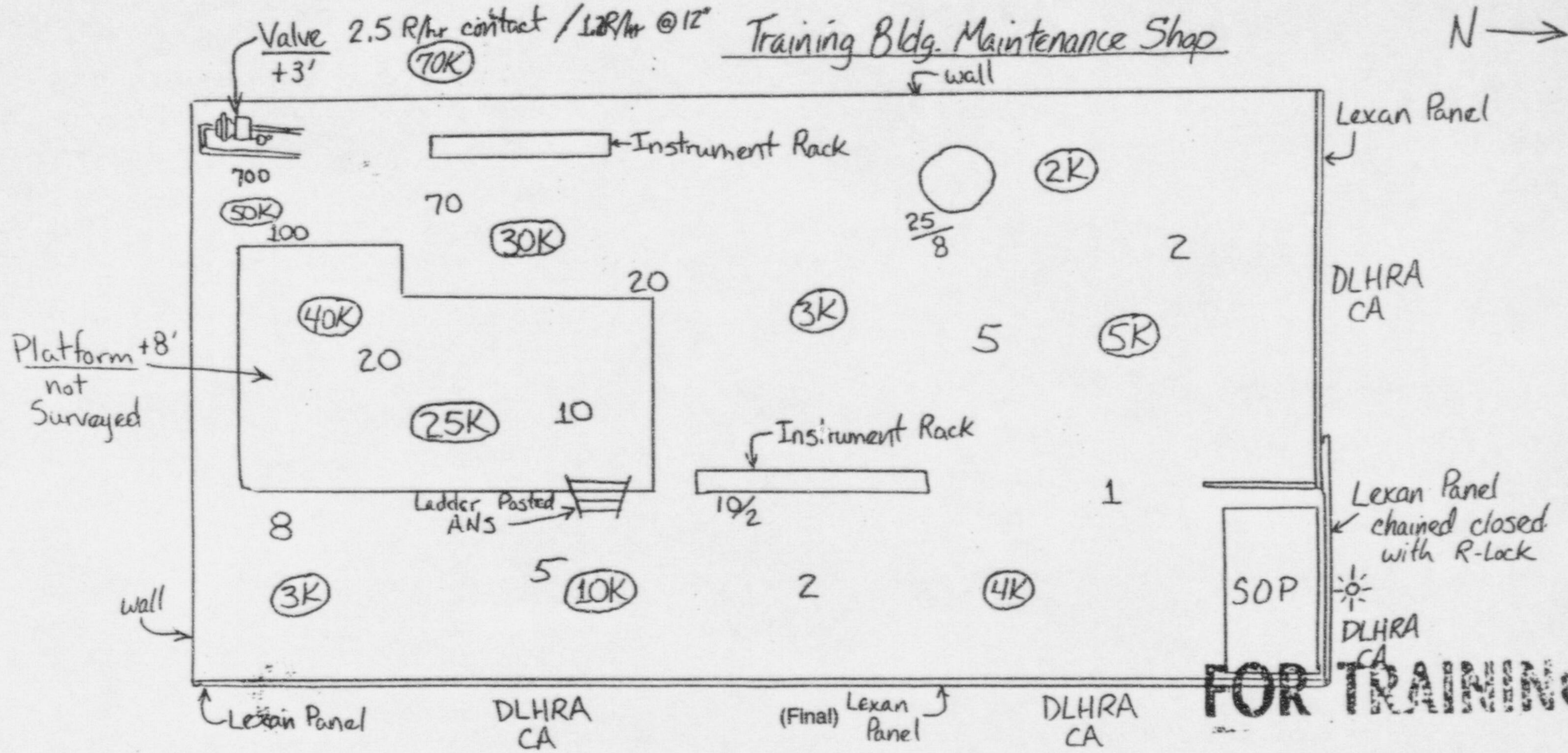
Facsimile

BRP 2000-T411
Revision 2

OT-XXX OUTSIDE BUILDING BLANK

SURVEY # 98-9999
DATE 08-04-98 TIME 1430
RPT AOT
WK NA MT NA QT NA INST RS05 SER A746V
RWP# 989999 RM14 7318
Other High Rad Investigation NA NA
All Inst Tested with Check Source
Reviewed by LRF Date 8/4/98

KEY:			
#	Gamma Dose Rate in mR/Hr	CRA	Caution Radiation Area
⊕'s	Smears dpm/100 cm2	CA	Contaminated Area
NCF	No Contamination Found	DHRA	Danger High Rad Area
(L)	Large Area Smear	ARA	Airborne Radioactivity Area
N	Neutron	RM	Radioactive Materials
▵	Air Sample Location	NR	Neutron TLD Required
B	Beta a Alpha	HCA	High Contamination Area
ANS	Area Not Surveyed	☼	Flashing Red Light



(1660SS/WPF/012194)

KEY?

Maximum Stay Time Worksheet For Areas >1000 mrem/hr
When RPT Is Not In Attendance

Max stay time required in areas >1000 mrem/hr when a RPT is not in attendance (Tech spec 6.12.2)

RWP # 98XXXX

Date	Work Group Job Description	Authorized Daily Dose (mrem)	Working Dose Rate (mrem/hr)	** Maximum Stay Time	Radiation Protection Supervision Initials
Example: 01-01-95	CV resin transfer	300	1500	12	JAD
9/16/98	VALVE LINE-UP	300	1050	17	JRT

FOR TRAINING USE ONLY

**Worker MUST leave the area when stay time has expired OR upon electronic dosimeter alarm due to accumulated dose, whichever occurs first.

(Final)

REFERENCE USE: YES

Question No: 1

An Alert Emergency has been declared on Unit 1. All equipment is functioning normally.
A leak has the potential for affecting one train of ECCS equipment. A person will have to enter the 383' Penetration and operate the valve handwheel to isolate the leak. The primary exposure will be to the hands and lower forearms. When asked, you volunteered to perform the operation.

What are the radiation exposure limits that should apply to this action and what individual must approve this exposure?

Expected Answer:

Exposure Limits:

- 10 rem TEDE (Whole Body)
- 30 rem to lens of the eye
- 100 rem to extremities (and any organs and skin)

Approval: The Station Director (CMEO, or Manager of Emergency Operations)

Actual Answer:

____
____
____
____
____
____

☐ Candidate's response matched expected answer.

Sat ___ **Unsat** ___.

K/A: 2.3.1 2.6/3.0

Reference(s): BZP 380-1 " Emergency Dose Limits and Radiological Controls for Rescue and Recovery Operations", Rev. 9, Section C.1
BZP 100-T1 "Station Director Checklist", Page 1
BZP's/GSEP Lesson Plan, Rev. 1, III.F.3 & F.2, page 70-71, LO 4.

ADMINISTRATIVE TOPICS
SECTION A.4 RO

REFERENCE USE: YES

Question No: 2

a. A Site Emergency has been declared and the Evacuation Alarm has been sounded. What are the areas of asembly for both Licensed and Non-Licensed Operators?

b. What is required if the Operation Support Center (OSC) is experiencing dose rates of 120mr/hour?

Expected Answer:

a. Control Room, Operation Support Center (OSC), and the Machine Shop.
b. Evacuate the OSC to the the Shift Engineers Office.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat __ **Unsat** __.

K/A: 2.4.29 2.6/4.0

Reference(s): BZP 310-4 "Assembly and Evacuation of Personnel", Rev. 18.
BZP 400-2 "Role and Staffing of OSC", Rev. 9.
BZP 310-4A2 "Assembly Areas", Rev. 1.
BZP's/GSEP Lesson Plan, Rev. 1, III.H.4.b.2), page 76, LO 8.
BZP's/GSEP Lesson Plan, Rev. 1, III.J.2 & 7, page 80-82, LO 1.

ADMINISTRATIVE TOPICS
SECTION A.4 RO
CANDIDATE QUESTION SHEET

Question No: 1

An Alert Emergency has been declared on Unit 1. All equipment is functioning normally.
A leak has the potential for affecting one train of ECCS equipment. A person will have to enter the 383' Penetration and operate the valve handwheel to isolate the leak. The primary exposure will be to the hands and lower forearms. When asked, you volunteered to perform the operation.

What are the radiation exposure limits that should apply to this action and what individual must approve this exposure?

Question No: 2

A Site Emergency has been declared and the Evacuation Alarm has been sounded. What are the areas of asembly for both Licensed and Non-Licensed Operators?

What is required if the Operation Support Center (OSC) is experiencing dose rates of 120mr/hour?

Facility: Byron 1 & 2 | Date of Examination: September14, 1998

Examination Level: SRO-I | Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 3. ONE Administrative JPM, OR 4. TWO Administrative Questions
A1	Plant Parameter Verification / Review A Completed Estimated Critical Condition	1. JPM K/A 2.1.7 3.7/4.4
	Conduct of Operations / Shift Turnover with Staffing Complications	1. JPM K/A 2.1.3 3.0/3.4; 2.1.4 2.3/3.4
A2	Clearance And Tagging / Identify And Replace Blown Fuse	1. JPM K/A 2.2.13 3.6/3.8
A.3	Protection From Radiation Exposure / Prepare For Entry Into High Radiation Area > 1000 mr/hr	1. JPM K/A 2.3.10 2.9/3.3
A.4	Emergency Plan / GSEP Classification And Protective Action Recommenadtions	1. JPM K/A 2.4.38 2.2/4.0

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Review a Completed Estimated Critical Condition

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.2.36	2.8/3.2*
2.1.25	2.8/3.1

JPM NUMBER	Task Number	Job Position
ADMIN 1.1 SRO		US

Revision: Date:

REVIEWED: ______________________________ ____________
INSTRUCTOR DATE

APPROVED: ______________________________ ____________
GROUP LEADER DATE

Start Time: ____________ Stop Time: ____________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ______________ [ ] Other ____________

EXAMINEE: ____________________ EVALUATOR: ____________________

DATE: ____________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ____

____

____

Specific Information:

1. These items were used as reference material in the development of this JPM:
   1BGP 100-7T1 (RRD); 1BGP 100-7T3; Curve Book BCB-1

2. These items are expected to be used by the examinee in the performance of the task:
   1BGP 100-7T3; BCB-1

3. Information to the Examinee and the Evaluator:

   a. Initial Conditions:
      Unit 1 is performing a plant startup following a reactor trip 18 hours previous. Operation prior to the trip was for a period of 80 days at 100% power, following initial startup with current core (Cycle 9).

   b. Task Initiating Condition:
      1BGP 100-7T3 for the ESTIMATED CRITICAL CONDITION (ECC) for the plant startup in 2 hours has been completed. Current plant conditions and the most recent Reference Reactivity Data (RRD) worksheet are provided. The process computer is currently unavailable. The Critical Rod Position is desired at 138 steps on Control Bank D.

   c. Initiating Cue:
      The NSO has provided the completed copy of 1BGP 100-7T3 to you for review. Complete the review.

   d. Your Position:
      US (Startup SRO, QNE)

4. Terminal Performance Objective: (TPO)

Determine the provided ECC is incorrect:

1. The incorrect value for S/U rod worth is used for Desired Critical Position (HFP instead of HZP).
2. Lower Administrative Threshold rod position and the -750 Administrative Limit rod position are adversely affected.

5. Critical Steps(*)

12, 14, 16, 21, 22 (1BGP 100-7T3 Sections A.6.b, A.6.d, A.8, A.9.e, A.9.f, A.9.h and A.9.i.)

6. Identification of Impacted Systems:

If this task is performed incorrectly, the following adverse reactions could occur:

The reactor could be taken critical in conditions NOT allowed by the facility license.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

RECORD START TIME _______.

```
***********************************************************
*                        NOTE                             *
* The candidate is to be supplied with the completed RRD  *
* (1BGP 100-7T1) and a blank copy of 1BGP 100-7T3.        *
*                                                         *
***********************************************************
```

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
1. Refer to 1BGP 100-7T3. (May be done at any time.)	Refer to 1BGP 100-7T3.	☐	☐	☐
2. Review Admin Data. **(CUE: SU # - 98-2-1TEST Startup Date - TODAY Time - 2 HOURS FROM CURRENT TIME Shutdown Date & Time - 18 HOURS BEFORE CURRENT TIME.)**	Determine information recorded correctly: o Unit 1 SU # - 98-2-1TEST o SU date & time - 2 hrs from current o SD date & time - 18 hrs before current o Time Interval since shutdown - 20 hrs	☐	☐	☐
3. Determine Change in Power Defect.	Determines 100% power value for Power Defect from RRD: -1317 pcm Calculate difference: +1317 pcm.	☐	☐	☐

```
***********************************************************
*                        NOTE                             *
* ITC at SU Tave & RCS Boron Conc. may be determined from *
* BCB-1 Table 2-3 but is NOT required since Tave will NOT *
* deviate from 557°F.  Value at 1092 ppm (1717 EFPH) = -  *
* 8.8 pcm/°F.                                             *
*                                                         *
***********************************************************
```

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
4. Change in RCS Temperature.	Determines temperature change reactivity: 0 pcm	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
5. Change in Samarium. (BCB-1 Table 1-4)	Determine SU Samarium Worth of -1002 pcm. (20 hours after SD from 100% at 1717 EFPH) Determine -919 pcm from RRD. Calculate Difference Samarium: -83 pcm.	☐	☐	☐
6. Change in Xenon. (BCB-1 Table 1-2 or Fig. 8c)	Determine SU Xenon Worth of -3318 pcm. (20 hours after SD from 100% at 1717 EFPH) Determine -2982 pcm from RRD. Calculate Difference Xenon: -336 pcm.	☐	☐	☐
7. Determine Overall Poisons.	Determine Overall Poisons: -419 pcm.	☐	☐	☐
8. Determine SD integral boron worth for RRD burnup, RRD RCS boron Conc and HZP Tave. (BCB-1 Table 1-5)	Interpolate and determine boron: -9349pcm (-9300 to -9400 pcm).	☐	☐	☐
9. Determine Poison Correction Factor for Integral Boron Worth (BCB-1 Figure 8b calculation)	Determine Poison Correction factor: +0.888 (+0.887 to +0.889).	☐	☐	☐
10. Determine corrected poisons reactivity worths.	Determine/calculate corrected poisons worths: -372 pcm.	☐	☐	☐
11. Record desired Control Bank position.	Determine 138 steps CB D recorded.	☐	☐	☐
* 12. Determine desired Control Bank Worth. (BCB-1 Table 1-8 or Fig 2D)	Determine 138 steps CBD Bank Worth: -250.1 pcm. Notify/Correct value of -215.6 pcm recorded.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
13. Record HFP inserted Rod Worth prior to Shutdown.	Determine -9.5 pcm from RRD recorded.	☐	☐	☐
* 14. Determine change in reactivity due to change in rod position.	Determine total reactivity of -240.6 pcm instead of -206.1 pcm.	☐	☐	☐
15. Determine change in burnup correction.	Section is N/A per NOTE.	☐	☐	☐
* 16. Determine Reactivity Balance.	Determine reactivity worths recorded from appropriate Sections: o Power Defect (A.1) [+1317 pcm] o Isothermal Temp. Defect (A.2) [0 pcm] o Corrected Poisoning Defect (A.5.d) [-372 pcm] • Rod Adjustments (A.6.d) [-240.6 pcm instead of -206.1 pcm] o Burnup correction (A.7.d) [0 pcm] **AND** Determine difference of +704.4 pcm (+704 to +705 pcm) instead of +738.9 pcm.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
17. Determine Differential Boron Worth at assumed critical boron concentration. (BCB-1 Table 2-4, Fig. 10A)	Determine Differential Boron Worth at 1100 ppm and 557°F: -8.82 pcm/ppm (-8.80 to -8.90 pcm/ppm).	☐	☐	☐

NOTE

The error in the Reactivity Balance value will affect the calculated critical boron concentration. However, the magnitude is relatively insignificant, so that the determination of the error is NOT Critical.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
18. Determine the change in RCS Boron needed.	Determine the boron concentration change of -80 ppm (-79 to -81 ppm) instead of -84 ppm.	☐	☐	☐
19. Determine initial critical RCS Boron concentration.	Determine RCS boron concentration from RRD: +1010 ppm entered. Determine calculated RCS boron change required: -80 ppm. Determine critical boron concentration: 1090 ppm (1089 to 1091 ppm) instead of 1094 ppm.	☐	☐	☐

NOTE

The following steps combine the steps of calculating the Administrative Limit values and determining the associated Control Bank position. The procedure performs these steps separately: Calculation of each of the three values, the determining the associated Threshold Control Bank position.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
20. Calculate +500 pcm inserted rod worth threshold. Determine corresponding Control Bank Upper Administrative Threshold position. (CBC-1 Table 1-8 or Fig 2D)	Determine/enter Desired Rod Worth: -250.1 pcm. Calculate +500 pcm worth: +249.9 pcm instead of +284.4. **AND** Determine that maximum allowed value is full out park position on CBD (228 steps).	☐	☐	☐
* 21. Calculate -500 pcm inserted rod worth threshold. Determine corresponding Control Bank Lower Administrative Threshold position. (CBC-1 Table 1-8 or Fig 2D)	Determine/enter Desired Rod Worth: -250.1 pcm. Calculate -500 pcm worth: -750.1 pcm instead of -715.6. **AND** Determine that minimum allowed value is 41 steps on CBD (37 to 45 steps) instead of 48 steps on CBD.	☐	☐	☐
* 22. Calculate -750 pcm inserted rod worth threshold. Determine corresponding Control Bank Upper Administrative Threshold position. (CBC-1 Table 1-8 or Fig 2D)	Determine/enter Desired Rod Worth: -250.1 pcm. Calculate -750 pcm worth: -1000.1 pcm instead of -965.6. **AND** Determine that minimum allowed value is 5 steps on CBD [OR 121 steps on CBC](1 to 10 steps CBD OR 117 to 125 steps CBC) instead of 11 steps on CBD.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
23. Complete Critical Condition Summary.	Verify/correct the following information: o Present boron conc - 1400 ppm o Est. Critical Boron conc: 1090 ppm (or value determined) o Est. Critical Bank position: CB **D** at 138 steps o Upper Admin Limit: CB **D** at 228 steps o Lower Admin Limit: CB **D** at 41 steps instead of 48 o -750 pcm Admin Limit: CB **D** at 5 steps instead of 11	☐	☐	☐

RECORD STOP TIME ________.

COMMENTS:

DATA SHEET

CURRENT

RCS Boron concentration	-	1400 ppm
RCS temperature	-	557°F
RCS pressure	-	2235 psig
Power level	-	0%
Rod Position	-	All control and shutdown banks inserted
Time since trip	-	18 hours

Startup planned to occur in 2 hours

Desired boron concentration	-	1100 ppm
Desired critical rod position	-	66 steps withdrawn on CBD
Desired critical RCS temp	-	557°F

HISTORY

RRD Data taken at time of trip.

TASK CONDITIONS:

1BGP 100-7T3 "Calculation Of Estimated Critical Condition Based On A Known Rod Position" has just been performed to provide the ESTIMATED CRITICAL CONDITION (ECC) for the plant startup. Current plant conditions and the most recent Reference Reactivity Data (RRD) worksheet are provided. The process computer is currently unavailable. The Critical Rod Position is desired at 138 steps on Control Bank D.

INITIATING CUES:

The NSO has provided the completed copy of 1BGP 100-7T3 to you for review. Complete the review.

DATA SHEET

CURRENT

RCS Boron concentration	-	1400 ppm
RCS temperature	-	557°F
RCS pressure	-	2235 psig
Power level	-	0%
Rod Position	-	All control and shutdown banks inserted
Time since trip	-	18 hours

Startup planned to occur in 2 hours

Desired boron concentration	-	1100 ppm
Desired critical rod position	-	66 steps withdrawn on CBD
Desired critical RCS temp	-	557°F

HISTORY

RRD Data taken at time of trip.

File Location: 1.02.0128

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION

*

> **NOTE**
> IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by an NSO. Typically, the Systems Engineering Dept. Nuclear Group should perform this procedure.

*, 2.c

Unit 1 Startup Number 1998 - 02 - 1 TEST
YR - SU# - ECC#

Startup Date ______/______/______ Startup Time ____:____

Shutdown Date ______/______/______ Shutdown Time ____:____
(From RRD Step F.2.a) (From RRD Step F.2.a)

Time Interval Since Shutdown 20 Hours

> **NOTE**
> 1BGP 100-7T3 can be used to manually calculate Critical Rod Position based on a known rod position. If a manual ECC for a Critical Rod Position based on a known boron concentration is required, use 1BGP 100-7T2. 1BGP 100-7T3 will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Systems Engineering Dept. Nuclear Group for review when no longer required on shift for reference. Upon completion of their review this form will be forwarded to Central File for permanent retention.

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
When referencing graphs or tables, use Hot Full Power (HFP) data prior to shutdown and Hot Zero Power (HZP) data prior to startup. Also, verify data corresponds to the proper core burnup.

A. MANUAL CALCULATIONS

1. Change in Power Defect:

DETERMINE the startup and shutdown Power Defect values and their difference using RRD step 1.f or equivalent:

0	pcm -	(-) 1317	pcm =	(+) 1317	pcm
Startup Power Defect		Shutdown Power Defect (RRD Step 1.f)		Difference Power Defect	

2. Change in RCS Temperature:

DETERMINE the startup Isothermal Temperature Defect (ITD) value by multiplying the temperature deviation from program Tave by the Isothermal Temperature Coefficient (ITC) determined at the startup RCS Tave, and at the projected startup RCS Boron concentration with the aid of BCB-1 Table 2-3 or equivalent:

(557 °F -	557°F)	*	-4.522	pcm/°F	=	0	pcm
Expected Tave at Startup	Program Tave at Startup		ITC at Expected Startup Tave and RCS Boron Concentration			Startup ITD	

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
During non-equilibrium Samarium conditions, different methods of predicting Samarium Worth should be consulted. If a different method (other than specified in this procedure) for determining Samarium Worth for Step A.3 is used, two QNE's shall concur.

3. Change in Samarium:

DETERMINE the startup and shutdown Samarium worth values and their difference at the applicable burnup, the Samarium Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-4 or equivalent:

	Startup
Applicable Burnup: (RRD Step 2.b)	1700 EFPH
Samarium Equivalent Power: (RRD Step 2.c)	100 %
Elapsed Time Since Shutdown:	20 hours

(-) 1002 pcm - (-) 919 pcm = (-) 83 pcm

Startup Samarium Worth	Shutdown Samarium Worth (RRD Step 1.h)	Difference Samarium
(-) 1002 pcm	(-) 919 pcm	(-) 83 pcm

*

NOTE
During nonequilibrium Xenon conditions, different methods of predicting Xenon worth should be consulted. The empirical method of estimating Xenon Worth of Startup (36 hr weighted average) is only valid beyond approximately 16 hours after shutdown. If a different method (other than specified in this procedure) for determining Xenon Worth for Step A.4 is used, two QNE's shall concur.

*, 2.i

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

*

NOTE
The Systems Engineering Dept. Nuclear Group shall verify that the Process/Prime inputs to the BEACON computer are accurate by performing BVP 500-14 and BVP 500-16 if the BEACON program is used to support ECC calculations.

*, 2.d

4. Change in Xenon:

DETERMINE the startup and shutdown Xenon worth values and their difference at the applicable burnup, the Xenon Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-2, Figure 8c, or equivalent:

	Startup
Applicable Burnup: (RRD Step 2.b)	1700 EFPH
Xenon Equivalent Power: (RRD Step 2.d)	100 %
Elapsed Time Since Shutdown:	20 hours

(-) 3318 pcm - (-) 2982 pcm = (-) 336 pcm

Startup Xenon Worth	Shutdown Xenon Worth (RRD Step 1.i)	Difference Xenon

5. Change in Overall Poisons:

DETERMINE the change in poisons by correcting Xenon and Samarium with respect to RCS Boron.

a. DETERMINE the overall sum of poisons by adding the Samarium difference to the Xenon difference:

(-) 83 pcm + (-) 336 pcm = (-) 419 pcm

Samarium Difference (A.3)	Xenon Difference (A.4)	Overall Poisons

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

b. DETERMINE the shutdown Integral Boron Worth at the RRD Step 1.g burnup, the RRD Step 1.d RCS Boron concentration and HZP Tave with the aid of BCB-1 Table 1-5 or equivalent:

Integral Boron Worth: (-) 9349 pcm

c. DETERMINE the poison correction factor by substituting the Integral Boron Worth from step A.5.b into the equation shown on BCB-1 Figure 8b:

Poison Correction Factor: (+) 0.888

d. DETERMINE the corrected poisons reactivity worth from the original sum of Xenon and Samarium from step A.5.a multiplied by the determined correction factor from step A.5.c:

(-) 419	pcm *	(+) 0.888	pcm =	(-) 372 pcm
Overall Poisons (A.5.a)		Poison Correction Factor (A.5.c)		Corrected Overall Poisons

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

6. Change in Rods:

DETERMINE the reactivity change due to adjustments in rod position.

*

NOTE
A control bank position of CBD withdrawn to at least 130 steps should be used as the desired control bank position for all ECCs. This will exchange rod worth for boron worth. There is less uncertainty associated with boron worth as compared with rod worth. Boron worth also changes less throughout core life when compared to rod worth. If plant conditions do not allow a choice of CBD position withdrawn to at least 130 steps, then the reason for the deviation shall be documented in Section D under the remarks. Either way, the CBD position SHALL be within 750 pcm of the fully withdrawn position.

*, 2.c

a. RECORD the desired Control Bank position:

CB __D__ at __138__ steps.

b. DETERMINE the desired Control Bank position worth recorded in step A.6.a at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2D, or equivalent:

Desired Control Bank Worth: (-) 215.6 pcm

c. RECORD the HFP inserted rod worth prior to shutdown from RRD step 1.c or equivalent:

HFP Inserted Rod Worth: (-) 9.5 pcm
(RRD Step 1.c)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

d. DETERMINE the change of reactivity due to the change in rod position by subtracting the HFP Inserted Rod Worth (A.6.c) from the Desired Inserted Rod Worth (A.6.b):

(-) 215.6	pcm -	(-) 9.5	pcm =	(-) 206.1	pcm
Desired Rod Worth (A.6.b)		HFP Inserted Rod Worth (A.6.c)		Change in Rod Position	

> **NOTE**
> If RRD Steps 1.g and 2.b contain the same burnup, step A.7 may be marked "N/A".

7. N/A Change in Burnup:

DETERMINE the calculation for correcting burnup.

a. DETERMINE the RRD Step 1.g burnup design Boron concentration by using BCB-1 Figure 11 or equivalent:

Stable Reference Design Boron Concentration: N/A ppm

b. DETERMINE the RRD Step 2.b burnup design Boron concentration by BCB-1 Figure 11 or equivalent:

Final Power Operation Design Boron Concentration: N/A ppm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
If BCB-1 Figure 10a, Table 2-4 does NOT contain HFP data, the FOLLOW code method for determining DBW at HFP would be the preferred method. Using HZP data will result in a DBW value -0.5 to -1.0 pcm/ppm more negative than a HFP value. For purposes of NSO Independent Verification of FOLLOW code output, Figure 10a may be used as a qualitative check against the attached FOLLOW code output.

c. DETERMINE the Differential Boron Worth (DBW) of the RRD Step 1.g Burnup and RRD Step 1.d Boron Concentration by one of the following methods (circle method used):

1). Figure 10a, Table 2-4, or equivalent

2). FOLLOW Code Output (attach copy of output)

Differential Boron Worth = (-) N/A pcm/ppm

d. DETERMINE the burnup correction by subtracting the Final Power Operation Design Boron Concentration (A.7.b) from the Stable Reference Design Boron Concentration (A.7.a) and multiplying by the Differential Boron Worth (A.7.c):

[N/A ppm - N/A ppm] * N/A pcm/ppm = ( ) N/A pcm

Stable Reference Design Boron Concentration (A.7.a)	Final Power Operation Design Boron Concentration (A.7.b)	DBW (A.7.c)	Burnup Correction

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

8. DETERMINE the Reactivity Balance by summing the following values:

Power Defect (A.1)	(+) 1317	pcm
Isothermal Temperature Defect (A.2)	( ) 0	pcm
Corrected Poisoning Defect (A.5.d)	(−) 372	pcm
Rod Adjustments (A.6.d)	(−) 206.1	pcm
Burnup Correction (A.7.d)	+ ( ) 0	pcm
REACTIVITY BALANCE	(+) 738.9	pcm

9. Determination of Critical RCS Boron:

> **NOTE**
> This section may need to be repeated if the assumed critical Boron Concentration for step A.9.a differs from that determined in step A.9.c.

a. DETERMINE the Differential Boron Worth at the RRD Step 2.b burnup, assumed critical RCS Boron concentration, and at the startup RCS Tave with the aid of BCB-1 Table 2-4, Figure 10A, or equivalent:

Differential Boron Worth: (-) 8.82 pcm/ppm

b. DETERMINE the change in RCS Boron needed by dividing the Reactivity Balance in step A.8 by the Differential Boron Worth in step A.9.a:

( ) 738.9 pcm / (-) 8.82 pcm/ppm = (−) 84 ppm

Reactivity Balance (A.8) / Differential Boron Worth (A.9.a) = Change in RCS Boron

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

c. DETERMINE the critical RCS Boron concentration by adding the change in RCS Boron step A.9.b to the RRD step 1.d Boron Concentration:

(+) 1010 ppm - (-) 84 ppm = 1094 ppm
RCS Boron at RRD Step 1.d; Change in RCS Boron (A.9.b); Critical RCS Boron

* d. CALCULATE the + 500 pcm inserted rod worth threshold:

(-) 215.6 pcm + 500 pcm = (+) 284.4 pcm
Desired Rod worth (A.6.b)

*, 2.c

* e. CALCULATE the - 500 pcm inserted rod worth threshold:

(-) 215.6 pcm - 500 pcm = (-) 715.6 pcm
Desired Rod worth (A.6.b)

*, 2.c

f. CALCULATE t.e (-) 750 pcm inserted rod worth limit:

(-) 215.6 pcm - 750 pcm = (-) 965.6 pcm
Desired Rod worth (A.6.b)

* g. DETERMINE the control bank position corresponding to the Upper Administrative Threshold by using BCB-1, Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.d at the RRD Step 2.b burnup. Do not exceed the full-out park position on Control Bank D:

Upper Administrative Threshold: CB D at 228 steps
*, 2.c

* h. DETERMINE the control bank position corresponding to the Lower Administrative Threshold by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.e at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

Lower Administrative Threshold: CB D at 48 steps
*, 2.c

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

i. DETERMINE the control bank position corresponding to the -750 Administrative Limit by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.f at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

- 750 pcm Administrative Limit: CB D at 11 steps

*

NOTE
Notify the Duty Station Manager if the hand calculated ECC differs by more than 250 pcm from the BEACON generated ECC (if BEACON is used). Station Duty Officer concurrence is required before proceeding with the startup.

*, 2.f

B. ESTIMATED CRITICAL CONDITION SUMMARY

Present Boron Concentration 1400 ppm
Estimated Critical Boron Concentration 1094 ppm (A.9.c)
Estimated Critical Bank Position CB D at 138 steps (A.6.a)

* Upper Administrative Threshold: CB D at 228 steps (A.9.g) *, 2.c

* Lower Administrative Threshold: CB D at 48 steps (A.9.h) *, 2.c

- 750 pcm Administrative Limit: CB D at 11 steps (A.9.i)

ECC performed by ____________ ________ (NSO, Qualified Nuclear Engineer)
NAME DATE

ECC reviewed by ____________ ________ (NSO, Qualified Nuclear Engineer)
NAME DATE

* Complete the "ECC parameters" placard and give to the Startup NSO. *, 2.c

____/____
Startup SRO

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

C. ESTIMATED CRITICAL POSITION FROM COUNTS INCREASING EIGHTFOLD

NOTE
A 1/M plot shall be maintained during startup.

*

NOTE
Any difference between the estimated time and the actual time for criticality could impact the final critical position. Contact Systems Engineering Dept. Nuclear Group to estimate the magnitude of this effect.

*, 2.c

1. Base Count Rate With Shutdown Banks Out ________ cps.

   Source Range Channel N __________.

2. Counts Increase Eightfold at Control Bank _______ at ______steps.

3. Predicted Critical Position From BCB-1, Figure 9.

   Control Bank ___________ at ____________ steps.

4. ENSURE the predicted Critical Control Bank Position in C.3 is ABOVE the Rod Insertion Limit (i.e. CBC is greater than 47 steps withdrawn) and - 750 pcm Administrative Limit. If not, DO NOT PROCEED WITH APPROACH TO CRITICALITY. The RCS Boron Concentration must be increased and the ECC recalculated.

   _____/_____/_____
   SRO Date Time

5. ENSURE the predicted Critical Control Bank Position in C.3 is within the ± 500 pcm Administrative Threshold. If not, Shift Manager and Qualified Nuclear Engineer concurrence is required to proceed with the reactor startup.

   _____/_____/_____ _____/_____/_____
   QNE Date Time SRO Date Time

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

*

NOTE
If the predicted critical bank position is not above the - 750 pcm administrative limit, then re-insert all Control Bank rods until the Systems Engineering Dept. Nuclear Group documents an evaluation in Section D under remarks and concurs to bring the reactor critical. A new ECC may be performed.

*, 2.c

6. RECORD the following information if criticality is achieved and power is stabilized at 10^{-8} amps on the highest reading IR Channel.

   a. Actual Time of Critical Data. ____________

   b. Actual Critical Bank Position. CB ______ at ________ steps

   c. Actual Critical Boron Concentration. _________ ppm

   d. Actual Temperature at time of Criticality. __________°F

D. REMARKS: ____

____

____

____

____

____

____

____

____

____

____________/________
NUCLEAR GROUP DATE

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

E. MARGIN TO CRITICALITY WITH SHUTDOWN BANKS WITHDRAWN

NOTE

The purpose of this section is to ensure:

1. The basis to the BDPS Analysis is met (- 1300 pcm Shutdown), and
2. An inadvertent Mode Change does not occur (K_{eff} < 0.99).

1. DETERMINE the Total Control Bank Worth (CBA @ 0 steps) at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2A, or equivalent:

   Total Control Bank Worth: (-)__________ pcm

NOTE

The following step takes into account 500 pcm uncertainty on the ECC calculation for conservatism.

2. DETERMINE the Required Boron Reactivity to satisfy the Margin to Criticality by completing the following arithmetic:

Total Control Bank Worth (E.1):	+	(-)__________	pcm
Control Bank Required Reactivity (A.6.b):	-	(-)__________	pcm
Bounding Margin to Criticality:	-	(-) 1300	pcm
Conservatism:	+	500	pcm
Required Boron Reactivity	=	( )__________	pcm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

5. If the answer in Step E.4.b is "NO", DO NOT withdraw Shutdown Banks until the RCS Boron Concentration is greater than or equal to the Minimum RCS Boron Concentration calculated in Step E.3.b.

_______/_______/_______
SRO Date Time

(Final)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

3. Determination of the Minimum RCS Boron Concentration which satisfies the Margin to Criticality:

a. DETERMINE the difference between the RCS Boron Concentration necessary to meet the Margin to Criticality requirements and the ECC Boron Concentration by dividing the Required Boron Reactivity calculated in Step E.2 by the Differential Boron Worth in Step A.9.a:

( ) ________ ppm / (-) ________ pcm/ppm = ( ) ________ ppm
Required Boron Reactivity (E.2) / Differential Boron Worth (A.9.a) = Difference in RCS Boron Concentration

b. DETERMINE THE Minimum RCS Boron Concentration necessary to meet the Margin to Criticality requirements by subtracting the difference in RCS Boron Concentration calculated in Step E.3.a from the ECC Boron Concentration:

( ) ________ ppm - ( ) ________ ppm = ( ) ________ ppm
ECC Boron Concentration (A.9.c) - Difference in RCS Boron Concentration (E.3.a) = Minimum Required RCS Boron Concentration

4. VERIFY Sufficient Margin to Criticality:

a. RECORD the present RCS Boron Concentration from the most recent Boron sample:

________ ________ ___/___/___
Present RCS Boron Concentration | Sample Time | Date

b. Is the present RCS Boron Concentration GREATER THAN OR EQUAL TO the Minimum RCS Boron Concentration calculated in Step E.3.b? (Circle one)

YES NO

File Location: 1.02.0128

REFERENCE REACTIVITY DATA WORKSHEET

> **NOTE**
> This worksheet will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Operating Staff when no longer required on shift for reference.

Unit One Startup Number ______ - ______ - ______
Year - S/U# - RRD#

1. Stable Reference Reactivity Data

> **NOTE**
> The data recorded in Step 1 shall be data from a stable core condition. Contact the Nuclear Group for assistance, if necessary. An exception to the stability criteria would be if this RRD were for a recent reactor startup.

(24 hours prior to current time) 1.a. Reference Date: ______ Reference Time: ______

1.b. Control Bank D at 213 steps.

* 1.c. Inserted Control Bank Worth

BCB-1 Table 1-7, Figure 2, Figure 2C, or equivalent (-) 9.5 pcm

* 1.d. Critical Boron Concentration from (CIRCLE mode of analysis used):

1). Accurate sample at a recent known stable condition,

2). Calculated by the Qualified Nuclear Engineer

(Attach calculations, logs, point history used)

C_B = 1010 ppm Time/Date: ____/____ (24 hours prior to current time)

1.e. Reference power level from BURP:

Stable Power: 100 %

(1403VV/WPF/062497)

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

1.f. Total Power Defect from:

BCB-1 Figure 17A, Table 2-1, or equivalent (-) 1317 pcm

1.g. RECORD accumulated core average burnup from BURP:

Core Average Burnup: 1700 EFPH

NOTE
If this RRD is being performed to reference a recent reactor startup, obtain the Samarium Worth from the applicable ECC Step 3 for Startup Samarium Worth or 1BVS XPT-13, as applicable. N/A the Samarium Equivalent Power.

1.h. Equivalent Power for Samarium Calculation from (BURP and Samarium Worth):

Sm Eq. PWR = Unweighted average power over 5 days (120 hrs)

Sm Eq. PWR = 100 %

Sm Worth from BCB-1 Table 1-4 or equivalent at 0 hrs after shutdown (-) 919 pcm

NOTE
If this RRD is being performed to reference a recent reactor startup, obtain the Xe Worth from the applicable ECC Step 4 for Startup Xenon Worth or 1BVS XPT-13, as applicable.

1.i. Determine the Xenon Worth from power in Step 1.e and BCB-1 Figure 8c, Table 1-2, or equivalent:

Xe Worth (-) 2982 pcm

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

2. Final Power Operation Reference Reactivity Data:

> **NOTE**
> The data recorded in Step 2 shall include the operating history of the reactor until it is shutdown. If the reactor tripped from a stable condition, record the applicable data from Step 1 into Step 2.

(20 hours prior to current time) 2.a. Reference Date: ________ Reference Time: ________

2.b. RECORD accumulated core average burnup from BURP:

Core Average Burnup: 1700 EFPH

2.c. Equivalent Power for Samarium Calculation from BURP:

Sm Eq. PWR = Unweighted average power over 5 days (120 hrs)

Sm Eq. PWR = 100 %

2.d. Determine the Equivalent Power for Xenon Calculation from BURP or equivalent:

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

2.d. (continued)

Hours Prior to Shutdown	Average Power (%)	Multiplier		Product
0 to 1	100	x 6	=	600
1 to 2	100	x 5	=	500
2 to 3	100	x 5	=	500
3 to 4	100	x 5	=	500
4 to 5	100	x 4	=	400
5 to 6	100	x 4	=	400
6 to 7	100	x 4	=	400
7 to 8	100	x 4	=	400
8 to 9	100	x 4	=	400
9 to 10	100	x 3	=	300
10 to 11	100	x 3	=	300
11 to 12	100	x 3	=	300
12 to 13	100	x 3	=	300
13 to 14	100	x 3	=	300
14 to 15	100	x 3	=	300
15 to 16	100	x 3	=	300
16 to 17	100	x 2	=	200
17 to 18	100	x 2	=	200
18 to 19	100	x 2	=	200
19 to 20	100	x 2	=	200
20 to 21	100	x 2	=	200
21 to 22	100	x 2	=	200
22 to 23	100	x 2	=	200
23 to 24	100	x 2	=	200
24 to 25	100	x 2	=	200
25 to 26	100	x 1	=	100
26 to 27	100	x 1	=	100
27 to 28	100	x 1	=	100
28 to 29	100	x 1	=	100
29 to 30	100	x 1	=	100
30 to 31	100	x 1	=	100
31 to 32	100	x 1	=	100
32 to 33	100	x 1	=	100
33 to 34	100	x 1	=	100
34 to 35	100	x 1	=	100
35 to 36	100	x 1	=	100

TOTAL = 9100

REFERENCE REACTIVITY DATA WORKSHEET
(continued)

2.d. (continued)

Equivalent Power for Xenon = $\frac{\text{Total}}{91}$ = $\frac{9100}{91}$

Xe Eq. PWR: 100 %

Remarks: None

NOTE
IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or, IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by the NSO. Typically, this procedure should be prepared by the Systems Engineering Dept. Nuclear Group. An independent member of the SED Nuclear Group should review the assumptions and calculations of the RRD for accuracy.

Performed by: ____________________/________ (NSO, Qualified Nuclear Engineer)
Name Date

Reviewed by: ____________________/________ (NSO, Qualified Nuclear Engineer)
Name Date

SRO: ____________________/________
Name Date

(Final)

SRO KEY

File Location: 1.02.0128

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION

NOTE
IF this procedure is performed by an NSO, THEN this procedure shall be reviewed by a Qualified Nuclear Engineer; or, IF this procedure is performed by a Qualified Nuclear Engineer, THEN this procedure shall be reviewed by an NSO. Typically, the Systems Engineering Dept. Nuclear Group should perform this procedure.

*, 2.c

Unit 1 Startup Number 1998 - 02 - 1 TEST
YR - SU# - ECC#

(Today's date + 2 hours fr conc) Startup Date ____/____/____ Startup Time ____:____

(Tod Current -18 hours) Shutdown Date ____/____/____ Shutdown Time ____:____
(From RRD Step F.2.a) (From RRD Step F.2.a)

Time Interval Since Shutdown 20 Hours

NOTE
1BGP 100-7T3 can be used to manually calculate Critical Rod Position based on a known rod position. If a manual ECC for a Critical Rod Position based on a known boron concentration is required, use 1BGP 100-7T2. 1BGP 100-7T3 will be retained as plant documentation. DO NOT DISCARD. Forward completed form to the Systems Engineering Dept. Nuclear Group for review when no longer required on shift for reference. Upon completion of their review this form will be forwarded to Central File for permanent retention.

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
When referencing graphs or tables, use Hot Full Power (HFP) data prior to shutdown and Hot Zero Power (HZP) data prior to startup. Also, verify data corresponds to the proper core burnup.

A. MANUAL CALCULATIONS

1. Change in Power Defect:

DETERMINE the startup and shutdown Power Defect values and their difference using RRD step 1.f or equivalent:

0 pcm	-	(-) 1317 pcm	=	(+) 1317 pcm
Startup Power Defect		Shutdown Power Defect (RRD Step 1.f)		Difference Power Defect

2. Change in RCS Temperature:

DETERMINE the startup Isothermal Temperature Defect (ITD) value by multiplying the temperature deviation from program Tave by the Isothermal Temperature Coefficient (ITC) determined at the startup RCS Tave, and at the projected startup RCS Boron concentration with the aid of BCB-1 Table 2-3 or equivalent:

(557 °F	-	557°F)	*	-4.522 pcm/°F	=	0 pcm
Expected Tave at Startup		Program Tave at Startup		ITC at Expected Startup Tave and RCS Boron Concentration		Startup ITD

CALCULATION OF ESTIMATEL CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
During non-equilibrium Samarium conditions, different methods of predicting Samarium Worth should be consulted. If a different method (other than specified in this procedure) for determining Samarium Worth for Step A.3 is used, two QNE's shall concur.

3. Change in Samarium:

DETERMINE the startup and shutdown Samarium worth values and their difference at the applicable burnup, the Samarium Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-4 or equivalent:

	Startup	
Applicable Burnup: (RRD Step 2.b)	1700	EFPH
Samarium Equivalent Power: (RRD Step 2.c)	100	%
Elapsed Ti. e Since Shutdown:	20	hours

(-) 1002 pcm - (-) 919 pcm = (-) 83 pcm

Startup Samarium Worth	Shutdown Samarium Worth (RRD Step 1.h)	Difference Samarium

NOTE
During nonequilibrium Xenon conditions, different methods of predicting Xenon worth should be consulted. The empirical method of estimating Xenon Worth of Startup (36 hr weighted average) is only valid beyond approximately 16 hours after shutdown. If a different method (other than specified in this procedure) for determining Xenon Worth for Step A.4 is used, two QNE's shall concur.

*, 2.1

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE
The Systems Engineering Dept. Nuclear Group shall verify that the Process/Prime inputs to the BEACON computer are accurate by performing BVP 500-14 and BVP 500-16 if the BEACON program is used to support ECC calculations.

*, 2.d

4. Change in Xenon:

DETERMINE the startup and shutdown Xenon worth values and their difference at the applicable burnup, the Xenon Equivalent Power(s) and at the elapsed hours since shutdown with the aid of BCB-1 Table 1-2, Figure 8c, or equivalent:

	Startup
Applicable Burnup: (RRD Step 2.b)	1700 EFPH
Xenon Equivalent Power: (RRD Step 2.d)	100 %
Elapsed Time Since Shutdown:	20 hours

(-) 3318 pcm - (-) 2982 pcm = (-) 336 pcm

Startup Xenon Worth	Shutdown Xenon Worth (RRD Step 1.i)	Difference Xenon
(-) 3318 pcm	(-) 2982 pcm	(-) 336 pcm

5. Change in Overall Poisons:

DETERMINE the change in poisons by correcting Xenon and Samarium with respect to RCS Boron.

a. DETERMINE the overall sum of poisons by adding the Samarium difference to the Xenon difference:

(-) 83 pcm + (-) 336 pcm = (-) 419 pcm

Samarium Difference (A.3)	Xenon Difference (A.4)	Overall Poisons
(-) 83 pcm	(-) 336 pcm	(-) 419 pcm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

b. DETERMINE the shutdown Integral Boron Worth at the RRD Step 1.g burnup, the RRD Step 1.d RCS Boron concentration and HZP Tave with the aid of BCB-1 Table 1-5 or equivalent:

Integral Boron Worth: (-) 9349 pcm

c. DETERMINE the poison correction factor by substituting the Integral Boron Worth from step A.5.b into the equation shown on BCB-1 Figure 8b:

Poison Correction Factor: (+) 0.888

d. DETERMINE the corrected poisons reactivity worth from the original sum of Xenon and Samarium from step A.5.a multiplied by the determined correction factor from step A.5.c:

(-) 419	pcm *	(+) 0.888	pcm =	(-) 372 pcm
Overall Poisons (A.5.a)		Poison Correction Factor (A.5.c)		Corrected Overall Poisons

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

6. Change in Rods:

DETERMINE the reactivity change due to adjustments in rod position.

NOTE
A control bank position of CBD withdrawn to at least 130 steps should be used as the desired control bank position for all ECCs. This will exchange rod worth for boron worth. There is less uncertainty associated with boron worth as compared with rod worth. Boron worth also changes less throughout core life when compared to rod worth. If plant conditions do not allow a choice of CBD position withdrawn to at least 130 steps, then the reason for the deviation shall be documented in Section D under the remarks. Either way, the CBD position SHALL be within 750 pcm of the fully withdrawn position.

*, 2.c

a. RECORD the desired Control Bank position:

CB __D__ at __138__ steps.

- Value taken from Table 1-7, HFP curve instead of Table 1-8, HZP curve

b. DETERMINE the desired Control Bank position worth recorded in step A.6.a at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2D, or equivalent:

Desired Control Bank Worth: (-) __215.6__ pcm Actual value 250.1

c. RECORD the HFP inserted rod worth prior to shutdown from RRD step 1.c or equivalent:

HFP Inserted Rod Worth: (-) __9.5__ pcm
(RRD Step 1.c)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

d. DETERMINE the change of reactivity due to the change in rod position by subtracting the HFP Inserted Rod Worth (A.6.c) from the Desired Inserted Rod Worth (A.6.b):

(-) 215.6 pcm	-	(-) 9.5 pcm	=	(-) 206.1 pcm
Desired Rod Worth (A.6.b)		HFP Inserted Rod Worth (A.6.c)		Change in Rod Position 206.

NOTE
If RRD Steps 1.g and 2.b contain the same burnup, step A.7 may be marked "N/A".

7. Change in Burnup:

DETERMINE the calculation for correcting burnup.

a. DETERMINE the RRD Step 1.g burnup design Boron concentration by using BCB-1 Figure 11 or equivalent:

Stable Reference Design Boron Concentration: N/A ppm

b. DETERMINE the RRD Step 2.b burnup design Boron concentration by BCB-1 Figure 11 or equivalent:

Final Power Operation Design Boron Concentration: N/A ppm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

NOTE

If BCB-1 Figure 10a, Table 2-4 does NOT contain HFP data, the FOLLOW code method for determining DBW at HFP would be the preferred method. Using HZP data will result in a DBW value -0.5 to -1.0 pcm/ppm more negative than a HFP value. For purposes of NSO Independent Verification of FOLLOW code output, Figure 10a may be used as a qualitative check against the attached FOLLOW code output.

c. DETERMINE the Differential Bor n Worth (DBW) of the RRD Step 1.g Burnup and RRD Step 1.d Boron Concentration by one of the following methods (circle method used):

1). Figure 10a, Table 2-4, or equivalent

2). FOLLOW Code Output (attach copy of output)

Differential Boron Worth = (-) N/A pcm/ppm

d. DETERMINE the burnup correction by subtracting the Final Power Operation Design Boron Concentration (A.7.b) from the Stable Reference Design Boron Concentration (A.7.a) and multiplying by the Differential Boron Worth (A.7.c):

[N/A ppm - N/A ppm] * N/A pcm/ppm = ( ) N/A pcm

Stable Reference Design Boron Concentration (A.7.a)	Final Power Operation Design Boron Concentration (A.7.b)	DBW (A.7.c)	Burnup Correction

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

8. DETERMINE the Reactivity Balance by summing the following values:

Power Defect (A.1)	(+) 1317	pcm
Isothermal Temperature Defect (A.2)	( ) 0	pcm
Corrected Poisoning Defect (A.5.d)	(-) 372	pcm
Rod Adjustments (A.6.d)	(T 206.1	pcm
Burnup Correction (A.7.d)	+ ( ) 0	pcm
REACTIVITY BALANCE	(+) 738.9	pcm

704.4

9. Determination of Critical RCS Boron:

> **NOTE**
> This section may need to be repeated if the assumed critical Boron Concentration for step A.9.a differs from that determined in step A.9.c.

a. DETERMINE the Differential Boron Worth at the RRD Step 2.b burnup, assumed critical RCS Boron concentration, and at the startup RCS Tave with the aid of BCB-1 Table 2-4, Figure 10A, or equivalent:

Differential Boron Worth: (-) 8.82 pcm/ppm

b. DETERMINE the change in RCS Boron needed by dividing the Reactivity Balance in step A.8 by the Differential Boron Worth in step A.9.a:

(+) 738.9 pcm /	(-) 8.82 pcm/ppm =	(-) 84 ppm
Reactivity Balance (A.8)	Differential Boron Worth (A.9.a)	Change in RCS Boron

(0645VV/WPF/110897)

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

c. DETERMINE the critical RCS Boron concentration by adding the change in RCS Boron step A.9.b to the RRD step 1.d Boron Concentration:

(+) 1010 ppm - (-) 84 ppm = 1094 ppm
RCS Boron at RRD Step 1.d — Change in RCS Boron (A.9.b) — Critical RCS Boron
1090

* d. CALCULATE the + 500 pcm inserted rod worth threshold:

(-) 215.6 pcm + 500 pcm = (+) 284.4 pcm
Desired Rod worth (A.6.b)
249.9

*, 2.c

* e. CALCULATE the - 500 pcm inserted rod worth threshold:

(-) 215.6 pcm - 500 pcm = (-) 715.6 pcm
Desired Rod worth (A.6.b)
750.1

*, 2.c

f. CALCULATE the (-) 750 pcm inserted rod worth limit:

(-) 215.6 pcm - 750 pcm = (-) 965.6 pcm
Desired Rod worth (A.6.b)
1000.1

* g. DETERMINE the control bank position corresponding to the Upper Administrative Threshold by using BCB-1, Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.d at the RRD Step 2.b burnup. Do not exceed the full-out park position on Control Bank D:

Upper Administrative Threshold: CB D at 228 steps
*, 2.c

* h. DETERMINE the control bank position corresponding to the Lower Administrative Threshold by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.e at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

Lower Administrative Threshold: CB D at 48 steps
*, 2.c
41

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

i. DETERMINE the control bank position corresponding to the -750 Administrative Limit by using BCB-1 Table 1-8, Figure 2D, or equivalent and the value obtained in Step A.9.f at the RRD Step 2.b burnup. Do not use a position below 47 steps on Control Bank C:

- 750 pcm Administrative Limit: CB D at 11 steps
5

*

NOTE

Notify the Duty Station Manager if the hand calculated ECC differs by more than 250 pcm from the BEACON generated ECC (if BEACON is used). Station Duty Officer concurrence is required before proceeding with the startup.

*, 2.f

B. ESTIMATED CRITICAL CONDITION SUMMARY

Present Boron Concentration 1400 ppm
Estimated Critical Boron Concentration 1094 ppm (A.9.c)
Estimated Critical Bank Position CB D at 138 steps (A.6.a)

* Upper Administrative Threshold: CB D at 228 steps (A.9.g)
*, 2.c

* Lower Administrative Threshold: CB D at 48 steps (A.9.h)
*, 2.c

- 750 pcm Administrative Limit: CB D at 11 steps (A.9.i)

*ECC performed by ______ NAME ______ DATE (NSO, Qualified Nuclear Engineer)

ECC reviewed by ______ NAME ______ DATE (NSO, Qualified Nuclear Engineer)

* Complete the "ECC parameters" placard and give to the Startup NSO.
*, 2.c

____/____
Startup SRO

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

C. ESTIMATED CRITICAL POSITION FROM COUNTS INCREASING EIGHTFOLD

NOTE
A 1/M plot shall be maintained during startup.

*

NOTE
Any difference between the estimated time and the actual time for criticality could impact the final critical position. Contact Systems Engineering Dept. Nuclear Group to estimate the magnitude of this effect.

*, 2.c

1. Base Count Rate With Shutdown Banks Out ________ cps.

   Source Range Channel N __________.

2. Counts Increase Eightfold at Control Bank _______ at ______steps.

3. Predicted Critical Position From BCB-1, Figure 9.

   Control Bank __________ at ___________ steps.

4. ENSURE the predicted Critical Control Bank Position in C.3 is ABOVE the Rod Insertion Limit (i.e. CBC is greater than 47 steps withdrawn) and - 750 pcm Administrative Limit. If not, DO NOT PROCEED WITH APPROACH TO CRITICALITY. The RCS Boron Concentration must be increased and the ECC recalculated.

   _____/_____/_____
   SRO Date Time

5. ENSURE the predicted Critical Control Bank Position in C.3 is within the ± 500 pcm Administrative Threshold. If not, Shift Manager and Qualified Nuclear Engineer concurrence is required to proceed with the reactor startup.

   _____/_____/_____ _____/_____/_____
   QNE Date Time SRO Date Time

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

*

NOTE

If the predicted critical bank position is not above the - 750 pcm administrative limit, then re-insert all Control Bank rods until the Systems Engineering Dept. Nuclear Group documents an evaluation in Section D under remarks and concurs to bring the reactor critical. A new ECC may be performed.

*, 2.c

6. RECORD the following information if criticality is achieved and power is stabilized at 10^{-8} amps on the highest reading IR Channel.

   a. Actual Time of Critical Data. ____________

   b. Actual Critical Bank Position. CB ______ at ________ steps

   c. Actual Critical Boron Concentration. _________ ppm

   d. Actual Temperature at time of Criticality. __________°F

D. REMARKS: ____

____

____

____

____

____

____

____

____

____

___________/________
NUCLEAR GROUP DATE

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

E. MARGIN TO CRITICALITY WITH SHUTDOWN BANKS WITHDRAWN

NOTE

The purpose of this section is to ensure:

1. The basis to the BDPS Analysis is met (- 1300 pcm Shutdown), and
2. An inadvertent Mode Change does not occur (K_{eff} < 0.99).

1. DETERMINE the Total Control Bank Worth (CBA @ 0 steps) at the RRD Step 2.b burnup with the aid of BCB-1 Table 1-8, Figure 2A, or equivalent:

   Total Control Bank Worth: (-) __________ pcm

NOTE

The following step takes into account 500 pcm uncertainty on the ECC calculation for conservatism.

2. DETERMINE the Required Boron Reactivity to satisfy the Margin to Criticality by completing the following arithmetic:

Total Control Bank Worth (E.1):	+ (-) __________	pcm
Control Bank Required Reactivity (A.6.b):	- (-) __________	pcm
Bounding Margin to Criticality:	- (-) 1300	pcm
Conservatism:	+ 500	pcm
Required Boron Reactivity	= ( ) __________	pcm

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

3. Determination of the Minimum RCS Boron Concentration which satisfies the Margin to Criticality:

a. DETERMINE the difference between the RCS Boron Concentration necessary to meet the Margin to Criticality requirements and the ECC Boron Concentration by dividing the Required Boron Reactivity calculated in Step E.2 by the Differential Boron Worth in Step A.9.a:

( ) ________ ppm / (-)	________ pcm/ppm =	( ) ________ ppm
Required Boron Reactivity (E.2)	Differential Boron Worth (A.9.a)	Difference in RCS Boron Concentration

b. DETERMINE THE Minimum RCS Boron Concentration necessary to meet the Margin to Criticality requirements by subtracting the difference in RCS Boron Concentration calculated in Step E.3.a from the ECC Boron Concentration:

( ) ________ ppm -	( ) ________ ppm =	( ) ________ ppm
ECC Boron Concentration (A.9.c)	Difference in RCS Boron Concentration (E.3.a)	Minimum Required RCS Boron Concentration

4. VERIFY Sufficient Margin to Criticality:

a. RECORD the present RCS Boron Concentration from the most recent Boron sample:

________	________	___/___/___
Present RCS Boron Concentration	Sample Time	Date

b. Is the present RCS Boron Concentration GREATER THAN OR EQUAL TO the Minimum RCS Boron Concentration calculated in Step E.3.b? (Circle one)

YES NO

CALCULATION OF ESTIMATED CRITICAL CONDITION
BASED ON A KNOWN ROD POSITION
(continued)

5. If the answer in Step E.4.b is "NO", DO NOT withdraw Shutdown Banks until the RCS Boron Concentration is greater than or equal to the Minimum RCS Boron Concentration calculated in Step E.3.b.

______/______/______
SRO Date Time

(Final)

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Shift Turnover With Staffing Complications (SRO)

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.1.3	3.0/3.4
2.1.4	2.3/3.4

JPM NUMBER	Task Number	Job Position
ADMIN 1.2 SRO		US

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ____________ Stop Time: ____________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ____________ [ ] Other ____________

EXAMINEE: ____________ EVALUATOR: ____________

DATE: ____________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

Specific Information:

1. These items were used as reference material in the development of this JPM:
   BAP 335-1; BAP 335-1T2 UNIT SUPERVISOR TURNOVER SHEET;
   BAP 320-1; Byron Units 1 & 2 ITS, 5.2.2 Facility Staff.

2. These items are expected to be used by the examinee in the performance of the task:
   UNIT SUPERVISOR TURNOVER SHEET; BAP 320-1

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Both Units status are described on the STATUS SHEET. Crew staffing levels are currently at the minimum allowable Tech Spec levels.

   b. Task Initiating Condition:
      You are the on-coming Unit Supervisor for Unit 1. Use the appropriate plant status for information.

   c. Initiating Cue:
      Perform shift turnover. (Current time is 0450)

   d. Your Position:
      Unit Supervisor

4. Terminal Performance Objective: (TPO)
   Perform Shift Turnover.
   Respond to improper ITS Action Statement Entry
   Respond to condition for staffing less than allowed.

5. Critical Steps(*)
   3, 7, 8, 9.

6. Identification of Impacted Systems:
   If this task is performed incorrectly, the following adverse reactions could occur:
   Failure to convey shift information for turnover and operation in a condition less than allowed by Technical Specifications (ITS).

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

RECORD START TIME ________.

```
*************************************************************
*                          NOTE                             *
* Inform the candidate to use current Unit status for any   *
* conditions NOT specifically identified on provided        *
* STATUS SHEET.  If NOT performed in Control Room, inform   *
* the candidate to assume status is "normal" unless         *
* indicated on provided STATUS SHEET.                       *
*                                                           *
*************************************************************
```

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
1. Obtain Unit Supervisor Turnover Sheet. (May be done at any time.)	Obtain UNIT SUPERVISOR TURNOVER SHEET.	☐	☐	☐
2. Review PLANT STATUS Section.	Ensure the following information filled in: • Mode - 1 • Reactor Power - 100% • Boron Conc - 900 ppm • Main Generator - 1175 MW	☐	☐	☐
*3. Review IN PROGRESS Section.	Ensure the following information filled in: o Steady State Operations • Low oil on 1A D/G Governor due to faulty gasket. Maintenance has been dispatched to add oil and replace gasket. • Air Regulator for 1RY455 has been isolated and removed due to leakage. Containment Entry planned for later to replace • LCOAR Status change - o 3.6.3 ITS (VQ) • **LCOAR AC Sources - 3.8.1 Action B.4 has NOT been initiated.** • **LCOAR PZR PORV - 3.4.11 Action B.3 has NOT been initiated** o Major Surv - None o Major OOS, T/L, R/S - None	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
	o Maintenance - Adding oil to DG 1A o Major Proc. - None			
4. Complete PENDING Section.	Ensure the following information filled in: • CNMT Entry to replace air regulator on 1RY455	☐	☐	☐
5. Review ADMINSTRATIVE Areas.	Ensure the following are reviewed: • Unit log books • Train Inoperability Status Board • Degraded Eqpt Log **AND** The following should be/may be reviewed depending on status: • Temp Procedures • Temp Alterations • Caution Cards • Aux Elec Room AEER Access • Daily Orders • Special Op Orders • PIFs • AR Focus Reports review • Temp Lifts	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
6. Review TURNOVER items area.	Ensure the following are reviewed: The following should be/may be reviewed depending on status: • NSO Shiftly & Daily Surveillances • SSPS Channels/Bistables • Sys-Safeguards • Sys-Primary • Sys-Balance of Plant • Nuclear Instr • MCB Instr • MCB Controllers • Elec Dist AC • Elec Dist DC • BPO/System status • Fire Protection • Blowdown (CW, SD) • MCB Alarms • Chemistry • Radiation Precautions • Reactivity Management -approved to add 150 gal. Of Primary Water with 50 gallons equal to .3F	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

```
***************************************************************
*                           NOTE                              *
* The next steps are directed at addressing minimum           *
* staffing requirements. Direct attention of candidate        *
* away from reporting requirements (if that direction is      *
* taken) and toward the staffing area.                        *
***************************************************************
```

CUE: The time is now 0800. Your Unit NSO is experiencing severe chest pains, and requires transportation to the hospital. The ambulance has been dispatched.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
* 7. Determine minimum staffing NOT met.	Note that shift staffing is NOW 1 person less than minimum.		☐	☐
* 8. Address shift staffing. **(CUE: CALLOUT has been initiated. An NSO is in route. Expected arrival is in one-half hour.)**	Take action to address less than minimum shift staffing: o Notify SM o Initiate CALLOUT		☐	☐
* 9. Determines action is satisfactory.	Determine NO further action required. (Allowable to have staffing one less than minimum required for unexpected absence of on-duty member, for up to 2 hours, as long as action immediate initiated to restore staffing.)		☐	☐

(CUE: This completes this JPM.)

RECORD STOP TIME ________.

COMMENTS:

TASK CONDITIONS:

Both Units status are described on the TURNOVER SHEET. Crew staffing levels are currently at the Tech Spec minimum allowable levels.

You are the on coming Unit Supervisor for Unit 1. Use the appropriate plant status for information.

INITIATING CUES:

Perform shift turnover. (Current time is 0450)

Unit Supervisor Turnover

PLANT STATUS

Grid Status: Green	"A" Train Week	WWM: Marcum	Shift: Current	Date: Today

UNIT 1

Mode: 1	% Pwr: 100%	MW: 1176
CB: 900 ppm	Xenon: equilibrium	Rod Height: D @ 211

IN PROGRESS

Steady State Operations

Low oil level on 1A D/G Governor, due to faulty gasket. Maintenance has been dispatched to add oil and replace gasket.

Air Regulator for 1 RY455 has been isolated and removed due to leakage. Containment Entry planned for later to replace.

LCOAR

3.6.3 ITS (VO)

OOS / T/L / RTS

MAINTENANCE

Oil addition to 1A D/G

MAJOR PROC.

PENDING

Containment entry to replace air regulator on 1RY455.

UNIT 2

Mode: 3	% Pwr: 0	MW: 0
CB: 1150 ppm	Xenon: equilibrium	Rod Height:

IN PROGRESS

ECC being performed for Unit 2 Reactor Startup. Plans are for the the Startup in 4 hours.

LCOAR

OOS / T/L / RTS

MAINTENANCE

None

MAJOR PROC.

2BGP 100-2 & 100-2A1

PENDING

Mode 2 and 1

Unit Supervisor Turnover

ADMINISTRATIVE		COMMENTS
Temporary Alterations	YES	
Unit 0 Logbook	YES	
Unit 1 Logbook	YES	
Unit 2 Logbook	YES	
Train Inop Status Board	YES	
Degraded Equipment Log	YES	
Daily Orders	YES	
* PIFs	YES	

TURNOVER ITEMS	NORMAL YES/NO	COMMENTS
NSO Shiftly and Daily Surv.	YES	Sys Primary see front 1RY455A
SYS-Primary	NO	
SYS-Balance of Plant	YES	
Nuclear Instrumentation	YES	
MCB Instrumentation	YES	
MCB Controllers	YES	Electrical Distribution AC - See 1A Diesel Generator
Electrical Distribution-AC	NO	
Electrical Distribution-DC	YES	
BPO	YES	
Blowdown (CW/SD)	YES	
Alarms (MCB)	YES	
Chemistry	YES	
Radiation Precautions	YES	

U-1 Reactivity, Dilution 50 Gals = 0.2 °F Planned reactivity changes for oncoming shift:

Plan to dilute 150 gallons to compensate for fuel depletion. K. Elam Nuclear Engineer on call.

U-2 Reactivity, Dilution Gals = °F Planned reactivity changes for oncoming shift:

Reactor Startup. Kevin Elam is the QNE

MISCELLANEOUS

Post Review: MCR Tour, Unit NSO, CD NSO Turnovers, Logs, Daily Orders

OFF-GOING		ON-COMING
Unit 1 Supervisor	U-1 Unit Supervisor	
Unit 2 Supervisor	U-2 Unit Supervisor	
	STA	

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Identify And Replace Blown Fuse

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.2.13	3.6/3.8

JPM NUMBER	Task Number	Job Position
ADMIN 2 SRO		U-1 US

Revision: Date:

REVIEWED: ____
INSTRUCTOR DATE

APPROVED: ____
GROUP LEADER DATE

Start Time: ______________ Stop Time: ______________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ______________ [ ] Other ______________

EXAMINEE: ______________________ EVALUATOR: ______________________
DATE: ______________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ____

Specific Information:

1. These items were used as reference material in the development of this JPM:
   BAP 350-6

2. These items are expected to be used by the examinee in the performance of the task:
   BAP 350-6; BAP 350-6T1 "Fuse Discrepancy Form"; BAP 350-6T2 "Fuse Discrepancy Document Control"

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Unit 1 is at 100% power. Unit 2 is at 100% power. All systems are normal.

   b. Task Initiating Condition:
      A fuse has blown on 1AF013F control power.

   c. Initiating Cue:
      The SM asks you for your recommendation.

   d. Your Position:
      Unit 1 Unit Supervisor

4. Terminal Performance Objective: (TPO)
   Replace fuse with non-like fuse.

5. Critical Steps(*)
   3, 7, & 8

6. Identification of Impacted Systems:
   If this task is performed incorrectly, the following adverse reactions could occur:
   The associated equipment would remain inoperable.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

RECORD START TIME ________.

1. Refer to BAP 350-6. (May be done at any time.)	Refer to BAP 350-6.	☐	☐	☐
2. Check Byron Station Fuse List. (Center Desk of Control Room)	Determine/record information for fuse to be replaced: • Panel No. - 1AP28E • Fuse type - BAF 3 • Fuse rating - 3/120 amp/volt	☐	☐	☐
* 3. Determine replacement fuse availability. **(CUE: The only available fuse is as provided and the Shift Manager would like a recommendation)**	• Determine like for like replacement fuse is NOT available. **AND** • Check with SM for emergency replacement authorization. • Recommendation shall be to replace the fuse non-like for like emergency.	☐	☐	☐

****

NOTE

Provide candidate with <u>blank copy</u> of BAP 350-6T1 Fuse Discrepancy Form.

****

4. Record Part 1 information on BAP 350-6T1.	Record in Part 1 of Fuse Discrepancy Form: • Date [Current] • Originator/phone • System - AF • WR # - N/A • Safety Class - Safety	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
5. Record Part 2 information on BAP 350-6T1.	Fuse Discrepancy Form: • Schematic/WD - 6E-1-4030AF08 / 6E-1-4687B • Panel No. - 1AP28E • Fuse ID - FU • Service • Reason for replacement - Blown • ID on Fuse List - Y • Fuse Manufacturer/type - BAF 3 • Fuse rating - 3/~~120~~ 250 V amp/volt HP	☐	☐	☐
6. Record Part 2 information on BAP 350-6T1.	• Is unlike fuse the same physical size as the original - Y • QRI Number - per red tag • Stores item number - XXX • Fuse Manuf. - ~~As per fuse~~ BUSSMANN MOL 3 AMP • Fuse Rating - 3/~~120~~ 250 V amp/volt HP	☐	☐	☐
* 7. Replace fuse. **(CUE: As SM, Approval for replacement is given.)**	Determine replacement acceptable and obtain replacement fuse. Initial and date in Part 3 of Fuse Discrepancy Form. Obtain SM or designee permission to replace fuse	☐	☐	☐

(NOW REQUIRE SRO APPLICANT TO REPLACE FUSE)

* 8. ~~Dispatch EO to install approved fuse.~~ HP INSTALL APPROVED FUSE ~~(CUE: EO is dispatched)~~	Ensure fuse is replaced. Sign in Part 3 of Fuse Discrepancy Form.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
9. Send completed Fuse Discrepancy Form to Fuse Coordinator	Identifies need to provide Fuse Discrepancy Form to Fuse Coordinator.	☐	☐	☐

(CUE: I will be responsible for forwarding of Form (Accept Form)

This completes this JPM.)

RECORD STOP TIME ________.

COMMENTS:

TASK CONDITIONS:

Unit 1 is at 100% power. Unit 2 is at 100% power. All systems are normal.

A fuse has blown on 1AF013F control power.

INITIATING CUES:

The US directs you to replace the fuse.

FUSE DISCREPANCY FORM

NOTE

NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: N/A

Discrepancy No: B- N/A

Date: TODAY

FDSR Updated (F.C.): N/A /

Originator: R. BROWN

Phone Extension: 3133

System: AF

Work Request No.: N/A

Safety Class: X Safety ___ Non-Safety ___ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: 6E-1-4030AF08

Fuse ID on Schematic: FU 1

Wiring Drawing: —

Fuse ID on Wiring: —

Panel No.: 1AP28E -132X4 COMP. 1

Service: CONTROL POWER

Reason for Fuse Replacement or Description of Discrepancy:

BLOWN FUSE

Does the Fuse List Identify the blown/installed fuse? X Yes ___ No

Fuse Manufacturer: BUSSMANN

Fuse Type: BAF 3

Fuse Rating: 3 Amps ~~150~~ 250V Volts

KEY

PART 3 - Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

X Yes ____ No

* QRI Number: PER R&D TAG (N/A if not applicable) *, 3

Stores Item No.: XXX

Fuse Manufacturer: BUSSMANN

Fuse Type: ~~BAF-6~~ MOL HP

Fuse Rating: 3 6 Amps ~~120~~ 250 HP Volts

F.C., SSE or SM Fuse Approval: SHIFT MANAGER Date: TODAY

Fuse Installation:

Shift Manager
(or designee) permission obtained: ____________ Date: ______

Fuse Replacer: ____________ Date: ______

F.C. Approval: ____________ Date: ______

Evaluation Complete (F.C.): ____________ Date: ______

APPROVED 01/17/97

Facsimile

FUSE DISCREPANCY FORM

NOTE

NETS has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

PART 1 - General Information:

File No: ____________________ Discrepancy No: B-____________

Date: ____________________ FDSR Updated (F.C.): ______/______

Originator: ____________________ Phone Extension: ____________

System: ____________________ Work Request No.: ____________

Safety Class: _____ Safety _____ Non-Safety _____ Regulatory

PART 2 - Blown/Installed Fuse Information:

Schematic Drawing: ____________ Fuse ID on Schematic: ____________

Wiring Drawing: ____________ Fuse ID on Wiring: ____________

Panel No.: ____

Service: ____
____

Reason for Fuse Replacement or Description of Discrepancy:

____
____
____
____

Does the Fuse List Identify the blown/installed fuse? _____ Yes _____ No

Fuse Manufacturer: ____________________

Fuse Type: ____________

Fuse Rating: _______ Amps _______ Volts

PART 3 - Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

_____ Yes _____ No

* QRI Number: ______________________ (N/A if not applicable) *, 3.g

Stores Item No.: ______________________

Fuse Manufacturer: ______________________

Fuse Type: ______________

Fuse Rating: _______ Amps ________ Volts

F.C., SSE or SM Fuse Approval: ______________________ Date: ________

Fuse Installation:

Shift Manager
(or designee) permission obtained: ______________________ Date: ________

Fuse Replacer: ______________________ Date: ________

F.C. Approval: ______________________ Date: ________

Evaluation Complete (F.C.): ______________________ Date: ________

PART 4 - Other Substitute Fuse Information:

Is Unlike Fuse the same size (physical dimension) as the original?

_____ Yes _____ No

* QRI Number: ____________________________ (N/A if not applicable) *, 3.g

Stores Item No.: __________________________

Fuse Manufacturer: ________________________

Fuse Type: ________________

Fuse Rating: __________ Amps __________ Volts

F.C. or SSE Fuse Approval: ___________________________ Date: ________

Fuse Installation:

Shift Manager
(or designee) permission obtained: ____________________ Date: ________

Fuse Replacer: ____ Date: ________

F.C. Approval: ____ Date: ________

(Final)

SARGENT & LUNDY
ENGINEERS

ELECTRICAL DEPARTMENT
FUSE LIST

STATION BYRON UNIT 1
COMPANY COMMONWEALTH EDISON CO.
PROJECT NO 8739-04

DATE 04/27/90
REVISED 12/12/91
REVISION NO C

SYSTEM AF

REV	SYS	01 SFT CLS	02 SCHEMATIC DRAWING 03 WIRING DRAWING	04 CIRCUIT VOLTAGE	PANEL NUMBER 05 FURTHER PANEL INFORMATION	CMP	FUSE 06 ID	07 MFR 08 TYPE	AMPS 09 DES	10 FLD	11 SERVICE 12	13 WIRING 14 IDENTIFICATION	15 APPLICABLE CALC NO. 16 STORES ITEM NO.	17 COMMENTS 18
	AF	S	6E-1-4030AF03 6E-1-4685D	120VAC	1AP24E/132X3 COMPT.D3		FU		3A		1AF01PB-A AF PP 1B LUBE	1 FUSE BAF 3		
	AF	S	6E-1-4030AF04 6E-1-4685A	120VAC	1AP24E/132X3 COMPT.A4	D1	FU		3A		1AF006B AF PP SX VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF11 6E-1-4685A	120VAC	1AP24E/132X3 COMPT.A5	D2	FU		3A		1AF017B AF PP SX VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF07 6E-1-4687B	120VAC	1AP28E/132X4 COMPT.B2		FU		3A		1AF013E SG1A AF VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF08 6E-1-4687B	120VAC	1AP28E/132X4 COMPT.B1	D1	FU		3A		1AF013F SG1B AF VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF09 6E-1-4687C	120VAC	1AP28E/132X4 COMPT.C1	D2	FU		3A		1AF013G SG1C AF VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF10 6E-1-4687B	120VAC	1AP28E/132X4 COMPT.B4	D3	FU		3A		1AF013H SG1D AF VLV	1 FUSE BAF 3		
	AF	S	6E-1-4030AF17 6E-1-4687H	120VAC	1AP28E/132X4 COMPT.H5	D4	FU		3A		1AF01PB-C AF PP 1B LUBE	1 FUSE BAF 3		
	AF	S	6E-1-4030AF14 6E-1-4942B	125VDC	1HS-AF121 LCP		FU		3A		1AF004A DSCH TEST VLV	AF4AP FU		
	AF	S	6E-1-4030AF14 6E-1-4942B	125VDC	1HS-AF121 LCP	D1	FU		3A		1AF004A DSCH TEST VLV	AF4AN FU		
	AF	S	6E-1-4030AF14 6E-1-4942B	125VDC	1HS-AF122 LCP		FU				1AF004B DSCH TEST VLV	AF4BP FU		
			6E-1-4030AF14		1HS-AF122	D1					1AF004B	AF4BN		

* FUSE CONTROL PROGRAM

*, 3.c

A. STATEMENT OF APPLICABILITY:

The purpose of this procedure is to provide guidelines for replacing blown/installed fuses used for Safety Related, Regulatory Related and Non-Safety Related applications. This procedure also provides guidelines for resolving fuse discrepancies under the fuse walkdown program.

B. REFERENCES:

1. XAP-0001, Control and Maintenance of Fuses and the Fuse List (Corporate Draft Procedure).

2. Station Procedures:

   a. BAP 350-6A1, Proper Fuse Orientation.

   b. BAP 350-6T1, Fuse Discrepancy Form.

   c. BAP 350-6T2, Fuse Discrepancy Document Control.

   d. BAP 350-6T3, Operating "Like-For-Like" Fuse Log.

   e. BAP 1600-1, Action/Work Request Processing Procedure.

   f. BAP 1600-14, Processing And Control of Minor Work Activities Completed As Action Requests, Minimal Work Request, or Pre-Reviewed Work Requests.

3. Station Commitments:

   a. 454-251-81-02300

   b. 454-251-83-03400

   c. 454-251-91-10300

   d. 454-230-93-00400-05

   e. 454-230-93-00400-06

   f. 454-315-94-003301F-04

   g. 454-251-92-04805

4. Byron Station Unit 1 and Unit 2 Fuse Lists.

B. continued

* 5. ENC-QE-84, Fuse Evaluations and Fuse List Updates. *, 3.f

* 6. TID-E/I&C-09, Fuse Selection Guidelines. *, 3.f

7. EIA-3, Interface Agreement for Generation and Control of Byron Station Fuse Discrepancy Resolutions.

8. Instruction PI-BB-537, Byron Fuse Discrepancy Resolution.

C. <u>PREREQUISITES:</u>

1. Obtain the Shift Manager or his designee's permission prior to removing or replacing any fuses.

2. Discrepancy forms (BAP 350-6T1, Fuse Discrepancy Form) shall be delivered to the Fuse Coordinator located in the Station Support Engineering (SSE) Electrical Group.

3. The fuse replacer and the Fuse Coordinator shall sign Part 3 or 4 of BAP 350-6T1, Fuse Discrepancy Form, whenever a Non-Like-For-Like fuse is replaced.

D. <u>PRECAUTIONS:</u>

1. Where applicable, ensure any special precautions or procedures are implemented prior to fuse removal and replacement (ie. SSPS, Ground Return Fuse, Rod Drive Fuses, etc.).

E. <u>LIMITATIONS AND ACTIONS:</u>

1. Prior to installing a fuse, the end caps should be checked to ensure they are not loose.

2. Orient the fuse as shown in BAP 350-6A1, Proper Fuse Orientation, to allow easy identification in the future.

3. Ensure fuse clips are tight and make firm contact with the end caps.

4. Where applicable, verify there are no abnormalities after fuse replacement.

E. continued

5. Whenever possible, verify power is resupplied to the circuit by observing indicating lights, hearing a relay pickup or by using a Volt Ohm Meter (VOM) to check coil energization or contact position.

* 6. Fuse Replacement Responsibilities:

   a. Operating may replace fuses that are blown or in a degraded condition in any equipment.

   b. Instrument Maintenance (IMs) may replace any fuse that is part of the 7300 system or circuit board related fuses pertaining to instrumentation.

   c. Electrical Maintenance (EMs) may replace fuses under an NWR (BAP 1600-1, Action/Work Request Processing Procedure), Minor Maintenance Work Request (BAP 1600-14, Processing And Control of Minor Work Activities Completed As Action Requests, Minimal Work Request, or Pre-Reviewed Work Requests), or as required in welding receptacles and miscellaneous lighting.

*, 3.e

F. <u>MAIN BODY:</u>

1.0 <u>Definitions:</u>

   a. <u>F.C.:</u> For the purpose of this procedure means "Fuse Coordinator".

   b. <u>Like-For-Like-Fuse:</u> A fuse which is identical in all respects (ie. manufacturer, type, size (physical dimension), amperage and voltage) to the fuse being replaced.

   c. <u>Non-Like-For-Like (Non Emergency) Fuse:</u> A fuse that has at least one characteristic different from the fuse being replaced, and has been approved by the F.C. and/or SSE Electrical Group prior to installation.

F.1. continued

d. Non-Like-For-Like (Emergency) Fuse: A fuse that has at least one characteristic different from the fuse being replaced and has been approved by the Shift Manager, F.C. or SSE Electrical Group prior to installation. An emergency condition requiring expeditious Non-Like-For-Like replacement is limited to any of the following conditions:

1). Personnel or plant safety.

2). Avoidance of unit shutdown or outage extension.

3). Plant operating in an unsafe manner.

4). Any other condition which is determined to be an emergency by the Shift Manager or Designee.

e. Controlled Location: An F.C. designated fuse storage location. The following are controlled locations:

1). Stores.

2). Main Control Room chart paper supply room.

f. Fuse Discrepancy Status Report (FDSR): A log maintained by ComEd for recording and tracking station fuse discrepancy status.

2.0 Fuse Replacement Classification Index

NOTE

Nuclear Engineering and Technology Services (NETS) has evaluated Bussmann rejection fuse types FRN-R, KTK-R, KTN-R, KWN-R and FRS-R and determined that these fuses may be used as substitutes for fuse types FRN, KTK, KTN, KWN and FRS respectively. Based on this information, the above listed fuses shall be considered Like-For-Like replacements (Refer to Chron #179149 dated January 21, 1991 and Chron #182536 dated March 16, 1992).

NOTE

The F.C. or SSE Electrical Group can be contacted for fuse information collected from fuse verification walkdowns if the fuse is not included in the Byron Station Fuse List.

F.2. continued

*

> **CAUTION**
> If the same fuse continues to blow, a NWR should be issued to investigate and repair the problem.

*, 3.a,b

> **CAUTION**
> Safety Related Non-Like-For-Like size (amperage) discrepancies shall be evaluated by Sargent & Lundy or SSE Electrical Group, except in an emergency where the Shift Manager or designee may evaluate and determine a replacement.

a. PERFORM section F.5 only during the fuse walkdown process for fuse replacement and discrepancy resolution when the correct fuse was specified in the pre-walkdown drawing verification.

b. CHECK the Byron Station Fuse List located in Central Files or at Center Desk in the Control Room prior to replacing any fuse or contact SSE Electrical Group for fuse information collected from fuse verification walkdowns.

c. If the blown/installed fuse is listed in the fuse list/walkdown verifications and matches the data in the fuse list /walkdown verifications, and:

* 1). correct fuse is available from a controlled location, replace the blown fuse, document replacement in BAP 350-6T3, Operating "Like-For-Like" Fuse Log, and exit this procedure.

*, 3.d

2). correct fuse is not available from a controlled location, go to step F.2.f.

3). if that fuse is currently installed, leave as is and exit the procedure.

d. If the blown/installed fuse is in but does not match the fuse list, go to step F.2.f.

F.2. continued

e. If the blown/installed fuse is not in the fuse list/walkdown verifications and:

1). review of the schematic drawings, internal and external wiring drawings, bill of materials or vendor manual identifies the correct size fuse, and

a). blown/installed fuse is incorrect or the correct size replacement is not available, go to step F.2.f.

* b). blown fuse is correct and available from a controlled location, replace the blown fuse, document replacement in BAP 350-6T3, Operating "Like-For-Like" Fuse Log, and exit this procedure.

*, 3.d

c). fuse installed is correct, leave installed and exit this procedure.

2). review of the schematic drawings, internal and external wiring drawings, bill of materials or vendor manual does not identify the correct size fuse, go to step F.2.f.

f. If the fuse replacement is Non-Like-For-Like and the F.C., Shift Manager or designee determines:

1). Non Emergency replacement is required, go to section F.3.

2). Emergency replacement is required, go to section F.4.

F. continued

3.0 Non-Like-For-Like (Non Emergency) Fuse Replacement

a. Record as much information as possible on Part 1 and 2 of BAP 350-6T1, Fuse Discrepancy Form:

1). Part 1 - General Information:

- Date
- Originator/Phone Number
- System
- Work Request Number (if applicable)
- Safety Classification

2). Part 2 - Blown/Installed Fuse Information:

- Schematic/Wiring Drawing
- Panel Number
- Fuse ID on Schematic
- Service
- Reason for Fuse Replacement or Description of Discrepancy
- Does the Fuse List identify the blown fuse?
- Fuse Manufacturer/Type/Rating

b. Forward BAP 350-6T1, Fuse Discrepancy Form, to the F.C. for review of Parts 1 and 2.

c. The F.C. should complete the information missing from the Fuse Discrepancy Form and assign it a number. The F.C. shall then enter the fuse discrepancy information into the FDSR and initial/date BAP 350-6T1, Fuse Discrepancy Form, (Part 1), documenting the FDSR has been updated.

F.3. continued

* d. SSE Electrical Group/Sargent & Lundy (S&L), using the applicable procedures (i.e., TID-E/I&C-09 Fuse Selection Guidelines) and design documentation shall determine a substitute fuse for the blown/installed fuse or determine the correct fuse in the case of a discrepancy between the fuse list or other design documentation and the blown/installed fuse. For the purpose of fuse walkdowns, the F.C. or SSE Electrical Group may perform a review to determine the correct fuse that consists of but is not limited to the following: schematic drawing, internal and external wiring drawing, bill of materials, or vendor manual. If the fuse is adequately documented and identified, the F.C. or SSE Electrical Group may approve replacement of installed fuse with recommended fuse from documentation/vendor review.

*, 3.f

* e. SSE Electrical Group shall then complete the following information on Part 3 of BAP 350-6T1, Fuse Discrepancy Form, as substitute or correct fuse information:

- Is Unlike Fuse the same size (physical dimension) as the original?
- QRI Number on Red Tag (N/A for Non-Safety Applications)
- Stores Item Number
- Fuse Manufacturer/Type/Rating

*, 3.g

f. The SSE Electrical Group Engineer shall sign BAP 350-6T1, Fuse Discrepancy Form, in SSE Electrical Group Approval blank.

NOTE

If the SSE Electrical Group approved fuse cannot be physically installed in the same location, the F.C. shall resubmit the discrepancy form to SSE Electrical Group for a resolution.

g. The person(s) responsible for replacing the fuse shall use the SSE Electrical Group approved substitute fuse, initial/date in Part 3 of BAP 350-6T1, Fuse Discrepancy Form, verifying that the Shift Manager or designee's permission is obtained prior to replacing the fuse, and then sign as the fuse replacer.

F.3. continued

h. The completed form shall then be sent to the F.C. for his/her signature and retention.

4.0 <u>Non-Like-For-Like (Emergency) Fuse Replacement</u>

a. Record as much information as possible on Part 1 and 2 of BAP 350-6T1, Fuse Discrepancy Form:

1). Part 1 - General Information:

- Date
- Originator/Phone Number
- System
- Work Request Number (if applicable)
- Safety Classification

2). Part 2 - Blown/Installed Fuse Information:

- Schematic/Wiring Drawing
- Panel Number
- Fuse ID on Schematic
- Service
- Reason for Fuse Replacement or Description of Discrepancy
- Does the Fuse List identify the blown fuse?
- Fuse Manufacturer/Type/Rating

F.4. continued

> **CAUTION**
> In an emergency the replacement fuse should be one of the same rating and size specified on the prints or other design documentation. Such a fuse should be evaluated within two working days by the F.C. or SSE Electrical Group. Place the affected equipment on the Degraded Equipment Log for tracking purposes.

* b. The F.C., SSE Electrical Group or the Shift Manager shall determine a proper substitute fuse using applicable procedures (i.e., TID-E/I&C-09 Fuse Selection Guidelines) and design documentation. Complete the following information in Part 3 of BAP 350-6T1, Fuse Discrepancy Form, and sign/date for fuse approval.

- Is Unlike Fuse the same size (physical dimension) as the original?
- QRI Number on Red Tag (N/A for Non-Safety Applications)
- Stores Item Number
- Fuse Manufacturer/Type/Rating

*, 3.f,g

c. The person(s) responsible for replacing the fuse shall use the F.C., SSE Electrical Group or the Shift Manager's approved substitute fuse, initial/date in Part 3 of BAP 350-6T1, Fuse Discrepancy Form, verifying that the Shift Manager or designee's permission is obtained prior to replacing the fuse, and then sign as the fuse replacer.

d. Forward BAP 350-6T1, Fuse Discrepancy Form, to the F.C.

e. The F.C. should complete the information missing from the Fuse Discrepancy Form and assign it a number. The F.C. shall then enter the fuse discrepancy information into the FDSR and initial/date BAP 350-6T1, Fuse Discrepancy Form, (Part 1) documenting the FDSR has been updated.

f. The F.C., SSE Electrical Group or S&L will then determine if the substitute fuse provides adequate protection or whether the fuse is inadequate and needs to be replaced.

F.4. continued

g. If the F.C., SSE Electrical Group or S&L determined the installed fuse is inadequate, the fuse replacer shall:

1). initial/date in Part 4 of BAP 350-6T1, Fuse Discrepancy Form, verifying that the Shift Manager or designee's permission is obtained prior to replacing the fuse,

2). replace the installed fuse with the F.C., SSE Electrical Group or S&L approved fuse and document in Part 4 of BAP 350-6T1, Fuse Discrepancy Form, Other Substitute Fuse Information.

3). sign Part 4 Fuse Replacer on BAP 350-6T1, Fuse Discrepancy Form, and go to step F.4.i.

h. If the F.C., SSE Electrical Group or S&L determined the installed fuse is adequate, go to step F.4.i.

i. The completed form shall then be sent to the F.C. for his/her signature and retention.

5.0 <u>Fuse Walkdown Non-Like-For-Like Fuse Replacement</u>

a. Record as much information as possible on Part 1 and 2 of BAP 350-6T1, Fuse Discrepancy Form:

1). Part 1 - General Information

- Date
- Originator/Phone Number
- System
- Work Request Number (if applicable)
- Safety Classification

2). Part 2 - Blown/Installed Fuse Information:

- Schematic/Wiring Drawing
- Panel Number
- Fuse ID on Schematic
- Service
- Reason for Fuse Replacement or Discrepancy
- Does the Fuse List identify the blown fuse?
- Fuse Manufacturer/Type/Rating

F.5. continued

* b. If pre-walkdown drawing verification was performed and the correct size and/or type of fuse was identified, the correct size and/or type of fuse can be installed. The person(s) performing the fuse walkdown shall complete the following information in Part 3 of BAP 350-6T1, Fuse Discrepancy Form.

   - Is Unlike Fuse the same size (physical dimension) as the original?
   - QRI Number on Red Tag (N/A for Non- Safety Applications
   - Stores Item Number
   - (Correct) Fuse Manufacturer/Type/Rating

*, 3.g

c. The person(s) responsible for replacing the fuse shall use the pre-walkdown verified fuse, initial/date in Part 3 of BAP 350-6T1, Fuse Discrepancy Form, verifying that the Shift Manager or designee's permission is obtained prior to replacing the fuse, and then sign as the fuse replacer.

d. Return BAP 350-6T1, Fuse Discrepancy Form, to the F.C. or SSE Electrical Group for SSE Electrical Group or F.C. approval and signature in Part 3.

e. The F.C. shall fill in as much of the information missing from the Fuse Discrepancy form as possible and assign it a number. Then, the F.C. shall enter the fuse discrepancy information into the FDSR and initial/date BAP 350-6T1, Fuse Discrepancy Form, (Part 1) documenting the FDSR has been updated.

f. SSE Electrical Group, F.C. or S&L shall perform an evaluation or attach documentation identifying the correct fuse. This evaluation will be attached to discrepancy form BAP 350-6T1, Fuse Discrepancy Form, to document resolution.

g. The completed form shall then be sent to the F.C. for his/her signature and retention.

F. continued

6.0 Completion of Fuse Discrepancy Forms

a. Once the substitute fuse has been replaced satisfactorily, the F.C. shall review BAP 350-6T1, Fuse Discrepancy Form, and determine if the fuse replacement has altered any controlled documents. Such documents may include, but are not limited to the following:

- Fuse List
- Schematic drawing showing the replaced fuse
- Wiring drawing showing the replaced fuse
- Single line drawing showing the replaced fuse
- Phase diagrams showing the replaced fuse
- Key diagrams
- Vendor or other equipment manual, description or procedures depicting or describing the replaced fuse
- Vendor or other operating manual, description or procedures depicting or describing the replaced fuse

b. If any controlled document is affected, the F.C. shall markup the affected document and prepare a "Document Change Request" in accordance with the applicable Station procedures.

c. The F.C. shall complete BAP 350-6T2, Fuse Discrepancy Document Control form.

NOTE
For fuse discrepancies related to walkdowns, the fuse list does not need to be updated immediately because updates will be made in large numbers using the DCR process.

d. The F.C. shall place a marked-up copy of the fuse list showing the DCR number in the Byron Station Fuse List located in Central File and at Center Desk. The F.C. should also keep a copy in his/her files.

F.6. continued

e. The F.C. shall prepare a package for the fuse replacement consisting of the following completed documents:

- BAP 350-6T1, Fuse Discrepancy Form
- BAP 350-6T2, Fuse Discrepancy Document Control, form.
- Supporting documentation (if fuse selected by F.C, SSE Electrical Group or S&L).
- Marked-up drawings.

This information will be maintained with the Fuse Coordinator.

* f. F.C. shall send package to SEC File Clerk for file retention.

*, 3.f

* g. SEC File Clerk shall package in file location 1.02.0411.

*, 3.f

7.0 Fuse Removal For Maintenance or Testing

a. To ensure fuses are returned to their proper location after maintenance (OOS, WRs, etc.) or testing, all removed fuses, under any circumstance should be individually tagged and secured. The tag label shall state the proper fuse location.

b. After the fuses are removed, they should be stored in a secure area or in a spare clip, to preclude their loss or damage.

(Final)

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: Prepare For Entry Into High Radiation Area Greater Than 1000 mr/hr

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.3.10	2.9/3.3

JPM NUMBER	Task Number	Job Position
ADMIN 3 SRO		IPSS (SRO)

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ____________ Stop Time: ____________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ____________ [ ] Other____________

EXAMINEE: ____________ EVALUATOR: ____________

DATE: ____________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

____

Specific Information:

1. These items were used as reference material in the development of this JPM:
   BAP 1450-2; BRP 5000-7

2. These items are expected to be used by the examinee in the performance of the task:
   RWP 98-XXX; BRP 6200-5T10

3. Information to the Examinee and the Evaluator:
   a. Initial Conditions:
      Unit 1 and Unit 2 are operating at 100% power. The Unit 2 Unit Supervisor has asked that a valve lineup be performed on valve 2CV XXX in the closed position.

   b. Task Initiating Condition:
      Entry into an area with expected dose rates of 1050 mrem/hr is required to check the position of a specific valve and perform a general inspection of the area. Due to staffing restrictions, the entry is to be made by only ONE individual and RPT is NOT in attendance.

   c. Initiating Cue:
      The US directs you to perform the necessary steps to prepare to make the entry into the area.

   d. Your Position:
      IPSS (SRO)

4. Terminal Performance Objective: (TPO)
   Perform actions necessary to allow entry into **HIGH RADIATION AREA >1000 mrem/hr (HRA)**.

5. Critical Steps(*)
   1, & 3

6. Identification of Impacted Systems:

   If this task is performed incorrectly, the following adverse reactions could occur:

   Failure to comply with CFR regulations, NRC Regulatory Guides, and station administrative procedures controlling high radiation areas and access to these areas. Potential for radiation overexposure to self and others.

RECORD START TIME ___ . ___

```
**************************************************************
*                          NOTE                              *
* The first two steps address the required dosimetry and    *
* radiation monitoring required by the individual.  These   *
* items should be obtained prior to entry into RPA and      *
* must be obtained prior to entry into HRA.  The            *
* requirements may be met by single device with multiple    *
* functions.  The candidate may refer to the RWP to ensure  *
* proper monitoring devices are acquired.                   *
*                                                            *
**************************************************************
```

* 1. Obtains a radiation monitoring device which continuously indicates radiation dose, has alarming capability, and continuously integrates the radiation dose rate. Also obtain radiological requirements for area to be entered.	Obtains and wears electronic dosimetry (and TLD). Obtain information from the RWP.: • Where Highest Dose rate area? 2.5 R/hr contact & 1.2 R/hr at 12" (upper left on survey map) • What does "ANS" stand for by the ladder? Area not Surveyed How long are you allowed into the area? 17 minutes (per BRP 6200-5T10). • What protective clothing is required? Per page ~~1 of~~ the RWP need Class 1. • If ~~asked~~ to wait after the survey mapped area was entered? Per survey map, wait ~~in~~ area by the door (low dose area) • What does 25/8 mean? (see upper right hand corner of the survey map) 25mr/hr contact and 8mr/hr at 12" **AND** • Review and sign onto RWP 98XXX	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
2. Review current survey of area.	Locate and review survey map(s) of area to be entered.		☐	☐
* 3. Obtain key for access to area.	Obtain proper key from HP Services (RP) Supv or designee.		☐	☐
4. Ensure information on BRP 6200-5T10, "Maximum Stay Time Worksheet For Areas >1000 mrem/hr When RPT is Not in Attendance" is complete. **(CUE: RP SUPV approval provided.)** **CUE: This completes this JPM.)**	Ensure/fill in appropriate information: • RWP # • Date • Work Group Job Desc • Authorized Daily Dose • Working Dose Rate • Maximum Stay Time • RP Supv Initials		☐	☐

RECORD STOP TIME _________.

COMMENTS:

TASK CONDITIONS:

Unit 1 and Unit 2 are operating at 100% power. The Unit 2 Unit Supervisor has asked that a valve lineup be performed on valve 2CV XXX.

INITIATING CUES:

Entry into an area with expected dose rates of 1050 mrem/hr is required to check the position of a specific valve and perform a general inspection of the area. Due to staffing restrictions, the entry is to be made by only ONE individual and RPT is NOT in attendance.

RWP 98,XX,XX

RWP ACKNOWLEDGEMENT LOG

I certify that I have read, understand, and will comply with the requiremnts of the RWP. I have reviewed the radiological conditions for my work area, and that I will not exceed the authorized exposure limit for this RWP.

SIGNATURE	DATE	BADGE #	SIGNATURE	DATE	BADGE #

FOR TRAINING USE ONLY

(Final)

ALARA ACTION REVIEW *
Cover Sheet

AAR # 06 / 98 [redacted] RWP # [redacted]

Station / Year / Sequence SARC Required if > 30 P/Rem [ ] Y [✓] N

Job Description: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work Location: All RPA's Work Group: ALL

RWP Request #: Various Work Analyst: NA

ALARA walkdowns recommended: [ ] Yes No [✓] Comments:

1. State the condition, from BRP 6200-5T8, that requires this AAR. LHRA entry. Multiple dose field entry.

2. Determine which of the following will contribute to reducing exposure for this work:

a. Shielding in area or equipment? (use historical and/or current surveys to determine needs). [✓] Yes No [ ]
Comments: Review for each application.

b. Portable Ventilation? (Hepa size/type, tent size etc.) [✓] Yes No [ ]
Comments: Review for each applicat

c. Mock up training? (Available photos, tapes, etc.) [✓] Yes No [ ]
Comments: Review for each application.

d. Source Term reduction? (Identify flushing, points, valves, systems and procedures. [✓] Yes No [ ]
Comments: Review for each application.

e. Remote handling tools, Robotics? (underwater work, reach rods, cameras: [✓] Yes No [ ]
Comments: Review for each applicatio

f. Decontamination of area or equipment? (Consider pre/post decon of work area based on historical/current surveys: [✓] Yes No [ ]
Comments:

g. Is Surrogate Tour or video maintenance information available? [✓] Yes No [ ]
Comments:

3. Access to Reactor Cavity Incore Area? [ ] Yes No [✓]

(Approval, if Yes) ______________________ ____________
Station Manager Date

______________________ ____________
Health Physics Supervisor Date

4. Access to whole body dose rates >/= 15 Rem/hour? [ ] Yes No [✓]

(Approval, if Yes) ______________________ ____________
Health Physics Supervisor Date

5. ALARA Brief required for this work? [ ] Yes No [✓]

Initial ___ Shiftly ___ Other ______________________

Completed by: Curt Repass Date: 12/22/97

*454-251-82-01200-07

ONLY

ALARA BRIEF CHECKLIST

AAR # 06 / 98 [redacted] NWR # Various
(or activity description)

Work scope: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work location: All RPA's

Recommended personnel to attend briefing: Work group supervisor ___ Work group ✓

RPLS ___ RPT ✓ QC __ Shift Manager __ Operations __ Vendor __ SQV __

Others ___

Survey information: Current ✓ Historical ✓ RPT in attendance ✓

Type of Brief: Pre-job ☑ YES ☐ NO (with front desk or Control Point RPT).

ALARA ☐ YES ☑ NO Initial ___ Shiftly ___ Other ___

Briefing Notes

A. RWP Requirements PC Class ☒1 ☒2 ☒3 ☒4	Daily: 100 Alarm: 80 Rate: 300
Face Shield: Y ☑ N ☐ Respirator: Y ☑ N ☐	Type of waterproof outer layer as needed
Working area dose rates Per surveys	Contamination Levels: per surveys
TEDE ALARA evaluations will determine respiratory needs. .	
B. RPT Coverage Requirements:	Coverage type: Continuous or documented stay times and timekeeping
Surveys needed: Air Samples as needed IRP/Frequency per survey Other Beta evaluation/confined space	
Timekeep/staytime requirements: Stay times documented on RWP and for beta assessment if needed.	
C. Contingency Plan: Dose rates exceed planned or historical information - Stop work, exit area immediately, contact RPLS.	
D. ALARA Brief requirements: Entry into: HRA ✓ LHRA ✓ HCA ✓ A/B ✓ Red Zone ✓	
Rad Holdpoints: As per current surveys.	
Areas for shielding: Check each application for shielding needs or potential.	
Contamination Control techniques to consider: see below	
Safety needs and/or exemptions: As per work supervisor.	
Has a TEDE ALARA evaluation been completed, if needed? As needed Results	
Insure work area pre/post decon as needed, based on current surveys.	
Insure all hotspot, low & high dose areas are identified as per survey.	

RPT coverage or stay times MUST be in place prior to entry, documented and communicated to workers. Working area dose rates also required. Insure Low dose and high dose areas are identified.
Any maintenance activities require RP review before entry.
Time and exposure should be estimated prior to entry.
RP approval required before entry on this RWP.
NO ACCESS TO AREAS > 15 REM/Hr on this RWP.
Determine entry requirements are IAW BAP 1450-2.

FOR TRAINING

USE ONLY

(1692AA/DOC/120597)

Additional Comments

FOR TRAINING

USE ONLY

ALARA Brief Information

#	Item	YES	NO	N/A	Comments
1	Radiological Hold points identified?	✔			
2	Shielding of areas and/or equipment.	✔			
3	Contamination control techniques.	✔			
4	Safety needs and/or exemptions for work identified.	✔			
5	TEDE ALARA evaluation needed?	✔			
6	Decon of areas and/or equipment.	✔			
7	Hot spots, low and high dose waiting areas identified?	✔			
8	Airborne concerns	✔			
9	Hot particle controls needed?	✔			
10	Procedural requirements # BAP 1450-2	✔			
11	HEPA Requirements?	✔			
12	Source Term concerns. Flushing / hydrolazing?	✔			
13	Use of Remote handling tools?		✔		
14	Use of high speed tools needed?			✔	
15	Outside work group interference?		✔		
16	Ventilation/radiological release concerns? Containment/FHB area rad monitor setpoints reset?	✔			Determine affect on any area rad monitors
17	Communication needs?	✔			
18	Use of robotics?	✔			
19	Lighting / work area concerns?	✔			
20	Photos, tapes, prints available? Surrogate Tour info?	✔			
21	Wireless Remote Monitoring?	✔			
22	Equipment train changes?	✔			

Completed by [redacted] Date: 12/22/97

(1692AA/DOC/120597)

ALARA REVIEW CONTINUATION/UPDATE

AAR # 06 / 98 [redacted] RWP # [redacted]

Work scope: LHRA entries: Including inspections, ops rounds and OOS, minor maintenance.

Work location: All RPA's

On the lines below document any or all of the following information:

1. Changes to the original AAR.
2. Suggestions, based on job performance, for enhancing this AAR for future work.
3. Additional information for the current AAR.
4. Any other comments or concerns.

(Final)

RADIATION WORK PERMIT
ALARA RECOMMENDATION CHECKLIST

Date/Time [redacted] / 04:15 RWP# [redacted]

I. Radiation Protection Personnel

> **NOTE**
> If any item(s) listed in section A have been answered yes:
> 1. An ALARA Action Review is required per BAP 700-2.
> 2. A Job Specific RWP is required per BAP 575-9.

			YES	NO
A.		Do any of the following conditions exist?	[✔]	[ ]
	1.	Total dose equivalent for the planned job is expected to equal or exceed one (1) Rem and job duration to be less than 100 man hours.	[ ]	[✔]
	2.	Planned work will involve prolonged [> 1 (one) hour] occupancy in an Airborne Radioactivity Area. (>.3 DAC)	[ ]	[✔]
	* 3.	Entry into either unit's reactor cavity incore area is planned (BAP 1450-3 addresses requirements to access reactor cavity incore space)	[ ]	[✔]
	4.	Entry into locked High Radiation Area (>1000 mrem/hr) Ensure RPT in attendance or complete maximum stay time worksheet BRP 6200-5T10	[✔]	[ ]
	5.	Items will be removed from the Spent Fuel Pool or flooded Reactor Cavity	[ ]	[✔]
	6.	Entry inside the containment missile barrier at ≥ 10% Reactor Power	[ ]	[✔]
	7.	Entry to containment 426' el. re-fuel floor cavity area at ≥ 10% Reactor Power	[ ]	[✔]
	8.	Work will include tasks involving the Incore Detector System	[ ]	[✔]
	9.	Work in areas where Hot Particles have been identified	[ ]	[✔]
	10.	Work will involve diver activities in radiologically posted areas	[ ]	[✔]
	11.	Work will involve radiography	[ ]	[✔]
	12.	Task will require workers to transient ≥ 15 rem/hr whole body dose fields	[ ]	[✔]
	** 13.	Work will involve accessing areas adjacent to spent fuel transfer tube where dose rates increase	[ ]	[✔]

* 454-251-91-06000
* 454-251-88-30900
** 454-251-78-00020

FOR TRAINING USE ONLY

(1170SS/WPF/120597)

	YES	NO
B. Are any of the following conditions expected?........	[ ]	[✔]
1. Primary or contaminated system work involving system breech. (Hot Particles?).....	[ ]	[✔]
2. System transfer of high level radioactive fluids/resins, etc. ≥ 100 mrem/hr @ contact....	[ ]	[✔]
3. Work involves the Waste Gas System............	[ ]	[✔]
C. Will work include any of the following Fuel Pool/flooded Reactor Cavity area activities?.........	[ ]	[✔]
1. Items will be moved in the fuel pool/ cavity but not removed........................	[ ]	[✔]
2. Involves work with tools/equipment that have come in contact with fuel pool/cavity water....	[ ]	[✔]
3. Involves work with fuel pool/cavity filter changes....................................	[ ]	[✔]
D. Will work involve containment entry to the following areas?............................	[ ]	[✔]
1. Entry into containment, inside missile barrier @ ≥ 10% reactor power..................	[ ]	[✔]
* 2. Entry into the Steam Generator or Pressurizer Coffin area(s) @ ≥ 10% reactor power..	[ ]	[✔]
* 3. Involves access to the Polar Crane @ ≥ 10% reactor power.........................	[ ]	[✔]
E. Will tasks involve handling of Radioactive Waste/Materials/Sources that include any of the following criteria?.........................	[ ]	[✔]
1. Sorting or transporting trash/rad materials reading ≥ 100 mrem/hr @ contact with the container.......................................	[ ]	[✔]
2. Sorting trash/laundry bags marked as coming from a Hot Particle (Red) zone................	[ ]	[✔]
3. Processing sludge from drums to HIC...........	[ ]	[✔]

NOTE

If any of the items in sections B through E are anticipated or found during pre-job surveys:

1. A Job Specific RWP is required as described in BAP 575-9.
2. An ALARA Review may be requested at the discretion of Rad Protection Supervision or upon the request of the work supervisor.

AAR Required: [Y ✔] [N]

RPT Sign: [redacted] Date: 12-18-97

FOR TRAINING

(Final)

USE ONLY

ATTACHMENT B

PROTECTIVE CLOTHING CLASSIFICATIONS AND GUIDELINES

CLASS 1 (GREEN)

COTTON GLOVE LINERS
RUBBER GLOVES
CLOTH BOOTIES
RUBBER SHOE COVERS
CAP

CLASS 3 (WHITE)

DOUBLE COVERALLS
DOUBLE CLOTH HOOD
COTTON GLOVE LINERS
DOUBLE RUBBER GLOVES
CLOTH BOOTIES
DOUBLE RUBBER SHOE COVERS

CLASS 2 (BLUE)

ONE PAIR OF COVERALLS
CAP (optional)
CLOTH HOOD
COTTON GLOVE LINERS
RUBBER GLOVES
CLOTH BOOTIES
RUBBER SHOE COVERS

CLASS 4 (RED)

ONE PAIR OF COVERALLS
WATERPROOF OUTER LAYER
CAP (optional)
DOUBLE CLOTH HOOD
COTTON GLOVE LINERS
DOUBLE RUBBER GLOVES
CLOTH BOOTIES
PLASTIC BOOTIES
DOUBLE RUBBER SHOES

<u>Guidelines:</u>

In lieu of a cloth hood, a cap may be substituted unless:

1). The worker will be entering a high contamination area, or

2). The worker will be wearing a face shield or respiratory protection, or

3). The worker will be carrying smearable contaminated items over their shoulder(s), or

4). The worker will be in a congested area, or

5). When specified by Radiation Protection.

For contamination control, hair should be tucked inside the cap or coveralls.

ATTACHMENT B

PROTECTIVE CLOTHING CLASSIFICATIONS AND GUIDELINES, Cont.

Guidelines:

For Class 1 and Class 2 Protective Clothing the following substitutions may be made:

1). Double or multi-layers of surgical gloves may be substituted for rubber gloves for contamination control for the following job evolutions or tasks with prior RP approval:

  a). Performing light work
  b). Inspections/walkdowns
  c). O.O.S. when no climbing is involved
  d). Instrument cals. (yellow tight surgical type gloves may be worn as substitute)
  e). Minor decon of small equipment or parts
  f). Performing routine RP surveys for radiation/contamination
  g). Handling/filling out paperwork during job evolutions
  h). Any activity approved by RP dept.

2). It is acceptable to wear, with prior RP approval, surgical gloves and/or **colored** cotton glove liners in clean (non-contaminated) areas of the RPA for handling of potentially contaminated materials or equipment such as:

  a). Informational radiological smears
  b). Maslin wipes or smears of equipment or floor
  c). Lead Blankets
  d). Bagged equipment coming from a posted contaminated area
  e). Laundry bags from SOPs
  f). Whenever RP gives prior approval

Byron Station
Radiation Work Permit
Worker Information

RWP #: [redacted] **Rev: 0**

Unit:	Building:	Elevation:	Location:
0	AUX AND RW	ALL	LHRAs

Equipment Name: NA

RWP Description: LHRA ENTRIES: INCLUDING INSPECTIONS / OPS ROUNDS AND OOS / MINOR MAINTENANCE

RWP Dose Approval:	100	mrem/day
Accumulated Dose Alarm:	80	mrem
Dose Rate Alarm:	300	mrem/hr

Exposure Monitoring Requirements

TLD and DIGI (Electronic Dosimeter) required.

Respiratory Protection Required

None

Special Instructions

ALL WORK ON THIS RWP MUST HAVE PRIOR RP APPROVAL.

NO ENTRY INTO AREAS REQUIRING PERSONNEL NEUTRON MONITORING

REVIEW SURVEYS OF RADIATION AND CONTAMINATED AREAS.

CLASS 1 CLOTHING (MINS) REQ. FOR VISUAL INSPECTION / NO CLIMBING.

CLASS 2 CLOTHING (FULL SET) REQ. FOR CLIMBING ABOVE 6 FT. / TIGHT AREAS POSTED CA.

WATERPROOF OUTER LAYER REQ. FOR WORK WITH RUNNING OR SPLASHING WATER.

THIS RWP IS FOR ALL WORK GROUPS, BUT ONLY FOR MINOR ACTIVITIES SUCH AS: STAGING EQUIPMENT / OPER. ROUNDS / INSPECTIONS / MINOR MAINT.

NO ENTRY INTO 15R/HR WHOLE BODY DOSE RATE WITHOUT PRIOR HPSS APPROVAL.

Protective Clothing Required

No PCs required in clean areas.

Class 1 (Mins)
Cloth Booties
Rubber Gloves
Cotton Glove Liners
Rubber Shoe Covers
Cap
Lab Coat

Class 2 (Full Set)
Cloth Booties
Rubber Gloves
Cotton Glove Liners
Rubber Shoe Covers
Cap
Cloth Hood
Coveralls

FOR TRAINING

USE ONLY

Byron Station
Radiation Work Permit
Radiation Protection Information

RWP #[redacted] Rev: 0

Survey Frequency Requirements

Radiation:	ROUTINE / New work Location
Contamination:	ROUTINE / New Work Location
Airborne:	ROUTINE

Pre-Job Briefing Required Yes

ENTRY INTO R-LOCKED HIGH RAD. AREAS REQ. RPT IN ATTENDANCE OR CALC. STAY TIMES DOCUMENTED AND COMMUNICATED TO WORKERS.

R.T. Coverage / Comments: Intermitent: Yes

Continuous tech coverage required if no current survey available for areas to be entered or if RP Supervision feels it necessary.

FOR TRAINING

USE ONLY

RP Supervisor		ALARA Review By	
BARTON BARRY M	12/31/97 10:02:56 AM	CURT REPASS AAR 06-98-A011	10/20/97 12:00:29 PM
Completed By		**Terminated By**	
ROBERTSON MARTA J	10/20/97 12:00:11 PM	BARTON BARRY M	2/16/98 10:17:19 AM
Job Supervisor			

DATE AND TIME: 01/07/98 09:00

RADIATION WORK PERMIT REQUEST

RWP REQUEST [redacted]

STATION NUMBER: BYR | UNIT NUMBER: 00 | RWP/REV: [redacted] 00

BUILDING: ALL | ELEVATION: ALL | ROOM/AREA: ALL COL: ____ ROW: ____

LOCATION DESCRIPTION: ALL LHRA ENTRIES

EQUIP. NAME: ____

NWR NUMBER: EPN: TASK/DEP

ACTIVITY LHRA ENTRIES INCL. MISC MINOR WORK

DESCRIPTION OF WORK (Be specific or attach clarifying documents):

LHRA ENTRIES : INCL INSPECTIONS / ROUNDS / OOS / MINOR MAINT

CHECK WHICH ITEMS ARE REQUIRED OR APPLY:

X Checklist N/A
_ Draining of Vessel or Tank
_ Component Disassembly
_ Confined/Enclosed Space Entry
_ Use of Controlled Rad. Sources
_ Work > than 6 feet Above Floor
_ Scaffolding
_ Surface Preparation Type: ____
_ Sweeping
_ Brushing
_ Weld/Brazing/Solder
_ Insulation Removal
_ Radiography
_ Open Process Lines
_ Splash/Running Water
_ Asbestos Removal
_ Drilling
_ Robotic Welding
_ Plasma/Air Arc Cutting
_ Movement of Shielding
_ Packing Removal
_ Cut or Grind Type: ____
_ Changes in Ventilation
_ Removal of Equip. from Fuel Pools associated cavities/Pits.
_ Use of Containment Devices (glove bags)
_ Work Below Grating

LIST ALL TASKS (Including Support Groups)	PERSON HOURS IN WORK AREA	FOR RAD. PROTECTION USE: WORK AREA DOSE RATE (mR/HR)	PERSON-REM ESTIMATE
1. INSPECTIONS/ ROUNDS / OOS / MINOR MAINT	350.0	.00	.000
2.			
3.			
4.			
5.			
6.			
7.			
8.			
TOTALS	350.0		.000
ALARA Est. :	350.0		.320

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EST. START DATE : ____
EST. COMPL DATE: ____

REQUESTOR:
NAME (PRINT) BARTON BARRY DEPARTMENT ____ PHONE 2975

ADDITIONAL RP COMMENTS

REP DATA

RAD PROTECTION REVIEW BY: BARTON BARRY
RAD PROTECTION REV DATE : 01/07/98
RAD PROTECTION REV TIME : 09:00

_ SEE ATTACHED LIST

**** END OF REPORT ****

RWP INFORMATION LOG

RWP [redacted]

DATE / TIME	INITIALS	RWP INFORMATION

FOR TRAINING USE ONLY

h:\mydocuments\xldata\rinfolog.xls

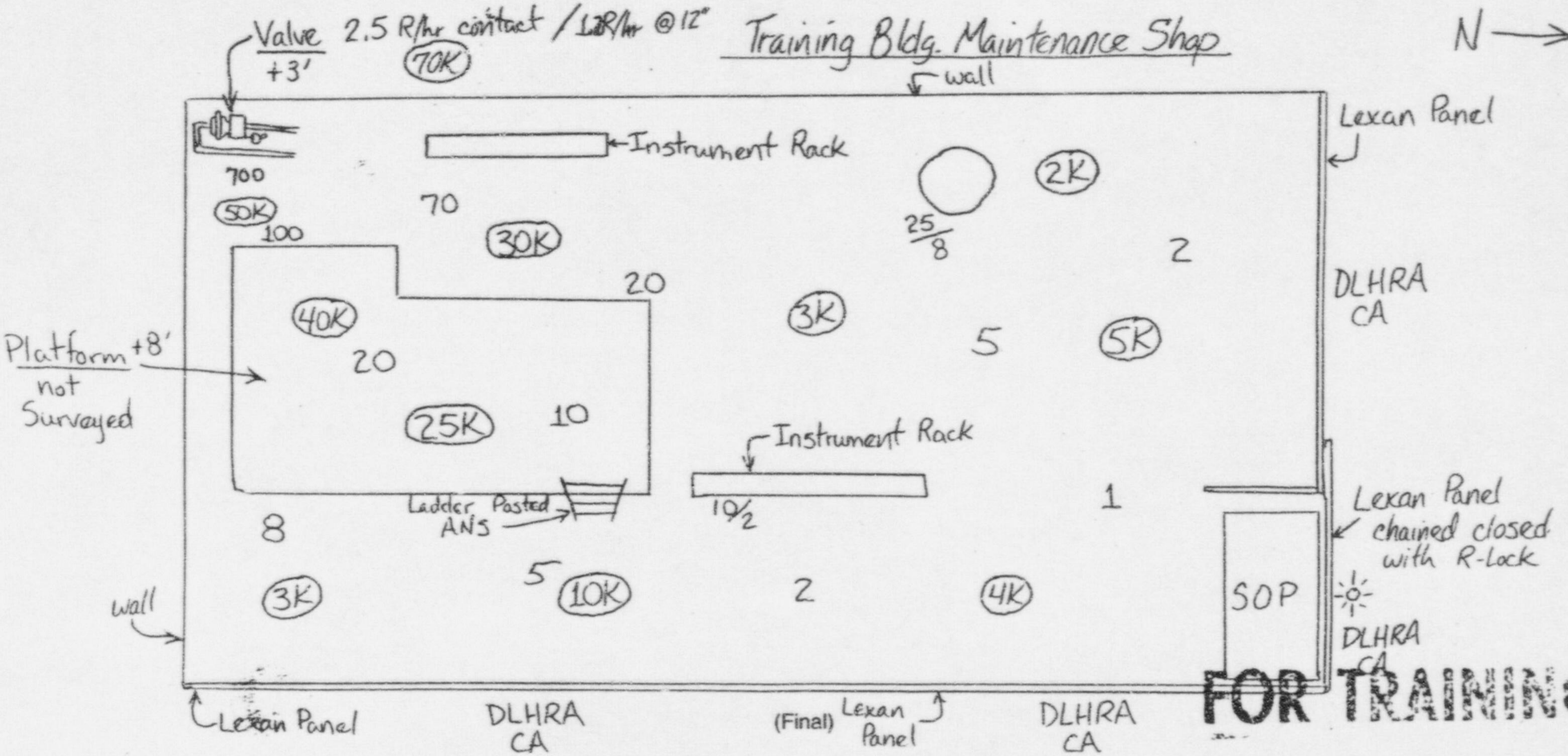
OT-XXX OUTSIDE BUILDING BLANK

SURVEY # 98-9999
DATE 08-04-98 TIME 1430
RPT AOT
WK NA MT NA QT NA INST R505 SER A746V
RWP# 989999 RM14 7318
Other High Rad Investigation NA NA
All Inst Tested with Check Source
Reviewed by LRF Date 8/4/98

KEY:

#	Gamma Dose Rate in mR/Hr	CRA	Caution Radiation Area
⊕'s	Smears dpm/100 cm2	CA	Contaminated Area
NCF	No Contamination Found	DHRA	Danger High Rad Area
(L)	Large Area Smear	ARA	Airborne Radioactivity Area
N	Neutron	RM	Radioactive Materials
▵	Air Sample Location	NR	Neutron TLD Required
B	Beta a Alpha	HCA	High Contamination Area
ANS	Area Not Surveyed	☼	Flashing Red Light

Training Bldg. Maintenance Shop



(1660SS/WPF/012194)

Maximum Stay Time Worksheet For Areas >1000 mrem/hr
When RPT Is Not In Attendance

Max stay time required in areas >1000 mrem/hr when a RPT is not in attendance (Tech spec 6.12.2)

RWP # 98XXXX

Date	Work Group Job Description	Authorized Daily Dose (mrem)	Working Dose Rate (mrem/hr)	** Maximum Stay Time	Radiation Protection Supervision Initials
Example: 01-01-95	CV resin transfer	300	1500	12	JAD
9/16/98	VALVE LINE-UP	300	1050	17	JRT

FOR TRAINING USE ONLY

**Worker MUST leave the area when stay time has expired OR upon electronic dosimeter alarm due to accumulated dose, whichever occurs first.

(Final)

Byron Station
Operations Training
Job Performance Measure

LO TASK DESCRIPTION: **GSEP Classification And Protective Action Recommendations**

NLO TASK DESCRIPTION: N/A

K/A NUMBER	RO/SRO RATING
2.4.38	2.2/4.0
2.4.41	2.3/4.0

JPM NUMBER	Task Number	Job Position
ADMIN 4 SRO		SM

Revision: Date:

REVIEWED: ______________________________
INSTRUCTOR DATE

APPROVED: ______________________________
GROUP LEADER DATE

Start Time: ______________ Stop Time: ______________

Estimated Time for Completion:

This JPM was [ ] Performed in the [ ] Control Room
[ ] Simulated [ ] Plant
[ ] Other ** [ ] Simulator
[ ] Mockup
** ______________ [ ] Other ______________

EXAMINEE: ______________ EVALUATOR: ______________

DATE: ______________

[ ] SATISFACTORY [ ] UNSATISFACTORY

Comments: ______________________________

____

____

Specific Information:

1. These items were used as reference material in the development of this JPM:

   BZP 200-A1; BZP 300-A1; BZP 300-A2

2. These items are expected to be used by the examinee in the performance of the task:

   BZP 200-1; BZP 200-A1; Byron Station GSEP; BZP 300-A1
   NARS Form (BZP 310-2T1); BZP 300-A2 PARs

3. Information to the Examinee and the Evaluator:

   a. Initial Conditions:
   Accident conditions have existed for BOTH Units for the past 15 minutes. The initiating event was a LOCA on Unit 2 coincident with rupture of the active Waste Gas Decay tank.

   b. Task Initiating Condition:
   The status for each Unit is provided on ATTACHMENT 1.

   c. Initiating Cue:
   Based on current event parameters, re-classify the event and complete an associated NARS form to include PARs information.

   d. Your Position:
   Acting Station Director (Shift Manager)

4. Terminal Performance Objective: (TPO)
   Determine the highest accident classification, complete the NARS form, and determine appropriate Protective Action Recommendations.

5. Critical Steps(*)
   3, 4, & 6

6. Identification of Impacted Systems:
   If this task is performed incorrectly, the following adverse reactions could occur:
   Failure to complete CFR reporting requirements and failure to provide recommendations for public protection due to accident conditions.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A

RECORD START TIME ___________

```
***********************************************************
*                        NOTE                             *
* Provide the candidate with blank NARS Form (BZP         *
* 300-A1) and PAR DETERMINATION Form (BZP 300-            *
* A2), as necessary.                                      *
***********************************************************
```

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
1. Refer to BZP 200-1 (A1), "Byron Emergency Action Levels".	Locate and Open BZP 200-1.	☐	☐	☐

Note: Candidates may list each individual EAL as follows:

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
2. Classify the Event utilizing BZP 200-A1.	Determine the following EALs apply: Both Units: •RS-1 Unit 2: •FP 3.a, •FP 3.d	☐	☐	☐
* 3. Determines applicable classification.	Determine HIGHEST classification of event for BOTH units is SITE EMERGENCY from RS-1 EAL	☐	☐	☐
* 4. Completes NARs Form.	Complete NARS Form sections 1-8: o Status - [A] Actual, [B] EXERCISE, or [C] DRILL • Station - [E] Byron • Classification - [C] SITE AREA (or as determined above) • Time - [current] Date - [current] EAL - RS1 • Release - [C] OCCURRING • Type - [B] R/A GAS • Wind Dir - from 40 degrees • Downwind Sector L • Wind Speed - 10 miles/hr	☐	☐	☐

(on NARS Form noted as Meters/sec and only miles/hr for Quad Cities) HP

PERFORMANCE CHECKLIST	STANDARDS	SAT	UN SAT	N/A
5. Refer to BZP 300-1, "Protective Actions Recommendations" and BZP 300-A2, "Recommended Protective Actions".	Locate and Open BZP 300-1 and 300-A2.	☐	☐	☐
* 6. Determines PARs.	Determine PAR: • Site Area Emergency • Release > 4.85E4 µCi/sec • PAR = (S) S) S) Provide PARs on NARS Form section 9: • [C] • [D] (Shelter all sectors 0-2 mile radius) • [F] (Shelter AT LEAST sectors K, L, M or downwind 2-5 mile radius) • [G] (Shelter AT LEAST sectors K, L, M or downwind 5-10 mile radius)	☐	☐	☐

RECORD STOP TIME ____________________

COMMENTS:

TASK CONDITIONS:

You are the Acting Station Director.

Accident conditions have existed for BOTH Units for the past 15 minutes. The initiating event was a LOCA on Unit 2 coincident with rupture of the active Waste Gas Decay tank.

The status for each Unit is provided on ATTACHMENT 1.

INITIATING CUES:

Based on current event parameters, re-classify the event and complete an associated NARS form to include PARs information.

Byron STATUS

(Assume all conditions have existed for 15 minutes)

PARAMETER	UNIT 1	UNIT 2
Status prior to event	MODE 4, 208°F 300 psig in heatup	MODE 1, 99% power
Initiating Event	Both RHR pumps currently unavailable (Bus 142 deenergized; RHR Pump A stopped)	LOCA
Diagnosed event/ Procedure status	Loss of Shutdown Cooling/ At Attachment B of BOA PRI-10	LOCA, RCPs tripped At step 26 of BEP-0
Equipment failures	Ruptured Waste Gas Decay Tank (in-service) Electrical fault on bus 142 RHR Pump A stopped due to erratic indications	DG 1B failed to start SI Pump B breaker tripped on start
CETC temperatures	212°F	540°F
PZR/RCS pressure	300 psig stable	250 psig slowly dropping
PZR level	62% and lowering	offscale low
S/G levels (A-D) [NR]	25%, 28%, 24%, 25%	15%, 20%, 22%, 18% increasing
S/G pressures (A-D) [psig]	0, 0, 0, 0	800 , 800, 800, 815
CNMT pressure	.2 psig stable	38 psig and lowering
CNMT radiation AR020/021	--	200 R/hr
MSIVs (A-D) [C-closed; O-open]	C, C, C , C	C, C, C, C
Aux Bldg Vent Stack Monitors (WRGM)	2.1×10^6 µci/sec	4.2×10^6 µci/sec
Charging/ECCS flows:		
Charging	115 gpm	--
CV	--	530 gpm
SI	--	750 gpm
RHR	--	0 gpm
		CNMT Spray normal
Meteorological	Wind is from 40 degrees at 10 mph	

APPROVED 12/30/97

Facsimile

(UTILITY FORM)

BZP 310-2T1
Revision 0

UTILITY MESSAGE NO. ______

STATE OF ILLINOIS
NUCLEAR ACCIDENT REPORTING SYSTEM FORM
JANUARY, 1998

STATE MESSAGE NO. N/A

INITIAL ROLL CALL
- ELECTRIC OPER. ☐
- IEMA ☐
- IDNS ☐
- WEM (Zion Only) ☐
- IOWA EMD (QC Only) ☐

MESSAGE INITIATED
(UTILITY USE ONLY)
TIME: ______
DATE: ______

1. **STATUS**
   - [A] ACTUAL
   - [B] EXERCISE
   - [C] DRILL
   - [D] TERMINATION

2. **STATION**
   - [A] DRESDEN
   - [B] LASALLE
   - [C] QUAD CITIES
   - [D] ZION
   - [E] BYRON
   - [F] BRAIDWOOD
   - [G] CLINTON

3. **ON-SITE ACCIDENT CLASSIFICATION**
   - [A] UNUSUAL EVENT
   - [B] ALERT
   - [C] SITE AREA EMERGENCY
   - [D] GENERAL EMERGENCY
   - [E] RECOVERY
   - [F] NOT APPLICABLE

4. **ACCIDENT CLASSIFIED**
   TIME: Current
   DATE: Current
   EAL#: RS.1

   ACCIDENT TERMINATED
   TIME: N/A
   DATE: N/A

5. **RELEASE TO ENVIRONMENT**
   - [A] NONE
   - [B] POTENTIAL
   - [C] OCCURRING
   - [D] TERMINATED

6. **TYPE OF RELEASE**
   - [A] NOT APPLICABLE
   - [B] RADIOACTIVE GAS
   - [C] RADIOACTIVE LIQUID

7. **WIND DIRECTION:**
   FROM 40 (DEGREES)
   DOWNWIND SECTOR: L

8. **WIND SPEED**
   - [A] METERS/SEC.: ______
   - [B] MILES/HR.*: 10

   *QUAD CITIES ONLY

9. **RECOMMENDED ACTIONS**
   - [A] NONE
   - [B] PREPARE FOR POSSIBLE ACTION INVOLVING THE PUBLIC
   - [C] INITIATE PUBLIC NOTIFICATION PROCEDURES INSTRUCT THE PUBLIC TO TAKE THE FOLLOWING ACTIONS:

SHELTER	EVACUATE		UTILITY ONLY
[D]	[H]	0 - 2	MILE RADIUS
[E]	[I]	0 - _	MILE RADIUS
[F]	[J]	2 - 5	MILES FOR SECTORS K L M
[G]	[K]	5 - 10	MILES FOR SECTORS K L M

[L] SHELTER SUB-AREAS: ______ (STATE USE ONLY)
[M] EVACUATE SUB-AREAS: ______ (STATE USE ONLY)

- [N] RECOMMEND POTASSIUM IODIDE (KI) IN ACCORDANCE WITH PROCEDURES (STATE USE ONLY)
- [O] CONFINE MILK-PRODUCING ANIMALS ON STORED FEED AND PROTECTED WATER OUT TO ___ MILE RADIUS (STATE USE ONLY)
- [P] COMMENCE RETURN OF PUBLIC (STATE USE ONLY)
- [Q] OTHER ______

10. **ADDITIONAL INFORMATION:** NONE

11. **MESSAGE TRANSMITTED BY:**
    ______ (NAME)
    ______ (ORGANIZATION)
    ______ (OUTSIDE PHONE NUMBER)

12. **MESSAGE TRANSMITTED:**
    CURRENT TIME: ______
    CURRENT DATE: ______

13. **MESSAGE RECEIVED BY:**
    ______ (NAME)
    ☐IEMA ☐COMED

OUTSIDE PHONE NUMBERS		FINAL ROLL CALL
ELECTRIC OPER.	630-691-4730	☐
IEMA	217-782-7860	☐
IDNS	217-785-0600	☐
WEM	800-943-0003 (ZION ONLY)	☐
IOWA EMD	515-281-3231 (QC ONLY)	☐

UTILITY USE ONLY

APPROVED BY: X ______ (NAME) ______ (TIME)

NDO NOTIFIED: ______ (NAME) ______ (TIME/DATE)
(ELECTRIC OPER. ONLY)

(9492AA/DOC/122797)

KEY

NARS FORM

INSTRUCTIONS FOR USE
(UTILITY FORM)

Complete the NARS as follows:

UTILITY MESSAGE NUMBER - For use by Utility personnel only. Number Messages sequentially, starting with 1, for the Event described. Enter "N/A" if this is a State NARS.

STATE MESSAGE NUMBER - Enter State Message Number when receiving a NARS message from the State. Enter "N/A" if this is a Utility NARS.

INITIAL ROLL CALL - Mark the box by the applicable agencies that are included in the initial roll call.

MESSAGE INITIATED (Utility Only) - Document the time and date at the completion of the initial roll call.

1. **STATUS** - Mark the letter corresponding to the appropriate status description.

2. **STATION** - Mark the letter corresponding to the affected Station.

3. **ON-SITE ACCIDENT CLASSIFICATION** - Mark the letter corresponding to the classification issued by the Utility.

4. **ACCIDENT CLASSIFIED** - Fill in the time and date at which the most recent accident classification was determined by the Utility. Also fill in the applicable On-Site Emergency Action Level (EAL) code number. Enter "N/A" if this is an accident termination message.

   ACCIDENT TERMINATED - Fill in the time and date of the accident termination, if applicable. Enter "N/A" if this is an accident classified message.

5. **RELEASE TO ENVIRONMENT** - Mark the letter corresponding to the appropriate description.

6. **TYPE OF RELEASE** - Mark the letter corresponding to the appropriate release type.

7. **WIND DIRECTION** - Fill in the direction from which the wind is coming, in degrees.

   DOWNWIND SECTOR - Fill in the letter corresponding to the Downwind Sector. Use environmental sampling maps or the following table:

DOWNWIND SECTOR	WIND FROM		WIND FROM DEGREES	DOWNWIND SECTOR	WIND FROM		WIND FROM DEGREES
J	N	___	349-11	A	S	___	169-191
K	NNE	___	12-33	B	SSW	___	192-213
L	NE	___	34-56	C	SW	___	214-236
M	ENE	___	57-78	D	WSW	___	237-258
N	E	___	79-101	E	W	___	259-281
P	ESE	___	102-123	F	WNW	___	282-303
Q	SE	___	124-146	G	NW	___	304-326
R	SSE	___	147-168	H	NNW	___	327-348

8. **WIND SPEED** - Fill in the wind speed under meters/second. For Quad Cities Station only, fill in both meters/seconds and miles/hour.

9. **RECOMMENDED ACTIONS** - Mark the letter corresponding to the appropriate protective action. Add additional information if [C] is chosen. If recommending shelter or evacuation for letters [F][G][J] or [K], provide the center line sector and at least one sector on each side of center line. Letters [L-P] are for State use only.

10. **ADDITIONAL INFORMATION** - Additional information should be included when:
    * An equal or lesser classification is made on the other unit,
    * A wind shift which results in additional downwind sectors,
    * A change is made in PARs,
    * Corrections to the current NARS are made.

    If the NARS is not being issued for one of the above reasons, this block should read "none".

11. **MESSAGE TRANSMITTED BY** - Fill in name, organization and outside phone number of person transmitting the NARS Form information.

12. **MESSAGE TRANSMITTED** - Fill in the current time and date that the message was transmitted by the person listed in step 11.

13. **MESSAGE RECEIVED BY** - Fill in name, and mark the applicable organization (IEMA or ComEd), of the person receiving the NARS message and filling out the NARS Form.

'NAL ROLL CALL - Mark the box by the [illegible]licable agencies that are included in the final roll call.

(Final)

(UTILITY FORM)

UTILITY MESSAGE NO. _______ STATE MESSAGE NO. _______

STATE OF ILLINOIS
NUCLEAR ACCIDENT REPORTING SYSTEM FORM
JANUARY, 1998

INITIAL ROLL CALL
- ELECTRIC OPER. ☐
- IEMA ☐
- IDNS ☐
- WEM (Zion Only) ☐
- IOWA EMD (QC Only) ☐

MESSAGE INITIATED
(UTILITY USE ONLY)
TIME: ______________
DATE: ______________

1. **STATUS**
[A] ACTUAL
[B] EXERCISE
[C] DRILL
[D] TERMINATION

2. **STATION**
[A] DRESDEN
[B] LASALLE
[C] QUAD CITIES
[D] ZION
[E] BYRON
[F] BRAIDWOOD
[G] CLINTON

3. **ON-SITE ACCIDENT CLASSIFICATION**
[A] UNUSUAL EVENT
[B] ALERT
[C] SITE AREA EMERGENCY
[D] GENERAL EMERGENCY
[E] RECOVERY
[F] NOT APPLICABLE

4. **ACCIDENT CLASSIFIED**
TIME: __________
DATE: __________
EAL#: __________

ACCIDENT TERMINATED
TIME: __________
DATE: __________

5. **RELEASE TO ENVIRONMENT**
[A] NONE
[B] POTENTIAL
[C] OCCURRING
[D] TERMINATED

6. **TYPE OF RELEASE**
[A] NOT APPLICABLE
[B] RADIOACTIVE GAS
[C] RADIOACTIVE LIQUID

7. **WIND DIRECTION:**
FROM ________ (DEGREES)
DOWNWIND SECTOR: ____

8. **WIND SPEED**
[A] METERS/SEC.: _____
[B] MILES/HR.*: _____
*QUAD CITIES ONLY

9. **RECOMMENDED ACTIONS**
[A] NONE
[B] PREPARE FOR POSSIBLE ACTION INVOLVING THE PUBLIC
[C] INITIATE PUBLIC NOTIFICATION PROCEDURES INSTRUCT THE PUBLIC TO TAKE THE FOLLOWING ACTIONS:

SHELTER	EVACUATE		UTILITY ONLY
[D]	[H]	0 - 2	MILE RADIUS
[E]	[I]	0 - __	MILE RADIUS
[F]	[J]	2 - 5	MILES FOR SECTORS __________
[G]	[K]	5 - 10	MILES FOR SECTORS __________

[L] SHELTER SUB-AREAS: ______________________ (STATE USE ONLY)
[M] EVACUATE SUB-AREAS: ______________________ (STATE USE ONLY)

[N] RECOMMEND POTASSIUM IODIDE (KI) IN ACCORDANCE WITH PROCEDURES (STATE USE ONLY)
[O] CONFINE MILK-PRODUCING ANIMALS ON STORED FEED AND PROTECTED WATER OUT TO _____ MILE RADIUS (STATE USE ONLY)
[P] COMMENCE RETURN OF PUBLIC (STATE USE ONLY)
[Q] OTHER ______________________________

10. **ADDITIONAL INFORMATION:** ______________________________

11. **MESSAGE TRANSMITTED BY:**
________________ (NAME)
________________ (ORGANIZATION)
________________ (OUTSIDE PHONE NUMBER)

12. **MESSAGE TRANSMITTED:**
CURRENT TIME: __________
CURRENT DATE: __________

13. **MESSAGE RECEIVED BY:**
________________ (NAME)
☐IEMA ☐COMED

OUTSIDE PHONE NUMBERS		FINAL ROLL CALL
ELECTRIC OPER.	630-691-4730	☐
IEMA	217-782-7860	☐
IDNS	217-785-0600	☐
WEM	800-943-0003 (ZION ONLY)	☐
IOWA EMD	515-281-3231 (QC ONLY)	☐

UTILITY USE ONLY

APPROVED BY: ______________ (NAME) ______________ (TIME)

NDO NOTIFIED: ______________ (NAME) ______________ (TIME/DATE)
(ELECTRIC OPER. ONLY)

NARS FORM

INSTRUCTIONS FOR USE
(UTILITY FORM)

Complete the NARS as follows:

UTILITY MESSAGE NUMBER - For use by Utility personnel only. Number Messages sequentially, starting with 1, for the Event described. Enter "N/A" if this is a State NARS.

STATE MESSAGE NUMBER - Enter State Message Number when receiving a NARS message from the State. Enter "N/A" if this is a Utility NARS.

INITIAL ROLL CALL - Mark the box by the applicable agencies that are included in the initial roll call.

MESSAGE INITIATED (Utility Only) - Document the time and date at the completion of the initial roll call.

1. STATUS - Mark the letter corresponding to the appropriate status description.

2. STATION - Mark the letter corresponding to the affected Station.

3. ON-SITE ACCIDENT CLASSIFICATION - Mark the letter corresponding to the classification issued by the Utility.

4. ACCIDENT CLASSIFIED - Fill in the time and date at which the most recent accident classification was determined by the Utility. Also fill in the applicable On-Site Emergency Action Level (EAL) code number. Enter "N/A" if this is an accident termination message.

   ACCIDENT TERMINATED - Fill in the time and date of the accident termination, if applicable. Enter "N/A" if this is an accident classified message.

5. RELEASE TO ENVIRONMENT - Mark the letter corresponding to the appropriate description.

6. TYPE OF RELEASE - Mark the letter corresponding to the appropriate release type.

7. WIND DIRECTION - Fill in the direction from which the wind is coming, in degrees.

   DOWNWIND SECTOR - Fill in the letter corresponding to the Downwind Sector. Use environmental sampling maps or the following table:

DOWNWIND SECTOR	WIND FROM		WIND FROM DEGREES	DOWNWIND SECTOR	WIND FROM		WIND FROM DEGREES
J	N	___	349-11	A	S	___	169-191
K	NNE	___	12-33	B	SSW	___	192-213
L	NE	___	34-56	C	SW	___	214-236
M	ENE	___	57-78	D	WSW	___	237-258
N	E	___	79-101	E	W	___	259-281
P	ESE	___	102-123	F	WNW	___	282-303
Q	SE	___	124-146	G	NW	___	304-326
R	SSE	___	147-168	H	NNW	___	327-348

8. WIND SPEED - Fill in the wind speed under meters/second. For Quad Cities Station only, fill in both meters/seconds and miles/hour.

9. RECOMMENDED ACTIONS - Mark the letter corresponding to the appropriate protective action. Add additional information if [C] is chosen. If recommending shelter or evacuation for letters [F][G][J] or [K], provide the center line sector and at least one sector on each side of center line. Letters [L-P] are for State use only.

10. ADDITIONAL INFORMATION - Additional information should be included when:
    - An equal or lesser classification is made on the other unit,
    - A wind shift which results in additional downwind sectors,
    - A change is made in PARs,
    - Corrections to the current NARS are made.

    If the NARS is not being issued for one of the above reasons, this block should read "none".

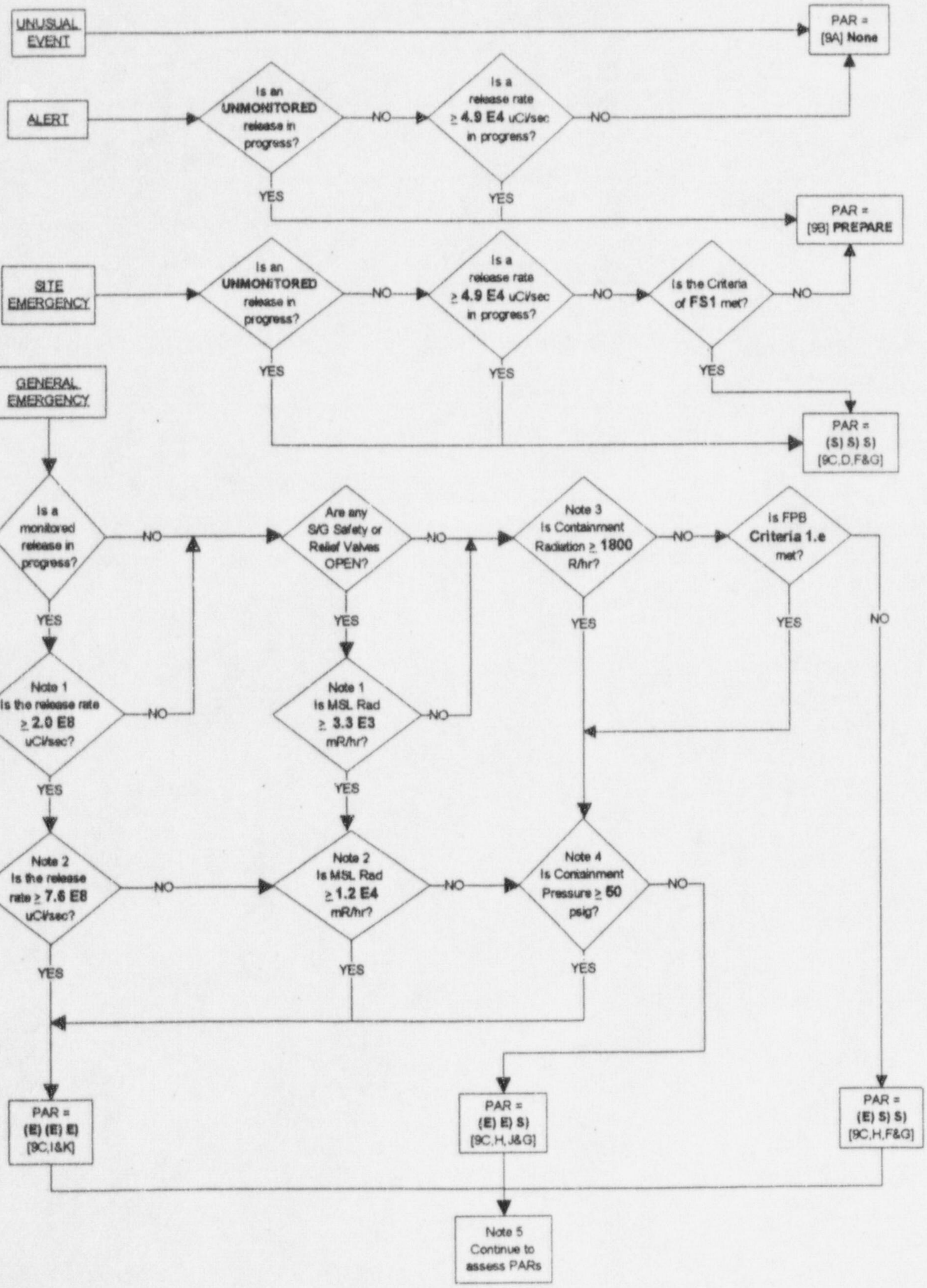
11. MESSAGE TRANSMITTED BY - Fill in name, organization and outside phone number of person transmitting the NARS Form information.

12. MESSAGE TRANSMITTED - Fill in the current time and date that the message was transmitted by the person listed in step 11.

13. MESSAGE RECEIVED BY - Fill in name, and mark the applicable organization (IEMA or ComEd), of the person receiving the NARS message and filling out the NARS Form.

FINAL ROLL CALL - Mark the box by the applicable agencies that are included in the final roll call.

FIGURE 6.3-1
PROTECTIVE ACTION RECOMMENDATION (PAR) DETERMINATION



FOOTNOTES TO FIGURE 6.3-1
BYRON STATION

Note 1. Site Specific monitor based on a 1 REM (TEDE) dose projection at 2 miles using annual average meteorology.

Note 2. Site Specific monitor value based on a 1 REM (TEDE) dose projection at 5 miles using annual average meteorology.

Note 3. Clad damage ≥ site specific Containment Fission Product Barrier Threshold Value for containment radiation level.

Note 4. Containment Design Pressure.

Note 5. Continuously reassess the need for additional PARs on changing plant conditions, effluent rates, meteorological conditions and dose projections. Never recommend a less conservative PAR once a more conservative PAR has been issued.

TABLE 6.3-1
RECOMMENDED PROTECTIVE ACTIONS FOR
GASEOUS RELEASE CONDITIONS *(Note 1)

Accident Classification	Rem (TEDE) Projected Doses (Rem)* in Zonal Areas X, Y, & Z *(Note 2) Whole Body X	Y	Z	Rem (CDE) Thyroid X	Y	Z	(Note 3) Recommended Protective Actions (S-Shelter, E-Evacuation, P-Prepare for Possible action, I. O. - info only) X	Y	Z	NARS Form Section 9
1. Unusual Event								I. O.		9.A
2. Alert	(1) No Release							I. O.		(1) 9.A
	(2) Release Occurring.							PREPARE		(2) 9.B
3. Site Emergency	(1) No release in progress.							PREPARE		(1) 9.B
	(2) Potential Release or Release Occurring.						(S)	S)	S)	(2) 9.C,D,F & G
4. General Emergency *(Note 3)	(1) No Dose Projections Available						Fig. 6.3-1			—
	(2) Any	<1	<1	Any	<5	<5	(E)	S)	S)	(2) 9.C,H,F & G
	(3) ≥1	≥1	<1	≥5	≥5	<5	(E)	E)	S)	(3) 9.C,H,J & G
	(4) ≥1	≥1	≥1	≥5	≥5	≥5	(E)	(E) *(Note 5)	E)	(4) 9.C,I & K *(Note 4)
5. Recovery	N/A							I. O.		(1) 9.A
6. Terminate	N/A							I. O.		(1) 9.A

The symbol "( )" represents the entire radius of all sectors of the designated zonal area as defined in Fig. 6.3-2, where a single ")" represents just the affected downwind sectors (minimum of three) of the designated zonal area. Example: (S) S) S). The following recommendation is (S) - shelter 0-2 mile radius, S) - shelter 2-5 mile affected downwind sectors, S) - shelter 5-10 mile affected downwind sectors.

*For Notes 1 through 5, refer to next page titled
"FOOTNOTES TO TABLE 6.3-1"

FOOTNOTES TO TABLE 6.3-1

Note 1. Control Room personnel are not expected to perform dose projection calculations. Control Room personnel may have dose projection information if the ODCS A-Model is available.

Note 2. The zones X, Y and Z are:
X = site boundary out to 2 miles (not including 2 miles)
Y = 2 miles out to 5 miles (not including 5 miles)
Z = 5 miles out to 10 miles (including 10 miles)

Note 3. Continuously reassess the need for additional PARs based on changing plant conditions, effluent release rates, meteorological conditions and dose projections. Never recommend a less conservative PAR once a more conservative PAR has been issued.

Note 4. If evacuation is recommended for Zonal areas Y and Z and if Zonal areas Y and Z are in Wisconsin, then the recommendation for evacuation should extend only to the range at which the projected dose is 1 Rem TEDE or 5 Rem CDE to the thyroid, whichever is the greater range.

The evaluation of weather and road conditions on the ability to evacuate areas is the responsibility of State and Local governments. It is important to note that the final determination <u>advisability</u> of any Protective Action Recommendations (PARs) lies with the offsite governmental officials. These governmental officials have direct access to key, non-plant related factors necessary to finalize any Protective Action Recommendation; such as EPZ population distributions, transportation availability, special facility requirements, roadway conditions and availability.

Note 5. Recommend 0-5 mile radius evacuation on NARS form.

(Final)

FINAL AS-ADMINISTERED WALKTHROUGH JPMS FOR BYRON EXAMINATION - SEP 1998

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 5.
3. RCS conditions are 188°F and 360 psig.

INITIATING CUES:

1. Respond, as necessary, to plant conditions on the 1PM05J.

NOTES FOR SETUP:

JPM 1 can be run in RCS low temperature and pressure conditions (MODE 5).

The desired conditions are approximately 188°F and 360 psig. This can be done with either RCS solid or Pzr bubble drawn with RCS loops filled. Source Range channel N-31 selected as audio count rate channel.

SRNI N-31 failed low, requires no particular plant conditions and is therefore suited for coupling with JPM 6.

The actions are performed as directed by BOA INST-1. The evaluated steps are 1, APPENDIX C steps 1-3, 5. The actions should include trip of the reactor per T.S. direction?

When directed by floor, MRF RP24 Bypass to bypass A Train of SSPS

JOB PERFORMANCE MEASURE

TASK TITLE: Respond to Source Range NI Failure   JPM No.: JPM-1

TPO No: K&A No.: 015000G120   K&A IMP. 4.3/4.2

TRAINEE:________________________________   DATE: ___/___/___

The Trainee: PASSED__________ this JPM   TIME STARTED: _________

FAILED __________   TIME FINISHED: _________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

BOA INST-1, NUCLEAR INSTRUMENT MALFUNCTION

TASK STANDARDS:

Respond to Source Range NI Failure.

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 5.
3. RCS conditions are 188°F and 360 psig.

INITIATING CUES:

1. Respond, as neceesary, to plant conditions on the 1PM05J.

CRITICAL ELEMENTS: (*)

4,7,10 and 13   (ADD STEP 12; simulated but critical) HP

APPROXIMATE COMPLETION TIME: 11 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A

RECORD START TIME ________

> **NOTE**
>
> **If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee.**

1. Refer to BOA INST-1, Nuclear Instrument Malfunction. **Note: This step may be performed at any time.** **If asked: *All Prerequisites have been met.***	Locate and open BOA INST-1.	❑	❑	❑
2. Determine failed channel.	DETERMINE WHICH NI CHANNEL OR FUNCTION FAILED AND GO TO APPROPRIATE ATTACHMENT: SR CHANNEL FAILURE – ATTACHMENT C (Page 10)	❑	❑	❑
3. Check SR required **Cue: P6 permissive light IS lit.**	SR BLOCK PERMISSIVE P6 (1-BP-3.2) – LIT.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*4. Check Audio Count Rate Channel **Cue: Channel N-31 selected.** When operated, **Channel N-32 is selected.**	Operable Channel – SELECTED AT 1PM07 J Determines Affected Channel selected AND Selects SR N-32 channel.	❑	❑	❑
5. Check Unit Mode **Cue: *Unit in MODE 5***	Unit – IN MODE 3, 4 OR 5 GO TO Step 5 (Page 12).	❑	❑	❑
6. Determine Mode 5 Actions **Cue: *SR-31 failed.***	Check SR Channels – ONLY ONE FAILED.	❑	❑	❑
*7. Defeat failed channel trip **Cue: Switch is in BYPASS.**	Place LEVEL TRIP switch for the affected channel on 1PM07J in BYPASS	❑	❑	❑
8. Defeat failed channel High Flux at S/D alarm **Cue: Switch is in BLOCK**	Place HIGH FLUX AT SHUTDOWN switch for the affected channel on 1PM07J in - BLOCK	❑	❑	❑
9. Check BDPS status **Cue: ALARM is NOT lit**	Check BDPS BLOCKED annunciator alarm (1-10-E4) – NOT LIT	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*10. Block BDPS **Cue: Switches are in BLOCK**	Place both BDPS RESET/BLOCK switches to – <u>BLOCK</u> • Train A • Train B	☐	☐	☐
11. Check CV pump suction aligned to VCT **Cue: VCT level is 45%.**	Check CV pump suction aligned to VCT: 1) Check VCT level – <u>GREATER THAN 37%</u>	☐	☐	☐
Cue: VCT pressure is 25 psig.	2) Check VCT pressure – <u>BETWEEN 15 AND 65 PSIG</u>	☐	☐	☐
Cue: Valves are OPEN.	VCT Outlet iol valves – <u>OPEN</u> • 1CV112B • 1CV112C			
Cue: Valves are CLOSED.	RWST to CV pump suction valves – <u>CLOSED</u> • 1CV112D • 1CV112E	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
* 12. Bypass BDPS signal for the affected SR channel	Bypass BDPS signal for the affected SR channel:	☐	☐	☐
NOTE: Use in book diagram to show how to operate switch. **NOTE: Simulator Operator action: IRF RP24 to BYPASS.**	1) Place BDPS TEST-NORMAL switch on card NM107 (inside SR drawer) in – <u>TEST</u> 2)			
Cue: Alarm is LIT.	2) Check BDPS BYPASSED alarm (1-10-D3) - <u>LIT</u>	☐	☐	☐
*13. BDPS RESET/BLOCK switches to – RESET	Place both BDPS RESET/BLOCK switches to – <u>RESET:</u>	☐	☐	☐
Cue: Switches are RESET	• Train A • Train B			
14. Notify US to evaluate T.S.	Inform US to Evaluate T.S.	☐	☐	☐
Cue: US Notified	NOTE TO EXAMINERS! FOR SROs ask clarifying question on what T.S. applies.			
Cue: THIS COMPLETES JPM.				

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** YES

A reactor startup is underway following a shutdown one day after the initial criticality for Cycle 9 on Unit 1. The estimated Critical Rod Position is 150 steps on Control Bank D. The upper administrative limit is 228 steps on Control Bank D, the lower administrative limit is 45 steps on Control Bank D and the -750 pcm limit is 118 steps on Control Bank C.

With the Shutdown Banks withdrawn, Source Range N32 reads 18 cps. When Source Range N32 reads 144 counts, the rods are at 65 steps on Control Bank C.

Explain the actions are required.

Expected Answer:

Since the 8-fold Bank position (65 CBC) gives an ECC Bank position of 95 steps on CBC that is below the -750 admin limit, all Control Bank rods must be fully inserted (until the SE Dept Nuclear Group documents an evaluation).

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 015000K505 4.1/4.5

Reference(s): 1BGP 100-7T3, Rev. 8, Section C, pages 12-13.

BCB-1, Figure 9, Rev. 17, ECP BOL, page 1.

II-GP-XL-02, BGP 100-2 Plant Startup, Rev. 21, LO 5,6.

JPM Questions

Question No: 2 **Reference Use:** YES

During a reactor startup with Shutdown Banks withdrawn, the following counts are noted for N31 Source Range Channel (Two Phi Meter). At 1000 hours, the operator places the Two Phi Meter TEST switch from TEST position to NORMAL with an initial count of 3 cps read at 1000 hours:

1001 - 3	1011 - 5	1021 - 9
1002 - 3	1012 - 5	1022 - 9
1003 - 4	1013 - 6	1023 - 8
1004 - 5	1014 - 5	1024 - 8
1005 - 5	1015 - 7	1025 - 7
1006 - 5	1016 - 7	1026 - 9
1007 - 4	1017 - 5	1027 - 9
1008 - 5	1018 - 7	1028 - 10
1009 - 4	1019 - 8	1029 - 12
1010 - 4	1020 - 7	1030 - 11

What indication would the operator expect in the control room? Include all actions that may occur, when they should occur, and why or why not they will occur?

Expected Answer:

At 1019, the annunciator 1-01-E3 BDPS FLUX DOUBLED should alarm. No other actuation should occur if the operator has manually BLOCKED both trains of BDPS. If NOT BLOCKED, the annunciator 1-10-E5 BDPS ACTUATED CHG SUCT SWITCHOVER will have alarmed. Position indications for 1CV112D & E would change from CLOSED (green) to OPEN (red), and 1CV112B & C would change from OPEN (red) to CLOSE (green).

Note: Follow up, if necessary, if applicant only gives answer related to BDPS manually blocked, ask what if BDPS was NOT blocked.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 015000A102 3.5/3.6

Reference(s): 1BGP 100-2 PLANT STARTUP, Step F.13, page 12
BAR 1-10-E3 BDPS FLUX DOUBLED, Rev. 51.
Chp 31, Source Range Nuclear Instrumentation, Rev. 1, II.C.2, pages 46-48.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use: YES**

A reactor startup is underway following a shutdown one day after the initial criticality for Cycle 9 on Unit 1. The estimated Critical Rod Position is 150 steps on Control Bank D. The upper administrative limit is 228 steps on Control Bank D, the lower administrative limit is 45 steps on Control Bank D and the -750 pcm limit is 118 steps on Control Bank C.

With the Shutdown Banks withdrawn, Source Range N32 reads 18 cps. When Source Range N32 reads 144 counts, the rods are at 65 steps on Control Bank C.

Explain the actions are required.

Question No: 2 **Reference Use: YES**

During a reactor startup with Shutdown Banks withdrawn, the following counts are noted for N31 Source Range Channel (Two Phi Meter). At 1000 hours, the operator places the Two Phi Meter TEST switch from TEST position to NORMAL with an initial count of 3 cps read at 1000 hours:

1001 - 3	1011 - 5	1021 - 9
1002 - 3	1012 - 5	1022 - 9
1003 - 4	1013 - 6	1023 - 8
1004 - 5	1014 - 5	1024 - 8
1005 - 5	1015 - 7	1025 - 7
1006 - 5	1016 - 7	1026 - 9
1007 - 4	1017 - 5	1027 - 9
1008 - 5	1018 - 7	1028 - 10
1009 - 4	1019 - 8	1029 - 12
1010 - 4	1020 - 7	1030 - 11

What indication would the operator expect in the control room? Include all actions that may occur, when they should occur, and why or why not they will occur?

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit 1 NSO.
2. Unit 1 is in Mode 1.

INITIATING CUES:

You have been directed to perform 1BOS 1.3.1.2-1, Unit One Moveable Control Assemblies Quarterly Surveillance for Control Bank B following maintenance to power cabinet.

JOB PERFORMANCE MEASURE Rev. 5, 4/29/94

TASK TITLE: Perform Moveable Control Assemblies Quarterly Surveillance JPM No.: JPM-2

TPO No: IV.C.QG-04 K&A No.: 001000A403 K&A IMP. 4.0/3.7

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED__________ this JPM TIME STARTED: _________

FAILED __________ TIME FINISHED: _________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

1BOS 1.3.1.2-1, Unit One Moveable Control Assemblies Quarterly Surveillance.

GENERAL REFERENCES:

1. Technical Specification 3/4.1.3 Moveable Control Assemblies
2. 1BOS 1.3.1.2-1 Unit One Moveable Control Assemblies Quarterly Surveillance

TASK STANDARDS:

1. Uses the specified Rod Control system mode to perform 1BOS 1.3.1.2-1 while maintaining the following:
   a. ΔI within limits.
   b. T_{ave} changes to within -4°F and +1°F.
2. Monitors the Automatic mode of operation following completion of the surveillance to ensure correct operation.

TASK CONDITIONS:

1. You are the Unit 1 NSO.
2. Unit 1 is in Mode 1.

INITIATING CUES:

You have been directed to perform 1BOS 1.3.1.2-1, Unit One Moveable Control Assemblies Quarterly Surveillance for Control Bank B following maintenance to power cabinet.

CRITICAL ELEMENTS: (*) 2,4,5,8,11

APPROXIMATE COMPLETION TIME: 13 Minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
RECORD START TIME ________				

> **NOTE**
>
> If this JPM is given on the simulator, only the cues <u>underlined</u> are required to be given to the Trainee.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
1. Verify all applicable prerequisites are met. **CUE:** •***<u>Cover sheet is signed and dated by SM.</u>*** •***<u>There are no blown fuses in the RD Power Cabinets</u>***	•Verify Data Package Cover sheet is signed and dated by the SM. •All RD Power Cabinets have been inspected for blown fuses.	❑	❑	❑
*2. Transfer Rod Control to MANUAL. **Cue:** • ***Rod Bank Selector Switch is in MANUAL.*** ° ***T_{ave} is MATCHED with T_{ref}.***	•Place Rod Bank Selector Switch to MANUAL position. ° Verify T_{ave} is matched with T_{ref}.	❑	❑	❑
3. RECORD Initial step counter readings. **CUE:** ***CBB indicates 228 steps.***	RECORD Initial step counter readings for Control Bank B in column 3a of surveillance.	❑	❑	❑
*4. SELECT Control Bank B. **CUE:** ***Rod Bank Selector Switch is in the CBB Position.***	SELECT CBB Position on Rod Bank Selector Switch.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*5. INSERT Control Bank B. CUE: ***Control Bank B Group Step Counters indicate 213-218 steps.***	INSERT Control Bank B 10 to 15 steps.	❑	❑	❑
6. RECORD Control Bank B Position. CUE: ***Control Bank B Group Step Counters indicate 213-218 steps.***	RECORD Control Bank B Position in column 3d of surveillance.	❑	❑	❑
7. VERIFY proper DRPI Indication. CUE: ***DRPI indicates 210-216 for Control Bank B.***	VERIFY proper rod movement by DRPI Indication and signify by initialing in the space provided in column 3e of the surveillance.	❑	❑	❑
*8. WITHDRAW Control Bank B. CUE: ***Control Bank B Group Step Counters indicate 228 steps.***	Position Control Bank B to ORIGINAL controlling position.	❑	❑	❑
9. RECORD Control Bank B Position. CUE: ***Control Bank B Group Step Counters indicate 228 steps.***	RECORD Control Bank B Position in column 3g of surveillance.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
10. VERIFY DRPI and Step Counters. **CUE:** ***DRPI and Step Counters indicate 228 steps for CBB.***	VERIFY proper DRPI and Group Step Counters showing Control Bank B is restored to original position and signify by initialing in column 3h.	❑	❑	❑
*11. Restore Rod Control to Automatic **CUE: •Low Power Interlock C-5 is NOT LIT and has been independently verified.** **•Tave/Tref Deviation is ≤1°F and has been independently verified.** **•Rod Bank Selector Switch is in AUTO position and has been independently verified.**	VERIFY: •Low Power Interlock C-5 is NOT LIT. •T_{ave}/T_{ref} Deviation ≤ 1°F •PLACE Rod Bank Selector Switch in AUTO Position	❑	❑	❑
12. Notify Chemistry Department. **CUE:** ***Chemistry Department has been notified.***	Notify Chemistry Department of Rod Movement.	❑	❑	❑

Cue: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** YES

Given the following conditions:

- 12 hours ago, the reactor tripped from 100% power.
- All control rods were fully withdrawn at the time of the trip.
- Safety Injection was NOT actuated.
- The reactor trip breakers have been reclosed.
- Rod control was reset by manually resetting all control board group step counters to zero individually.
- The Rod Cont Startup Switch was **NOT** positioned to the Starup position.

How will the control rods in the CONTROL BANKS respond if the operator attempts rod movement?

Expected Answer:

Rods will fail to move regardless of the mode selected (MANUAL or BANK SELECT) because an urgent failure alarm is received.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 001000K402 3.8/3.8

Reference(s): Chapter 28: Rod Control System, Rev. 1; LO 12,17; II.A,4,b, pg 30, II.A.9.e, pg 50.
RD-7, Rod Drive Notes, Rev. 2, Start-Up Reset,

JPM Questions

Question No: 2 **Reference Use:** YES/~~NO~~

Given the following conditions for Unit 2:

- Startup is underway following refueling (Cycle 7)
- Reactor power is stable at 75%
- Tavg is on program
- RCS boron concentration is 1375 ppm
- All Pre-conditioning limits have been met.

What are the restrictions on control rod position?

SRO Only: And what actions are required per ITS for control rods being below this restriction?

Expected Answer:

For minimum rod position (RIL) control bank D must be maintained greater than 104 (± 2) steps.

SRO Only: IAW ITS 3.1.~~1~~6 HP, a boration must be commenced within 1 hour and the controd rods must be > the RIL within 2 hours.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat ____ **Unsat** _____.

K/A: 001000A302 3.7/3.6

Reference(s):

RPI Lesson Text, LO-PSC-8b, Rev 2 Sec. 2; LO 4.

Byron Units 1 & 2 ITS, 3.1.3 MTC, page 3.1-4

BCB-2, Figure 18, Rev. 0

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** **YES**

Given the following conditions:

- 12 hours ago, the reactor tripped from 100% power.
- All control rods were fully withdrawn at the time of the trip.
- Safety Injection was NOT actuated.
- The reactor trip breakers have been reclosed.
- Rod control was reset by manually resetting all control board group step counters to zero individually.
- The Rod Cont Startup Switch was **NOT** positioned to the Starup position.

How will the control rods in the CONTROL BANKS respond if the operator attempts rod movement?

Question No: 2 **Reference Use:** **YES**

Given the following conditions for Unit 2:

- Startup is underway following refueling (Cycle 7)
- Reactor power is stable at 75%
- Tavg is on program
- RCS boron concentration is 1375 ppm
- All Pre-conditioning limits have been met.

What are the restrictions on control rod position?

SRO Only: And what actions are required per ITS for control rods being below this restriction?

EXHIBIT A
Page 1 of 1

PREDEFINE DATA PACKAGE COVER SHEET

Procedure # 1BOS 1.3.1.2-1 Unit: 1 PM ID: ______
Title Movable Control Assemblies Quarterly Surveillance

PREDEFINE INFORMATION: Work Request #: ______
Due Date: ______ Critical Date: ______
Tech Spec: NO ___ YES X
COMPLETE or PARTIAL Performance
(CIRCLE ONE) if PARTIAL, record step(s) performed in comments

SIGNATURE AUTHORIZATION/APPROVALS

Opposite Train Operable	YES NO N/A		
Authorization to Start Work	Scott C. Frein	:now	today
Work Started By		:	
Work Completed By		:	
Surveillance Found Within Acceptance Criteria	YES NO		
Surveillance Left Within Acceptance Criteria	YES NO		
Supv Review of Work Complete		:	
	Signature	Time	Date

COMMENTS

Perform on Control Bank B only.

REVIEW OF RESULTS

Title	Signature	Date

MOVEABLE CONTROL ASSEMBLIES QUARTERLY SURVEILLANCE

A. STATEMENT OF APPLICABILITY:

This procedure applies to the verification of control assembly operability in Modes 1 and 2.

B. REFERENCES:

1. Technical Specifications:
   a. 4.1.3.1.2
2. Station Procedures:
   a. 1BOS 1.3.1-1a, LCOAR - Moveable Control Assemblies Group Height.
   b. BCP 210-20, Silver Determination in an RCS Crud Sample.
3. NTS/Commitments:
   a. 454-200-97-SCAQ00021-12

C. PREREQUISITES:

1. Receive permission from the Shift Manager or designated SRO licensed assistant prior to performing this surveillance by having the Data Package Cover Sheet signed and dated.
2. A visual inspection inside of all 5 RD power cabinets indicates that no blown fuse indicators are tripped.

D. PRECAUTIONS:

1. Before transferring to automatic control, ensure permissive C-5 is extinguished.
2. Avoid variations in plant load, reactor coolant temperature, and boron concentration.
3. During the surveillance, reactor coolant average temperature changes greater than -4°F or +1°F shall be compensated for by moving rods intermittently to match TAVE and TREF.

D. continued

4. Maintain ΔI within prescribed limits.

5. Before transferring to automatic reactor control, manually adjust Tavg to within ± 1°F of the reference temperature to avoid a transient following the transfer.

E. <u>LIMITATIONS AND ACTIONS:</u>

1. As stated in Technical Specifications Limiting Condition for Operation 3.1.3.1.

2. In the event the Acceptance Criteria is not met during the performance of this surveillance, IMMEDIATELY notify the Shift Manager to initiate LCOAR 1BOS 1.3.1-1a, LCOAR - Moveable Control Assemblies Group Height.

* 3. During execution of step F.4.k, any control rod motion with the BANK SELECT switch in AUTO or MAN may result in improperly sequenced control rod movement. Necessary control rod motion must be made using individual bank select, and automatic control bank overlap will not be available. Do not insert Control Bank D lower than the overlap engage point.

*, 3.a

F. <u>MAIN BODY:</u>

NOTE
Initial each step in the space provided adjacent to the main body step number <u>AFTER</u> the step has been <u>SUCCESSFULLY</u> completed. Persons performing independent verification should initial in the space provided after the step.

_____ 1. TRANSFER/VERIFY rod control to manual.

a. PLACE/VERIFY bank selector switch to MANUAL position.

b. Utilizing the Rod Motion Control switch MAINTAIN TAVE matched with TREF.

F. continued

N/A 2. Shutdown banks

a. ENTER in column 2a. the initial group 1 and group 2 step counter readings for Shutdown Banks A, B, C, D, and E. (Note - There are no group 2 Step Counter Readings for S/D Banks C, D & E)

b. SELECT Shutdown Bank E by placing bank select switch in SBE position.

c. Utilizing the rod motion control switch, INSERT Shutdown Bank E 10-15 steps.

d. RECORD in column 2d group 1 and group 2 step counter readings.

e. VERIFY, utilizing DRPI, that each rod in Shutdown Bank E moved 10-15 steps and signify this by initialing in space provided in column 2e.

f. Utilizing the rod motion control switch, WITHDRAW Shutdown Bank E to 228 steps.

g. RECORD in column 2g final group 1 and group 2 step counter readings.

h. VERIFY, utilizing DRPI, that all rods in Shutdown Bank E are at 228 steps and signify this by initialing in space provided in column 2h.

F.2. continued

i. REPEAT steps 2b through 2h for Shutdown Banks D, C, B, A.

Shutdown Rod Bank 2.	2a. Initial Step Counter Reading		2d. Step Counter Readings After Insertion		2e. Each rod In Bank Moved 10-15 Steps	2g. Final Step Counter Readings		2h. All Rods In Bank At 228 Steps
	Group 1	Group 2	Group 1	Group 2		Group 1	Group 2	
Shutdown Bank A					¢ A			
Shutdown Bank B				N	¢			
Shutdown Bank C		N/A		N/A	¢		N/A	
Shutdown Bank D		N/A		N/A	¢		N/A	
Shutdown Bank E		N/A		N/A	¢		N/A	

_____ 3. Control Banks

a. ENTER in column 3a the initial group 1 and group 2 step counter readings for Control Banks A, B, C, and D.

> **NOTE**
> If the bank is fully inserted, record the group 1 and group 2 step counter readings, mark all other columns on Data Sheet N/A and do not proceed with surveillance for that bank.

b. SELECT Control Bank A by placing bank select switch in CBA position.

> **NOTE**
> Control Banks may be moved 10-15 steps in or out at the discretion of the Shift Manager or designated SRO licensed assistant to meet the requirements of this surveillance. Monitor Reactor Power and Tave closely and correct as necessary to minimize plant transients.

c. Utilizing the rod motion control switch, MOVE Control Bank A 10-15 steps.

d. RECORD in column 3d, group 1 and group 2 step counter readings.

F.3. continued

e. VERIFY, utilizing DRPI, that each rod in Control Bank A moved 10-15 steps and signify this by initialing in space provided in column 3e.

f. Utilizing the rod motion control switch, POSITION Control Bank A to original controlling position.

g. RECORD in column 3g final group 1 and group 2 step counter readings.

h. VERIFY, utilizing DRPI and group step counters, that all rods in Control Bank A are RESTORED to their original position and signify this by initialing in space provided in column 3h.

i. REPEAT steps 3b through 3h for Control Banks B, C, and D.

Control Rod Bank 3.	3a. Initial Step Counter Reading		3d. Step Counter Readings After Movement		3e. Each Rod In Bank Moved 10-15 Steps	3g. Final Step Counter Readings		3h. All Rods At Original Position
	Group 1	Group 2	Group 1	Group 2		Group 1	Group 2	
Control Bank A	N/A	N/A	N/A	N/A	¢ N/A	N/A	N/A	N/A
Control Bank B					¢			
Control Bank C	N/A	N/A	N/A	N/A	¢ N/A	N/A	N/A	N/A
Control Bank D	N/A	N/A	N/A	N/A	¢ N/A	N/A	N/A	N/A

F. continued

> **NOTE**
> Prior to performing P/A Converter and Bank Overlap Unit checks, ensure both CFD group 1 and group 2 demand step counters indicate the same number of steps withdrawn (even bank).

> **NOTE**
> During the performance of P/A Converter and Bank Overlap Unit checks, the CBD position will need to be maintained until the completion of these checks.

_____ 4. VERIFY P/A Converter and Bank Overlap Alignment.

_____ a. OBTAIN key 5061 or 5062 or equivalent for the Rod Drive Logic Cabinet 1RD07J.

_____ b. OBTAIN key 5071 or 5072 or equivalent for the Rod Drive P/A Converter Cabinet 1RD08J.

_____ c. RECORD CBD Bank Height Position from 1PM05J Demand Step Counters.

_____ steps N/A

_____ d. ACCESS the Rod Drive P/A Converter in 1RD08J.

_____ e. RECORD the following RCCA Bank Heights by rotating the Control Bank Select Switch in 1RD08J.

CBA _____ steps
CBB _____ steps
CBC _____ steps
CBD _____ steps

_____ f. COMPARE the values obtained from step F.4.e to those expected and step F.4.c. Adjust the P/A Converter as necessary or contact SED.

INDEPENDENT VERIFICATION __________ ________

F.4. continued

_____ g. RESTORE the P/A Converter Control Bank Select Switch in 1RD08J to the "Display Off" position.

INDEPENDENT VERIFICATION ____________________

_____ h. SECURE the P/A Converter Cabinet 1RD08J.

_____ i. ACCESS the Rod Drive Logic Cabinet 1RD07J.

* _____ j. RECORD the "As Found" thumbwheel switch settings from the Bank Overlap Panel within the Logic Cabinet 1RD07J.

S1 _________ S2 _________ S3 _________

S4 _________ S5 _________ S6 _________

*, 3.a

N/A

> **NOTE**
> Avoid control rod motion during execution of step F.4.k. If control rod motion is necessary, then invoke Limitations and Actions E.3.

* _____ k. EXERCISE the switch contacts for S1 through S6 by rotating each thumbwheel through approximately three revolutions.

*, 3.a

* _____ l. VERIFY/RETURN the following to the "As Found" condition.

S1 _________ S2 _________ S3 _________

S4 _________ S5 _________ S6 _________

INDEPENDENT VERIFICATION ____________________

*, 3.a

_____ m. RECORD the Bank Overlap Counter Display value on the Bank Overlap Panel within the Logic Cabinet 1RD07J.

Bank Overlap Display _________

F.4. continued

_____ n. CALCULATE the expected Bank Overlap Display value by adding the S5 Setting with the current CBD position.

____________ +	____________ =	____________
S5 Setting (F.4 j)	CBD Height (F.4.c)	Expected Display

N A

_____ o. COMPARE the values obtained from step F.4.n to those recorded in step F.4.m. Adjust the Bank Overlap Counter as necessary or contact SED.

INDEPENDENT VERIFICATION ____________________

_____ p. SECURE the Rod Drive Logic Cabinet 1RD07J.

_____ 5. RESTORE rod control to automatic if plant condition allows.

_____ a. VERIFY Low Power Interlock C-5 NOT LIT.

INDEPENDENT VERIFICATION ____________________

_____ b. VERIFY TAVE-TREF deviation $\leq$ 1°F.

INDEPENDENT VERIFICATION ____________________

_____ c. PLACE bank selector switch in AUTO.

INDEPENDENT VERIFICATION ____________________

_____ 6. Notify Chemistry Department of rod movement to determine if RCCA cladding defect sampling should be obtained per BCP 210-20, Silver Determination in an RCS Crud Sample.

G. ACCEPTANCE CRITERIA:

1. Each rod not fully inserted in the core shall be determined OPERABLE at least once each 92 days by movement of at least 10 steps in any one direction.

(Final)

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit NSO.
2. A LOCA has occurred.
3. BEP ES-1.2 is in progress.

INITIATING CUES:

1. The US directs you to depressurize the RCS starting at BEP ES-1.2 Step 9.

NOTES FOR SETUP:

Desired conditions:

1. Break flow equal to injection flow with at least TWO CV pumps running in HHSI alignment.
2. MSIVs open (either block Steamline SI, or reset if actuated, and open MSIVs)
3. RCS pressure between 1000 psig and 1450 psig
4. CNMT pressure is expected to be ADVERSE and should indicate that at some point 20 psig was exceeded
5. Pzr level about 40% but less than 50%
6. All RCPs stopped
7. SI reset, Phase A reset and air restored to CNMT, Phase B reset (if actuated)
8. Insert malfunctions TH11A and TH11B to 0 value to prevent operation of PZR Porvs.
9. Open CV8105 and CV8106.

The Pressurizer spray valves (and controllers, if required) are to be failed closed. The major steps of BEP-1 are complete through STEP 12. The steps of BEP ES-1.2 are complete through STEP 7. A cooldown should be set up as appropriate (20°F/hr to 50°F/hr). 1BEP ES-1.2 steps 9 & 10 are the evaluated actions for the JPM.

JOB PERFORMANCE MEASURE

TASK TITLE: Depressurize the RCS per ES-1.2 Post-LOCA Cooldown and Depressurization   JPM No.: JPM-3

TPO No: K&A No.: 00WE03A202   K&A IMP. 3.5/4.1

TRAINEE:________________________________   DATE: ___/___/___

The Trainee: PASSED_________ this JPM   TIME STARTED: ________

FAILED __________   TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

1BEP ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION

TASK STANDARDS:

Depressurize the RCS per ES-1.2 Post-LOCA Cooldown and Depressurization

TASK CONDITIONS:

1. You are the Unit NSO.
2. A LOCA has occurred.
3. BEP ES-1.2 is in progress.

INITIATING CUES:

1. The US directs you to depressurize the RCS starting at BEP ES-1.2 Step 9.

CRITICAL ELEMENTS: (*)

2, 5 and 6

APPROXIMATE COMPLETION TIME: 10 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A

RECORD START TIME ________

> **NOTE**
>
> **If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee.**

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
1. Refer to ES-1.2, Post LOCA Cooldown And Depressurization **Note: This step may be performed at any time.** **If asked: *All Prerequisites have been met.***	Locate and open ES-1.2, Post LOCA Cooldown And Depressurization	❑	❑	❑
*2. DEENERGIZE PZR HEATERS **Cue: Heaters are OFF.**	DEENERGIZE PZR HEATERS: a. Place B/U heater contactors in – OFF • Group 1A • Group 1B • Group 1D	❑	❑	❑
Cue: Switch is in AFTER TRIP.	Place variable heater control switch in – AFTER TRIP: Group 1C	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
Observes CAUTION	CAUTION Voiding may occur in the RCS during RCS depressurization. This will result in a rapidly increasing PZR level.	❑	❑	❑
3. Depressurize RCS to Refill PZR ***NOTE: RCPs are OFF normal spray not available***	a. Use normal PZR spray: • 1RY455B • 1RY455C	❑	❑	❑
4. Depressurize RCS using PZR PORV's **Cue*: 1RY455A and/or 1RY456 are closed.***	Step 10 RNO a. use one PZR PORV: o 1RY455A o 1RY456	❑	❑	❑
* 5. Depressurize RCS using Aux Spray **Cue*: 1CV8145 is open. 1CV8146 & 1CV8147 are closed.***	Step 10 RNO: • Open PZR Aux Spray Valve 1CV8145 • Verify/Close • 1CV8146 • 1CV8147	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*6. Stop depressurization **Cue: <u>Containment pressure is 20 psig</u>** **Cue: <u>PZR level is 51%</u>**	When Pzr level – GREATER THAN 21% (**50%** FOR ADVERSE CNMT) • Stop RCS Depressurization by closing Aux Spray Valve, 1Cv8145	❑	❑	❑

CUE: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** YES

Following operation of the Pressurizer PORV(s), the crew is preparing to drain the PRT. RCDT Drain pump RE01PB is out of service for motor replacement. If all systems are in normal alignment with RCDT level at 65%, what will occur when 1AOV-RY8031, PRT Drn Isol Vlv, is opened and why?

Expected Answer:

(RCDT Drain Pump RE01PA (50 gpm) will be running.) PRT volume will be pumped to the (Recycle) Hold Up Tanks due to the already running of the RCDT Drain Pump RE01PA (50 gpm).

Actual Answer:

____

____

____

____

____

____

____

____

☐ Candidate's response matched expected answer.

Sat _____ Unsat _____.

K/A: 002000K105 3.2/3.4

Reference(s): BOP RY-4, DRAINING THE PRESSURIZER RELIEF TANK, Rev. 2.

RY-4 PRT & RCDT, Rev. 2, Simplified MCR Circuit for RCDT Pumps.

Chp 14, Pressurizer (RY), Rev. 3, II.C.4, Page 64, LO 17.

JPM Questions

Question No: 2 **Reference Use:** NO

A Pressurizer Safety Relief valve has lifted. All ECCS components started and aligned as designed. RWST level is 84% and decreasing very slowly. RCS pressure has fallen to 1400 psig.

Describe how the pump cooling flowpaths change for the Centrifugal Charging and Safety Injection Pumps if the Pzr Safety Relief valve closes and pressurizer pressure returns to NOP?

Expected Answer:

CV: Initially flow from the pump discharge into the RCS provides the cooling. When pressure reaches approximately 1650 psig, the CV miniflow valves will reopen providing an additional flowpath to the seal return line.

SI: Initially flow from the pump discharge into the RCS and recirculation to the RWST provides pump cooling. At approximately 1700 psig, all flow will be recirculated to the RWST.

Actual Answer:

____

____

____

____

____

____

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 000008AA213 RO/SRO 3.8/3.9

Reference(s): BAR 1-9-E1, Rev. 0

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** YES

Following operation of the Pressurizer PORV(s), the crew is preparing to drain the PRT. RCDT Drain pump RE01PB is out of service for motor replacement. If all systems are in normal alignment with RCDT level at 65%, what will occur when 1AOV-RY8031, PRT Drn Isol Vlv, is opened and why?

Question No: 2 **Reference Use:** NO

A Pressurizer Safety Relief valve has lifted. All ECCS components started and aligned as designed. RWST level is 84% and decreasing very slowly. RCS pressure has fallen to 1400 psig.

Describe how the pump cooling flowpaths change for the Centrifugal Charging and Safety Injection Pumps if the Pzr Safety Relief valve closes and pressurizer pressure returns to NOP?

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit NSO.
2. A LOCA has occurred.
3. 1BEP-0 is in progress.

INITIATING CUES:

1. The US directs you to continue 1BEP-0 at step 14.

NOTES FOR SETUP:

Desired conditions:

1. Break flow equal to injection flow with at least TWO CV pumps running in HHSI alignment.
2. MSIVs open (either block Steamline SI, or reset if actuated, and open MSIVs)
3. RCS pressure between 1000 psig and 1450 psig
4. CNMT pressure is expected to be ADVERSE and should indicate that at some point 20 psig was exceeded
5. Pzr level about 40% but less than 50%
6. All RCPs stopped

CNMT Spray actuation failed, CS007 valves closed (NOT failed), CS019 valves closed (NOT failed), One CS pump running, if possible. The evaluated actions are those of ATTACHMENT B of BEP-0. Would like to have one CS pump running with associated CS007 valve closed. The other pump can be NOT running. This forces the RNO actions of step 1.b. CS019 valves should be close (if this does not affect CS pump in step 1.b). One CS pump is restarted per step 1.b, if possible, and the other (or both) is started in step 2.a.

Valve slaves for 1A CS pump – RF RP37 OUT

Valve slaves for 1B CS pump – RF RP63 OUT

Malfunction CS01B for 1B CS Pump

JOB PERFORMANCE MEASURE

TASK TITLE: Manual CS Actuation JPM No.: JPM-4

TPO No: K&A No.: 007000K301 K&A IMP. 4.0/4.6

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED_________ this JPM TIME STARTED: ________

FAILED __________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

1BEP, E-0, Reactor Trip or Safety Injection

TASK STANDARDS:

Manually Actuate Containment Spray

TASK CONDITIONS:

1. You are the Unit NSO.
2. A LOCA has occurred.
3. 1BEP-0 is in progress.

INITIATING CUES:

1. The US directs you to continue 1BEP-0 at step 14.

CRITICAL ELEMENTS: (*)

6, 7, 8 and 9 [ADD step 5 - had to open CS007 A&B]
[ADD step 12 - A Required RNO action due to CS019B closed]

APPROXIMATE COMPLETION TIME: 7 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A

RECORD START TIME _______

> **NOTE**
>
> **If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee.**

1. Refer to BEP-0, Reactor Trip or Safety Injection **Note: This step may be performed at any time.** **If asked: *All Prerequisites have been met.***	Locate and open BEP-0, Reactor Trip or Safety Injection	❑	❑	❑
2. Check Containment Spray required. **Cue: Cnmt pressure indicates >20 psig.**	CHECK IF CONTAINMENT SPRAY IS REQUIRED: a. Cnmt pressure (1PR-937 or 1PI-CS934 thru 1PI-937) – HAS INCREASED TO GREATER THAN 20 PSIG	❑	❑	❑
3. Check Group 6 monitor lights **Cue: Lights are NOT LIT.**	Group 6 CS momitor lights – LIT	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
4. Perform RNO **Cue:** ***Group 6 monitor lights remain NOT LIT.***	RNO for Step 14.b. Manually actuate CS and Phase B Isolation. <u>IF</u> group 6 CS monitor lights are <u>NOT</u> LIT, <u>THEN</u> GO to ATTACHMENT B, Step 1 (page 39).	☐	☐	☐
* 5. Perform Att. B – Check CS Valve alignment **Cue: Valves are OPEN.**	<u>CHECK CS VALVE ALIGNMENT:</u> a. CS pump RWST suction valves – <u>OPEN:</u> • 1CS001A • 1CS001B	☐	☐	☐
(* **Cue*:** ***Valve 1CS007A and B are CLOSED.***)	b. CS pump header isolation valves – <u>OPEN</u> • 1CS007A • 1CS007B	☐	☐	☐

Instructor Note:

If 1B pump is aligned first, Go To Step 10

*6. Perform RNO for CS007A **Cue: "A" pump is running.** **Pump switch is in PULL OUT.**	RNO for Step 1.b IF the associated CS pump is running, THEN perform the following to open the affected valve: Place 1A CS pump control switch in PULL OUT.	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*7. Continue with Step 1.b. RNO **Cue: Switch is in NORMAL**	Continue with Step 1.b. RNO Verify associated 1A CS pump test switch is in NORMAL	❑	❑	❑
*8. Continue with Step 1.b. RNO **Cue: Valve 1CS007A is OPEN**	Continue with Step 1.b. RNO Manually open valve 1CS007A after the 30 second time delay.	❑	❑	❑
*9. Continue with Step 1.b. RNO **Cue: Pump is now running**	Continue with Step 1.b. RNO Restart CS pump.	❑	❑	❑
10. Continue with Step 1.b. RNO **Cue: 1CS007B is OPEN**	Continue with Step 1.b. RNO Open 1CS007B	❑	❑	❑
11. Continue with Step 1.c. **Cue: 1CS019B is CLOSED**	Continue with Step 1.c. CS eductor spray additive valves – <u>OPEN:</u> • 1CS019A • 1CS019B	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*12. Perform RNO for 1CS019B **Cue:** **1) Switch is in TEST** **2) Valve is OPEN** **3) Switch is in NORMAL**	RNO for 1CS019B Perform the following for the affected train: 1) Place 1B CS pump test switch in TEST 2) Manually open valve 1CS019B 3) Place 1B CS pump Test switch in NORMAL	☐	☐	☐
13. Continue with step 1 d. **Cue:** ***Valves are OPEN***	Continue with step 1 d. CS eductor inlet flow control valves – <u>OPEN:</u> • 1CS010A • 1CS010B	☐	☐	☐
14. Check CS pumps **Cue: "B" pump us NOT running**	<u>CHECK CS PUMPS RUNNING:</u> CS pumps – BOTH NOT RUNNING	☐	☐	☐
15. Performs RNO	RNO for Step 2 (NOTE: Does NOT attempt local start of 1B CS Pump since 1A pump is running) Return to main body Step 14.c.	☐	☐	☐

CUE: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **SRO ONLY** **Reference Use:YES (No Horse Notes)**

Unit 1 is at 100% power with the following containment spray system conditions have just been reported:

- Spray Additive Tank NaOH Concentration - 31%
- Spray Additive Tank Level - 78%

1A CS pump has been out of service for 91 hours for breaker repair. What is the maximum power level/mode that Unit 1 is allowed to be at, per ITS, 40 hours from now and why?

Expected Answer:

100% power/Mode 1. The action for the OOS pump is 7 days to repir before shutdown actions are directed. The LCO for the additive system is also 7 days. (The additive system being out does not render both trains inoperable)

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: SYS026 2.1.12 2.9/4.0

Reference(s): ITS 3.6.6 - Containment Spray and Cooling Systems, page 3.6-16

ITS 3.6.7 - Spray Additive System, page 3.6-19

JPM Questions

Question No: 1 **RO ONLY** **Reference Use:YES (No Horse Notes)**

Immediately following a CS actuation due to a steam line break inside containment, the NSO, while verifying proper CS flow, notes a higher eductor flow rate on train B than on train A. Approximately TEN (10) minutes after the accident, the operator then notes that eductor flows on both trains have increased. Explain why Train B has more flow and why eductor flow increased during the event.

Expected Answer:

Because train B has more spray nozzles in its respective ring headers than does train A, train B delivers more total pump flow (253 vs. 219 nozzles). As containment pressure is reduced through the operation of the CS system, the back pressure as felt by the pumps is decreased and overall pump flow increases. Therfor, eductor flow will increase.

Actual Answer:

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☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 026000A401 4.5/4.3

Reference(s): CS-1 Containment Spray, Rev. 3, Diagram.

____

JPM Questions

Question No: 2 **Reference Use:** YES

Given the fc.lowing conditions:

- Unit 1 is at 100% power.
- Testing of the Containment Spray Pump 1B is initiated.
- The pump failed to start when the control switch was place in the CLOSE position.
- PP 1B TEST switch is in the TEST position.

Using the electrical prints, show what conditions could have prevented the pump from starting if the electrical protection for the motor was found to be normal?

Expected Answer:

1. 1CS007B, Containment Spray Isolation valve, is OPEN (NOT CLOSED).
2. 1CS040B, U-1 CS Add Tk 1B Outlet Dwst Isol Vlv, is OPEN (NOT CLOSED).
3. 1SI001B, CS Pp 1B Dsch to RWST Test Line Isol Vlv, is CLOSED (NOT OPEN).

Actual Answer:

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☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 026000A401 4.5/4.3

Reference(s): 06-E-1-4030CS01/2

BOP CS-5, CONTAINMENT SPRAY SYSTEM RECIRCULATION TO THE RWST, Rev. 5.

Chp 59, Containment Spray System, Rev. 2, II.F.1, page 54, LO 7, 8, 11.c

JPM Questions

Question No: 1 **SRO ONLY** **Reference Use:YES (No Horse Notes)**

Unit 1 is at 100% power with the following containment spray system conditions have just been reported:

- Spray Additive Tank NaOH Concentration - 31%
- Spray Additive Tank Level - 78%

1A CS pump has been out of service for 91 hours for breaker repair. What is the maximum power level/mode that Unit 1 is allowed to be at, per ITS, 40 hours from now and why?

Question No: 2 **Reference Use: YES**

Given the following conditions:

- Unit 1 is at 100% power.
- Testing of the Containment Spray Pump 1B is initiated.
- The pump failed to start when the control switch was place in the CLOSE position.
- PP 1B TEST switch is in the TEST position.

Using the electrical prints, show what conditions could have prevented the pump from starting if the electrical protection for the motor was found to be normal?

OPERATOR QUESTION SHEET

Question No: 1 **RO ONLY** **Reference Use:YES (No Horse Notes)**

Immediately following a CS actuation due to a steam line break inside containment, the NSO, while verifying proper CS flow, notes a higher eductor flow rate on train B than on train A. Approximately TEN (10) minutes after the accident, the operator then notes that eductor flows on both trains have increased. Explain why Train B has more flow and why eductor flow increased during the event.

Question No: 2 **Reference Use: YES**

Given the following conditions:

- Unit 1 is at 100% power.
- Testing of the Containment Spray Pump 1B is initiated.
- The pump failed to start when the control switch was place in the CLOSE position.
- PP 1B TEST switch is in the TEST position.

Using the electrical prints, show what conditions could have prevented the pump from starting if the electrical protection for the motor was found to be normal?

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 1.
3. Normal Letdown is in service at 120 GPM.

INITIATING CUES:

1. You have just been told by the US to establish maximum excess letdown to the RCDT due to a leak in the normal letdown line.
2. The US does not want normal Letdown secured at this time.

JOB PERFORMANCE MEASURE

TASK TITLE: Establish Excess Letdown JPM No.: JPM-5

TPO No: IV.C.CV-07 K&A No.: 004000G013 K&A IMP. 3.6/3.5

TRAINEE:________________________ DATE: ___/___/___

The Trainee: PASSED_________ this JPM TIME STARTED: ________

FAILED __________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

BOP CV-15, Excess Letdown Operations

TASK STANDARDS:

Perform the actions required to place Excess Letdown in service.

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 1.
3. Normal Letdown is in service at 75 GPM.

INITIATING CUES:

1. You have just been told by the US to establish maximum excess letdown to the RCDT due to a leak in the normal letdown line.
2. The US does not want normal Letdown secured at this time.

CRITICAL ELEMENTS: (*)

2, 4, 5, 6, 7

APPROXIMATE COMPLETION TIME: 10 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A

RECORD START TIME ________

> **NOTE**
>
> **If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee.**

1. Refer to BOP CV-15, Excess Letdown Operations.	Locate and open BOP CV-15.	❑	❑	❑
Note: This step may be performed at any time.				
If asked: ***All Prerequisites have been met.***				
*2. Establish Initial Conditions.	Perform the following at 1PM06J:	❑	❑	❑
Cue: • ***_CC9437A Open light is LIT.***	Open: • 1CC9437A			
• ***_CC9437B Open light is LIT.***	• 1CC9437B			
3. Verify throttle valve position.	Perform the following at 1PM05J:	❑	❑	❑
Cue: ***_HCV-CV123 Indicates 0 %.***	◦ Verify/Take to 0% demand on controller for 1CV123 .			

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*4. Align HX outlet flowpath. Cue: • ***_CV8143 is in RCDT position.*** ° (if requested) ***<u>US DOES NOT desire flow directed to VCT spray nozzle.</u> (i.e. _CV8482 & _CV8484 do not require repositioning)***	Perform the following at 1PM05J: • Place 1CV8143 to RCDT position.			
*5. Align Flow Path. Cue: • ***Selected loop drain 1RC8037A/B/C/D Open light is LIT.*** **Note: Only 1 loop drain is required to be opened. (all 4 can be opened)**	Open: • ONE Loop Drain Valve 1RC8037A/B/C or D	❑	❑	❑
*6. Align Heat Exchanger. **Cue:** • ***1CV8153A/B Open light is LIT.*** **Note: To maximize flowrate, the candidate may elect to use both Hx's.**	Open: • 1CV8153A and/or B	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*7. Establish Flow.	Throttle/open 1CV123 to obtain flow.	❑	❑	❑
Cue • ***1HCV-CV123 Position Indicator INDICATES DEMANDED position.***				
• ***1TI-122A INDICATES 140°F.***	• Check excess letdown outlet temperature < 165°F on 1TI-122A, Exc Ltdwn Hx Temp.			

Cue: (If requested)
Seal leakoff flow recorders INDICATE 3 gpm.

CUE: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** YES

Given the following conditions:

Unit 1 is at 100% power
Excess letdown to the VCT is in service with normal letdown isolated.

What effect would a SI signal have on excess letdown system without any operator action? Using prints, show sequence and affects of valve operations with no operator action.

Expected Answer:

The SI signal also generates a Containment Phase A Isolation. On Phase A, CNMT Isolation valves CV8112 and CV8100 close, isolating the excess letdown (and seal return) line. At 150 psig, the relief valve inside CNMT to the PRT will open allowing flow. In the long run, Instrument Air to CNMT Isolation valves close, and without air, control valves in excess letdown line (CV8153A/B and CV123) will fail closed stopping excess letdown flow.

Actual Answer:

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☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 004000A212 4.1/4.3

Reference(s): CV-1 CVCS, Rev. 2

4030 CV Prints

Chp 15a - Chemical and Volume Control System, Rev. 02, II.A.5.f.4), page 57, LO 8.

JPM Questions

Question No: 2 **Reference Use:** NO

With excess letdown in service to the VCT, a reduction in CC flow to the Excess Letdown HX results in a rise in outlet temperature and pressure.

What is the concern associated with the pressure rise?

Expected Answer:

High pressure on the excess letdown line may reduce RCP Seal Leakoff Flows below required values since they share the same return line to the VCT.

Actual Answer:

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☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 004000K104 3.4/3.8

Reference(s): BOP CV-15 EXCESS LETDOWN OPERATIONS, Rev. 5, D.1, page 2.

Chp 15a - Chemical and Volume Control System, Rev. 02, I.C.2, page 10, LO 2.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use: YES**

Given the following conditions:

Unit 1 is at 100% power
Excess letdown to the VCT is in service with normal letdown isolated.

What effect would a SI signal have on excess letdown system without any operator action?

Question No: 2 **Reference Use: NO**

With excess letdown in service to the VCT, a reduction in CC flow to the Excess Letdown HX results in a rise in outlet temperature and pressure.

What is the concern associated with the pressure rise?

JOB PERFORMANCE MEASURE

TASK CONDITIONS:

1. You are the Unit 1 NSO.
2. The Unit is in mode 1.
3. The 1B DG was started and is suppling Bus 142 to perform the 18 month Crosstie Surveillance.

INITIATING CUES:

The Unit Supervisor directs you to synchronize the SAT back to bus 142 to place the 1B DG in parallel to the grid per BOP AP-32.

Simulator Setup:

1. Ensure Voltage and Frequency are set to require an adjustment to 60 hz and 4160 volts.

JOB PERFORMANCE MEASURE Rev. 4, 8/23/93

TASK TITLE: Synchronize a SAT to a Bus being Fed by a DG Following Surveillance.

JPM No.: JPM-6

TPO No: IV.C.DG-04 K&A No.: 064000A203 K&A IMP. 3.1/3.1

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED_________ this JPM TIME STARTED: ________

FAILED _________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

BOP AP-32, Synchronizing a SAT to a Bus being Fed by a DG

TASK STANDARDS:

Perform actions necessary to synchronize a SAT to a Bus being Fed by a DG.

TASK CONDITIONS:

1. You are the Unit 1 NSO.
2. The Unit is in mode 1.
3. The 1B DG was started and is suppling Bus 142 to perform the 18 month Crosstie Surveillance.

INITIATING CUES:

The UNIT SUPERVISOR directs you to synchronize the SAT back to bus 142 to place the 1B DG in parallel to the grid per BOP AP-32.

CRITICAL ELEMENTS: (*)

3, 4, 6, 8, 9

APPROXIMATE COMPLETION TIME: 10 Minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
RECORD START TIME________				

> **NOTE**
>
> If this JPM is given on the simulator, only the cues underlined are required to be gi,en to the Trainee.

1. Refer to BOP AP-32 **Note: This step may be performed at any time**	Locate and Open BOP AP-32	☐	☐	☐
2. Check if DG was started Manually Cue: ***DG was started MANUALLY***	Verify/Check if DG was started Manually	☐	☐	☐
*3. Verify DG operating properly Cue: ***• DG Frequency is 60 Hz*** ***• DG Voltage is 4160 Volts***	Adjust: • DG Frequency-60 Hz • DG Voltage- 4160 V	☐	☐	☐
*4. Turn Synchroscope ON Cue: ***SAT 142 -2 Feed to 4KV Bus 142 SYNC ACB 1422 Switch is ON***	Place SAT 142-2 Feed to 4KV Bus 142 SYNC ACB 1422 Switch in On Position	☐	☐	☐
5. Verify Incoming voltage $\geq$ 114 VAC Cue: ***• DIV 12 Incoming Voltage is 120 Volts***	Verify Incoming Voltage $\geq$114 VAC • DIV 12 Incoming Volts	☐	☐	☐

PERFORMANCE CHECKLIST		STANDARDS	SAT	UNSAT	N/A
*6.	Adjust DG voltage	Adjust DG voltage control so that Running Voltage is slightly higher than Incoming Voltage • DIV 12 Incoming Volts	☐	☐	☐
Cue:	***• DIV 12 Incoming Voltage is 120 Volts*** ***• DIV 12 Running Voltage is 121 Volts***	• DIV 12 Running Volts			
7.	Verify Phase Voltages are Equal	Verify DG Voltage Meter indicates the same voltage, 4160V, when DG Voltmeter Selector Switch is placed in the following positions	☐	☐	☐
Cue:	***DG Voltmeter readings are:*** ***• ØAB-4160V*** ***• ØBC-4160V*** ***• ØCA-4160V***	• ØAB • ØBC • ØCA			
* 8.	Adjust DG Frequency	• DIV 12 Synchroscope Place DG Governor Adjust in RAISE until DIV 12 Synchroscope is Rotating Slowly in the SLOW direction	☐	☐	☐
Cue:	***• DIV 12 Synchroscope is rotating Slowly in the FAST direction*** ***When DG Governor Adjust is placed in RAISE,the DIV12 Synchroscope STOPS then reverses to rotate slowly in the SLOW direction***				
Note:	***If Governor adjusted in LOWER direction, rotation speed will be faster in the FAST direction.***				

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*9. Close ACB 1422	When DIV 12 Synchroscope is within 5 minutes the 12 O-Clock position • Close ACB 1422 • Check ACB 1422 CLOSE light - LIT , ADJUSTED KVARS to < 1000 - Good Practice	❑	❑	❑
Cue: ***ACB 1422 CLOSE Light is LIT***				
10. Turn Synchroscope OFF	Place Synchroscope switch in OFF	❑	❑	❑
Cue: ***Synchoscope is in OFF***				

Cue: ***This completes JPM***

RECORD STOP TIME________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** **YES** (electrical prints only)

What conditions must be met for Bus 143 UAT Feeder Breaker to AUTO close if the control switch ACB 1431 is in the AFTER-TRIP position?

Expected Answer:

1. No lockouts on either UAT or SAT feed to bus
2. OCB 3-4 OR OCB 4-5 must be closed AND MT Disconnect must be closed
3. ACB 1411 (ESF Bus to Non-ESF Bus crosstie) must be OPEN
4. Control switch for ACB 1432 in AFTER-CLOSE position
5. ACB 1432 opens

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 062000K403 2.8/3.1

Reference(s): 4030-AP-041, AP42, AP26, MP24

BOP AP-85

Chp 4, A.C. Electrical Power Distribution System, Rev. 2, II.C.3.b.1).c), page 96, LO 11.e

JPM Questions

Question No: 2 **Reference Use:** YES

The following plant conditions exist:

- Unit 1 is at 100% power
- Normal at power electrical line up
- Diesel Gen 1B Start Switch on the MCB is inadvertantly placed in PTL

If the SAT feeder breaker to bus 142 (breaker 1422) were inadvertantly opened from the control room, what would be the 1B D/G and 1423 breaker response?

Expected Answer:

The 1B DG will start, breaker 1423 would cycle closed and open, then diesel will sart to shutdown and then restart due to the UV and restart cycle.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 064000K4.02 3.9/4.2

Reference(s): 06E-1-4030DG02, DG40

Chp 9, DG & Aux. Systems, Rev. 1, LO 3e, 4.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** **YES** (electrical prints only)

What conditions must be met for Bus 143 UAT Feeder Breaker to AUTO close if the control switch ACB 1431 is in the AFTER-TRIP position?

Question No: 2 **Reference Use:** **YES**

The following plant conditions exist:

- Unit 1 is at 100% power
- Normal at power electrical line up
- Diesel Gen 1B Start Switch on the MCB is inadvertantly placed in PTL

If the SAT feeder breaker to bus 142 (breaker 1422) were inadvertantly opened from the control room, what would be the 1B D/G and 1423 breaker response?

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 5.
3. RCS conditions are 188°F and 360 psig.

INITIATING CUES:

1. Reactor strartup is in progress and BGP 100-1 is being perfromed.
2. At Step F.28 a start of the first Reactor Coolant Pump is directed per BOP RC-1.
3. The US directs you to start the 1D RCP.

NOTES FOR SETUP:

1. *Reset to IC-3*
2. *Secure 1D RCP*
3. *Close 1RY455B*
4. *Operate Heaters as necessary*
5. *Shut 1CV8141D.*

JOB PERFORMANCE MEASURE

TASK TITLE: Start a Reactor Coolant Pump JPM No.: JPM-7

TPO No: K&A No.: 003000G120 K&A IMP. 4.3/4.2

TRAINEE:______________________________ DATE: ___/___/___

The Trainee: PASSED__________ this JPM TIME STARTED: ________

FAILED __________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

BOP RC-1, STARTUP OF A REACTOR COOLANT PUMP

TASK STANDARDS:

Perform the actions required to start a Reactor Coolant Pump.

TASK CONDITIONS:

1. You are the Unit NSO.
2. The Unit is in mode 5.
3. RCS conditions are 188°F and 360 psig.

INITIATING CUES:

1. Reactor startup is in progress and BGP-100-1 is being performed.
2. At step F.28 a start of the first Reactor Coolant Pump is directed per BOP RC-1.
3. The US directs you to start the 1D RCP.

CRITICAL ELEMENTS: (*)

13, 15, 17, 23

APPROXIMATE COMPLETION TIME: 14 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A

RECORD START TIME ________

> **NOTE**
>
> **If this JPM is given on the simulator, only the cues underlined are required to be given to the Trainee.**

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
1. Refer to BOP RC-1, Startup of a Reactor Coolant Pump. **Note: This step may be performed at any time.** **If asked: *All Prerequisites have been met.***	Locate and open BOP RC-1.	❑	❑	❑
2. Dust Cover Removal **Cue: • *Dust Covers are removed.***	VERIFY/REMOVE all dust covers prior to starting any RCPs.	❑	❑	❑
3. Loose Parts Monitoring System **Cue: The LPMS is in operation.**	ENSURE that the Loose Parts Monitoring System is operating.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
4. Verify operable trip coils. **Cue: *<u>Lights are illuminated.</u>***	Verify the Trip Coils are operable for each Reactor Coolant Pump to be started by ensuring the Reactor Coolant Pump under frequency Trip Lights are illuminated. A RCP DS8025 PA11J DS8025 PA12J B RCP DS8027 PA11J DS8027 PA12J C RCP DS8028 PA11J DS8028 PA12J **D RCP DS8026 PA11J DS8026 PA12J**	❑	❑	❑
5. Initiates Trending on the computer **Demonstrates the initiation of trending on the computer.**	VERIFY/INITIATE trending of RCP temperatures on the Unit computer: RCP D: TO472 RCP 4 MTR STATOR WINDING T. TO473 RCP 4 MTR UPPER RADIAL BRG T. TO474 RCP 4 MTR UPPER THRUST BRG T. TO475 RCP 4 MTR LOWER RADIAL BRG T. TO476 RCP 4 MTR LOWER THRUST BRG T. TO477 RCP 4 LOWER SEAL WTR BRG T.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
6. Check VCT pressure. **Cue:** ***VCT Pressure is 33 psig.***	ENSURE VCT pressure is at least 15 psig as indicated on PI-115, VCT Press, at 1PM05J.	☐	☐	☐
7. Check VCT temperature. **Cue:** ***VCT temperature is 115°F.***	ENSURE VCT temperature is less than 135 F as indicated on TI-116, VCT Temp, at 1PM05J.	☐	☐	☐
8. Check VCT Level. **Cue:** ***VCT Level is 43 %.***	ENSURE VCT level is between 37 -73% as indicated on LT-112, VCT Level, at 1PM05J.	☐	☐	☐
9. Check VCT Annunciators **Cue:** ***VCT annunciators are clear.***	ENSURE the following annunciators are cleared: a. VCT LEVEL HIGH LOW (1-9-A2). b. VCT PRESS HIGH LOW (1-9-B2). c. VCT TEMP HIGH (1-9-C2).	☐	☐	☐
10. Check RCP Annunciators **Cue:** ***RCP Annunciators are clear.***	ENSURE the following annunciators for the applicable pump(s) are cleared. a. RCP THERM BARR CC WTR TEMP HIGH (1-7-E3). b. RCP THERM BARR CC WTR FLOW LOW (1-7-A4/B4/C4/**D4**). c. RCP BRNG CC WTR FLOW LOW (1-7-A5/B5/C5/**D5**). d. RCP BRNG CC WTR TEMP HIGH (1-7-E5).	☐	☐	☐

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
11. Check RCP Annunciators **Cue: *RCP Annunciators are clear.***	ENSURE the following annunciators for the applicable pump(s) are cleared. a. RCP LOWER OIL RSRVR LVL HIGH LOW (1-13-A6/B6/C6/**D6**). b. RCP UPPER OIL RSRVR LVL HIGH LOW (1 -13-A7/B7/C7/**D7**).	❑	❑	❑
Observes Caution	CAUTION Do not open CV8141A/B/C/**D** or CV8142 unless there is a minimum of 100 psig RCS pressure. This prevents blowing stagnant unfiltered water into the seals.			
12. Verify Open Seal Ret... line	Verify open 1Cv8100 and 1CV8112.			
*13. Establish seal leakoff flow. **Cue: *_CV8141A/B/C/D, RCP A/B/C/D are open.***	OPEN CV8141A/B/C/**D**, RCP A/B/C/**D** No. 1 Seal Leakoff Stop Valve.	❑	❑	❑
14. Check Seal leakoff flows normal. **Cue: *Seal leakoff flows are within normal range.***	ENSURE all RCP Seal Leakoff Flows are within the normal operating range per BOP RC-1A1, RCP No 1 Seal Leakoff Normal Operating Range for A/B/C/**D** RCP.	❑	❑	❑
*15. Start oil lift pump. **Cue: *Oil lift pump has started.***	START the Oil Lift Pump for D RCP.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
16. Check RCP annunciators **Cue:** ***RCP annunciators are clear.***	ENSURE the following annunciators for the applicable pump are cleared: a. RCP SEAL DP LOW (1 -7-A3). b. RCP STANDPIPE LEVEL HIGH (1 -7-A6/B6/C6/**D6**). c. RCP STANDPIPE LEVEL LOW (1-7-A7/B7/C7/**D7**). d. RCP SEAL LEAKOFF FLOW HIGH (1 -7-B3). NOTE RCP Seal Leakoff Flow Low alarm setpoint is 0.82 gpm. The minimum flow required is determined using BOP RC-1A1, RCP No 1 Seal Leakoff Normal Operating Range. This alarm does not have to be cleared as long as #1 seal leakoff flow is in the acceptable region. NOTE If indicated RCP Seal Leakoff flow is less than the required flow per BOP RC-1A1, RCP No 1 Seal Leakoff Normal Operating Range, a bucket test may be performed, to measure the amount of leakoff actually returning from the RCP Seals.	❑	❑	❑
*17. Verify oil lift pump run for two minutes minimum. **Cue:** ***Pump has been running for two minutes. Lights are illuminated.***	ENSURE the Oil Lift Pump for D RCP has run for at least two minutes and is producing adequate pressure (OIL PRESS UP light On).	❑	❑	❑
18. Check seal leakoff flow normal **Cue:** ***Seal leakoff flows are within normal range.***	ENSURE Seal Leakoff flow is within the normal operating range per BOP RC-1A1, RCP No 1 Seal Leakoff Normal Operating Range.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
19. Check #1 seal DP. **Cue: *Seal DP is > 400 psid.***	ENSURE greater than 200 psid across #1 Seal for Reactor Coolant Pump A/B/C/D, as indicated on PI-153A/152A/151A/150A, RCP A/B/C/D No. 1 Seal DP, at PM05J.	❑	❑	❑
20. Pump Start Announcement	ANNOUNCE the RCP to be started over the plant page system. NOTE RCS pressure will drop ~100 psig when initially starting an RCP. RCS pressure will then increase as the RCP comes up to speed. NOTE If an RCP is to be started with the RCS solid, then manually controlling CV131, Letdown line Press Cont Vlv, will minimize any pressure transients in the RCS.	❑	❑	❑
21. Take Manual control of 1CV131 **Cue: *another operator will monitor and control RCS pressure.***	PLACE 1CV131, Ltdwn Line Press Cont Vlv, in MANUAL, if RCS is solid. (RCS is NOT solid)	❑	❑	❑
22. Monitor RCS pressure.	MONITOR RCS pressure CLOSELY and ADJUST 1CV131, Ltdwn Line Press Cont Vlv, as required to maintain pressure.	❑	❑	❑

Notes CAUTION	**CAUTION** As the RCP comes up to speed, the differential pressure across its No. 1 seal is expected to decrease as the static pressure at the pump suction decreases. The RCP must be stopped if seal ΔP cannot be maintained above 200 psid, or if seal leakoff flow is lost. **NOTE** On the first start of each pump, the RCP should be stopped within approximately 35 seconds. On the second start, the RCP should be stopped after approximately 1 minute. An optional 5 minute run may be performed on each RCP. This pertains to filling and venting the RCS. If the RCS is already filled and pressurized, disregard this note. **NOTE** It is preferred to start the RCPs in the following sequence D, C, B, A.			
CUE: **RCS is filled and vented using vacuum refill system.** **An operator is standing by at the RCP to monitor rotation.**				
*23. Starts Reactor Coolant Pump	START D RCP and ENSURE shaft rotation within 2 seconds, or TRIP the RCP, and NOTIFY the Shift Manager.	❑	❑	❑
24. Checks RCP current. **Cue:** ***RCP current behavior is as expected.***	ENSURE current drops to less than or equal to 650 amps within 35 seconds, or TRIP the RCP.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
25. Check RCP Annunciator. **Cue: *RCP Annunciator is clear.***	ENSURE "RC PUMP BREAKER OPEN OR FLOW LOW ALERT" annunciator cleared (Window -13-D3).	❑	❑	❑

Cue: <u>This completes JPM.</u>

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** Yes

Unit 1 plant conditions:

- Reactor power is 50%
- RCP SEAL LEAKOFF FLOW HIGH annunciator alarms (1-7-B3)
- RCP 1D No. 1 seal leakoff flow rate indicates 5.6 gpm
- RCP 1D SEAL No. 2 LEAKOFF FLOW HIGH alarm is NOT printed
- RCP 1D No. 1 seal DP indicates > 400 psid
- RCP 1D #2 Seal Leakoff (1FIS-0191) indicates 0.5 gpm
- All RCP temperatures are normal and stable
- There are no instrument failures

What operator actions are required for the above conditions?

Expected Answer:

Maintain at least 9 gpm seal injection flow to RCP 1D; initiate a unit shutdown per BGP 100-4 (POWER DESCENSION); trip the 1D RCP within 8 hrs; Close 1CV8141D; and Close 1RY455B.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 003000A2.01 3.7/4.0

Reference(s): BOA RCP-1 RCP SEAL FAILURE, Rev. 55C.

JPM Questions

Question No: 2 **Reference Use:** NO

The reactor is starting up and is at 35% power. A reactor coolant pump is accidentally tripped.

What is the origination of the reactor protection system signal that will trip the reactor?

Expected Answer:

A reactor trip will occur from Reactor Coolant Low Flow 2/3 channels < 90% loop flow on 1/4 loops (power above P-8).

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ Unsat _____.

K/A: 012000A306 3.7/3.7

Reference(s): EF-1 ESF Setpoints, Rev. 4, Reactor Trip

BAR 1-11-C5, Rev. 51, Setpoint.

Chapter 60b/Reactor Protection System, Rev. 2, II.B.c.5), page 22, LO 4.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** YES

Unit 1 plant conditions:

- Reactor power is 50%
- RCP SEAL LEAKOFF FLOW HIGH annunciator alarms (1-7-B3)
- RCP 1D No. 1 seal leakoff flow rate indicates 5.6 gpm
- RCP 1D SEAL No. 2 LEAKOFF FLOW HIGH alarm is NOT printed
- RCP 1D No. 1 seal DP indicates > 400 psid
- RCP 1D #2 Seal Leakoff (1FIS-0191) indicates 0.5 gpm
- All RCP temperatures are normal and stable
- There are no instrument failures

What operator actions are required for the above conditions?

Question No: 2 **Reference Use:** NO

The reactor is starting up and is at 35% power. A reactor coolant pump is accidentally tripped.

What is the origination of the reactor protection system signal that will trip the reactor?

JOB PERFORMANCE MEASURE

TASK CONDITIONS:

1. You are an extra NSO.
2. The Unit has just tripped in conjunction with an electrical fire in the Unit's Remote Shutdown Panel.
3. The 1A AF Pump is OOS for maintenance and the 1B AF Pump did not auto start, and will NOT manually start with the MCR Switch.

INITIATING CUES:

The Shift Manager has just directed you to initiate a Local Emergency Start of the 1B AF Pump using BOA ELEC-5, Attachment D.

TASK TITLE: Local Emergency Start of 1B AFW Pump JPM No.: JPM-8

TPO No: IV.D.OA-35 K&A No.: 013000G013 K&A IMP. 3.9 / 4.0

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED__________ this JPM TIME STARTED: _________

FAILED __________ TIME FINISHED: _________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______

MATERIALS:

1BOA ELEC-5, Attachment D, Diesel Driven AF Pump Local Start.

GENERAL REFERENCES:

1BOA ELEC-5, Attachment D, Diesel Driven AF Pump Local Start.

TASK STANDARDS:

Correctly perform the actions required for 1B AF Pump Local Emergency Start.

TASK CONDITIONS:

1. You are an extra NSO.
2. The Unit has just tripped in conjunction with an electrical fire in the Unit's Remote Shutdown Panel.
3. The 1A AF Pump is OOS for maintenance and the 1B AF Pump did not auto start, and will not manually start with the MCR Switch.

INITIATING CUES:

The Shift Manager has just directed you to initiate a Local Emergency Start of the 1B AF Pump using BOA ELEC-5, Attachment D.

CRITICAL ELEMENTS: (*)

1, 4, 7, 8, 9, 10

APPROXIMATE COMPLETION TIME: 12 minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
RECORD START TIME ________				
*1. Locate the 1B AF pump.	Locate the 1B AF pump.	❑	❑	❑
Note: Provide the Candidate with a copy of BOA ELEC-5, Attachment D.				
2. Verify/Start associated Aux Lube Oil Pump.	Verify/Start 1B Aux Lube Oil Pump.	❑	❑	❑
Cue: *Aux Lube Oil Pump running.*				
3. Verify/Start Gearbox Lube Oil Pump.	Verify/Start Gearbox Lube Oil Pump.	❑	❑	❑
Cue: *Gearbox Lube Oil Pump running.*				
*4. Place ENGINE START Switch to MANUAL.	Place ENGINE START Switch to MANUAL.	❑	❑	❑
Cue: *ENGINE START Switch is in "MAN".*				
5. Verify Diesel Air Box Tripped reset.	Verify Diesel Air Box Tripped annunciator reset.	❑	❑	❑
Cue: *Air Box Tripped is reset.*				
6. Momentarily depress the RESET button.	Momentarily depress the RESET button.	❑	❑	❑
NOTE: Located on 1AF01J.				

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*7. Start the 1B AF Pump.	Depress the START Button.	❑	❑	❑
Cue: ***The Engine does NOT crank.***	•Verify the ENGINE RUNNING Light is lit.			
The ENGINE RUNNING Light is NOT LIT.				
NOTE: If other battery bank is selected, the engine will still not start.				
*8. Perform RNO.	RNO for Step 2.e	❑	❑	❑
Cue: ***Engine switch is in AUTO***	Return Engine Switch to AUTO			
*9. Start the 1B AF Pump at Emergency Control Panel	1) Proceed to 1AF03J (364 M16)	❑	❑	❑
Cue: ***The ENGINE RUNNING Light is NOT LIT.***	2) Place REMOTE EMERGENCY START switch to **START**			
*10. Start the 1B AF Pump in START WITH BYPASS	Place REMOTE EMERGENCY START switch to **START WITH BYPASS**	❑	❑	❑
Cue: ***The engine STARTS w/ ENGINE RUNNING light LIT***				

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
11. Verify the SX Cooling Valves are open. **NOTE: Provide copy of BOP AF-T1 DDAFP Operating Logs.** **NOTE: Identifying location of valves is sufficient.** **Cue: • *1SX173 is OPEN.*** **• *1SX178 is OPEN.***	Verify OPEN using stem position indication: • 1SX173 • 1SX178	❑	❑	❑

Cue: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** NO

Given the following:

Unit 1 tripped due to a loss of feedwater
AF Pump B auto started on the trip
AF Pump A failed to start due to a failure of Train A SSPS to process any actuation signals and was manually started by the control room operator.

What are the expected AF system responses as CST level reaches an empty condition?

Expected Answer:
(At 20.1 psia at the suction of either AF Pump, annunciator 1-3-A7 AF PUMP SUCT PRESS LOW will alarm.)

At 18.1 psia detected at the suction of the AF 1B Pump, SX supply valves AF017B and AF006B will open (CST recirc closes; SX recirc opens). This should ensure adequate pressure maintained to the AF 1B Pump.

At 16.5 psia detected at the suction of the AF 1A Pump, the pump will trip. (Swapover to SX will NOT occur since pump was manually started.)

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 061000A104 3.9/3.9

Reference(s): AF-1, Auxiliary Feed System, Rev. 3, AF SUCTION PRESS SETPOINTS.

BAR 1-3-A7, Rev. 9.

Chp 26, Auxiliary Feedwater System (AF), Rev. 03, II.A.2, page 8-10, LO 10.

JPM Questions

Question No: 2 **Reference Use:** NO

Following a reactor trip from 100% power due to a trip of a feedwater pump, only AF Pump 1B started. Following establishment of AFW flow to all SGs, the line downstream of AF005H ruptured and severed the main instrument air line. This resulted in a loss of instrument air at the Unit.

1. What is the minimum flow that will be provided to the SGs?

2. How would level in the SGs be controlled from the MCB?

Expected Answer:

1. The minimum flow to each SG other than SG D is 160 gpm; **OR** total flow to the SGs will be at least 480 gpm.

2. Flow to the 3 SGs may be controlled by throttling the (motor-driven) AF013 valves (AF013E, F, G) to SGs A B and C.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 061000K302 4.2/4.4

Reference(s): AF-1 Auxiliary Feed System, Rev. 3.

Chp 26, Auxiliary Feedwater System (AF), Rev. 03, II.A.6.c, page 35 and II.A.6.e, page 37-39, LO 12, 13.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** NO

Given the following:

Unit 1 tripped due to a loss of feedwater
AF Pump B auto started on the trip
AF Pump A failed to start due to a failure of Train A SSPS to process any actuation signals and was manually started by the control room operator.

What are the expected AF system responses as CST level reaches an empty condition?

Question No: 2 **Reference Use:** NO

Following a reactor trip from 100% power due to a trip of a feedwater pump, only AF Pump 1B started. Following establishment of AFW flow to all SGs, the line downstream of AF005H ruptured and severed the main instrument air line. This resulted in a loss of instrument air at the Unit.

1. What is the minimum flow that will be provided to the SGs?

2. How would level in the SGs be controlled from the MCB?

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 1 OF 3)
DIESEL DRIVEN AUXILIARY FEEDWATER PUMP LOCAL START

```
*******************************************
*                  NOTE                   *
*  A start of the 1B AF pump from         *
*  either of the following locations      *
*  will bypass the lube oil pressure      *
*  start permissives:                     *
*                                         *
*  o  Local Control Panel (383 L16)       *
*  o  Emergency Control Panel (364 M16)   *
*******************************************
```

1 **START AUX LUBE OIL PUMPS:**

- Pump lube oil pump
    - 1AF01PB-A (outside pump room 333 L15)
- Gearbox lube oil pump
    - 1AF01PB-C (inside pump room 383 L16)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 2 OF 3)
DIESEL DRIVEN AUXILIARY FEEDWATER PUMP LOCAL START

2 START 1B AF PUMP AT LOCAL CONTROL PANEL 1AF01J:

a. Place ENGINE START switch in - MAN

b. Check AIR BOX TRIPPED annunciator - NOT LIT

b. Reset diesel air box trip.

c. Depress RESET pushbutton

*d. Depress START pushbutton

d. If engine fails to crank, THEN perform the following:

1) Select otner battery bank.

2) Depress RESET pushbutton.

3) Depress START pushbutton.

e. Verify engine starts - WITHIN 60 SECONDS

e. Perform the following:

1) Return ENGINE START switch to AUTO.

2) **GO TO** Step 3 (Next Page).

f. **GO TO** Step 4 (Next Page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 3 OF 3)
DIESEL DRIVEN AUXILIARY FEEDWATER PUMP LOCAL START

CAUTION
The START WITH BYPASS position will start the 1B AF pump with the Low Suction Pressure Trip DISABLED.

3 **START 1B AF PUMP AT EMERGENCY CONTROL PANEL 1AF03J (364 M16):**

a. Place REMOTE EMERGENCY START switch in - START

b. Verify RUN light - LIT WITHIN 60 SECONDS

RESPONSE NOT OBTAINED:

b. Perform the following:

1) Place the REMOTE EMERGENCY START switch in START WITH BYPASS.

2) Verify the RUN light lit within 60 seconds.

IF the pump fails to start contact the Shift Manager for guidance.

4 **MONITOR 1B AF PUMP OPERATIONS:**

a. Perform BOP AF-7T1, DIESEL DRIVEN AUXILIARY FEEDWATER PUMP OPERATING LOG

5 **RETURN TO PROCEDURE AND STEP IN EFFECT**

-END-

DIESEL DRIVEN AU ILIARY FEEDWATER PUMP
OPI ATING LOG

NOTE

PERFORM the applicable steps of this Data Sheet after the start of the pump and every 30 minutes thereafter. Forward the completed BOP AF-7T1 to the AF System Engineer, SED Thermal Group.
Notify the SM if Engine cranks more than 4 times upon starting.

____ B AF Pump START DATE _____ START TIME _____ NUMBER OF CRANKS BEFORE START _____

EQUIPMENT DESCRIPTION									EXPECTED VALUES
TIME									N/A
INITIALS									N/A
DAY TANK LEVEL									≥ 50%
SX COOLING VLVS _SX173 + _SX178									BOTH OPEN
CUBICLE COOLER SX FLOW									< 130 GPM
ENGINE RPM									1740-1840 U-1 1790-1875 U-2 RPM
MP SUCT PRESS									> 6#
PUMP RECIRC FLOW									80 - 110 GPM
OIL PUMP SHAFT BRG TEMP									< 185°F
PUMP OIL PRESS (FILTER OUT)									> 8#
OIL FILTER, DIFF PRESS									< 4#
TURN PUMP OIL FILTER									YES

DIESEL DRIVEN AUXILIARY FEEDWATER PUMP
OPERATING LOG

EQUIPMENT DESCRIPTION									EXPECTED VALUES
TIME									N/A
INITIALS									N/A
PP OIL COOLER OUTLET TEMP									65 - 128°F
TURN GEAR OIL FILTER									YES
GEAR COOLER, OIL OUTLET TEMP									65 - 130°F
GEAR OIL PRESS									> 13#
COOLER, SX OUTLET TEMP									< 150°F
ENGINE OIL PRESS									50 - 70#
ENGINE OIL TEMP									< 200°F
ENGINE WATER TEMP									< 180°F
TURN FAN GEAR OIL FILTER									YES

(Final)

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are an extra NSO.
2. Unit-2 is in Mode 3.
3. A fault on a 345KV line has caused the SAT's to trip.
4. Bus 241 is energized by D/G 2A.
5. Bus 242 BUS ALIVE light is NOT LIT.
6. The UNIT NSO has placed the breakers identified in Step 1 of 2BOA ELEC-3 ATTACHMENT D in their appropriate positions and has check lockout alarms NOT lit.

INITIATING CUES:

The US directs you to perform a Local Start of the 2B D/G using 2BOA ELEC-3, ATTACHMENT D.

JOB PERFORMANCE MEASURE Rev.0, 4/6/94

TASK TITLE: Local Abnormal Start of a D/G JPM No.: JPM-9

TPO No: IV.D.OA-34 K&A No.: 064000A401 K&A IMP. 4.0 / 4.3

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED_________ this JPM TIME STARTED: _________

FAILED _________ TIME FINISHED: _________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______

MATERIALS:

2BOA ELEC-3, LOSS of 4KV ESF BUS

GENERAL REFERENCES:

2BOA ELEC-3, LOSS of 4KV ESF BUS

TASK STANDARDS:

Perform actions necessary to complete a Local Abnormal Start of a D/G.

TASK CONDITIONS:

1. You are an extra NSO.
2. Unit-2 is in Mode 3.
3. A fault on a 345KV line has caused the SAT's to trip.
4. Bus 241 is energized by D/G 2A.
5. Bus 242 BUS ALIVE light is NOT LIT.
6. The UNIT NSO has placed the breakers identified in Step 1 of 2BOA ELEC-3 ATTACHMENT D in their appropriate positions and has check lockout alarms NOT lit.

INITIATING CUES:

The US directs you to perform a Local Start of the 2B D/G using 2BOA ELEC-3, ATTACHMENT D.

CRITICAL ELEMENTS: (*)

7,9, 10

APPROXIMATE COMPLETION TIME: 20 Minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
RECORD START TIME _______				
NOTE: Completion of Step 1 is provided in task condition.				
1. Refer to 2BOA ELEC-3, ATT. D, Local Start of a D/G	Locate and open 2BOA ELEC-3, ATT. D.	❑	❑	❑
Note: This step may be performed at any time.				
Note: Provide the Candidate with a copy of 2BOA ELEC-3, ATTACHMENT 'D'.				

Note:

Simulate obtaining keys from Center Desk.

2. Get keys for local D/G operation.	Identify keys at center desk:	❑	❑	❑
	• U2 PRI-5 keys			
Cue: ***Keys have been obtained.***	• B-core masters			

Note:

For cueing steps 4,5,8 for DC control power, starting air receiver pressure, and support systems status, have candidate use actual values if D/G is operable. If D/G is inoperable or the actual parameter is out of spec, give the listed cues after the candidate locates the component.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*3. Check 2B D/G Shutdown. **Cue:** ***oRunning Idle Light NOT Lit*** ***• Emergency Stop P/B is depressed and released***	o Verify Running Idle Light NOT Lit • Depress Emergency Stop Pushbutton	❑	❑	❑
4. Verify DC control power available **Cue:** ***•DC power on/bus #1 light is Green*** ***•DC power on/bus #2 light is Green***	Verify lights lit: • DC POWER ON/BUS #1 • DC POWER ON/BUS #2	❑	❑	❑
5. Verify starting air available. **Cue:** ***•2PI- DG097B = 240#*** ***•2PI-DG096B = 240#***	Verify either air receiver >100 psig: oLeft bank 2PI-DG097B oRight bank 2PI-DG096B	❑	❑	❑
6. Determine support system status. **Cue:** ***•2SA140B is CLOSED*** ***•2SA140D is CLOSED***	Check air recvr valve position: • 2SA140B • 2SA140D	❑	❑	❑

Note:
Opening either valve in the next step would provide sufficient starting air for the D/G- however both are closed bullets in the procedure.

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*7. Correct valve misalignment. **Cue:** ***•2SA140B is OPEN*** ***•2SA140D is OPEN***	Open air receiver valves: • 2SA140B • 2SA140D	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
8. Verify all additional support systems status.	Verify :	❑	❑	❑
Cue: • ***Fuel Head Tank upper Bull's Eye Full***	• Fuel Head Tank upper Bull's Eye Full			
• ***Speed droop is 0***	• Speed droop – 0			
• ***Load limit is at MAX FUEL***	• Load limit - max fuel			
• ***Speed is per LOCAL PLACARD (9.70)***	• Speed - per local placard			
• ***Oil level is within sightglass***	• Oil level within sightglass			
• ***Output shaft is at MAX FUEL***	• Output shaft - max fuel			
• ***Overspeed Gov oil is within sightglass***	• Overspeed Gov Oil level - within sightglass.			
• ***The turning gear is DISENGAGED***	• Turning gear disengaged			
• ***Fuel rack man. trip lever is LATCHED IN VERTICAL POSITION.***	• Fuel rack manual trip lever latched in vertical position			
• ***Control air Left Bank is ON*** • ***Non failsafe air is ON*** • ***Air drain is CLOSED***	• Left bank control air lineup: - Cranking air on - Non failsafe air on - Air drain closed			
• ***JW expansion tank level is WITHIN THE SIGHTGLASS.***	• J.W. expansion tank level within sightglass			
• ***Overspeed butterfly valve is OPEN.***	• Overspeed butterfly valve open			
• ***Lube oil sump level is WITHIN THE SIGHTGLASS.***	• Lube oil sump level within sightglass			
• ***Control air Right Bank is ON*** • ***Non failsafe air is ON*** • ***Air drain is CLOSED***	• Right bank control air lineup: - Cranking air on - Non failsafe air on - Air drain closed			

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*9. Prepare for 2B D/G start.		❑	❑	❑
Cue: ◦ ***Bus 242 is dead (Control Room report)***	°Check bus 242 is dead at 1PM01J			
◦ ***D/G is CLEAR of personnel***	°Verify D/G clear of personnel			
°***U-2 has been NOTIFIED***	°Request Unit 2 verify DG controls:			
◦***2B D/G Control switch is in After Trip (A/T)***	◦Asks if 2B D/G C/S at 2PM01J in A/T			
◦ ***ACB 2423 switch is in After Trip (A/T)***	◦Asks if ACB 2423 in A/T			
• ***Annunciator and system reset switch has been placed in RESET and RELEASED.***	•Place annunciator & system reset switch to RESET.			
*10. Start D/G 2B	• Depress Emergency Stop Reset P/B	❑	❑	❑
Cue: •***Emergency stop reset P/B has been DEPRESSED.***				
°***Engine is CRANKING.***	° Check: - Engine cranking - Speed > 590 rpm			
°***Speed is 600 rpm.***				
°***2SX169B is OPEN.***	° Check DG SX valve 2SX169B open.			
°***RUNNING LOADED light is LIT.***	° Check bus 242 energized by RUNNING LOADED light.			

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
11. Monitor DG per BOP DG-11T2.	Locates BOP DG-11T2 and indicates logging parameters.	❑	❑	❑

Cue: This completes this JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** **YES** (Horse Notes Not Allowed)

Contrast the difference between a start of the D/G during normal testing per BOP DG-11 DIESEL GENERATOR STARTUP and a start of the D/G due to a SI signal as they relate to the operation of the D/G Air Compressor and Dryer.

Expected Answer:

On a normal start, the air dryer will start when the air receiver pressure falls to 240 psig. 90-180 seconds later the air compressor will start. On a safety injection, both the air dryer and the air compressor will start when the air receiver pressure falls to 240 psig.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 064000K105 3.4/3.9

Reference(s): BOP DG-1, Diesel Generator Alignment to Standby Condition, Rev 5, Pages 5 & 6.

6E-2-4030DG10, DG14, DG32, and EF11

DG-6, D/G Air Start / Pneu. Protect., Rev. 1, DRYER/COMPRESSOR.

Chp 9, Diesel Generators & Aux. Systems, Rev. 1, II.E.1, page 24-25, LO 2.e.

TABLE FOR SLAVE RELAYS DEVELOPMENT SSPS PANEL 1PA09J

INITIATING MASTER RELAY	OUTPUT RELAY NO.	COIL S/D REFERENCE		CONTACT DEVELOPMENT & REFERENCE S/D								FUNCTION
		REGULAR	TESTING									
K501	K601 (LATCH)	EF36	EF09	△ SP	SP	△ SP	SP	△ SP	SP	△ SP	△ SP	FEED WATER VALVES (SAFETY INJECTION) ISOLATION
K521	K602 (LATCH)			ACTUATE [illegible]	O-VA18	[illegible] EF36	O-VA18	EF36	O-VA19	O-VA18	O-VC61	SAFETY INJECTION
K501	K603 (LATCH)			CV15	SI06	SI11	* SP	CV10	CV11	AF09	*SI11	SAFETY INJECTION
K521	K604 (LATCH) ○			AF04	SP	SI12	AF11	* SP	* AF14	* EF03 TEST	*SI12	SAFETY INJECTION
K502	K605 (LATCH)			*CV19	ANNUN EF53	SP	*SI21	*SI26	WG12	WM05	WM06	CONTAINMENT ISOLATION-PA
K522	K606 (LATCH)			*RY11	*RE04	*RE04	*LE03	*CC09	ØG11	ø PR01	SP	CONTAINMENT ISOLATION-PA
K502	K607 (LATCH)			CV12	*IA04	□ PS31	□ PS31	*SP	*PR01	ø PS32	*EF03 TEST	CONTAINMENT ISOLATION-PA
K501	K608 (LATCH)			EF01	EF01	SP	*EF01	EF01	*EF01	SP	*EF03 TEST	SAFETY INJECTION
K521	K609 (LATCH)			AP30	SP	SP	NX10	SP	SP	EF100	SP	SAFETY INJECTION
K501	K610 (LATCH)			VP01	VP03	VP02	VP06	*SX13	*SX15	*SX16	SP	SAFETY INJECTION
K521	K611 (LATCH)			DG01	DG31	DG32	DG01	SP	O-WA01	O-WA07	SP	SAFETY INJECTION
K522	K612 (LATCH)			*PS01	*PS01	*PS02	*PS02	O-Ø609	SP	Ø608	Ø609	CONTAINMENT ISOLATION-PA
K502	K613 (LATCH)			*SD03	*SD03	*SD07	*SD07	*SD04	*SD04	ØG18	*SA04	CONTAINMENT ISOLATION-PA
K522	K614 (LATCH)			*SD05	*SD05	*SD08	*SD08	*SD06	*SD06	O-Ø613	*RF04	CONTAINMENT ISOLATION-PA
K503	K615 (LATCH)	EF36		SP	ANNUN. EF68	* VQ07	SP	SP	SP	SP	SP	CONTAINMENT VENT ISOLATION
K504	K616 (LATCH)	EF35		MS01	MS02	MS03	MS04	SP	SP	SP	*EF03 TEST	STEAM STOP VALVES
K506	K618 (LATCH)	EF36		EF36	SP	SP	SP	SP	SP	SP	SP	CONTAINMENT ISOLATION-PB
K506	K619 (LATCH)	EF36					SPARE					CONTAINMENT ISOLATION-PB
K515	K620	EF34		△ SD03	* SD03	△ SD04	* SD04	△ SD05	* SD05	△ SD06	△ EF03 TEST	AUX. FW PUMPS (1/4 STEAM GEN. LOW-LOW LEVEL)
K508	K621	EF37		SP	SP	SP	SP	EF100	SP	SP	*EF03 TEST	TRIP FEED WATER PUMPS
K503	K622 (LATCH)	EF36		SP	* VQ08	SP	* VQ11	*VQ07	*VQ08	*VQ09	*VQ10	CONTAINMENT VENT ISOLATION
K504	K623 (LATCH)	EF35		*MS06	*MS06	*MS07	*MS07	SP	SP	SP	SP	STEAM STOP VALVES
K506	K625 (LATCH)	EF36		SP	SP	SP	SP	SP	SP	SP	SP	CONTAINMENT ISOLATION-PB
K506	K626 (LATCH)	EF35		CC06	CC07	CC04	SP	SP	SP	SP	*EF03 TEST	CONTAINMENT ISOLATION-PB
K509	K627	EF28		RC01	RC02	RC03	RC04	SP	SP	SP	*EF03 TEST	RCP UNDERFREQUENCY
K510	K628	EF33		△ SP	△ SP	△SI11	△SI12	-	-	-	-	PRESSURIZER RELIEF BLOCK-P11
K511	K629	EF19		SP	SP	SP	*NR05	SP	SP	SP	SP	SOURCE RANGE BLOCK
K512	K630 (LATCH)	EF36		△SPARE	△ SP	△ SP	△ SP	△ SP	SP	△ EF03 TEST	□ FW56	SAFETY INJECTION-FEEDWATER CONTROL
K513	K631	EF30		MS08	SP	SP	SP	-	-	-	-	LO-LO TAVG STEAM DUMP INTERLOCK
K514	K632 ○	EF28		SP	AF05	* AF14	ACTUATE MS39 (EF09)	-	-	-	-	AUXILIARY FEED WTR PUMPS (DELA
K515	K633 ○	EF34		AF01	AF03	AF04	AF11	SP	* AF14	* SD06	* EF03 TEST	AUXILIARY FEED WTR PUMPS (1/4 OF 4 GEN LO-LO LVL)
K516	K634	EF34		SP	* SP	SP	SP	-	-	-	-	AUXILIARY FEED WTR.PUMPS (2/4 OF 4 GEN LO-LO LVL)
K517	K635	EF27		MS08	SP	SP	TEST *EF03	-	-	-	-	GENERATOR & TURBINE TRIP
K520	K636 (LATCH)	EF37		△ SP	SP	△ SP	SP	△ SP	SP	△ SP	△ SP	FEEDWATER VALVES (REACTOR TRIP)
K520	K637 (LATCH)	EF37		EF37	△ SP	△ SP	△ SP	△ SP	SP	△ EF03 TEST	□ FW56	FEEDWATER VALVES (REACTOR TRIP)
K507	K638	EF37		SPARE	△ SP	△ SP	△ SP	△ SP	SP	△ EF03 TEST	□ FW64	FEEDWATER VALVES (HI-HI STEAM GENERA LEVEL) ISOLATION
K536	K640 (LATCH)	EF37		TG04	SP	SP	SP	SP	SP	SP	*EF03 TEST	TURBINE TRIP
K536	K641 (LATCH)	EF37		SP	SP	SP	SP	SP	SP	SP	* SP	TURBINE TRIP
K505 & K513	K643 (LATCH)	EF36		EF36	* EF09	CS06	CS06	*CS07	CS09	* SP	CS05	SPRAY ACTUATION
	K644 (LATCH)	EF36		CS01	AN061	SP	CS01	1-4061 CB07	SP	SP	* EF09	SPRAY ACTUATION
	K645 (LATCH)	EF36		SP	SP	SP	SP	-	-	-	-	SPRAY ACTUATION
K602	K647 (LATCH)	EF36		SI14	AP26	EF10	CV16	SP	SP	SP	EF32	SAFETY INJECTION
K523	K648	EF30		SI14	CV16	SP	SP	-	-	-	-	RWST (REFUELING WATER STORAGE TANK) LO-LO LEVEL
K526	K617	EF17		CV37	SP	SP	SP	—	—	—	—	LOW RCS PRESSURE
K527	K624	EF17		△CV37	SP	SP	SP	—	—	—	—	HIGH RCS PRESSURE
												FUTURE
K632	K639 ○	EF28	EF07	AF01	AF04	AF11	SP	SP	SP	SP	* EF03 TEST	AUXILIARY FEED WTR PUMPS (DELAYED)
K512	K646 (LATCH)	EF36	EF09	CV37	EF10	△CV37	△ EF03 TEST	SP	SP	SP	SP	SAFETY INJECTION
FUTURE	K649											FUTURE
K518												IR ROD STOP BLOCK
K524												PWR FAILURE & GEN. WARNING
K525	K642	EF22	EF09	CV10	CV11	SP	SP	—	—	—	—	SOURCE RANGE FLUX DOUBLING 1.0 BORON DILUTION

TEST STATUS	
G-G (GO-GO)	N-G (NO-GO)
ME	NONE
L THE USED CONTACTS (G-G)	NONE
L THE USED CONTACTS (GG)	NONE
L THE USED CONTACTS (G-G)	NONE
L THE USED CONTACTS (G-G)	NONE
L THE USED CONTACTS (G-G)	NONE
-8, 9-10, 15-16	1-2, 3-4, , 15-16
-4, 9-10, 15-16	1-2, 4-12
-8, 9-10, 15-16	NONE
L THE USED CONTACTS (G-G)	NONE
2, 3-4, 7-8, 13-14, 15-16, 9-10	NONE
L THE USED CONTACTS (G-G)	NONE
. THE USED CONTACTS (G-G)	NONE
. THE USED CONTACTS (G-G)	NONE
3-4, 7-8	NONE
E	1-2, 3-4, 7-8, 9-10
L	NONE
E	NONE "U"
3-4, 7-8, 9-10, 11-12, 13-14, 15-16	NONE
12	NONE
. THE USED CONTACTS (GG)	NONE
, 3-4, 7-8, 9-10	NONE
E	NONE
E	1-2, 3-4, 7-8
E	1-2, 3-4, 7-8, 9-10
3, 9-10	NONE
10	NO TEST REQ
TACTS 17-18	NONE
TACT - 1-2	NONE
-4, 7-8	NONE "U"
, 3-4, 7-8, 9-10, 13-14, 15-16	NONE
R	NONE
	CONTACTS - 1-2
	NONE
ACTS - 1-2 17-18	NONE
ACTS - 17-18	NONE
ACT - 1-2	NONE
E	NONE
THE USED CONTACTS (GG)	NONE
3-6, 9-10, 11-12, 17-18	NONE
	NONE
, 3-4, 7-8, 9-10	NONE -
, 3-4	NONE -
	1-2
	1-2
, 3-4, 7-8	NONE
8	1-2
, 3-4	NONE

CONTROLLED DOCUMENT
RB
(INITIAL)
DATE ISSUED
JAN 06 1992
TS GROUP —
DEPT. TR JOB Sim
JOB # 0 Set 1
Sim Rm —
ISSUED TO DATE VOID

REVISION PENDING
PECN P-1185
~~DCR 91-150~~

NO.	NOTES
1.	* FIELD TO CONVERT CONTACTS TO NORMALLY CLOSED.
2.	ALL RLYS ARE WEST TYPE (AR)
3.	THIS DWG IS REDRAWN FROM A PART OF W DWG. 1087H92 SH.27, REV.F
4.	A - INDICATES NORMALLY CLOSED CONTACTS PROVIDED BY W
5.	FIELD TO CONVERT CONTACTS TO NORMALLY OPEN
6.	SPECIAL TEST PERMISSIVE

REFERENCE DRAWINGS

DWG. NO.	DESCRIPTION
E-1-4030EF18 THRU 19	S/D - SOLID STATE PROTECTION SYSTEM TRAIN "A" CAB. 1PA09J

P
MPO OK

NUCLEAR SAFETY RELATED
EQUIPMENT IS SHOWN ON THIS DRAWING

SCHEMATIC DIAGRAM
REACTOR PROTECTION SYSTEM
OUTPUT RELAYS DEVELOPMENT TR.A

BYRON/[illegible] STATION - UNIT 1
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

DRAWING RELEASE RECORD			
REV.	DATE	DESCRIPTION	DRAWN / CHECKED / ENGR. APPROVAL
R	1-29-86	[illegible]	[illegible]
S	8-10-87	[illegible]	[illegible]
T	12/29/88	[illegible]	[illegible]
U	11/26/91	INCORPORATED DCR 91-150, PECN P-1185, [illegible]	[illegible]

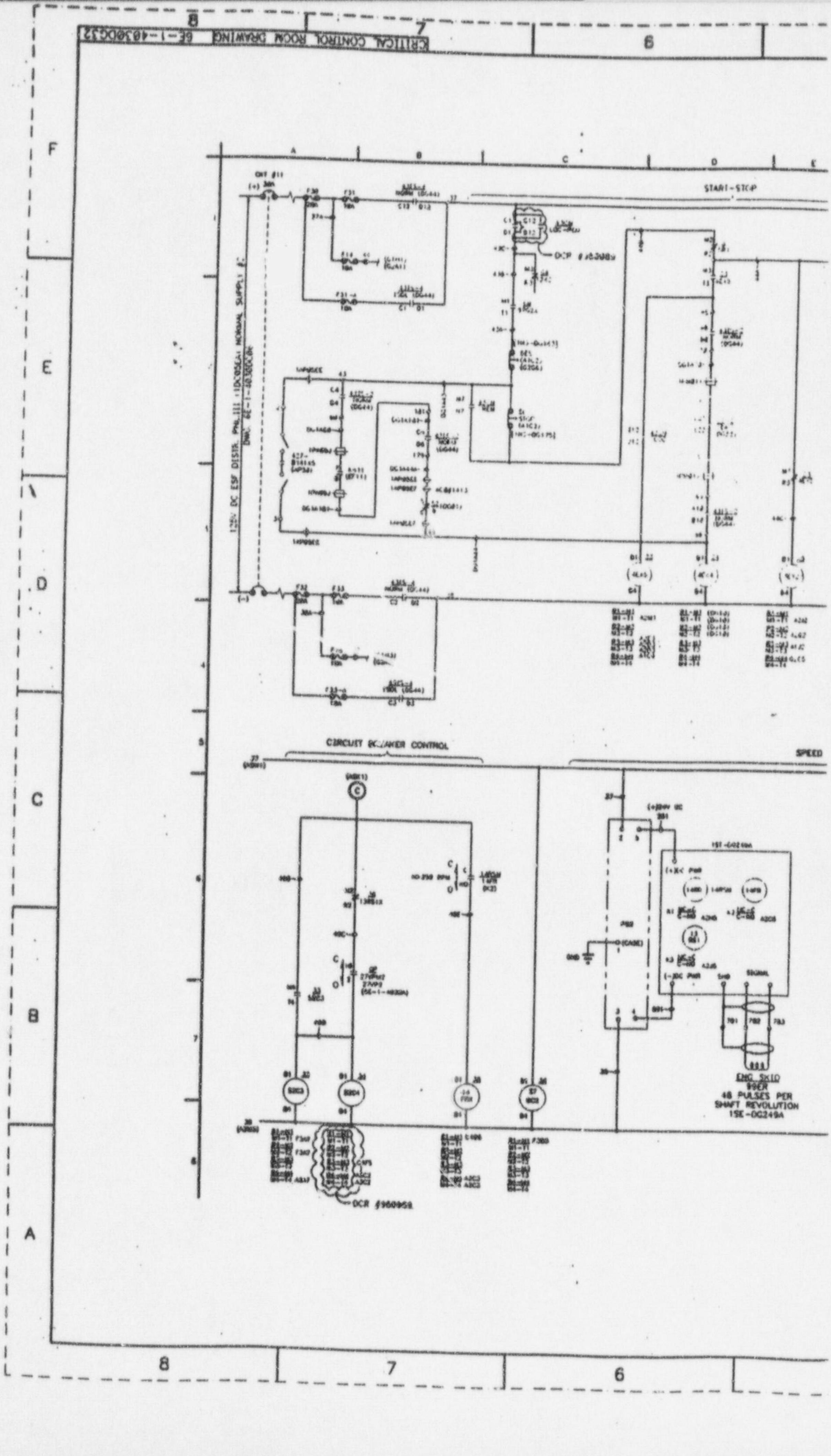
SCALE NONE
DRAWN P.S. [illegible] 12-14-77
CHECKED M.P. PATEL 12.20.77

SARGENT & LUNDY
ENGINEERS
CHICAGO

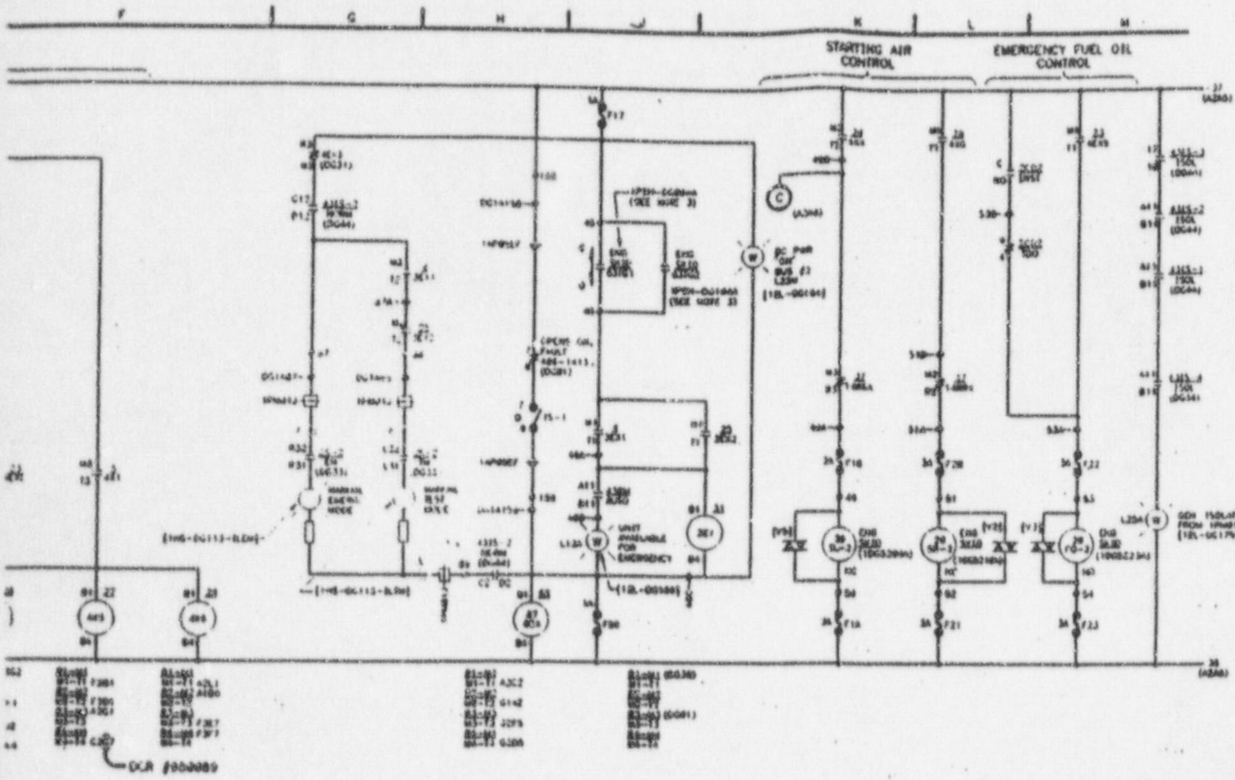
DRAWING NO.
BYRON 6E-1-4030EF11

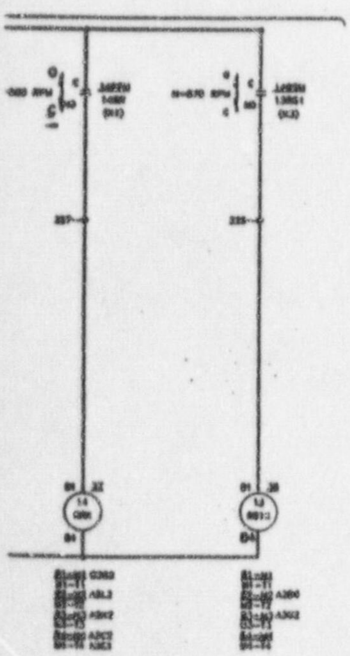
07

BYN 6890(T) [illegible] (U)



CRITICAL CONTROL ROOM DRAWING GE-1-4030DC32
START-STOP
125V DC ESF DISTR. PNL III
CIRCUIT BREAKER CONTROL
SPEED
ENG SKID
48 PULSES PER
SHAFT REVOLUTION
1SE-0G249A





CRITICAL DRAWING

Contact Central File Prior to Initiating Design Change Request

NO.	NOTES
1.	FOR SCHEMATIC DIAGRAM NOTES SEE DWG. 6E-1-4030DG31.
2.	ALL DEVICES ON THIS DWG. ARE ESF DIV. 11.
3.	THESE INSTRUMENTS WERE QUALIFIED THROUGH ANALYSIS (IRR) FOR THEIR SAFETY FUNCTION. DO NOT USE SPARE CONTACTS WITHOUT PRIOR ENGINEERING JUSTIFICATION.

REFERENCE DRAWINGS

DWG. NO.	DESCRIPTION
6E-1-4030 SERIES	FOR SCHEM. DIAGRAM NOTES, LEGENDS & REFERENCE DRAWINGS.
6E-1-4044 SERIES	INT./EXT. W/D MCB 1PM01J.
6E-1-4003 SERIES	EXT. W/D D/G 1A CONT. PNL. 1PL07J.

ComEd

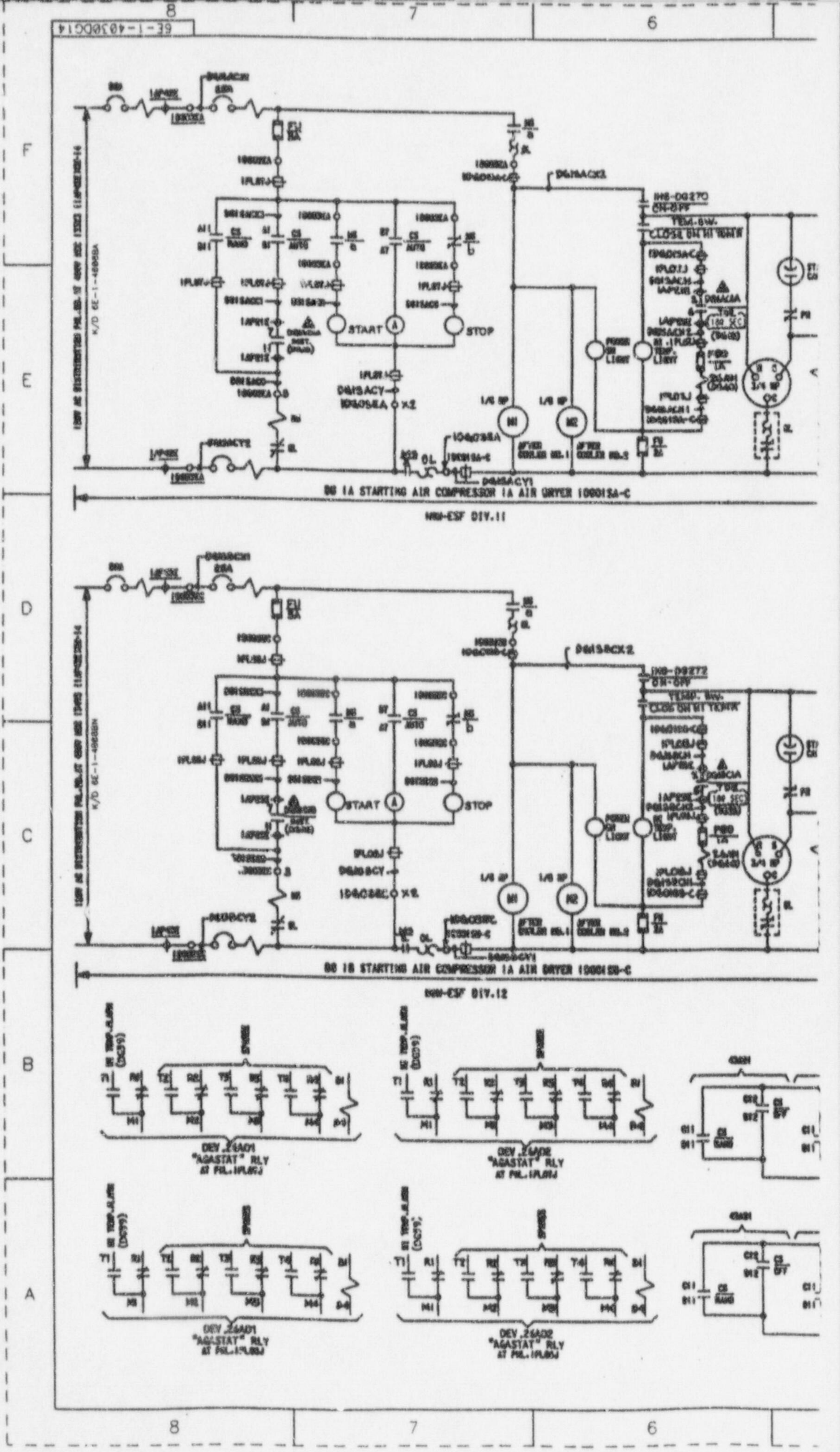
NUCLEAR SAFETY RELATED EQUIPMENT IS SHOWN ON THIS DRAWING

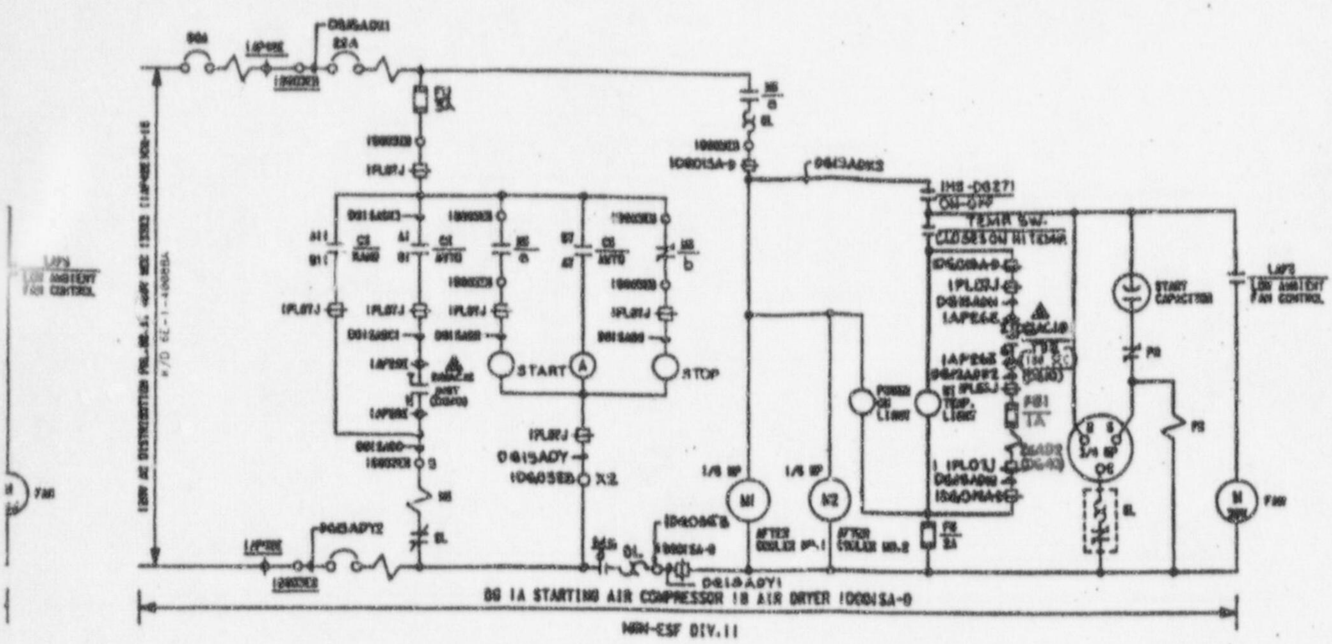
SCHEMATIC DIAGRAM
DIESEL GENERATOR 1A
STARTING SEQUENCE CONTROL
1DG01KA PART-2

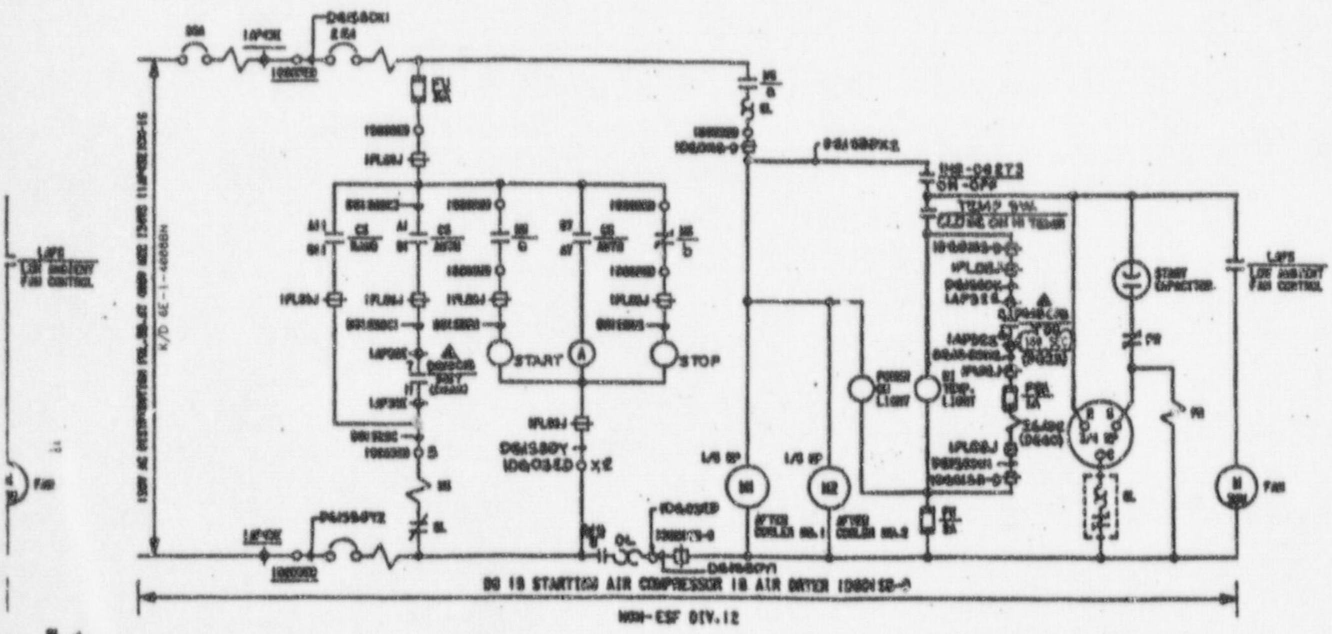
6E-1-4030DG32

SHEET NUMBER: SIZE F E07

CRITICAL CONTROL ROOM DRAWING


8
7
6
6E-1-4030DG14
F
E
D
C
B
A
START
STOP
DG 1A STARTING AIR COMPRESSOR 1A AIR DRYER 1DG01SA-C
NON-ESF DIV.11
DG 1B STARTING AIR COMPRESSOR 1A AIR DRYER 1DG01SB-C
NON-ESF DIV.12
DEV.26AD1
"AGASTAT" RLY
DEV.26AD2
"AGASTAT" RLY





INSTR.AS. 43AD1(1DG01SA-C) (1HS-DG151)
43AD2(1DG01SA-D) (1HS-DG150)
43AD1(1DG01SB-C) (1HS-DG200)
43AD2(1DG01SB-D) (1HS-DG199)

CONTACT	SW	POSITION		
		HAND	OFF	AUTO
A11-B11	HAND	X		
A12-B12	OFF		X	
A1-B1	AUTO			X
A5-B5	HAND	X		
A6-B6	OFF		X	
A7-B7	AUTO			X
C11-D11	HAND	X		
C12-D12	OFF		X	
C1-D1	AUTO			X
C5-D5	HAND	X		
C6-D6	OFF		X	
C7-D7	AUTO			X

WESTINGHOUSE TYPE W-2 CONTROL SWITCH 3 POSITION, MAINTAINED CONTACTS BASIC SWITCH #[illegible] PISTOL GRIP FIXED HANDLE

X - DENOTES CONTACT CLOSED

⊕ - DENOTES CONTACT USED

CONTROL SWITCH DEVELOPMENT "CS" (TYPICAL)

43AD1(1DG01SA-C), 43AD2(1DG01SA-D) AT PNL. 1PL07J

43AD1(1DG01SB-C), 43AD2(1DG01SB-D) AT PNL. 1PL08J

▲ NUCLEAR SAFETY RELATED EQUIPMENT.

SCOTT EQUIPMENT CO. DWG. NO. 112.2
COOPER BESSEMER CO. DWG. NO. GS-553-124 SH. 14, REV. 2

REFERENCE DRAWINGS

DWG. NO.	DESCRIPTION
6E-1-4030 SERIES	FOR SCHEMATIC DIAGRAM NOTES, LEGENDS & REFERENCE DRAWINGS.
6E-1-4099F	INT/EXT. W/D DG. 1A & 1B STARTING AIR COMPRESSORS & AIR DRYERS.

REV	DATE	DESCRIPTION	PRep.	REVW.	APPR.
L	11/17/97	FOR RECORD-INCORP. OF AS-BUILT DCP [illegible]	CRH	AJR	DRH
M	11/26/97	FOR RECORD-INCORP. OF TO #511 (DCP #9700542)	AJR	[illegible]	DRH
--	--		--	--	--
--	--		--	--	--

SCH/DIAG DIESEL GENERATOR 1A & 1B STARTING AIR COMPRESSORS AIR DRYERS 1DG01SA-C, 1DG01SA-D, 1DG01SB-C & 1DG01SB-D

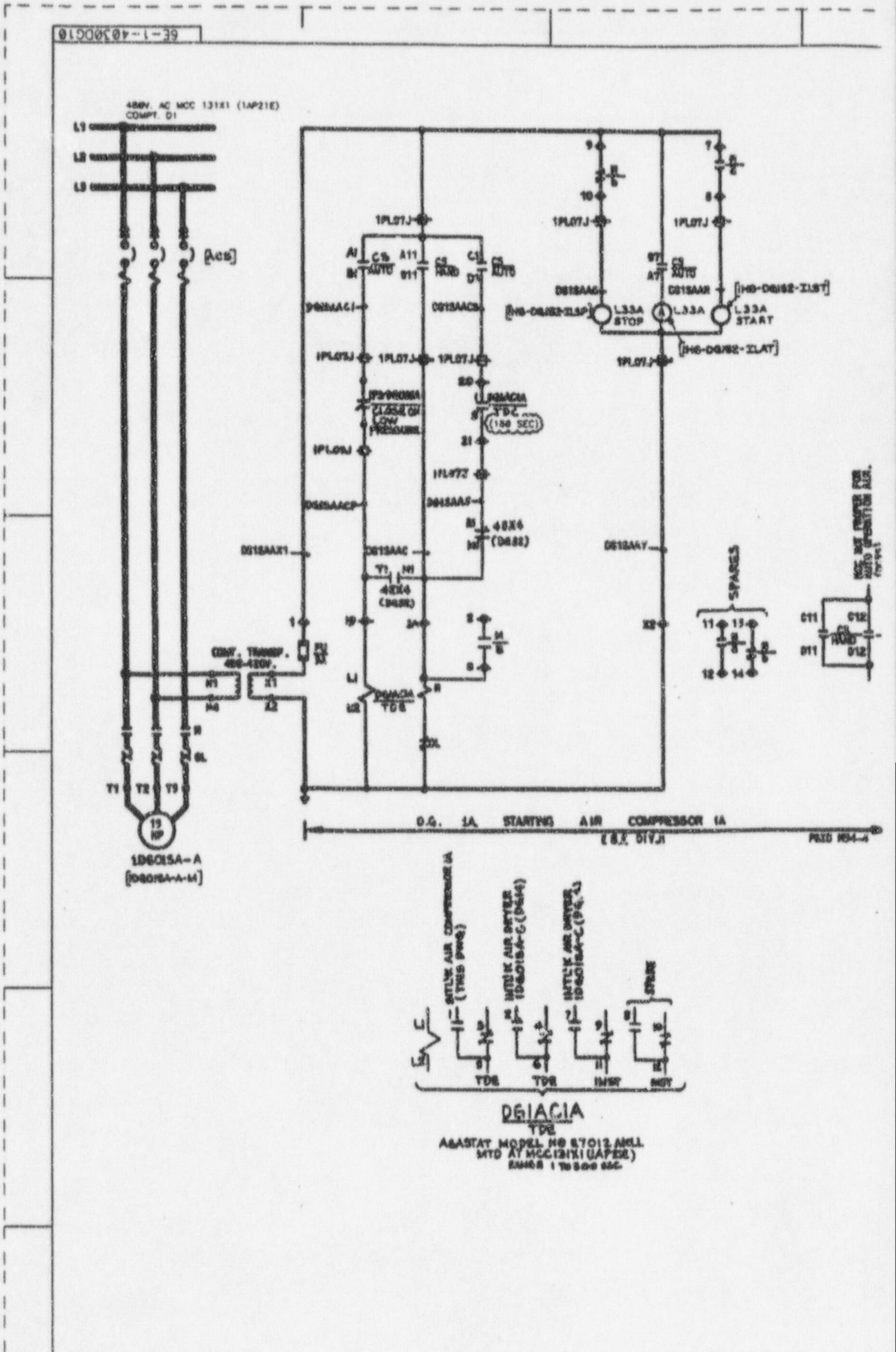
ComEd
Chicago, Illinois
Byron Station Unit 1

NUCLEAR SAFETY RELATED EQUIPMENT IS SHOWN ON THIS DRAWING

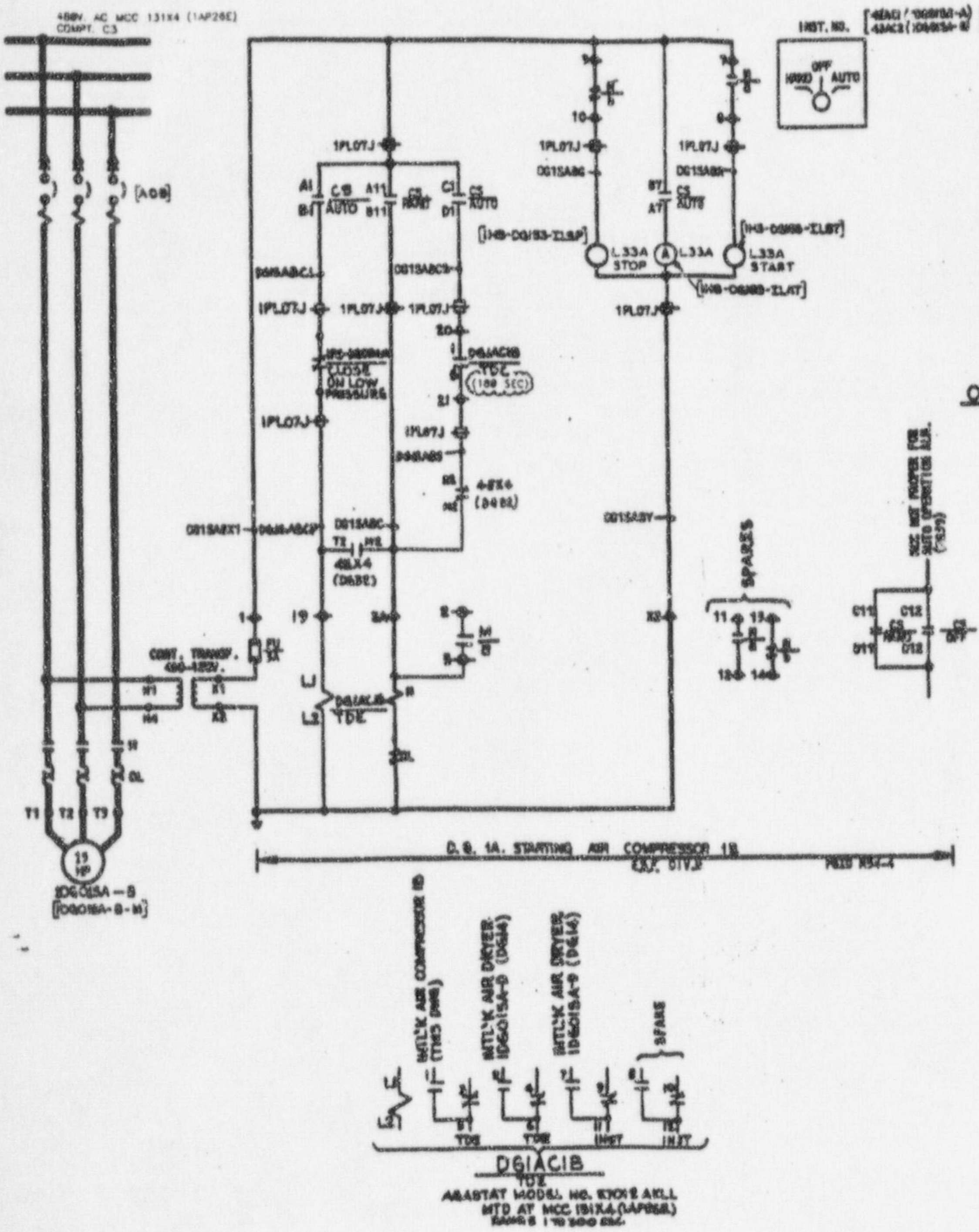
SCALE: NONE
DATE: 11/[illegible]
DRAWN BY: CRH

6E-1-4030DG14

SHEET NUMBER: | SIZE F | E07



480V. AC MCC 131X1 (1AP21E)
COMPT. D1
L1
L2
L3
[ACB]
L33A STOP
L33A
L33A START
[HS-DG152-1LAT]
LOW PRESSURE
(180 SEC)
SPARES
COMT. TRANSF.
T1
T2
T3
15 HP
1DG01SA-A
D.G. 1A STARTING AIR COMPRESSOR 1A
DG1ACIA
TDE



CONTACT	SYM	POSITION			
		HAND	OFF	AUTO	
A11-B11	HAND	X			o
A12-B12	OFF		X		
A1-B1	AUTO			X	o
A5-B5	HAND	X			
A6-B6	OFF		X		
A7-B7	AUTO			X	o
C11-D11	HAND	X			o
C12-D12	OFF		X		o
C1-D1	AUTO			X	o
C5-D5	HAND	X			
C6-D6	OFF		X		
C7-D7	AUTO			X	

WESTINGHOUSE TYPE W-2 CONTROL SWITCH 3 POSITION, MAINTAINED CONTACTS, BASIC SWITCH 5490D56712G64 PISTOL GRIP FIXED HANDLE

X-DENOTES CONTACT CLOSED
o-DENOTES CONTACT USED

CONTROL SWITCH DEVELOPMENT "CS"
AT PNL 1PL07J
(TYPICAL)

REFERENCE DRAWINGS	
DRAWING NO.	DESCRIPTION
6E-1-4030 SERIES	FOR SCHEMATIC DIAGRAM NOTES, LEGENDS & REFERENCE DRAWINGS.
6E-1-4661 SERIES	INT/EXT W/D 480V AC MCC 131X1 (1AP21E)
6E-1-4667 SERIES	INT/EXT W/D 480V AC MCC 131X4 (1AP26E)

REV	DATE	DESCRIPTION	PREP	REVW	APPR
0	11/25/97	FOR RECORD-INCORP. 07 TO 8511 (DCP 9700043)	AJR	SHD	DPW
	--		--	--	--
	--		--	--	--
	--		--	--	--

ComEd
Byron Station Unit 1

NUCLEAR SAFETY RELATED EQUIPMENT IS SHOWN ON THIS DRAWING

SCHEMATIC DIAGRAM
DIESEL GENERATOR 1A
STARTING AIR COMPRESSORS
1DG01SA-A & 1DG01SA-B

SCALE: NONE
DATE: 11/11/97
DRAWN BY: AJR

6E-1-4030DG10

SHEET NUMBER:
SIZE: F
E07

JPM Questions

Question No: 2 **Reference Use:** Diesel Generator Room

Following a diesel generator EMERGENCY start, it is required to trip the diesel locally. State three (3) methods that will trip the diesel?

Expected Answer: (any three of the following)

Depressing the "Emergency Stop" pushbutton.
Manually closing the "Air Inlet Butterfly Valve".
Manually positioning the "Fuel Rack" to "Off".
Manually close Fuel Supply Isolation valve(s).

Actual Answer:

☐ Candidate's response matched expected answer.

Sat ____ **Unsat** ____.

K/A: 064000A406 3.9/3.9

Reference(s): Chp 9, Diesel Generators & Aux. Systems, Rev. 1, II.D.1.b, II.G.4.c.1.c, II.B.5.a, LO 5

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** **YES** (Horse Notes Not Allowed)

Contrast the difference between a start of the D/G during normal testing per BOP DG-11 DIESEL GENERATOR STARTUP and a start of the D/G due to a SI signal as they relate to the operation of the D/G Air Compressor and Dryer.

Question No: 2 **Reference Use:** Diesel Generator Room

Following a diesel generator EMERGENCY start, it is required to trip the diesel locally. State three (3) methods that will trip the diesel?

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 1 OF 12)
LOCAL START OF 2B DG

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	**AT 2PM01J CHECK IF BUS 242 CAN BE ENERGIZED BY DG 2B:**	
	a. Place DG 2B feed breaker control switch in - PULL OUT: • ACB 2423	
	b. Place breaker control switches in - PULL OUT: • Non-ESF bus tie (ACB 2421) • SAT feed (ACB 2422) • Reserve feed (ACB 2424)	
	c. Check Bus 242 lockout alarms - NOT LIT: • BUS 242 FD BRKR 2422 TRIP (2-22-A7) • BRKR 2424 CROSS-TIE OVERCURRENT (2-22-B8) • DG 2B OVERLOAD (2-22-B9) • DG 2B GROUND (2-22-C9) • DG 2B DIFF LOCKOUT/OVERSPEED (2-22-D8)	c. IF a fire has occurred, THEN perform the following: 1) Locally check lockout relays NOT tripped: • ACB 2423 (Bus 242 cub 16) • ACB 2424 (Bus 242 cub 4) • ACB 2422 (Bus 242 cub 6) IF any relay is tripped, THEN **GO TO** *ATTACHMENT C, Step 6 (Page 29). 2) **GO TO** Step 2 (Next Page). IF a fire has NOT occurred, THEN **GO TO** *ATTACHMENT C, Step 6 (Page 29).

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 2 OF 12)
LOCAL START OF 2B DG

```
****************************************
*                NOTE                  *
*  The Shift Manager should be informed *
*  of delays so that recovery efforts   *
*  can be prioritized.                  *
****************************************
```

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	**OBTAIN KEYS FROM CENTER DESK:** • U2 PRI-5 keys • B-core masters	Obtain keys from the SE's Office.
3	**CHECK DG 2B SHUTDOWN:**	
	a. RUNNING IDLE light - NOT LIT	a. **GO TO** Step 12 (Page 41).
	b. Check Emergency Stop pushbutton - DEPRESSED	b. Depress Emergency Stop pushbutton.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 3 OF 12)
LOCAL START OF 2B DG

NOTE

A loss of DC Bus #2 will disable the following controls and indications but will NOT prevent DG 2B from starting:

- Auto start of DG supply fan
- 2PL08J annunciators
- Manual speed control
- Start pushbutton
- RESET light
- TRIPPED light
- UNIT AVAILABLE FOR EMERGENCY light
- GEN. ISOLATED from 2PM01J light

4 CHECK DC CONTROL POWER AVAILABLE:

Action/Expected Response	Response Not Obtained
a. DC POWER ON/BUS #1 light - LIT	a. IF a fire has occurred, THEN **GO TO** Step 9 (Page 39). IF a fire has NOT occurred, THEN perform the following: 1) Verify fuses at 2PL08J are NOT blown: • FU27 and FU29 • FU26 and FU28 2) Verify breaker BF1-16 on DC Bus 212 is CLOSED. IF DC Bus #1 can NOT be restored, THEN **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
b. DC POWER ON/BUS #2 light - LIT	b. Perform the following: 1) Verify fuses at 2PL08J are NOT blown: • FU31 and FU33 • FU30 and FU32 2) Verify breaker BR1-13 on DC Bus 212 is CLOSED.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 4 OF 12)
LOCAL START OF 2B DG

5 CHECK STARTING AIR AVAILABLE:

a. At least one air receiver pressure - GREATER THAN 100 PSIG:

- o Left Bank (2PI-DG097B)
- o Right Bank (2PI-DG096B)

Response Not Obtained:

a. Pressurize the selected receiver from the DG starting air cart:

1) Connect air hose to the air receiver drain valve:

- o 2SA147B
- o 2SA147D

2) Open the air receiver drain valve:

- o 2SA147B
- o 2SA147D

3) Open THREE air bottle outlet valves.

4) Set the regulator on the HP air cart to maintain 250 PSIG.

5) Continue with Step 6 (Next Page), WHEN air receiver pressure is greater than 100 PSIG OR stops rising, THEN perform the following:

a) Close the air receiver drain valve:

- o 2SA147B
- o 2SA147D

b) Close the air bottle outlet valves.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 5 OF 12)
LOCAL START OF 2B DG

6 CHECK SUPPORT SYSTEMS ALIGNED:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Air receiver outlet valves - OPEN: • 2SA140B • 2SA140D	a. Open any closed valve.
b. Fuel head tank level - UPPER BULL'S-EYE FULL	b. **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
c. Electro-hydraulic governor:	
1) Settings: • Speed droop - 0 • Load limit - MAX FUEL • Speed - PER PLACARD ON 2PL08J	1) Place governor control(s) in required position.
2) Oil level - WITHIN SIGHTGLASS	2) Add oil.
3) Output shaft (on front of governor) - MAX FUEL	3) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
d. Overspeed governor oil level - WITHIN SIGHTGLASS	d. Add oil.
e. Turning gear - DISENGAGED	e. Disengage the turning gear.
f. Fuel rack manual trip lever - LATCHED IN VERTICAL POSITION	f. Latch the fuel rack trip lever in the vertical position.

Step continued on next page

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 6 OF 12)
LOCAL START OF 2B DG

Step 6 (continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
g. Left bank control air lineup: • Control Air Left Bank Cranking - ON • Control Air Non Failsafe - ON • Control Air Drain - CLOSED	g. Place valve(s) in required position.
h. Jacket water standpipe level - WITHIN SIGHTGLASS	h. Fill the jacket water standpipe per BOP DG-3, FILLING THE DIESEL GENERATOR JACKET WATER SYSTEM. IF standpipe level can NOT be restored, THEN **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
i. Overspeed butterfly valve - OPEN	i. Open and relatch the butterfly valve.
j. Lube oil sump level - WITHIN SIGHTGLASS	j. **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
k. Right bank control air lineup: • Control Air Right Bank Cranking - ON • Control Air Non Failsafe - ON • Control Air Drain - CLOSED	k. Place valve(s) in required position.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 7 OF 12)
LOCAL START OF 2B DG

7 **PREPARE FOR DG 2B START:**

a. Check Bus 242 at 2PM01J - DEAD

a. Contact Shift Manager to determine if local emergency start is still desired.

IF a emergency start is NOT desired, THEN **RETURN TO** procedure and step in effect.

b. Verify DG clear of personnel

c. Request Unit 2 to verify DG 2B controls - ALIGNED FOR AUTO START:

1) DG 2B start switch in - AFTER TRIP

2) ACB 2423 control switch in - AFTER TRIP

d. Momentarily place Annunciator and System Reset switch in - RESET

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 8 OF 12)
LOCAL START OF 2B DG

```
*****************************************
*                NOTE                   *
*  The DG should start when the         *
*  Emergency Stop Reset pushbutton is   *
*  depressed.                           *
*****************************************
```

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	**START DG 2B:**	
	a. Depress Emergency Stop Reset pushbutton	
	b. Check engine - CRANKING	b. Perform the following: 1) Place the DG Control Mode Selector switch in LOCAL. 2) Depress the Start pushbutton. IF the engine fails to start, THEN perform the following: 1) Depress the Emergency Stop pushbutton. 2) **GO TO** Step 9 (Next Page).
	c. Check engine speed - GREATER THAN 590 RPM	c. Perform the following: 1) Depress the Emergency Stop pushbutton. 2) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
	d. Check DG SX valve - OPEN: • 2SX169B	d. Open the valve.
	e. Check Bus 242 - ENERGIZED: • RUNNING LOADED light - LIT	e. **GO TO** Step 12 (Page 41).
	f. **GO TO** Step 13 (Page 42)	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 9 OF 12)
LOCAL START OF 2B DG

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9	**ISOLATE DG 2B CONTROL CIRCUITS:**	
	a. Align switches on 2PL08J:	
	1) Verify Control Mode Selector in - LOCAL	
	2) Place switch 43IS-1 in - ISOL	
	3) Place switch 43IS-2 in - ISOL	
	4) Place switch 43IS-3 in - ISOL	
10	**ALIGN BACKUP FUSES:**	
	a. Place switch 43IS-4 in - ISOL	
	b. Check DC POWER ON/BUS #1 light - LIT	b. **RETURN TO** ATTACHMENT C, Step 6 (Page 29).

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 10 OF 12)
LOCAL START OF 2B DG

****
* NOTE *
* The DG will start when the Emergency *
* Stop Reset pushbutton is depressed. *
****

11 EMERGENCY START DG 2B:

a. Install jumpers at 2PL08J (upper left hand side, rear wall):

- Terminals 7 to 8
- Terminals 43 to 44

b. Momentarily place Annunciator and System Reset switch in - RESET

c. Depress Emergency Stop Reset pushbutton

d. Check engine speed - GREATER THAN 590 RPM

d. Perform the following:

1) Depress the Emergency Stop pushbutton.

2) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).

e. Check DG SX valve - OPEN:

- 2SX169B

e. Open the valve.

f. Check Bus 242 - ENERGIZED:

- RUNNING LOADED light - LIT

f. **GO TO** Step 12 (Next Page).

g. **GO TO** Step 13 (Page 42)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 11 OF 12)
LOCAL START OF 2B DG

12 ENERGIZE BUS 242 FROM DG 2B:

a. Check lockout relays - NOT TRIPPED:

- ACB 2423 (Bus 242 cub 16)
- ACB 2424 (Bus 242 cub 4)
- ACB 2422 (Bus 242 cub 6)

a. Perform the following:

1) Depress DG 2B Emergency Stop pushbutton.

2) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).

b. Check DG voltage - GREATER THAN 4000 VOLTS

b. IF DC POWER ON/FIELD FLASH light is NOT lit, THEN perform the following:

1) Verify fuses FU73 and FU74 at 2PL08J are NOT blown.

2) Verify breaker BF1-19 on DC Bus 212 is CLOSED.

3) IF DG voltage is still less than 4000 VOLTS, THEN perform the following:

a) Depress DG 2B Emergency Stop pushbutton.

b) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).

c. Request Unit 2 to verify ACB 2423 control switch in - AFTER TRIP

Step continued on next page

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D (PG 12 OF 12)
LOCAL START OF 2B DG

Step 12 (continued)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
d. Check Bus 242 - ENERGIZED: • RUNNING LOADED light - LIT	d. Perform the following: 1) Locally verify all breakers on Bus 242 are open. 2) Close ACB 2423 per 2BOA ELEC-5, LOCAL EMERGENCY CONTROL OF SAFE SHUTDOWN EQUIPMENT. IF Bus 242 can NOT be energized, THEN perform the following: 1) Verify ACB 2423 open. 2) Depress DG 2B Emergency Stop pushbutton. 3) **RETURN TO** *ATTACHMENT C, Step 6 (Page 29).
13 DETERMINE BUS LOADING METHOD	
a. Monitor DG per BOP DG-11T2, DIESEL GENERATOR OPERATING LOG	
b. Check if Loss of All AC Power Recovery - IN PROGRESS: o Either Unit 2 ESF bus - ENERGIZED FROM A UNIT 1 DG -OR- o ESF Bus 241 - DEAD	b. **RETURN TO** *ATTACHMENT C, Step 5 (Page 28).
c. **RETURN TO** procedure and step in effect	

-END-

JOB PERFORMANCE MEASURE

CANDIDATE CUE SHEET

TASK CONDITIONS:

1. You are extra licensed operator on shift.
2. The Unit 1 is in Post LOCA Conditions.
3. Unit 2 is in Mode 3, NOP, NOT.
4. Possible failures exist that could affect CC alignment.
5. BOP CC-8 has been completed.

INITIATING CUES:

The US instructs you to separate the CC safety trains per BOP CC-14 Sect. F.2.

NOTES FOR SETUP:

1. *JPM is local alignment of CCW for Post-LOCA alignment. The initial conditions are a LOCA on Unit 1 with possible failures that could affect CCW alignment. Actions provide for train separation (U-1) with B CC Pp available. The evaluated actions are those local actions of BOP CC-14, section 2. (The actions of BOP CC-8 (& CC-10 for aligning 0CC to Unit 1) are completed prior to this JPM.)*

JOB PERFORMANCE MEASURE

TASK TITLE: Align U-1 CC System for Post-LOCA Conditions JPM No.: JPM-10

TPO No: K&A No.: 008000G120 K&A IMP. 4.3/4.2

TRAINEE:________________________________ DATE: ___/___/___

The Trainee: PASSED_________ this JPM TIME STARTED: ________

FAILED __________ TIME FINISHED: ________

EVALUATION METHOD: PERFORM______ SIMULATE_______

LOCATION: IN PLANT______ SIMULATOR______

MATERIALS:

None

GENERAL REFERENCES:

BOP CC-14, POST LOCA ALIGNMENT OF THE CC SYSTEM

TASK STANDARDS:

Perform the actions required to separate CC safety trains with U-1 B CC Pump available for service.

TASK CONDITIONS:

1. You are an extra licensed operator on shift.
2. Unit 1 is in Post LOCA Conditions.
3. Unit 2 is in Mode 3, NOP, NOT.
4. Possible failures exist that could affect CC alignment.
5. BOP CC-8 has been completed.

INITIATING CUES:

The US instructs you to separate the CC safety trains per BOP CC-14 Sect. F.2.

CRITICAL ELEMENTS: (*)

5, 6, 7, 9, 12

APPROXIMATE COMPLETION TIME:__20__ minutes

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
RECORD START TIME ________				
1. Refer to BOP CC-14, POST LOCA ALIGNMENT OF THE CC SYSTEM. **Note: This step may be performed at any time.** **If asked: *All Prerequisites have been met.***	Locate and open BOP CC-14, Sect. 2.	❑	❑	❑
2. Open CC Pp Dsch Hdr Xtie Vlv. **Cue: Valve is OPEN.** **Note**: The valve is operated from the control room.	VERIFY OPEN 1CC9473B, CC Pp Dsch Hdr Xtie Vlv.	❑	❑	❑
3. Open CC Pp Suct Hdr Xtie Isol Vlv. **Cue: Valve is OPEN.**	VERIFY OPEN 1CC9459B, CC Pp Suct Hdr Xtie Isol Vlv.	❑	❑	❑
4. Open CC HX Dsch Hdr Xtie Isol Vlv. **Cue: Valve is OPEN.**	VERIFY OPEN 1CC9467B, CC HX Dsch Hdr Xtie Isol Vlv.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
*5. Close CC Pp Suct Hdr Xtie Vlv. **NOTE: Valve is normally OPEN.** **Cue:** When operated, **Valve is slowly closing & indicates CLOSED.**	CLOSE SLOWLY 1CC9459A, CC Pp Suct Hdr Xtie Vlv.	❑	❑	❑
*6. Close CC Pp Dsch Hdr Isol Vlv. **NOTE: Valve is normally OPEN.** **Cue:** When operated, **Valve is slowly closing & indicates CLOSED.**	CLOSE SLOWLY 1CC9458, CC Pp Dsch Hdr Isol Vlv.	❑	❑	❑
*7. Close CC Pp Dsch Hdr Xtie Isol Vlv. **Cue: Valve is OPEN.** Following CR contact report, **Valve is CLOSED.** **NOTE: The valve is operated from the control room.**	Contact Control Room to check 1CC9473A, CC Pp Dsch Hdr Xtie Isol Vlv position AND Direct closing 1CC9473A.	❑	❑	❑
8. Verify flow from control room. **Cue:** Following CR contact report, **Flow is 4700 gpm.**	VERIFY component cooling flow indicated to 1B RH Heat Exchanger, (1FI-0689, 1PM06J).	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
Notes CAUTION.	CAUTION When the next step is executed: 1. The 1A and/or U-0 CC pump(s) will provide service loads (via 1CC9415) and the 1A RH load. Ensure that flow demand meets pumping capability (<4800 gpm). 2. The 1B CC pump will be serving 'B' train RH load only.	❑	❑	❑
*9. Close CC HX Dsch Hdr Xtie Isol Vlv. **NOTE: Valve is normally OPEN.** **Cue:** When operated, **Valve is closing & indicates CLOSED.**	CLOSE 1CC9467A, CC HX Dsch Hdr Xtie Isol Vlv.	❑	❑	❑
Cue: RCPs are off and CC to RCP's is NOT required.	NOTE Perform step 2.i based on plant conditions, i.e.: only if RCPs are tripped and CC cooling to RCPs is not required.	❑	❑	❑
10. Verify U-1 Service Loop Isol Vlv is closed from control room. **Cue:** Following CR contact report, **Valve is CLOSED.**	VERIFY/CLOSE 1CC9415, MOV U-1 Service Loop Isol Vlv.	❑	❑	❑

PERFORMANCE CHECKLIST	STANDARDS	SAT	UNSAT	N/A
Notes CAUTION.	CAUTION To completely separate the U-1 CC Loop from U-2, CC Flow to the 2A RH HX, 2A RH Pp seal cooler, and U-2 PD charging Pp must be Isolated. If applicable, LCOAR 2BOS 7.3-1a must be initiated on U-2.	❑	❑	❑
11. Notify US to initiate LCOAR 2BOS 7.3-1a. **Cue:** When notified, **US reports LCOAR entered.**	Notify Unit 2 US to initiate LCOAR 7.3-1a.	❑	❑	❑
*12. Isolate U-1 CC Loop from U-2 **Note: For 2CC9504A and 2CC9506B, applicant needs to identify where valves are located, but not simulate valve motion.** **Cue:** When operated, **Valves are closing & indicate CLOSED.**	Close the following valves on U-2 • 2CC9504A - 2A RH HX CC Inlt Isol Vlv. Is located at 364, S-19, AB2, +12 feet • 2CC9506B - 2A RH Pp Clg Wtr Inlt Isol Vlv. Is located at 343, U23, RXB2, +2 feet • 2CC9482B – PD Chg Pp Clg Wtr Inlt Isol Vlv.			

Cue: THIS COMPLETES JPM.

RECORD STOP TIME ________

COMMENTS:

JPM Questions

Question No: 1 **Reference Use:** NO

The maximum CC heat exchanger outlet temperature is designed to be 105°F.

When is this outlet temperature allowed to increase to 120°F?

Expected Answer:

The temperature is allowed to reach 120°F for up to three hours during the initial phase of RHR cooldown.

Actual Answer:

____
____
____
____
____
____
____
____

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 008000A203 3.0/3.2
194001G132 3.4/3.8

Reference(s): CC-1 CC System, Rev.2, CC Design (CC-8, CC-14).

BAR 1-2-C5, Rev. 1, CC HX OUTLET TEMP HIGH, B. NOTE.

Chp 19, Component Cooling System (CC), Rev. 2, I.C.2, page 4; II.B.1.a.13), page 36, LO 9.

JPM Questions

Question No: 2 **Reference Use:** YES

During the performance of 2BOS 7.3.2.a-1, Unit 2 CCW Pump Operability Monthly Surveillance, the following data was collected:

CC PUMPS	2CC01PA	2CC01PB	0CC01P	REQUIRED DATA
START TIME	0000	0900	0430	N/A
MOTOR CURRENT	42	49	43	≤ 50 AMPS
PUMP DSCH PRESS	135	150	135	85 psig < System Pressure < 150 psig
HX OUTLET TEMP	101°F ¢	119°F ¢	100°F ¢	< 118°F
STOP TIME	0430		0900	N/A
RUN TIME	4.5 hours ¢	¢	4.5 hours ¢	≥ 4 HOURS

It is now 1330 and no other pump operations have occurred, what further actions, if any are required and why?

SRO ONLY: What additional actions are required per Technical Specifications?

Expected Answer:

Start the 2A or Common CC pump and secure the 2B CC pump. Take the 2B CC pump OOS due to HX Outlet Temperature not meeting acceptance criteria during the surveillance.

SRO ONLY:
Place the "0" CC pump racked in to BUS 242 and NOT in Pull-Out and 2B CC Pump in Pull-Out.

Actual Answer:

☐ Candidate's response matched expected answer.

Sat _____ **Unsat** _____.

K/A: 008000A303 3.0/3.1

Reference(s): 2BOS 7.3.2.a-1, Unit 2 CCW Pump Operability Monthly Surveillance, Rev 1.
BOP CC-1 COMPONENT COOLING WATER SYSTEM STARTUP, Rev. 1, D.3, page 2.
Chp 19, Component Cooling System (CC), Rev. 2, II.B.1.b, page 38, LO 3, 12.

OPERATOR QUESTION SHEET

Question No: 1 **Reference Use:** NO

The maximum CC heat exchanger outlet temperature is designed to be 105°F.

When is this outlet temperature allowed to increase to 120°F?

Question No: 2 **Reference Use:** **YES**

During the performance of 2BOS 7.3.2.a-1, Unit 2 CCW Pump Operability Monthly Surveillance, the following data was collected:

CC PUMPS	2CC01PA	2CC01PB	0CC01P	REQUIRED DATA
START TIME	0000	0900	0430	N/A
MOTOR CURRENT	42	49	43	≤ 50 AMPS
PUMP DSCH PRESS	135	150	135	85 System 150 psig < Pressure < psig
HX OUTLET TEMP	101°F ¢	119°F ¢	100°F ¢	< 118°F
STOP TIME	0430		0900	N/A
RUN TIME	4.5 hours ¢	¢	4.5 hours ¢	≥ 4 HOURS

It is now 1330 and no other pump operations have occurred, what further actions, if any are required and why?

SRO ONLY: What additional actions are required per Technical Specifications?

* POST LOCA ALIGNMENT OF THE CC SYSTEM

A. STATEMENT OF APPLICABILITY:

This procedure outlines the steps necessary to align the Component Cooling System for Post-LOCA recovery.

B. REFERENCES:

1. P & IDs:

   a. M-66 Sheets 1-4, Component Cooling.

   b. M-139 Sheets, 1 & 2, Component Cooling Unit 2.

2. Station Procedures:

   a. BOP CC-1, Component Cooling System Startup and Operation.

   b. BOP CC-8, Isolation of CC between U-1 and U-2.

   c. BOP CC-10, Alignment of "0" CC PP to a Unit.

   d. BOS 7.3-1a, LCOAR-CC Water System.

3. Westinghouse Evaluation of CC Interunit Sharing - November 28, 1988.

4. Ltr: B. R. Shelton to PWR Station Managers Chron #PWR 127109, May 23, 1989.

5. UFSAR 9.2.2.3.5

C. PREREQUISITES:

1. The Component Cooling System is in operation in accordance with BOP CC-1.

2. Essential Service Water is capable of supplying water to the U-0 CC Heat Exchanger.

D. PRECAUTIONS:

1. The temperature of the cooling water supplied to the various components should not exceed 105°F during normal operation. During initial operation of the RH System, the temperature may be permitted to increase to 120°F for a maximum period of three hours.

2. The Component Cooling Pumps should not be operated with less than 500 gpm flow through an operating pump as determined by a maximum pump discharge pressure of 150 psig on _PI-CC673 locally, on PI-CC107 at _PM06J, or Computer Point P0670.

3. Pump Start Limitations.

   a. 2 Starts from ambient, and 45 minutes cooldown between additional starts.

NOTE
Running start is defined as any start performed after a minimum run time of 45 minutes.

   b. 1 Start from running and 15 minute minimum cooldown between additional starts.

E. LIMITATIONS AND ACTIONS:

1. Two pumps, two heat exchangers, and one surge tank are normally provided for the unit undergoing Post-LOCA recovery. The U-0 Pump is also available and aligned for the Post LOCA unit. Normal procedure is to operate Component Cooling Unit-Separate with Safeguard Trains shared. In this procedure unit separation is accomplished in Subsection F.1 for U-1 and F.4 for U-2. Limitations and Actions for the unit separation operation are included in BOP CC-8 and BOP CC-10.

2. Subsections F.2, F.3, F.5, and F.6 are provided in the event that Separation of the Safeguard Trains is desired. These sections should be performed ONLY with the SE's permission. Limitations and Actions associated with separation of the Safeguard Trains are the following:

3. LIMITATIONS AND ACTIONS FOR TRAIN SEPARATION ONLY

a. CC will be lost to the following components:

1. Spent Fuel Cooling HX.

2. Reactor Coolant Pumps.

3. CV Letdown HX.

4. RCS and Pressurizer Sample Coolers.

5. Boron Recycle System.

6. Waste Gas Compressors.

b. The Spent Fuel Cooling System must be transferred to the unaffected unit.

c If the U-0 CC Pump must be used instead of the _B CC Pump (Alignments Specified in Steps F.3 and F.6) the following Limitations apply:

1. The U-0 CC Pump will be isolated from the Surge Tank.

2. _A CC Pump will be serving _B Train loads and the U-0 CC Pump will be serving _A Train loads. A loss of an ESF Bus will require the following realignments:

a). Loss of _41 Bus will require aligning the flow of the U-0 CC Pump for _B Train RH service.

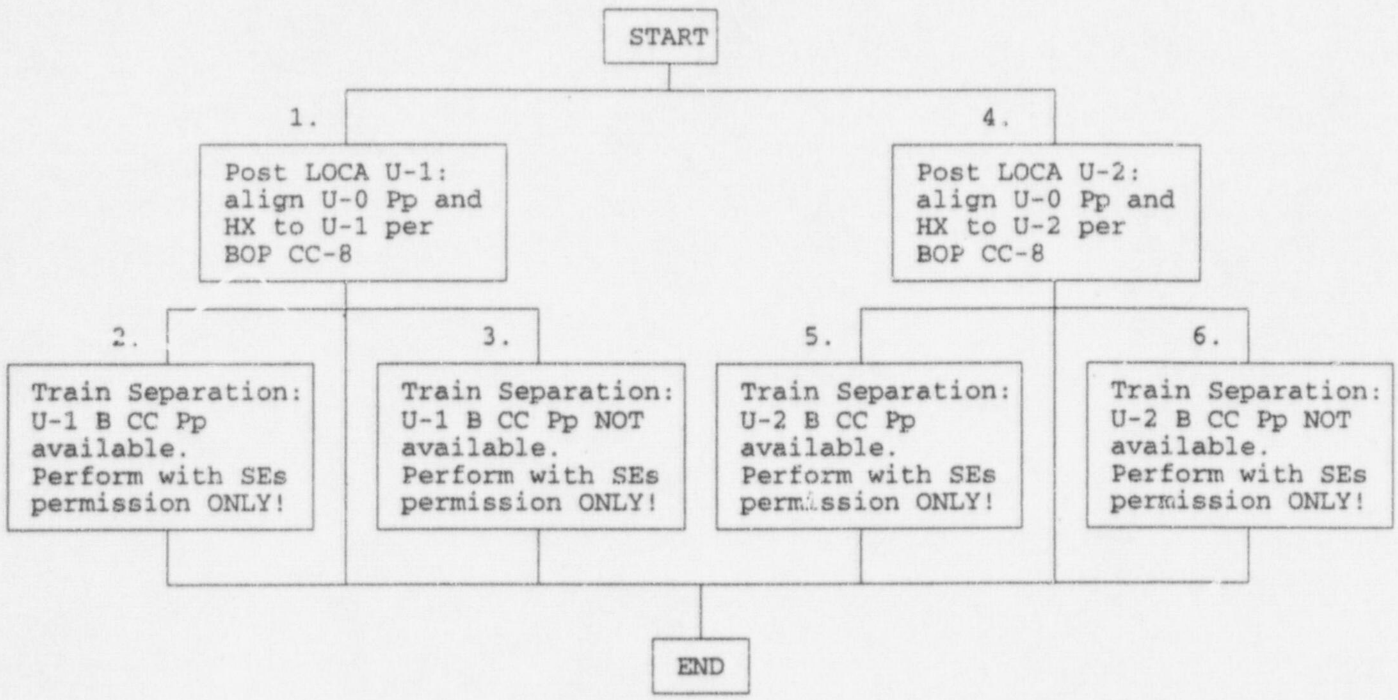
b). Loss of _42 Bus will require one of the following steps:

1). Realign the U-0 Pump Switchgear to the _41 Bus.

2). Realign flow of the _A CC Pump for _A Train RH service.

F. MAIN BODY:

NOTE
The subsections of section F are noted by the following flowchart.



1. To Align U-1 for Post LOCA Recovery, perform the following:

   a. VERIFY/PERFORM BOP CC-8 to ensure that alignments are performed at the discretion of the Shift Engineer based on present heat loads, CC System Pressures, and anticipated unit cool down requirements. Two pumps, two HXs and one surge tank are normally provided for the unit undergoing Post LOCA recovery with the U-0 CC Pump aligned for added support.

NOTE
Subsections 2 and 3 to be performed at the discretion of the Shift Engineer.

2. This section separates Safety Trains with the U-1 'B' CC Pump available for service. Perform ONLY with SE's permission.

   a. VERIFY/OPEN 1CC9473B, CC Pp Dsch Hdr Xtie Vlv.

b. VERIFY/OPEN 1CC9459B, CC Pp Suct Hdr Xtie Isol Vlv.

c. VERIFY/OPEN 1CC9467B, CC HX Dsch Hdr Xtie Isol Vlv.

d. CLOSE SLOWLY 1CC9459A, CC Pp Suct Hdr Xtie Vlv.

e. CLOSE SLOWLY 1CC9458, CC Pp Dsch Hdr Isol Vlv.

f. VERIFY/CLOSE 1CC9473A, CC Pp Dsch Hdr Xtie Isol Vlv.

g. VERIFY component cooling flow indicated to 1B RH Heat Exchanger, (1FI-0689, 1PM06J).

CAUTION

When the next step is executed:

1. The 1A and/or U-0 CC pump(s) will provide service loads (via 1CC9415) and the 1A RH load. Ensure that flow demand meets pumping capability ($\leq$4800 gpm).

2. The 1B CC pump will be serving 'B' train RH load only.

h. VERIFY/CLOSE 1CC9467A, CC HX Dsch Hdr Xtie Isol Vlv.

NOTE

Perform step 2.i based on plant conditions ie: only if RCPs are tripped and CC cooling to RCPs is not required.

i. VERIFY/CLOSE 1CC9415, MOV U-1 Service Loop Isol Vlv.

CAUTION

To completely separate the U-1 CC Loop from U-2, CC Flow to the 2A RH HX, 2A RH Pp seal cooler, and U-2 PD charging Pp must be isolated. If applicable, LCOAR 2BOS 7.3-1a must be initiated on U-2.

j. VERIFY/CLOSE 2CC9504A, 2A RH HX CC Inlt Isol Vlv.

k. VERIFY/CLOSE 2CC9506B, 2A RH Pp Clg Wtr Inlt Isol Vlv.

l. VERIFY/CLOSE 2CC9482B, PD Chg Pp Clg Wtr Inlt Isol Vlv.

3. This Section separates Safeguard Trains when the U-1 'B' CC Pump is NOT available for service. Perform ONLY with the SE's permission.

a. VERIFY/OPEN 1CC9458, CC Pp DSCH HDR ISOL VLV.

b. VERIFY/OPEN 1CC9459A, CC Pp Suct Hdr Xtie Isol Vlv.

c. VERIFY/OPEN 1CC9467A, CC HX Dsch Hdr Xtie Isol Vlv.

CAUTION

Execution of following step will isolate the U-0 CC pump from surge protection. See Limitations And Actions, Section E.3.c.

d. CLOSE SLOWLY 1CC9459B, CC Pp Suct Hdr Xtie Isol Vlv.

e. CLOSE MOV 1CC9473B, MOV CC Dsch Hdr Xtie Isol Vlv.

f. CLOSE MOV 1CC9473A, MOV CC Dsch Hdr Xtie Isol Vlv.

CAUTION

When the next step is executed:

1 The 1A CC pump will provide service loads (via 1CC9415) and 1B RH loads. Ensure that flow demand meets pumping capabilities ($\leq$4800 gpm).

2. The '0' CC pump will be serving 'A' Train RH. Ensure that a flow path is open to the 'A' Train RH HX.

See Limitations And Actions, Section E.3.c

g. CLOSE 1CC9467B, CC HX Dsch Hdr Xtie Isol Vlv.

NOTE

Perform step 3.h. based on plant conditions, ie: only if RCPs are tripped and CC cooling to RCPs is not required.

h. VERIFY/CLOSE 1CC9415, MOV U-1 Service Loop Isol Vlv.

CAUTION

To completely separate the U-1 CC loop from U-2, CC Flow to the 2A RH HX, 2A RH Pp seal cooler, and U-2 PD charging Pp must be isolated. If applicable, LCOAR 2BOS 7.3-1a must be initiated on U-2.

i. VERIFY/CLOSE 2CC9504A, 2A RH HX CC Inlet Isol Vlv.

j. VERIFY/CLOSE 2CC9506B, 2A RH Pp Clg Wtr Inlt Isol Vlv.

k. VERIFY/CLOSE 2CC9482B, PD Chg Pp Clg Wtr Inlt Isol Vlv.

4. To Align U-2 for Post LOCA Recovery, perform the following:

   a. VERIFY/PERFORM BOP CC-8 to ensure that alignments are performed at the discretion of the Shift Engineer based on present heat loads, CC System Pressures, and anticipated unit cool down requirements. Two pumps, two HXs and one surge tank are normally provided for the unit undergoing Post LOCA recovery.

> **NOTE**
> Subsections 5.0 and 6.0 to be performed at the discretion of the Shift Engineer.

5. This section separates Safety Trains with the U-2 'B' CC Pump available for service. Perform ONLY with the SE's permission.

   a. VERIFY/OPEN 2CC9473B, MOV CC Pp Dsch Hdr Xtie Vlv.

   b. VERIFY/OPEN 2CC9459B, CC Pps Suct Hdr Xtie Isol Vlv.

   c. VERIFY/OPEN 2CC9467B, CC HX Dsch Hdr Xtie Isol Vlv.

   d. CLOSE SLOWLY 2CC9459A, CC Pps Suct Hdr Xtie Vlv.

   e. CLOSE SLOWLY 2CC9458, CC Pp Dsch Hdr Isol Vlv.

   f. VERIFY/CLOSE 2CC9473A, MOV CC Pp Dsch Hdr Xtie Isol Vlv.

   g. VERIFY Component Cooling flow to 1B RH Heat Exchanger, (2FI-0689, 2PM06J).

> **CAUTION**
> When the next step is executed:
>
> 1. The 2A and/or U-0 CC pump(s) will provide service loads (via 2CC9415) and the 2A RH load. Ensure that flow demand meets pumping capability ($\leq$4800 gpm).
>
> 2. The 2B CC pump will be serving 'B' Train RH load only.

   h. VERIFY/CLOSE 2CC9467A, CC HX Dsch Hdr Xtie Isol Vlv.

> **NOTE**
> Perform step 5.i. based on plant conditions ie: only if RCPs are tripped and CC cooling to RCPs is not required.

   i. VERIFY/CLOSE 2CC9415, MOV U-2 Service Loop Isol Vlv.

CAUTION
To completely separate the U-2 CC loop from U-1, CC flow to the 1A RH HX, 1A RH Pp seal cooler, and U-1 PD charging Pp must be isolated. If applicable, LCOAR 1BOS 7.3-1a must be initiated on U-1.

j. VERIFY/CLOSE 1CC9504A, RH HX 1A CC Inlt Isol Vlv.

k. VERIFY/CLOSE 1CC9506B, 1A RH Pp CC Inlt Isol Vlv.

l. VERIFY/CLOSE 1CC9482B, PD Chg Pp CC Inlt Isol Vlv.

6. This Section separates Safeguard Trains when the U-2 'B' CC Pump is NOT available for service. Perform ONLY with SE's permission.

a. VERIFY/OPEN 2CC9458, CC Pp Dsch Hdr Isol Vlv.

b. VERIFY/OPEN 2CC9459A, CC Pps Suct Hdr Xtie Vlv.

c. VERIFY/OPEN 2CC9467A, CC HX Dsch Hdr Xtie Isol Vlv.

CAUTION
Execution of following step will isolate the U-0 CC pump from surge protection. See Limitations And Actions, Section E.3.c.

d. CLOSE SLOWLY 2CC9459B, CC Pps Suct Hdr Xtie Isol Vlv.

e. CLOSE MOV 2CC9473B, CC Pp Dsch Hdr Xtie Isol Vlv.

f. CLOSE MOV 2CC9473A, MOV CC Pp Dsch Hdr Xtie Isol Vlv.

CAUTION
When the next step is executed:

1. The 2A pump will provide service loads (via 2CC9415) and 2B Train RH loads. Ensure that flow demand meets pumping capability ($\leq$4800 gpm).

2. The '0' CC pump will be serving 'A' Train RH. Ensure that the flow path to the 2A Train RH is open.

See Limitations And Actions, Section E.3.c.

g. CLOSE 2CC9467B, CC HX Dsch Hdr Xtie Isol Vlv.

NOTE
Perform step 6.h. based on plant conditions, ie: only if RCPs are tripped and CC cooling to RCPs is not required.

h. VERIFY/CLOSE 2CC9415, MOV U-2 Service Loop Isol Vlv.

CAUTION
To completely separate the U-2 CC loop from U-1, CC flow to the 1A RH HX, 1A RH Pp seal cooler, and U-1 PD charging Pp must be isolated. If applicable, LCOAR 1BOS 7.3-1a must be initiated on U-1.

i. VERIFY/CLOSE 1CC9504A, RH HX 1A CC Inlt Isol Vlv.

j. VERIFY/CLOSE 1CC9506B, 1A RH Pp CC Inlt Isol Vlv.

k. VERIFY/CLOSE 1CC9482B, PD Chg Pp CC Inlt Isol Vlv.

G. CHECKOFF LIST:

VALVE #	DESCRIPTION	LOCATION
1CC9458	CC Pp Dsch Hdr Isol Vlv, +10	364' L17 AB1
1CC9459A	CC Pp Suct Hdr Xtie Isol Vlv, +8'	364' L17 AB1
1CC9459B	CC Pp Suct Hdr Xtie Isol Vlv, +8'	364' L17 AB1
1CC9467A	CC HX Dsch Hdr Xtie Isol Vlv, +9'	364' N15 AB1
1CC9467B	CC HX Dsch Hdr Xtie Isol Vlv, +9'	364' M16 AB1
1CC9482B	PD Charging Pp CC Inlt Isol Vlv	364' S16 AB1
1CC9504A	Rh HX 1A CC Inlt Isol Vlv, +3'	375' S16 AB1
1CC9506B	1A RH Pp CC Inlt Isol Vlv, +3'	343' U12 RXB1
2CC9467A	CC HX Dsch Hdr Xtie Isol Vlv, +10'	364' M19 AB2
2CC9467B	CC HX Dsch Hdr Xtie Isol Vlv, +10'	364' M18 AB2
2CC9482B	PD Charging Pp Clg Wtr Inlt Isol, +1'	364' S19 AB2
2CC9504A	2A RH HX CC Inlt Vlv, +12'	364' S19 RXB2
2CC9506B	2B RH Pp Clg Wtr Inlt Isol Vlv +2'	364' P18 AB2
2CC9458	CC Pp Dsch Hdr Isol Vlv, +10'	364' L19 AB2
2CC9459A	CC Pps Suct Hdr Xtie Vlv, +8'	364' L19 AB2
2CC9459B	CC Pps Suct Hdr Man Xtie Isol Vlv, +7'	364' L18 AB2

incorrectly noted in procedure - It should be 2A RH Pump AP

(Final)

(0231VV/WPF/050694)

UNIT TWO
COMPONENT COOLING WATER PUMP
OPERABILITY MONTHLY SURVEILLANCE

A. STATEMENT OF APPLICABILITY:

This procedure applies to the monthly verification of the operability of the component cooling pumps.

B. REFERENCES:

1. Technical Specification

   a. 4.7.3.2.a

2. Station Procedures

   a. BOP CC-2, Component Cooling Water System Shutdown.

   b. BOP CC-15, Switching Operating and Standby Component Cooling System Pumps.

   c. BOP CC-E2, Component Cooling System Electrical Lineup (Unit 2).

   d. BOP CC-M2, Component Cooling System Valve Lineup.

   e. 2BOS 7.3-1a, LCOAR Component Cooling Water System Tech Spec LCO #3.7.3.

3. Station Drawings

   a. M-66, Component Cooling.

C. PREREQUISITES:

1. Receive permission from the Shift Manager or designated SRO licensed assistant prior to performing this surveillance by having the Data Package Cover Sheet signed and dated.

D. PRECAUTIONS:

1. Ensure the CC surge tank is within its normal operating level.

2. Taking a control switch from the Pull-to-lock position can auto-start the pumps due to low system pressure.

E. LIMITATIONS AND ACTIONS:

1. As stated in Technical Specifications Limiting Condition for Operation 3.7.3.

2. In the event the Acceptance Criteria is not met during the performance of this procedure IMMEDIATELY notify the Shift Manager to initiate LCOAR 2BOS 7.3-1a, LCOAR Component Cooling Water System Tech Spec LCO #3.7.3.

F. MAIN BODY:

> **NOTE**
> Initial each step in the space provided adjacent to the Main Body step number AFTER the step has been SUCCESSFULLY completed. Persons performing INDEPFNDENT VERIFICATION should initial in the space provided below the step.

> **NOTE**
> In order to verify the operability of a component/system the Shift Manager may elect to perform individual steps of this procedure provided all Prerequisites, Precautions and Limitations and Actions are observed.

> **NOTE**
> The start time for a running pump shall be the time when the surveillance is started.

_____ 1. VERIFY Operability of CC Pumps:

a. VERIFY/START the applicable CC Pump and record start time on CC Pump Data Chart.

b. ENTER data for the running pump(s) in the Data Chart after $\geq$ 4 hours from the time recorded in step F.1.a.

> **NOTE**
> If necessary to swap pumps then refer to BOP CC-15, Switching Operating and Standby Component Cooling System Pumps.

c. Complete steps F.1.a and F.1.b for each non-operating pump.

F.continued

CC PUMPS	2CC01PA	2CC01PB	0CC01P	REQUIRED DATA
START TIME				N/A
MOTOR CURRENT				≤ 50 AMPS
PUMP DSCH PRESS				85 System 150 psig < Pressure < psig
HX OUTLET TEMP	¢	¢	¢	< 118°F
STOP TIME				N/A
RUN TIME	¢	¢	¢	≥ 4 hours

2. VERIFY 2 CC pumps will auto-start on an ESF actuation:

   a. Initial the OPERABLE CC pump on Division 21:

      _____ 2A CC pump racked in to BUS 241 and <u>NOT</u> in Pull-out

      INDEPENDENT VERIFICATION ___________________

      -OR-

      _____ 0 CC pump racked in to BUS 241 and <u>NOT</u> in Pull-out and 2A CC pump in Pull-out.

      INDEPENDENT VERIFICATION ___________________

   b. Initial the OPERABLE CC pump on Division 22:

      _____ 2B CC pump racked in to BUS 242 and <u>NOT</u> in Pull-out.

      INDEPENDENT VERIFICATION ___________________

      -OR-

      _____ 0 CC pump racked in to BUS 242 and <u>NOT</u> in Pull-out and 2B CC pump in Pull-out.

      INDEPENDENT VERIFICATION ___________________

¢ _____ c. VERIFY one CC pump OPERABLE on each Division in F.2.a and F.2.b above.

G. ACCEPTANCE CRITERIA:

1. At least two component cooling water pumps shall be demonstrated operable by verifying that each pump starts upon actuation, operates for at least 4 hours, satisfies the cooling requirements for the routine operation of the component cooling water system, and is capable of auto-starting on an ESF actuation.

NOTE

If a CC pump is running then it shall be implied that the pump has started upon actuation.

(Final)

FINAL AS-ADMINISTERED SCENARIOS FOR BYRON EXAMINATION - SEP 1998

Simulation Facility Byron 1 & 2 Scenario No.: 1 Op Test No.: 1

Examiners: ____________________ Operators: ____________________ SRO

____________________ ____________________ RO

____________________ ____________________ BOP

Objectives: In accordance with plant procedures:

1. raise reactor power.
2. respond to trip of Component Cooling water Pump with failure of auto-start of standby pump due to header pressure instrument failure.
3. respond to failure of controlling pressurizer level channel
4. respond to degraded operation of Charging Pump.
5. respond to failure of the steam header pressure transmitter supplying feedwater pump speed control.
6. respond to a faulted steam generator with failure of ESF signal for Steamline Isolation.
7. respond to Pzr PORV failing open
8. perform actions for a loss of heat sink.

Initial Conditions:

1. IC-18, Reactor Power 75%, MOL, BGP 100-3, step F.61.
2. PZR level control is selected to 459/460.
3. 1B CV Pump running; 1A CV Pump in standby
4. SG 1B level LT-557 is out of service.
5. 1B AF pump OOS, 1A HDP OOS.

Turnover:

1. Reactor power is 75%.
2. Raise reactor power at 5 MW/hr after shift turnover.
3. 1B CV Pump is currently in service following pump seal replacement testing. 1A CV Pump is in standby.
4. Narrow range level transmitter LT-557 on SG B is out of service. All required actions have been performed per BOA INST-2 and the AR has been initiated.
5. The Diesel Driven Aux Feedwater Pump is OOS for replacement of a fuel injector. The pump has been OOS for 6 hours and is expected to be returned to service by the end of the shift.
6. 1A Heater Drain Pump is out of service for motor bearing replacement.
7. A thunderstorm warning is in effect for Stephenson, Winnebago and Ogle counties for the next 4 hours.

Event No.	Malf. No.	Event Type*		Event Description
Preload	FW43 FW44			1A and 1B AFW Pumps fail to start
Preload	RX06H, 0 MRF - RX125 trip RX072 trip RX113 trip RX146 trip			Narrow Range Steam Generator level LT-557 out of service
Preload	RP-34, OUT RP-35, OUT RP-60, OUT RP-61, OUT			Failure of MSIV automatic closure signal
Preload	MS01A, 100%			1A MSIV Fails to Close
1		R	RO SRO	Raise reactor power (5 MW/min)
		N	BOP SRO	Set and raise turbine load
2	CC01B CC02B, 144	C	BOP SRO	1A CC Pump trips coincident with 1B CC Pump discharge pressure switch failing as-is.
3	RX13A, 0, 120	I	RO SRO	Controlling pressurizer level (1LT-459) fails downscale on a 120 second ramp. **NOTE 1**
4	CV29B,75%	C	RO SRO	Running charging pump 1B experiences impeller degradation of 75% over a 4 minute period causing reduction in flow and pressure
5	RX05, 0	I	BOP SRO	Steam Header Pressure Detector PT-507 fails low
6	MS09, 3.5 MLBH	M	RO SRO BOP	Main Steam Header Break with failure of MSIV auto closure
7	(MS01A)	C	RO SRO BOP	1A Steam Generator MSIV failure to close both automatic and manual
8	(FW43)	M	RO SRO BOP	1A MD AFW pump trip results in loss of feed.
9	TH01B, 100	C	RO SRO	Pzr PORV 456 fails open

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

NOTE 1: When RO identifies failing channel or LOW PZR LEVEL alarm is actuated, immediately fail channel LOW to ensure letdown isolation.

EVENT 3: MRF RP20 – cabinet #1 (door) open
MRF RX029 – LB459A (bistable) trip

SCENARIO #1-1

SCENARIO SUMMARY:

Reactor power is 75%. The 1B AF pump is OOS due to injection pump replacement, and has been OOS for the past 6 hours. The AF pump is expected to be returned to service in the next 12 hours. SG 1B Narrow Range Steam Generator Level Transmitter LT-557 is out of service. All required actions have been performed and an AR has been initiated. 1A Heater Drain Pump is out of service for motor bearing replacement. Power is to be increased after shift turnover at 5MW/min.

After power has been increased approximately 5%, the 1A CC Pump will trip and the standby 1B CC Pump will NOT auto start due to failure of the associated discharge pressure instrument. BOA PRI-6 will be entered and the operator will be required to recognize failure of auto start of the standby pump, diagnose failed pressure instrument and start the 1B CC Pump. The SRO will address Technical Specification, Condition B.

Two minutes after the actions are determined for the inoperable CC pump, the controlling channel of pressurizer level (LT-459) will fail downscale on a 120 second ramp. BOA INST-2, ATTACHMENT C will be entered to restore pressurizer level and select an operable channel. Letdown will be placed back in service and heaters restored. Channel LT-459 will be taken OOS and Technical Specification 3.3.1 Table 3.3.1-1 Function 9 actions (Condition J) addressed.

Following Technical Specification actions, the 1B Charging Pump experiences impeller degradation (to 50%) resulting in reduction of charging flow and discharge pressure. Low charging line flow alarm actuates and pump amps will decrease. Operator response should include placing the 1A Charging Pump inservice and stopping the 1B Pump. The SRO addresses Technical Specifications 3.5.2 (Condition A) and 3.5.5 (Condition A) and TRM 3.1.d.

After addressing the failed Charging Pump actions, steam header pressure transmitter PT-507 will fail downscale causing feedwater pumps to go to minimum flow. Manual control will have to be taken of the feedpump speed controller to restore normal feed flow (FW header pressure).

A Main Steam header break occurs at the steam header crosstie with a failure of the Steamline Isolation automatic closure signal and a failure of the 1A MSIV to close. The 1A AFW pump will trip on overcurrent. Feed flow is lost to the SGs. BFR-H.1 will be entered and an alternate method of feedwater will be required. With 1A steam generator being faulted, the actions of BEP-2 will be required following transition from BFR-H.1. One Pzr PORV will fail open requiring the operator to close its associated Block valve to isolate the leak path to the PRT. The scenario ends following transition to BEP-1 after isolating the faulted SG in BEP-2.

ERG-Based Critical Tasks

1. EP-0 – P: Manually actuate main steamline isolation before a severe challenge develops to either the Subcriticality or the Integrity CSF OR before transition to BCA-2.1, whichever occurs first.
2. EP-2 – A: Isolate the faulted SG before transition out of EP-2.
3. FR-H.1 – A: Establish feedwater flow into at least one SG before RCS bleed and feed is required.

Scenario No: 1-1		Event No. 1	Page 4 - 5 of 24
Event Description:		Normal power increase at 5 MW/min	

Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BGP 100-3, Step F.61.
	US	Direct increase to 100% power at 5 MW/minute.
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	Verify rod position and boron concentration. Initiate dilution, if required. (BOP CV-5) • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Cont to desired dilution rate. • Verify 1CV111A in AUTO • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Verify 1CV11B & 1CV110B in AUTO • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (CV111A & 111B open, PW pump is running, CV110B opens [if ALT DIL]) • Verify PW flow on recorder • Verify B/U Heaters ON and spray valves 1RY455B/C modulates OPEN.
	BOP	Initiate turbine load increase: • DEPRESS the LOAD RATE MW/MIN Pushbutton • VERIFY/ENTER the desired load rate of 5.0 MW/min • DEPRESS the REF Pushbutton • Using the number Pushbuttons, SET in 1050 MW on the REFERENCE DEMAND window • When ready to begin load increase, depress GO • Verify load increases.

Comments: ____

Scenario No: 1-1		Event No. 1	Page 4 - 5 of 24
Event Description:		Normal power increase at 5 MW/min	

Time	Position	Applicant's Actions or Behavior
	RO	Monitor power increase: • Monitor reactor power, Tave • Verify rods move in AUTO to maintain Tave within ± 2.0°F of Tref. If diluting: • Monitor VCT level • Verify RCS concentration decreasing • Monitor Primary Water Control counter countdown. • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow for current boron concentration.

Comments: ______________________________

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Scenario No: 1-1	Event No. 2	Page 6 - 7 of 24
Event Description:	The 1A CC Pump trips. Normally the standby pump (1B CC Pp) would start on low CC header discharge pressure; however, the 1B CC Pump discharge header pressure instrument fails as-is.	

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators (1-2-A4) CC PUMP TRIP (1-2-B5) CC PUMP DSCH PRESS LOW May also receive associated CC low flow alarms for cooled equipment • 1PI-CC107 indicates LOW
	US/BOP	Identify/report trip of CC Pump 1A. Identify/report failure of 1B CC Pump to start on low header pressure.
	US	Implement BOA PRI-6 "Component Cooling Malfunction" and direct operator action.

	BOP/US	Perform actions of BOA PRI-6 as directed:
		
		• Check CC Surge Tank level > 13% and stable
		
		• Check CC Pumps and manually start standby CC Pump (1B)
		
		• Check CC system pressure > 85 psig.
		
		• Check CC HX outlet temperatures < 105°F
		
		• Check CC flow to RCP cooling. The following alarms NOT lit:
		  • RCP __ THERM BARR CC WTR FLOW LOW (1-7-_4)
		  • RCP __ BRNG CC WTR FLOW LOW (1-7-_5)
		  • RCP THERM BARR CC WTR TEMP HIGH (1-7-E3)
		  • RCP THERM BARR CC WTR FLOW HIGH LOW (1-7-E4)
		  • RCP BRNG CC WTR TEMP HIGH (1-7-E5)
		
		• Check letdown temperatures. LTDWN HX OUTLET TEMP HIGH (1-8-C5) & LTDWN TEMP HIGH (1-9-E2) alarms NOT lit.
		
		• Check CC Surge Tank level between 50% and 65%
		
		(NOTE: The crew may place the "0" CC pump in AFTER TRIP with the "1A" CC pump in PTL.)

Comments: ______________________________

Scenario No: 1-1		Event No. 2	Page 6 - 7 of 24
Event Description:		The 1A CC Pump trips. Normally the standby pump (1B CC Pp) would start on low CC header discharge pressure; however, the 1B CC Pump discharge header pressure instrument fails as-is.	
Time	Position	Applicant's Actions or Behavior	
	US	Check Technical Specifications: • 3.7.7 • CONDITION B - Restore required CC Pump to OPERABLE status within 7 days.	
	US	Inform SM/Maint of trip of 1A CC Pump Inform SM/Maint of failure of 1B CC Pump to auto start.	
	US	Inform SM of unit status.	

Comments: ____

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Scenario No: 1-1	Event No. 3	Page 8 - 9 of 24
Event Description:	Selected controlling PZR level channel 1LT-459 fails LOW over a 120 second period. This results in isolation of CVCS letdown, rising charging flow, Pzr heaters deenergized, and rising PZR level.	

Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators (1-12-A4) PZR LVL LOW HTRS OFF LTDWN SECURED (1-12-B4) PZR LEVEL CONT DEV LOW • PZR heaters tripped OFF • Letdown Isolation Valve LCV-459 & Orifice Isolation valves 1CV8149A/B/C CLOSE • Charging flow control CV-121 throttles open to increase flow
	RO/US	Identify/report failed PZR level channel: • LT-459
	US	Implement BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment C "PRESSURIZER LEVEL CHANNEL FAILURE" and direct operator action.
	RO/US	Check PZR Level: • Verify level normal (56% to 60%) • If NOT take manual control of either the master level controller (LK-459) OR CV121 valve (FK-121) and adjust charging flow to minimum while maintaining RCP seal injection flow within required limits. • Select Operable Channel on LEVEL CHANNEL SELECTOR by placing to **461/460** position. o Verify Channel 460 or 461 selected on PZR level recorder
	RO	Reestablish normal letdown per BOP CV-17: • Place letdown pressure controller PCV-CV131 in MAN and raise de[illegible]0% • Place letdown Hx Out temperature controller TCV-CC130A to MAN and raise demand to 60%. • Open Letdown Line Isolation valve LCV-CV460 o Verify open inservice regen Hx isolation valves CV8324A/B & CV8389A/B o Verify open Letdown Line CNMT isolation valves CV8160 & 8152 • When plant conditions are stable and PZR level at normal (58-60%), place FCV-121 in AUTO.

Comments: ____

Scenario No: 1-1	Event No. 3	Page 8 - 9 of 24
Event Description:	Selected controlling PZR level channel 1LT-459 fails LOW over a 120 second period. This results in isolation of CVCS letdown, rising charging flow, Pzr heaters deenergized, and rising PZR level.	

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	• Adjust in MAN Cent Chg Pump Flow controller FK-121 to establish ≈ 100 gpm charging flow with 8-10 gpm seal injection flow. • Open the selected letdown orifice isolation valve(s) CV8149 A/B/C to establish desired letdown flow • Adjust PCV-CV131 to obtain 360-380 psig on PI-131 and place in AUTO • Adjust TCV-CC130A to obtain 90-115°F on TK-130 and place in AUTO • Restore Variable Heaters by taking Control Switch to CLOSE.
	US/RO	Trip bistables by placing in TEST: • LB459A C1-751 BS-1 PZR HI WTR LVL RX TRIP
	RO/US	Place PZR level control in AUTO: • Master PZR Level Controller • 1CV121 controller
	US	Check Technical Specifications: • 3.3.1 - Rx Trip Inst. Table 3.3.1-1 FU 9; Req Channels 3 - Ensure only ONE channel inop; place inop channel in TRIP within 6 hours • 3.3.3 - Post Accident Monitoring. Table 3.3.3-1 Function 6; Req Channels 2 - NO ACTION • 3.3.4 - Remote Shutdown System. CONDITION A - Restore required Function to OPERABLE within 30 days
	US	Inform SM/Maint of PZR level channel LT-459 status.
	US	Inform SM of unit status/potential GSEP event.

Comments: ____

Scenario No: 1-1	Event No. 4	Page 10 - 11 of 24

Event Description:	The running CVCS Charging Pump (1B) experiences impeller degradation of 75% over a 5-minute period. This condition results in decreasing charging flow and charging header pressure.

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator (1-9-D3) CHG LINE FLOW HIGH LOW (1-7-B2) RCP SEAL WTR INJ FLOW LOW • CV pump amp indication decreasing • FI-121 flow lowering • Possible indications of letdown line flashing (and associated alarms)
	RO/US	Identify/report lowering charging flow/ Charging Pump 1B degradation.
	RO/US	Response per AR 1-9-D3: • Ensure PZR level is normal • Check RCP seal injection flow, if NO flow go to BOA RCP-2 (See actions covered below on this page.) • Check for flow control failure • IF desired, start second Charging Pu p • Check output of PZR Master Level Controller 1LK-459
	CREW	Dispatch operator to check Charging Pump 1B Dispatch operator to check Charging Pump 1A if started
		NOTE: BOA RCP-2 " Loss of Seal Cooling" may also be entered due to loss of RCP seal injection flow. If so. Actions are directed per step 1 of BOA RCP-2 below.
	US	Implement BOA RCP-2 " Loss of Seal Cooling" and direct operator action.
	RO/US	• Check seal cooling: o RCP seal outlet temperatures less than 235°F (TI-173/171/169/167) o RCP lower bearing temperatures less than 225°F (TI-172/170/168/166) o CC flow to RCP thermal barrier FLOW LOW annunciators not lit (1-7-A4/B4/C4/D4)

Comments: ____

Scenario No: 1-1	Event No. 4	Page 10 - 11 of 24
Event Description:	The running CVCS Charging Pump (1B) experiences impeller degradation of 75% over a 5-minute period. This condition results in decreasing charging flow and charging header pressure.	

Time	Position	Applicant's Actions or Behavior
	RO/US (cont.)	• Restore seal injection: • Start a CV pump o Check seal injection isol valves open (CV8355A/B/C/D) o RCP SEAL WTR INJ FILTER DP HIGH annunciator (1-7-A2) not lit • Establish seal injection flow between 8 gpm & 13 gpm per RCP: o Throttle CV121 o Throttle CV182
	RO	When Charging Pump 1B stopped, place control switch in PULL TO LOCK.
	US	Check Technical Specifications: • 3.5.2 - ECCS subsystems CONDITION A - Restore charging pump within 7 days. Check Technical Requirements Manual: • 3.1.b Boration Flow Paths - Operating (see below) • 3.1.d Charging Pumps - Operating, CONDITION A - Restore charging pump within 7 days.
	US	Inform SM/Maint of 1B Charging Pump trip/problem
	US	Inform SM of unit status/potential GSEP event.

Comments: ____

Event Description:	Steamline pressure sensor PT-MS507 fails LOW causing FW Pump speeds to decrease. Manual control of FW Pump master controller is expected. Steam Dumps are affected if operated in STM PRESS Mode; the dumps will NOT open in AUTO since measured pressure is ZERO.

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-15-A9/B9/C9/D9) S/G 1_ LEVEL DEVIATION HIGH LOW (1-15-A3/B3/C3/D3) S/G 1_ FLOW MISMATCH STM FLOW LOW PI-507 indication at bottom of scale PI-507 computer input low Decreasing SG levels Decreasing feedwater flow FW pump(s) decrease speed
	BOP	Identify/report PT-507 failed low
	BOP/US	Response per AR 1-15-A9/B9/C9/D9 and 1-15-A3/B3/C3/D3: • Take MAN control of FW Pump speed controller (Feedwater Pumps Master Controller) and raise speed to increase FW flow • If required, take MAN control of FW Reg valves (FW 510/520/530/540) and open to restore level • Recover SG levels to 63% (± 5%) • Monitor SG levels and FW flows, adjusting feed pump speed as necessary • Return FW Reg valves to AUTO if required
	US	Inform SM/Maint of PT-507 failure/status.

Comments: ____

Scenario No: 1-1		Event No. 6	Page 13 - 15 of 24
Event Description:		A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.	

Time	Position	Applicant's Actions or Behavior
	CUE	Increased steam flow indication on all SGs (until MSIVs close) SG pressures decreasing RCS temperature falling PZR level lowering PZR pressure lowering
	US	Implement BEP-0 "REACTOR TRIP OR SI"

	RO	Perform immediate operator actions of BEP-0:
		• Verify reactor trip
		  • Rod bottom lights LIT
		  • Reactor trip & Bypass breakers open
		  • Neutron flux lowering

	BOP	• Verify Turbine Trip
		  • Turbine throttle valves closed
		  • Turbine governor valves closed
		• Verify power to 4KV busses
		  • Bus 141 alive light lit
		  • Bus 142 alive light lit

	CREW	Determine SI needed/actuated
		• If actuated
		  • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1)
		  • SI ACTUATED lit (1-BP-4.1)
		  • SI Equipment actuated (SI pumps running, CV Cold leg injection SI8801A/B open)

Comments: ____

Scenario No: 1-1	Event No. 6	Page 13 - 15 of 24

Event Description: A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.

Time	Position	Applicant's Actions or Behavior

	CREW (cont.)	• If SI NOT actuated
		  • Check
		    • PZR pressure <1829 psig
		    • Steamline pressure <460 psig
		    • CNMT pressure > 3.4 psig
		    • PZR level CANNOT be maintained > 4%
		  • Manually actuate SI

	CREW	Identify/report failure of MSIVs to close on SG low(ering) pressure at 640 psig.

	BOP/US	• Verify FW isolated
		  • FW pumps tripped
		  • Isolation monitor lights lit
		  • FW pumps disch valves closed (FW002A-C)

	RO/US	• Verify ECCS pumps running
		  • CENT Chg pumps
		  • RH pumps
		  • SI pumps

	RO/US	• Monitor RCP trip criteria and trip RCPs
		  o RCS pressure < 1370 psig AND HHSI flow > 50 gpm OR SI flow > 100 gpm
		  o CNMT Phase B actuated
		  o Loss of CC water to RCP

Comments: ____

Scenario No: 1-1		Event No. 6	Page 13 - 15 of 24
Event Description:		A steam break outside CNMT develops on steam header crosstie. MSIVs fail to close automatically on SGs low pressure. Manual operation of MSIVs (Control Room control switches) is available.	

Time	Position	Applicant's Actions or Behavior
	BOP/US	• Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit
		SEE Event 7

Comments: ____________________

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Scenario No: 1-1	Event No. 7 , 8 & 9	Page 16 - 24 of 24

Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close duc to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior
	BOP	Identifies/reports failure of AFW Pump 1A to start.
	BOP/US	• Verify AF system: • AF 1B pump OOS and NOT available • AF 1A pump fails to start manually • AF isolation valves open (AF13A-H) • AF flow control valves throttled (AF005A-H) • Verify RCFCs running in LOW SPEED • Verify CC Pumps running • Verify SX Pumps running
	BOP/US	• Check Main Steamline Isolation • Check SG pressure < 640 psig • Check CNMT pressure >8.2 • Verify MSIV and MSIV Bypass valves closed
	BOP	If NOT performed previously, identify/report MSIV failure to auto close

Comments: ____

Event Description:	The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior
	BOP/US [CT] E-0--P	• Manually actuate Main Steamline Isolation • Verify MSIV and MSIV Bypass valves closed o Identify/report 1A MSIV failed to close. SG 1A still steaming
	BOP/US	• Check if CNMT Spray is required • CNMT pressure > 20 psig • Determine/report CNMT Spray NOT required
	BOP/US	• Verify AF flows • AF flow > 500 gpm • Determine/report AF flows ZERO • Check SG levels > 10% • If level is NOT > 10% in any SG (i.e. ≤ 10% in ALL SGs), then transition is made to 1BFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" (Actions of 1BFR-H.1 covered below)
		1BFR-H.1 ACTIONS
	US	Transition to 1BFR-H.1 "RESPONSE TO LOSS OF SECONDARY HEAT SINK" • Direct initiation of Critical Safety Function Status Tree monitoring.
	US	Direct action of BFR-H.1

Comments: ______________________________

Event Description:	The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior
	CREW	• Check secondary heat sink required • RCS pressure > non-faulted SG pressure • RCS temperature > 350°F
	RO/US	• Check at least ONE Cent Chg pump running
	CREW	• Check if Feed and Bleed is required by either ONE of the following: • Wide Range level in any THREE SGs < 27% OR • PZR pressure > 2335 psig due to loss of heat sink Determine/report Feed & Bleed is NOT required at this time.
	BOP/US	• Try to establish AF flow to ONE SG • Verify SG blowdown valves closed (SD002A-H) • Verify SG sample isol valves closed (SD005A-D) • Review feed flow guidelines (ATTACHMENT B): • Do NOT feed any DRY SGs (WR level < 10%) • If SG feedlines are NOT voided (VOIDED - feed flow lost for > 75 min), feed at least TWO non-dry SGs at rate to increase WR level • If SG lines voided: • Feed TWO non-dry SGS at sufficient rate to increase WR level • Feed remaining non-dry SGs between 40 and 80 gpm for 15 min. prior to restoring desired feed rate. • Check AF PUMP SX VLVS ARMED (1-3-E7) NOT lit • Check AF Pumps both running

Comments: ______________________________

Scenario No: 1-1	Event No. 7 , 8 & 9	Page 16 - 24 of 24

Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MS!V for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior
	BOP/US (cont.)	• Since neither pump starts, dispatch an operator to start one pump per 1BOA ELEC-5 • Verify AF test valves open (AF004A/B) • Verify AF isol valves open (AF013B/C/D/F/G/H) • Verify AF flow control valves throttled/open (AF005B/C/D/F/G/H)
	RO/US	• Check RCP status • All stopped

	BOP/US	• Prepare to restore FW:
		  • Check at least ONE CD/CB pump running
		  • Place FW Reg valves in MANUAL at ZERO demand (1FW510/520/530/540)
		  • Place FW Bypass Reg valves in MANUAL at ZERO demand (1FW510A/520A/530A/540A)
		  • Place tempering flow control valves in MANUAL at ZERO demand (1FW034A-D)

	RO	Identify/report Pzr PORV RY456 open and will NOT close
	RO	• Determine PORV NOT required to be open • Attempt to close PORV RY456 by taking switch to CLOSE • When PORV identified as NOT closing , take control switch for 1RY8000B, PORB RY456 Block valve, to CLOSE

	BOP/US	• Reset FW Isol
		  • Check for FW isolation aux relay lights lit
		  • Check SI actuated

Comments: NOTE: SRO INTERPRETATION OF SUMMARY PAGE OF EOP BFR-H.1 FOR "BLEED AND FEED INITIATION". DETERMINED THAT IMMEDIATE BLEED AND FEED WAS REQUIRED DUE TO PZR PORV CYCLING OPEN AFTER TERMINATION OF RCPs (NATURAL CIRC) AND THAT PZR PRESSURE EQUAL TO 2335 PSIG. AP.

Scenario No: 1-1	Event No. 7, 8 & 9	Page 16 - 24 of 24

Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior

	BOP/US (cont.)	• Dispatch operator to pull FW Isol Aux Relay fuses:
		  • 1PA27J - FU-24 & FU-27
		  • 1PA28J - FU-24 & FU-27
		
		• Establish main FW flow
		  • Check either Startup FW Pump OR FW Pump 1A available
		  • Open FW Tempering Isol valve for selected SGs, 1FW035B, C and/or D
		  • Check at least TWO CD/CB pumps running

	BOP/US **[CT]** FRH.1-A	• Start the Startup FW Pump
		  • Check Bus 159 energized
		  • Check discharge valve 1FW059 open
		  • Place recirc valve 1FW076 in MODULATE and check open
		  • Close Main FW Pump recirc valves 1FW012A/B/C
		  • Take control switch for SU Feed Pump to START
		
		• Review feed flow guidelines (same as above)
		  • Throttle tempering flow control valves for selected SGs 1FW034B, C and/or D
		  • Maintain hotwell level > 20 inches
		
		• Check Narrow range level in at least one SG > 10%
		  • If NOT, verify adequate feed flow to at least one SG
		    • SG WIDE RANGE level increasing
		    • Core Exit TCs decreasing
		
		(NOTE: If adequate AF flow NOT verified, crew will use APPENDIX C to establish flow through the low flow line.)

Comments: ____

Event Description:	The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.	

Time	Position	Applicant's Actions or Behavior
	BOP/US (cont.)	• If adequate feed flow verified, restore level in at least ONE SG to >10% narrow range and return to procedure and step in effect
		BEP-0 ACTIONS (cont.)
	RO/US	• Verify ECCS valve alignment & flows • Group 2 CL Inj monitor lights lit • HHSI flow >50 gpm • SI flow > 100gpm (if RCS pressure <1590 psig)
	RO/US	• Check at least ONE PZR PORV relief path available: • At least ONE PORV Isol valve energized. • PORV in AUTO • Associated Isol valve open
	BOP/US	• Verify generator trip • OCB 3-4 and 4-5 open • PMG output breaker open • Verify both DGs running • DG SX valves 1SX169A & B open • Dispatch operator to locally check DGs • Ventilation systems aligned for emergency • Control Room • Control Room d/P on 0PDI-VC038 > +0.125" H2O • Aux Bldg • Fuel Handling Bldg

Comments: ____

Event Description: The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.

Time	Position	Applicant's Actions or Behavior

	RO/US	• Check PZR sprays & PORVs closed
		
		• RCS temperature control
		  • Check RCP status - any running OR none running
		  • Check RCS CL temps trending to or stable at 557°F

	RO/US	• Check RCP status: • If any RCP running and RCS pressure < 1425 psig AND HHSI flow > 50 gpm OR SI flow > 100 gpm • Stop all RCPs and place Steam Dumps in STM PRESS Mode (NOTE: Operator must control in MAN due to earlier PT-MS507 failure)
	BOP/US	• Check SG secondary boundary • Identify/report 1A SG pressure lower and decreasing
	CREW	Diagnose faulted SG
	US	Transition to 1BEP-2 "Faulted Steam Generator Isolation"
		1BEP-2 ACTIONS
	US	Direct operator actions of 1BEP-2.

	BOP/US	• Check Main Steamline Isolated
		  • Identify report SG 1A MSIV NOT closed
		
		• Check if any SG boundary intact
		  • Identify/report 1B, 1C & 1D SGs pressures higher (than 1A) and stable
		
		• Identify faulted SG
		  • 1A SG identified faulted
		    o Lowering pressure
		    o Indicated steam flow
		    o Complete depressurized

Comments: ______________________________

Scenario No: 1-1	Event No. 7 , 8 & 9	Page 16 - 24 of 24
Event Description:	The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.	

Time	Position	Applicant's Actions or Behavior
	BOP/US **[CT]** E-2—A	• Isolate 1A SG • Manually close AF valves (AF013A, AF013E) o FW Isol valves 1FW009A closed o FW tempering flow control valves 1FW034A closed o FW tempering Isol valves 1FW035A closed o Low flow FW Isol valve 1FW039A closed o FW Reg valve1FW510 close o 1FW Reg Bypass valve1FW510A close o Verify SG PORV closed (MS018A) o Verify SG blowdown isol valves closed (SD002A, SD002B) o Verify SG blowdown sample isol valve closed (SD005A) • Check AF PUMP SX VLVS ARMED (1-3-E7) NOT lit
	BOP/US	• Check secondary radiation • NO group 12 rad monitors in alarm • Reset CNMT Isol Phase A • Request Chem to sample SGs and open sample isol valves 1SD005A-D at Chem Dept request
	US	• Transition to BEP-1 "Loss Of Reactor or Secondary Coolant"
		1BEP-1 ACTIONS
	US	Direct actions of BEP-1, STEP 3.

Comments: ____

Scenario No: 1-1		Event No. 7 , 8 & 9	Page 16 - 24 of 24
Event Description:		The 1A AFW Pump fails to start resulting in a loss of feed flow to all SGs. The next event (addressed immediately following AF), with the AUTO MSIV failure the operator is required to manually close MSIVs. The MSIV for SG A fails to close due to binding. With recognition for actions required for loss of feedwater flow, Pzr PORV 456 fails open and path to must be isolated.	
Time	Position	Applicant's Actions or Behavior	
	BOP /US	• Check intact SG levels • Narrow range levels >10%. If not flow is maintain > 500 gpm (& within feed Guidelines of ATTACHMENT B of BFR-H.1) • Control feed flow to maintain intact SG levels between 10% and 50% • Check narrow range levels NOT increasing in an uncontrolled manner.	
		SCENARIO TERMINATED	

Comments: ____

SHIFT MANAGER'S TURNOVER

TODAY ONCOMING SHIFT

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE....... 1 **%PWR....... 75** **MWe....... 862** **Max Load/Power....... 1175 MW** **Min Load/Power....... 750 MW** **Max Ramp Rate....... 5MW/min** **Desired Delta I.......TARGET** **Boron @ 575** **Control Bank D @ 188**	SG 1B level transmitter LT557 is OOS. 1B AF Pump is OOS for injection pump replacement on diesel. 1A HDP is OOS for motor bearing replacement.
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 1 MAJOR SURVEILLANCES**
LCOARs have been entered for 1LT557 and 1B AF Pump.	
UNIT 1 IN PROGRESS	**UNIT 1 AND COMMON PENDING**
1B CV pump is in service following pump seal replacement and post maintenance testing. 1B CV pump is OPERABLE. The National Weather Service has declared a Thunderstorm Warning in effect for Stephenson, Winnebago and Ogle counties for the next 4 hours.	Ready to increase power to 100%. The BPO has requested a power ascension to Full Power at 5MW/min.
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

UNIT 2 STATUS	UNIT 2 MAJOR OOS's
MODE............ 1 %Pwr............ 99.8 MWe............. 1178 Max Load/Power.. 100% Min Load/Power.. 750 MW Max Ramp Rate... 2 MW/Min Desired Delta I. Target Unit on EGC..... NA Boron @ 535 Control Bank D @ 213	
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 2 MAJOR SURVEILLANCES**
UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

ADMINISTRATIVE	
TEMPORARY PROCEDURES/ALTS	
DAILY ORDERS/SPECIAL OP. ORDERS	
DAILY MANNING SCHEDULE	
CONTROL ROOM ROUNDS	
(GSEP/LER/DVR/ENS)	
MATERIAL CONDITIONING	
RWP'S/RELEASES/PRECAUTIONS/ALARA	
INFREQUENT EVOLUTION ACTIVITIES	
SPSO/DIVISION LD	Alternate BPO Outside # 815-727-5902/5903 Tie # 8-565-5902/5903

UNIT 1 COMMENTS

S/G B/D returning to Condenser per SPP

UNIT COMMON COMMENTS

CW Blowdown Lineup	U-2
FC Cleanup	U-1
FC Cooling	U-1
50K DO Tank	Certified
125K DO Tank	Certified
Aux Steam	U-1
U-0 CC HX	U-1

UNIT 2 COMMENTS

S/G B/D returning to Condenser per SPP

GENERAL COMMENTS

Caution Cards

CCNUM	EPN

Abnormal Positioned Components

CCNUM	EPN	Abnormal Position

SHIFT: LAST TO PRESENT TIME: NOW DATE: TODAY
OFFGOING ______________
ONCOMING ______________

Simulation Facility Byron 1 & 2 Scenario No.: 2 Op Test No.: 1

Examiners: ______________________ Operators: ______________________ SRO

______________________ ______________________ RO

______________________ ______________________ BOP

Objectives: In accordance with plant procedures:

1. reduce reactor power (for shutdown).
2. respond to Pressurizer Pressure Master controller failure with a failure of the PORV to close.
3. respond to a loss of instrument air to the containment.
4. respond to a steam generator tube leak.
5. respond to failure of feedwater isolation on reactor trip and SI.
6. respond to a loss of Control Room dP.
7. perform emergency actions for a SGTR with out Pressurizer Pressure control.

Initial Conditions:

1. IC-21, Reactor Power 100%, Steady state BOL, BGP 100-3, step F.61.
2. PZR pressure control selected to 455/456.
3. Pressurizer pressure channel PT-458 is OOS with bistables tripped.
4. PORV RY456 control switch is in CLOSE and Block Valve RY-8000B is closed and deenergized.
5. 1A HDP OOS
6. 250' Meteorological Tower OOS.

Turnover:

1. Reactor Power is 100%, Steady state power at BOL. BGP 100-3 is in effect.
2. Unit 2 is at 100% power.
3. The block valve (RY-8000B) for PCV-456 is closed and deenergized. A leak had developed on PCV-456. When the block valve was shut it tripped after the closed indication was observed. Electrical Maintenance is investigating. Valve has been OOS for 62 hours.
4. Pressurizer pressure instrument 1PT-458 is failed. All actions of BOA INST-2, ATTACHMENT B have been completed. PT-14 for channel has been initiated. Currently no report of expected time for release to service.
5. Heater Drain Pump 1A is out of service to meggar motor leads.
6. The 250 foot Meteorological Tower is out of service and actions of TRM 3.3.c being tracked. (LCOAR)
7. High wind warnings have been issued for Stephenson, Winnebago and Ogle counties for the next 2 hours.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RF RP-78 & RP-79 , RF FW-150 & FW-151, REMOVED	I	BOP	FWI valves fail to close (FWI signal failure)
Preload	OR ZAO0UREM002P2, 0 OR ZAO0UREM012P1, 0 OR ZAO0UREM012P2, 0			250' Met Tower OOS
Preload	RX22B, 2500 RF RX044 TRIP RF RX045 TRIP RF RX046 TRIP RF RX025 TRIP RF RX141 TRIP			Pressurizer pressure instrument 458 is OOS bistables tripped
Preload	RF ED065D OPEN			Block Valve MOV-RY8000B (PCV 456) was closed to cycle the valve. When the operators attempted to open valve, the motor operator tripped on overload.
1	RX15, 2500	I	RO SRO	Pressurizer Pressure Master Controller failure to maximum output.
2	TH11A, 25%	C	RO SRO	PORV 455A fails to close requiring the block valve RY8000A to be closed.
		R	SRO RO	Lowering reactor power during shutdown due to inoperable PORVs
3		N	SRO BOP	Set and lower turbine load
4	TH03D, 25	C	RO SRO BOP	Steam Generator 1D Tube Leak – 25 gpm.
5	IA03, 5000	C	RO BOP SRO	Loss of instrument air to the containment.
6	TH03D, 500	M	RO BOP SRO	Steam Generator 1D Tube Rupture – Increases requiring a reactor trip and SI.
7	(Preload)	I	BOP	FWI signal fails requiring manual operation of FW components
7	OR ZAO0PDIVC038 C SE:PN0530 ON	I	BOP SRO	Main Control Room differential pressure failure with decreasing pressure.
8	RF ED058C OPEN	C	RO BOP SRO	Power is lost to the power supply for the Block Valve MOV-RY8000A (PORV 455A) while valve is closed (control switch taken to OPEN).

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

SCENARIO #1-2

SCENARIO SUMMARY:

The scenario will begin at 100% power. Pressure transmitter 1PT-458 is out of service. An AR has been initiated and all required actions have been taken per BOA INST-2. The block valve for PORV 456 is closed and deenergized due to thermal overloads tripping on the valve operator. The 250' elevation Meteorological Tower Instrumentation has failed and action of TRM 3.3.c is being tracked (LCOAR).

A failure of the Pressurizer Pressure Controller will cause PORV PCV-455A and the spray valves to open. PORV 455A fails open since the PORV enabling pressure channel PT-458 is failed HIGH. Failure of PORV 455A to close will require closure of its block valve MOV-RY8000A. The spray valves will close after manual control is taken of the pressurizer pressure controller. SRO will address Technical Specification 3.4.11 (Condition E) and TRM 3.3.k and 3.4.d.

Unit shutdown and cooldown to less than 500°F within 6 hours is initiated due to the inoperability of TWO PORVs.

After pressurizer pressure is returned to the normal band using manual control, a tube leak will occur in SG 1D. The crew will have to diagnose the tube leak and perform actions per the BOA PRI-1 and BOA SEC-8. This will include determination of leak size (~ 25 gpm) and SRO will address Technical Specification 3.4.13 (Condition A).

After initial actions have been performed for the SG tube leak, instrument air will be lost to the containment. Actions will be performed in accordance with the BOA SEC-4 for loss of instrument air to the containment. The loss of instrument air will prevent operation of the pressurizer normal spray valves or the auxiliary spray valve. The crew may decide to continue with the unit shutdown or may decide to trip the reactor since the ability to control Pzr pressure is severely impacted.

The reactor trip will cause Steam Generator Tube Rupture to increase requiring a SI. EOP actions of BEP-0 and BEP-3 will be performed. In BEP-0, the feedwater system will not isolate due to a failure of the feedwater isolation signal requiring manual action to isolate feedwater, and at step 21, the operator will recognize failure to maintain positive Control Room pressure and will perform actions of BOP VC-14. PORV Block valve (RY8000A) electrical power feed will trip if the valve is taken to open. Without pressurizer PORVs, pressurizer normal spray valves and Aux. Spray valves, pressurizer pressure control is lost. This will require that BCA-3.3, "SGTR Without Pressurizer Pressure Control", be performed during actions for the SGTR. The scenario ends with the establishment of RCS cooldown either in BCA-3.3 or BCA-3.1, as appropriate.

ERG Based Critical Tasks:

1. EP-3 – A: Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

2. EP-3 – B: Establish/maintain and RCS temperature so that transition from EP-3 does not occur because RCS temperature is in either of the following conditions.
   - Too high to maintain minimum required subcooling
     OR
   - Below the RCS temperature that causes an extreme (red-path) or a severe (orange path) challenge to the subcriticality and/or integrity CSF.

3. ECA-3.3-A Terminate SI before a water release occurs through the SG PORV or SG Safeties.

Event Description:		Master PZR Pressure Master Controller PK-455A fails HIGH. This results in normal Pzr Spray valves opening, Pzr PORV PCV-455A opening. Following opening of PORV PCV-455A, the PORV fails to close when demanded (Manual or Auto). The operator is required to close the Block valve associated with PORV-455A (MOV RY-800A). The PORV failure results in BOTH PORVs being inoperable.
Time	Position	Applicant's Actions or Behavior
	CUES:	Annunciators (1-12-D2) PZR PESS CONT DEV HIGH (1-12-C6) PZR PORV DSCH TEMP HIGH • Pzr Spray valves OPEN • Pzr heaters tripped OFF • Pzr PORV PCV-455A OPEN
	RO/US	Identify/report failed Master PZR Pressure Controller (AUTO).
	RO/US	Perform actions of 1BAR 1-12-D2: • Place Master PZR Pressure Controller to MANUAL OR spray s to MANUAL • Restore PZR pressure to normal • Monitor PZR pressure and level
	RO/US	Identify/report failure of PCV-455A to close (either AUTO or when C/S taken to CLOSE) • Close MOV RY8000A Pzr PORV Block valve
	US	May chose to implement BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment B "PRESSURIZER PRESSURE CHANNEL FAILURE" and direct operator action.
	RO/US	Check PZR pressure: • Take manual control to restore Pzr pressure • Determine all channels of Pzr pressure operable except PT-458 which was OOS prior to event • Check PORVs closed, then if PZR pressure < 2315 psig, Manually close PORV • If PORV will NOT close, manually close PORV Isol valve 1RY8000A • Check spray valves 1RY455B & 455C closed, then manually close if open • Manually operate PZR heaters

Comments: ____

Scenario No: 1-2 | Event No. 1 & 2 | Page 4 - 5 of 32

Event Description: Master PZR Pressure Master Controller PK-455A fails HIGH. This results in normal Pzr Spray valves opening, Pzr PORV PCV-455A opening.
Following opening of PORV PCV-455A, the PORV fails to close when demanded (Manual or Auto). The operator is required to close the Block valve associated with PORV-455A (MOV RY-800A). The PORV failure results in BOTH PORVs being inoperable.

Time	Position	Applicant's Actions or Behavior
	US	Check Technical Specifications: • 3.4.1 - RCS Pressure, Temp, and Flow DNB Limits. If PZR pressure <2219 psig, the CONDITION A applies with ACTION to restore above limit within TWO hours. • 3.4.11 - PZR PORVs; CONDITION E (TWO PORVs inop) with ACTION to immediate initiate actions to restore ONE, CLOSE Block Valves within ONE hour, Remove Block Valve power within ON~~E~~ hour, and be in MODE 3 with RCS Tavg < 500°F in 6 hours. E #P Check TRM: • 3.4.d – PORVs; CONDITION A – BOTH PORVs unable to automatically perform a pressure relief actuation, restore the automatic pressure relief function to at least ONE PORV in 72 hours.
	US	Inform SM/Maint of PZR Master Pressure Controller failure. Inform SM/Maint of PZR PORV PCV-455A failure to close
	US	Inform SM of unit status/potential GSEP event (TWO PORVs inoperable).

Comments: ____________________

Scenario No: 1-2		Event No. 3 Page 6 - 7 of 32
Event Description:		Power decrease for plant shutdown due to inoperable PORVs.
Time	Position	Applicant's Actions or Behavior
	US	Identify Technical Specification REQUIRED ACTION requiring plant shutdown due to inoperable PORVs.
	US	Implement actions of 1BGP 100-4, Step F.1: • Implement flowpath 1BGP 100-4T1, Power Descension Flowchart. • Direct initiation of Reference Reactivity Data as per 1BGP 100-7.
	US	Direct decrease from 100% power at 5 MW/minute.
	CREW	Review applicable Precautions, and Limitations and Actions.
	BOP	Initiate turbine load decrease to 580 MW: • DEPRESS the LOAD RATE MW/MIN Pushbutton • VERIFY/ENTER the desired load rate of 5.0 • DEPRESS the REF Pushbutton • Using the number Pushbuttons, SET in 580 MW on the REFERENCE DEMAND window • When ready to begin load decrease, depress GO • Verify load decreases.
	RO	Initiate boration: (BOP CV-6) • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to BOR position. • Set 1FK-110 BA Flow Cont to desired boration rate. • Fill out Boration/Dilution/Rod Motion Log

Comments: ______________________________

Scenario No: 1-2		Event No. 3	Page 6 - 7 of 32
Event Description:		Power decrease for plant shutdown due to inoperable PORVs.	
Time	**Position**	**Applicant's Actions or Behavior**	
	RO	• Verify 1CV110A in AUTO • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Verify 1CV110B in AUTO • Verify BA Transfer Pump in START or AUTO • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & BA transfer pump (CV110B open, BA pump is running, CV110A throttles open) • Verify BA flow on recorder • Verify B/U Heaters ON and spray valves 1RY455B/C modulates OPEN.	
	CREW	Monitor power decrease: • Monitor reactor power, Tave • Verify rods move in AUTO to maintain Tave within ± 2.0°F of Tref. if borating: • Monitor VCT level • Verify RCS concentration increasing • Monitor B/A Control counter countdown. • Verify boration auto stops at preset value. • Return Reactor Makeup System to blended flow for current boron concentration.	

Comments: ____

Scenario No: 1-2		Event No. 4	Page 8 - 12 of 32

Event Description: 25 gpm S/G tube leak occurs in 1D S/G.

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator (1-12-B4) PZR LEVEL CONT DEV LOW (1-12-C1) PZR PRESS CONT DEV LOW HTRS ON SG blowdown radiation monitor 1PR08 increasing SJAE/Gland Steam Exhauster radiation monitor 1PR027 increasing Steamline radiation monitors 1RE-AR022, AR023 N-16 monitor increasing when aligned Increased charging flow PZR level dropping PZR pressure dropping
	CREW	• Identify/ report RCS leak rate increasing • Identify/report secondary radiation increasing/SG leakage
		NOTE: BOA SEC-8 (see page 9) may be entered directly on symptoms of tube leak OR may be entered on transition from BOA PRI-1. PRI-1 actions are provided but are NOT required to be performed.
		BOA PRI-1 ACTIONS
	US	*Implement BOA PRI-1 "EXCESSIVE PRIMARY PLANT LEAKAGE" and direct operator action.*

	RO/US	• *Attempt to maintain PZR level*
		  • *Check Cent Chg pump running*
		  • *Throttle Charging header valves to maintain PZR level*
		    o *CV121*
		    o *CV182*
		
		  • *Isolate inservice letdown paths at SM discretion (NOTE: Letdown is isolated due to loss of IA)*
		    • *Close letdown orifice isol valves and letdown line isol (CV8149A/B/C, CV459, CV460)*
		
		• *Check PZR pressure*
		  • *<2210 psig*
		  • *PZR PORVs closed (NOTE: PORV 455A indicates open; Block valves are closed)*
		    • *RY455A*
		    • *RY456*

Comments: ____________________

Event Description: 25 gpm S/G tube leak occurs in 1D S/G.

Time	Position	Applicant's Actions or Behavior

	RO/US	• *PZR spray valves closed (NOTE: Valves are failed close due to loss of IA)*
		  • *RY455B*
		  • *RY455C*
		  • *CV8145 Aux spray*
		• *Check all PZR heaters energized*
		• *PZR pressure stable or increasing*
		• *Monitor PZR level stable or increasing*
		  • *If not start second Cent Chg pump*
		• *Check letdown isolated*
		• *Isolate portions of charging, if desired, to determine leak location and determine leak NOT isolable*
		• *Check SG Tube intact:*
		• *Check secondary rad monitors*
		  • *SJAE GS exhaust 1PR27J Grid 1 1PS027*
		  • *SG Blowdown 1PR08J Grid 1 1PS108*
		  • *Main Steam: 1RT-AR022 & 1RRT-AR023 for each SG, Grid 1 4AA122/123, 4AB222/223, 4AC322/323, 4AD422/423*
		  • *Main Steam Penetration 1A/1D 1RT-AR024 Grid 4 4AA124*
		  • *Main Steam Penetration 1B/1C 1RT-AR024 Grid 4 4AB124*

		BOA SEC-8 ACTIONS
	US	Implement BOA SEC-8 "STEAM GENERATOR TUBE LEAK" and direct operator action.

	RO/US	• Attempt to maintain PZR level
		  • Throttle Charging header valves to maintain PZR level
		    o CV121
		    o CV182

	RO/US	• Check PZR level stable or increasing • If not establish 75 gpm letdown flow

Comments: ____________________

Event Description: 25 gpm S/G tube leak occurs in 1D S/G.

Time	Position	Applicant's Actions or Behavior
	RO/US	• Monitor VCT level
	BOP/US	• Minimize secondary contamination • Perform BOP MS-11 (NOTE: Actions covered below on page 11.) • Notify Rad Pro • Monitor secondary systems • Monitor condensate polisher area • Initiate 0BCS 11.2.4.1-1
	CREW	• Estimate SG tube leak rate o Observe difference between charging flow and seal leakoff o Change in VCT level o Chemistry estimated primary to secondary leak rate • Determine leak rate > 10 gpm
	US	• Initiate Unit shutdown • Review Technical Specifications • 3.4.13 RCS Operational LEAKAGE - LCO d. & e. , CONDITION A & B, Required ACTION reduce leakage with 4 hours or be in MODE 3 in 6 hours • Continue shutdown of Unit

Comments: ______________________________

Event Description: 25 gpm S/G tube leak occurs in 1D S/G.

Time	Position	Applicant's Actions or Behavior
	CREW	• Identify leaking SG o Decreasing feed flow with stable level o Unexpected rise in SG NR level o High activity sample o Increasing trend on any Main Steamline Rad Group 12 o 1D SG RT-AR022 Grid 1 4AD422 o 1D SG RT-AR023 Grid 1 4AD423 • Identify/report 1D SG as leaking
		ACTIONS OF BOP MS-11
	CREW	• *IDENTIFY leaking steam generator(s):* • *REQUEST Chemistry to take sample(s) on the suspected leaking SG(s).* • *PERFORM a quick count (approximately 10 minutes).* • *REQUEST that the Shift Manager be notified of any activity that is found in the sample(s).* • *IDENTIFY contaminated systems:* • *NOTIFY Chemistry Supervision to establish activity sampling per BCP 300-A9, Steam Generator Tube Leak System Check Requirements.* • *If contamination is suspected, then REQUEST Chemistry sample the following for activity:* • *Affected unit's condensate pump discharge header.* • *Affected unit's radwaste sumps:* • *Condenser floor drain sump.* • *Condensate pit sump.* • *Turbine Building Equipment Drain sump.*

Comments:

Event Description: 25 gpm S/G tube leak occurs in 1D S/G.

Time	Position	Applicant's Actions or Behavior

	CREW (cont.)	• *MINIMIZE input to the affected unit's secondary systems:*
		  • *If Aux Feed is being used to feed steam generators, use of the Startup Feedwater Pump should be considered.*
		  • *If Aux Steam is being used for the unaffected unit's Gland Steam, then TRANSFER Aux Steam to an unaffected source per BOP AS-5, Transferring Aux Steam Loads.*
		  • *TRANSFER GS to unaffected unit's AS per BOP GS-6 if either of the following occur:*
		    • *Cooldown rate must be reduced.*
		    • *Insufficient Main Steam header pressure to maintain Gland Seal pressure develops during cooldown.*
		  • *VERIFY Aux Steam returns aligned::*
		    • *If Aux Steam is being supplied from the affected unit, then VERIFY CLOSED unaffected unit's AS103, Htg Sys HX Cnds Rtrn to U- HD Tk Cont Vlv Dwst Isol Vlv.*
		    • *If Aux Steam is being supplied from the unaffected unit, then VERIFY CLOSED affected unit's AS103, Htg Sys HX Cnds Rtrn to U- HD Tk Cont Vlv Dwst Isol Vlv.*
		  • *ALIGN condensate collection tank pressure control to non-affected unit:*
		    • *CLOSE AS246, AS Collection Vent to U- MS Flash Tank, on affected unit.*
		    • *OPEN AS246, AS Collection Vent to U- MS Flash Tank, on non-affected unit.*
		• *Notify Radwaste Supervisor of any sample results indicating a contaminated secondary system or radwaste sump so action can be initiated to minimize the spread of contamination.*
		• *CONTACT System Engineering Thermal Group Leader to have N-16 monitors placed.*
		• *INITIATE plant walkdowns by Operations.*
		• *REQUEST Rad Protection initiate surveys to monitor for contaminated areas in the Turbine Building, Main Steam Tunnel, and TR.*

	US	Inform SM of SG Tube Leak and continuation of planned shutdown.
	US	Inform SM of unit status/potential GSEP event.

Comments: ____

Scenario No: 1-2	Event No. 5	Page 13 - 16 of 32
Event Description:	Instrument air to containment is lost due to rupture of IA line inside CNMT.	

Time	Position	Applicant's Actions or Behavior

	CUES:	Various Instrument Air low pressure annunciators may alarm.
		
		• Air operated controls and valves begin to go to FAIL position
		• Specific CNMT valves fail;
		  • RY455A-456 Pzr PORV's (have accumulators) Closed
		  • RY455 B-C Pzr sprays Closed
		  • RC8037 A-D Loop Drains Closed
		  • CV459-CV460 Letdown Isolation Valves Closed
		  • CV8389 A-B Regen Hx Letdown inlet isol Closed
		  • CV8149 A-C Orifice Isolations Closed
		  • CV816 Letdown cnmt isol. Closed
		  • CV8324 A-B Regen Hx Charging inlet isol Closed
		  • CV8146-8147 Charging to loops A-B Open
		  • CV8145 Aux Spray Closed
		  • CV123 Excess Letdown Flow Control Closed
		  • CV8143 Excess Letdown Divert To Seal Water Hx
		  • CV8141 A-D #1 seal leakoff isolation Open
		  • CV8142 #1 seal bypass isolation Closed
		  • CC9437 A/B Excess Letdown Hx isol Closed
		• Leak may be isolated if IA CNMT Isol valves IA065/066 close (FAIL CLOSE on loss of air)

	RO/US	Identify/report decreasing Instrument Air pressure
		NOTE: Crew initiate actions of 1BOA SEC-4 OR may select to enter and perform 0BOA SEC-4 either initially or as followup to 1BOA SEC-4 (See actions below on page 15).
	US	Implement 1BOA SEC-4 "Loss Of Instrument Air" and direct operator action.
	BOP/US	• Direct Unit 2 NSO to initiate 2BOA SEC-4. • Evaluate plant conditions • Refer to TABLE A for potential actuations (See above for expected failures)

	RO/US	• Control RCP seal injection
		  • Check CV121 failed open, if NOT continue with VCT level
		    o If valve is failed open, Direct operator to locally throttle open Bypass valve 1CV8387A/Band locally close 1CV121 Isol valve 12CV8483A/B

Comments: ______________________________

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Scenario No: 1-2		Event No. 5
Event Description:		Instrument air to containment is lost due to rupture of IA line inside CNMT.
Time	Position	Applicant's Actions or Behavior

	RO/US (cont.)	• Check VCT level
		  • Check that VCT level is NOT <10%
		
		• Maintain Pzr level
		  • Maintain Pzr level between 25% and 60%
		    o Control charging
		    o Reduce turbine load
		    o Cooldown RCS at < 100°F/hr
		
		• Check RCS pressure
		  • RCS pressure < 2335 psig
		    • If NOT, open one PORV to reduce pressure to 2235 psig (NOTE: PORVs are NOT available)
		
		  • Cycle Pzr heaters to maintain pressure stable

	BOP/US	• Minimize secondary plant effects:
		  • Check GS supply header < 120 psig on 1PI-GS001
		
		  • Check HP turbine gland seal pressure 1psig to 3 psig on 1PI-GS002
		
		  • Direct operator to locally check
		    • LP turbine gland seal regulators operating at 1 psig to 3 psig
		    • MS flash tank vent NOT blowing
		
		  • Check FW PUMP SEAL WTR TANK LEVEL HIGH LOW (1-16-B5) NOT lit

	CREW	• Restore control & System alignments:
		  • Determine components isolated by recovery actions (See above for affected components)
		
		Determine air leak is in CNMT and if NOT already isolated, close 1IA065 and/or 1IA066 (NOTE: valves fail closed on loss of IA).
		
		  • Check IA pressure > 95 psig and stable or increasing
		
		  • Maintain RCP seal injection between 8 gpm & 13 gpm

Comments: ____

Scenario No: 1-2		Event No. 5	Page 13 - 16 of 32
Event Description:		Instrument air to containment is lost due to rupture of IA line inside CNMT.	
Time	Position	Applicant's Actions or Behavior	
	CREW (cont.)	• Restore at SM direction o Control Systems o System alignments Minimize charging flow to RCS	
		ACTIONS OF 0BOA SEC-4	
	US	Implement 0BOA SEC-4 "Loss Of Instrument Air" and direct operator action.	
	BOP/US	• Direct Unit 2 NSO to initiate 2BOA SEC-4. (If NOT done prior) • Check SAC control air available • Check minimum SAC control pressure o IA header pressure > 28 psig o Direct operator locally check SAC control cabinet supply pressure • Check at least one SAC running loaded • Check SA pressure > 105 psig • Check IA status • IA pressure > 90psig and stable or increasing	
	CREW	• Locate and isolate air leak Determine leak is inside CNMT Determine leak is isolated by CNMT IA isolation valves IA065 and IA066	
	BOP/US	• Restore control & System alignments: • Check IA pressure > 95 psig and stable or increasing	

Comments: ______________________________

Scenario No: 1-2		Event No. 5	Page 3 - 16 of 32
Event Description:		Instrument air to containment is lost due to rupture of IA line inside CNMT.	
Time	Position	Applicant's Actions or Behavior	
	CREW (cont.)	• Direct local check SAC alignment (ONE SAC base loaded, ONE loaded in AUTO & ONE in standby) • Direct local check IA dryer alignment (TWO online, ONE in standby)	
	US	Inform SM/Maint of loss of IA to CNMT Inform SM of loss of PZR pressure control components (Normal sprays, Aux Spray, & PORVs) and RCS letdown. Decide to either continue unit shutdown monitoring Pzr pressure control OR initiate a reactor trip due to limited capability for Pzr pressure control .	
		NOTE: When the crew makes a decision to trip reactor, EVENT 6 (SGTR) will be activated	
	US	Inform SM of unit status/potential GSEP event.	

Comments: ____

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Scenario No: 1-2	Event No. 6 & 7	Page 17 - 20 of 32

Event Description:	The SG Tube leak will increase in size to a SGTR. This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pump(s) and isolate FW flow to the SGs.

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator (1-12-B4) PZR LEVEL CONT DEV LOW (1-12-C1) PZR PRESS CONT DEV LOW HTRS ON SG blowdown radiation monitor 1PR08J increasing SJAE/Gland Steam Exhauster radiation monitor 1PR 27J increasing Increased charging flow PZR level dropping PZR pressure dropping FW flow/Steam flow mismatch for 1D SG Feed Reg Valves and FW Isol valves will remain open Main FW Pumps continue to run (fail to trip)
	CREW	Identify increase in RCS leakage
	RO	Report inability to maintain PZR level > 17%
	US	Direct reactor trip and SI initiation
	RO	• Manually trips reactor • Manually actuates SI
	US	Implement BEP-0 "REACTOR TRIP OR SI"

	RO	Perform immediate operator actions of BEP-0:
		• Verify reactor trip
		  • Rod bottom lights LIT except TWO
		  • Reactor trip & Bypass breakers open
		  • Neutron flux lowering

	BOP	• Verify Turbine Trip
		  • Turbine throttle valves closed
		  • Turbine governor valves closed

Comments: ______________________________

Scenario No: 1-2	Event No. 6 & 7	Page 17 - 20 of 32

Event Description: The SG Tube leak will increase in size to a SGTR. This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pump(s) and isolate FW flow to the SGs.

Time	Position	Applicant's Actions or Behavior

	BOP (cont.)	• Verify power to 4KV busses
		  • Bus 141 alive light lit
		  • Bus 142 alive light lit

	CREW	• Determine SI actuated
		  • SI First OUT annunciator lit (1-11-C1)
		  • SI ACTUATED lit (1-BP-4.1)
		  • SI Equipment actuated (SI pumps running, CV Cold leg injection SI8801A/B open)
		
		• Actuate SI by taking either SI switch to ACTUATE (1PM05J or 1PM06J)

	BOP/US	• Verify FW isolated
		  • FW pumps tripped
		    • FW PUMPS TRIPPED alarms NOT lit and/or FW Isolation Monitor lights NOT lit
		
		Determine/report failure of FWI signal
		
		  • Manually trip pumps
		
		  • Manually close FW Reg valves 1FW510/520/530/540 and/or FW shutoff valves 1FW006A-D
		
		  • FW pumps disch valves closed (FW002A-C)

	RO/US	• Verify ECCS pumps running
		  • CENT Chg pumps
		  • RH pumps
		  • SI pumps

	BOP/US	• Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit

Comments: ____

Event Description:	The SG Tube leak will increase in size to a SGTR. This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pump(s) and isolate FW flow to the SGs.	

Time	Position	Applicant's Actions or Behavior
	BOP/US (cont.)	• Verify AF system: • BOTH AF pumps running • AF isolation valves open (AF13A-H) • AF flow control valves throttled (AF005A-H) • Verify RCFCs running in LOW SPEED • Verify CC Pumps running {1B and 0 (common)} • Verify SX Pumps running • Check Main Steamline Isolation NOT required • Check SG pressure > 640 psig • Check CNMT pressure <8.2 • Check if CNMT Spray is required • CNMT pressure > 20 psig • Determine/report CNMT Spray NOT required • Verify AF flows • AF flow > 500 gpm available • SG levels maintained between 10% and 50%
	BOP/US **[CT]** E-3--A	• Check for NR level NOT increasing in uncontrolled manner • If ruptured SG suspected, isolate AF Isol valves: • AF013D • AF013H
	RO/US	• Verify ECCS valve alignment & flows • Group 2 CL Inj monitor lights lit (except 1A CC pump) • HHSI flow >50 gpm • SI flow > 100 gpm (if RCS pressure <1590 psig)

Comments: ____

Event Description:	The SG Tube leak will increase in size to a SGTR. This will require a manual reactor trip and SI. The FWI signal will fail to actuate and operator action is required to trip the feed pump(s) and isolate FW flow to the SGs.	
Time	**Position**	**Applicant's Actions or Behavior**
	RO/US	• Check at least ONE Pzr PORV relief path available: • PORV Isol valves at least one energized Determine NO PORV Isol valve energized (assuming action taken per Tech Specs)
	BOP/US	• Verify Generator trip

	BOP/US	• Verify DG running
		  • SX valves open (SX169A/B)
		  • Dispatch operator locally to check operation

		CONTINUED IN EVENT 8

Comments: ____

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Scenario No: 1-2	Event No. 8	Page 21 - 28 of 32
Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (0-33-C7) MCR PRESSURE LOW MCR/TB BLDG DP indication reading below 0.125 "H2O (GREEN band)

	BOP/US	• Ventilation systems aligned for emergency
		  • Control Room
		    • Control Room pressure > +0.125" H2O on 0PDI-VC038
		
		Determine/report control d/P inadequate
		
		Determine BOP VC-14 needs to be performed (See actions below on page 23.)

	BOP/US	• Ventilation systems aligned for emergency
		  • Aux Bldg
		  • Fuel Handling Bldg

	RO/US	• Check PZR sprays & PORVs closed
		  • Pzr Spray valves 1RY455B & 455C closed (NOTE: valves are failed closed due to loss of IA)
		  • PORVS 1RY455A and 1RY456 closed (NOTE: PORVs isolated due to faults earlier)
		
		• RCS temperature control
		  • Check RCP status
		  • If RCP running, check RCS Tave trending to 557°F, OR if NO RCP running, check RCS CL temperatures stable at or trending to 557°F.
		
		• Check status of RCPs
		  • If any running, apply trip criteria
		    o HHSI flow >50 gpm on 1FI-917
		    o SI flow > 100 gpm on 1FI-918/922
		    o RCS pressure < 1425 psig

Comments: ____

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Scenario No: 1-2	Event No. 8	Page 21 - 28 of 32
Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	

Time	Position	Applicant's Actions or Behavior
	BOP/US	• If RCPs stopped, place steam dumps in STEAM PRESSURE Mode
	BOP/US	• Check if SGs secondary pressure boundaries are intact • NO SG pressure decreasing in an uncontrolled manner • NO SG completely depressurized Determine secondary boundary intact
	CREW	• Check if SG Tubes intact • SJAE GS exhaust 1PR27J Grid 1 1PS027 < ALERT ALARM • SG Blowdown 1PR08J Grid 1 1PS108 < ALERT ALARM • Main Steam: 1RT-AR022 & 1RRT-AR023 for each SG, Grid 1 4AA122/123, 4AB222/223, 4AC322/323, 4AD422/423 < ALERT ALARM • Main Steam Penetration 1A/1D 1RT-AR024 Grid 4 4AA124 < ALERT ALARM • Main Steam Penetration 1B/1C 1RT-AR024 Grid 4 4AB124 < ALERT ALARM
	CREW	• Diagnose SGTR • Secondary area rad monitors levels increasing or in ALERT
	US	• Transition to BEP-3 "STEAM GENERATOR TUBE RUPTURE" (See page 24.) • Direct initiation of Critical Safety Function Status Trees monitoring.

Comments: ____

Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.

Time	Position	Applicant's Actions or Behavior
		BOP VC-14 ACTIONS. NOTE: US/BOP may direct that a different operator perform actions.
	BOP	Restore pressure by performing actions of BOP VC-14

- CHECK position indication of the operating train dampers at 0PM02J for abnormal alignment of the system:

0A/0B TRAIN DAMPER #	NORMAL POSITION	MAKEUP POSITION
• 0VC17Y/0VC01Y	OPEN	OPEN
• 0VC19Y/0VC03Y	OPEN	OPEN
• 0VC20Y/0VC04Y	CLOSED	CLOSED
• 0VC18Y/0VC02Y	CLOSED	CLOSED
• 0VC24Y/0VC08Y	CLOSED	OPEN or DUAL (modulating)
• 0VC281Y/0VC282Y	OPEN	CLOSED
• 0VC32Y/0VC16Y	OPEN	CLOSED
• 0VC312Y/0VC313Y	CLOSED	CLOSED
• 0VC25Y/0VC09Y	CLOSED	OPEN
• 0VC033Y/0VC172Y	OPEN	OPEN
• 0VC43Y/0VC44Y	OPEN	CLOSED
• 0VC21Y/0VC05Y	CLOSED	OPEN
• 0VC22Y/0VC06Y	CLOSED	OPEN

Determine/report 0VC24Y/0VC08Y modulating closed

Take differential controller to MANUAL and adjust dampers open to restore d/P > +0.125" H2O

Comments: ____

Scenario No: 1-2	Event No. 8	Page 21 - 28 of 32
Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	

Time	Position	Applicant's Actions or Behavior

	BOP (cont.)	• CHECK the shutdown train isolation dampers indicate CLOSED at 0PM02J.
		  • 0A Train: Return fan 0VC17Y, Supply fan 0VC33Y
		  • 0B Train: Return fan 0VC01Y, Supply fan 0VC172Y

CHECK the area differential pressure indicators to determine which area or areas have the low pressure problems:

LOCATION	INDICATOR	AREA WP INDICATED	NORMAL READING
• 0PM02J	0PDI-VC037	Control Room - Aux Bldg	> +0.125"
• 0PM02J	0PDI-VC038	Control Room - Turbine Bldg	> +0.125"
• 0VC01JA	0PDI-VC037A	Control Room - Turbine Bldg	> +0.125"
• 0VC01JA	0PDI-VC037C	Control Room - #1 Computer Room	> +0.125"
• 0VC01JA	0PDI-VC037D	0A VC HVAC Rm - Div 11 Misc. Elect. Equip. Rm	> +0.125"
• 0VC01JB	0PDI-VC038A	Control Room - #2 Computer Room	> +0.125"
• 0VC01JB	0PDI-VC038B	Control Room - Lower Cable Spreading Rm.	> +0.125"
• 0VC01JB	0PDI-VC038D	0B VC HVAC Rm - Div 21 Misc. Elect. Equip. Rm	> +0.125"

If NO previous action taken, determine pressure is low in most areas, the problem is probably due to the VC system line-up.

Take differential controller to MANUAL and adjust dampers open to restore d/P > +0.125" H2O

Time	Position	Applicant's Actions or Behavior
		BEP-3 ACTIONS
	US	Direct operator actions of BEP-3.

	RO/US	• Check status of RCPs
		  • If any running, apply trip criteria
		    o HHSI flow >50 gpm on 1FI-917
		    o SI flow > 100 gpm on 1FI-918/922
		    o RCS pressure < 1425 psig

Comments: ______________________________

Event Description: Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.

Time	Position	Applicant's Actions or Behavior
	BOP/US	• If RCPs stopped, place steam dumps in STEAM PRESSURE Mode
	CREW	• Identify ruptured SG o Unexpected rise in NR level o Main steamline rad monitor o RT-AR022 Grid 1 4AD422 o RT-AR023 Grid 1 4AD423 o Main Steam Penetration 1A/1D 1RT-AR024 Grid 4 4AA124 < ALERT ALARM o High activity for any SG sample • Reset CNMT isol Phase A • Notify Chem to locally sample • Open SG blowdown sample valves at Chem request
	CREW	Identify/report 1D SG as ruptured
	BOP/US	• Isolate flow from rupture SG • SG PORV MS018D in AUTO • Check SG PORV MS018D closed • Verify closed when SG pressure < 1115 psig • Verify SG blowdown valves closed unless open for sampling • SD002C • SD002D • Close MSIV and MSIV bypass valves for 1D SG

Comments: ______________________________

Scenario No: 1-2	Event No. 8	Page 21 - 28 of 32
Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	

Time	Position	Applicant's Actions or Behavior

	BOP/US
	[CT]
	E-3--A
		• Check ruptured SG level
		  • > 10%
		
		  • Close AF isol valves
		    • AF013D
		    • AF013H

	RO/US	• Check PZR PORVs
		  • Power to PORV Isol valves available
		    • US may direct reenergizing PORV Block valve 1RY8000A (US may choose implement 10CFR50.54(x)) by closing breaker MCC 131X2B A5
		
		  • PORVs closed
		    • RY455A
		    • RY456
		
		Reports 1RY455 A is open; Ensures Block valve is closed.
		
		  • At least ONE PORV Block valve OPEN
		    o RY8000A
		    o RY8000B
		
		Determines PORV Isol valve should NOT be opened.

	BOP/US	• Check SG secondary boundaries intact
		
		• Check intact SG levels
		  • NR level > 10%
		  • Maintain level between 18% and 50%
		  • Check NR level NOT increasing in uncontrolled manner.

Comments: ____

Scenario No: 1-2	Event No. 8	Page 21 - 28 of 32
Event Description:	Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	

Time	Position	Applicant's Actions or Behavior
	RO/US	• Reset SI • Reset CNMT isolation • Restore Instrument Air to CNMT Determine air CANNOT be restored to CNMT due to IA leak
	BOP/US	• Verify all AC buses powered from offsite

	RO/US	• Check if RH stopped
		  • RCS pressure >300 psig
		  • Stop RH pumps and place in standby

	BOP/US	• Check 1D SG pressure > 640 psig

	CREW
	[CT]
	E-3--B
		• Initiate RCS cooldown
		  • Determine target temperature based on 1D SG pressure (Normal CNMT)
		  o Check PZR pressure < 1930 psig
		    • If so, block Steamline SI

	BOP/US	• Dump steam from intact SGs at maximum rate
		    o Steam dumps in STEAM PRESSURE Mode
		    o If steam dumps NOT available, use SGA, B, C PORVs
		  • Check average CETC temperatures < value determined above
		• Check ruptured SG pressure stable or increasing.

Comments: ______________________________

Scenario No: 1-2		Event No. 8	Page 21 - 28 of 32
Event Description:		Main Control Room (MCR) differential pressure controller fails causing MCR envelope differential pressure to drop with respect to Turbine Building and Aux Building. Continue with actions of BEP-0.	
Time	Position	Applicant's Actions or Behavior	
	CREW	• Check RCS subcooling acceptable per ATTACHMENT A & 1BEP 3-2	
		SEE Event 9	

Comments: ____

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Scenario No: 1-2	Event No. 9	Page 29 - 32 of 32
Event Description:	Power is lost to PORV Block valve 1RY8000A while valve is closed. This results in a loss of ALL Pzr pressure control for depressurization, except for MANUAL control of Pzr heaters.	

Time	Position	Applicant's Actions or Behavior
	CUE	1RY8000A control/position lights extinguish 1RY8000A remains closed
	RO/US	• Depressurize RCS • Use PZR sprays Determines normal sprays NOT available due to loss of IA • Depressurize RCS • PZR PORV at least ONE available Determine either PORVs NOT available OR PORV open and Block Valve available • Attempt to open PORV Block Valve 1RY8000A, if directed Determine/report Block Valve is NOT OPEN and NOT available
	US	Transition to 1BCA-3.3 "SGTR WITHOUT PRESSURIZER PRESSURE CONTROL"
		BCA-3.3 ACTIONS
	US	Direct operator actions of BCA-3.3.
	BOP/US	• Check ruptured SG NR level < 88% • If level > 88% go to step 7 (NOTE: Marked ♦ below on page 31.)
	RO /US	• Try to establish normal Pzr Spray • Check RCP status running in either loop D or loop C Determine normal spray NOT available • Try to establish PZR PORV • Manually open or locally open one PORV isol valve Determine PORV CANNOT be operated

Comments: ______________________________

Scenario No: 1-2		Event No. 9	Page 29 - 32 of 32
Event Description:		Power is lost to PORV Block valve 1RY8000A while valve is closed. This results in a loss of ALL Pzr pressure control for depressurization, except for MANUAL control of Pzr heaters.	
Time	Position	Applicant's Actions or Behavior	
	RO/US (cont.)	• Try to establish Aux Spray • Both SI pumps running • At least one CENT CHG pump running • Reset SI recirc sump isol valves 1SI8811A/1CV8110, 1SI881B/1CV8111 • Reset SI CENT CHG pump miniflow isol valves 1CV8114, 1CV8116 • Establish 70 gpm charging flow • Verify CENT CHG miniflow valves open 1CV8810, 1CV8111, 1CV8114, 1CV8116 • Throttle CENT CHG pumps flow control 1CV121 to 5% open • Open charging line CNMT isol valves 1CV8105, 1CV8106 • Close CENT CHG pumps to CL injection isol valves 1SI8801A/B • Throttle 1CV182 to maintain seal injection flow between 8 gpm & 13 gpm per RCP • Throttle 1CV121 to establish 70 gpm charging flow • Establish aux spray flow • Open PZR Aux Spray flow 1CV8145 Determine PZR Aux Spray NOT available due to loss of IA in CNMT	
	BOP/US	• Check intact SG levels • NR level >10% • Maintain level between 18% and 50% • Check NR level NOT increasing in uncontrolled manner.	
	RO /US	• Check PZR level > 4%	

Comments: ____________________

Event Description:	Power is losι to PORV Block valve 1RY8000A while valve is closed. This results in a loss of ALL Pzr pressure control for depressurization, except for MANUAL control of Pzr heaters.

Time	Position	Applicant's Actions or Behavior
	CREW	♦ • Check if ECCS flow can be terminated • RCS Subcooling acceptable o Iconic Display OR o ATTACHMENT A, FIGURE 1BCA 3.3-1 • Secondary heat sink o Total feed flow to SGs > 500 gpm available OR o NR level in at least ONE intact SG > 10% • Check RCPs running • If NONE running, check Plenum region of RVLIS indicates > 15% • If < 15%, DO NOT stop ECCS Pumps and go to 1BCA-3.1 • Check ruptured SG level NR level increasing in uncontrolled manner OR offscale high • If NOT, DO NOT stop ECCS pumps and return to steps to attempt to establish PZR pressure control capabilities for depressurization.
	CREW [CT] ECA-3.3 -A	• Stop ECCS Pumps and place in standby • SI Pumps • All but ONE CENT CHG pump
	RO/US	• Establish 70 gpm charging flow • Reset SI recirc sump isol valves 1SI8811A/1CV8110, 1SI881B/1CV8111 • Reset SI CENT CHG pump miniflow isol valves 1CV8114, 1CV8116 • Verify CENT CHG miniflow valves open 1CV8810, 1CV8111, 1CV8114, 1CV8116

Comments: ______________________________

Scenario No: 1-2		Event No. 9	Page 29 - 32 of 32
Event Description:		Power is lost to PORV Block valve 1RY8000A while valve is closed. This results in a loss of ALL Pzr pressure control for depressurization, except for MANUAL control of Pzr heaters.	
Time	Position	Applicant's Actions or Behavior	
	RO/US (cont.)	• Throttle CENT CHG pumps flow control 1CV121 to 5% open • Open charging line CNMT isol valves 1CV8105, 1CV8106 • Close CENT CHG pumps to CL injection isol valves 1SI8801A/B • Throttle 1CV182 to maintain seal injection flow between 8 gpm & 13 gpm per RCP • Throttle 1CV121 to establish 70 gpm charging flow	
	CREW	• Verify ECCS flow NOT required • RCS Subcooling acceptable o Iconic Display OR o ATTACHMENT A, FIGURE 1BCA 3.3-1 • Check RCPs running • If NONE running, check Plenum region of RVLIS indicates > 15% • If < 15%, manually operate ECCS equipment as necessary and go to 1BCA-3.1	
		SCENARIO TERMINATED	

Comments: ______________________________

SHIFT MANAGER'S TURNOVER

TODAY ONCOMING SHIFT

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE........ 1 **%PWR........ 98** **MWe........ 1157** **Max Load/Power........ 1175 MW** **Min Load/Power........ 750 MW** **Max Ramp Rate........ 5MW/min** **Desired Delta I........TARGET** **Boron @ 868** **Control Bank D @ 220**	PZR pressure channel PT-458 PORV 1RY456 with PORV Block Valve 1RY8000B closed and deenergized. Heater Drain Pump 1A is out of service to meggar motor leads. 250' Meteorological Tower instruments are OOS.
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 1 MAJOR SURVEILLANCES**
LCOARs have been entered for 1PT458 and PORV 1RY456. LCOAR has been entered for 250' Met Tower.	
UNIT 1 IN PROGRESS	**UNIT 1 AND COMMON PENDING**
The National Weather Service has declared a high wind warnings in effect for Stephenson, Winnebago and Ogle counties for the next 2 hours.	
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

UNIT 2 STATUS	UNIT 2 MAJOR OOS's
MODE............ 1 %Pwr............ 99.8 MWe............. 1178 Max Load/Power.. 100% Min Load/Power.. 750 MW Max Ramp Rate... 2 MW/Min Desired Delta I. Target Unit on EGC..... NA Boron @ 535 Control Bank D @ 213	
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 2 MAJOR SURVEILLANCES**
UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

ADMINISTRATIVE	
TEMPORARY PROCEDURES/ALTS	
DAILY ORDERS/SPECIAL OP. ORDERS	
DAILY MANNING SCHEDULE	
CONTROL ROOM ROUNDS	
(GSEP/LER/DVR/ENS)	
MATERIAL CONDITIONING	
RWP'S/RELEASES/PRECAUTIONS/ALARA	
INFREQUENT EVOLUTION ACTIVITIES	
SPSO/DIVISION LD	Alternate BPO Outside # 815-727-5902/5903 Tie # 8-565-5902/5903

UNIT 1 COMMENTS

S/G B/D returning to Condenser per SPP

UNIT COMMON COMMENTS

CW Blowdown Lineup	U-2
FC Cleanup	U-1
FC Cooling	U-1
50K DO Tank	Certified
125K DO Tank	Certified
Aux Steam	U-1
U-0 CC HX	U-1

UNIT 2 COMMENTS

S/G B/D returning to Condenser per SPP

GENERAL COMMENTS

Caution Cards

CCNUM	EPN

Abnormal Positioned Components

CCNUM	EPN	Abnormal Position

SHIFT: LAST **TO PRESENT TIME:** NOW **DATE:** TODAY
OFFGOING ____________
ONCOMING ____________

Simulation Facility Byron 1 & 2 Scenario No.: 3 Op Test No.: 1

Examiners: ____________________ Operators: ____________________ SRO

____________________ ____________________ RO

____________________ ____________________ BOP

Objectives: In accordance with plant procedures:

1. increase reactor power.
2. respond to a trip of one feedpump.
3. respond to a failed primary RTD
4. respond to failure of digital rod position indication channel.
5. respond to failed steam flow channel.
6. respond to TWO dropped control rods with failure of the reactor to trip.
7. respond to failure of running Charging Pump.
8. perform actions for a large break LOCA where containment phase B actuation fails to operate and running CS pump trips.

Initial Conditions:

1. IC-190, Reactor Power 67%, MOL, BGP 100-3, step F.61.
2. 1B CV Pump running; 1A CV Pump in standby.
3. 1A Containment Spray pump OOS.
4. 1A Motor driven Feedwater Pump OOS
5. 250' Meteorological Tower OOS.

Turnover:

1. Reactor power is 67% with power increase to continue following turnover at 5MW/hr.
2. Unit 2 is operating at 100% power.
3. 1B CV Pump is currently in service checking for post-test leakage. 1A CV Pump is in standby.
4. 1A Containment Spray pump is OOS due to high vibrations during testing. An AR has been initiated and the pump is expected to be release to service in 24 hours.
5. 1A Feedwater Pump is OOS with electrical supply cleared due to electrical wiring problem. Pump will NOT be ready to return to service this week.
6. The 250 foot Meteorological Tower is out of service.
7. Thunderstorm warning is in effect for Stephenson, Winnebago and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*		Event Description
Preload	RP01	C	RO SRO	Reactor protection system failure of automatic trip
Preload	CS01A			1A Containment Spray pump OOS.
Preload	OR ZAO0UREM002P2, 0 OR ZAO0UREM012P1, 0 OR ZAO0UREM012P2, 0			250' Met Tower OOS
~~Preload~~	~~OR ZDI1CS01PB, TRIP (NOTE 1)~~			deleted -- NOT NEEDED ~~Failure of CS Pump to start and Phase B to actuate on High-High Containment Pressure~~
		R	SRO RO	Raise Reactor Power (5MW/min)
1		N	BOP	~~Raise reactor power (5 MW/min)~~ Set and Raise Turbine Load
2	FW02A	C	BOP SRO	1B (turbine driven) Main FW Pump trips.
3	RX18A, 630	I	RO SRO	Tcold RTD fails high resulting in higher Tavg input
4	RD13AK10	C	RO SRO	A DATA A failure occurs for rod K10 when rod motion occurs.
~~5~~	~~RX03B, 4.8 MLBH~~	~~I~~	~~BOP SRO~~	Deleted Not NEEDED ~~Steam Flow Transmitter FT-513 (input to controlling SGWLC) fails upscale~~
6	RD02K10 RD02F06 (RP01)	M	RO BOP SRO	TWO dropped control rod – Failure of the reactor to trip on negative rate trip.
7	CV01B	C	RO SRO	Running Charging Pump trip (to occur on reactor trip).
8	TH06, 50,000 to 400,000	M	RO SRO BOP	Large break LOCA inside containment. . (Put on a 5 min. ramp for containment pressure to rise above HI HI setpoint.)
~~9~~	~~(OR) CS01B~~	~~C~~	~~RO BOP SRO~~	NOT NEEDED ~~Failure of Phase B and containment spray system to actuate automatically.~~ ~~1B CS Pump trips after starting (approx. 30 sec).~~

*(N)ormal, (R)eactivity (I)nstrument, (C)omponent, (M)ajor Transient

NOTE 1: Trigger is set up on ZDI1CS01PB using – 2DICIPBA1, 2DICIPBA2, 2DICIPBA3, 2DICIPBA4

SCENARIO #1-3

SCENARIO SUMMARY:

The scenario begins with power at 67% with the 1A Containment Spray pump out of service due to high vibration during the last run. The 250' elevation Meteorological Tower Instrumentation has failed and action of TRM 3.3.c is being tracked. Power is to be raised at 5 MW/hr.

After reactor power is increased at least 5%, the 1B Main Feedwater will trip. The crew should respond per BOA SEC-1 and reduce power to within the capacity of one feedpump (540 to 600 MWe or ~ 60% power).

Prior to power stabilization following the FW Pump trip, a loop Tcold RTD will fail high resulting in increased auctioneered high Tave. This will result in demand inward motion of the control rods. The crew will perform actions of BOA ROD-1 due to the rod motion, and will be directed to BOA INST-2, ATTACHMENT A. Coincident with the RTD failure, a DATA A failure (DRPI coil fails open) will occur on CBD rod K10. Alarm Response procedures and/or BOA ROD-3 will be entered. SRO will review Technical Specification 3.3.1, Table 3.3.1-1, Function 6 & 7 (Condition D) and 3.1.7 (Condition A).

NOT NEEDED

~~Following completion of actions for taking the failed RTD instrument out of service, the 1A SG selected flow channel instrument fails high. This results in indication of increased steam flow and initial opening of the 1A SG Feed Reg Valve to attempt to match feed flow to steam flow. An equilibrium level should be reached if manual control is not taken expediently. The operator will perform the actions of BOA INST-2, Attachment H.~~

Following stabilization of SG levels after control is returned to auto, TWO rods trip into the core. The reactor fails to automatically trip on the PR Negative Rate trip and the operator will have to manually trip the reactor (also required on drop of more than one rod). The running Charging Pump trips coincident with the reactor trip, and the operator must start the 1A CV Pump to provide charging flow. After performing the first FOUR steps of BEP-0, transition will be made to BEP ES-0.1.

After Step 10 is performed in BEP ES-0.1, a large break LOCA will occur requiring BEP-0 to be re-entered and actions of BEP-0 and BEP-1 to be performed. ~~Phase B will fail to occur and containment spray will fail to initiate (i.e., the CS pumps will NOT start) requiring the crew to manually actuate CS and Phase B Isolation. Following auto alignment and start of 1B CS pump, that pump will trip approximately 30 seconds later~~. The scenario ends with completion of alignment of the ECCS and CS for cold leg recirculation in BEP ES-1.3. NOT NEEDED

ERG-Based Critical Tasks:

1. EP-0 – A: Manually trip the reactor from the Control Room before transition to ES-0.1.

2. EP-0 – E: Manually actuate at least the minimum required complement of containment cooling equipment before an extreme (red path) challenge develops to the containment CSF.

3. ES-1.3 – A: Transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the LOCA analysis (one train).

Scenario No: 1-3	Event No. 1	Page 4 - 5 of 33

Event Description: Normal power increase at 5 MW/min

Time	Position	Applicant's Actions or Behavior
	US	Implement actions of 1BGP 100-3, Step F.61:
	US	Direct increase to 100% power at 5 MW/minute.
	CREW	Review applicable Precautions, and Limitations and Actions.
	RO	Verify rod position and boron concentration. Initiate dilution, if required. (BOP CV-5) • Place MU MODE CONT SWITCH to STOP position. • Set MU MODE SELECT to DIL or ALT DIL position. • Set 1FK-111 PW/Total Flow Cont to desired dilution rate. • Verify 1CV111A in AUTO • Set 1FY-0111 Primary Water Control Preset Counter to desired volume. • Verify 1CV11B & 1CV110B in AUTO • Place MAKE-UP CONTROL Switch to START • Verify proper operation of valves & PW pump (CV111A & 111B open, PW pump is running, CV110B opens [if ALT DIL]) • Verify PW flow on recorder • Verify B/U Heaters ON and spray valves 1RY455B/C modulates OPEN.
	BOP	Initiate turbine load increase: • DEPRESS the LOAD RATE MW/MIN Pushbutton • VERIFY/ENTER the desired load rate of 5.0 • DEPRESS the REF Pushbutton • Using the number Pushbuttons, SET in 1050 MW on the REFERENCE DEMAND window • When ready to begin load increase, depress GO • Verify load increases.

Comments: ______________________________

Scenario No: 1-3		Event No. 1	Page 4 - 5 of 33
Event Description:		Normal power increase at 5 MW/min	

Time	Position	Applicant's Actions or Behavior
	RO	Monitor power increase: • Monitor reactor power, Tave • Verify rods move in AUTO to maintain Tave within ± 2.0°F of Tref. If diluting: • Monitor VCT level • Verify RCS concentration decreasing • Monitor Primary Water Control counter countdown. • Verify dilution auto stops at preset value. • Return Reactor Makeup System to blended flow for current boron concentration.

Comments: ____

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Scenario No: 1-3	Event No. 2	Page 6 - 10 of 33
Event Description:	Main Fed Pump 1B trips. Load must be reduced to approximately 60% (700 MWe) in order to ensure feed flow requirements are within capacity of ONE pump.	

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciators (1-16-B1) FW PUMP 1B TRIP (1-15-A4/B4/C4/D4) S/G 1_ FLOW MISMATCH FW FLOW LOW Trip of 1B FW Pump Lowering FW flow FW Pump 1C speed increase in AUTO
	US/BOP	Identify/report trip of FW Pump 1B.
	US	Implement BOA SEC-1 "Secondary Pump Trip", ATTACHMENT A and direct operator action.

	BOP/US	Perform actions of BOA SEC-1 as directed:
		• Close recirc valve 1FW012B
		
		• Check Turbine load > 700MWE
		
		• Check at least ONE FW Pump running
		
		Determine/report 1C FW Pump running
		
		• Reduce turbine load
		  • Depress TURBINE RUNBACK pushbutton
		
		  • Check turbine load decreasing

	RO/US	• Verify rod control in AUTO • Initiate boration as necessary

	BOP/US	• Raise FW Pump Suction Pressure
		(NOTE: Annunciator alarm 1-16-E1 may NOT be lit
		  • *If FW PUMP NPSH LOW (1-16-E1) alarm lit*
		    • *Verify open CP bypass valves 1CD210A/B*
		    • *Start standby CD/CB Pump*

Comments: ____

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Event Description:	Main Fed Pump 1B trips. Load must be reduced to approximately 60% (700 MWe) in order to ensure feed flow requirements are within capacity of ONE pump.

Time	Position	Applicant's Actions or Behavior

	BOP/US (cont.)	• *Verify HDP discharge valve 1HD046B responding as necessary*
		• *Verify CB pump recirc valves 1CB113A-D closed*
		• *Close CD Pump recirc valve 1CD152*
		• *Open GS condenser bypass valves 1CD157A/B*
		
		• Restore Feed flow
		
		Determine FW Pump 1A NOT available
		
		• Check feed flow restored
		  • Feed flow > Steam flow
		  • Stop turbine runback
		    • Depress TURBINE RUNBACK pushbutton
		    • Depress turbine HOLD pushbutton
		
		• Check feed flow stable
		  • SG levels stable at or trending to NORMAL
		  • FW PUMP DSCH FLOW HIGH alarm (1-16-D2) NOT lit

	CREW	• Evaluate Plant Status
		  • Check control rods > RIL
		  • Check ΔI within TARGET BAND
		  • Check TURBINE RUNBACK pushbutton NOT lit
		    • If it is lit, US may direct reset, depressing TURBINE RUNBACK button
		  • Check LOSS OF TURBINE LOAD INTLK C7 Bypass Permissive light (1-BP-4.6) NOT lit

Comments: ____

Scenario No: 1-3		Event No. 2	Page 6 - 10 of 33
Event Description:		Main Fed Pump 1B trips. Load must be reduced to approximately 60% (700 MWe) in order to ensure feed flow requirements are within capacity of ONE pump.	

Time	Position	Applicant's Actions or Behavior
	BOP/US	• Restore Plant conditions • Verify recirc valve 1FW012C in MODULATE • Verify valve controls in AUTO for running eqpt • HD Pump disch • CB Pump recircs • CD Pumps recirc • GS condenser bypass • Complete shutdown of FW Pump 1B per BOP FW-2a (See below on this page) • Shutdown unnecessary CD/CB pump per BOP CD/CB-2 (See below on page 9) • Adjust SG blowdown flows and calorimetric inputs • Place DEHC feedback loop in service o Impulse o MW • Notify Chemistry to monitor secondary chemistry • Complete applicable sections of 1BGP 100-4 • Check power change> 15% in one hour Determine change was < 15%
		ACTIONS OF 1BOP FW-2a
	BOP	• ENSURE/OPEN the following valves: • 1GS046A, Stop Vlv Drain Valve, at 1PM04J. • 1GS047A, Stop Vlv Drain Valve, at 1PM04J. • 1MS070A, 1B FW PP Hot Reheat Stm Sup Line Drn Vlv. (local) • 1MS071A, 1B FW PP Hot Reheat Stm Sup Line Drn Vlv. (local) • 1MS073A, 1B FW PP Hot Reheat Stm Sup AOV Check Vlv Drn Vlv. (local) • 1MS074A, 1B FW PP Hot Reheat Stm Sup AOV Check Vlv Drn Vlv. (local)

Comments: ____

Scenario No: 1-3		Event No. 2	Page 6 - 10 of 33
Event Description:		Main Fed Pump 1B trips. Load must be reduced to approximately 60% (700 MWe) in order to ensure feed flow requirements are within capacity of ONE pump.	

Time	Position	Applicant's Actions or Behavior

	BOP (cont.)	• 1GS075A, 1B FW PP Chest Drn Vlv. (local)
		• 1GS076A, 1B FW PP HP Stop/Gov Vlv Stm Leakoff Vlv. (local)
		• 1MS201A, 1B FW Pp Turb MS S/U Sup Hdr Drn Vlv. (local)
		
		• VERIFY/CLOSE 1FW012B, FW Pump 1B Recirc Valve, at 1PM04J when Turbine speed decreases to 1500 RPM.
		
		• ENSURE that the Turbine Tripped Indicating Backlight ILLUMINATES.
		
		• ENSURE the following:
		  • High Pressure Stop Valve Closed Indicating Backlight ILLUMINATED.
		  • Low Pressure Stop Valve Closed Indicating Backlight ILLUMINATED.
		  • High Pressure Gov. Valve Closed Indicating Backlight ILLUMINATED.
		  • Low Press Gov. Valve Closed Indicating Backlight ILLUMINATED.
		  • If necessary, ISOLATE 1MS072A, FW Pp 1B Hot RHT Stm Sup Isol Vlv, to ensure steam isolation.
		  • If necessary, ISOLATE 1MS079A, FW Pp 1B MS Supply Isol Vlv, to ensure steam isolation to the FW Pp.
		
		• ENSURE that FW Pump 1B Turning Gear AUTOMATICALLY ENGAGES when zero speed is indicated.

		ACTIONS OF BOP CD/CB-2
	BOP	• VERIFY/START the Aux Lube Oil Pump at PM03J for the selected CD/CB Pump. • VERIFY/PLACE the CD/CB STBY PUMP SELECT Switch in the OFF position at PM03J. • PLACE CD113A/B/C/D, CB Pump Recirc Vlv, in the OPEN position for the pump being stopped. • STOP CD/CB Pump from panel PM03J.

Comments: ____

Scenario No: 1-3		Event No. 2	Page 6 - 10 of 33
Event Description:		Main Fed Pump 1B trips. Load must be reduced to approximately 60% (700 MWe) in order to ensure feed flow requirements are within capacity of ONE pump.	

Time	Position	Applicant's Actions or Behavior
	BOP	• PLACE CB113A/B/C/D, CB Pump Recirc Vlv in the CLOSED position for the pump being stopped. • PLACE the STBY PUMP SELECT Switch at PM03J to the desired position, if it is desired to select a Stby Pump. • STOP the Lube Oil Pump 5 minutes following the shutdown of the affected CD/CB Pump.
	US	Inform SM/Maint of trip of 1B FW Pump
	US	Inform SM of unit status.

Comments: ________________________________

Scenario No: 1-3	Event No. 3 & 4	Page 11 - 13 of 33
Event Description:		Tcold RTD fails HIGH on loop A (TE-411B). This results in high Tavg for loop A with a low ΔT on the same loop. Auctioneered HIGH Tavg is associated with this loop and rods will begin to insert in AUTO to match Tavg with Tref. Coincident with RTD failure, a DATA A failure occurs for rod K10 on DRPI.
Time	**Position**	**Applicant's Actions or Behavior**
	CUES:	Annunciators (1-14-A5) LOOP 1A ΔT DEV LOW (1-14-B/C/D3) Loop 1B/C/D TAVE DEV LOW (1-14-D1) TAVE CONT DEV HIGH (1-12-B4) PZR LEVEL CONT DEV LOW • Loop 1 Tave indication at top of scale and Loop1 ΔT indication at bottom of scale • Rods begin to move inward in AUTO • PZR level begins to rise • Charging flow control CV-121 throttles open to increase flow Annunciators (1-10-D6) ROD CONT NON-URGENT FAILURE • DATA A FAIL LEDs flashing • GW LED flashing for rod K10
	RO/US	Identify/report failed RTD input/TAVE channel. Diagnose NR Cold RTD failure
	US	Implement BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment A "RCS NARROW RANGE RTD CHANNEL FAILURE" and direct operator action.

	RO/US	• Place ROD BANK SELECT switch in MANUAL
		
		• Manually defeat failed RTD channel:
		  • Select LOOP A on TAVE DEFEAT switch
		  • Select LOOP A on ΔT DEFEAT switch
		
		• Select LOOP B, C or D on ΔT recorder
		
		• Check Tave-Tref stable and within 1°F
		  • If NOT,
		    o Adjust rods
		    o Adjust turbine load
		    o Adjust RCS boron concentration

Comments: ______________________________

Event Description:	Tcold RTD fails HIGH on loop A (TE-411B). This results in high Tavg for loop A with a low ΔT on the same loop. Auctioneered HIGH Tavg is associated with this loop and rods will begin to insert in AUTO to match Tavg with Tref. Coincident with RTD failure, a DATA A failure occurs for rod K10 on DRPI.

Time	Position	Applicant's Actions or Behavior
	RO/US (cont.)	• Check Pzr level normal & stable • If NOT, manually restore to program level

	US/RO	• Trip bistables by placing in TEST:
		  • TB411G C1-124 BS-1 OPΔT TRIP
		  • TB411H C1-124 BS-2 OPΔT RUNBACK
		  • TB411C C1-124 BS-3 OTΔT TRIP
		  • TB411D C1-124 BS-4 OTΔT RUNBACK
		  • TB412G C1-121 BS-2 LOW TAVE
		  • TB412D C1-121 BS-1 LO-LO TAVE

	RO/US	• Check if rod control can be placed in AUTO:
		  • TURBINE LOW POWER INTLK C5 (1BP-5.7) NOT lit
		  • Tave-Tref deviation stable and within 1°F
		  • If desired, place ROD BANK SELECT switch to AUTO
		• Check P12 Interlock, LO-2 TAVE STM DUMP INTLK P12 (1-BP-5.4) NOT lit

	US	Check Technical Specifications:
		• 3.3.1 - Rx Trip Inst. Table 3.3.1
		  • FU 6(OTΔT): Req Channels 4 - CONDITION D, Ensure only ONE channel inop or restore to only one inop within 1 hour; place inop channel in TRIP within 6 hours
		  • FU 7(OPΔT): Req Channels 4 - CONDITION D, Ensure only ONE channel inop or restore to only one inop within 1 hour; place inop channel in TRIP within 6 hours
		• 3.3.2 - ESFAS Inst. Table 3.3.2-1; FU 8.c Tave --Low-2 P-12: Required channels 3, satisfied. NO ACTION

Comments: ______________________________

Event Description:	Tcold RTD fails HIGH on loop A (TE-411B). This results in high Tavg for loop A with a low ΔT on the same loop. Auctioneered HIGH Tavg is associated with this loop and rods will begin to insert in AUTO to match Tavg with Tref. Coincident with RTD failure, a DATA A failure occurs for rod K10 on DRPI.

Time	Position	Applicant's Actions or Behavior
	US/RO	Determine/report failure of DRPI DATA A for control rod K10
	RO/US	Perform actions of BAR 1-10-D6: • Check SER Printout for Point 2150; If in alarm • CHECK the front of the DRPI system display panel for a "Data A FAILURE" or "Data B FAILURE" LED • PLACE the "ACCURACY MODE" switch(S106) on the back of the DRPI display panel to B ONLY position (NOTE: Window 1-10-D6 will remain in alarm until the system is returned to the "A + B" accuracy mode.)
	US	Inform SM/Maint of Loop A Cold Leg RTD failure. Inform SM/Maint of DRPI DATA A failure for rod K10.
	US	Inform SM of unit status/potential GSEP event.

Comments: ____________________

Scenario No: 1-3		Event No. 5	Page 14 of 33

Event Description:	Steam flow transmitter FT-513 fails HIGH. This channel inputs to the SG Water Level Controller for SG 1A Fed Reg valve, 1FW510. The Feed Reg valve will open due to the steam flow/feed flow mismatch.

Time	Position	Applicant's Actions or Behavior
	CUE:	Annunciator (1-15-A4) S/G 1A FLOW MISMATCH FW FLOW LOW • FT-513 indication reading high (4.8 x 10^6) • 1FW510 throttling open • FW flow increasing • SG level increasing above program
	BOP/US	Identify/report steam flow channel FT-513 failure • Take MANUAL control of 1FW510 and balance Feed flow with Steam flow to stabilize SG level, as necessary.
	US	Implement BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment H "STEAN FLOW CHANNEL FAILURE" and direct operator action.
	BOP/US	• Check affected SG levels normal • If NOT, • Place feed reg valve in manual • Verify adequate feedwater ΔP • Restore SG level to a stable condition • Select operable steam flow channel FT-512 • Establish AUTO level control • Verify steam pressure channels PT-514 and PT-515 normal
	US	Inform SM/Maint of failure of SG 1A steam flow channel FT-513
	US	Inform SM of unit status/potential GSEP event.

Deleted

NOT NEEDED

Comments:

Scenario No: 1-3	Event No. 6 & 7	Page 15 - 18 of 33
Event Description:	TWO control rods, K10 and F6, drop into the core. A negative rate on at least TWO channels of Power Range NIs which should generate a reactor trip. AUTOMATIC trip will NOT occur and operator will be required to manually trip the reactor. Coincident with the reactor trip, the running CENT CHG pump trips. The operator will be required to manually start the standby CENT CHG pump (1A)	

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-10-B6) ROD AT BOTTOM (1-10-C3) PRW RNG FLUX RATE RX TRIP ALERT (1-11-E2) PWR RNG FLUX RATE HIGH RX TRIP • PR NI indication lowering • Decreasing Tave • K10 and F6 ROD BOTTOM LEDs lit on DRPI Annunciator (1-9-A3) CHG PUMP TRIP (1-9-D3) CHG LINE FLOW HIGH LOW (1-7-B2) RCP SEAL WTR INJ FLOW LOW Trip indication for CENT CHG pump 1B NO charging flow indicated FI-121 Flashing indicated by pressure swings in letdown line PI-131
	CREW	Identify/report failure of reactor to trip on TWO channels PR NI negative rate trip Identify need to manually trip reactor/manually trip reactor
	US	Direct trip of reactor Implement BEP-0 "REACTOR TRIP OR SI"
	RO [CT] EP-0-A	Perform immediate operator actions of BEP-0: • Manually trip the reactor with switch at 1PM05J OR 1PM06J • Check PR channels < 5% • Check IR SUR less negative than -0.2 DPM

Comments: ______________________________

Event Description:	TWO control rods, K10 and F6, drop into the core. A negative rate on at least TWO channels of Power Range NIs which should generate a reactor trip. AUTOMATIC trip will NOT occur and operator will be required to manually trip the reactor. Coincident with the reactor trip, the running CENT CHG pump trips. The operator will be required to manually start the standby CENT CHG pump (1A)

Time	Position	Applicant's Actions or Behavior
	BOP	• Verify Turbine Trip • Turbine throttle valves closed • Turbine governor valves closed • Verify power to 4KV busses • Bus 141 alive light lit • Bus 142 alive light lit
	CREW	Determine SI NOT actuated/required • SI First OUT annunciator NOT lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1) • SI ACTUATED NOT lit (1-BP-4.1) • SI Equipment NOT actuated (SI pumps NOT running, CV Cold leg injection SI8801A/B open for emergency boration) • PZR pressure > 1829 psig • Steamline pressure > 640 psig • CNMT pressure <3.4 psig • PZR level > 4%
	US	• Review immediate operator actions and determine SI not required Transition to BEP ES-0.1 "Reactor Trip Response" • Direct initiation of Critical Safety Function Status Trees monitoring.
	RO/US	Determine/report trip of running CENT CHG pump 1A

Comments: ____

Scenario No: 1-3	Event No. 6 & 7	Page 15 - 18 of 33
Event Description:	TWO control rods, K10 and F6, drop into the core. A negative rate on at least TWO channels of Power Range NIs which should generate a reactor trip. AUTOMATIC trip will NOT occur and operator will be required to manually trip the reactor. Coincident with the reactor trip, the running CENT CHG pump trips. The operator will be required to manually start the standby CENT CHG pump (1A)	

Time	Position	Applicant's Actions or Behavior
	RO/US	Perform action of BAR 1-9-A3 • ENSURE suction source to standby Charging Pump. • VERIFY/CLOSE 1CV121 Cent Chg Pumps Flow Cont Vlv. • START an alternate Charging Pump 1A. • PLACE 1CV121, Cent Chg Pumps Flow Cont Vlv, in AUTO. • OPEN 1CVLCV459 and 460, Ltdwn Line Isol Vlvs, when PZR level has increased to 17%. • OPEN 1CV8149A/B/C, Ltdwn Orif Isol Vlvs, as appropriate. • DETERMINE cause of trip; Dispatch operator to locally check CENT CHG pump 1B and electric breaker Bus 142 cubicle 10
		BEP ES-0.1 ACTIONS
	US	Direct operator actions of BEP ES-0.1.
	CREW	• Announce reactor trip on page.

	BOP/US	• Verify generator tripped
		  • Output breakers open
		    • OCB 3-4
		    • OCB 4-5
		  • PMG output breaker open

	RO/US	• Check RCP Status and with RCP(s) running check RCS average temperature stable or trending to 557°F.

Comments: ______________________________

Event Description:	TWO control rods, K10 and F6, drop into the core. A negative rate on at least TWO channels of Power Range NIs which should generate a reactor trip. AUTOMATIC trip will NOT occur and operator will be required to manually trip the reactor. Coincident with the reactor trip, the running CENT CHG pump trips. The operator will be required to manually start the standby CENT CHG pump (1A)

Time	Position	Applicant's Actions or Behavior
	BOP/US	• Check FW isolation • FW Isolation monitor lights LIT • Trip HD Pumps • Check total feed flow to SGs > 500 gpm available • Check SG blowdown valves SD002 A-H closed
	RO/US	• Verify all control rods fully inserted • Checks all rod bottom lights lit • Check Pzr level control • Level > 17% • Check charging and letdown in service • Check level trending to 25% • Check Pzr pressure control • Pressure > 1829 psig • Pressure stable at or trending to 2235 psig
	BOP/US	• Check SG levels • Narrow range levels > 10% in any SG • If level in all SG NOT > 10% NR, maintain feed flow > 500 gpm • When level is at least one SG > 10% NR, feed flow may be throttled • Control feed flow to maintain SG NR levels between 10% and 50% • Verify all AC busses energized by offsite power • Transfer Steam Dumps to Steam Pressure Mode (NOTE: Steam lines may be isolated and if so dumps are unavailable)
		SEE Event 8

Comments: ______________________________

Event Description: A LOCA occurs inside CNMT.

Time	Position	Applicant's Actions or Behavior
	CUE	• RCS temperature falling • PZR level lowering • PZR pressure lowering • CNMT pressure, temperature & humidity rapidly rising
	CREW	Recognize/report indications of LOCA
		BEP-0 ACTIONS
	US	Transition to/Implement BEP-0 "REACTOR TRIP OR SI"

	RO	Perform immediate operator actions of BEP-0:
		• Verify reactor trip (Previously performed)
		  • Rod bottom lights LIT
		  • Reactor trip & Bypass breakers open
		  • Neutron flux lowering

	BOP	• Verify Turbine Trip
		  • Turbine throttle valves closed
		  • Turbine governor valves closed
		• Verify power to 4KV busses
		  • Bus 141 alive light lit
		  • Bus 142 alive light lit

	CREW	Determine SI needed/actuated
		• If actuated
		  • SI First OUT annunciator lit (1-11-B1, 1-11-C1, 1-11-D1, 1-11-E1)
		  • SI ACTUATED lit (1-BP-4.1)
		  • SI Equipment actuated (SI pumps running, CV Cold leg injection SI8801A/B open)
		  • Manually actuate SI

Comments: ____________________

Event Description: A LOCA occurs inside CNMT.

Time	Position	Applicant's Actions or Behavior
	CREW	• Recognize ADVERSE CNMT conditions when o CNMT pressure > 5psig o CNMT rad level > 10^5 R/hr (Grid 4 4AS120 or 4AS121)
	RO/US	• Trip RCPs per Operator Action Summary o CC Water lost to RCP o CNMT Phase B actuated o ALL of the following exist • Controlled RCS cooldown NOT in progress • RCS pressure < 1425 psig • HHSI flow > 50 gpm OR SI pump discharge flow > 100 gpm Trip all RCPs when parameters indicate (RCS pressure & SI flow)
	BOP/US	• Verify FW isolated • FW pumps tripped • Isolation monitor lights lit • FW pumps disch valves closed (FW002A-C)
	RO/US	• Verify ECCS pumps running • CENT Chg pumps • RH pumps • SI pumps
	BOP/US	• Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 Monitor lights lit

Comments: ____

Scenario No: 1-3		Event No. 8	Page 19 - 21 of 33
Event Description:		A LOCA occurs inside CNMT.	
Time	Position	Applicant's Actions or Behavior	
	BOP/US (cont.)	• Verify AF system: • AF 1B pumps running • AF isolation valves open (AF13A-H) • AF flow control valves throttled (AF005A-H) • Verify RCFCs running in LOW SPEED • Verify CC Pump 1B running • Verify SX Pumps running • Check Main Steamline Isolation • Check SG pressure > 640 psig • Check CNMT pressure on 1PR-937 OR 1PI-CS934-937 is >8.2 psig • Verify MSIV and MSIV Bypass valves closed	
		SEE Event 9	

Comments: ____________________

NOT NEEDED
Deleted -JP.

Scenario No: 1-3	Event No. 9	Page 22 - 33 of 33
Event Description:	~~Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation~~. CNMT Spray Pump 1A is OOS.	

Time	Position	Applicant's Actions or Behavior
	CUE	• CNMT pressure > 20 psig • CS Pump 1B NOT running • CS valves position NOT in actuation position • Phase B valves position NOT in actuation position
	BOP/US **[CT]** EP-0-E	• Check if CNMT Spray is required • CNMT pressure > 20 psig • Check Group 6 monitor lights lit • Check Group 6 monitor Phase B lights lit Identifies/reports failure of CS Pump 1B to start. Identifies/reports failure of PHASE B actuation/positioning of PHASE B valves • Manually actuate BOTH switches CS & ϕB ISOL switches • Check Group 6 CS monitor lights LIT • Check Group 6 Phase B Isol monitor lights LIT • Stop ALL RCPs • Check eductor suction flow >15 gpm on 1FI-CS014 • Check CS eductor additive flow > 5 gpm on 1FI-CS016 Identify/report start of 1B CS pump and 1A CS pump NOT running Identify/report trip of 1B CS Pump.
		NOTE: At some time CNMT pressure is expected to rise to an ORANGE Path condition (without CS pumps running). If so performance of 1BFR-Z.1 "Response To High Containment Pressure" is required. Actions are covered below on page 25.

Comments: ______________________________

Event Description: Phase B Iso. and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	BOP/US	• Align SX Cooling Towers
		  • All EIGHT riser valve 0SX163A-H open
		  • All FOUR Hot water Basin Bypass valves 0SX162A-D open
		  • All EIGHT SX cooling tower fans running in HIGH Speed
		• Verify AF flows
		  • AF flow > 500 gpm
		  • Check SG NR level > 10%
		  • SG levels maintained between 31% and 50%
		  • NR levels NOT increasing in an uncontrolled manner

	RO/US	• Verify ECCS valve alignment & flows
		  • Group 2 CL Inj monitor lights lit
		  • HHSI flow >50 gpm
		  • SI flow > 100gpm (if RCS pressure <1590 psig)
		  • Check RCS pressure < 300 psig
		    • If so, check RH pump discharge flow > 100 gpm
		• Check at least ONE PZR PORV relief path available:
		  • At least ONE PORV Isol valve energized.
		  • PORV in AUTO
		  • Associated Isol valve open

	BOP/US	• Verify generator trip
		  • OCB 3-4 and 4-5 open
		  • PMG output breaker open

Comments: ______________________________

Event Description:	Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.	
Time	**Position**	**Applicant's Actions or Behavior**

	BOP/US (cont.)	• Verify both DGs running
		  • DG SX valves 1SX169A & B open
		  • Dispatch operator to locally check DGs
		
		• Ventilation systems aligned for emergency
		  • Control Room
		    • Control Room d/P on 0PDI-VC038 > +0.125" H2O
		  • Aux Bldg
		  • Fuel Handling Bldg

	RO/US	• Check PZR sprays & PORVs closed
		
		• RCS temperature control
		  • Check RCP status – none running
		  • Check RCS CL temps trending to or stable at 557°F

	RO/US	• Check RCP status: • If any RCP running and RCS pressure < 1425 psig AND HHSI flow > 50 gpm OR SI flow > 100 gpm • Stop all RCPs and place Steam Dumps in STM PRESS Mode

	BOP/US	• Check SG secondary boundary
		  • All SG pressure stable
		
		• Check SG tubes intact
		  • All secondary rad monitors < ALERT setpoint

	CREW	• Diagnose LOCA
		  • CNMT are rad monitors levels increasing or in ALERT
		    • Grid 4 AS101, 4AS202, 4AS303 (1RT-AR014)
		    • Grid 4 AS111 (1RT-AR011)
		    • Grid 4 AS112 (1RT-AR012)
		    • Grid 4 AS120 (1RT-AR020)
		    • Grid 4 AS121 (1RT-AR021)
		
		  • CNMT pressure > 3.4 psig
		
		  • CNMT sump level 1A & 1B lights lit

Comments: ____

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Scenario No: 1-3	Event No. 9	Page 22 - 33 of 33
Event Description:	Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.	

Time	Position	Applicant's Actions or Behavior
	US	Transition to BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" (See page 27.)
		NOTE: With cooldown an ORANGE path may exist for the INTEGRITY CSFST. If so performance of 1BFR-P.1 "Response To Imminent Pressurized Thermal Shock condition" is required.
		1BFR-P.1 ACTIONS
	US	Direct action of BFR-P.1
	RO/US	• Check RCS pressure > 300 psig • I RCS pressure < 300 psig, check RH flow > 1000 gpm
	US	Transition to procedure & step in effect
		NOTE: At some time CNMT pressure is expected to rise to an ORANGE Path condition (without CS pumps running). If so performance of 1BFR-Z.1 "Response To High Containment Pressure" is required.
		1BFR-Z.1 ACTIONS
	US	Direct action of BFR-Z.1
	BOP/US	• Verify Phase A isolation - Group 3 Monitor lights lit • Verify CNMT Ventilation isolation - Group 6 CNMT Vent Monitor lights lit • Check if CNMT Spray is required • CNMT pressure > 20 psig • Verify CS Pump run lights LIT • If NOT lit, Manually initiate CS & ϕB • With CS pumps NOT running • Place 1B CS pump Test Switch in TEST • Verify 1CS019B open • Place 1B CS pump Test Switch in NORMAL • Verify 1CS007B open • Attempt to manually start 1B CS pump NOT NEEDED Deleted Identify/report failure of 1B CS pump to start (NOTE: Since 1B CS pump had tripped, Crew may decide NOT to attempt start of pump) • Dispatch operator to locally check 1B CS pump and electrical breaker • Operator reports CS pump breaker bus 142 cub 8 is racked in and CS overcurrent relay target is UP.

Comments: ______________________________

Scenario No: 1-3		Event No. 9	Page 22 - 33 of 33
Event Description:		Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.	
Time	Position	Applicant's Actions or Behavior	
	BOP/US (cont.)	• Verify CS System valves in EMERGENCY alignment o RWST suction valve 1CS001B open OR o Sump suction 1CS009B open o CS pump header isol valve 1CS007B open • CS eductor spray additive valve 1CS019B open • CS eductor inlet flow control valve 1CS010B open • Check Group 6 Phase B Isol monitor lights LIT • Stop ALL RCPs • Check CS flow indication on scale • CS pump disch flow on 1FI-CS012 • CS eductor suction flow on 1FI-CS014 • CS eductor additive flow on 1FI-CS016 (NOTE: No flow will be indicated, but RNO does NOT provide for NO CS pumps running) • Reset CNMT Spray signal • When SPRAY ADDITVE TANK LO-2 level lights LIT, close CS eductor spray additive valves 1CS019A/B • Verify RCFCs LOW SPEED run lights LIT • Verify Main Steamline Isolation by ALL MSIV and MSIV Bypass valves closed • Check if feed flow should be isolated to any SG • Check pressure in all SGs o ANY SG pressure decreasing in an uncontrolled manner OR o Any SG completely depressurized • Check Hydrogen concentration • Reset CNMT Isol Phase A	

Comments: ____________________

Event Description: Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	BOP/US (cont.)	• Obtain hydrogen concentration measurement per BOP PS-9
		  • Verify open or open valves – 1PS228A, 1PS230A, 1PS228B, 1PS229A, 1PS229B, and 1PS230B on PM12J
		  • Direct local operator to open valves – 1PS232A, 1PS233A, 1PS232B and 1PS233B
		  • Direct local operator to verify LOCAL SET/NORMAL switch for alarms on H2 units are set to NORMAL
		  • Place ON/OFF switch on H2 panels (1HSU-PS345/346) to ON position on PM12J
		  • After 4 minutes verify H2 and System Status alarm lights OFF (PM12J)
		  • Verify LO RANGE lights are ON for 1EL-PS343 and PS344 on PM06J (CS section)
		• Check Hydrogen concentration < 5.0% in dry air and < 0.5% in dry air
		• Notify TSC of Hydrogen concentration
		• Periodically obtain a hydrogen concentration measurement
		• Return to procedure & step in effect

		BEP-1 ACTIONS
	US	Direct actions of BEP-1

	CREW	• Check Status of RCPs
		  • If any RCP is running check if RCPs should be stopped:
		    • Check RCS pressure < 1425 psig
		    AND
		    • Check HHSI flow > 50 gpm OR SI flow > 100 gpm
		  • If so, stop all RCPs
		  AND
		  • Place Steam Dumps in STM PRESS Mode (NOTE: Operator must control in MAN due to earlier PT-MS507 failure)

	BOP/US	• Check SG secondary boundaries intact
		  • Check pressure in all SGs
		    • No SG pressure decreasing in uncontrolled manner
		    • No SG completely depressurized

Comments: ______________________________

Event Description: Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	BOP/US (cont.)	• Check intact SG levels
		  • Narrow range levels >31%. If not flow is maintain > 500 gpm
		  • Control feed flow to maintain intact SG levels between 31% and 50%
		  • Check narrow range levels NOT increasing in an uncontrolled manner.

	CREW	• Check secondary radiation normal
		  • SJAE GS exhaust 1PR27J Grid 1 1PS027
		  • SG Blowdown 1PR08J Grid 1 1PS108
		  • Main Steam: 1RT-AR022 & 1RRT-AR023 for each SG, Grid 1 4AA122/123, 4AB222/223, 4AC322/323, 4AD422/423
		  • Main Steam Penetration 1A/1D 1RT-AR024 Grid 4 4AA124
		  • Main Steam Penetration 1B/1C 1RT-AR024 Grid 4 4AB124

	RO/US	• Check PZR PORVs • Power to PORV Isol valves 1RY8000A/B available • PORVs RY455A & RY456 CLOSED • At least ONE PORV Block valve RY8000A OR RY8000B OPEN

	CREW	• Check if ECCS flow should be reduced
		  • RCS Subcooling acceptable
		    o Iconic Display
		    OR
		    o ATTACHMENT A, FIGURE 1BEP 1-1
		
		  • Secondary heat sink
		    o Total feed flow to SGs > 500 gpm available
		    OR
		    o NR level in at least ONE intact SG > 10%
		
		  • RCS Pressure stable or increasing
		
		  • PZR level >38%
		
		Determine ECCS reduction criteria NOT met (subcooling likely)

Comments:

Event Description: Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	CREW	• Check if CNMT Spray should be stopped
		  • CS Pump 1B run light LIT
		  • Reset CS signal
		  • When Spray Additive tank LO-2 level lights LIT, close eductor spray additive valves 1CS019A/B
		  • When CNMT pressure is < 15 psig AND CS has operated for at least 2 hours, continue with steps to secure CS

	RO/US	• Check if RH Pumps should be stopped
		  • Reset SI
		    • Depress BOTH SI RESET pushbuttons
		    • Verify SI ACTUATED permissive light NOT lit
		    • Verify AUTO SI BLOCK permissive light LIT
		• Check RCS pressure > 300 psig
		  • If NOT, DO NOT stop RH pumps
		  • If < 300 psig AND pressure stable or increasing
		    • Stop RH pumps and place in standby

	CREW	• Check RCS and SG pressures
		  • Check pressure in ALL SGs stable or increasing
		  • Check RCS pressure stable or decreasing

	BOP/US	• Check if DG should be stopped
		  • SAT 142-1 & 142-2 BUS ALIVE lights lit
		  • ACB 1412 & 1422 closed
		  • ACB 1432 & 1442 closed
		  • Stop 1A & 1B DG per BOP DG-12

Comments: ______________________________

Scenario No: 1-3	Event No. 9	Page 22 - 33 of 33
Event Description:	Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.	

Time	Position	Applicant's Actions or Behavior
	CREW	♠ • Evaluate plant status • CL recirc • Power available to RH pump 1A OR 1B • CNMT sump isol valve position light lit for SI8811A/B
	BOP/US	• Check various Aux Bldg radiation monitors • Reset CNMT ISOL Phase A • Place Hydrogen monitors in service per BOP PS-9 • Verify open or open valves – 1PS228A, 1PS230A, 1PS228B, 1PS229A, 1PS229B, and 1PS230B on PM12J • Direct local operator to open valves – 1PS232A, 1PS233A, 1PS232B and 1PS233B • Direct local operator to verify LOCAL SET/NORMAL switch for alarms on H2 units are set to NORMAL • Place ON/OFF switch on H2 panels (1HSU-PS345/346) to ON position on PM12J • After 4 minutes verify H2 and System Status alarm lights OFF (PM12J) • Verify LO RANGE lights are ON for 1EL-PS343 and PS344 on PM06J (CS section) • Obtain samples by contacting Chem • RCS activity • RCS boron • CNMT atmosphere • Prepare both hydrogen recombiners per BOP OG-10. Dispatch operators • Align SX MDCT for long-term cooling per BOP SX-T2 • Place SX tower makeup in AUTO • CLOSE SXCT B/D to Flume Isol valves SX161A/B • Shutdown unnecessary equipment

Comments: ____________________

Event Description:	Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	BOP/US (cont.)	• Align NDCT for temperature & level control
		  • Place NDCT riser valves CS for Unit 1 BYPASS OPEN position
		  • Verify NDCT TURBINE INTERLOCK switch in OVERRIDE position
		  • Verify flume level within seasonal band
		  • Dispatch operator to locally check Basin water levels acceptable
		
		• Align NDCT per BOP CW-25a

	RO/US	• Check if RCS cooldown and depressurization required
		  • RCS pressure > 300 psig
		    • If NOT check RHR flow > 1000 gpm
		      • If NOT, go to BEP ES-1.2
		      • If SO, when RWST level < 46% for transition to BEP ES-1.3
		
		(NOTE: While waiting for RWST level to fall below 46%, the crew should reverify the steps above indicated with ♠on page 30.)

	US	Transition to BEP ES-1.3 "TRANSFER TO COLD LEG RECIRCULATION"
		BEP ES-1.3 ACTIONS
	US	Direct actions of BEP ES-1.3

	CREW	• Establish CC flow to RH HX
		  • OPEN CC to RH HX isol valves
		    • 1CC9412B
		    o 1CC9412A
		
		  • Check CC to RH HX flows > 5000 gpm on 1FI0689/0688
		
		• Verify adequate CNMT sump level
		  • Check CNMT sump BOTTOM 4 LIGHTS lit on CNMT SUMP 1A or 1B LVL
		
		• Align RH pumps suction to CNMT sumps
		  • Verify both RH pumps running
		
		  • Check CNMT sump isol valves 1SI881A and 1SI 8811B open
		
		  • Close RH pump suction from RWST 1SI8812B (AND 8812A) AP

Comments:

Event Description: Phase B Isol an[illegible]MT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align C[illegible]T Spray Train B for operation. CNMT Spray Pump 1A is OOS.

Time	Position	Applicant's Actions or Behavior

	Crew
	(cont.)
		• Check if SI & CENT CHG pumps are in ECCS injection mode
		  o Any SI pump running
		  OR
		  o Any CENT CHG pumps to cold legs injection isol valves 1SI8801A/B
		
		• Align SI & CENT CHG pumps for cl recirc
		  • Dispatch operators to energize
		    • 1SI8813 (MCC 132X4A L3)
		    • 1SI8806 (MCC 131X1A P3)
		
		  • Verify CENT CHG pump miniflow isol valves 1CV8111, 1CV8114, 1CV8110 and 1CV8116 CLOSED
		
		  • Close SI pump miniflow isol valves 1SI8814, 1SI8920 and 1SI8813

	CREW [CT] ES-1.3-A	• Close RH HX discharge crosstie valves 1RH8716A and 1RH8716B • OPEN SI & CENT CHG pumps suction header crosstie valves 1SI8807A, 1SI8807B and 1SI8924 • Check RH pump 1A running • Open RH HX to CENT CHG pumps isol valve 1CV8804A • Check RH pump 1B running • Open RH HX to SI pumps isol valve 1SI8804B • Start SI and CENT CHG pumps as necessary

	CREW	• Reset SI
		  • depress both SI RESET pushbuttons
		
		  • Verify SI ACTUATED permissive light NOT lit
		
		  • Verify AUTO SI BLOCKED permissive light LIT

Comments: ____________________

Event Description:		Phase B Isol and CNMT Spray Actuation signal will fail resulting in manual action to actuate Phase B, and start and align CNMT Spray Train B for operation. CNMT Spray Pump 1A is OOS.
Time	**Position**	**Applicant's Actions or Behavior**

	CREW (cont.)	• Isolate RWST from SI and CENT CHG pumps
		  • Close SI pump suction from RWST isol valve 1SI8806
		
		  • Close RWST to CENT CHG pumps suction valves 1CV112D and 1CV112E
		
		  • Dispatch operator to deenergize RWST to CENT CHG pumps valves
		    • 1CV112D - MCC 131X1 K4
		    • 1CV112E - MCC 132X4 C2
		
		• Align CNMT Spray system for recirculation
		  • Check RWST level < 12% - RWST LEVEL LO-3 status lights LIT
		    • When LO-3 level is reached (NOTE: Next MAJOR step below will be performed if level> LO-3)
		      • Open CS pump sump suction valves 1CS009B
		
		      • Close CS pump RWST suction valves 1CS001B
		
		      • Verify both CS pumps running
		
		Identify/ report 1A CS pump is NOT available
		
		• Align CC System for Post LOCA recovery
		  • Establish SX flow to Unit 0 CC HX
		    • Open CC HX 0 outlet valve 0SX146
		    • Open CC HX 0 inlet valve 1SX005
		
		  • Dispatch operator to check SX to CC HX flows > 6000 gpm
		    • If flow is NOT > 6000 gpm, direct throttling of following as necessary
		      o 0SX007
		      o 1SX007
		
		  • Initiate alignment of CC for post LOCA recovery per BOP CC-14

		SCENARIO TERMINATED

Comments: ____

SHIFT MANAGER'S TURNOVER

TODAY ONCOMING SHIFT

UNIT 1 STATUS	UNIT 1 MAJOR OOS's
MODE....... 1 **%PWR....... 67** **MWe....... 780** **Max Load/Power....... 1175 MW** **Min Load/Power....... 500 MW** **Max Ramp Rate....... 5MW/min** **Desired Delta I.......TARGET** **Boron @ 575** **Control Bank D @ 190**	1A CS Pump is OOS. 1A FW Pump is OOS. 250' Meteorological Tower instruments are OOS.
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 1 MAJOR SURVEILLANCES**
LCOARs has been entered for 1A CS Pump. LCOAR has been entered for 250' Met Tower.	
UNIT 1 IN PROGRESS	**UNIT 1 AND COMMON PENDING**
The National Weather Service has declared a Thunderstorm Warning in effect for Stephenson, Winnebago and Ogle counties for the next 6 hours.	Ready to increase power to 100%. Electrical Operations has requested a power ascension to Full Power at 5MW/min.
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

UNIT 2 STATUS	UNIT 2 MAJOR OOS's
MODE............ 1 %Pwr............ 99.8 MWe............. 1178 Max Load/Power.. 100% Min Load/Power.. 750 MW Max Ramp Rate... 2 MW/Min Desired Delta I. Target Unit on EGC..... NA Boron @ 535 Control Bank D @ 213	
LCOAR ENTRIES PREVIOUS 48 HRS	**UNIT 2 MAJOR SURVEILLANCES**
UNIT 2 IN PROGRESS	**UNIT 2 PENDING**
SCHEDULED ACTIVITY CONFLICTS	

SHIFT MANAGER'S TURNOVER

ADMINISTRATIVE	
TEMPORARY PROCEDURES/ALTS	
DAILY ORDERS/SPECIAL OP. ORDERS	
DAILY MANNING SCHEDULE	
CONTROL ROOM ROUNDS	
(GSEP/LER/DVR/ENS)	
MATERIAL CONDITIONING	
RWP'S/RELEASES/PRECAUTIONS/ALARA	
INFREQUENT EVOLUTION ACTIVITIES	
SPSO/DIVISION LD	Alternate BPO Outside # 815-727-5902/5903 Tie # 8-565-5902/5903

UNIT 1 COMMENTS	UNIT COMMON COMMENTS
S/G B/D returning to Condenser per SPP	CW Blowdown Lineup U-2 FC Cleanup U-1 FC Cooling U-1 50K DO Tank Certified 125K DO Tank Certified Aux Steam U-1 U-0 CC HX U-1

UNIT 2 COMMENTS	GENERAL COMMENTS
S/G B/D returning to Condenser per SPP	

Caution Cards	Abnormal Positioned Components
CCNUM EPN	CCNUM EPN Abnormal Position

SHIFT: LAST TO PRESENT **TIME:** NOW **DATE:** TODAY

OFFGOING ________________

ONCOMING ________________