Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Calculate RCS Boron Concentration Based on Total Mass	JPM No.:	R.A.1
K/A Reference:	2.1.23 Ability to perform specific system and integrated plant procedures during all modes of plant operation. (4.3)		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom	X	Simulator		Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	The crew is performing a natural circulation cooldown using EMG ES-04, NATURAL CIRCULATION COOLDOWN, and is currently at step 10b. Chemistry reports sample results are: • RCS Hot Leg Loop 1 - 995 ppm • RCS Hot Leg Loop 3 - 905 ppm • Letdown line isolated • PZR concentration - 800 ppm PZR level is 27% and stable.
Task Standard:	Applicant completed the calculation from EMG ES-04, NATURAL CIRCULATION COOLDOWN, Attachment ‘A’ and determined RCS boron concentration to be 899.54 ppm (range of 898 to 900 to account for rounding errors).
Required Materials:	EMG ES-04 (rev 16), NATURAL CIRCULATION COOLDOWN; calculator
General References:	EMG ES-04, NATURAL CIRCULATION COOLDOWN
Handouts:	EMG ES-04, NATURAL CIRCULATION COOLDOWN

Initiating Cue:	CRS directs you to complete in EMG ES-04, NATURAL CIRCULATION COOLDOWN, step 10b, Verify Cold Shutdown Boron Concentration By Sampling: Determine RCS boron concentration on a total mass basis, using Attachment ‘A’, DETERMINATION OF RCS BORON CONCENTRATION BASED ON TOTAL MASS. Document your results on the provided EMG ES-04, NATURAL CIRCULATION COOLDOWN.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	No
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

	Examiner NOTE:	**NOTE: Letdown line sample is used to determine RCS cold leg concentration. If letdown is isolated, this sample is not required.**
	Performance Step: 1 A1	Record Chemistry sample results: a. RCS Concentrations: • RCS Hot Leg Loop 1 - 995 ppm • RCS Hot Leg Loop 3 - 905 ppm • Letdown Line N/A ppm b. PZR Concentration 800 ppm
	Standard:	Applicant recorded Chemistry sample results from cue sheet.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Attachment 'A' table under step A2**
	Performance Step: 2 A2	Determine PZR and RCS multipliers from the following table:
	Standard:	Applicant determined PZR and RCS multipliers to be 0.052 and 0.948 respectively based on PZR level of 27% (given on the cue sheet)
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 A3	Determine PZR contribution = A • (PZR concentration) X (PZR multiplier) = (A)
	Standard:	Applicant determined 800 ppm X 0.052 = 41.6 ppm
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 A4	Determine RCS contribution = B: • (Lowest RCS concentration) X (RCS multiplier) = (B)
	Standard:	Applicant determined 905 ppm X 0.948 = 857.94 ppm
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 5** A5	Determine RCS boron concentration based on total mass = C: • (A) + (B) = (C)
	Standard:	Applicant determined 41.6 ppm + 857.94 ppm = 899.54 ppm (range of 898 to 900 to account for rounding errors)
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	R.A.1
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	The crew is performing a natural circulation cooldown using EMG ES-04, NATURAL CIRCULATION COOLDOWN, and is currently at step 10b. Chemistry reports sample results are: • RCS Hot Leg Loop 1 - 995 ppm • RCS Hot Leg Loop 3 - 905 ppm • Letdown line isolated • PZR concentration - 800 ppm PZR level is 27% and stable.

INITIATING CUE:	CRS directs you to complete in EMG ES-04, NATURAL CIRCULATION COOLDOWN, step 10b, Verify Cold Shutdown Boron Concentration By Sampling: Determine RCS boron concentration on a total mass basis, using Attachment ‘A’, DETERMINATION OF RCS BORON CONCENTRATION BASED ON TOTAL MASS. Document your results on the provided EMG ES-04, NATURAL CIRCULATION COOLDOWN.

KEY

ATTACHMENT A
(Page 1 of 2)

DETERMINATION OF RCS BORON CONCENTRATION BASED ON TOTAL MASS

NOTE

Letdown line sample is used to determine RCS cold leg concentration. If letdown is isolated, this sample is not required.

A1. Record Chemistry sample results:

a. RCS Concentrations:

o RCS Hot Leg Loop 1 __________ 995 ppm

o RCS Hot Leg Loop 3 __________ 905 ppm

o Letdown Line __________ N/A ppm

b. PZR Concentration: __________ 800 ppm

A2. Determine PZR and RCS multipliers from the following table:

INDICATED PZR LEVEL	PZR MULTIPLIER	RCS MULTIPLIER
91% TO 100%	0.144	0.856
81% TO 90%	0.132	0.868
71% TO 80%	0.119	0.881
61% TO 70%	0.107	0.893
51% TO 60%	0.094	0.906
41% TO 50%	0.080	0.920
31% TO 40%	0.066	0.934
21% TO 30%	0.052	0.948
11% TO 20%	0.037	0.963
0% TO 10%	0.022	0.978

Key

ATTACHMENT A
(Page 2 of 2)
DETERMINATION OF RCS BORON CONCENTRATION BASED ON TOTAL MASS

A3. Determine PZR contribution = A:

- 800 (PZR concentration) x 0.052 (PZR multiplier) = 41.6 (A)

A4. Determine RCS contribution = B:

- 905 (Lowest RCS concentration) x 0.948 (RCS multiplier) = 857.94 (B)

A5. Determine RCS boron concentration based on total mass = C:

- 41.6 (A) + 857.94 (B) = 899.54 (898 to 900 for rounding) (C)

-END-

RA2 – proprietary

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Review STS BG-005A for errors	JPM No.:	R.A.3
K/A Reference:	2.2.12 Knowledge of surveillance procedures. (3.7)		

Examinee:		NRC Examiner:			
Facility Evaluator:		Date:			
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom	X	Simulator		Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	Crew has just completed STS BG-005A, BORIC ACID TRANSFER SYSTEM INSERVICE PUMP ‘A’ TEST. All data has been collected and recorded on Attachment ‘A’.
Task Standard:	Refer to attached KEY for errors on data sheet (changes highlighted in yellow). Determined pump FAILED surveillance. Provided the corrected data sheet to the SM/CRS. NOTE: contacting Reactor engineering is not part of the critical task.
Required Materials:	STS BG-005A rev 28, BORIC ACID TRANSFER SYSTEM INSERVICE PUMP ‘A’ TEST with Attachment ‘A’ completed
General References:	STS BG-005A, BORIC ACID TRANSFER SYSTEM INSERVICE PUMP ‘A’ TEST
Handouts:	STS BG-005A, BORIC ACID TRANSFER SYSTEM INSERVICE PUMP ‘A’ TEST completed Attachment ‘A’
Initiating Cue:	CRS assigns you to peer check Attachment ‘A’ for completion and correctness. Document any changes on the provided Attachment ‘A’.
Time Critical Task: (Yes or No)	No

Alternate Success Path: (Yes or No)	Yes
Validation Time:	15 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

	Evaluator NOTE	**A Key has been provided (changes highlighted in yellow). Each incorrect item on the as given Attachment 'A' is listed below and all are critical steps. Each item can be completed in any order. No cue's given for correct steps**
	Performance Step: 8.1.13 V2 **Alternate Path Step**	Reviews Attachment 'A' for completeness and correctness.
	Standard:	Applicant marked step 8.1.13 V2 as UNSAT.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 8.1.13 V3**	Reviews Attachment 'A' for completeness and correctness.
	Standard:	Applicant removed circle for step 8.1.13 V3 OR left it after talking with support engineering.
	Cue:	If notified then cue: **Support Engineering evaluated this condition and determined it to be SAT.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 8.1.13 V5**	Reviews Attachment 'A' for completeness and correctness.
	Standard:	Applicant removed circle for step 8.1.13 V5 OR left it after talking with support engineering.
	Cue:	Ifn notified then cue: **Support Engineering evaluated this condition and determined it to be SAT.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 8.1.20**	Reviews Attachment ‘A’ for completeness and correctness.
	Standard:	Applicant recognized step 8.1.20 was marked incorrectly and changed to UNSAT.
	Cue:	If notified then cue: **CRS will initiate a CR for this item.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 6**	Reviews Attachment ‘A’ for completeness and correctness.
	Standard:	Applicant determined ‘A’ Boric Acid Transfer Pump failed the surveillance. Notified the SM/CRS.
	Cue:	When notified then cue: **‘A’ Boric Acid Transfer Pump has failed the surveillance test.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

Job Performance Measure No.:	R.A.3
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
<u>Question Documentation:</u>	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

JPM CUE SHEET

INITIAL CONDITIONS:	Crew has just completed STS BG-005A, BORIC ACID TRANSFER SYSTEM INSERVICE PUMP ‘A’ TEST. All data has been collected and recorded on Attachment ‘A’.

INITIATING CUE:	CRS assigns you to peer check Attachment ‘A’ for completion and correctness. Document any changes on the provided Attachment ‘A’.

WOLF CREEK
NUCLEAR OPERATING CORPORATION

STS BG-005A

BORIC ACID TRANSFER SYSTEM INSERVICE PUMP A TEST

<u>Responsible Manager</u>

Manager Operations

Revision Number	28
Use Category	Continuous
Administrative Controls Procedure	No
Management Oversight Evolution	No
Program Number	29B

DC38 6/26/2012

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This surveillance procedure demonstrates operability for the following components:

- o PBG02A, BORIC ACID TRANSFER PUMP A
- o BG-V147, BATP A DISCH CHECK VLV
- o BG-V155, BATP A DISCH TO BAT A CHECK VLV

2.0 SCOPE

2.1 This procedure partially satisfies A Boric Acid Transfer Pump operability surveillance requirements of Technical Specification 5.5.8 for comprehensive pump testing.

2.2 This procedure partially satisfies BG-V147 and BG-V155 valve operability surveillance requirements of Technical Specification 5.5.8.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 PIR NP 93-1580, Concerns Raised By NRC On Whether Method Of Venting Gauge Lines Complies With ASME Section XI Subsection IWP-4210

3.1.2 QPD 8/87-130, Procedures Did Not Specifically Address That The Vibration Analyzer Operator Sign Or Initial

3.1.3 M-721-00132, Instruction Manual For Crane Chempump Canned Motor Pumps

3.1.4 PIR 2002-2064, Bi-Directional Testing Of Check Valves

3.1.5 CCP 011501, VCT Modulate Divert Setpoint Change

3.2 Commitments

3.2.1 PIR OP 93-0047, Temporary Suction Gauge Installed At Incorrect Elevation. PDR TS 91-0238, Failure To Properly Account For Gauge Height

4.0 PRECAUTIONS/LIMITATIONS

4.1 Report any irregularities or component malfunctions to SM/CRS immediately and refer to TR 3.1.9 in Modes 1, 2 or 3 and TR 3.1.10 in Modes 4, 5 or 6.

4.2 Performance of this test is not mode dependent.

4.3 During portions of this test, Boric Acid Transfer Pump A will be inoperable. Ensure that Boric Acid Transfer Pump B and the RWST are available as a boration flow path to satisfy TR 3.1.9 and TR 3.1.10, as applicable.

4.4 Section 8.2, BAT PUMP A DISCH CHECK VLV BG-V147 TEST sends approximately 150 gallons of blended flow to the RWST. The effect on RWST concentration has been evaluated by chemistry and this small amount of blended flow does not impact RWST operability. However, if makeup is added to the accumulators after supplying blended flow to the RWST and prior to the RWST being sampled for boron concentration, the accumulators may require sampling in order to verify compliance with TS SR 3.5.1.4.

5.0 TEST EQUIPMENT

NOTE

This note applies to all of section 5.0. If equivalent equipment is used, justification shall be provided in section 9.0, RESTORATION comments.

5.1 CSI 2130 vibration analyzer, with an accuracy of ±3.5%, of full scale in the velocity (in/sec) mode of operation or equivalent.

Analyzer WC Number: ________________________

Cal Due Date: ______________________________

Transducer WC Number: ______________________

Cal Due Date: ______________________________

NOTE

If an equivalent gauge is used, the total accuracy of the two gauges must be less than or equal to ± 0.5%. If an analog gauge is used, the reading must fall in the upper 2/3's of the range of the instrument. If a digital gauge is used, the reading must fall within the lower 70% of the full scale range.

5.2 Obtain one 0-30 psig Crystal Engineering XP^2 digital pressure gauge with an accuracy of ±0.02% of full scale from 0% to 20% of full scale and an accuracy of ±0.1% of reading from >20% to 100% of full scale.

WC Number: ________________________

Cal Due Date: ______________________________

5.3 Obtain one 0-300 psig Crystal Engineering XP^2 digital pressure gauge with an accuracy of ±0.02% of full scale from 0% to 20% of full scale and an accuracy of ±0.1% of reading from >20% to 100% of full scale.

WC Number: ________________________

Cal Due Date: ______________________________

6.0 ACCEPTANCE CRITERIA

NOTE

This note applies to all of section 6.0. Failure to meet Acceptance Criteria given below may constitute a failure to comply with TR 3.1.9 and TR 3.1.10.

6.1 Check valves BG-V147 and BG-V155 exercise open testing is performed by verifying check valve disc will travel to open position by passing the maximum required accident condition flow. BG-V147 meets the acceptance criteria by satisfactory completion of step 8.2.14 and BG-V155 meets the acceptance criteria by satisfactory completion of step 8.1.12.

- IF required change valve disc position is NOT obtained, THEN valve shall be declared inoperable and corrective action initiated.

6.2 Check valve BG-V147 exercise close testing is performed by verifying valve disc will travel to the close seat on reversal of flow. BG-V147 meets the acceptance criteria by satisfactory completion of step 8.2.30.

- IF required change valve disc position is NOT obtained, THEN valve shall be declared inoperable and corrective action initiated.

6.3 Check valve BG-V155 exercise close testing is performed by verifying valve disc will travel to the close seat when a flow path is created from Boric Acid Tank A to a floor drain via BG-V578, BA TRANSFER PUMP A CASING DRAIN. BG-V155 meets the acceptance criteria by satisfactory completion of step 8.1.20.

- IF required change valve disc position is NOT obtained, THEN valve shall be declared inoperable and corrective action initiated.

6.4 Pump performance data shall be within the acceptable range indicated on ATTACHMENT A, DATA SHEET to satisfy the requirements of TS 5.5.8 for each data point indicated as a Required Action 1.

- IF any pump parameter indicated as a Required Action 1 parameter exceeds the acceptable limit, THEN the A Boric Acid Transfer Pump shall be declared inoperable and corrective action initiated.

INIT/DATE

7.0 PREREQUISITES

7.1 The RWST is not on recirculation during the performance of this test. ☐

7.2 Communications have been established or are available between Control Room and local operators. ☐

7.3 IF performing section 8.1, BAT PUMP A AND CHECK VLV BG-V155 TEST, THEN have the engineer performing the test or I&C install temporary test pressure gauge on BG PI-113, BORIC ACID TRANS PMP A DISCH valve manifold, as follows:

7.3.1 IF a Crystal Engineering gauge is being used, THEN ensure the gauge indicates 0.0 psi prior to installation. ☐

7.3.2 Install a 0-300 psig temporary pressure gauge on BG PI-113 valve manifold. ☐

NOTE

Centerline for Crystal Engineering gauges is just above the nut used for gauge installation (i.e., location of pressure sensing diaphragm).

7.3.3 Ensure centerline of the test gauge is at same elevation, ± 2 inches, as centerline of BG PI-113. [3.2.1] ☐

7.3.4 Open BATP A DISCH PI-113 ISO.

o BG-V146 - OPEN ☐

7.3.5 Open manifold valve on BG PI-113 and vent temporary pressure gauge. (3.1.1) ☐

7.3.6 Close BATP A DISCH PI-113 ISO.

o BG-V146 - CLOSED ☐

7.3.7 Temporary pressure gauge located, installed, vented and isolated per above instructions. ____/____

INIT/DATE

7.4 IF performing section 8.1, BAT PUMP A AND CHECK VLV BG-V155 TEST, THEN have the engineer performing the test or I&C install test gauge at BG-V503, BAT A OUTLET LINE DRAIN, as follows:

7.4.1 IF a Crystal Engineering gauge is being used, THEN ensure the gauge indicates 0.0 psi prior to installation. ☐

7.4.2 Install a 0-30 psig temporary pressure gauge at BG-V503. ☐

NOTE

Centerline for Crystal Engineering gauges is just above the nut used for gauge installation (i.e., location of pressure sensing diaphragm).

7.4.3 Ensure centerline of the test gauge is at the same elevation, ± 2 inches, as centerline of BG-8461A, BAT A OUTLET ISO. [3.2.1] ☐

7.4.4 Open BAT A OUTLET LINE DRAIN and vent temporary pressure gauge. (3.1.1)

o BG-V503 - OPEN ☐

7.4.5 Close BAT A OUTLET LINE DRAIN.

o BG-V503 - CLOSED ☐

7.4.6 Temporary pressure gauge located, installed, vented and isolated per above instructions. ____/____

7.5 IF section 8.2, BAT PUMP A DISCH CHECK VLV BG-V147 TEST will be performed, THEN notify Chemistry that approximately 150 gallons of blended flow will be sent to the RWST. ☐

Chemistry Contact_______________

7.6 A Vibration Technician is available to take readings. ☐

7.7 Precautions and Limitations have been reviewed. ____/____

INIT/DATE

8.0 PROCEDURE

8.1 BAT PUMP A AND CHECK VLV BG-V155 TEST

8.1.1 All prerequisites have been met. ☐

8.1.2 Ensure the following valves are open:

- o BORIC ACID TANK A FILL VALVE.
  - o BG-V157 - LOCKED OPEN ☐
- o BORIC ACID TRANSFER PUMP A TO BORIC ACID TANK A ISOLATION.
  - o BG-V156 - LOCKED OPEN ☐
- o BATP A SUCTION ISO.
  - o BG-8463 - LOCKED OPEN ☐
- o BAT A OUTLET ISO.
  - o BG-8461A - LOCKED OPEN ☐
- o BORIC ACID TRANSFER PMP A TO BORIC ACID TK A THRTL VLV.
  - o BG-V209 - LOCKED OPEN ☐

8.1.3 Ensure BA BATCHING TK OUTLET TO BATP A ISO is closed.

- o BG-8465A - CLOSED ☐

8.1.4 Close BATP A DISCH TO BAT A SAMPLE SYS ISO.

- o BG-V330 - CLOSED ☐

NOTE

The following step will make BA Transfer Pump A inoperable. Boric Transfer Pump B should be verified operable prior to performing this step.

8.1.5 Unlock and close BORIC ACID TRANSFER PUMP A DISCHARGE ISOLATION.

- o BG-V148 - UNLOCKED/CLOSED ☐

INIT/DATE

8.1.6 Open BAT A OUTLET LINE DRAIN, to place suction pressure test gauge inservice.

o BG-V503 - OPEN ☐

8.1.7 Record suction pressure, as indicated on temporary test pressure gauge installed at BG-V503 on ATTACHMENT A, DATA SHEET. ☐

o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

8.1.8 Start BA TRANSFER PUMP A.

o BG HIS-5A - NORMAL-AFTER-RUN ☐

o Record Start Time Nn ATTACHMENT A, DATA SHEET ☐

8.1.9 Unlock and throttle BATP A TO BAT A THROTTLE VLV, until flow indicator BG FI-36, BAT PUMP PBG02A TEST FLOW indicates between 29 gpm and 31 gpm (nominally 30 gpm).

o BG-V209 - UNLOCKED/THROTTLED ☐

o BG FI-36 - BETWEEN 29 GPM AND 31 GPM ☐

8.1.10 Open BATP A DISCH PI-113 ISO to place the temporary pressure gauge and BG PI-113 inservice.

o BG-V146 - OPEN ☐

8.1.11 Perform the following:

1. Determine BA TRANSFER PUMP A differential pressure:

   a. Record suction pressure as indicated on temporary test pressure gauge installed at BG-V503 in step 8.1.11.1.c. ☐

   b. Record discharge pressure as indicated on temporary test pressure gauge installed on BG PI-113 valve manifold in step 8.1.11.1.c. ☐

INIT/DATE

c. Calculate BA TRANSFER PUMP A differential pressure (ΔP): ☐

________ psig - _______ psig = ____ psid (ΔP)
8.1.11.1.b   8.1.11.1.a

2. IF BA TRANSFER PUMP A differential pressure is NOT between 102.4 and 117.1 psid, inclusive, THEN adjust BORIC ACID TRANSFER PMP A TO BORIC ACID TK A THRTL VLV, as necessary, to obtain a differential pressure between 102.4 and 117.1 psid, inclusive, while maintaining flow between 29 gpm and 31 gpm, as indicated on BG FI-36.

   - o BG-V209 - THROTTLED to obtain a differential pressure between 102.4 and 117.1 psid, inclusive, while maintaining flow between 29 gpm and 31 gpm. ☐

NOTES

o Allow pump to run and system to stabilize for a minimum of two minutes prior to data collection. BG-V209, BORIC ACID TRANSFER PMP A TO BORIC ACID TK A THRTL VLV may need to be readjusted, to maintain the desired flow and differential pressure.

o Steps 8.1.12 and 8.1.13 can be performed simultaneously.

8.1.12 Record the following pump performance parameters on ATTACHMENT A, DATA SHEET:

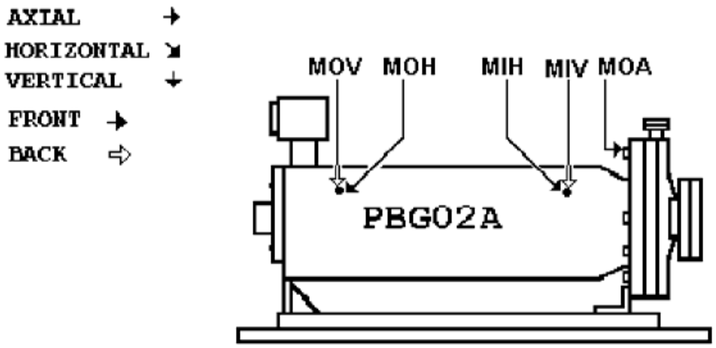
- o Suction pressure, as indicated on temporary test pressure gauge installed at BG-V503. ☐
  - o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐
- o Discharge pressure, as indicated on temporary test pressure gauge installed on BG PI-113 valve manifold. ☐
- o Recirculation flow, as indicated on flow indicator BG FI-36. ☐
  - o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

INIT/DATE

NOTE

The data points are physically indicated on the equipment. A circular metallic disc is the preferred method, but is not mandatory.

8.1.13 Measure pump vibration amplitudes at points indicated and record on ATTACHMENT A, DATA SHEET. (3.1.2) ____/____



o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

8.1.14 Stop BA TRANSFER PUMP A.

o BG HIS-5A - NORMAL-AFTER-STOP ☐

o Record Stop Time On ATTACHMENT A, DATA SHEET ☐

8.1.15 Place BA TRANSFER PUMP A handswitch in pull-to-lock.

o BG HIS-5A - PULL-TO-LOCK ☐

8.1.16 Fully open BORIC ACID TRANSFER PMP A TO BORIC ACID TK A THRTL VLV.

o BG-V209 - OPEN ☐

8.1.17 Unlock and close BATP A SUCTION ISO.

o BG-8463 - CLOSED ☐

INIT/DATE

8.1.18 Remove pipe cap and install a drain hose downstream of BA TRANSFER PUMP A CASING DRAIN.

o BG-V578 - CAP REMOVED ☐

o BG-V578 - HOSE INSTALLED AND ROUTED TO DRAIN ☐

8.1.19 Open BA TRANSFER PUMP A CASING DRAIN.

o BG-V578 - OPEN ☐

NOTE

Waiting 60 seconds will allow system to stabilize prior to taking reading.

8.1.20 WHEN at least 60 seconds have elapsed, THEN record recirculation flow reading from BG FI-36, BAT PUMP PBG02A TEST FLOW on ATTACHMENT A, DATA SHEET. ☐

o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

8.1.21 Close and install pipe cap on BA TRANSFER PUMP A CASING DRAIN.

o BG-V578 - CLOSED/CAPPED ____/____

IV ____/____

INIT/DATE

NOTES

- **Data to be used for calculations is recorded on ATTACHMENT A, DATA SHEET. The step numbers have been provided for positive reference to the correct data point.**
- **Steps 8.1.22 and 8.1.23 can be performed simultaneously.**

8.1.22 Complete the following to calculate BA Transfer Pump A differential pressure (ΔP): (P2 = disch press & P1 = suct press) ☐

P2 - P1 = (ΔP)

________ psig - ________ psig = ____ psid (ΔP)
8.1.12 8.1.12

1. Record calculated ΔP on ATTACHMENT A, DATA SHEET. ☐

   o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

NOTE

The following step will restore A Boric Acid Transfer Pump to an operable status.

8.1.23 Align the following valves, as indicated:

o Open BATP A DISCH TO BAT A SAMPLE SYS ISO.

  o BG-V330 - OPEN ____/____

  IV ____/____

o Lock open BORIC ACID TRANSFER PUMP A DISCHARGE ISOLATION.

  o BG-V148 - LOCKED OPEN ____/____

  IV ____/____

o Lock open BATP A SUCTION ISO.

  o BG-8463 - LOCKED OPEN ____/____

  IV ____/____

INIT/DATE

- o Close BAT A OUTLET LINE DRAIN.
  - o BG-V503 - CLOSED ____/____

IV ____/____

- o Close BATP A DISCH PI-113 ISO.
  - o BG-V146 - CLOSED ____/____

IV ____/____

- o Lock open BORIC ACID TRANSFER PMP A TO BORIC ACID TK A THRTL VLV.
  - o BG-V209 - LOCKED OPEN ____/____

IV ____/____

8.1.24 Place BA TRANSFER PUMP A handswitch in normal-after-stop.

- o BG HIS-5A - NORMAL-AFTER-STOP ____/____

IV ____/____

8.1.25 Section 8.1, BAT PUMP A AND CHECK VLV BG-V155 TEST, complete. ____/____

INIT/DATE

8.2 BAT PUMP A DISCH CHECK VLV BG-V147 TEST

NOTE

BG-V178, RMW TO CHEM MIX TK/BA BLENDING TEE HDR ISO and BG-V601, RMW TO BA BLENDING TEE FO-10 UPSTREAM ISO, may be opened under administrative control in Modes 3, 4, or 5 with no RCPs running.

8.2.1 IF required, THEN ensure RMW TO CHEM MIX TK/BA BLENDING TEE HDR ISO and RMW TO BA BLENDING TEE FO-10 UPSTREAM ISO are unlocked and open.

o BG-V178 - UNLOCKED/OPEN ☐

o BG-V601 - UNLOCKED/OPEN ☐

NOTE

VCT level should be maintained approximately 60% for duration of this test.

8.2.2 Lineup VCT makeup control to manual.

1. Place RCS M/U CTRL to stop.

    o BG HS-26 - NORMAL-AFTER-STOP ☐

2. Place RCS M/U CTRL SEL in manual.

    o BG HS-25 - MANUAL ☐

8.2.3 Place BA TRANSFER PUMP B handswitch in pull-to-lock.

o BG HIS-6A - PULL-TO-LOCK ☐

8.2.4 Record the following hand controller pot settings on ATTACHMENT A, DATA SHEET:

o BG FK-110, BA FLOW CTRL ☐

o BG FK-111, REACTOR M/U WTR FLOW CTRL ☐

INIT/DATE

8.2.5 Perform the following:

- o Set BA FLOW CTRL to a pot setting of 8.93 (equivalent to a boric acid flow rate of 35.7 gpm).
  - o BG FK-110 Pot Setting - 8.93 ☐
- o Ensure BA FLOW CTRL controller is in auto.
  - o BG FK-110 - AUTO ☐

8.2.6 Perform the following:

1. Reset upper and lower register for BA COUNTER.
   - o BG FY-110B Upper And Lower Register - RESET ☐
2. Set BA COUNTER upper register to 35.7 gallons of boric acid.
   - o BG FY-110B - SET AT 35.7 GALLONS ☐

8.2.7 Perform the following:

- o Set REACTOR M/U WTR FLOW CTRL to a pot setting of 6.25 (equivalent to a flow rate of 100 gpm).
  - o BG FK-111 Pot Setting - 6.25 ☐
- o Ensure REACTOR M/U WTR FLOW CTRL controller is in auto.
  - o BG FK-111 - AUTO ☐

INIT/DATE

NOTE

Reactor M/U Water Counter should be set high enough to ensure that boric acid flow will stop prior to M/U water flow in order to flush out the line. The 150 gallons setting will allow for about 30 gallons of water to flush the line.

8.2.8 Perform the following:

1. Reset upper and lower register for COMBINED M/U & BA COUNTER.

   o BG FY-111B Upper And Lower Register - RESET ☐

2. Set COMBINED M/U & BA COUNTER upper register to 150 gallons of makeup water.

   o BG FY-111B - SET AT 150 GALLONS ☐

NOTE

The following alignment will direct the blended flow to the Refueling Water Storage Tank.

8.2.9 Open BLENDED SUPPLY TO RWST ISO.

o BG-V195 - OPEN ☐

8.2.10 Unlock and open BLENDED SUPPLY HDR ISO.

o BG-V192 - UNLOCKED/OPEN ☐

NOTE

00-041D, BA FLOW DEV may be momentarily received due to a large error signal between BGFK0110 setpoint and initial 0.0 gpm flow condition.

8.2.11 Place RCS M/U CTRL to run.

o BG HS-26 - NORMAL-AFTER-RUN ☐

INIT/DATE

8.2.12 Ensure that the following flow control valves remain closed.

1. MAKEUP TO VCT INLET.

   o BG HIS-111B - INDICATES CLOSED ☐

2. MAKEUP TO VCT OUTLET.

   o BG HIS-110B - INDICATES CLOSED ☐

8.2.13 Perform the following:

o Verify BA TRANSFER PUMP A is running.

  o BG HIS-5A, Red Light - LIT ☐

o <u>IF</u> in normal-after-stop, <u>THEN</u> verify REACTOR M/U WTR TRANSFER PUMP A or REACTOR M/U WTR TRANSFER PUMP B has started.

  * BL HIS-3, Red Light - LIT ☐

  * BL HIS-4, Red Light - LIT ☐

<u>8.2.14</u> Record boric acid flow, as indicated by red pen or digital readout on BG FR-110, BA BLENDING FLOW RECORDER on ATTACHMENT A, DATA SHEET. ☐

o Verify Required Indication By Circling Either SAT (S) Or UNSAT (U) ☐

8.2.15 <u>WHEN</u> COMBINED M/U & BA FLOW TOTALIZER counts down to zero, <u>THEN</u> place RCS M/U CTRL to stop.

o BG HS-26 - NORMAL-AFTER-STOP ☐

8.2.16 Perform the following:

o Verify BA TRANSFER PUMP A stopped.

  o BG HIS-5A, Green Light - LIT ☐

o <u>IF</u> in normal-after-stop, <u>THEN</u> verify REACTOR M/U WTR TRANSFER PUMP A or REACTOR M/U WTR TRANSFER PUMP B, that started in step 8.2.13, has stopped.

  * BL HIS-3, Green Light - LIT ☐

  * BL HIS-4, Green Light - LIT ☐

INIT/DATE

8.2.17 Place BA TRANSFER PUMP B in normal-after-stop.

o BG HIS-6A - NORMAL-AFTER-STOP ____/____

IV ____/____

8.2.18 Set BA FLOW CTRL to pot setting recorded in step 8.2.4.

o BG FK-110 Pot Setting - RESET ☐

8.2.19 Set REACTOR M/U WTR FLOW CTRL to pot setting recorded in step 8.2.4.

o BG FK-111 Pot Setting - RESET ☐

8.2.20 Lock closed BLENDED SUPPLY HDR ISO.

o BG-V192 - LOCKED CLOSED ____/____

IV ____/____

8.2.21 Close BLENDED SUPPLY TO RWST ISO.

o BG-V195 - CLOSED ____/____

IV ____/____

8.2.22 <u>IF</u> BG-V178, RMW TO CHEM MIX TK/BA BLENDING TEE HDR ISO and BG-V601, RMW TO BA BLENDING TEE FO-10 UPSTREAM ISO were opened in step 8.2.1, <u>THEN</u> perform the following:

o BG-V178 - LOCKED CLOSED ____/____

IV ____/____

o BG-V601 - LOCKED CLOSED ____/____

IV ____/____

INIT/DATE

8.2.23 Ensure the following valves are locked open:

o BORIC ACID TANK B FILL VALVE.

  o BG-V169 - LOCKED OPEN ☐

o BORIC ACID TRANSFER PUMP B TO BORIC ACID TANK B ISOLATION.

  o BG-V168 - LOCKED OPEN ☐

o BATP B SUCTION ISO.

  o BG-8475 - LOCKED OPEN ☐

o BAT B OUTLET ISO.

  o BG-8461B - LOCKED OPEN ☐

o BORIC ACID TRANSFER PMP B TO BORIC ACID TK B THRTL VLV.

  o BG-V210 - LOCKED OPEN ☐

8.2.24 Ensure BA BATCHING TK OUTLET TO BATP B ISO is closed

o BG-8465B - CLOSED ☐

8.2.25 Place BA TRANSFER PUMP A handswitch in pull-to-lock.

o BG HIS-5A - PULL-TO-LOCK ☐

NOTE

The following step will make BA Transfer Pump A inoperable. Boric Transfer Pump B should be verified operable prior to performing this step.

8.2.26 Unlock and close BATP A SUCTION ISO.

o BG-8463 - UNLOCKED/CLOSED ☐

8.2.27 Record flow indication from BG FI-36, BAT PUMP PBG02A TEST FLOW on ATTACHMENT A, DATA SHEET ☐

INIT/DATE

8.2.28 Calculate acceptance criteria for BG-V147 closed test, by performing the following:

1. Add 1.5 gpm to flow indication recorded in step 8.2.27. ☐

   Acceptance Criteria =
   1.5 gpm + _____ gpm = _____ gpm

2. Record Acceptance Criteria that was calculated above on ATTACHMENT A, DATA SHEET. ☐

8.2.29 Start BA TRANSFER PUMP B.

o BG HIS-6A - NORMAL-AFTER-RUN ☐

o Record Start Time On ATTACHMENT A, DATA SHEET ☐

8.2.30 Determine the results of the BG-V147, BATP A DISCH CHECK VLV closed test, by performing the following:

1. Record flow indication from BG FI-36, BAT PUMP PBG02A TEST FLOW on ATTACHMENT A, DATA SHEET and compare it to the flow calculated in step 8.2.28. ☐

   o IF recorded flow is less than or equal to calculated flow, THEN indicate SAT (S). ☐

   o IF recorded flow is greater than calculated flow, THEN indicate UNSAT (U). ☐

8.2.31 Stop BA TRANSFER PUMP B.

o BG HIS-6A - NORMAL-AFTER-STOP ☐

o Record Stop Time On ATTACHMENT A, DATA SHEET ☐

INIT/DATE

NOTE

The following step will make BA Transfer Pump A operable.

8.2.32 Lock open BATP A SUCTION ISO.

o BG-8463 - LOCKED OPEN ____/____

IV ____/____

8.2.33 Place BA TRANSFER PUMP A in normal-after-stop.

o BG HIS-5A - NORMAL-AFTER-STOP ____/____

IV ____/____

8.2.34 Section 8.2, BAT PUMP A DISCH CHECK VLV BG-V147 TEST, complete. ____/____

INIT/DATE

9.0 RESTORATION

9.1 Align Reactor Makeup Control System, as directed by SM/CRS, per SYS BG-200, REACTOR MAKEUP CONTROL SYSTEM NORMAL OPERATION. ☐

9.2 IF section 8.1, BAT PUMP A AND CHECK VLV BG-V155 TEST was performed, THEN have the engineer performing the test or I&C remove the temporary test gauge on BG-V503, as follows:

9.2.1 Remove temporary test pressure gauge installed at BG-V503. ☐

9.2.2 Re-install pipe cap at BAT A OUTLET LINE DRAIN.

- BG-V503 - CLOSED/CAPPED ____/____

IV ____/____

9.3 IF section 8.1, BAT PUMP A AND CHECK VLV BG-V155 TEST was performed, THEN have the engineer performing the test or I&C remove the temporary test gauge on BG PI-113, as follows:

- Isolate temporary test pressure gauge at BG PI-113 manifold. ____/____

IV ____/____

- Remove temporary test pressure gauge installed at BG PI-113 manifold. ☐

9.4 Ensure all data sheet entries are complete and all data recorders have signed data sheet. ☐

9.5 Inform the SM/CRS of completion and status of this test. ____/____

9.6 Record comments:

____

____

10.0 RECORDS

10.1 The following QA records are generated by this procedure:

- Section 5.0, 7.0, 8.0 and 9.0 of this test.
- ATTACHMENT A, DATA SHEET

-END-

ATTACHMENT A
(Page 1 of 1)
DATA SHEET

STEP	PARAMETER	MINIMUM ACCEPTABLE	ACTUAL	ALERT	MAXIMUM ACCEPTABLE	SAT/ UNSAT	REQ'D ACTION
8.1.7	Static suction pressure	6.5 psig		N/A	N/A	S / U	1
8.1.8	Start time	N/A		N/A	N/A	N/A	N/A
8.1.12	Dynamic suction pressure P1	6.5 psig		N/A	N/A	S / U	1
	Discharge pressure P2	N/A		N/A	N/A	N/A	N/A
	Recirc Flow (PBG02A/BG-V155)	29.0 gpm		N/A	31.0 gpm	S / U	1
8.1.13	Outboard Axial (MOA) - V1	N/A		0.1621 in/sec	0.3890 in/sec	S / U	1, 3
	Outboard Horizontal (MOH) - V2	N/A		0.1275 in/sec	0.3060 in/sec	S / U	1, 3
	Outboard Vertical (MOV) - V3	N/A		0.1827 in/sec	0.4384 in/sec	S / U	1, 3
	Inboard Horizontal (MIH) - V4	N/A		0.1637 in/sec	0.3930 in/sec	S / U	1, 3
	Inboard Vertical (MIV) - V5	N/A		0.0927 in/sec	0.2226 in/sec	S / U	1, 3
8.1.14	Stop time	N/A		N/A	N/A	N/A	N/A
8.1.20	Recirc Flow(BG-V155 closed test)	N/A		N/A	0.5 gpm	S / U	2
8.1.22.1	Calculated ΔP	102.4 psid		105.8 psid	117.1 psid	S / U	1, 4
8.2.4	BG FK-110 pot setting	N/A		N/A	N/A	N/A	N/A
	BG FK-111 pot setting	N/A		N/A	N/A	N/A	N/A
8.2.14	BA flow (BG-V147 open test)	30 gpm		N/A	N/A	S / U	1
8.2.27	Recirc flow	N/A		N/A	N/A	N/A	N/A
8.2.28.2	Calculated maximum acceptable	N/A		N/A	N/A	N/A	N/A
8.2.29	Start time	N/A		N/A	N/A	N/A	N/A
8.2.30.1	Recirc flow (BG-V147 close test)	N/A		N/A	N/A	S / U	2
8.2.31	Stop time	N/A		N/A	N/A	N/A	N/A

Required Action 1: If this value is UNSAT, notify the SM/CRS that the A Boric Acid Transfer Pump has failed the surveillance test and is inoperable. Initiate corrective action.

Required Action 2: If this value is UNSAT, notify the SM/CRS that corrective action should be initiated. This does not make the A Boric Acid Transfer Pump inoperable.

Required Action 3: If the actual value is greater than the alert but less than or equal to the maximum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.

Required Action 4: If the actual value is less than the alert but greater than or equal to the minimum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.

Data Recorded by:

/	/		/	/	
/	/		/	/	
/	/		/	/	
Print Name	Signature	Date	Print Name	Signature	Date

-END-

ATTACHMENT A
(Page 1 of 1)
DATA SHEET

STEP	PARAMETER	MINIMUM ACCEPTABLE	ACTUAL	ALERT	MAXIMUM ACCEPTABLE	SAT/ UNSAT	REQ'D ACTION
8.1.7	Static suction pressure	6.5 psig	**8.5**	N/A	N/A	[✓ S] / U	1
8.1.8	Start time	N/A	**1145**	N/A	N/A	N/A	N/A
8.1.12	Dynamic suction pressure P1	6.5 psig	**7.0**	N/A	N/A	[✓ S] / U	1
	Discharge pressure P2	N/A	**142**	N/A	N/A	N/A	N/A
	Recirc Flow (PBG02A/BG-V155)	29.0 gpm	**31.0**	N/A	31.0 gpm	[✓ S] / U	1
8.1.13	Outboard Axial (MOA) - V1	N/A	**0.1487**	0.1621 in/sec	0.3890 in/sec	[✓ S] / U	1, 3
	Outboard Horizontal (MOH) - V2	N/A	**0.3065**	0.1275 in/sec	0.3060 in/sec	[✓ S] / U	1, 3
	Outboard Vertical (MOV) - V3	N/A	**0.2145**	0.1827 in/sec	0.4384 in/sec	[✓ S] / U	1, 3
	Inboard Horizontal (MIH) - V4	N/A	**0.1478**	0.1637 in/sec	0.3930 in/sec	[✓ S] / U	1, 3
	Inboard Vertical (MIV) - V5	N/A	**0.1927**	0.0927 in/sec	0.2226 in/sec	[✓ S] / U	1, 3
8.1.14	Stop time	N/A	**1234**	N/A	N/A	N/A	N/A
8.1.20	Recirc Flow(BG-V155 closed test)	N/A	**0.7**	N/A	0.5 gpm	[✓ S] / U	2
8.1.22.1	Calculated ΔP	102.4 psid	**104.5**	105.8 psid	117.1 psid	[✓ S] / U	1, 4
8.2.4	BG FK-110 pot setting	N/A	**3.71**	N/A	N/A	N/A	N/A
	BG FK-111 pot setting	N/A	**7.50**	N/A	N/A	N/A	N/A
8.2.14	BA flow (BG-V147 open test)	30 gpm	**45**	N/A	N/A	[✓ S] / U	1
8.2.27	Recirc flow	N/A	**2**	N/A	N/A	N/A	N/A
8.2.28.2	Calculated maximum acceptable	N/A	**3.5**	N/A	N/A	N/A	N/A
8.2.29	Start time	N/A	**1245**	N/A	N/A	N/A	N/A
8.2.30.1	Recirc flow (BG-V147 close test)	N/A	**0.7**	N/A	N/A	[✓ S] / U	2
8.2.31	Stop time	N/A	**1248**	N/A	N/A	N/A	N/A

Required Action 1: If this value is UNSAT, notify the SM/CRS that the A Boric Acid Transfer Pump has failed the surveillance test and is inoperable. Initiate corrective action.
Required Action 2: If this value is UNSAT, notify the SM/CRS that corrective action should be initiated. This does not make the A Boric Acid Transfer Pump inoperable.
Required Action 3: If the actual value is greater than the alert but less than or equal to the maximum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.
Required Action 4: If the actual value is less than the alert but greater than or equal to the minimum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.

Data Recorded by:
Joe Nuclear / JJN / Today   / /
/ /   / /
/ /   / /
Print Name Signature Date   Print Name Signature Date

-END-

PASSED

ATTACHMENT A
(Page 1 of 1)
DATA SHEET

STEP	PARAMETER	MINIMUM ACCEPTABLE	ACTUAL	ALERT	MAXIMUM ACCEPTABLE	SAT/ UNSAT	REQ'D ACTION
8.1.7	Static suction pressure	6.5 psig	**8.5**	N/A	N/A	[✓ S] / U	1
8.1.8	Start time	N/A	**1145**	N/A	N/A	N/A	N/A
8.1.12	Dynamic suction pressure P1	6.5 psig	**7.0**	N/A	N/A	[✓ S] / U	1
	Discharge pressure P2	N/A	**142**	N/A	N/A	N/A	N/A
	Recirc Flow (PBG02A/BG-V155)	29.0 gpm	**31.0**	N/A	31.0 gpm	[✓ S] / U	1
8.1.13	Outboard Axial (MOA) - V1	N/A	**0.1487**	0.1621 in/sec	0.3890 in/sec	[✓ S] / U	1, 3
	Outboard Horizontal (MOH) - V2	N/A	**0.3065**	0.1275 in/sec	0.3060 in/sec	S / [✓ U]	1, 3
	Outboard Vertical (MOV) - V3	N/A	**0.2145**	0.1827 in/sec	0.4384 in/sec	[✓ S] / U	1, 3
	Inboard Horizontal (MIH) - V4	N/A	**0.1478**	0.1637 in/sec	0.3930 in/sec	[✓ S] / U	1, 3
	Inboard Vertical (MIV) - V5	N/A	**0.1927**	0.0927 in/sec	0.2226 in/sec	[✓ S] / U	1, 3
8.1.14	Stop time	N/A	**1234**	N/A	N/A	N/A	N/A
8.1.20	Recirc Flow(BG-V155 closed test)	N/A	**0.7**	N/A	0.5 gpm	S / [✓ U]	2
8.1.22.1	Calculated ΔP	102.4 psid	**104.5**	105.8 psid	117.1 psid	[✓ S] / U	1, 4
8.2.4	BG FK-110 pot setting	N/A	**3.71**	N/A	N/A	N/A	N/A
	BG FK-111 pot setting	N/A	**7.50**	N/A	N/A	N/A	N/A
8.2.14	BA flow (BG-V147 open test)	30 gpm	**45**	N/A	N/A	[✓ S] / U	1
8.2.27	Recirc flow	N/A	**2**	N/A	N/A	N/A	N/A
8.2.28.2	Calculated maximum acceptable	N/A	**3.5**	N/A	N/A	N/A	N/A
8.2.29	Start time	N/A	**1245**	N/A	N/A	N/A	N/A
8.2.30.1	Recirc flow (BG-V147 close test)	N/A	**0.7**	N/A	N/A	[✓ S] / U	2
8.2.31	Stop time	N/A	**1248**	N/A	N/A	N/A	N/A

Required Action 1: If this value is UNSAT, notify the SM/CRS that the A Boric Acid Transfer Pump has failed the surveillance test and is inoperable. Initiate corrective action.

Required Action 2: If this value is UNSAT, notify the SM/CRS that corrective action should be initiated. This does not make the A Boric Acid Transfer Pump inoperable.

Required Action 3: If the actual value is greater than the alert but less than or equal to the maximum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.

Required Action 4: If the actual value is less than the alert but greater than or equal to the minimum acceptable value, contact Support Engineering for further evaluation prior to marking the value as SAT or UNSAT.

Data Recorded by:

Joe Nuclear / JJN / Today ______ / ______ / ______

______ / ______ / ______ ______ / ______ / ______

______ / ______ / ______ ______ / ______ / ______

Print Name / Signature / Date Print Name / Signature / Date

-END-

FAILED

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Determine radiological requirements for High Radiation Area Entry	JPM No.:	R.A.4
K/A Reference:	2.3.4 Knowledge of radiation exposure limits under normal or emergency conditions. (3.2)		

Examinee:				NRC Examiner:			
Facility Evaluator:				Date:			
Method of testing:							
Simulated Performance:				Actual Performance:		X	
	Classroom	X	Simulator		Plant		

READ TO THE EXAMINEE	
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	An extensive tagout containing a large number of tags is required to be hung in the Auxiliary Building. The first tag on the tagout, which has already been completed by you, was located in a 120 mR/hr field. It took 8 minutes to close this valve and hang the tag on it. The remainder of the tags are located in a General Area dose rate of 30 mR/hr. You are using RWP 130005 task 5 (provided).
Task Standard:	Applicant determined that the **MAXIMUM** time that can be spent hanging tags in the General Area is 18 minutes.
Required Materials:	None
General References:	GT1245201, Generic Radiation Worker rev 27, RWP 130005 Rev 000
Handouts:	RWP 130005 Rev 000
Initiating Cue:	Determine the **MAXIMUM** time that can be spent hanging the <u>remaining</u> tags in the General Area without exceeding the dose limit for the RWP. Document your results on the cue sheet.
Time Critical Task: (Yes or No)	No

Alternate Success Path: (Yes or No)	No
Validation Time:	15 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

*	**Performance Step: 1**	Determine total dose received hanging tags in the 120 mR/hr field.
	Standard:	Applicant calculated 16 mR/hr. 120 mR/hr X 8 min ÷ 60 min/hr = 16 mR.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 2**	Determine the available dose left to hang the remainder of the tagout based on task 5 of RWP 130005.
	Standard:	Applicant calculated 9 mR. 25mR – 16 mR = 9 mR.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 3**	Determine MAX time to hang remainder of the tags based on MAX dose allowed.
	Standard:	Applicant calculated 18 minutes. 9 mR ÷ 30 mR/hr X 60 min/hr = 18 minutes.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	R.A.4
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
<u>Question Documentation:</u>	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	An extensive tagout containing a large number of tags is required to be hung in the Auxiliary Building. The first tag on the tagout, which has already been completed by you, was located in a 120 mR/hr field. It took 8 minutes to close this valve and hang the tag on it. The remainder of the tags are located in a General Area dose rate of 30 mR/hr. You are using RWP 130005 task 5 (provided).

INITIATING CUE:	Determine the **MAXIMUM** time that can be spent hanging the remaining tags in the General Area without exceeding the dose limit for the RWP. Document your results on the cue sheet.

SA1 – proprietary

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Review manual calculation of RTP STS SE-002, Manual Calculation of Reactor Thermal Power.	JPM No.:	S.A.2
K/A Reference:	2.1.20 Ability to interpret and execute procedure steps. (4.6)		

Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	

Method of testing:

Simulated Performance:			Actual Performance:	X	
Classroom	X	Simulator		Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Control Room Supervisor. The Reactor Operator (RO) has completed STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER through step 9.1. The RO reports no NI adjustments per the procedure. STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC, calculated power results are 66.8% power. A personal computer is not available.
Task Standard:	Applicant disapproved the manual calculation of reactor thermal power. The following errors were discovered: 1. Unique error: At C.4, the calculation for Power is incorrect – the RO used Total Average Feedwater flow 10.17 E6 lbm/hr (should have used compensated FW flow 10.345 E6 lbm/hr). The correct Power Calculation is 67.5 to 68.5% (not 66.8%). At 67.5 to 68.5% power, NI41 and NI44 needs to be adjusted.
Required Materials:	RO's completed STS SE-002 (rev 26), MANUAL CALCULATION OF REACTOR THERMAL POWER.
General References:	STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER.

Handouts:	RO’s completed STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER.
Initiating Cue:	Document on STS SE-002 or the cue sheet the following: 1. Approve / Disapprove the RO’s work for completeness and correctness. 2. Any errors found. 3. List NI’s, if any, that need to be adjusted per procedure.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	45 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

	Examiner NOTE:	Key has been provided with all corrected values highlighted in yellow.
	Performance Step: 1 Attachment B [A]	Calculate total average feedwater flow.
	Standard:	Applicant calculated total feedwater flow at 10.18 X10^6 lbm/hr.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 Attachment B [C]	Calculate average feedwater temperature.
	Standard:	Applicant calculated average feedwater temperature at 405°F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 Attachment B [D]	Calculate total average S/G pressure.
	Standard:	Applicant calculated total average S/G pressure at 984.7 psia.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 Attachment B [E]	Calculate average S/G blowdown.
	Standard:	Applicant calculated average S/G blowdown at 126.28 klbm/hr.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 Attachment B [F, G, H, I]	Calculate average NI power per quadrant.
	Standard:	Applicant calculated average NI power per quadrant at: NI 41 – 66.4 NI 42 – 67.6 NI 43 – 67.7 NI 44 – 66.4
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 Attachment C.1.1	Determine feedwater density from Attachment F based on average feedwater temperature.
	Standard:	Applicant calculated feedwater density from Attachment F at 53.719.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 7 Attachment C.1.2	Determine density correction factor.
	Standard:	Applicant calculated density correction factor at 1.0172.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 8 Attachment C.1.3	Determine compensated feedwater flow.
	Standard:	Applicant calculated compensated feedwater flow at 10.355.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	Range is from 1193.3 to 1193.7 and 654.2 and 652.3 due to rounding on Attachment.
	Performance Step: 9 Attachment C.2.1	Determine steam enthalpy and latent heat of vaporization from Attachment G based on average S/G pressure.
	Standard:	Applicant determined steam enthalpy and latent heat of vaporization from Attachment G based on average S/G pressure at 1193.5 and 653.25 respectively .
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	Range is from 375.90 to 386.72 due to rounding on Attachment.
	Performance Step: 10 Attachment C.2.2	Determine feedwater enthalpy from the Attachment H based on average feedwater temperature.
	Standard:	Applicant determined feedwater enthalpy from the Attachment H based on average feedwater temperature at 381.3.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	Range is from 806.58 to 817.8 due to rounding on Attachment.
	Performance Step: 11 Attachment C.2.3	Determine heat transfer.
	Standard:	Applicant determined heat transfer at 812.2.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 12 Attachment C.3	Determine S/G blowdown correction.
	Standard:	Applicant determined S/G blowdown correction at 0.678.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	Range is from 67.5 to 68.5 due to rounding on Attachment.
*	**Performance Step: 13** Attachment C.4 **Alternate Path Step**	Calculate power.
	Standard:	Applicant calculated power at 68.0 and corrects Attachment C.4.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 14** Attachment E from step 8.9.2.1	Calculate calorimetric difference AND determine SAT or UNSAT.
	Standard:	Applicant calculated calorimetric difference at 1.2% and determined UNSAT and corrects Attachment E from step 8.9.2.1.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 15** Attachment E from step 8.10	Record average NIS drawer power levels on Attachment E from step 8.10.
	Standard:	Recorded average NIS drawer power levels at NI 41 – 66.4, NI 42 – 67.6, NI 43 – 67.7, NI 44 – 66.4 on Attachment E from step 8.10.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 16** Attachment E from step 8.12.2	Calculate and document power difference using calculated calorimetric power and indicated NIS drawer power AND place a checkmark in the box on Attachment E for each one indicating more than 1% less than calculated power.
	Standard:	Applicant calculated and documented power difference using calculated calorimetric power and indicated NIS drawer power AND placed a checkmark in the box for NI 41 and NI 44 at: NI 41 66.4 - 67.5 = -1.1 UNSAT placed a checkmark in the box 66.4 - 68.5 = -2.1 UNSAT NI 42 67.6 - 67.5 = +0.1 SAT 67.6 - 68.5 = -0.9 SAT NI 43 67.7 - 67.5 = +0.2 SAT 67.7 - 68.5 = -0.8 SAT NI 44 66.4 - 67.5 = -1.1 UNSAT placed a checkmark in the box 66.4 - 68.5 = -2.1 UNSAT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*****	**Performance Step: 17**	Approve / Disapprove RO’s work for STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER.
	Standard:	Disapproves STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER paperwork.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S.A.2
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attachmentempts:	
Time to Complete:	
<u>Question Documentation:</u>	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the Control Room Supervisor. The Reactor Operator (RO) has completed STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER through step 9.1. The RO reports no NI adjustments per the procedure. STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC, calculated power results are 66.8% power. A personal computer is not available.

INITIATING CUE:	Document on STS SE-002 or the cue sheet the following: 1. Approve / Disapprove the RO's work for completeness and correctness. 2. Any errors found. 3. List NI's, if any, that need to be adjusted per procedure.

Approve / Disapprove

WOLF CREEK
NUCLEAR OPERATING CORPORATION

STS SE-002

MANUAL CALCULATION OF REACTOR THERMAL POWER

<u>Responsible Manager</u>

Manager Operations

Revision Number	26
Use Category	Continuous
Administrative Controls Procedure	No
Management Oversight Evolution	No
Program Number	21D

DC38 11/19/2008

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This Surveillance Test compares calculated reactor power to power level indicated on the power range nuclear instrument channels and provides the steps necessary to readjust the power range nuclear instrument channels when required.

1.2 This procedure is used in lieu of the preferred procedure, STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC when the NPIS computer is unavailable.

1.3 This Surveillance Test is used on a periodic basis as a cross check of the computer calorimetric computations performed in accordance with STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC.

2.0 SCOPE

2.1 This Surveillance procedure satisfies Technical Specification SR 3.3.1.2, Table 3.3.1-1, Function 2.a, when the NPIS computer is <u>NOT</u> available.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 ASME Steam Tables 5th Edition

3.1.2 CONTROL ROOM OPERATING CURVES AND TABLES REFERENCE MANUAL For Current Cycle

3.1.3 PIR 1996-1066, 1999-0986, 2001-1256 And ITIP 03327, Westinghouse Technical Bulletin ESBU-TB-92-14-R1: Decalibration Effects Of Calorimetric Power Measurements On NIS High Power Reactor Trip At Power Levels Less Than 70% RTP. Modified By Technical Specification License Amendment 148

3.1.4 PIR 2001-1299, Procedure Overly Conservative With Respect To Technical Specifications For NI Calibration And Adjustment

3.2 Commitments

3.2.1 None

4.0 PRECAUTIONS/LIMITATIONS

4.1 Report any irregularities or component malfunctions to the SM/CRS immediately. Reference Technical Specification 3.3.1.

4.2 Unit operating parameters should <u>NOT</u> be changed during the performance of this surveillance.

4.3 Test data should be obtained expeditiously so that it is current. Any adjustments to the NIS power range channels should be accomplished promptly after the calorimetric calculation.

4.4 Care should be taken when adjusting NIS power range channels to prevent an inadvertent reactor trip.

4.5 List each alternate indicator used and the reason why in Comments Section.

4.6 As a result of power range NI gain adjustments during down powers or at low power, decalibration effects could render power range high flux level trip setpoints non-conservative. Therefore, if adjusting power range NI gains DOWN when less than 45% thermal (calorimetric) power, power range high flux trip setpoints will require adjustment to less than or equal to 80% per STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT ADJUSTMENT. (3.1.3)

5.0 TEST EQUIPMENT

5.1 None

6.0 ACCEPTANCE CRITERIA

NOTES

- **Failure to meet Acceptance Criteria given below may constitute a failure to comply with Technical Specification 3.3.1.**
- **Technical Specification Amendment 148 deleted the requirement to adjust the NI Power Range Channels if they read higher than the calorimetric calculated power.**

6.1 The output of the NI Power Range Channels (SE NI-41, SE NI-42, SE NI-43 and SE NI-44) are adjusted such that they read no more than 2% below the calorimetric calculated power.

6.2 IF a power range channel cannot be adjusted to within the acceptance criteria, THEN the affected channel shall be declared inoperable and corrective action shall be initiated.

6.3 IF this procedure is used as the periodic check of the NPIS computer calorimetric (STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC), THEN the power calculated in this procedure must agree within ±1.0% of the NPIS computer calorimetric calculation.

INIT/DATE

7.0 PREREQUISITES

7.1 Reactor power has been stable ± 0.5% with Tavg stable ± 1°F for at least 5 minutes. ☑

7.2 The plant is in Mode 1 and greater than 15% power. ☑

7.3 No power changes are anticipated over the next hour. ☑

7.4 Ensure AE HIS-38, FW HP HTRS BYPASS VLV is closed per SYS AE-125, HP FW HEATER BYPASS THROTTLING OPERATIONS. ☑

7.5 No other NIS testing is in progress or will be started during the performance of this test. ☑

7.6 Precautions and Limitations have been reviewed. ***RO/Today***

INIT/DATE

8.0 PROCEDURE

8.1 All prerequisites have been met. *RO/Today*

NOTES

- **The steam flow calorimetric should be used when performing a calorimetric above 85% power if indications of venturi fouling have been identified.**
- **The computer will automatically shift to the feedwater calorimetric (RJK9026A=1) when average power range NI power as indicated on both SEU1169 and SEU1150 is reduced to less than 85% or when both SEU1169 and SEU1150 have unacceptable qualities.**
- **If steam flow calorimetric is required, the computer must be manually switched to the steam flow calorimetric (RJK9026A=2) when calorimetric power exceeds 85% or upon restoration of the NPIS computer.**

8.2 IF desired and the NPIS computer is available, THEN perform STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC through step 8.2. ☑

8.3 Record the type of calorimetric by circling either Feed Flow or Steam Flow on ATTACHMENT B, CALORIMETRIC DATA COLLECTION. ☑

8.4 Record data, as required, on ATTACHMENT B, CALORIMETRIC DATA COLLECTION taking one data set approximately every five minutes. ☑

NOTE

The computer based calorimetric data should be completed as soon as possible after the last data set to ensure power calculations are consistent between the computer calculation and the manual calculation.

8.5 IF STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC is being performed concurrently for the periodic check, THEN complete STS SE-001 steps 8.3 through 8.5 as soon as practicable after taking the last set of data. ☑

INIT/DATE

8.6 IF a Personal Computer is available, THEN perform the following:

8.6.1 Complete ATTACHMENT A, INSTRUCTIONS TO PERFORM MANUAL CALCULATIONS USING THE "POP" PROGRAM and attach the computer printout to this procedure. N/A /

IV /

NOTE

Capital letters in brackets are used on ATTACHMENTS B, C, D and E to assist in identifying data to be transferred from ATTACHMENT B, CALORIMETRIC DATA COLLECTION.

8.7 IF a Personal Computer is NOT available, THEN perform one of the following steps to manually calculate the calorimetric power:

* Complete ATTACHMENT C, FEEDWATER CALORIMETRIC CALIBRATION, using data from ATTACHMENT B, CALORIMETRIC DATA COLLECTION. *RO1/Today*

IV *RO2/Today*

* Complete ATTACHMENT D, STEAM CALORIMETRIC CALCULATIONS, using data from ATTACHMENT B, CALORIMETRIC DATA COLLECTION. /

IV /

8.8 Record the calculated power from step 8.6 or 8.7, as applicable, on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. ☑

8.9 IF STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC is being performed concurrently for the periodic check, THEN perform the following:

8.9.1 Record calculated power from STS SE-001 on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. ☑

INIT/DATE

8.9.2 Perform the following to compare results between this procedure and STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC:

1. Calculate the difference between power recorded in step 8.9.1 and power recorded in step 8.8. ☑

   o Record the results on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT and verify results as Sat or Unsat. ☑

NOTE

As long as the power calculation results of STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC and STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER agree within ±1%, then any NIS power range adjustments will be performed and documented using STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC.

2. IF the power calculations agree within ±1%, THEN mark steps 8.9.2.3 through 8.13 N/A and continue with 9.0, RESTORATION. ☑

3. IF the power calculations between STS SE-001, POWER RANGE ADJUSTMENT TO CALORIMETRIC and STS SE-002, MANUAL CALCULATION OF REACTOR THERMAL POWER do NOT agree within ±1%, THEN perform steps 8.3 through 8.9.2.2 again before continuing with this procedure. N/A

4. IF disagreement of greater than ±1% exists after the second performance, THEN perform the following:

   o Notify Reactor Engineering and initiate corrective action. N/A

   o Adjust NIS power range channels to the most conservative (highest) calorimetric power in the following steps. N/A

8.10 Record average NIS drawer power levels, calculated on ATTACHMENT B, CALORIMETRIC DATA COLLECTION on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. N/A

<u>INIT/DATE</u>

8.11 <u>IF</u> power range NI gains need to be adjusted DOWN <u>AND</u> (calorimetric) power is less than 45 percent rated thermal <u>AND</u> power range trip setpoints are set at greater than 80%, <u>THEN</u> perform the following: (3.1.3)

8.11.1 Direct I&C to lower power range trip setpoints to less than or equal to 80% per STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT ADJUSTMENT. N/A

8.11.2 <u>WHEN</u> STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT ADJUSTMENT is complete, <u>THEN</u> continue with step 8.12. N/A

8.12 Determine if any NIS power range channel requires adjustment by performing the following:

8.12.1 <u>IF</u> the as-found difference between any power range channel indication and calculated power is greater than ±5%, <u>THEN</u> notify Reactor Engineering. N/A

<u>NOTE</u>

The requirement to ensure NIS channels indicate no more than 1% less than calculated power is a plant administrative limit not a Technical Specification requirement. This ensures the assumptions made in USAR Table 15.0-5 are met.

<u>8.12.2</u> <u>IF</u> any NIS power range channel indicates less than calorimetric calculated power by more than 1%, <u>THEN</u> record by placing a checkmark in the box on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. N/A

<u>NOTE</u>

When calorimetric power is greater than 45%, NIS power range channels should be adjusted such that they indicate no more than 1% higher than calorimetric calculated power to prevent unnecessary power reductions in the event of a loss of NPIS.

<u>8.12.3</u> <u>IF</u> any NIS channel is indicating within its allowable tolerance but adjustment for optimum indication is desired, <u>THEN</u> place a checkmark in the box on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. N/A ☐

INIT/DATE

CAUTION

If a TRIP Signal exists on any channel, I&C should be contacted to BYPASS the TRIP, while adjustment is being made to any of the Gain Potentiometer(s), to prevent an inadvertent reactor trip. Refer to Technical Specification 3.3.1.

8.13 IF any NIS power range adjustment is necessary, THEN perform the following:

8.13.1 Place ROD BANK AUTO/MAN SEL in MAN.

o SE HS-9 - MAN **N/A**

8.13.2 Record the AS FOUND Gain Potentiometer Settings in ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT, for the NIS channel to be adjusted. **N/A**

8.13.3 Adjust the NIS output as follows:

1. Unlock the gain adjust potentiometer. **N/A**

2. Slowly adjust the Gain Potentiometer (R303) on the NIS Power Range Drawer B until the Percent Power Reading agrees with the highest (most conservative) calculated value recorded on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. **N/A**

3. Lock the gain adjust potentiometer. **N/A**

4. Record the Gain Potentiometer (R303) as left reading on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. **N/A**

5. Record the NIS Power Range channel reading on ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. **N/A**

6. IF the Fine Adjust Potentiometer reaches its Maximum Limit, THEN contact I&C to adjust the Course Level Adjustment Potentiometer R312. **N/A**

   o Annotate the course Adjustment change in the comments section at the end of ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT. **N/A**

INIT/DATE

8.13.4 IF required, THEN repeat steps 8.13.2 and 8.13.3 for the remaining channels needing adjustment. **N/A**

8.13.5 **(**ρ**)** IF desired, THEN return ROD BANK AUTO/MAN SEL to AUTO when Tavg is adjusted to within 1.0°F of Tref.

o SE HS-9 - AUTO **N/A** /

CV **N/A** /

INIT/DATE

9.0 RESTORATION

9.1 Ensure all data sheet entries are complete and all data recorders have signed data sheet. ☑

9.2 IF any NIS Power Range Adjustments were necessary, THEN ensure the applicable NIS channel gain potentiometers are locked.

* N-41 ____/____

IV ____/____

* N-42 ____/____

IV ____/____

* N-43 ____/____

IV ____/____

* N-44 ____/____

IV ____/____

9.3 IF desired, THEN perform SYS AE-125, HP FW HEATER BYPASS THROTTLING OPERATIONS to return AE HV-38 to the throttled OPEN position. ____/____

9.4 Inform SM/CRS of completion and status of this test. ____/____

9.5 Record Comments:

____

____

____

10.0 RECORDS

10.1 The following QA records are generated by this procedure:

o Section 7.0, 8.0 and 9.0
o ATTACHMENT B, CALORIMETRIC DATA COLLECTION (if used)
o ATTACHMENT C, FEEDWATER CALORIMETRIC CALCULATION (if used)
o ATTACHMENT D, STEAM CALORIMETRIC CALCULATIONS (if used)
o ATTACHMENT E, CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT (if used)
o Computer printout of Calorimetric results, if obtained.

-END-

INIT/DATE

ATTACHMENT A
(Page 1 of 2)
INSTRUCTIONS TO PERFORM MANUAL CALCULATIONS USING THE "POP" PROGRAM

NOTES

- **The computer must be logged in to the LAN to print the report.**
- **The Reactor Thermal Power module is not cycle-specific.**
- **On-screen help is available by pressing the {F1} key.**
- **The POP program is normally only installed on the Shift Engineer's PC. It should be accessible through a shortcut on the desktop or a menu item in Start, All Programs. If the program is NOT accessible, Reactor Engineering will need to be contacted.**

A.1 Start the POP computer program. ☐

A.2 Use the arrow keys to highlight the desired calculation type {steam flow or feedwater flow} and press {ENTER}. ☐

N A

A.3 Input the plant data collected on ATTACHMENT B, CALORIMETRIC DATA COLLECTION. ☐

NOTES

- **Following data input, the calculated thermal power will be displayed on the screen.**
- **Use F10 to view each page.**

A.4 Perform the following steps to verify and/or correct data input:

A.4.1 Select "View Report" and press {ENTER}. ☐

A.4.2 IF "View Report" does not work, THEN use "Edit Input". ☐

A.4.3 Verify the in-putted data is accurate. ☐

- IF required, THEN correct any erroneous data. ☐

INIT/DATE

ATTACHMENT A
(Page 2 of 2)

INSTRUCTIONS TO PERFORM MANUAL CALCULATIONS USING THE "POP" PROGRAM

A.5 To obtain a hard copy of the report perform the following:

NOTE

Selection of "MS-DOS Text" will ensure the borders of the tables show up as lines.

A.5.1 Open C: backslash POP backslash RPT backslash SE002.RPT in WORD (MS-DOS Text) ☐

A.5.2 Print the report ☐

A.5.3 Close C: backslash POP backslash RPT backslash SE002.RPT ☐

N A

A.6 Select "Quit" and press Enter. ☐

A.7 ATTACHMENT A, INSTRUCTIONS TO PERFORM MANUAL CALCULATIONS USING THE "POP" PROGRAM, complete. ____/____

-END-

ATTACHMENT B
(Page 1 of 2)
CALORIMETRIC DATA COLLECTION

TYPE OF CALORIMETRIC: [✓ FEED FLOW] or STEAM FLOW (Circle One)

FEEDWATER FLOW (Only Required for Feedwater Flow Calorimetric)

	T1	T2	T3	T4	T5	T6	Avg. Per S/G
AE FI-510A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	**2.60**
AE FI-511A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	
AE FI-520A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	**2.49**
AE FI-521A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	
AE FI-530A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	**2.60**
AE FI-531A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	
AE FI-540A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	**2.49**
AE FI-541A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	

Total Avg.
FW Flow
10.18 x E6 lbm/hr
[A]

STEAM FLOW (Only Required For Steam Flow Calorimetric)

Calculate Normalization Factors (Obtain Values from WCGS Curve Book)
$\frac{(RJK9018) + (RJK9019)}{2} = \frac{\quad + \quad}{2} = (1)$ $\quad\frac{(RJK9020) + (RJK9021)}{2} = \frac{\quad + \quad}{2} = (2)$

Calculate Normalization Factors (Obtain Values from WCGS Curve Book)
$\frac{(RJK9022) + (RJK9023)}{2} = \frac{\quad + \quad}{2} = (3)$ $\quad\frac{(RJK9024) + (RJK9025)}{2} = \frac{\quad + \quad}{2} = (4)$

	T1	T2	T3	T4	T5	T6	Average Per S/G	Norm. Factor	Norm. Stm Flow
AB FI-512A									
AB FI-513A									
AB FI-522A				**N**	**A**				
AB FI-523A									
AB FI-532A									
AB FI-533A									
AB FI-542A									
AB FI-543A									

(AVG) x (NORM. FACTOR) = NORM. STM. FLOW   Total Normalized Steam Flow_________ XE6 lbm/hr [B]

ATTACHMENT B
(Page 2 of 2)
CALORIMETRIC DATA COLLECTION

FEEDWATER TEMPERATURE

	T1	T2	T3	T4	T5	T6	Avg. FW Temp.	
AE TI-37	**405**	**405**	**405**	**405**	**405**	**405**	**405** °F	[C]

STEAM PRESSURE

	T1	T2	T3	T4	T5	T6	Avg. Per S/G
AB PI-515A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-516A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-514A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-524A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-526A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-525A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-534A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-536A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-535A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-545A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-546A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-544A	**971**	**970**	**969**	**971**	**970**	**969**	

Avg S/G Press.
Total Avg

$$\frac{3880}{4} + 14.7 =$$

984.7 psia [D]

S/G BLOWDOWN FLOW

	T1	T2	T3	T4	T5	T6	Avg S/G Blowdown	
BM FI-26	**126.3**	**126.3**	**126.2**	**126.3**	**126.3**	**126.3**	**126.28** klbm/hr	[E]

INDICATED POWER
(On NI Power Drawer)

	T1	T2	T3	T4	T5	T6	Avg Per Quadrant	
N-41	**66.4**	**66.5**	**66.3**	**66.4**	**66.5**	**66.3**	**66.4**	[F]
N-42	**67.5**	**67.6**	**67.7**	**67.7**	**67.5**	**67.6**	**67.6**	[G]
N-43	**67.7**	**67.8**	**67.6**	**67.6**	**67.7**	**67.8**	**67.7**	[H]
N-44	**66.4**	**66.3**	**66.5**	**66.5**	**66.4**	**66.3**	**66.4**	[I]

-END-

ATTACHMENT C
(Page 1 of 1)
FEEDWATER CALORIMETRIC CALCULATION

C.1 COMPENSATED FEEDWATER FLOW

C.1.1 Determine FW density (rho) from Attachment F, based on Avg. FW temp [C]. rho = **53.719** lbm/cu.ft.

C.1.2 Determine density correction factor (DCF):

$$DCF = \left[\frac{rho}{51.913}\right]^{1/2} = \left[\frac{\mathbf{53.719}}{51.913}\right]^{1/2} = \mathbf{1.0172}$$

C.1.3 Determine compensated FW Flow:

10.18 x **1.0172** = **10.355**
(Total Avg FW Flow [A]) x (DCF)=Compensated FW Flow

C.2 HEAT TRANSFER

C.2.1 Determine Steam Enthalpy (hg) and latent heat of vaporization (hfg) from Attachment G, based on Avg. S/G Press. [D]
Hg = **1193.5** BTU/lbm
hfg = **653.25** BTU/lbm

C.2.2 Determine Feedwater Enthalpy from the Attachment H, based on Avg. FW Temp. [C] and Avg. S/G Press. [D]
hFW = **381.3** BTU/lbm

C.2.3 Determine Heat Transfer H = hg - hFW

$$H = \underbrace{\mathbf{1193.5}}_{hg} - \underbrace{\mathbf{381.3}}_{hFW} = \mathbf{812.2}\ \text{BTU/lbm}$$

C.3 STEAM GENERATOR BLOWDOWN CORRECTION

$$\frac{(\text{Avg B/D Rate [E]})\text{x}(\text{hfg})\text{x}(100)}{12.166\ \text{X E9 BTU/hr}} = \text{SGBD Corr}$$

$$\frac{(\mathbf{126.28}\text{Klbm/hr})\text{x}(1000\ \text{lb/Klbm})\text{x}(\mathbf{653.25}\text{BTU/lbm})\text{x}(100)}{12.166\ \text{x E9 BTU/hr}} = \underset{\text{SGBD Corr}}{\mathbf{0.678}\ \%}$$

C.4 POWER CALCULATION

$$\frac{(\text{Com. FW Flow})\text{x}(\text{H})\text{x}(100)}{12.166\ \text{x E9 BTU/hr}} - \text{RCP heat} - \text{SGBD Corr} = \text{POWER}$$

$$\frac{(\mathbf{10.18}\ \text{x E6 lbm/hr})\text{x}(\mathbf{812.2}\text{BTU/lbm})\text{x}(100)}{12.166\ \text{x E9 BTU/hr}} - 0.415\% - (\mathbf{0.678})\% = \underset{\text{POWER}}{\mathbf{66.9}\ \%}$$

-END-

ATTACHMENT D
(Page 1 of 1)
STEAM CALORIMETRIC CALCULATIONS

D.1 HEAT TRANSFER

D.1.1 Determine Steam Enthalpy (hg) and liquid Enthalpy (hf) from Attachment G, based on Avg. S/G Press. [D]
hg = _________ BTU/lbm
hf = _________ BTU/lbm

D.1.2 Determine Feedwater Enthalpy from Attachment H, based on Avg. FW Temp. [C] and Avg. S/G Press. [D]
hFW = _________ BTU/lbm

D.1.3 Determine Heat Transfer H = hg - hFW

$$H = \underbrace{\_\_\_\_\_}_{hg} - \underbrace{\_\_\_\_\_}_{hFW} = \_\_\_\_\_ \text{ BTU/lbm}$$

D.2 STEAM GENERATOR BLOWDOWN CORRECTION

$$H(B/D) = \underbrace{\_\_\_\_\_\_\_}_{hf} - \underbrace{\_\_\_\_\_\_\_}_{hFW} = \_\_\_\_\_\_\_ \text{BTU/lbm}$$

N A

$$\frac{(\text{Avg B/D Rate [E]})x(H(B/D))x(100)}{12.166 \text{ X E9 BTU/hr}} = \text{SGBD Corr}$$

$$\frac{(\quad \text{Klbm/hr})x(1000 \text{ lb/Klbm})x(\quad \text{BTU/lbm})x(100)}{12.166 \text{ x E9 BTU/hr}} = \underbrace{\_\_\_\_\_\_\_\_\_}_{\text{SGBD Corr}}\%$$

D.3 POWER CALCULATION

$$\frac{(\text{Normalized Steam Flow [B]})x(H)x(100))}{12.166 \text{ x E9 BTU/hr}} - \text{RCP heat} + \text{SGBD Corr} = \text{POWER}$$

$$\frac{(\quad \text{x E6 lbm/hr})x(\quad \text{BTU/lbm})x(100))}{12.166 \text{ x E9 BTU/hr}} - 0.415\% + (\quad)\% = \underbrace{\_\_\_\_\_}_{\text{POWER}}\%$$

-END-

ATTACHMENT E
(Page 1 of 1)
CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT

STEP NO.	DATA
8.8	Calculated Power **66.9** %
8.9.1	STS SE-001 Calculated Power **66.8** %
8.9.2.1	Calorimetric Difference **0.1** % Meets acceptance, difference is less than or equal to 1.0%. ☒ SAT ☐ UNSAT
8.10	Individual NIS drawer power level average indications (N41) ____%[F] (N42) ____%[G] (N43) ____%[H] (N44) ____%[I]
8.12.2 8.12.3	Check the box for any NIS channel being adjusted ☐ (N41) ☐ (N42) ☐ (N43) ☐ (N44)
8.13.2	AS FOUND gain setting for channel(s) to be adjusted (N41) ___turns (N42) ___turns (N43) ___turns (N44) ___turns
8.13.3.4	AS LEFT gain setting for channel(s) adjusted (N41) ___turns (N42) ___turns (N43) ___turns (N44) ___turns
8.13.3.5	Individual NIS drawer power level indications (N41) ____% (N42) ____% (N43) ____% (N44) ____%

COMMENTS: **No adjustments needed**

Data Recorded by: **Reactor Operator1** / / **Today**
Reactor Operator2 / / **Today**
/ /
Print Name Signature Date

-END-

ATTACHMENT F

(Page 1 of 1)

DENSITY OF COMPRESSED WATER AT 1042.6 PSIA

DENSITY OF COMPRESSED WATER AT 1042.6 PSIA

T	RHO	T	RHO	T	RHO	T	RHO
300	57.537	341	56.169	382	54.648	423	52.944
301	57.504	342	56.132	383	54.607	424	52.900
302	57.472	343	56.095	384	54.565	425	52.855
303	57.439	344	56.058	385	54.524	426	52.810
304	57.406	345	56.021	386	54.483	427	52.766
305	57.373	346	55.984	387	54.442	428	52.721
306	57.340	347	55.946	388	54.401	429	52.676
307	57.307	348	55.909	389	54.359	430	52.632
308	57.274	349	55.872	390	54.318	431	52.587
309	57.241	350	55.835	391	54.280	432	52.543
310	57.208	351	55.800	392	54.241	433	52.499
311	57.176	352	55.766	393	54.203	434	52.454
312	57.143	353	55.731	394	54.164	435	52.410
313	57.111	354	55.697	395	54.126	436	52.365
314	57.078	355	55.662	396	54.087	437	52.321
315	57.046	356	55.627	397	54.049	438	52.277
316	57.013	357	55.593	398	54.010	439	52.232
317	56.980	358	55.558	399	53.972	440	52.188
318	56.948	359	55.524	400	53.933	441	52.142
319	56.915	360	55.489	401	53.890	442	52.096
320	56.883	361	55.450	402	53.847	443	52.050
321	56.850	362	55.411	403	53.805	444	52.004
322	56.818	363	55.371	404	53.762	445	51.959
323	56.785	364	55.332	405	53.719	446	51.913
324	56.752	365	55.293	406	53.676	447	51.867
325	56.720	366	55.254	407	53.633	448	51.821
326	56.687	367	55.214	408	53.590	449	51.775
327	56.654	368	55.175	409	53.547	450	51.729
328	56.622	369	55.136	410	53.505	451	51.681
329	56.589	370	55.096	411	53.462	452	51.634
330	56.556	371	55.060	412	53.419	453	51.586
331	56.521	372	55.023	413	53.377	454	51.538
332	56.486	373	54.987	414	53.334	455	51.490
333	56.451	374	54.950	415	53.292	456	51.443
334	56.416	375	54.913	416	53.249	457	51.395
335	56.382	376	54.877	417	53.206	458	51.347
336	56.347	377	54.840	418	53.164	459	51.300
337	56.312	378	54.803	419	53.121	460	51.252
338	56.277	379	54.767	420	53.079	461	51.200
339	56.242	380	54.730	421	53.034	462	51.149
340	56.207	381	54.689	422	52.989	463	51.097

T= TEMPERATURE (DEG F), RHO = DENSITY (LBM/CUBIC FT)

-END-

ATTACHMENT G
(Page 1 of 1)
PROPERTIES OF SATURATED STEAM/WATER

Enthalphy (BTU/LBM)

Pressure (PSIA)	Water (hf)	Evap (hfg)	Steam (hg)
1200	571.9	613.0	1184.8
1190	570.5	614.8	1185.3
1180	569.0	616.6	1185.7
1170	567.6	618.5	1186.1
1160	566.2	620.3	1186.6
1150	564.8	622.2	1187.0
1140	563.3	624.1	1187.4
1130	561.9	625.9	1187.8
1120	560.5	627.8	1188.2
1110	559.0	629.6	1188.7
1100	557.5	631.5	1189.1
1090	556.1	633.4	1189.5
1080	554.6	635.3	1189.9
1070	553.1	637.1	1190.3
1060	551.6	639.0	1190.7
1050	550.1	640.9	1191.0
1040	548.6	642.8	1191.4
1030	547.1	644.7	1191.8
1020	545.6	646.6	1192.2
1010	544.1	648.5	1192.6
1000	542.6	650.4	1192.9
990	541.0	652.3	1193.3
980	539.5	654.2	1193.7
970	537.9	656.1	1194.0
960	536.3	658.0	1194.4
950	534.7	660.0	1194.7
940	533.2	661.9	1195.1
930	531.6	663.8	1195.4
920	530.0	665.8	1195.7
910	528.3	667.7	1196.1
900	526.7	669.7	1196.4
890	525.1	671.6	1196.7
880	523.4	673.6	1197.0
870	521.8	675.6	1197.3
860	520.1	677.6	1197.7

-END-

ATTACHMENT H
(Page 1 of 1)
PROPERTIES OF COMPRESSED WATER

PROPERTIES OF COMPRESSED WATER

	850 PSIA	900 PSIA	950 PSIA	1000 PSIA	1050 PSIA	1100 PSIA	1150 PSIA	1200 PSIA
	Enthalphy, hFW, btu/lbm							
500°F	487.86	487.83	487.81	487.79	487.77	487.75	487.73	487.72
490°F	476.09	476.08	476.07	476.06	476.05	476.05	476.04	476.03
480°F	464.48	464.48	464.48	464.49	464.49	464.49	464.50	464.50
470°F	453.01	453.03	453.04	453.05	453.06	453.08	453.09	453.11
460°F	441.68	441.70	441.72	441.74	441.76	441.79	441.81	441.83
450°F	430.46	430.49	430.52	430.55	430.58	430.61	430.64	430.67
440°F	419.35	419.38	419.42	419.45	419.49	419.53	419.57	419.60
430°F	408.33	408.37	408.41	408.46	408.50	408.54	408.59	408.63
420°F	397.40	397.45	397.50	397.55	397.60	397.65	397.70	397.75
410°F	386.56	386.61	386.66	386.72	386.77	386.83	386.88	386.94
400°F	375.79	375.84	375.90	375.96	376.02	376.08	376.14	376.20
390°F	365.08	365.15	365.21	365.27	365.34	365.40	365.47	365.53
380°F	354.45	354.51	354.58	354.65	354.72	354.79	354.85	354.92
370°F	343.87	343.94	344.01	344.08	344.16	344.23	344.30	344.37
360°F	333.34	333.42	333.50	333.57	333.65	333.72	333.80	333.88
350°F	322.87	322.95	323.03	323.11	323.19	323.27	323.35	323.43
340°F	312.45	312.53	312.61	312.69	312.78	312.86	312.94	313.02
330°F	302.07	302.15	302.24	302.32	302.41	302.49	302.58	302.67
320°F	291.73	291.82	291.91	291.99	292.08	292.17	292.26	292.35
310°F	281.43	281.52	281.61	281.70	281.79	281.88	281.97	282.06
300°F	271.16	271.26	271.35	271.44	271.54	271.63	271.72	271.82
290°F	260.93	261.03	261.12	261.22	261.32	261.41	261.51	261.60
280°F	250.73	250.83	250.93	251.03	251.13	251.22	251.32	251.42
270°F	240.56	240.66	240.76	240.86	240.96	241.06	241.16	241.26
260°F	230.42	230.52	230.62	230.72	230.83	230.93	231.03	231.13
250°F	220.30	220.40	220.50	220.61	220.71	220.82	220.92	221.03
240°F	210.20	210.30	210.41	210.52	210.62	210.73	210.84	210.94
230°F	200.12	200.23	200.34	200.44	200.55	200.66	200.77	200.88
220°F	190.06	190.17	190.28	190.39	190.50	190.61	190.72	190.83
210°F	180.02	180.13	180.24	180.35	180.46	180.58	180.69	180.80

-END-

ATTACHMENT B
(Page 1 of 2)
CALORIMETRIC DATA COLLECTION

TYPE OF CALORIMETRIC: [✓ FEED FLOW] or STEAM FLOW (Circle One)

FEEDWATER FLOW (Only Required for Feedwater Flow Calorimetric)

	T1	T2	T3	T4	T5	T6	Avg. Per S/G
AE FI-510A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	**2.60**
AE FI-511A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	
AE FI-520A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	**2.49**
AE FI-521A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	
AE FI-530A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	**2.60**
AE FI-531A	**2.60**	**2.59**	**2.61**	**2.60**	**2.59**	**2.61**	
AE FI-540A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	**2.49**
AE FI-541A	**2.49**	**2.48**	**2.50**	**2.49**	**2.48**	**2.50**	

Total Avg.
FW Flow
10.18 x E6 lbm/hr

[A]

STEAM FLOW (Only Required For Steam Flow Calorimetric)

Calculate Normalization Factors (Obtain Values from WCGS Curve Book) $\frac{(RJK9018) + (RJK9019)}{2} = \frac{\quad + \quad}{2} = (1)$ $\frac{(RJK9020) + (RJK9021)}{2} = \frac{\quad + \quad}{2} = (2)$

Calculate Normalization Factors (Obtain Values from WCGS Curve Book) $\frac{(RJK9022) + (RJK9023)}{2} = \frac{\quad + \quad}{2} = (3)$ $\frac{(RJK9024) + (RJK9025)}{2} = \frac{\quad + \quad}{2} = (4)$

	T1	T2	T3	T4	T5	T6	Average Per S/G	Norm. Factor	Norm. Stm Flow
AB FI-512A									
AB FI-513A									
AB FI-522A									
AB FI-523A									
AB FI-532A									
AB FI-533A									
AB FI-542A									
AB FI-543A									

N A

(AVG) x (NORM. FACTOR) = NORM. STM. FLOW

Total Normalized Steam Flow_________ XE6 lbm/hr [B]

ATTACHMENT B
(Page 2 of 2)
CALORIMETRIC DATA COLLECTION

FEEDWATER TEMPERATURE

	T1	T2	T3	T4	T5	T6	Avg. FW Temp.	
AE TI-37	**405**	**405**	**405**	**405**	**405**	**405**	**405** °F	[C]

STEAM PRESSURE

	T1	T2	T3	T4	T5	T6	Avg. Per S/G
AB PI-515A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-516A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-514A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-524A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-526A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-525A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-534A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-536A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-535A	**971**	**970**	**969**	**971**	**970**	**969**	
AB PI-545A	**970**	**969**	**971**	**970**	**969**	**971**	**970**
AB PI-546A	**969**	**971**	**970**	**969**	**971**	**970**	
AB PI-544A	**971**	**970**	**969**	**971**	**970**	**969**	

Avg S/G Press.
Total Avg

$$\frac{\mathbf{3880}}{4} + 14.7 =$$

984.7 psia [D]

S/G BLOWDOWN FLOW

	T1	T2	T3	T4	T5	T6	Avg S/G Blowdown	
BM FI-26	**126.3**	**126.3**	**126.2**	**126.3**	**126.3**	**126.3**	**126.28** klbm/hr	[E]

INDICATED POWER
(On NI Power Drawer)

	T1	T2	T3	T4	T5	T6	Avg Per Quadrant	
N-41	**66.4**	**66.5**	**66.3**	**66.4**	**66.5**	**66.3**	**66.4**	[F]
N-42	**67.5**	**67.6**	**67.7**	**67.7**	**67.5**	**67.6**	**67.6**	[G]
N-43	**67.7**	**67.8**	**67.6**	**67.6**	**67.7**	**67.8**	**67.7**	[H]
N-44	**66.4**	**66.3**	**66.5**	**66.5**	**66.4**	**66.3**	**66.4**	[I]

-END-

ATTACHMENT C
(Page 1 of 1)
FEEDWATER CALORIMETRIC CALCULATION

C.1 COMPENSATED FEEDWATER FLOW

C.1.1 Determine FW density (rho) from Attachment F, based on Avg. FW temp [C]. rho = **53.719** lbm/cu.ft.

C.1.2 Determine density correction factor (DCF):

$$DCF = \left[\frac{rho}{51.913}\right]^{1/2} = \left[\frac{\mathbf{53.719}}{51.913}\right]^{1/2} = \mathbf{1.0172}$$

C.1.3 Determine compensated FW Flow:

10.18 x **1.0172** = **10.355**
(Total Avg FW Flow [A]) x (DCF)=Compensated FW Flow

C.2 HEAT TRANSFER

C.2.1 Determine Steam Enthalpy (hg) and latent heat of vaporization (hfg) from Attachment G, based on Avg. S/G Press. [D]
Hg = **1193.5** BTU/lbm
hfg = **653.25** BTU/lbm

C.2.2 Determine Feedwater Enthalpy from the Attachment H, based on Avg. FW Temp. [C] and Avg. S/G Press. [D]
hFW = **381.3** BTU/lbm

C.2.3 Determine Heat Transfer H = hg - hFW

$$H = \underbrace{\mathbf{1193.5}}_{hg} - \underbrace{\mathbf{381.3}}_{hFW} = \mathbf{812.2} \text{ BTU/lbm}$$

C.3 STEAM GENERATOR BLOWDOWN CORRECTION

$$\frac{(\text{Avg B/D Rate [E]})\text{x}(\text{hfg})\text{x}(100)}{12.166 \text{ X E9 BTU/hr}} = \text{SGBD Corr}$$

$$\frac{(\mathbf{126.28}\text{Klbm/hr})\text{x}(1000 \text{ lb/Klbm})\text{x}(\mathbf{653.25}\text{BTU/lbm})\text{x}(100)}{12.166 \text{ x E9 BTU/hr}} = \underbrace{\mathbf{0.678}\ \%}_{\text{SGBD Corr}}$$

C.4 POWER CALCULATION

$$\frac{(\text{Com. FW Flow})\text{x}(\text{H})\text{x}(100)}{12.166 \text{ x E9 BTU/hr}} - \text{RCP heat} - \text{SGBD Corr} = \text{POWER}$$

$$\frac{(\mathbf{10.355} \text{ x E6 lbm/hr})\text{x}(\mathbf{812.2}\text{BTU/lbm})\text{x}(100)}{12.166 \text{ x E9 BTU/hr}} - 0.415\% - (\mathbf{0.678})\% = \underbrace{\mathbf{68.0}\%}_{\text{POWER}}$$

-END-

ATTACHMENT D
(Page 1 of 1)
STEAM CALORIMETRIC CALCULATIONS

D.1 HEAT TRANSFER

D.1.1 Determine Steam Enthalpy (hg) and liquid Enthalpy (hf) from Attachment G, based on Avg. S/G Press. [D]

hg = _________ BTU/lbm

hf = _________ BTU/lbm

D.1.2 Determine Feedwater Enthalpy from Attachment H, based on Avg. FW Temp. [C] and Avg. S/G Press. [D]

hFW = _________ BTU/lbm

D.1.3 Determine Heat Transfer H = hg - hFW

$$H = \underset{hg}{\_\_\_\_\_} - \underset{hFW}{\_\_\_\_\_} = \_\_\_\_\_ \text{ BTU/lbm}$$

D.2 STEAM GENERATOR BLOWDOWN CORRECTION

$$H(B/D) = \underset{hf}{\_\_\_\_\_\_\_} - \underset{hFW}{\_\_\_\_\_\_\_} = \_\_\_\_\_\_\_ \text{BTU/lbm}$$

N A

$$\frac{(\text{Avg B/D Rate [E]})x(H(B/D))x(100)}{12.166 \text{ X E9 BTU/hr}} = \text{SGBD Corr}$$

$$\frac{(\quad\quad \text{Klbm/hr})x(1000 \text{ lb/Klbm})x(\quad\quad \text{BTU/lbm})x(100)}{12.166 \text{ x E9 BTU/hr}} = \underset{\text{SGBD Corr}}{\_\_\_\_\_\_\_\_\_}\%$$

D.3 POWER CALCULATION

$$\frac{(\text{Normalized Steam Flow [B]})x(H)x(100))}{12.166 \text{ x E9 BTU/hr}} - \text{RCP heat} + \text{SGBD Corr} = \text{POWER}$$

$$\frac{(\quad\quad x \text{ E6 lbm/hr})x(\quad\quad \text{BTU/lbm})x(100))}{12.166 \text{ x E9 BTU/hr}} - 0.415\% + (\quad\quad)\% = \underset{\text{POWER}}{\_\_\_\_\_}\%$$

-END-

ATTACHMENT E
(Page 1 of 1)

CALORIMETRIC COMPARISON AND NIS POWER RANGE ADJUSTMENT

STEP NO.	DATA
8.8	Calculated Power **68.0** %
8.9.1	STS SE-001 Calculated Power **66.8** %
8.9.2.1	Calorimetric Difference **1.2** % Meets acceptance, difference is less than or equal to 1.0%. ☐ SAT ☒ UNSAT
8.10	Individual NIS drawer power level average indications (N41) **66.4**%[F] (N42) **67.6**%[G] (N43) **67.7**%[H] (N44) **66.3**%[I]
8.12.2 8.12.3	Check the box for any NIS channel being adjusted ☑ (N41) ☐ (N42) ☐ (N43) ☑ (N44)
8.13.2	AS FOUND gain setting for channel(s) to be adjusted (N41) ___turns (N42) ___turns (N43) ___turns (N44) ___turns
8.13.3.4	AS LEFT gain setting for channel(s) adjusted (N41) ___turns (N42) ___turns (N43) ___turns (N44) ___turns
8.13.3.5	Individual NIS drawer power level indications (N41) ____% (N42) ____% (N43) ____% (N44) ____%

COMMENTS: **NI41 and NI44 need adjusted**

Data Recorded by: **Reactor Operator 1** / / **Today**
Reactor Operator 2 / / **Today**
/ /
Print Name Signature Date

-END-

ATTACHMENT F
(Page 1 of 1)
DENSITY OF COMPRESSED WATER AT 1042.6 PSIA

DENSITY OF COMPRESSED WATER AT 1042.6 PSIA

T	RHO	T	RHO	T	RHO	T	RHO
300	57.537	341	56.169	382	54.648	423	52.944
301	57.504	342	56.132	383	54.607	424	52.900
302	57.472	343	56.095	384	54.565	425	52.855
303	57.439	344	56.058	385	54.524	426	52.810
304	57.406	345	56.021	386	54.483	427	52.766
305	57.373	346	55.984	387	54.442	428	52.721
306	57.340	347	55.946	388	54.401	429	52.676
307	57.307	348	55.909	389	54.359	430	52.632
308	57.274	349	55.872	390	54.318	431	52.587
309	57.241	350	55.835	391	54.280	432	52.543
310	57.208	351	55.800	392	54.241	433	52.499
311	57.176	352	55.766	393	54.203	434	52.454
312	57.143	353	55.731	394	54.164	435	52.410
313	57.111	354	55.697	395	54.126	436	52.365
314	57.078	355	55.662	396	54.087	437	52.321
315	57.046	356	55.627	397	54.049	438	52.277
316	57.013	357	55.593	398	54.010	439	52.232
317	56.980	358	55.558	399	53.972	440	52.188
318	56.948	359	55.524	400	53.933	441	52.142
319	56.915	360	55.489	401	53.890	442	52.096
320	56.883	361	55.450	402	53.847	443	52.050
321	56.850	362	55.411	403	53.805	444	52.004
322	56.818	363	55.371	404	53.762	445	51.959
323	56.785	364	55.332	405	53.719	446	51.913
324	56.752	365	55.293	406	53.676	447	51.867
325	56.720	366	55.254	407	53.633	448	51.821
326	56.687	367	55.214	408	53.590	449	51.775
327	56.654	368	55.175	409	53.547	450	51.729
328	56.622	369	55.136	410	53.505	451	51.681
329	56.589	370	55.096	411	53.462	452	51.634
330	56.556	371	55.060	412	53.419	453	51.586
331	56.521	372	55.023	413	53.377	454	51.538
332	56.486	373	54.987	414	53.334	455	51.490
333	56.451	374	54.950	415	53.292	456	51.443
334	56.416	375	54.913	416	53.249	457	51.395
335	56.382	376	54.877	417	53.206	458	51.347
336	56.347	377	54.840	418	53.164	459	51.300
337	56.312	378	54.803	419	53.121	460	51.252
338	56.277	379	54.767	420	53.079	461	51.200
339	56.242	380	54.730	421	53.034	462	51.149
340	56.207	381	54.689	422	52.989	463	51.097

T= TEMPERATURE (DEG F), RHO = DENSITY (LBM/CUBIC FT)

-END-

ATTACHMENT G
(Page 1 of 1)
PROPERTIES OF SATURATED STEAM/WATER

Enthalphy (BTU/LBM)

Pressure (PSIA)	Water (hf)	Evap (hfg)	Steam (hg)
1200	571.9	613.0	1184.8
1190	570.5	614.8	1185.3
1180	569.0	616.6	1185.7
1170	567.6	618.5	1186.1
1160	566.2	620.3	1186.6
1150	564.8	622.2	1187.0
1140	563.3	624.1	1187.4
1130	561.9	625.9	1187.8
1120	560.5	627.8	1188.2
1110	559.0	629.6	1188.7
1100	557.5	631.5	1189.1
1090	556.1	633.4	1189.5
1080	554.6	635.3	1189.9
1070	553.1	637.1	1190.3
1060	551.6	639.0	1190.7
1050	550.1	640.9	1191.0
1040	548.6	642.8	1191.4
1030	547.1	644.7	1191.8
1020	545.6	646.6	1192.2
1010	544.1	648.5	1192.6
1000	542.6	650.4	1192.9
990	541.0	652.3	1193.3
980	539.5	654.2	1193.7
970	537.9	656.1	1194.0
960	536.3	658.0	1194.4
950	534.7	660.0	1194.7
940	533.2	661.9	1195.1
930	531.6	663.8	1195.4
920	530.0	665.8	1195.7
910	528.3	667.7	1196.1
900	526.7	669.7	1196.4
890	525.1	671.6	1196.7
880	523.4	673.6	1197.0
870	521.8	675.6	1197.3
860	520.1	677.6	1197.7

-END-

ATTACHMENT H
(Page 1 of 1)
PROPERTIES OF COMPRESSED WATER

PROPERTIES OF COMPRESSED WATER

	850 PSIA	900 PSIA	950 PSIA	1000 PSIA	1050 PSIA	1100 PSIA	1150 PSIA	1200 PSIA
	Enthalphy, hFW, btu/lbm							
500°F	487.86	487.83	487.81	487.79	487.77	487.75	487.73	487.72
490°F	476.09	476.08	476.07	476.06	476.05	476.05	476.04	476.03
480°F	464.48	464.48	464.48	464.49	464.49	464.49	464.50	464.50
470°F	453.01	453.03	453.04	453.05	453.06	453.08	453.09	453.11
460°F	441.68	441.70	441.72	441.74	441.76	441.79	441.81	441.83
450°F	430.46	430.49	430.52	430.55	430.58	430.61	430.64	430.67
440°F	419.35	419.38	419.42	419.45	419.49	419.53	419.57	419.60
430°F	408.33	408.37	408.41	408.46	408.50	408.54	408.59	408.63
420°F	397.40	397.45	397.50	397.55	397.60	397.65	397.70	397.75
410°F	386.56	386.61	386.66	386.72	386.77	386.83	386.88	386.94
400°F	375.79	375.84	375.90	375.96	376.02	376.08	376.14	376.20
390°F	365.08	365.15	365.21	365.27	365.34	365.40	365.47	365.53
380°F	354.45	354.51	354.58	354.65	354.72	354.79	354.85	354.92
370°F	343.87	343.94	344.01	344.08	344.16	344.23	344.30	344.37
360°F	333.34	333.42	333.50	333.57	333.65	333.72	333.80	333.88
350°F	322.87	322.95	323.03	323.11	323.19	323.27	323.35	323.43
340°F	312.45	312.53	312.61	312.69	312.78	312.86	312.94	313.02
330°F	302.07	302.15	302.24	302.32	302.41	302.49	302.58	302.67
320°F	291.73	291.82	291.91	291.99	292.08	292.17	292.26	292.35
310°F	281.43	281.52	281.61	281.70	281.79	281.88	281.97	282.06
300°F	271.16	271.26	271.35	271.44	271.54	271.63	271.72	271.82
290°F	260.93	261.03	261.12	261.22	261.32	261.41	261.51	261.60
280°F	250.73	250.83	250.93	251.03	251.13	251.22	251.32	251.42
270°F	240.56	240.66	240.76	240.86	240.96	241.06	241.16	241.26
260°F	230.42	230.52	230.62	230.72	230.83	230.93	231.03	231.13
250°F	220.30	220.40	220.50	220.61	220.71	220.82	220.92	221.03
240°F	210.20	210.30	210.41	210.52	210.62	210.73	210.84	210.94
230°F	200.12	200.23	200.34	200.44	200.55	200.66	200.77	200.88
220°F	190.06	190.17	190.28	190.39	190.50	190.61	190.72	190.83
210°F	180.02	180.13	180.24	180.35	180.46	180.58	180.69	180.80

-END-

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Review QPTR calculation	JPM No.:	S.A.3
K/A Reference:	2.2.12 Knowledge of surveillance procedures. (4.1) 2.2.42 Ability to recognize system parameters that are entry level condition for TS. (4.6)		

Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	

Method of testing:

Simulated Performance:				Actual Performance:	X	
	Classroom	X	Simulator		Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	The STA has completed STS RE-012, QPTR DETERMINATION. NPIS is out of service. Reactor engineering will not be performing a flux map.

Task Standard:	Applicant corrected math errors as follows: Step 8.4.4.2 average lower normalized current wrong corrected to 245.330. Step 8.4.5 upper tilts wrong corrected to 1.078, 0.969, 1.034, and 0.919 respectively. Step 8.4.6 lower tilt values all wrong due to wrong average number used. Corrected to 1.099, 0.955, 0.997, and 0.949 respectively. Step 8.4.7 maximum radial flux tilt wrong. Corrected to 1.098. Applicant applied TS as follows based on QPTR results: TS 3.2.4 applies with the following items: A1 – reduced RTP to 70.3% 9.9 X 3 = 29.7 so 100% - 29.7% = 70.3% A2 – applies A3 – applies A4 – reduced power range neutron flux high trip setpoints to 79.3% 9.9 X 3 = 29.7 so 109% - 29.7% = 79.3% A5 – applies A6 – after A5 performed A7 – after A6 performed
Required Materials:	Completed STS RE-012 (rev 12), QPTR DETERMINATION, WCRX-25 (rev 4), CURVES AND TABLES REFERENCE MANUAL, TS, calculator.
General References:	STS RE-012, QPTR DETERMINATION, WCRX-25, CURVES AND TABLES REFERENCE MANUAL, TS
Handouts:	Completed STS RE-012, QPTR DETERMINATION, calculator
Initiating Cue:	You are the CRS. Review the STA's STS RE-012, QPTR DETERMINATION, for completeness and errors. Document any items on the cue sheet or on STS RE-012, QPTR DETERMINATION. Record any T.S. with values that may be involved, if required.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	15 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

	Examiner NOTE:	All corrected values are located on the key highlighted in yellow. Correct values are not listed in the JPM.
	Performance Step: 1	Review the STS RE-012, QPTR DETERMINATION, to determine completeness and errors.
	Standard:	Applicant reviewed STS RE-012 for errors.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 2** 8.4.4.2	Determine if all number blanks are complete and correct without any math errors.
	Standard:	Applicant determined the following errors and documented: Step 8.4.4.2 average lower normalized current wrong Corrected to 245.330.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 3** 8.4.5	Determine if all number blanks are complete and correct without any math errors.
	Standard:	Applicant determined the following errors and documented: Step 8.4.5 upper tilts wrong Corrected to 1.078, 0.969, 1.034, and 0.919 respectively.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

---

*	**Performance Step: 3** 8.4.6	Determine if all number blanks are complete and correct without any math errors.
	Standard:	Applicant determined the following errors and documented: Step 8.4.6 lower tilt values all wrong due to wrong average number used. Corrected to 1.099, 0.955, 0.997, and 0.949 respectively.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 4** 8.4.7	Determine if all number blanks are complete and correct without any math errors.
	Standard:	Applicant determined the following errors and documented: Step 8.4.7 maximum radial flux tilt wrong. Corrected to 1.099.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 3** 8.6.2.1	Review TS for any implications based on findings with QPTR calculation.
	Standard:	Applicant determined TS 3.2.4 applies with the following items: A1 – reduced RTP to 70.3% 9.9 X 3 = 29.7 so 100% - 29.7% = 70.3% A2 – applies A3 – applies A4 – reduced power range neutron flux high trip setpoints to 79.3% 9.9 X 3 = 29.7 so 109% - 29.7% = 79.3% A5 – applies A6 – after A5 performed A7 – after A6 performed
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S.A.3
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

JPM CUE SHEET

INITIAL CONDITIONS:	The STA has completed STS RE-012, QPTR DETERMINATION. NPIS is out of service. Reactor engineering will not be performing a flux map.

INITIATING CUE:	You are the CRS. Review the STA's STS RE-012, QPTR DETERMINATION, for completeness and errors. Document any items on the cue sheet or on STS RE-012, QPTR DETERMINATION. Record any TS with values that may be involved, if required.

WOLF CREEK
NUCLEAR OPERATING CORPORATION

STS RE-012

QPTR DETERMINATION

Responsible Manager

Manager Nuclear Engineering

Revision Number	12
Use Category	Reference
Administrative Controls Procedure	No
Management Oversight Evolution	No
Program Number	29

Revision: 12	QPTR DETERMINATION	STS RE-012
Reference Use		Page 1 of 10

TABLE OF CONTENTS

INIT/DATE

1.0 PURPOSE

1.1 This procedure is used to determine the Quadrant Power Tilt Ratio (QPTR) and to verify QPTR is within acceptable limits.

1.2 This procedure is applicable in Mode 1 above 50% RTP.

1.3 The QPTR shall be determined to be within the limit above 50% RTP by:

NOTE

The QPTR alarm function is met if:

Annunciators 00-078B, PR UPPER DETECTOR FLUX DEV, AND 00-078C, PR LOWER DETECTOR FLUX DEV, are operable;

OR

Annunciator 00-079C, RPI DEV OR PR TILT, is operable.

1.3.1 Calculating the ratio at least once per 7 days when the QPTR alarm is operable.

1.3.2 Calculating the ratio at least once per 12 hours when the QPTR alarm is inoperable.

1.4 With one PR channel inoperable and power level above 75% RTP, core power distribution measurement information shall be used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR at least once per 12 hours.

2.0 SCOPE

2.1 This procedure fulfills the Surveillance Requirements of Technical Specifications SR 3.2.4.1 and SR 3.2.4.2.

2.2 This procedure satisfies the requirements of Technical Requirements Manual (TRM) TR 3.3.10 if the QPTR is determined with the Movable Incore Detector System.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 Control Room Operating Curves and Tables Reference Manual (Curve Book)

3.1.2 SYS SR-200, MOVABLE INCORE DETECTOR OPERATION

3.1.3 RXE 03-001, INCORE DATA REDUCTION AND ANALYSIS

INIT/DATE

3.1.4 STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT REDUCTION

3.1.5 PIR 2002-1086, Error in RCS unidentified leakage rate calculation

3.1.6 PIR 2003-3649, Static Buildup on Power Range Current Meter Faces

3.2 Commitments

3.2.1 None

4.0 PRECAUTIONS/LIMITATIONS

4.1 If the Incore Movable Detector System is used for QPTR determination, at least 75% of the thimbles (44 thimbles), with a minimum of two thimbles per core quadrant, are to be operable as required by TRM TR 3.3.10.

4.2 With one excore detector inoperable, the remaining three detectors shall be used for computing the average.

4.3 The recorded reactor power must be from the indication being used to control reactor power (i.e., the highest reading NI channel or the calorimetric).

4.4 STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT REDUCTION, shall be used for reduction of the Power Range Neutron Flux-High Trip Setpoints as required by Technical Specification 3.2.4, Required Action A.4.

5.0 TEST EQUIPMENT

5.1 None

6.0 ACCEPTANCE CRITERIA

6.1 QPTR shall not exceed 1.02.

7.0 PREREQUISITES

7.1 The Reactor is operating at a steady power level above 45% RTP for at least 10 minutes. ☑

7.2 IF Reactor Engineering personnel perform or verify this procedure, THEN they shall be qualified in accordance with ES9280113, QPTR Determination. N/A

8.0 PROCEDURE

8.1 Record the present reactor power level.

RJU157MA __________ MWT/35.65 = ______ % RTP

OR

Highest NI Channel **100** % RTP

8.2 Perform QPTR determination per the method of Section 8.3 or 8.4. Indicate method used.

> **NOTE**
>
> **With one power range channel inoperable and power level above 75% RTP, core power distribution measurement information shall be used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR at least once per 12 hours. This is done per Section 8.5. Section 8.5 is not a stand-alone method of QPTR monitoring. Section 8.5 may only be used to confirm QPTR determined in Section 8.3 or 8.4.**

* NPIS - Section 8.3 ☐

* NIS Current - Section 8.4 ☑

* Core Power Distribution Measurement - Section 8.5 ☐

8.3 NPIS - Tilting Factors Determination Of QPTR

8.3.1 Select Core Monitoring on an NPIS terminal. ☐

8.3.2 Select Tilting Factors. ☐

8.3.3 Record the following data:

	NIS N-41 (Q4)	NIS N-42 (Q2)	NIS N-43 (Q1)	NIS N-44 (Q3)
Upper Tilt	________	________	________	________
Lower Tilt	________	________	________	________

8.3.4 Record the maximum tilt.

QPTR = ___________

8.3.5 Perform ONE of the following:

*IF a core power distribution measurement is required, THEN proceed to Section 8.5, Core Power Distribution Measurement, ☐

OR

*IF a core power distribution measurement is NOT Required, THEN proceed to Section 8.6, Verification of QPTR within Limits. ☐

8.4 NIS Current Determination Of QPTR

8.4.1 Record the Normalization Factor for each of the upper (detector A) and lower (detector B) detectors from page 7.5 of the Curve Book (Reference 3.1.1).

	N41	N42	N43	N44
Upper (Detector A)	**0.9250**	**0.9900**	**1.0200**	**1.0650**
Lower (Detector B)	**0.9461**	**0.9602**	**1.0632**	**1.0304**

8.4.2 Use anti-static spray on the NIS detector current meters and clean with a cotton wipe. (3.1.6) ☑

8.4.3 Record NIS detector currents.

NIS detector currents (microamps)

	N41	N42	N43	N44
Upper (Detector A)	**260**	**250**	**275**	**255**
Lower (Detector B)	**255**	**225**	**260**	**240**

8.4.4 Normalize each of the detector currents recorded in 8.4.3 by dividing each current by the corresponding normalizing factor recorded in 8.4.1.

$$\frac{\text{Detector Current}}{\text{Normalization Factor}}$$

Normalized NIS currents (microamps)

	N41	N42	N43	N44
Upper (Detector A)	**281.081**	**252.525**	**269.608**	**239.437**
Lower (Detector B)	**269.528**	**234.326**	**244.545**	**232.919**

1. Calculate the average of the upper normalized currents.

(Upper)

$$\frac{\overset{N41}{\mathbf{281.081}} + \overset{N42}{\mathbf{252.525}} + \overset{N43}{\mathbf{269.608}} + \overset{N44}{\mathbf{239.437}}}{\mathbf{4}\ \text{(number of operable detectors)}}$$

Average Upper Normalized Current **260.663**

2. Calculate the average of the lower normalized currents.

(Lower)

$$\frac{\overset{N41}{\mathbf{269.528}} + \overset{N42}{\mathbf{234.326}} + \overset{N43}{\mathbf{244.545}} + \overset{N44}{\mathbf{232.919}}}{\mathbf{4}\ \text{(\# of operable detectors)}}$$

Average Lower Normalized Current **254.330**

8.4.5 Calculate the upper tilts by dividing each of the upper normalized currents in 8.4.4 by the average of the upper normalized currents in 8.4.4.1.

$$\frac{\text{Each upper Normalized Current}}{\text{Avg. of upper Normalized Currents}}$$

Upper Tilt Values

N41	N42	N43	N44
1.018	**0.969**	**1.012**	**0.919**

8.4.6 Calculate the lower tilts by dividing each of the lower normalized currents in 8.4.4 by the average of the lower normalized currents in 8.4.4.2.

$$\frac{\text{Each Lower Normalized Current}}{\text{Avg. Lower Normalized Currents}}$$

Lower Tilt Values

N41	N42	N43	N44
1.019	**0.958**	**0.996**	**0.949**

8.4.7 Record the maximum radial flux tilt.

QPTR = **1.019**

8.4.8 Calculation performed by: RO1 / Today

Qualification Required for Reactor Engineer: ES9280113

Calculation verified by: (3.1.5) RO2 / Today

Qualification Required for Reactor Engineer: ES9280113

8.4.9 Perform ONE of the following:

*<u>IF</u> a core power distribution measurement is required, <u>THEN</u> proceed to Section 8.5, Core Power Distribution Measurement, ☐

<u>OR</u>

*<u>IF</u> a core power distribution measurement is <u>NOT</u> Required, <u>THEN</u> proceed to Section 8.6, Verification of QPTR within Limits. ☑

8.5 Core Power Distribution Measurement

8.5.1 IF using the Moveable Incore Detectors, THEN

1. Perform a symmetric or full core flux map per SYS SR-200, MOVABLE INCORE DETECTOR OPERATION. ☐

2. Reduce and analyze flux map data per RXE 03-001, INCORE DATA REDUCTION AND ANALYSIS. ☐

3. IF a full core flux map was performed, THEN verify that at least 44 thimbles were used with a minimum of two detector thimbles per core quadrant. ____/____

4. IF a symmetric flux map was performed, THEN verify that only core locations C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8 were used. ____/____

5. Attach a copy of the detector plateaus. ☐

8.5.2 IF using the Power Distribution Monitoring System, THEN perform STS RE-021, BEACON POWER DISTRIBUTION MEASUREMENT. ☐

8.5.3 Record the following data:

	NIS N-43 (Q1)	NIS N-42 (Q2)	NIS N-44 (Q3)	NIS N-41 (Q4)
Radial Upper Flux Tilt	_______	________	________	________
Radial Lower Flux Tilt	_______	________	________	________

NOTE

Incore tilts at the time of the most recent excore detector QPTR normalization should be taken into account in this evaluation.

8.5.4 Confirm that the tilts recorded in the previous step are consistent with the indicated QPTR determined per this procedure. ____/____

8.6 Verification of QPTR within Limits

8.6.1 IF QPTR is less than or equal to 1.02, THEN restore system per SM/CRS direction. RO1 / Today

8.6.2 IF QPTR is greater than 1.02, THEN perform the following:

1. Refer to Technical Specification 3.2.4. ____/____
2. Contact Reactor Engineering. ____/____
3. Confirm the out-of-limit condition by verifying the method used and by performing other available methods per this surveillance. ____/____

9.0 RESTORATION

9.1 None.

10.0 RECORDS

10.1 The following QA records are generated by this procedure:

- Sections 7.0 and 8.0
- Incore detector plateaus (if Step 8.5.1 was used)
- Any calculations supporting Step 8.5.4 (if performed)

\- END -

WOLF CREEK
NUCLEAR OPERATING CORPORATION

STS RE-012

QPTR DETERMINATION

Responsible Manager

Manager Nuclear Engineering

Revision Number	12
Use Category	Reference
Administrative Controls Procedure	No
Management Oversight Evolution	No
Program Number	29

TABLE OF CONTENTS

INIT/DATE

1.0 PURPOSE

1.1 This procedure is used to determine the Quadrant Power Tilt Ratio (QPTR) and to verify QPTR is within acceptable limits.

1.2 This procedure is applicable in Mode 1 above 50% RTP.

1.3 The QPTR shall be determined to be within the limit above 50% RTP by:

NOTE

The QPTR alarm function is met if:

Annunciators 00-078B, PR UPPER DETECTOR FLUX DEV, AND 00-078C, PR LOWER DETECTOR FLUX DEV, are operable;

OR

Annunciator 00-079C, RPI DEV OR PR TILT, is operable.

1.3.1 Calculating the ratio at least once per 7 days when the QPTR alarm is operable.

1.3.2 Calculating the ratio at least once per 12 hours when the QPTR alarm is inoperable.

1.4 With one PR channel inoperable and power level above 75% RTP, core power distribution measurement information shall be used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR at least once per 12 hours.

2.0 SCOPE

2.1 This procedure fulfills the Surveillance Requirements of Technical Specifications SR 3.2.4.1 and SR 3.2.4.2.

2.2 This procedure satisfies the requirements of Technical Requirements Manual (TRM) TR 3.3.10 if the QPTR is determined with the Movable Incore Detector System.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 Control Room Operating Curves and Tables Reference Manual (Curve Book)

3.1.2 SYS SR-200, MOVABLE INCORE DETECTOR OPERATION

3.1.3 RXE 03-001, INCORE DATA REDUCTION AND ANALYSIS

INIT/DATE

3.1.4 STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT REDUCTION

3.1.5 PIR 2002-1086, Error in RCS unidentified leakage rate calculation

3.1.6 PIR 2003-3649, Static Buildup on Power Range Current Meter Faces

3.2 Commitments

3.2.1 None

4.0 PRECAUTIONS/LIMITATIONS

4.1 If the Incore Movable Detector System is used for QPTR determination, at least 75% of the thimbles (44 thimbles), with a minimum of two thimbles per core quadrant, are to be operable as required by TRM TR 3.3.10.

4.2 With one excore detector inoperable, the remaining three detectors shall be used for computing the average.

4.3 The recorded reactor power must be from the indication being used to control reactor power (i.e., the highest reading NI channel or the calorimetric).

4.4 STS IC-932, POWER RANGE NEUTRON HIGH FLUX TRIP SETPOINT REDUCTION, shall be used for reduction of the Power Range Neutron Flux-High Trip Setpoints as required by Technical Specification 3.2.4, Required Action A.4.

5.0 TEST EQUIPMENT

5.1 None

6.0 ACCEPTANCE CRITERIA

6.1 QPTR shall not exceed 1.02.

7.0 PREREQUISITES

7.1 The Reactor is operating at a steady power level above 45% RTP for at least 10 minutes. ☑

7.2 IF Reactor Engineering personnel perform or verify this procedure, THEN they shall be qualified in accordance with ES9280113, QPTR Determination. N/A

8.0 PROCEDURE

8.1 Record the present reactor power level.

RJU157MA __________ MWT/35.65 = ______ % RTP

OR

Highest NI Channel **100** % RTP

8.2 Perform QPTR determination per the method of Section 8.3 or 8.4. Indicate method used.

> **NOTE**
>
> **With one power range channel inoperable and power level above 75% RTP, core power distribution measurement information shall be used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR at least once per 12 hours. This is done per Section 8.5. Section 8.5 is not a stand-alone method of QPTR monitoring. Section 8.5 may only be used to confirm QPTR determined in Section 8.3 or 8.4.**

* NPIS - Section 8.3 ☐

* NIS Current - Section 8.4 ☑

* Core Power Distribution Measurement - Section 8.5 ☐

8.3 NPIS - Tilting Factors Determination Of QPTR

8.3.1 Select Core Monitoring on an NPIS terminal. ☐

8.3.2 Select Tilting Factors. ☐

8.3.3 Record the following data:

	NIS N-41 (Q4)	NIS N-42 (Q2)	NIS N-43 (Q1)	NIS N-44 (Q3)
Upper Tilt	________	________	________	________
Lower Tilt	________	________	________	________

8.3.4 Record the maximum tilt.

QPTR = ___________

8.3.5 Perform ONE of the following:

*IF a core power distribution measurement is required, THEN proceed to Section 8.5, Core Power Distribution Measurement, ☐

OR

*IF a core power distribution measurement is NOT Required, THEN proceed to Section 8.6, Verification of QPTR within Limits. ☐

8.4 NIS Current Determination Of QPTR

8.4.1 Record the Normalization Factor for each of the upper (detector A) and lower (detector B) detectors from page 7.5 of the Curve Book (Reference 3.1.1).

	N41	N42	N43	N44
Upper (Detector A)	**0.9250**	**0.9900**	**1.0200**	**1.0650**
Lower (Detector B)	**0.9461**	**0.9602**	**1.0632**	**1.0304**

8.4.2 Use anti-static spray on the NIS detector current meters and clean with a cotton wipe. (3.1.6) ☑

8.4.3 Record NIS detector currents.

NIS detector currents (microamps)

	N41	N42	N43	N44
Upper (Detector A)	**260**	**250**	**275**	**255**
Lower (Detector B)	**255**	**225**	**260**	**240**

8.4.4 Normalize each of the detector currents recorded in 8.4.3 by dividing each current by the corresponding normalizing factor recorded in 8.4.1.

$$\frac{\text{Detector Current}}{\text{Normalization Factor}}$$

Normalized NIS currents (microamps)

	N41	N42	N43	N44
Upper (Detector A)	**281.081**	**252.525**	**269.608**	**239.437**
Lower (Detector B)	**269.528**	**234.326**	**244.545**	**232.919**

1. Calculate the average of the upper normalized currents.

(Upper)

$$\frac{\overset{N41}{\mathbf{281.081}} + \overset{N42}{\mathbf{252.525}} + \overset{N43}{\mathbf{269.608}} + \overset{N44}{\mathbf{239.437}}}{\mathbf{4}}$$

(number of operable detectors)

Average Upper Normalized Current **260.663**

2. Calculate the average of the lower normalized currents.

(Lower)

$$\frac{\overset{N41}{\mathbf{269.528}} + \overset{N42}{\mathbf{234.326}} + \overset{N43}{\mathbf{244.545}} + \overset{N44}{\mathbf{232.919}}}{\mathbf{4}}$$

(# of operable detectors)

Average Lower Normalized Current **245.330**

8.4.5 Calculate the upper tilts by dividing each of the upper normalized currents in 8.4.4 by the average of the upper normalized currents in 8.4.4.1.

$$\frac{\text{Each upper Normalized Current}}{\text{Avg. of upper Normalized Currents}}$$

Upper Tilt Values

N41	N42	N43	N44
1.078	**0.969**	**1.034**	**0.919**

8.4.6 Calculate the lower tilts by dividing each of the lower normalized currents in 8.4.4 by the average of the lower normalized currents in 8.4.4.2.

$$\frac{\text{Each Lower Normalized Current}}{\text{Avg. Lower Normalized Currents}}$$

Lower Tilt Values

N41	N42	N43	N44
1.099	**0.958**	**0.996**	**0.949**

8.4.7 Record the maximum radial flux tilt.

QPTR = **1.099**

8.4.8 Calculation performed by: RO1 / Today

Qualification Required for Reactor Engineer: ES9280113

Calculation verified by: (3.1.5) RO2 / Today

Qualification Required for Reactor Engineer: ES9280113

8.4.9 Perform ONE of the following:

*IF a core power distribution measurement is required, THEN proceed to Section 8.5, Core Power Distribution Measurement, ☐

OR

*IF a core power distribution measurement is NOT Required, THEN proceed to Section 8.6, Verification of QPTR within Limits. ☑

8.5 Core Power Distribution Measurement

8.5.1 IF using the Moveable Incore Detectors, THEN

1. Perform a symmetric or full core flux map per SYS SR-200, MOVABLE INCORE DETECTOR OPERATION. ☐

2. Reduce and analyze flux map data per RXE 03-001, INCORE DATA REDUCTION AND ANALYSIS. ☐

3. IF a full core flux map was performed, THEN verify that at least 44 thimbles were used with a minimum of two detector thimbles per core quadrant. ____/_____

4. IF a symmetric flux map was performed, THEN verify that only core locations C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8 were used. ____/_____

5. Attach a copy of the detector plateaus. ☐

8.5.2 IF using the Power Distribution Monitoring System, THEN perform STS RE-021, BEACON POWER DISTRIBUTION MEASUREMENT. ☐

8.5.3 Record the following data:

	NIS N-43 (Q1)	NIS N-42 (Q2)	NIS N-44 (Q3)	NIS N-41 (Q4)
Radial Upper Flux Tilt	_______	________	________	________
Radial Lower Flux Tilt	_______	________	________	________

NOTE

Incore tilts at the time of the most recent excore detector QPTR normalization should be taken into account in this evaluation.

8.5.4 Confirm that the tilts recorded in the previous step are consistent with the indicated QPTR determined per this procedure. ____/_____

8.6 Verification of QPTR within Limits

8.6.1 IF QPTR is less than or equal to 1.02, THEN restore system per SM/CRS direction. N/A ____/____

8.6.2 IF QPTR is greater than 1.02, THEN perform the following:

1. Refer to Technical Specification 3.2.4. RO1 / Today
2. Contact Reactor Engineering. ____/____
3. Confirm the out-of-limit condition by verifying the method used and by performing other available methods per this surveillance. ____/____

3.2.4 condition A1, A2, A3, A4, A5, A6, A7

9.0 RESTORATION

9.1 None.

10.0 RECORDS

10.1 The following QA records are generated by this procedure:

- Sections 7.0 and 8.0
- Incore detector plateaus (if Step 8.5.1 was used)
- Any calculations supporting Step 8.5.4 (if performed)

- END -

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Approve containment purge permit for restart	JPM No.:	S.A.4
K/A Reference:	2.3.6 Ability to approve release permits. (3.8) 2.3.11 Ability to control radiation releases. (4.3)		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom	X	Simulator		Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	The Unit is in MODE 6 for a refueling outage. Health Physics has asked you to restart a containment purge that was previously stopped.
Task Standard:	Applicant determined the containment purge release permit can NOT be used based on the following: The permit has expired as of 04/11/2013 @ 0800 (written on form and per AP 07B-001 step 6.2.4.4). The noble gas reading of 5.06 e-6 μCi/cc is within the restart limit (4.4 e-6 X1.2 = 5.28 e-6 max) but 1.42 e-5 μCi/cc from GTG323 is over the limit for restart (1.14 e-5 X1.2 = 1.37 e-5 max).
Required Materials:	Completed containment purge release permit APF 07B-001-009, calculator.
General References:	AP 07B-001, rev 19 RADIOACTIVE RELEASES, AI 07B-024, rev 16 INSTRUCTIONS FOR CONTAINMENT PURGE PERMITS.
Handouts:	Completed containment purge release permit APF 07B-001-009, calculator

Initiating Cue:	You are the CRS. Review the containment purge permit to determine if a purge can be restarted using the same permit. Document ALL errors found AND your determination on the cue sheet or on the APF 07B-001-09, CONTAINMENT PURGE RELEASE PERMIT. The current date and time is 04/11/2013 @ 1400. Current containment atmospheric monitor readings from RM-11R are: GT RE-31, Containment Atmosphere Containment Particulate Channel, GTP311: 6.55 e-016 μCi/cc Containment Iodine Channel, GTI312: 3.12 e-015 μCi/cc Containment Noble Gas Channel, GTG313: 5.06 e-06 μCi/cc GT RE-32, Containment Atmosphere Containment Particulate Channel, GTP321: 6.33 e-012 μCi/cc Containment Iodine Channel, GTI322: 2.12 e-013 μCi/cc Containment Noble Gas Channel, GTG323: 1.42 e-05 μCi/cc
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk)

START TIME:_________

	Examiner NOTE:	A key has been provided with corrections highlighted in yellow.
	Performance Step: 1	Review the current APF 07B-001-09, CONTAINMENT PURGE RELEASE PERMIT, to determine if can be used to restart a purge.
	Standard:	Applicant reviewed the current APF 07B-001-09, CONTAINMENT PURGE RELEASE PERMIT, and determined it can NOT be used to restart a purge.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	The following steps can be completed in any order.
*	**Performance Step: 2** AP 07B-001 step 6.2.4.4 second asterisk	Determine if purge restart can be completed with the current permit based on expiration time.
	Standard:	Applicant determined the current permit has expired as of 04/11/2013 @ 0800.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	The following steps can be completed in any order.
*	**Performance Step: 3** AP 07B-001 step 6.2.4.6.b first bullet	Determine if purge restart can be completed with the current permit based on current gas concentration readings in containment.
	Standard:	Applicant determined the current reading from GTG313 was acceptable. 5.06 e-6 μCi/cc (limit of 5.28 e-6 μCi/cc) (4.4 e-6 X1.2 = 5.28 e-6 max)
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	The following steps can be completed in any order.
*	**Performance Step: 3** AP 07B-001 step 6.2.4.6.b first bullet	Determine if purge restart can be completed with the current permit based on current gas concentration readings in containment.
	Standard:	Applicant determined the current reading from GTG323 was not acceptable. 1.42 e-5 μCi/cc was to high for restart (limit of 1.37 e-5 μCi/cc) (1.14 e-5 X1.2 = 1.37 e-5 max)
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S.A.4
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

INITIAL CONDITIONS:	The Unit is in MODE 6 for a refueling outage. Health Physics has asked the CRS to restart a containment purge that was previously stopped.

INITIATING CUE:	You are the CRS. Review the containment purge permit to determine if a purge can be restarted using the same permit. Document ALL errors found AND your determination on the cue sheet or on the APF 07B-001-09, CONTAINMENT PURGE RELEASE PERMIT. The current date and time is 04/11/2013 @ 1400. Current containment atmospheric monitor readings from RM-11R are: GT RE-31, Containment Atmosphere Containment Particulate Channel, GTP311: 6.55 e-016 µCi/cc Containment Iodine Channel, GTI312: 3.12 e-015 µCi/cc Containment Noble Gas Channel, GTG313: 5.06 e-06 µCi/cc GT RE-32, Containment Atmosphere Containment Particulate Channel, GTP321: 6.33 e-012 µCi/cc Containment Iodine Channel, GTI322: 2.12 e-013 µCi/cc Containment Noble Gas Channel, GTG323: 1.42 e-05 µCi/cc

CONTAINMENT PURGE RELEASE PERMIT

Wolf Creek Nuclear Operating Corporation

GRP No. **2013123**
Date **04/04/2013 @ 0800**

K04-008

RELEASE CONDITIONS

Containment Atmosphere Activity				Containment Monitor Gas Reading	
Gas	**9.754 e-07** μCi/cc	Particulate	**N/A** μCi/cc	GTG313	**4.40 e-06** μCi/cc
Tritium	**1.118 e-06** μCi/cc	Iodine	**N/A** μCi/cc	GTG323	**1.14 e-05** μCi/cc

Expected Monitor Response (GTG 223/333): **5.40 e-06** μCi/cc
NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.

Containment Purge (GT RE-22/33)	SP056A Number GTG223/GTG333	High Setpoint (Channel Item 009)	Low Setpoint (Channel Item 010)
		1.0 e-03 μCi/cc	**3.81 e-05** μCi/cc

Containment Atmos. (GT RE-31/32)	SP056A Number GTG313/GTG323	High Setpoint (Channel Item 009)	Low Setpoint (Channel item 010)
		2.06 e-03 μCi/cc	**2.06 e-04** μCi/cc

SPECIAL INSTRUCTIONS

Initiate release prior to: (Date/Time) **04/04/2013** / **2000**
Permit Expiration (Date/Time) **04/11/2013** / **0800**
Comments:

AUTHORIZATION SECTION

Release Permit Initiated by: JJN / **04/04/2013** Chemistry Technician
Release Permit Verified by: JJJN / **04/04/2013** Chemistry Tech. or Supervisor

Check Source, per STN SP-001: LJN / **04/04/2013** Operator
Supervisor RM-80 Database Setpoints Entered by: LJN / **04/04/2013** Operator
Supervisor RM-80 Database Setpoints Verified by: LJN / **04/04/2013** Operator
Release Approved by: BJN / **04/04/2013** Shift Manager

RELEASE DATA:

	Time/Date		Time/Date
Exhaust Dampers OPENED	**1950 / 04/04/2013**	Exhaust Fan STARTED	**1950 / 04/04/2013**
Exhaust Dampers CLOSED	**0215 / 04/06/2013**	Exhaust Fan STOPPED	**0215 / 04/06/2013**
Supply Dampers OPENED	**N/A** / **N/A**	Supply Fan STARTED	**N/A** / **N/A**
Supply Dampers CLOSED	**N/A** / **N/A**	Supply Fan STOPPED	**N/A** / **N/A**
Mini-Purge Flow Rate=	**4206** cfm	Full Purge Flow Rate=	**0** cfm

GRP #_**2013123**______

NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.
Reading Restart
Limit
Cont. Atmos. Noble Gas Monitor * (GTG 313) _________μCi/cc ________Ci/cc

* (GTG 323) _________μCi/cc ________Ci/cc

Check Source, per STN SP-001: _______________/______Operator

Supervisor RM-80 Database Setpoints Entered by: _______________/______Operator

Supervisor RM-80 Database Setpoints Verified _______________/_______Operator
Release Approved by: _______________/_______Shift Manager

PART V RELEASE DATA: Date / Time Date / Time
Exhaust Dampers OPENED ______/______ Exhaust Fan STARTED ______/______
Exhaust Dampers CLOSED ______/______ Exhaust Fan STOPPED ______/______
Supply Dampers OPENED______/______ Supply Fan STARTED ______/______
Supply Dampers CLOSED______/______ Supply Fan STOPPED ______/______
Mini-Purge Flow Rate = ___________cfm Full Purge Flow Rate = ____________cfm

*If Noble Gas Monitor reading is greater than Restart Limit DO NOT restart the purge.
Contact Chemistry for sample required prior to restart.

CONTINUATION SHEET : CONTAINMENT PURGE

NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.
Reading Restart Limit
Cont. Atmos. Noble Gas Monitor * (GTG 313) _______ μCi/cc _______ μCi/cc

* (GTG 323) _______ μCi/cc _______ μ
Ci/cc

Check Source, per STN SP-001: ________________/______Operator

Supervisor RM-80 Database Setpoints Entered by: _______________/______Operator

Supervisor RM-80 Database Setpoints Verified _______________/______Operator
Release Approved by: _______________/______Shift Manager

PART V RELEASE DATA: Date / Time Date / Time
Exhaust Dampers OPENED ______/______ Exhaust Fan STARTED ______/______
Exhaust Dampers CLOSED ______/______ Exhaust Fan STOPPED ______/______
Supply Dampers OPENED______/______ Supply Fan STARTED ______/______
Supply Dampers CLOSED______/______ Supply Fan STOPPED ______/______
Mini-Purge Flow Rate = _____________cfm Full Purge Flow Rate = ____________cfm

*If Noble Gas Monitor reading is greater than Restart Limit DO NOT restart the purge.
Contact Chemistry for sample required prior to restart.

Release Packet Data Reviewed by Chemistry Supervisor or designee/Date:___________/______

CONTAINMENT PURGE RELEASE PERMIT

Wolf Creek Nuclear Operating Corporation

GRP No. **2013123**
Date **04/04/2013 @ 0800**

K04-008

RELEASE CONDITIONS

Containment Atmosphere Activity — Containment Monitor Gas Reading

Gas	**9.754 e-07** µCi/cc	Particulate	**N/A** µCi/cc	GTG313	**4.40 e-06** µCi/cc
Tritium	**1.118 e-06** µCi/cc	Iodine	**N/A** µCi/cc	GTG323	**1.14 e-05** µCi/cc

Expected Monitor Response (GTG 223/333): **5.40 e-06** µCi/cc

NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.

Containment Purge (GT RE-22/33)	SP056A Number GTG223/GTG333	High Setpoint (Channel Item 009)	Low Setpoint (Channel Item 010)
		1.0 e-03 µCi/cc	**3.81 e-05** µCi/cc

Containment Atmos. (GT RE-31/32)	SP056A Number GTG313/GTG323	High Setpoint (Channel Item 009)	Low Setpoint (Channel item 010)
		2.06 e-03 µCi/cc	**2.06 e-04** µCi/cc

SPECIAL INSTRUCTIONS

Initiate release prior to: (Date/Time) **04/04/2013** / **2000**
Permit Expiration (Date/Time) **04/11/2013** / **0800**
Comments:

AUTHORIZATION SECTION

Release Permit Initiated by: JJN / **04/04/2013** Chemistry Technician
Release Permit Verified by: JJJN / **04/04/2013** Chemistry Tech. or Supervisor

Check Source, per STN SP-001: LJN / **04/04/2013** Operator
Supervisor RM-80 Database Setpoints Entered by: LJN / **04/04/2013** Operator
Supervisor RM-80 Database Setpoints Verified by: LJN / **04/04/2013** Operator
Release Approved by: BJN / **04/04/2013** Shift Manager

RELEASE DATA:

	Time/Date		Time/Date
Exhaust Dampers OPENED	**1950 / 04/04/2013**	Exhaust Fan STARTED	**1950 / 04/04/2013**
Exhaust Dampers CLOSED	**0215 / 04/06/2013**	Exhaust Fan STOPPED	**0215 / 04/06/2013**
Supply Dampers OPENED	**N/A** / **N/A**	Supply Fan STARTED	**N/A** / **N/A**
Supply Dampers CLOSED	**N/A** / **N/A**	Supply Fan STOPPED	**N/A** / **N/A**
Mini-Purge Flow Rate=	**4206** cfm	Full Purge Flow Rate=	**0** cfm

GRP # **2013123**

NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.

Reading Restart Limit

Cont. Atmos. Noble Gas Monitor * (GTG 313) **5.06 e-06**µCi/cc **5.28 e-06**Ci/cc

* (GTG 323) **1.42 e-05**µCi/cc **1.37 e-05**Ci/cc

Check Source, per STN SP-001: ________________/_______Operator

Supervisor RM-80 Database Setpoints Entered by: ________________/_______Operator

Supervisor RM-80 Database Setpoints Verified ________________/________Operator
Release Approved by: ________________/________Shift Manager

PART V RELEASE DATA: Date / Time Date / Time
Exhaust Dampers OPENED ______/______ Exhaust Fan STARTED ______/______
Exhaust Dampers CLOSED ______/______ Exhaust Fan STOPPED ______/______
Supply Dampers OPENED______/______ Supply Fan STARTED ______/______
Supply Dampers CLOSED______/______ Supply Fan STOPPED ______/______
Mini-Purge Flow Rate = ____________cfm Full Purge Flow Rate = _____________cfm

*If Noble Gas Monitor reading is greater than Restart Limit DO NOT restart the purge. Contact Chemistry for sample required prior to restart.

CONTINUATION SHEET : CONTAINMENT PURGE

NOTE: Refer to Section 6.6 of SYS SP-121 for setpoint changes.

Reading Restart Limit

Cont. Atmos. Noble Gas Monitor * (GTG 313) ________ µCi/cc ________ µCi/cc

* (GTG 323) ________ µCi/cc ________ µCi/cc

Check Source, per STN SP-001: ________________/_______Operator

Supervisor RM-80 Database Setpoints Entered by: ________________/_______Operator

Supervisor RM-80 Database Setpoints Verified ________________/_______Operator
Release Approved by: ________________/_______Shift Manager

PART V RELEASE DATA: Date / Time Date / Time
Exhaust Dampers OPENED ______/______ Exhaust Fan STARTED ______/______
Exhaust Dampers CLOSED ______/______ Exhaust Fan STOPPED ______/______
Supply Dampers OPENED______/______ Supply Fan STARTED ______/______
Supply Dampers CLOSED______/______ Supply Fan STOPPED ______/______
Mini-Purge Flow Rate = _____________cfm Full Purge Flow Rate = _____________cfm

*If Noble Gas Monitor reading is greater than Restart Limit DO NOT restart the purge. Contact Chemistry for sample required prior to restart.

Release Packet Data Reviewed by Chemistry Supervisor or designee/Date:___________/_____

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Classify an Event	JPM No.:	S.A.5
K/A Reference:	2.4.41 Knowledge of the emergency action level thresholds and classifications. (4.6) 2.4.44 Knowledge of emergency plan protective action recommendations. (4.4)		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied. **This is a two-part JPM. Part 1: Classification. Part 2: Emergency Notification form.**

Initial Conditions:	You are the Shift Manager.
Task Standard:	Part 1: Upon completion of this JPM, the Applicant correctly completed classification within 15 minutes as to 2-SGTF 1,2,9,10,11 – SAE and documented on the cue sheet and Part 2: Accurately completed Blocks 1 thru 8 & 13 of the Emergency Notification Form key provided.
Required Materials:	APF 06-002-01 (rev 16), EMERGENCY ACTION LEVELS IC 30, File S-012

General References:	AP 06-002 (rev 14), RADIOLOGICAL EMERGENCY RESPONSE PLAN EPP 06-001 (rev 17), CONTROL ROOM OPERATIONS EPP 06-005 (rev 6), EMERGENCY CLASSIFICATION EPP 06-006 (rev 8), PROTECTIVE ACTION RECOMMENDATIONS APF 06-002-01 (rev 16), EMERGENCY ACTION LEVELS EPF 06-007-01 (rev 11), WCGS EMERGENCY NOTIFICATION 10 CFR 50, APPENDIX E 4 (CONTENT OF EMERGENCY PLAN), C. 2 NEI 99-02 (rev 6), REGULATORY ASSESSMENT PERFORMANCE INDICATOR GUIDELINE, Section 2.4, Emergency Preparedness Cornerstone
Handouts:	Notepad; APF 06-002-01, EMERGENCY ACTION LEVELS, EPP 06-006 , PROTECTIVE ACTION RECOMMENDATIONS
Initiating Cue:	Part 1: You will witness an event occur. You may take notes and use all references available to you in order to classify the event in accordance with the E-Plan. A minimal amount of operator actions, such as tripping the reactor, initiating safety injection, throttling AFW, etc, will occur automatically during the event. The simulator will freeze after sufficient time to classify the event has elapsed. The classification clock begins when plant conditions indicate that a classifiable event is in progress. NPIS is available for diagnosis. You will have a designated NPIS terminal to use for diagnosis. When Classification completed, provide the Examiner with your Classification Time for verification. Critical Safety Function Status Trees on NPIS are accurate unless the examiner informs you otherwise. Part 2: You are directed to accurately complete a hard copy Emergency Notification form.
Time Critical Task: (Yes or No)	Yes
Alternate Success Path: (Yes or No)	No
Validation Time:	15 minutes

Simulator Operator actions: IC-30 with horns off

When Examiner is ready: RUN Scenario File “S-012.scn”

```
;S-012
;MSIV "A" fails open
ICM vmodABHV0014 t:1
;Steam line break (loop A) outside CTMT
IMF mAB04A f:4e+006 d:120
;SGTR on SG A
IMF mBB02A f:700 r:30
; Trip RCPs @ 1400 psig
{bbp0403<1350} IMF mBB03A i:-1 f:-1
{bbp0403<1350} IMF mBB03B i:-1 f:-1
{bbp0403<1350} IMF mBB03C i:-1 f:-1
{bbp0403<1350} IMF mBB03D i:-1 f:-1
; Trip Rx
01:56.650 IOR P03016C f:0
01:56.700 IOR P03016A f:1
01:56.700 IOR P03016 f:1
01:57.650 IOR P03016A f:0
01:57.650 IOR P03016C f:1
01:57.650 IOR P03016 f:-1
; Initiate SI
01:59.650 IOR P01012A f:1
02:00.850 IOR P01012A f:0
02:01.950 IOR P01011A f:1
02:03.450 IOR P01011A f:0
; All Close MSIVs
02:27.700 IOR P06070A f:1
02:31.500 IOR P06070A f:0
; Isolate "A" AFW
02:49 ICM vmodALHV0008 t:4 f:0 d:0 r:0
02:49 ICM vmodALHV0007 t:4 f:0 d:0 r:0
; Throttle AFW to unaffected S/Gs
02:49 ICM vmodALHV0006 t:4 f:0 d:0 r:10
02:49 ICM vmodALHV0010 t:4 f:0 d:10 r:10
02:49 ICM vmodALHV0012 t:4 f:0 d:10 r:10
02:49 ICM vmodALHV0005 t:4 f:0.4 d:0 r:0
02:49 ICM vmodALHV0009 t:4 f:0.4 d:0 r:0
02:49 ICM vmodALHV0011 t:4 f:0.4 d:0 r:0
03:00 COR
17:00 Freeze
; End File
```

Floor actions: When the scenario file trips the Rx, initiates SI, closes the MSIVs and throttles AFW flow, then inform the Applicant that the crew tripped the Rx, initiated SI and all closed the MSIVs. Inform the candidates that “A” MSIV will not close. Inform the Applicants that AFW is throttled. When RCS pressure is < 1400 psig, then inform the Applicants that the crew has tripped the RCPs.

Announcements:

- ☐ Rx trip
- ☐ Safety Injection
- ☐ MSIVs closed
- ☐ MSIV ‘A’ will not close
- ☐ AFW throttled
- ☐ RCPs are tripped

Time 0 = _____________
T=0 when tube leakage exceeds 150 GPD as indicated by PZR level lowering.

(Denote Critical Steps with an asterisk)

START TIME:_________

	Examiner NOTE:	T=0 when tube leakage exceeds 150 GPD as indicated by PZR level lowering.
*	**Performance Step: 1**	Classify the event.
	Standard:	Applicant classified the event as 2-SGTF 1,2,9,10,11 – SAE within 15 minutes of T=0 and informed the Examiner.
	Cue:	When Applicant informs Examiner of classification inform Applicant “Complete emergency notification form” and provide the form and the cue sheet.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	For Release Data, if there is a Monitored **AND** Unmonitored Release in progress, **EITHER** can be marked on the form and be correct. Only **ONE** can be marked. Completed form has been provided for a key.
*	**Performance Step: 2**	Complete emergency notification form.
	Standard:	Applicant completed the Emergency Notification form, with the following attributes completed accurately: • Message Number – correct sequence • Emergency Classification – correct level • EAL Path – correct for event • Wind Direction • Wind Speed • Appropriate PAR for event • Release data – correct for conditions • Date and Time of Classification – correct for event • Actual or Drill appropriately indicated.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**NOTE:** Also ACCEPTABLE Met data: Wind speed = 10.2 mph From 29.2° towards 209.3°

Terminating Cue:	**JPM IS COMPLETE.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S.A.5
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
<u>Question Documentation:</u>	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the Shift Manager.

INITIATING CUE:	Part 1: You will witness an event occur. You may take notes and use all references available to you in order to classify the event in accordance with the E-Plan. A minimal amount of operator actions, such as tripping the reactor, initiating safety injection, throttling AFW, etc, will occur automatically during the event. The simulator will freeze after sufficient time to classify the event has elapsed. The classification clock begins when plant conditions indicate that a classifiable event is in progress. NPIS is available for diagnosis. You will have a designated NPIS terminal to use for diagnosis. When Classification completed, provide the Examiner with your Classification Time for verification. Critical Safety Function Status Trees on NPIS are accurate unless the examiner informs you otherwise. Part 2: You are directed to accurately complete a hard copy Emergency Notification form.

Part 1: When classification completed, fill in the time and show it to an Examiner.

Emergency Classification AND Time: _________________

1. For Examiner purpose – verify the following as completed.	
Classification time verified	
2. Once verified, return the Cue sheet and hand out the Emergency Notification form for completion.	

EPF 06-007-01, Rev 11 Key MESSAGE #: CR - 0 0 1

WOLF CREEK GENERATING STATION EMERGENCY NOTIFICATION

1. **STATUS**: ☐ ACTUAL
☒ DRILL

2. **CODE WORD** (County/State only): **Wildcat**

3. **TYPE**: ☒ IMMEDIATE (Steps 1-8, & 13)
☐ FOLLOWUP (All Steps)

4. **EMERGENCY CLASSIFICATION**:

TIME: **CT1** DATE: **Today**

☐ UNUSUAL EVENT ☐ ALERT ☒ SITE AREA
☐ GENERAL ☐ RECOVERY ☐ TERMINATION

5. **REASON FOR CLASSIFICATION**: (EAL)

☐ 1-RER ☒ 2-SGTF ☐ 3-LRCB
☐ 4-MSLB ☐ 5-FEF ☐ 6-LEP/AC
☐ 7-FHA ☐ 8-SSFM ☐ 9-LPC/SC
☐ 10-FR ☐ 11-NP ☐ 12-OH
☐ 13-ADM

EAL Flow Path: **1, 2, 9, 10, 11**

6. **METEOROLOGICAL DATA**: STABILITY CLASS: **D**

WIND: AT: **10** MPH, FROM: **29°** TOWARDS: **209°**

7. **RADIOLOGICAL RELEASE**: ☐ NONE
☒ MONITORED or ☒ UNMONITORED ☐ TERMINATED

8. **PROTECTIVE ACTION RECOMMENDATION**: ☐ NONE

TIME/DATE of PAR Only: /

☒ Evacuate CCL & JRR
☐ Evacuate Sub-zones ☐ Shelter Sub-zones

0 - 2 MILES: ☐ CTR
2 - 5 MILES: ☐ N-1 ☐ NE-1 ☐ E-1 ☐ SE-1
☐ S-1 ☐ SW-1 ☐ W-1 ☐ NW-1
5 -10 MILES: ☐ N-2 ☐ NE-2 ☐ NE-3 ☐ E-2
☐ SE-2 ☐ SE-3 ☐ SE-4 ☐ S-2
☐ SW-2 ☐ W-2 ☐ NW-2
> 10 MILES: ☐ DISTANCE FROM PLANT: ______ MILES

N/A

9. **CURRENT PLANT CONDITION**: ☐ IMPROVING ☐ STABILIZED ☐ DEGRADING TIME REACTOR TRIPPED ______

NOTE: N/A steps 10, 11, & 12 if Step 7, RADIOLOGICAL RELEASE, was marked NONE.

10. **FIELD TEAM DATA**: ☐ Not Available Time Collected: ______ At ______ Miles From CTMT =

______ mR/hr GAMMA, ______ (uCi/cc) IODINE, ______ (uCi/cc) PART.

11. **RELEASE RATE**: Release Start Time: ______ Estimated Total Release Time In Hours: ______

Data Collected (Time) ______ Release Rate = ______ Ci/Sec NOBLE GAS and ______ Ci/Sec RADIOIODINE

12. **CENTERLINE DOSES**: ☐ RAD MONITORING SYSTEM ☐ USAR SOURCE TERM ESTIMATE ☐ FIELD TEAM DATA

INTEGRATED DOSES PROJECTED:
RELEASE START TIME: ______
RELEASE STOPPED TIME: ______

	EAB	2 MI	5 MI	10 MI
TEDE (REM)				
THYROID (REM)				

COMMENTS: [Commitment Step 3.2.1] **Key for SA5**

13. **APPROVAL**: **Signature** / **Shift Manager** **Today**
Signature Title Date

(FOR WCNOC USE ONLY)	PRIMARY CONTACT	ALTERNATE CONTACTS		PERSON/TIME
KANSAS DIVISION OF EMERGENCY MANAGEMENT	785-296-3176 LEAVE MESSAGE	STATE RADIO	STATE EOC ACTIVATED 785-274-1422	
COFFEY COUNTY SHERIFF	620-364-2123	STATION RADIO	KHP 785-827-4437	
NRC RESIDENT INSPECTOR	OFFICE EXT. 4574	SN. RESIDENT RESIDENT REG. IV BRANCH	Cell: 620-203-8032 Cell: 785-338-0668 Cell: 817-320-2422	
TOPEKA SYSTEM DISPATCH	785-575-6078			
ANI (ALERT OR HIGHER)	877-680-2644			
INPO (ALERT OR HIGHER)	800-321-0614			

CHEMISTRY/OPERATIONS ACTION FORM

K04-014

APF 02-003-01-01

COAF #: 064800

Chemistry Action Required:

Please run the CVCS cation bed for 40 minutes at 120 gpm letdown.

Requested By: Chemist

Date/Time: today / earlier

Chemistry Action Taken:

Person Performing Action: Applicant

Responsible Shift Manager: Shift Manager

Date/Time Action Taken: ____________________

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	<u>Place cation bed demineralizer in service</u>	JPM No.:	<u>P1</u>
K/A Reference:	076 AK3.06 Knowledge of reasons for the following responses as they apply to the High Reactor Coolant Activity: Actions contained in EOP for high reactor coolant activity. 3.2/3.8 076 AA2.02 Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: Corrective actions required for high fission product activity in RCS. 2.8/3.4		

Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	

<u>Method of testing:</u>

Simulated Performance:	X		Actual Performance:		
Classroom		Simulator		Plant	X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the spare Reactor Operator. The plant is in MODE 1 with the Normal Charging Pump (NCP) inservice. The Control Room is performing OFN BB-006, HIGH REACTOR COOLANT ACTIVITY. Chemistry Operations Action Form is in the Control Room requesting the cation bed demineralizer is placed into service.
Task Standard:	The Applicant placed the cation bed demineralizer in service per section 6.1 of SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN.
Required Materials:	SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN
General References:	SYS BG-202, rev 27, OPERATION OF THE CVCS CATION BED DEMIN.
Handouts:	SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN

Initiating Cue:	Per OFN BB-006, HIGH REACTOR COOLANT ACTIVITY, step 6c, the Control Room Supervisor directs you to place the cation bed demineralizer into service by performing section 6.1 of SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN. The prerequisites have been completed. COAF generated by Chemistry – run the CVCS cation bed for 40 minutes at 120 gpm letdown. The cation bed demineralizer has previously been used and RCS boron concentration has not changed more than 20 ppm since the last time the bed has been inservice. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	No
Validation Time:	25 minutes

(Denote Critical Steps with an asterisk)
Examiner NOTE: Provide the Information Only copy of SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN to Applicant.

START TIME:_________

	Examiner NOTE:	**SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN, section 6.1, Placing Cation Bed Demineralizer Inservice. Pay attention to Rad Postings.**
	Performance Step: 1 6.1.1	(ρ) IF any of the following conditions exist, THEN adjust boron concentration of the Cation Bed in accordance with section 6.3, prior to placing inservice. ∗ Cation bed demin is new and has not been borated to current RCS boron concentration ∗ RCS boron concentration has changed more than 20 ppm since the last time that the Cation Bed demin was inservice
	Standard:	Applicant recognized from the initiating cue that this step is NA.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 6.1.2	Ensure CATION BED DEMIN INLET ISOLATION valve is open. • BG-8516 – OPEN
	Standard:	Applicant located valve BG-8516 in the filter gallery, 2000' Auxiliary Building, on the upper deck level, northeast corner. Applicant checked the reach rod position indicator in the open position and/or the handwheel did not turn in the counter clockwise direction.
	Cue:	If needed: The handwheel will not turn in the counter clockwise direction.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 3** 6.1.3	Open CATION BED DEMIN OUTLET ISOLATION valve. • BG-8518 – OPEN
	Standard:	Applicant located valve BG-8518 in the valve cubicle, northeast side. Applicant opened the valve by turning the handwheel in the Counter Clockwise (CCW) direction.
	Cue:	CCW direction cue: handwheel is turning. When valve open: handwheel stops movement in CCW direction If Clockwise (CW) direction cue: handwheel does not turn.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE	Applicant may go down to the 2000' level, inside the Mixed bed FBG03B valve room, and verify the globe valve stem is in the down position.
*	**Performance Step: 4** 6.1.4	Close MIXED BED DEMIN COMBINED OUTLET VALVE. • BG-8514 – CLOSED
	Standard:	Applicant located BG-8514 in the filter gallery, upper deck, northeast center. Applicant closed the reach rod valve by turning the handwheel in the Clockwise (CW) direction. Applicant verified the position indicator in the closed position.
	Cue:	CW direction cue: handwheel is turning. When valve closed: handwheel stops movement in CW direction. If Counter Clockwise (CCW) direction cue: handwheel does not turn.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**NOTE: Flow read at BG FI-136 should correspond to Letdown flow as read on BG FI-132 in the Control Room.**
	Performance Step: 5 6.1.5.1	Record the following data: 1. Time Cation Bed placed inservice. Time: ___________________
	Standard:	Applicant recorded time.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 6.1.5.2	Record the following data: 2. Local Cation Bed flow. • BG FI-136 flow ____________________
	Standard:	Applicant located flow meter BG FI-136 on the south wall of the hallway outside filter alley, left of the normal entrance door. Applicant recorded flow.
	Cue:	At BG FI-136, using a pen/stylus, indicate ~120 gpm on meter.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 7 6.1.5.3	Record the following data: 3. Cation Bed dP. • BG PDI-135 dP _________________
	Standard:	Applicant located BG PDI-135 on the left side of the normal entrance door to filter alley, on the 2000' level of the Auxiliary Building. Applicant recorded dP.
	Cue:	At BG PDI-135, using a pen/stylus, indicate ~9 psid.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**CAUTION: Normal letdown flow to demineralizers is a nominal 120 gpm with a maximum inlet temperature is 130°F. In Modes 5, 6 or defueled, letdown flow may be increased up to 130 gpm, as long as the dP across the demineralizer bed is frequently monitored to ensure it does not exceed 25 psid.**
	Performance Step: 8 6.1.6	Contact the Control Room to verify Letdown Heat Exchanger Outlet Flow less than or equal to 130 gpm and to inform them of the time the cation bed was placed inservice.
	Standard:	Applicant communicated with the Control Room. 1. Requested verification that letdown heat exchanger outlet flow is less than or equal to 130 gpm. 2. Reported the time the cation bed was placed inservice.
	Cue:	1. Letdown heat exchanger outlet flow is 120 gpm. 2. Acknowledge report (time the cation bed placed into service).
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 9 6.1.7	Section 6.1, Placing Cation Bed Demineralizer Inservice, complete.
	Standard:	Applicant initialed and dated step.
	Cue:	JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. Section 6.1, Placing Cation Bed Demineralizer Inservice, complete.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	P1
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the spare Reactor Operator. The plant is in MODE 1 with the Normal Charging Pump (NCP) inservice. The Control Room is performing OFN BB-006, HIGH REACTOR COOLANT ACTIVITY. Chemistry Operations Action Form is in the Control Room requesting the cation bed demineralizer is placed into service.

INITIATING CUE:	Per OFN BB-006, HIGH REACTOR COOLANT ACTIVITY, step 6c, the Control Room Supervisor directs you to place the cation bed demineralizer into service by performing section 6.1 of SYS BG-202, OPERATION OF THE CVCS CATION BED DEMIN. The prerequisites have been completed. COAF generated by Chemistry – run the CVCS cation bed for 40 minutes at 120 gpm letdown. The cation bed demineralizer has previously been used and RCS boron concentration has not changed more than 20 ppm since the last time the bed has been inservice. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Natural Circ – depressurize inactive steam generator	JPM No.:	P2
K/A Reference:	E09 EA1.3 Ability to operate and/or manipulate the following as they apply to the Natural Circulation Operations: Desired operating results during abnormal and emergency situations. 3.5/3.8		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:	X		Actual Performance:		
Classroom		Simulator		Plant	X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the spare Reactor Operator. Unit is performing a natural circ cooldown per EMG ES-04, NATURAL CIRCULATION. Steam Generator ‘B’ is inactive and must be depressurized. Steam Generator ‘B’ Atmospheric Relief Valve (ARV) was manually opened from the Control Room and ALL steam paths were previously isolated per Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, steps D1 through D7. The TDAFW pump is operating.
Task Standard:	Applicant locally opened MSIV bypass valve (AB HV-18) and Main Steam Loop 2 to AFW Pump Turb HV-5 Inlet Iso valve, AB-V085, in order to depressurize inactive Steam Generator ‘B’.
Required Materials:	EMG ES-04, rev 16, NATURAL CIRCULATION
General References:	EMG ES-04, NATURAL CIRCULATION
Handouts:	EMG ES-04, NATURAL CIRCULATION, Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, step D8

Initiating Cue:	The Control Room Supervisor directs you to perform EMG ES-04, NATURAL CIRCULATION, Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, step D8 for Steam Generator ‘B’. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	30 minutes

(Denote Critical Steps with an asterisk)
Examiner NOTE: Provide the Information Only copy of EMG ES-04, NATURAL CIRCULATION, Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, step D8, to Applicant.

START TIME:_________

	Examiner NOTE:	**EMG ES-04, NATURAL CIRCULATION, Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, step D8.** **AB-V040 is a normally locked open valve. For purposes of this JPM, AB-V040 was closed – recall Initial Conditions.** **NOTE prior to step D8 does not apply.**
	Performance Step: 1 D8. a. second asterisk **Alternate Path Step**	Check S/G ARVs Will Be Used To Decrease Inactive Loop(s) S/G Pressure: a. Ensure S/G ARV local isolation valve is open. ∗ AB-V040 For S/G B (MAIN STEAM ENCLOSURE ABOVE GRATING).
	Standard:	Applicant located AB-V040 in Main Steam Enclosure Room above the grating. Applicant rotated handwheel in Counter clockwise (CCW) direction to open AB-V040. After cue: Transitioned to RNO column.
	Cue:	Handwheel does not move in CCW direction.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 2** D8. RNO 1. second asterisk	Perform the following: 1. IF using a MSIV Bypass Valve, THEN locally open: ∗ AB HV-18 (MAIN STEAM ENCLOSURE ABOVE GRATING)
	Standard:	Applicant located AB HV-18 in Main Steam Enclosure Room above the grating. Applicant removed locking tabs. Applicant rotated handwheel in Counter clockwise (CCW) direction to open AB HV-18.
	Cue:	Locking Tabs removed, Handwheel rotates in CCW direction.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**There is position indication on the (North) back side.**

	Examiner NOTE:	**AB-V085 is a normally locked open valve. For purposes of this JPM, AB-V085 was closed – recall Initial Conditions.**
*	**Performance Step: 3** D8. RNO 2. first asterisk	IF the TDAFW is running AND RCS Loop(s) B or C are inactive AND require depressurization, THEN locally open: ∗ AB-V085 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING)
	Standard:	Applicant located AB-V085 in Main Steam Enclosure Room below the grating. Applicant rotated handwheel in Counter clockwise (CCW) direction to open AB-V085.
	Cue:	Handwheel rotates in CCW direction, stem is rising.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4	Applicant notifies Control Room that Attachment D, step D8 (D8 RNO) is complete.
	Standard:	Applicant notified Control Room that AB HV-18, MSIV Bypass Valve and AB-V085, Main Steam Loop 2 to AFW Pump Turb HV-5 Inlet Iso valve, have been opened.
	Cue:	Acknowledge report.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. Reported to Control Room acknowledged AB HV-18 and AB-V085 are opened – Attachment D, step D8 completed.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	P2
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

JPM CUE SHEET

INITIAL CONDITIONS:	You are the spare Reactor Operator. Unit is performing a natural circ cooldown per EMG ES-04, NATURAL CIRCULATION. Steam Generator 'B' is inactive and must be depressurized. Steam Generator 'B' Atmospheric Relief Valve (ARV) was manually opened from the Control Room and ALL steam paths were previously isolated per Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, steps D1 through D7. The TDAFW pump is operating.

INITIATING CUE:	The Control Room Supervisor directs you to perform EMG ES-04, NATURAL CIRCULATION, Attachment D, INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING, step D8 for Steam Generator 'B'. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D
(Page 1 of 6)
INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

D1.	**Check Initial Isolation Or Isolation After Steaming Of Inactive Loop(s)- Required**	Go to step D8.

FOLDOUT PAGE FOR EMG ES-04

1. **SI ACTUATION CRITERIA**
   IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:
   * RCS Subcooling - LESS THAN 30°F
   OR
   * Pressurizer Level - CANNOT BE MAINTAINED GREATER THAN 6%

2. **AFW SUPPLY SWITCHOVER CRITERIA**
   IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

ATTACHMENT D
(Page 2 of 6)

INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
D2.	**Isolate Main Steamlines Associated With Inactive Loop(s):**	
	a. Ensure Main Steamline Isolation Valve(s) - CLOSED * AB HIS-14 For S/G A * AB HIS-17 For S/G B * AB HIS-20 For S/G C * AB HIS-11 For S/G D	a. In SA075A OR SA075B, disconnect A and B solenoid fuses (4 fuses total) for the affected valve(s): * Fuses for AB HV-14 * Fuses for AB HV-17 * Fuses for AB HV-20 * Fuses for AB HV-11
	b. Ensure Main Steamline Isolation Bypass Valves - CLOSED o AB ZL-15A For S/G A o AB ZL-18A For S/G B o AB ZL-21A For S/G C o AB ZL-12A For S/G D	b. Perform the following:. 1) Ensure MS ISO BYPASS VLVS CTRL is in MAN with 0% output. o AB HIK-15 - MAN/0% OUTPUT 2) IF ALL MSIV Bypass Valves are NOT closed, THEN locally close: * AB HV-15 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-18 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-21 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-12 (MAIN STEAM ENCLOSURE ABOVE GRATING)

FOLDOUT PAGE FOR EMG ES-04

1. **SI ACTUATION CRITERIA**
   IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:
   * RCS Subcooling - LESS THAN 30°F
   OR
   * Pressurizer Level - CANNOT BE MAINTAINED GREATER THAN 6%

2. **AFW SUPPLY SWITCHOVER CRITERIA**
   IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

ATTACHMENT D
(Page 3 of 6)

INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Ensure Main Steamline Low Point Drain Valve(s) - CLOSED * AB HIS-9 For S/G A * AB HIS-8 For S/G B * AB HIS-7 For S/G C * AB HIS-10 For S/G D	c. Locally isolate main steamline low point drain valve(s). * Close AB-V062 For S/G A (MAIN STEAM ENCLOSURE BELOW GRATING) * Close AB-V072 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING) * Close AB-V082 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING) * Close AB-V052 For S/G D (MAIN STEAM ENCLOSURE BELOW GRATING)
D3.	**Check S/G ARV Associated With RCS Inactive Loop - CLOSED**	Perform the following: a. IF S/G ARV is open to automatically control S/G pressure, THEN go to step D4. b. IF S/G ARV is NOT closed, THEN place ARV controller in manual and close ARV. c. IF S/G ARV can NOT be closed, THEN locally isolate ARV. * AB-V018 For S/G A (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V040 For S/G B (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V029 For S/G C (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V007 For S/G D (MAIN STEAM ENCLOSURE ABOVE GRATING).

FOLDOUT PAGE FOR EMG ES-04

1. **SI ACTUATION CRITERIA**
   IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:
   * RCS Subcooling - LESS THAN 30°F
     OR
   * Pressurizer Level - CANNOT BE MAINTAINED GREATER THAN 6%

2. **AFW SUPPLY SWITCHOVER CRITERIA**
   IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT D
(Page 4 of 6)
INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

D4.	**Check RCS Loops B or C - INACTIVE**	Go to step D5.
	a. Locally close steam supply to Turbine Driven AFW Pump from inactive loops. * AB-V085 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING * AB-V087 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING	

FOLDOUT PAGE FOR EMG ES-04

1. **SI ACTUATION CRITERIA**
   IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:
   * RCS Subcooling - LESS THAN 30°F
   OR
   * Pressurizer Level - CANNOT BE MAINTAINED GREATER THAN 6%

2. **AFW SUPPLY SWITCHOVER CRITERIA**
   IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

ATTACHMENT D
(Page 5 of 6)
INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
D5.	**Verify Blowdown, Lower, And Upper Sampling Isolated On RCS Inactive Loop(s):** a. S/G Blowdown Containment Isolation Valves - CLOSED * BM HIS-1A For S/G A * BM HIS-2A For S/G B * BM HIS-3A For S/G C * BM HIS-4A For S/G D b. S/G Upper Sample Isolation Valves - CLOSED * BM HIS-19 For S/G A * BM HIS-20 For S/G B * BM HIS-21 For S/G C * BM HIS-22 For S/G D c. S/G Lower Sample Isolation Valves - CLOSED * BM HIS-35 For S/G A * BM HIS-36 For S/G B * BM HIS-37 For S/G C * BM HIS-38 For S/G D	Perform the following: 1. Manually close the valve(s). 2. <u>IF</u> affected S/G Blowdown Containment Isolation Valves is <u>NOT</u> closed, <u>THEN</u> locally isolate the line: * BM-V002 for S/G A (MAIN STEAM ENCLOSURE) * BM-V013 for S/G B (MAIN STEAM ENCLOSURE) * BM-V024 for S/G C (MAIN STEAM ENCLOSURE) * BM-V035 for S/G D (MAIN STEAM ENCLOSURE) 3. <u>IF</u> all S/G Lower AND Upper Isolation Valves are <u>NOT</u> closed, <u>THEN</u> ensure one or both of the following valves are closed: * BM HIS-65 AND/OR BM HIS-5 For S/G A * BM HIS-66 AND/OR BM HIS-6 For S/G B * BM HIS-67 AND/OR BM HIS-7 For S/G C * BM HIS-68 AND/OR BM HIS-8 For S/G C
D6.	**Maintain RCS Cooldown In RCS Cold Legs Less Than Maximum Allowable Limits Of FIGURE 2, C/D RATE AS A FUNCTION OF DECAY HEAT/ACTIVE LOOP ΔT.**	
D7.	**Return To Procedure And Step In Effect.**	

FOLDOUT PAGE FOR EMG ES-04

1. **SI ACTUATION CRITERIA**
   IF either condition listed below occurs, THEN actuate SI and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1:
   * RCS Subcooling - LESS THAN 30°F
   OR
   * Pressurizer Level - CANNOT BE MAINTAINED GREATER THAN 6%

2. **AFW SUPPLY SWITCHOVER CRITERIA**
   IF CST suction pressure decreases to less than 2.6 psig, THEN switch to alternate AFW suction supply.

ATTACHMENT D
(Page 6 of 6)
INACTIVE LOOP STEAM PATH ISOLATION AND STEAMING

NOTE

If any of the MSIV Bypass valves are manually opened in Mode 3, refer to Technical Specification 3.7.2 Condition H.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
D8.	**Check S/G ARVs Will Be Used To Decrease Inactive Loop(s) S/G Pressure:** a. Ensure S/G ARV local isolation valve is open. * AB-V018 For S/G A (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V040 For S/G B (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V029 For S/G C (MAIN STEAM ENCLOSURE ABOVE GRATING). * AB-V007 For S/G D (MAIN STEAM ENCLOSURE ABOVE GRATING). b. Use S/G ARVs In Manual * AB PIC-1A for S/G A * AB PIC-2A for S/G B * AB PIC-3A for S/G C * AB PIC-4A for S/G D	Perform the following: 1. IF using a MSIV Bypass Valve, THEN locally open: * AB HV-15 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-18 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-21 (MAIN STEAM ENCLOSURE ABOVE GRATING) * AB HV-12 (MAIN STEAM ENCLOSURE ABOVE GRATING) 2. IF the TDAFP is running AND RCS Loop(s) B or C are inactive AND require depressurization, THEN locally open: * AB-V085 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING * AB-V087 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING
D9.	**Return To Procedure And Step In Effect.**	

-END-

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Align 120VAC vital bus to SOLA transformer	JPM No.:	P3
K/A Reference:	057 AK3.01 Knowledge of the reasons for the following responses as they apply to the Loss of Vital AC Instrument Bus: Actions contained in EOP for loss of vital ac electrical instrument bus. 4.1/4.4		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:	X		Actual Performance:		
Classroom		Simulator		Plant	X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are a spare Reactor Operator. The Plant is in MODE 3 with all items for entering MODE 2 complete. Annunciators “NN02 INST BUS UV” and “NN12 INV UV” are in alarm. The Reactor Operator has verified from OFN NN-021, LOSS OF 120 VAC INSTRUMENT BUS, that bus NN02 is de-energized.
Task Standard:	Applicant re-energized bus NN02 from the backup transformer (SOLA transformer) per steps B4 and B5 of OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, Attachment B, LOSS OF VITAL INSTRUMENT BUS NN02 (WHITE TRAIN).
Required Materials:	OFN NN-021, rev 19 LOSS OF VITAL 120 VAC INSTRUMENT BUS
General References:	OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS
Handouts:	OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, Attachment B, LOSS OF VITAL INSTRUMENT BUS NN02 (WHITE TRAIN)

Initiating Cue:	The Control Room Supervisor directs you to locally restore power to BUS NN02 using OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, using steps B4 and B5. Contact the Control Room when task is complete. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	25 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copy of OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, Attachment B, LOSS OF VITAL INSTRUMENT BUS NN02 (WHITE TRAIN), to the Applicant.

START TIME:_________

	Examiner NOTE:	**OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, Attachment B, LOSS OF VITAL INSTRUMENT BUS NN02 (WHITE TRAIN)**
	Performance Step: 1 B4.a.	Locally Restore Normal Power To Bus NN02: a. Check NN02 Bus – NO APPARENT DAMAGE
	Standard:	At NN02, 2016' level of the Control Building, Applicant checked for indication physical damage (e.g. visual charring damage, odor of smoke or heat).
	Cue:	No damage is evident and no odor of smoke or heat exists.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Steps B1, B2 and B3 performed by Control Room.**

	Performance Step: 2 B4.b. **Alternate Path Step**	Check inverter NN12 output voltage – NORMAL
	Standard:	Applicant located inverter output voltmeter on NN12. Applicant determined voltmeter indicated 0 (NOT NORMAL). Applicant transitioned to RNO column.
	Cue:	At NN12, using a pen/stylus, inverter output voltmeter indicates ~0 volts. (or state 0 volts)
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 B4 RNO b.	Go to step B5.
	Standard:	Applicant transitioned to step B5.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 4** B5.a.	Align Backup Power TO Bus NN02: a. Close backup transformer XNN06 power supply breaker. • NG02AFF3
	Standard:	Applicant located NG02AFF3, 2000’ level of Control Building. Applicant rotated the operator up to the ON position to close the breaker.
	Cue:	At NG02AFF3, using a pen/stylus, operator indicates the ON position. (or state ON position)
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**If asked current breaker status BEFORE manipulation, Using the pen/stylus, breaker operator indicates OFF position.**

	Performance Step: 5 B5.b.	Verify Backup Power Available White Light – LIT
	Standard:	At NN02, 2016’ level of the Control Building, Applicant determined White light LIT.
	Cue:	At NN02, White light LIT.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Turbine Building watch normally carries the key. A spare key is also located in the Shift Manager's key box.**
*	**Performance Step: 6** B5.c.	Open Normal Feeder Breaker. • NN0201
	Standard:	Applicant turned circuit breaker to OFF position to open breaker.
	Cue:	Using the pen/stylus, breaker operator indicates OFF position. (or state OFF position)
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**An alternate method to perform this task is to install the interlock key into the lock mechanism, rotate the key, and then slide the slider bar from NN0202 to NN0201. This action opens NN0201 breaker. It does not Close NN0202.**

	Examiner NOTE:	**Turbine Building watch normally carries the key. A spare key is also located in the Shift Manager's key box.**
	Examiner NOTE:	**Applicant may contact Control Room prior to closing the Alternate Feeder Breaker. If contacted, acknowledge report.**
*	**Performance Step: 7** B5.d.	Close Alternate Feeder Breaker. • NN0202
	Standard:	Applicant located key for the key interlock. Applicant installed the interlock key into the lock mechanism and rotated. *****Applicant moved the slider bar from NN0202 to NN0201. *****Applicant turned circuit breaker to ON for NN0202 to close breaker.
	Cue:	If needed: Key in hand. If needed: Key in mechanism. Using the pen/stylus, breaker operator indicates ON position. (or state ON position)
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 8	Applicant contacts Control Room to inform them that steps B4 and B5 are complete. Bus NN02 is energized from the SOLA transformer (backup transformer).
	Standard:	Applicant contacted Control Room and informed of NN02 status.
	Cue:	Acknowledge report. JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. Bus NN02 re-energized from the backup transformer (SOLA transformer).**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	P3
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

JPM CUE SHEET

INITIAL CONDITIONS:	You are a spare Reactor Operator. The Plant is in MODE 3 with all items for entering MODE 2 complete. Annunciators “NN02 INST BUS UV” and “NN12 INV UV” are in alarm. The Reactor Operator has verified from OFN NN-021, LOSS OF 120 VAC INSTRUMENT BUS, that bus NN02 is de-energized.

INITIATING CUE:	The Control Room Supervisor directs you to locally restore power to BUS NN02 using OFN NN-021, LOSS OF VITAL 120 VAC INSTRUMENT BUS, using steps B4 and B5. Contact the Control Room when task is complete. Do not operate any components in the plant. Upon arrival at a component, describe what you expect to see, what you expect to do and what you expect to happen.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Control Rod parking – dropped control rod	JPM No.:	S1
K/A Reference:	001 A2.11: Ability to (a) predict the impacts of the following malfunctions or operations on the CRDS and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Situations requiring a reactor trip. 4.4/4.7 003 AA1.03: Ability to operate an/or monitor the following as they apply to the Dropped Control Rod: Rod control switches. 3.6/3.3		

Examinee:			NRC Examiner:			
Facility Evaluator:			Date:			
Method of testing:						
Simulated Performance:			Actual Performance:	X		
Classroom		Simulator	X	Plant		

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. Unit is in MODE 1. STN SF-001, CONTROL ROD PARKING, is being performed. STS SF-001, CONTROL AND SHUTDOWN ROD OPERABILITY VERIFICATION, is not being performed in conjunction with this procedure. Flushes for Shutdown Banks ‘A’ through ‘E’ have been performed. Control Rod park position is not being changed.
Task Standard:	Applicant manipulated ROD BANK AUTO/MAN SEL, SE HS-9, from position CBA to MAN, stopping uncontrolled Control Bank ‘A’ insertion.

Required Materials:	STN SF-001, CONTROL ROD PARKING Simulator Operator Instructions: IC 30, 100% power. Ensure switch SE HS-9 in AUTO position. Ensure both files (S1 1 and rod-motion 2) have been loaded into the Simulator file directory. Run S1 1.scn file. SIMULATOR OPERATOR: Insert Key 1 prior to performance of the third flush. ;S1 1 file: {Key[1]} scn rod-motion 2 Rod-motion 2 file: ; uncontrolled rod motion when stepped in {x03i115i} IMF mSF06B f:0
General References:	STN SF-001, rev 16, CONTROL ROD PARKING, AP 15C-003, rev 29, PROCEDURE USER'S GUIDE FOR ABNORMAL PLANT CONDITIONS (step 6.1.7)
Handouts:	STN SF-001, CONTROL ROD PARKING
Initiating Cue:	The Control Room Supervisor directs you to flush Control Bank 'A' per step 8.1.1.6 of STN SF-001, CONTROL ROD PARKING. All prerequisites have been met.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	No
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copy of STN SF-001, CONTROL ROD PARKING, to the Applicant.

START TIME:_________

	Examiner NOTE:	**STN SF-001, CONTROL ROD PARKING, step 8.1.1.6**
*	**Performance Step: 1** 8.1.1.6.a.1	Perform the following to flush Control Bank A: a. Perform the first flush for Control Bank A per the following: 1) Position ROD BANK AUTO/MAN SEL switch to Control Bank A. • SE HS-9 – CONTROL BANK A
	Standard:	Applicant manipulated SE HS-9 from AUTO (right) to CBA position.
	Cue:	If needed: Acknowledge manipulation.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Critical step: because the correct bank must be selected.**

	Examiner NOTE:	**Monitor Control Bank 'A' movement on Group Step Counters SC CB-A1 and SC CB-A2.**
	Performance Step: 2 8.1.1.6.a.2	Using SF HS-2, MAN ROD CTRL, insert Control Bank A one step.
	Standard:	Applicant inserted Control Bank A one step using SF HS-2, MAN ROD CTRL.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 8.1.1.6.a.3	Using SF HS-2, MAN ROD CTRL, withdraw Control Bank A one step.
	Standard:	Applicant withdrew Control Bank A one step using SF HS-2, MAN ROD CTRL.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**First flush complete.**

	Performance Step: 4 8.1.1.6.b.1	Perform the second flush for Control Bank A per the following: 1. Using SF-HS-2, MAN ROD CTRL, insert Control Bank A one step.
	Standard:	Applicant inserted Control Bank A one step using SF HS-2, MAN ROD CTRL.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 8.1.1.6.b.2	Using SF HS-2, MAN ROD CTRL, withdraw Control Bank A one step.
	Standard:	Applicant withdrew Control Bank A one step using SF HS-2, MAN ROD CTRL.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Second flush complete.** **SIMULATOR OPERATOR: Insert Key 1 prior to performance of the third flush.**

	Performance Step: 6 8.1.1.6.c.1	Perform the third flush for Control Bank A per the following: 1. Using SF HS-2, MAN ROD CTRL, insert Control Bank A one step.
	Standard:	Applicant inserted Control Bank A one step using SF HS-2, MAN ROD CTRL. Applicant determined Control Bank 'A' continued to insert as determined by DRPI.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Once Applicant determined a Control Bank 'A' continued to insert, Applicant may directly manipulate SE HS-9, ROD BANK AUTO/MAN SEL, to MAN position.** **Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly.** **It is a failure of the JPM if the Applicant allows Control Rod Bank 'A' to insert until Main Control Board alarm 00-081C, ROD BANK LOLO LIMIT, annunciates – CBA at ~208 steps.**
*	**Performance Step: 7** 8.1.1.6.c.1	Applicant determined Control Bank 'A' continued to insert as determined by DRPI.
	Standard:	Applicant manipulated SE HS-9, ROD BANK AUTO/MAN SEL, from CBA to MAN position. Applicant verified Control Bank 'A' motion stopped.
	Cue:	JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. Control Bank 'A' insertion stopped.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S1
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. Unit is in MODE 1. STN SF-001, CONTROL ROD PARKING, is being performed. STS SF-001, CONTROL AND SHUTDOWN ROD OPERABILITY VERIFICATION, is not being performed in conjunction with this procedure. Flushes for Shutdown Banks ‘A’ through ‘E’ have been performed. Control Rod park position is not being changed.

INITIATING CUE:	The Control Room Supervisor directs you to flush Control Bank ‘A’ per step 8.1.1.6 of STN SF-001, CONTROL ROD PARKING. All prerequisites have been met.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Letdown Heat Exchanger Temperature High Divert	JPM No.:	S2
K/A Reference:	004 A3.03 Ability to monitor automatic operation of the CVCS, including: Ion exchange bypass. 2.9/2.9 004 A4.05 Ability to manually operate and/or monitor in the control room: Letdown pressure and temperature control valves. 3.6/3.1		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. Unit is at 100%. ALR 00-039A, LTDN HX TEMP HI DIVERT is LIT.
Task Standard:	Applicant placed BG HIS-129 in VCT position and using BG TK-130 in manual, reduced Letdown Heat Exchanger Outlet Temperature to value between 110 F and 120 F.

Required Materials:	ALR 00-039A, LTDN HX TEMP HI DIVERT Simulator Operator: IC 30 - 100% power. Run file S2 1. When Examiner cues, insert Key 1. File S2 1 ; Fail BG TK-130 low in auto IMF mEG09A f:3 k:1 ; prevent auto swap of BG HIS-129 IOR P01030D f:1 {hwx01i105v} DOR P01030D
General References:	ALR 00-039A, rev 10, LTDN HX TEMP HI DIVERT
Handouts:	ALR 00-039A, LTDN HX TEMP HI DIVERT
Initiating Cue:	The Control Room Supervisor directs you to perform ALR 00-039A, LTDN HX TEMP HI DIVERT.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	15 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide Information Only copy of ALR 00-039A, LTDN HX TEMP HI DIVERT to the Applicant.

START TIME:_________

	Examiner NOTE:	**ALR 00-039A, LTDN HX TEMP HI DIVERT**
	Performance Step: 1 1	Check Letdown Heat Exchanger Outlet Temperature – GREATER THAN 137°F • BG TI-130
	Standard:	Applicant checked Letdown Heat Exchanger Outlet Temperature on BG TI-130. • Temperature on BG TI-130 greater than140 °F and rising.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 2 **Alternate Path Step**	Check CVCS Demineralizer Inlet Divert Valve In VCT Position • BG HIS-129
	Standard:	Applicant determined BG HIS-129 not in VCT position: DEMIN Red light LIT VCT Red light EXTINGUISHED Applicant transitioned to RNO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 3** 2 RNO	Place valve in VCT position.
	Standard:	Applicant depressed VCT pushbutton on BG HIS-129: VCT Red light LIT DEMIN Red light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 3	Check Annunciator 00-038A, LTDN REGEN HX TEMP HI - CLEAR
	Standard:	From Main Control Boards, Applicant determined alarm 038A was clear.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 4 **Alternate Path Step**	Check Letdown Heat Exchanger Outlet Temperature Control Valve responding properly • BG TK-130
	Standard:	Applicant determined BG TK-130 is not responding properly – it should be opening further in AUTO to control temperature. Applicant transitioned to RNO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 6** 4 RNO a.	Perform the following: a. Place valve in manual and establish temperature between 110 F and 120 F.
	Standard:	At BG TK-130: Applicant depressed MAN pushbutton. MAN: Red light LIT AUTO: Red light EXTINGUISHED Applicant depressed UP ARROW pushbutton to establish temperature, as read from BG TI-130, between 110 F and 120 F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**As temperature reduces, Main Control Board alarms 039A and 039B clear.** **When temperature is between 110 F and 120 F, controller BG TK-130 meter readout is approximately 28% output.**

	Performance Step: 7 5	Check Letdown Heat Exchanger Outlet Flow – LESS THAN 120 GPM • BG FI-132 Applicant transitioned to RNO.
	Standard:	Using BG FI-132, Applicant determined ~120 gpm flow.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 8 5 RNO a.	Decrease letdown flow: a. Ensure correct orifice isolation valve lineup.
	Standard:	Applicant verified letdown orifice isolation valves were open: • LTDN ORIFICE A VLV, BG HIS-8149AA Red light – LIT Green light – EXTINGUISHED • LTDN ORIFCE B VLV, BG HIS-8149BA Red light – LIT Green light – EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 9 5 RNO b	b. Ensure Letdown Heat Exchanger Outlet Pressure Control Valve maintaining desired pressure. • BG PK-131
	Standard:	Applicant verified BG PK-131 in AUTO and pressure maintained.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 10 5 RNO c	c. IF letdown from RHR System in progress, THEN adjust RHR Cleanup To Letdown Heat Exchanger Flow Control as necessary to maintain flow less than 120 gpm. • BG HC-128
	Standard:	Applicant determined step Not Applicable.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 11 6	Check Letdown Heat Exchanger Outlet Temperature – DECREASING OR STABLE BETWEEN 110 F and 120 F. - BG TI-130
	Standard:	Using BG TI-130, Applicant determined temperature ~115 F. **Acceptable: DECREASING OR STABLE BETWEEN 110 F and 120 F.**
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 12 7	Check Letdown Heat Exchanger Outlet Temperature – LESS THAN 120 °F. - BG TI-130
	Standard:	Using BG TI-130, Applicant determined temperature ~115 F **Acceptable: Temperature less than 120 F**
	Cue:	**JPM "complete" at Examiner discretion.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	EXAMINER NOTE:	**From validation on 5-8-13 with licensed operator, they would not do this step (going back to DEMIN position) until the cause of the high temperature was determined.**
	Performance Step: 13 8	Place CVCS Demineralizer Inlet Divert Valve in DEMIN Position. - BG HIS-129
	Standard:	At BG HIS-129, Applicant requests direction. No action taken. VCT – Red light LIT DEMIN – Red light EXTINGUISHED
	Cue:	CRS cue if asked: leave it in the VCT position.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 14 9	Return to Procedure And Step In Effect.
	Standard:	Applicant completed task.
	Cue:	JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM Complete. Letdown Heat Exchanger Outlet Temperature – DECREASING OR STABLE BETWEEN 110 F and 120 F.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S2
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. Unit is at 100%. ALR 00-039A, LTDN HX TEMP HI DIVERT is LIT.

INITIATING CUE:	The Control Room Supervisor directs you to perform ALR 00-039A, LTDN HX TEMP HI DIVERT.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Isolate Accumulators following a LOCA	JPM No.:	S3
K/A Reference:	006 A3.01 Ability to monitor automatic operation of the ECCS, including: Accumulators. 4.0/3.9 006 A4.07 Ability to manually operate and/or monitor in the control room: ECCS pumps and valves. 4.4/4.4		

Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	

Method of testing:

Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. A LOCA has occurred. Actions of EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION, are being performed. All systems have functioned as expected.
Task Standard:	Applicant isolated Accumulators ‘A,’ ‘B,’ and ‘C’. Applicant vented Accumulator ‘D’ because isolation valve would not close.
Required Materials:	EMG ES-11, rev 20, POST LOCA COOLDOWN AND DEPRESSURIZATION Simulator Operator: IC 304 IC 304 includes: ;Close Accumulator breakers IRF rEP05 f:3 k:1 ;EP HIS-8808D ;movEPHV8808 – FAILED OPEN There are SIMULATOR OPERATOR cues in this JPM as written.

General References:	EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION
Handouts:	EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION
Initiating Cue:	The Control Room Supervisor directs you to perform step 41 and 42 of EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION. Report when task is complete.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	25 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide Information Only copy of EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION, to Applicant.

START TIME:_________

	Examiner NOTE:	**EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION, step 41.**
	Performance Step: 1 41.a.	Check If SI Accumulators Should Be Isolated: a. Check RCS Subcooling – GREATER THAN 30°F [45°F]
	Standard:	Applicant checked subcooling from either BB TI-1390A or BB TI-1390B, RCS DEGREES SUBCOOLING meters. Subcooling ~155°F Applicant determined subcooling was GREATER THAN 30°F [45°F]
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Applicant may use Steam Tables – subcooling per Steam Tables is ~155 degrees**

	Performance Step: 2 41.b.	Check PZR Level – GREATER THAN 6% [33%]
	Standard:	Applicant determined PZR level ~ 40%
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Applicant may use PZR PROGRAM LEV RECORDER, BB LR-459 or PZR LEV meters BB LI-460A, BB LI-459A or BB LI-461.**

	Performance Step: 3 42.a.	Isolate SI Accumulators: a. Locally close breakers for SI Accumulator Outlet valves. • NG01BGF3 for EP HV-8808A • NG02BGF3 for EP HV-8808B • NG01BGF2 for EP HV-8808C • NG02BHF2 for EP HV-8808D
	Standard:	Applicant dispatched Auxiliary Building Watch to close the breakers.
	Cue:	Cue as Auxiliary Building watch: Acknowledge request. Report that breakers are closed.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**SIMULATOR OPERATOR: Insert Key 1 to close breakers**

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*	**Performance Step: 4** 42.b. first bullet	Close Accumulator Tank Outlet Isolation Valves. • EP HIS-8808A
	Standard:	Applicant depressed EP HIS-8808A CLOSE pushbutton. Green light LIT Red light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**EP ZL-8808AA: Green light LIT & Red light EXTINGUISHED**

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*	**Performance Step: 5** 42.b second bullet	Close Accumulator Tank Outlet Isolation Valves. • EP HIS-8808B
	Standard:	Applicant depressed EP HIS-8808B CLOSE pushbutton. Green light LIT Red light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**EP ZL-8808BA: Green light LIT & Red light EXTINGUISHED**

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*	**Performance Step: 6** 42.b third bullet	Close Accumulator Tank Outlet Isolation Valves. • EP HIS-8808C
	Standard:	Applicant depressed EP HIS-8808C CLOSE pushbutton. Green light LIT Red light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**EP ZL-8808CA: Green light LIT & Red light EXTINGUISHED**

	Performance Step: 7 42.b fourth bullet Alternate Path Step	Close Accumulator Tank Outlet Isolation Valves. • EP HIS-8808D
	Standard:	Applicant depressed EP HIS-8808D CLOSE pushbutton. Red light remained LIT Green light remained EXTINGUISHED Applicant determined EP HIS-8808D would not close. Applicant transitioned to RNO.
	Cue:	If contacted as Aux. Building watch, “Breaker is tripped.”
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Accumulator pressure decreases slowly. In approximately one minute, Annunciator 46B, ACC TK D PRESS HILO, actuates. It is an expected alarm.** **When 46B actuates, the JPM can be completed.**
*	**Performance Step: 8** 42.b RNO b.1 fourth asterisk	IF any accumulator can NOT be isolated, THEN perform the following: 1. Open associated accumulator vent valve(s). ∗ EP HIS-8950F For Accumulator D
	Standard:	Applicant depressed EP HIS-8950F OPEN pushbutton. Red light LIT Green light EXTINGUISHED
	Cue:	If desired, JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**EP1 screen from NPIS may be used to monitor 'D' Accumulator decrease. 'D' Accumulator pressure can be monitored on MCB indicators EP PI-966 and EP PI-967.**

	Performance Step: 9 41.c.	Locally open and tag breakers for SI Accumulator Outlet valves. • NG01BGF3 for EP HV-8808A • NG02BGF3 for EP HV-8808B • NG01BGF2 for EP HV-8808C • NG02BHF2 for EP HV-8808D
	Standard:	Applicant dispatched Auxiliary Building Watch to open the breakers.
	Cue:	Cue as Auxiliary Building watch: acknowledge request. Cue after Remote rEP05 changed to ALL OPEN: Breakers are open.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**SIMULATOR OPERATOR: From Remote screen, select rEP05. Change Final Value to ALL OPEN.**

	Performance Step: 10	Per Initiating Conditions: report when task complete.
	Standard:	Applicant reported Accumulators are isolated per step 42 and Accumulator ‘D’ was vented per step 42 RNO b.
	Cue:	Acknowledge report. JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. Accumulator ‘A’, ‘B’ and ‘C’ are isolated. ‘D’ Accumulator vent in progress.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S3
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. A LOCA has occurred. Actions of EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION, are being performed. All systems have functioned as expected.

INITIATING CUE:	The Control Room Supervisor directs you to perform step 41 and 42 of EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION. Report when task is complete.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Start a Reactor Coolant Pump (RCP)	JPM No.:	S4
K/A Reference:	003 A4.06 Ability to manually operate and/or monitor in the control room: RCP parameters. 2.9/2.9		

Examinee:			NRC Examiner:			
Facility Evaluator:			Date:			
Method of testing:						
Simulated Performance:			Actual Performance:	X		
Classroom		Simulator	X	Plant		

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. The Unit is in MODE 4. Reactor Coolant Pump (RCP) ‘A’ was secured earlier in the shift due to leakoff issues. Maintenance reports all corrective actions are complete. Personnel are stationed to constantly monitor the Loose Parts Monitoring System. NPIS computer display BB3, Reactor Coolant System is displayed. Health Physics has been notified.
Task Standard:	Applicant started Reactor Coolant Pump ‘A’ and secured RCP ‘A’ Lift Oil Pump.
Required Materials:	SYS BB-201, rev 56, REACTOR COOLANT PUMP STARTUP Simulator Operator: IC 302 Ensure NPIS has BB3 displayed.
General References:	SYS BB-201, REACTOR COOLANT PUMP STARTUP
Handouts:	SYS BB-201, REACTOR COOLANT PUMP STARTUP
Initiating Cue:	The Control Room Supervisor directs you to start RCP ‘A’ per SYS BB-201, REACTOR COOLANT PUMP STARTUP, section 6.1, Reactor Coolant Pump Startup. All prerequisites have been met.

Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	No
Validation Time:	25 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide Information Only copy of SYS BB-201, REACTOR COOLANT PUMP STARTUP, to the Applicant.

START TIME:_________

	Examiner NOTE:	**SYS BB-201, REACTOR COOLANT PUMP STARTUP, section 6.1** **CAUTIONS:** • **Do not start an RCP while the Emergency Diesel Generators are paralleled with site power.** • **If RCS temperature is greater than 160°F and all RCPs are stopped while the RCS is being cooled down by the RHR System, a steam bubble in the Pressurizer is required prior to starting a RCP due to non-uniform RCS temperatures.** • **If RCS temperature is greater than 160°F and all RCPs are stopped for greater than 5 minutes, a steam bubble in the Pressurizer is required prior to starting a RCP due to non-uniform RCS temperatures.** • **If RCS temperature is less than 100°F, no more than two RCP's shall be in operation.**
	Performance Step: 1 6.1.1.1	Initiate Seal Water Injection flow to the RCP(s) to be started: 1. Ensure RCP Seal Water Injection Valves are open. ∗ BB HIS-8351A For RCP A – OPEN ∗ BB HIS-8351B For RCP B - OPEN ∗ BB HIS-8351C For RCP C - OPEN ∗ BB HIS-8351D For RCP D – OPEN OR ∗ Computer point BBD8351A – OPEN ∗ Computer point BBD8351B – OPEN ∗ Computer point BBD8351C – OPEN ∗ Computer point BBD8351D – OPEN
	Standard:	Applicant verified: ∗ Computer point BBD8351A – OPEN ☐
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 6.1.1.2 first asterisk	Open RCP Seal Water Return Valves. ∗ BB HIS-8141A For RCP A - OPEN
	Standard:	Applicant verified BB HIS-8141A OPEN Red light LIT Green light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	If flow is low, Applicant may adjust flow using BG HC-182, CHG HDR BACK PRESS CTRL (in the close direction), increasing seal injection flow.
	Performance Step: 3 6.1.1.3	Verify Seal Water Injection flow to RCPs is between 8 gpm and 13 gpm. ∗ BG FR-157 For RCP A – BETWEEN 8 GPM AND 13 GPM ∗ BG FR-156 For RCP B – BETWEEN 8 GPM AND 13 GPM ∗ BG FR-155 For RCP C – BETWEEN 8 GPM AND 13 GPM ∗ BG FR-154 For RCP D – BETWEEN 8 GPM AND 13 GPM
	Standard:	At RCP SEAL LEAKOFF & INJ FLOW RECORDERS, Applicant verified seal injection flow between 8 and 13 gpm. ∗ BG FR-157 For RCP A – BETWEEN 8 GPM AND 13 GPM
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**BG FR-157, BG FR-156, BG FR-155 and BG FR-154 at ~8.7 gpm.**

	Performance Step: 4 6.1.2 first asterisk	Check RCP Seal dP greater than 200 psid on RCP(s) to be started. ∗ BB PI-153A For RCP A – GREATER THAN 200 PSID ∗ BB PI-152A For RCP B – GREATER THAN 200 PSID ∗ BB PI-151A For RCP C – GREATER THAN 200 PSID ∗ BB PI-151A For RCP D – GREATER THAN 200 PSID
	Standard:	At RCP seal dP meters, Applicant verified greater than 200 psid. ∗ BB PI-153A For RCP A – GREATER THAN 200 PSID
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**BB PI-153A at ~340 psid.**

	Performance Step: 5 6.1.3.1	Check the status of the following annunciators: 1. Ensure 00-042C, VCT PRESS HILO is clear.
	Standard:	Applicant verified annunciator CLEAR: 00-042C, VCT PRESS HILO – CLEAR
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 6.1.3.2 all four asterisks	Ensure the following annunciators are not in alarm due to conditions present on the RCP to be started: ∗ 00-071A, RCP #1 SEAL ΔP LO – CLEAR ∗ 00-072A, RCP #1 SEAL FLOW HI – CLEAR ∗ 00-073A, RCP #2 SEAL FLOW HI – CLEAR ∗ 00-074D, RCP OIL RSVR LEV HILO - CLEAR
	Standard:	Applicant verified annunciators CLEAR: ∗ 00-071A, RCP #1 SEAL ΔP LO – CLEAR ☐ ∗ 00-072A, RCP #1 SEAL FLOW HI – CLEAR ☐ ∗ 00-073A, RCP #2 SEAL FLOW HI – CLEAR ☐ ∗ 00-074D, RCP OIL RSVR LEV HILO - CLEAR ☐
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 7 6.1.3.3 first bullet	IF starting RCP A, THEN verify the following annunciators are clear: • 00-070C, RCP A THRM BAR CCW FLOW – CLEAR
	Standard:	Applicant verified annunciator CLEAR: • 00-070C, RCP A THRM BAR CCW FLOW – CLEAR
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 8 6.1.3.3 second bullet	• 00-070E, RCP A STNDPIPE LEV LO – CLEAR
	Standard:	Applicant verified annunciator CLEAR: • 00-070E, RCP A STNDPIPE LEV LO – CLEAR
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 9 6.1.3.4	IF starting RCP B, THEN verify the following annunciators are clear: • 00-071C, RCP B THRM BAR CCW FLOW – CLEAR • 00-071E, RCP B STNDPIPE LEV LO – CLEAR
	Standard:	Applicant realized this step is Not Applicable.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 10 6.1.3.5	IF starting RCP C, THEN verify the following annunciators are clear: • 00-072C, RCP C THRM BAR CCW FLOW – CLEAR • 00-072E, RCP C STNDPIPE LEV LO – CLEAR
	Standard:	Applicant realized this step is Not Applicable.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 11 6.1.3.6	IF starting RCP D, THEN verify the following annunciators are clear: • 00-073C, RCP D THRM BAR CCW FLOW – CLEAR • 00-073E, RCP D STNDPIPE LEV LO – CLEAR
	Standard:	Applicant realized this step is Not Applicable.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	The Red pen (1) is #1 Seal leakoff flow at the recorders. Only RCP 'A' is presented as the other RCPs are not being started.
*	**Performance Step: 12** 6.1.4 first asterisk	Check RCP #1 Seal Leakoff flow greater than the minimum required based on #1 Seal dP, refer to FIGURE 1, RCP NUMBER 1 SEAL LEAKOFF VERSUS SEAL dP for RCP(s) to be started. ∗ BG FR-157 For RCP A – GREATER THAN MINIMUM
	Standard:	Applicant used #1 seal leakoff flow from BG FR-157, RCP 'A' seal ΔP from BB PI-153A and FIGURE 1 to determine Acceptance (greater than minimum). ∗ #1 seal leakoff flow from BG FR-157 ≅ 1.2 gpm ∗ RCP A seal ΔP from BB PI-153A ≅ 390-400 psid ∗ From FIGURE 1 criteria = ACCEPTABLE REGION
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Critical step because Applicant determined values and read graph to determine Acceptable region on Figure 1.**

	Performance Step: 13 6.1.5	Check RCP Seal Water Injection Temperature less than 135°F. • BG TI-216 – LESS THAN 135°F
	Standard:	Using BG TI-216, Applicant determined seal water injection temperature less than 135°F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**BG TI-216 indicates ~112°F.**

	Performance Step: 14 6.1.6	Personnel are stationed to constantly monitor the Loose Parts Monitoring System for each RCP start and for 30 minutes following each RCP start.
	Standard:	Applicant recalled Initial Condition cue: Personnel are stationed to constantly monitor the Loose Parts Monitoring System.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 15 6.1.7	Monitor RCP temperatures. ∗ NPIS Computer TOC - BB3, REACTOR COOLANT SYSTEM ∗ Trend Recorder BB-TR-500 on RP068
	Standard:	Applicant recalled Initial Condition cue: NPIS computer display BB3, Reactor Coolant System is displayed.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Examiner NOTE:**	Applicant may make a plant announcement prior to starting the RCP lift pump. RCP lift pump start time: ___________________
	Performance Step: 16 6.1.8 first asterisk	Start RCP lift pump for the Reactor Coolant Pump to be started. ∗ BB HIS-41 For RCP A – NORMAL AFTER RUN
	Standard:	Applicant manipulated BB HIS-41 to RUN position. Red light LIT White light LIT
	Cue:	If needed: Acknowledge pump start.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	RCP lift pump start time from above _____________ plus 2 minutes = ____________________ earliest time RCP A is started.
	Performance Step: 17 6.1.9	Allow lift pump to run for at least 2 minutes.
	Standard:	Applicant monitored time to verify two minutes have passed.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**CAUTION: If lift oil system fails to come up to pressure, it may be vapor locked. Stop lift oil pump and restart it after one minute. Check indicator light for proper pressure and continue if the desired pressure has been achieved. This may be repeated up to five times in rapid succession per Westinghouse vendor.** **NOTE: A pressure interlock prevents starting the RCP unless a minimum oil pressure of 600 psig is available to the Motor Thrust Bearing Oil Lift System. This interlock is satisfied when the white light on the respective oil lift pump control switch is lit.**
	Performance Step: 18 6.1.10 first asterisk	IF white light on respective oil lift pump control switch is NOT lit, THEN cycle respective RCP lift pump at one minute intervals, until proper pressure is achieved or up to 5 times. ∗ BB HIS-41 For RCP A – STOP/NORMAL-AFTER-RUN
	Standard:	Applicant determined White light LIT for oil lift pump. Step did not apply.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**HP HOLD POINT**
	Performance Step: 19 Prior to 6.1.11	Notify Health Physics of potential changes to radiological conditions. [3.2.7] RCP A: Verified: Date
	Standard:	Applicant recalled from Initiating Condition that Health Physics has been notified.
	Cue:	Health Physics/CRS cue: Acknowledge information.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	Applicant may make a plant announcement prior to starting RCP 'A'. RCP 'A' start time: _______________. Must be at least two minutes after lift pump started in step 6.1.9.
	Examiner NOTE:	**CAUTIONS:** • **If starting an RCP during solid plant operations, manual control of Letdown may be necessary to reduce the possible pressure surge.** • **Start one RCP at a time and allow flow and amps to stabilize before starting the next RCP.** **NOTES:** • **Indicated upper oil level may decrease when starting an RCP, due to circulation in the reservoir. RCP upper oil level may indicate 6-8 percent less then when the pump is running, than when stopped. Refer to ALR 00-074D, RCP OIL RSVR LEV HILO.** • **If indicated oil level decreased more than 8percent as a result of a pump start, oil may have been displaced into the "dry leg" of the level detector. Refer to ALR 00-074D, RCP OIL RSVR LEV HILO**
*	**Performance Step: 20** 6.1.11 first asterisk	Start desired RCP. ∗ BB HIS-37 For RCP A – NORMAL AFER RUN
	Standard:	Using BB HIS-37, Applicant manipulated switch to RUN position. Red light LIT
	Cue:	SYS OPS cue if needed: Acknowledge information.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Diverse indication of RCP a pump start:** ∗ **Amps increased - RCP A AMPS, meter BB II-1 (~240 amps indicated)** ∗ **LOOP 1 REACTOR COOLANT FLOW increased – BB FI-414/BB FI-415/BB FI-416 (110% indicated)**

	Examiner NOTE:	Time RCP 'A' started plus one minute = time that RCP lift pump can be secured. Time RCP lift pump secured ______________________ Applicant may make a plant announcement.
*	**Performance Step: 21** 6.1.12 first asterisk	WHEN RCP has run for greater than 1 minute, THEN stop RCP lift pump. ∗ BB HIS-41 For RCP A – NORMAL AFTER STOP
	Standard:	Applicant manipulated switch BB HIS-41 to STOP and secured RCP A lift pump. Red light EXTINGUISHED White light EXTINGUISHED Green light LIT
	Cue:	JPM Complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**These steps complete the procedure and are not required to be performed.**
	Performance Step: 22 6.1.13	Check RCP #1 Seal Leakoff in acceptable region of FIGURE 1, RCP NUMBER 1 SEAL LEAKOFF VERSUS SEAL dP for running pump. ∗ BG FR-157 For RCP A – IN ACCEPTABLE REGION
	Standard:	Applicant used #1 seal leakoff flow from BG FR-157, RCP 'A' seal ∆P from BB PI-153A and FIGURE 1 and determined leakoff rate was in Acceptable Region (greater than minimum).
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 23 6.1.14	IF No. 1 Seal Leakoff rates are outside the acceptable region of FIGURE 1, RCP NUMBER 1 SEAL LEAKOFF VERSUS SEAL dP, THEN refer to OFN BB-005, RCP MALFUNCTIONS.
	Standard:	Applicant determined rate was acceptable.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**NOTES:** • **It is desirable to initiate pressurizer spray flow, as soon as possible, to commence circulation of RCS thru Pressurizer to enhance mixing for thermal and chemistry concerns.** • **Spray valve associated with a non-running pump should not be opened, unless 'D' is the only running pump.**
	Performance Step: 24 6.1.15	IF this is first RCP started, THEN establish pressurizer spray flow, by slowly opening pressurizer spray valves, as required. ∗ BB PK-455B – SLOWLY OPENED, AS REQUIRED ∗ BB PK-455C – SLOWLY OPENED, AS REQUIRED
	Standard:	Applicant determined this step is not applicable as this is the fourth RCP being started.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 25 6.1.16	IF this is the first RCP to be started, THEN perform ATTACHMENT A, RCS SAMPLE REQUIREMENTS, step 1.
	Standard:	Applicant determined this step is not applicable as this is the fourth RCP being started.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 26 6.1.17	Section 6.1, Reactor Coolant Pump Startup, complete.
	Standard:	JPM complete.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM COMPLETE. RCP 'A' started and RCP 'A' lift pump secured.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S4
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. The Unit is in MODE 4. Reactor Coolant Pump (RCP) ‘A’ was secured earlier in the shift due to leakoff issues. Maintenance reports all corrective actions are complete. Personnel are stationed to constantly monitor the Loose Parts Monitoring System. NPIS computer display BB3, Reactor Coolant System is displayed. Health Physics has been notified.

INITIATING CUE:	The Control Room Supervisor directs you to start RCP ‘A’ per SYS BB-201, REACTOR COOLANT PUMP STARTUP, section 6.1, Reactor Coolant Pump Startup. All prerequisites have been met.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Synchronize the Main Generator to the Grid	JPM No.:	S5
K/A Reference:	045 A4.02 Ability to manually operate and/or monitor in the control room: T/G controls, including breakers. 2.7/2.6		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE	
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.	
Initial Conditions:	You are the Balance of Plant operator. The Unit is at ~8 to ~10%. GEN 00-003, HOT STANDBY TO MINIMUM LOAD step 6.8 is in progress.
Task Standard:	Applicant synchronized the Main Turbine/Generator to the grid and closed switchyard breaker 1.
Required Materials:	SYS AC-120, rev 82, MAIN TURBINE GENERATOR STARTUP, GEN 00-003, rev 91, HOT STANDBY TO MINIMUM LOAD Simulator Operator: IC 301. Set up NPIS terminal by BOP with the trends for MAI004 (0-1000 scale) and MAP001 (scale 0-50MW)
General References:	SYS AC-120, MAIN TURBINE GENERATOR STARTUP
Handouts:	SYS AC-120, MAIN TURBINE GENERATOR STARTUP
Initiating Cue:	The Control Room Supervisor directs you to synchronize the Main Generator to the grid per GEN 00-003, HOT STANDBY TO MINIMUM LOAD step 6.8, using SYS AC-120, MAIN TURBINE GENERATOR STARTUP, section 6.4, Synchronizing Main Generator, at step 6.4.1. All prerequisites are complete. Meter and Relay personnel are prepared to enable distance relays. System Operations has been notified. Reactor Operator has been briefed per step 6.4.3.2 for energizing PZR backup heaters. Select Breaker 1 as the first switchyard breaker to synchronize.

Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	No
Validation Time:	30 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copies of SYS AC-120, MAIN TURBINE GENERATOR STARTUP, and if requested, GEN 00-003, HOT STANDBY TO MINIMUM LOAD, to the Applicant.

START TIME:_________

	Examiner NOTE:	**SYS AC-120, MAIN TURBINE GENERATOR STARTUP, section 6.4, Synchronizing Main Generator**
	Performance Step: 1 6.4.1	Meter and Relay personnel are prepared to enable distance relays 321-1/G, 321-2/G & 321-3/G, when Exciter Field Breaker is closed.
	Standard:	Applicant recalled Initiating Cue: Meter and Relay personnel are prepared to enable distance relays.
	Cue:	If needed: Meter and Relay personnel are prepared.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 6.4.2.1	Establish Main Generator field, as follows: 1. Notify System Operations that the Generator is ready to be synchronized.
	Standard:	Applicant recalled Initiating Cue: System Operations has been notified.
	Cue:	If needed: Systems OPS notified.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 6.4.2.2	Ensure POWER SYS STABILIZER MODE SEL switch is in normal, unless System Operations directs otherwise. • MB HS-4 - NORMAL
	Standard:	Applicant determined switch MB HS-4 in NORMAL.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 6.4.2.3.a	Ensure Sync Check Relay Bypass switch in off position. a. MA HS-7 – HANDLE REMOVED
	Standard:	Applicant determined MA HS-7 HANDLE REMOVED.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**NOTE: When Exciter Field Breaker is racked in and open, the manual (DC) regulator receives a signal to drive it to the low limit. The regulator position cannot be changed when Exciter Breaker is open.**
	Performance Step: 5 6.4.2.4	Place REG MODE TRANSFER switch in manual • MB HS-3 - MANUAL
	Standard:	Applicant verified MB HS-3 in MANUAL. Green light LIT on MB ZL-3
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 6.4.2.5	Check the green light lit on the DC MAN VOLT REG • MB ZL-5 – GREEN LIGHT LIT
	Standard:	Applicant checked Green light LIT on MB ZL-5
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Amber light LIT on MB ZL-5, too**

	Performance Step: 7 6.4.2.6	Verify turbine speed – AT 1800 RPM
	Standard:	Applicant verified turbine speed at 1800 rpm.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**On OVATION graphic display 5551, Turb Cont Sys Operation or 5552, Turbine Roll Up Panel**

	Performance Step: 8 6.4.2.7	Close EXCITER FIELD BKR. • MB HS-2 - CLOSED
	Standard:	Applicant manipulated MB HS-2 to CLOSE. MB ZL-2 Red light LIT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**MB ZL-7, DE-EXCITATION CIRCUIT, Red light LIT, too.**

	Examiner NOTE:	**NOTE: Steps 6.4.2.8 and 6.4.2.9 may be performed concurrently with 6.4.2.10 thru 6.4.2.13.**
	Performance Step: 9 6.4.2.8 first bullet	At panels MA104C/MA104B, ensure Meter and Relay personnel have enabled 321-1/G, 321-2/G and 321-3/G distance relays. • Distance relays - ENABLED
	Standard:	Applicant determined Distance relays were enabled.
	Cue:	If needed: Field report: Distance relays: 321-1/G, 321-2/G and 321-3/G are enabled.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**SIMULATOR OPERATOR: IC 301 has the relays enabled.**

	Performance Step: 10 6.4.2.8 second bullet	Target /Auxiliary Relays – DROP FLAGS RESET • 21XM001 (MA104C) • 21XMA002 (MA104C) • 21XMA003 (MA104C) • 321/X (MA104B)
	Standard:	Applicant determined Target /Auxiliary Relays Drop Flags were reset.
	Cue:	If needed: Field report: Drop flags reset.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**SIMULATOR OPERATOR: IC 301 – target relays are reset.**

	Performance Step: 11 6.4.2.9	At panel MA104B, Main Generator System Relays Panel, ensure Reverse Power Relay 332/GX and Reverse Power Time Delay 362/G are reset. • 332/GX – RESET • 362/G - RESET
	Standard:	Applicant determined Reverse Power Relay 332/GX and Reverse Power Time Delay 362/G were reset. • 332/GX – RESET ☐ • 362/G – RESET ☐
	Cue:	If needed: Field report: Reverse Power Relay 332/GX and Reverse Power Time Delay 362/G are reset
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**SIMULATOR OPERATOR: IC 301 – reverse power relays are reset.**

	Performance Step: 12 6.4.2.10	Place MAIN GEN VOLTMETER 0 SEL switch in any position except off. • MA HS-1 – NOT IN OFF
	Standard:	Applicant manipulated MA HS-1 to the A-B position.
	Cue:	If needed: CRS cue: Place MA HS-1 in A-B position
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 13 6.4.2.11	Adjust MB HS-5, DC MAN VOLT REG BKR, as necessary, to establish Main Generator voltage at 24.5 KV on all three phases. • MB HS-5 – ADJUSTED, AS NECESSARY • MA EI-1 – At 24.5 KV
	Standard:	Applicant adjusted MB HS-5 in LOWER/RAISE direction to achieve 24.5 KV as read on MA EI-1.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 14 6.4.2.11 second bullet	• MA EI-1 – AT 24.5 KV
	Standard:	Applicant determined voltage at 24.5 KV as read from MA EI-1.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	During validation, it took a few adjustments to get off the Low stop.
	Performance Step: 15 6.4.2.12	Adjust MB HS-6, AC AUTO VOLT REG BKR, as necessary, to zero Voltage Regulator Manual/Auto Signal Match. • MB HS-6 – ADJUSTED AS NECESSARY • MB EI-3 – 0 VOLTAGE MISMATCH
	Standard:	Applicant adjusted MB HS-6 in the RAISE direction to correct mismatch as read on MB EI-3.
	Cue:	If needed: Adjust til off the low stop.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 16 6.4.2.12 second bullet	- MB EI-3 – 0 VOLTAGE MISMATCH
	Standard:	Applicant determined MB EI-3 at zero voltage mismatch.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 17** 6.4.2.13	Transfer REG MODE TRANSFER switch to auto. - MB HS-3 – AUTO - MB ZL-3, REG MODE MAN/AUTO Red Light - LIT
	Standard:	Applicant manipulated MB HS-3 to AUTO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	Red light LIT on MB ZL-3 – see next performance table.

	Performance Step: 18 6.4.2.13 second bullet	- MB ZL-3, REG MODE MAN/AUTO Red Light - LIT
	Standard:	Applicant determined Red light LIT on MB ZL-3
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**CAUTIONS:** - **(ρ) Reactivity SRO should be used to oversee and approve use of Control rods when synchronizing the Main Generator.** - **(ρ) If the Turbine loads faster than steam dumps close, control rods may be used to maintain primary to secondary balance by withdrawing during the loading and inserting as steam dumps go closed. Control rod withdrawal and insertion will be limited by MTC, i.e. fewer steps at BOL versus EOL.** **NOTE:** **8% to 10% reactor power is desired. This ensures an adequate number of Steam Dumps are open to support synchronizing Main Generator without all Steam Dumps going closed and requires minimal rod movement.**
	Performance Step: 19 6.4.3.1	Synchronize Main Generator to grid, as follows: 1. From NPIS, monitor the following points: - MAI0004 - MAP0001
	Standard:	
	Cue:	Applicant monitors NPIS display points.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**NPIS terminal by BOP has NPIS points displayed.**

	Examiner NOTE:	**Additional staff on floor will make any control rod adjustments or Pressurizer heater adjustments.**
	Performance Step: 20 6.4.3.2	Brief RO on the need to respond to RCS pressure, using control rods as necessary, while monitoring RCS temperature, pressure and reactor power.
	Standard:	Applicant recalled Initiating Cue: Reactor Operator has been briefed per step 6.4.3.1.
	Cue:	If needed: Reactor Operator has been briefed per step 6.4.3.2.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 21 6.4.3.3	Ensure SWYD 345-50/60 MSN TRIP PERMIT is in off. • MA HS-5 - OFF
	Standard:	Applicant verified MA HS-5 in OFF position.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 22 6.4.3.4	Select first switchyard breaker to be synchronized, using MA HS-2, BKR SEL SWITCH ∗ Breaker 1 – SELECTED OR ∗ Breaker 2 - SELECTED
	Standard:	Applicant manipulated switch MA HS-2 to BKR R1 position (Breaker 1 selected)
	Cue:	If needed: Select breaker 1
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Recall Initial Cues: Select Breaker 1 as the first switchyard breaker to synchronize.**

	Examiner NOTE:	**NOTE: Matching Generator transformer voltage with switchyard voltage must be as close as possible to avoid system upset.**
*	**Performance Step: 23** 6.4.3.5	Adjust MB HS-6, AC AUTO VOLT REG BKR, as necessary, to establish Generator Transformer Voltage between 1 KV and 2 KV higher than switchyard voltage. • MA EI-8 For Transformer Voltage • MA EI-9 For Switchyard Voltage
	Standard:	Applicant adjusted MB HS-6 in the LOWER direction to establish generator voltage between 1 KV and 2 KV higher than switchyard voltage.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**NOTE: When adjusting Turbine speed at or near 1800 rpm, response to small changes may require between 15 seconds and 30 seconds to stabilize.**
	Performance Step: 24 6.4.3.6.a.	Adjust Main Generator speed for synchronizing, as follows: a. Select Graphic 5551, TURBINE CONTROL SYSTEM – OPERATION PANEL.
	Standard:	Applicant, used OVATION controls, selected Graphic 5551 - TURBINE CONTROL SYSTEM – OPERATION PANEL
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Graphic 5551 may already be displayed on OVATION.**

	Performance Step: 25 6.4.3.6.b.	b. From the SETPOINTS section, select the TRIM button.
	Standard:	Applicant used OVATION controls, SETPOINTS section, selected TRIM button.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 26** 6.4.3.6.c.	c. From Popup 7059, MODIFY SPEED REFERENCE, select the applicable MODIFY REF arrow button to raise or lower turbine speed, until the Main Generator Synchroscope is rotating slowly in the fast direction. • MA SI-6
	Standard:	Applicant, used OVATION controls, Popup 7059, used RAISE/LOWER arrow button until Main Generator Synchroscope was rotating slowly in the fast direction as observed on MA SI-6.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 27** 6.4.3.6.d.	Ensure rotation of the synchroscope is between 30 seconds and 90 seconds, by adjusting turbine speed, as necessary
	Standard:	Applicant, used OVATION controls, Popup 7059, used RAISE/LOWER arrow button until Main Generator Synchroscope was rotating in between 30 and 90 seconds as observed on MA SI-6.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**SYNC CHECK PERMISSIVE light, MA ZL-2, White light LIT for Breaker 1 and MA SI-6 synchroscope pointer is in the up position.**
	Performance Step: 28 6.4.3.6.e.	Check selected breaker Sync Check Permissive white light is lit only when synchroscope pointer is in the up direction. ∗ MA ZL-2 – LIT ∗ MA ZL-3 - LIT
	Standard:	Applicant checked MA ZL-2 White light LIT when synchroscope pointer in the up position.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**MB HS-6, AC AUTO VOLT REG BKR, may be adjusted.**

	Performance Step: 29 6.4.3.6.f.	Ensure Generator transformer voltage is between 1 KV and 2 KV higher than switchyard voltage. • MA EI-8 • MA EI-9
	Standard:	Applicant compared MA EI-8 and MA EI-9 to ensure generator transformer voltage was between 1 KV and 2 KV higher than switchyard voltage.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 30** 6.4.3.7	WHEN selected breaker Sync Check Permissive white light is lit for the selected breaker, THEN close selected breaker. ∗ MA HS-3 – CLOSED OR ∗ MA HS-4 CLOSED
	Standard:	When MA ZL-2, SYNC CHECK PERMISSIVE White light LIT, Applicant manipulated MA HS-3 in the CLOSE direction.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 31 6.4.3.8	Ensure selected switchyard breaker closed. ∗ Breaker 1 – CLOSED ∗ At RL006, MA ZL-3A ∗ At RL014, 1ZL-SY010
	Standard:	☐ At RL006, Applicant verified MA ZL-3A CLOSED: Red Light LIT **OR** ☐ At RL014, Applicant verified 1ZL-SY010 CLOSED: Red Light LIT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 32 6.4.3.9	Immediately place the Pressurizer Backup Heater that was placed in auto per GEN 00-003, HOT STANDBY TO MINIMUM LOAD, to on, using SYS BB-203, PRESSURIZER BACKUP HEATER OPERATIONS.
	Standard:	If needed: SIMULATOR OPERATOR on the Floor, will perform this action.
	Cue:	Cue if needed: SIMULATOR OPERATOR on the Floor, will perform this action.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**NOTES:** **• Computer point MAP0001 may update quicker, be more accurate and should be monitored in addition to the LOAD indication on Graphic 5551.** **• Operation of Main Turbine below 5% load is not recommended, due to the increased rates of moisture erosion of the latter stage buckets.** **• Rapid temperature changes increase the likelihood of initiating a packing rub on monoblock rotors. Average temperature ramp rates of 125°F/hr for the LP rotors and 150°F/hr for the HP rotor are recommended.** **• With exhaust hood temperature between 125°F and 175°F, the unit may be operated continuously but load should be increased slowly to avoid unnecessary thermal stress.**
	Examiner NOTE:	With OVATION controls, the Main Generator automatically picks up load.
	Performance Step: 33 6.4.4.1	Load Main Generator: 1. IF generator load is NOT at or above 20 Mwe, THEN perform the following.
	Standard:	From Graphic 5551, Applicant determined that generator load is greater than or equal to 20 Mwe. Section 6.4.4 not necessary to perform.
	Cue:	**If needed: step 6.4.4.1 not needed to be performed. If prompted for a setpoint and rate, cue: 4 MW above current and 6 MW per minute.** **If desired: JPM complete. Breaker 1 selected.**
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 34 6.4.5.1	Close the other switchyard breaker: 1. Select open switchyard breaker on MA HS-2, BKR SEL. ∗ Breaker 1 – SELECTED OR ∗ Breaker 2 - SELECTED
	Standard:	On MA HS-2, BKR SEL, Applicant rotated knob to BRK R2 position.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**The following procedure steps added to close out procedure section – not required to be performed.**

	Performance Step: 35 6.4.5.2	Close selected switchyard breaker. ∗ MA HS-3 – CLOSED OR ∗ MA HS-4 - CLOSED
	Standard:	Applicant rotated MA HS-4 to CLOSE position.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 36 6.4.5.3	Ensure selected switchyard breaker is closed. ∗ Breaker 1 – CLOSED ∗ At RL006, MA ZL-3A ∗ At RL014, 1ZL-SY010 ∗ Breaker 2 – CLOSED ∗ At RL006, MA ZL-4A ∗ At RL014, 1ZL-SY011
	Standard:	☐ At RL006, Applicant verified MA ZL-4A CLOSED: Red Light LIT ☐ At RL014, Applicant verified 1ZL-SY011 CLOSED: Red Light LIT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 37 6.4.6	Open Bus Duct Cooling Unit Heater breaker. • PG1502 - OPEN
	Standard:	Building watch (or CRS) contacted to have breaker PG1502 opened.
	Cue:	Cue: Breaker PG1502 will be opened
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 38 6.4.7	Section 6.4, Synchronizing Main Generator, complete.
	Standard:	Applicant reports Main Generator synchronized to the grid, both breakers are closed.
	Cue:	JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM complete. Switchyard breaker 1 is closed.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S5
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

JPM CUE SHEET

INITIAL CONDITIONS:	You are the Balance of Plant operator. The Unit is at ~8 to ~10%. GEN 00-003, HOT STANDBY TO MINIMUM LOAD step 6.8 is in progress.

INITIATING CUE:	The Control Room Supervisor directs you to synchronize the Main Generator to the grid per GEN 00-003, HOT STANDBY TO MINIMUM LOAD step 6.8, using SYS AC-120, MAIN TURBINE GENERATOR STARTUP, section 6.4, Synchronizing Main Generator, at step 6.4.1. All prerequisites are complete. Meter and Relay personnel are prepared to enable distance relays. System Operations has been notified. Reactor Operator has been briefed per step 6.4.3.2 for energizing PZR backup heaters. Select Breaker 1 as the first switchyard breaker to synchronize.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Start Containment Atmosphere Control Fan	JPM No.:	S6
K/A Reference:	027 A4.03 Ability to manually operate and/or monitor in the control room: Containment Iodine Removal System fans. 3.3/3.2		

Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	

Method of testing:

Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. Unit is Refueling – fuel movement in Containment is in progress. The Fuel Handling SRO reported a fuel handling accident in Containment. OFN KE-018, FUEL HANDLING ACCIDENT, is in progress. NOTE: For JPM purposes, the Source Range Audio is turned down.
Task Standard:	The Applicant started Train ‘A’ Containment Atmospheric Control System Fan, manually initiated CPIS and manually closed the following valves: Red Train: GT HIS-7, CTMT S/D PURGE AIR SPLY CTMT ISO GT HIS-9, CTMT S/D PURGE EXH OUTER CTMT ISO Yellow Train: GT HIS-6, CTMT S/D PURGE AIR SPLY CTMT ISO GT HIS-8, CTMT S/D PURGE EXH INNER CTMT ISO

Required Materials:	OFN KE-018, rev 12, FUEL HANDLING ACCIDENT Simulator Operator: IC 305. Refueling IC with shutdown CTMT purge in progress per SYS GT-121, CONTAINMENT SHUTDOWN PURGE SYSTEM OPERATION, with sections 6.1 and 6.2 completed. File embedded in the IC ;S6 3 NEW ;Shutdown supply and return auto-close defeats, manual available IMF mSA27GT15 i:-1 f:-1 IMF mSA27GT13 i:-1 f:-1 IMF mSA27GT14 i:-1 f:-1 IMF mSA27GT16 i:-1 f:-1
General References:	OFN KE-018, FUEL HANDLING ACCIDENT
Handouts:	OFN KE-018, FUEL HANDLING ACCIDENT
Initiating Cue:	The Control Room Supervisor directs you to perform step 4 and 5 of OFN KE-018, FUEL HANDLING ACCIDENT. Start ‘A’ train fan.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copy of procedure OFN KE-018, FUEL HANDLING ACCIDENT, to the Applicant.

START TIME:_________

	Examiner NOTE:	**OFN KE-018, FUEL HANDLING ACCIDENT, step 4**
	Performance Step: 1 4.a.	Verify Adequate CTMT Ventilation: a. Ensure Containment Coolers – AT LEAST TWO OPERATING IN FAST SPEED
	Standard:	Applicant verified CTMT COOLER FAN B and CTMT COOLER FAN D running in fast speed.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Applicant may make a plant announcement prior to fan start.**
*	**Performance Step: 2** 4.b.	Ensure Containment Atmosphere Control System Fan – AT LEAST ONE RUNNING ∗ GR HIS-10 For Train A ∗ GR HIS-20 For Train B
	Standard:	From INITIATING CUE, Applicant manipulated GR HIS-10, CTMT ATMS CTRL SYS A FAN & DAMPER switch to RUN. Red Light LIT Green Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 5.a. Alternate Path Step	Ensure CTMT Purge Isolation – ACTUATED a. Check ESFAS Status Panel CPIS Section – ALL WHITE LIGHTS LIT • Red Train • Yellow Train
	Standard:	Red Train: At ESFAS panel SA066-X: Applicant determined All white lights – NOT LIT ☐ Yellow train: At ESFAS panel SA066-Y: Applicant determined All white lights – NOT LIT ☐ Applicant transitioned to RNO column.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 5.a. RNO a.1. first bullet	a. Perform the following: 1. IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation. • SA HS-11
	Standard:	Applicant depressed ACTUATE pushbutton SA HS-11, CTMT PURGE TRN A ISO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 5.a RNO a.1 second bullet	• SA HS-15
	Standard:	Applicant depressed ACTUATE pushbutton SA HS-15, CTMT PURGE TRN B ISO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**These steps can be done in any order.**
*	**Performance Step: 6** 5.a RNO a. 2 (Red Train)	IF any CPIS component NOT properly aligned, THEN manually align component. IF component(s) can NOT be aligned, THEN manually or locally isolate affected containment penetration.
	Standard:	Applicant determined from SA066-X panel CTMT S/D PURGE AIR SPLY DMPR, GTHZ7, was NOT LIT. Applicant depressed CLOSE pushbutton, GT HIS-7, CTMT S/D PURGE AIR SPLY CTMT ISO. Green Light LIT Red Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 7** 5.a RNO a. 2 (Red Train)	IF any CPIS component NOT properly aligned, THEN manually align component. IF component(s) can NOT be aligned, THEN manually or locally isolate affected containment penetration.
	Standard:	Applicant determined from SA066-X panel CTMT S/D PURGE EXH DMPR, GTHZ9, was NOT LIT. Applicant depressed CLOSE pushbutton, GT HIS-9, CTMT S/D PURGE EXH OUTER CTMT ISO. Green Light LIT Red Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

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*	**Performance Step: 9** 5. a RNO a. 2 (Yellow Train)	IF any CPIS component NOT properly aligned, THEN manually align component. IF component(s) can NOT be aligned, THEN manually or locally isolate affected containment penetration.
	Standard:	Applicant determined from SA066-Y panel CTMT S/D PURGE AIR SPLY DMPR, GTHZ6, was NOT LIT. Applicant depressed CLOSE pushbutton, GT HIS-6, CTMT S/D PURGE AIR SPLY CTMT ISO. Green Light LIT Red Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 8** 5.a RNO a. 2 (Yellow Train)	IF any CPIS component NOT properly aligned, THEN manually align component. IF component(s) can NOT be aligned, THEN manually or locally isolate affected containment penetration.
	Standard:	Applicant determined from SA066-Y panel CTMT S/D PURGE EXH DMPR, GTHZ8, was NOT LIT. Applicant depressed CLOSE pushbutton, GT HIS-8, CTMT S/D PURGE EXH INNER CTMT ISO. Green Light LIT Red Light EXTINGUISHED
	Cue:	JPM Complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM Complete. Containment Atmosphere Control System Fan started and CPIS was correctly aligned.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S6
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. Unit is Refueling – fuel movement in Containment is in progress. The Fuel Handling SRO reported a fuel handling accident in Containment. OFN KE-018, FUEL HANDLING ACCIDENT, is in progress. NOTE: For JPM purposes, the Source Range Audio is turned down.

INITIATING CUE:	The Control Room Supervisor directs you to perform step 4 and 5 of OFN KE-018, FUEL HANDLING ACCIDENT. Start ‘A’ train fan.

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Place Unit Vent Monitor in Accident Mode of operation	JPM No.:	S7
K/A Reference:	073 A4.02 Ability to manually operate and/or monitor in the control room: radiation monitoring system control panel. 3.7/3.7		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. The Unit has declared a General Emergency. A Unit Vent radiological release is in progress.
Task Standard:	Applicant placed Unit Vent in Accident Mode of operation and verified using SP010 panel.
Required Materials:	SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM Simulator Operator: IC 303 – large break LOCA IC.
General References:	SYS SP-121, rev 21, OPERATION OF THE G.A. MONITOR SYSTEM, EPP 06-001, rev 17, CONTROL ROOM OPERATIONS
Handouts:	SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM
Initiating Cue:	The Control Room Supervisor directs you to perform step 6.10.1 to place Unit Vent Monitor, GT RE-21B, in ACCIDENT mode using the RM-11R (SP056).
Time Critical Task: (Yes or No)	No

Alternate Success Path: (Yes or No)	No
Validation Time:	10 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copy of SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM to the Applicant.

START TIME:_________

	Examiner NOTE:	**SYS SP-121, OPERATION OF THE G.A. MONITOR SYSTEM, step 6.10, Placing Unit Vent Monitor In Accident Mode.**
	Performance Step: 1 6.10.1.1	Placing Unit Vent Monitor GT RE-21B in Accident Mode using RM-11R (SP056A): 1. Press the GRID 1 key.
	Standard:	Applicant depressed GRID 1 key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**NOTE: The Unit Vent Monitor can not be verified in Accident Mode using RM-11R (SP056A).**

	Performance Step: 2 6.10.1.2	Place Supervisor Master Key in the key slot and turn it to SUPERVISOR position.
	Standard:	Applicant placed key in slot and turned to SUPERVISOR position.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 3 6.10.1.3	Key in the three digit channel identification number 213.
	Standard:	Applicant keyed in 213 identification number.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 6.10.1.4	Press the SEL key and check the selected channel is outlined in white.
	Standard:	Applicant depressed SEL key. ☐ Selected channel (213) was outlined in white. ☐
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 6.10.1.5	Press the LIT key.
	Standard:	Applicant depressed the LIT key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 6.10.1.6	Press the GRID 5 key.
	Standard:	Applicant depressed the GRID 5 key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 7 6.10.1.7	Press the SEL key.
	Standard:	Applicant depressed the SEL key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Supervisor RM-80 Database is displayed on the RM-11 monitor screen.**

	Performance Step: 8 6.10.1.8	Press 1.
	Standard:	Applicant depressed 1.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 9 6.10.1.9	Press the SEL key and check Monitor Item 1 is backlit.
	Standard:	Applicant depressed the SEL key. ☐ Applicant check Monitor Item 1 was backlit. ☐
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Supervisor RM-80 Database Monitor item 1 is backlit.**

	Performance Step: 10 6.10.1.10	Press 4.
	Standard:	Applicant depressed 4.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 11** 6.10.1.11	Press the ENTER key.
	Standard:	Applicant depressed the ENTER key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**At the bottom of the RM-11 monitor screen, Operator instructions pop up. Enter must be depressed a second time for the database to be updated.**

	Performance Step: 12 6.10.1.12	At GT RIC-21B, verify Unit Vent Monitor in Accident Mode, as follows
	Standard:	Applicant recalled NOTE prior to step 6.10.1 and moved over to GT RIC-23B (RM-23 for the Unit Vent Monitor) on the SP010 Panel.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 13 6.10.1.12.a	Press the MON key.
	Standard:	Applicant depressed the MON key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**After depressed, the MON key will be backlit.**

	Performance Step: 14 6.10.1.12.b	Press 139.
	Standard:	Applicant depressed 139.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

*	**Performance Step: 15** 6.10.1.12.c	Press the ITEM key.
	Standard:	Applicant depressed ITEM key.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**After depressed, the ITEM key will be backlit.**

	Performance Step: 15 6.10.1.12.d	Check display reading 000.
	Standard:	Applicant verified display reading 000.
	Cue:	JPM complete.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM Complete. Applicant changed RM-11 Supervisor database for the Unit Vent and verified Unit Vent in Accident Mode at the Unit Vent's RM-23 (SP010 panel).**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S7
Examinee's Name:	
Examiner's Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner's Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. The Unit has declared a General Emergency. A Unit Vent radiological release is in progress.

INITIATING CUE:	The Control Room Supervisor directs you to perform step 6.10.1 to place Unit Vent Monitor, GT RE-21B, in ACCIDENT mode using the RM-11R (SP056).

Facility:	Wolf Creek	Task No.:	N/A
Task Title:	Transfer Component Cooling Water System Service Loop	JPM No.:	S8
K/A Reference:	008 A2.01 Ability to (a) predict the impacts of the following malfunctions or operations on the CCWS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions, or operations: Loss of a CCW pump. 3.3/3.6 008 A4.01 Ability to manually operate ad/or monitor in the control room: CCW indications and controls. 3.3/3.1		

Examinee:			NRC Examiner:		
Facility Evaluator:			Date:		
Method of testing:					
Simulated Performance:			Actual Performance:	X	
Classroom		Simulator	X	Plant	

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Reactor Operator. Unit is at 100%. ALR 00-052A, CCW TO RCP FLOW LO, is LIT.
Task Standard:	Applicant started CCW pump ‘A’ or ‘C’ and transferred the Service loop from Train ‘B’ to Train ‘A’.
Required Materials:	ALR 00-052A, CCW TO RCP FLOW LO Simulator Operator: IC 30 – 100% power Run file S8
General References:	ALR 00-052A, rev 13, CCW TO RCP FLOW LO
Handouts:	ALR 00-052A, CCW TO RCP FLOW LO

Initiating Cue:	The Control Room Supervisor directs you to perform ALR 00-052A, CCW TO RCP FLOW LO.
Time Critical Task: (Yes or No)	No
Alternate Success Path: (Yes or No)	Yes
Validation Time:	15 minutes

(Denote Critical Steps with an asterisk)

Examiner NOTE: Provide the Information Only copy of ALR 00-052A, CCW TO RCP FLOW LO, to the Applicant.

START TIME:_________

	Examiner NOTE:	**ALR 00-052A, CCW TO RCP FLOW LO, step 1.**
	Performance Step: 1 1.	Check CCW To RCS Flow – LESS THAN 1.25 x 10^6 LBM/HR • EG FI-128 • EG FI-129
	Standard:	At EG FI-128 and EG FI-129 Applicant determined flow was • ≅ 1.24 E6 LBM/HR for EG FI-128 • ≅ 1.23 E6 LBM/HR for EG FI-129
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 2 2	Check If CCW Flow To RCS Required: ∗ RCS Temperature – GREATER THAN 200°F
	Standard:	Applicant determined RCS temperature greater than 200°F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**NPIS computer display.**

	Performance Step: 3 3	Check Containment Isolation Phase B – NOT ACTUATED
	Standard:	Applicant determined Containment Isolation Phase B – NOT ACTUATED Main Control Board alarm 59B, CISB, CLEAR Or ESFAS status panels (SA066X and SA066Y) CTMT ISO SYS PHASE B, NO WHITE LIGHTS LIT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 4 4.a	Monitor RCP Motor Temperatures Using NPIS Computer: a. Check RCP Motor Bearing Temperatures – LESS THAN 195°F • Turn On Code BB3
	Standard:	Applicant used BB3 display from an NPIS terminal to check RCP motor bearing temperatures < 195°F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 5 4.b	b. Check RCP Motor Stator Winding temperatures - LESS THAN 299°F • Turn On Code BB3
	Standard:	Applicant used BB3 display from an NPIS terminal to check RCP motor bearing temperatures < 299°F.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 6 5 **Alternate Path Step**	Check CCW Pumps In Train Supplying Service Loop – BOTH RUNNING
	Standard:	Applicant determined CCW B pump running. Applicant determined CCW D pump not running. Applicant transitioned to RNO.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 7 5 RNO a.	Perform the following: a. Start standby CCW Pump in train supplying service loop.
	Standard:	Applicant manipulated handswitch CCW PUMP D, EG HIS-24, to RUN CCW pump 'D' does not start. Green Light – LIT Amber Light - LIT
	Cue:	If needed: Respond as Building Watch to investigate CCW 'D'. If needed: Respond as Building watch to perform pre-start checks. Pre-start checks are SAT.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 8 5 RNO b.	b. IF a CCW Pump in train aligned to the service loop can NOT be started, THEN ensure alternate train CCW Pump is operating and shift service loop to alternate CCW train:
	Standard:	Applicant determined alternate train CCW Pump must be started.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Examiner NOTE:	**Starting either CCW pump is acceptable.** **CCW Pump started: A or C** **Time _______________**
*	**Performance Step: 9** 5 RNO b.1	Ensure alternate train CCW pump is running.
	Standard:	Applicant started CCW Pump A using handswitch EG HIS-21 to the RUN position. Red Light LIT Green Light EXTINGUISHED OR Applicant started CCW Pump C using handswitch EG HIS-23 to the RUN position. Red Light LIT Green Light EXTINGUISHED
	Cue:	If needed: Respond as Building watch to perform pre-start checks. Pre-start checks are SAT.
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**Main Control Board alarms IN and CLEAR: 51C, CCW PMP A FLOW LO, Or 52C, CCW PMP C FLOW LO, expected based on CCW pump started. Alarm 52B, CCW PMP A/C PRESS LO, expected.**

*	**Performance Step: 10** 5 RNO b.2	Open service loop CCW supply and return valves for train not supplying service loop. ∗ EG ZL-15 AND EG ZL-53 For Train A o EG HS-15
	Standard:	Applicant depressed OPEN pushbutton CCW TRN A SPLY/RETURN VLVS, EG HS-15, until dual indication observed. Red Lights for EG ZL-53 and EG ZL-15 LIT Green Lights for EG ZL-53 and EG ZL-15 EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**MCB alarm 51F, CCW SPLY RTN VLVS MISALIGN, comes in.**

*	**Performance Step: 11** 5 RNO b. 3	Close service loop CCW supply and return valves for train previously supplying service loop. ∗ EG ZL-16 AND EG ZL-54 For Train B o EG HS-16
	Standard:	Applicant depressed CLOSE pushbutton CCW TRN B SPLY/RETURN VLVS, EG HS-16, until dual indication observed. Red Lights for EG ZL-54 and EG ZL-16 EXTINGUISHED Green Lights for EG ZL-54 and EG ZL-16 LIT
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	**MCB alarm 51F, CCW SPLY RTN VLVS MISALIGN, clears.**

	Performance Step: 12 6. a	Ensure CCW Containment Isolation Valves – OPEN a. CCW From RCS Outer Containment Isolation Valve - OPEN • EG HIS-59
	Standard:	Applicant checked EG HIS-59 OPEN Red Light LIT Green Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 13 6. b.	b. CCW From RCS Inner Containment Isolation Valve - OPEN • EG HIS-60
	Standard:	Applicant checked EG HIS-60 OPEN Red Light LIT Green Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 14 6. c. 1.	c. CCW To RCS Outer Containment Isolation Valve - OPEN 1) EG HIS-58
	Standard:	Applicant checked EG HIS-58 OPEN Red Light LIT Green Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 15 6. c. 2.	2) EG HIS-71
	Standard:	Applicant checked EG HIS-71 OPEN Red Light LIT Green Light EXTINGUISHED
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 16 7	Check CCW To RCS Flow – GREATER THAN 1.25 x 10^6 LBM/HR • EG FI-128 • EG FI-129
	Standard:	At EG FI-128 and EG FI-129 Applicant determined flow was • ≅ 1.3 E6 LBM/HR for EG FI-128 • ≅ 1.35 E6 LBM/HR for EG FI-129
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

	Performance Step: 17 8	Return To Procedure And Step In Effect.
	Standard:	JPM complete.
	Cue:	
	Score: SAT or UNSAT	SAT or UNSAT
	Comment:	

Terminating Cue:	**JPM Complete. CCW pump ‘A’ or ‘C’ started and CCW Service loop transferred to Train ‘A’.**

STOP TIME: ___________

VERIFICATION OF COMPLETION

Job Performance Measure No.:	S8
Examinee’s Name:	
Examiner’s Name:	
Date Performed:	
Facility Evaluator:	
Number of Attempts:	
Time to Complete:	
Question Documentation:	
Question:	
Response:	

Result:		SAT			UNSAT	

Examiner’s Signature:		Date:	

INITIAL CONDITIONS:	You are the Reactor Operator. Unit is at 100%. ALR 00-052A, CCW TO RCP FLOW LO, is LIT.

INITIATING CUE:	The Control Room Supervisor directs you to perform ALR 00-052A, CCW TO RCP FLOW LO.

Facility: ____Wolf Creek_________ Scenario No.: ___1___ Op-Test No.: _______

Examiners: ______________________________ Operators: ______________________________

______________________________ ______________________________

______________________________ ______________________________

Initial Conditions: 100%, Middle of Life

Turnover: Motor Driven AFW pump 'A' is tagged out for maintenance activities. Technical Specification (TS) 3.7.5 Condition B.1 (restore AFW train to OPERABLE in 72 hours) was entered. Expected return is 48 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	mBB01F	I SRO ATC	RCS temperature, BB TI-421 (T-cold), fails high. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 7, Condition E (72 hours to trip bistables). OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment L.
2	mAB01A1	I SRO BOP	Steam Generator "A" steam pressure, AB PI-514A, fails low. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables). TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D ALR 00-108B, SG A LEV DEV or ALR 00-108C, SG A FLOW MISMATCH and/or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment C.

3	mBB21B	I SRO ATC	Pressurizer pressure instrument, BB PI-456, fails low. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Conditions E and M are entered (both are 72 hours to trip bistables). TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, 1.d, 3.a.3, 5.d, 6.e and 8.b, Conditions D (1.d, 3.a.3, 5.d, 6.e: 72 hours to place channel in bypass) and L (one hour to verify P-11 interlock in correct state) are entered. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 condition D TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 condition D OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment K.
4	mAE08D	C SRO BOP	Main Feed Regulating Valve "D" fails closed; manual control available using controller AE FK-540. ALR 00-111C, SG D FLOW MISMATCH or ALR 00-111B, SG D LEV DEV.
5	mSG01 mSF15A mSA01B mAL02 bkrDPAL01B	M SRO ATC BOP	Seismic event with an inadvertent Reactor trip and Safety Injection (SI) signal and a Loss of all Auxiliary Feedwater. **(Critical Task (CT) – FR-H1-A: to restore AFW to SG's)** EMG E-0, REACTOR TRIP OR SAFETY INJECTION, EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK and SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION.
6	mAC02C mAC02B	C SRO BOP	Preloaded and post trip: Main turbine fails to trip (auto), manual trip available. BOP depressed both MAIN TURBINE MASTER TRIP "A" and "B" pushbuttons: AC HS-002A and AC HS-002B. **(CT – Manual Main Turbine trip)** Immediate Action step 2RNO EMG E-0, REACTOR TRIP OR SAFETY INJECTION.
7	mSA27GN03B mSA27GN05B	C SRO ATC	Preloaded and post trip: Containment Fan Coolers "A" and "C" are not running in SLOW speed. EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F.
*	(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor		

SCENARIO SUMMARY

Turnover and Initial Conditions: Unit is at 100% power, Middle of Life. Motor Driven AFW pump ‘A’ is tagged out for maintenance activities. Technical Specification (TS) 3.7.5 Condition B.1 (restore AFW train to OPERABLE in 72 hours) was entered. Expected return is 48 hours.

Event 1: Reactor Coolant System (RCS) temperature T-cold instrument BB TI-421 fails high. Control rods step inward. The crew identifies and diagnoses the temperature instrument failure and enters OFN SB-008, INSTRUMENT MALFUNCTIONS. Attachment L, Narrow Range RTD Malfunction, is used to identify and mitigate the instrument failure. Memory Action steps are performed by the BOP (verify no load rejection in progress) and ATC (take rods to manual using SE HS-9). Technical Specifications are identified by the SRO. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Fu 6 and 7 are identified and Conditions A and E are entered.

Event 2: Steam pressure channel for Steam Generator “A”, AB PI-514A, fails low. The crew identifies and diagnoses the steam pressure channel failure and enters Alarm Response procedure ALR 00-108B, SG A LEV DEV or ALR 00-108C, SG A FLOW MISMATCH and/or OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment C, Steam Pressure Channel Malfunction, is used to identify and mitigate the instrument failure. Memory action steps are performed by the BOP (“A” Main Feed Regulating Valve placed in manual and Steam Generator level controlled manually). Technical Specifications are identified by the SRO. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Table 3.3.2-1, Fu 1.e and 4.e are identified and Conditions A and D are entered. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION and TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION are entered.

Event 3: Pressurizer (PZR) pressure instrument, BB PI-456, fails low. The crew identifies and diagnoses PZR pressure instrument failure and enters OFN SB-008, INSTRUMENT MALFUNCTIONS. Attachment K, PZR Pressure Malfunction, is used to identify and mitigate the instrument failure. Technical Specifications are identified by the SRO. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Fu 6 and 8 are identified and Conditions A, E and M are entered. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Table 3.3.2-1, Fu 1.d, 3.a.3, 5.d, 6.e and 8.b are identified and Conditions A, D and L are entered. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION and TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION are entered.

Event 4: Steam Generator “D” Main Feed Regulating Valve (MFRV) closes in automatic. The crew identifies and diagnoses the MFRV failure and enters Alarm Response procedure ALR 00-111C, SG D FLOW MISMATCH or ALR 00-111B, SG D LEV DEV, to mitigate the MFRV failure.

Event 5: The Major event is accompanied by a seismic alarm. An Inadvertent Reactor trip and Safety Injection Signal occurs followed by a Loss of all Auxiliary Feedwater. The crew diagnoses the seismic event and Reactor Trip and Safety Injection actuation. The crew enters EMG E-0, REACTOR TRIP OR SAFETY INJECTION.

During the performance of EMG E-0, REACTOR TRIP OR SAFETY INJECTION, the crew diagnoses the Loss of all Auxiliary Feedwater (AFW). At step 8 RNO, the crew ensures the BIT valves are open and transitions to Functional Recovery procedure EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.

Success path for the scenario is accomplished at step 8 of EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, when AFW flow from the Non-Safety Related Auxiliary Feedwater Pump is established to the Steam Generators. SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION, is performed.

Critical Task (CT) FR-H1-A is performed. (Establish feedwater flow into at least one SG before RCS bleed and feed is initiated and before SGs dry out.)

Event 6: Post trip, the BOP determines the Main Turbine failed to trip. The BOP depresses both MAIN TURBINE MASTER TRIP “A” and “B” pushbuttons (AC HS-002A and AC HS-002B) during the performance of Immediate Actions step 2 RNO of EMG E-0, REACTOR TRIP OR SAFETY INJECTION.

Critical Task – Manual Main Turbine trip is performed. (The Main Turbine is tripped in order to prevent an uncontrolled cooldown of the RCS due to high steam flow.)

Event 7: Post trip, the ATC/BOP determines that Containment Fan Coolers “A” and “C” are not running in SLOW speed. EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, step F8 RNO directs starting the fans in SLOW speed.

SCENARIO TERMINATION:
Successful mitigation of the scenario requires the crew restore secondary heat sink by performance of EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, using the Non-Safety Related Auxiliary Feedwater Pump per procedure SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION.

CRITICAL TASKS (CT)

Event 5: FR-H1-A: Establish feedwater flow into at least one SG before RCS bleed and feed is initiated and before SGs dry out. Restore AFW to the Steam Generators using Non-Safety Related Aux Feed (NSAFW) Pump per procedure SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION, entered from EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.

Event 6: Manual Main Turbine trip is performed. The Main Turbine is tripped in order to prevent an uncontrolled cooldown of the RCS due to high steam flow. Due to the new design/controls, both MAIN TURBINE MASTER TRIP “A” and “B” pushbuttons (AC HS-002A and AC HS-002B) are manipulated.

TECHNICAL SPECIFICATIONS:
Event 1: Reactor Coolant System (RCS) temperature T-cold instrument BB TI-421 fails high. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 7, Condition E (72 hours to trip bistables).

Event 2: Steam pressure channel for Steam Generator “A”, AB PI-514A, fails low.

- TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables).
- TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.
- TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.

Event 3: Pressurizer (PZR) pressure instrument, BB PI-456, fails low.

- TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Conditions E and M are entered (both are 72 hours to trip bistables). TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, 1.d, 3.a.3, 5.d, 6.e and 8.b, Conditions D (1.d, 3.a.3, 5.d, 6.e: 72 hours to place channel in bypass) and L (one hour to verify P-11 interlock in correct state) are entered.

- TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.
- TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.

PRA/PSA: On March 31, 2013, NE 13-0022 provided the Notice of Probabilistic Risk Assessment (PRA) Model Revision 6.

Scenario	PRA application	Description
Scenario 1	Top Operator Action	Failure to Enter EMG FR-H1 Note: Crew does enter EMG FR-H1 and the success path is to feed the S/Gs using the NSAFW pump.
Scenario 2	Core Damage Frequency (CDF) by Initiating Event Large Early Release Frequency (LERF) by Initiating Event	Switchyard centered LOOP Note: This event is complicated when the only available EDG experiences a fuel failure and the crew enters EMG C-0.
Scenario 3	Core Damage Frequency (CDF) by Initiating Event	Large steamline break outside CTMT

Op-Test No.: ______ Scenario No.: 1 Event No.: 1 Page 1 of 26

Event Description: RCS temperature Loop 2, BB TI-421 (T-cold), fails high.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 1 at Lead Examiner direction. Diagnostics: Control rods step inward. RCS pressure decrease. Loop 2 Reactor Coolant Tavg meter increases. Loop 2 Reactor Coolant OTDT Setpoint and DT meters decrease. Main Control Board (MCB) alarms actuate: 65C and 65E, 66D, 67B, 68D and 69D.		
	SRO, ATC, BOP	Crew diagnoses instrument failure. BOP and ATC perform Memory Action steps of OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment L, NARROW RANGE RTD MALFUNCTION.
	BOP	(Memory Action) At OVATION control, screen 5551, BOP determined No Runback in progress. • Generator Load MW are stable
	ATC	(SRO direction/Memory Action) Using SE HS-9, ROD BANK AUTO/MAN SEL, ATC rotates from AUTO to MAN position. Inward rod motion stopped. **Possible Critical Task (PCT): Place rods in MAN position, using SE HS-9, stopping inward motion.** **EXAMINER NOTE: If rod motion is not stopped, a PZR PRESS LO RX TRIP reactor trip occurs.**
	SRO, ATC, BOP	Enter and Perform OFN SB-008, rev 34, INSTRUMENT MALFUNCTIONS SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS
	SRO, ATC	1. Check for malfunction: ∗ Check If Reactor Coolant System Instrument Channel Or Controller Is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel or controller from table below:

Variable	Channels	Attachment
RCS Temperature	T-411, T-421, T-431, T-441	Attachment L

Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
NOTE: Steps L1 and L2 are Memory Action steps.		
	BOP	L1 Check Load rejection - NOT IN PROGRESS • Generator Load MW – STABLE EXAMINER NOTE: Memory Action was performed earlier.

Op-Test No.: ______ Scenario No.: 1 Event No.: 1

Event Description: RCS temperature Loop 2, BB TI-421 (T-cold), fails high.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	L2. Switch ROD BANK AUTO/MAN SEL Switch To – MANUAL • SE HS-9 EXAMINER NOTE: Memory Action was performed earlier.
	SRO, BOP	L3. Check Steam Dumps: a. Check STEAM DUMP SEL Switch – IN TAVG MODE • AB US-500Z b. Check Steam Dumps - CLOSED
	SRO, ATC	L4. Identify Failed Instrument Channel: a. Compare loop Tavg and ΔT indications to confirm a NR RTD failure:
	SRO, ATC	L5. Remove Failed Temperature Channel From Tavg and ΔT Auctioneering Circuits, Using DELTA T DEFEAT And ROD CTRL T AVG INPUT CHANNEL DEFEAT Switches • BB TS-411F • BB TS-412T EXAMINER NOTE: T421 selected both switches. When circuits are defeated, MCB alarms clear. 67B and 67C remain.
	SRO, ATC	L6. Check (Tavg/Tref) Error Signal Within 1°F, If No, Perform RNO L6. RNO (ρ) Manually adjust control rod position, to control Tavg within 1°F of Tref

L4 table:

LOOP	FUNCTION	INDICATION
2	ΔT TAVG	BB TI-421A BB TI-422

NOTE: It may take several minutes for power and temperature rate circuitry outputs to return to normal before switching back to automatic rod control.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	L7. Check ROD BANK AUTO/MAN SEL Switch In Auto. If No, Perform RNO. • SE HS-9 L7. RNO (ρ) WHEN Tavg is within 1°F of Tref, THEN place ROD BANK AUTO/MAN SEL switch in auto, if desired. • SE HS-9

Op-Test No.: ______ Scenario No.: 1 Event No.: 1 Page 3 of 26

Event Description: RCS temperature Loop 2, BB TI-421 (T-cold), fails high.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	L8. Monitor Rod Control System Response To Ensure Proper Control
	SRO, ATC, BOP	L9. Check C-7 Loss Of Load Interlock – NOT LIT
	SRO, BOP	L10. Check STEAM DUMP BYPASS INTERLOCK Switches In – ON • AB HS-63 • AB HS-64
	SRO, BOP	L11. Monitor Steam Dump Control System To Ensure Proper Operation
	SRO, ATC, BOP	L12. Check Failed Temperature Channel Not Selected On OPDT/OT DT LOOP RECORD SEL; If No, Perform RNO • SC TS-411E L12. RNO. Select alternate temperature channel for input to recorder.
	SRO	L13. Monitor The Following Technical Specification LCOs And Comply With Action Statements, As Appropriate: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 6 and 7 SRO identifies: TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 7, Condition E (72 hours to trip bistables)
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
Event termination: Instrument failure identified; SRO identified applicable Technical Specifications or at Lead Examiner Discretion. Simulator Operator: Insert Key 2 at direction of Lead Examiner.		

Op-Test No.: ______ Scenario No.: 1 Event No.: 2

Event Description: Steam Generator "A" steam pressure, AB PI-514A, fails low.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 2 at direction of Lead Examiner. Diagnostics: Meter SG A PRESS, AB PI-514A, decreasing to zero. Main Control Board alarms 00-108C, SG A FLOW MISMATCH and 00-108B, SG A LEV DEV, annunciate.		
	SRO, BOP, ATC	Crew diagnoses instrument failure. BOP performs Memory Actions of either ALR 00-108C, SG A FLOW MISMATCH; 00-108B, SG A LEV DEV; or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment C, SG PRESSURE CHANNEL MALFUNCTION.
	BOP	(SRO direction/Memory Action) Places SG A MFW REG VLV CTRL, AE FK-510, in Manual and depresses UP ARROW pushbutton, matching steam flow and feed flow. **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow.** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, ATC, BOP	Enter and Perform ALR 00-108C, rev 9A, SG A FLOW MISMATCH; or ALR 00-108B, rev 9, SG A LEV DEV. SRO directs the ALR.
EXAMINER NOTE: ALR 108C and 108B are very similar. As 108B is the higher tier ALR, only 108B is presented.		
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, BOP, ATC	1. Check Steam Generator A Controlling Level Channel: ∗ 5% GREATER THAN PROGRAM LEVEL OR ∗ 5% LESS THAN PROGRAM LEVEL
	SRO, ATC, BOP	2. Check Instruments – OPERATING PROPERLY; If No, Perform RNO • Steam Generator A Controlling Level Channel – WITHIN 6% OF REMAINING S/G A NARROW RANGE LEVEL CHANNELS ∗ AE LI-559 ∗ AE LI-551 • Steam Generator A Controlling Steam Pressure Channel – WITHIN 100 PSIG OF REMAINING CHANNELS; No, Perform RNO ∗ AB PI-514A ∗ AB PI-515A

Op-Test No.: ______ Scenario No.: 1 Event No.: 2

Event Description: Steam Generator “A” steam pressure, AB PI-514A, fails low.

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	2 RNO Perform the following: a. Place Feedwater Reg Valve or Feedwater Reg Bypass Control Valve in manual. ∗ AE FK-510 ∗ AE LK-550 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow.**
	SRO, BOP	2 RNO b. Adjust Feedwater Reg Valve or Feedwater Reg Bypass Control Valve, as necessary, to establish Steam Generator level at program value. ∗ AE FK-510 ∗ AE LK-550 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow.** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, BOP	2 RNO c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, step 1.
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
EXAMINER NOTE: The crew may enter OFN SB-008, INSTRUMENT MALFUNCTIONS, directly.		
	SRO, BOP, ATC	Enter and Perform OFN SB-008, INSTRUMENT MALFUNCTIONS SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS
	SRO, ATC, BOP	1. Check For Malfunction: ∗ Check If Secondary System Instrument Channel Is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel from table below

VARIABLE	CHANNEL	ATTACHMENT
S/G Pressure (AB)	P-514, P-515, P-516 P-524, P-525, P-526 P-534, P-535, P-536 P-544, P-545, P-546	ATTACHMENT C

CAUTION: SG steam pressure is an input to the thermal power program. A failed steam pressure channel could cause the thermal power program to be inaccurate.

NOTES:

- Steps C1 through C3 are Memory Action steps.
- A steam flow channel compensated by failed pressure channel will affect Main Feed pump speed until the failed channel is selected out.

Op-Test No.: ______ Scenario No.: 1 Event No.: 2 Page 6 of 26

Event Description: Steam Generator "A" steam pressure, AB PI-514A, fails low.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP, ATC	C1. Identify Failed Instrument Channel: • Compare S/G pressure Indications To Confirm S/G Pressure Channel Failure: o AB PI-514A For S/G A o AB PI-515A For S/G A o AB PI-516A For S/G A
	SRO, BOP	C2. Check If Failed S/G Pressure Channel Used For Feedwater Control: a. Identify steam flow channel compensated by failed pressure channel from table below:
	SRO, BOP	C2. b Check steam flow channel associated with failed steam pressure channel selected on SG STEAM FLOW CHANNEL SEL Switch EXAMINER NOTE: Selector switch AB FS-512C has F-512 selected. P-514 corresponds to F-512.
	SRO, BOP	C3. Check Main Feed Red Valves In Control: a. Place Affected SG MFW REG VLV CTRL – IN MANUAL ∗ AE FK-510 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow.**
	SRO, BOP	b. Adjust affected S/G MFW REG VLV CTRL, as necessary, to establish Steam Generator level at program. ∗ AE FK-510 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow.** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, BOP	C4. Select Alternate Steam Flow Channel On SG STEAM FLOW CHANNEL SEL Switch: • AB FS-512C EXAMINER NOTE: Channel F513 is selected as the alternate channel on switch AB FS-512C. MCB alarm 108C clears.

Table from step C2.a:

S/G	STEAM PRESSURE CHANNEL	ASSOCIATED STEAM FLOW CHANNEL
A	P-514 P-515	F-512 F-513

Op-Test No.: ______ Scenario No.: 1 Event No.: 2 Page 7 of 26

Event Description: Steam Generator "A" steam pressure, AB PI-514A, fails low.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	C5. Restore Affected SG MFW REG VLV CTRL To – AUTO EXAMINER NOTE: AUTO pushbutton depressed, restoring AE FK-510 to automatic control. MCB alarm 108B clears upon restoration of SG level to program band (45% - 55%).
	SRO	C6. Monitor The Following Technical Specifications LCOs And Comply With Action Statements, As Appropriate: • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION, Table 3.3.2-1, Functions 1.e And 4.e • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 7 • 3.3.3, POST ACCIDENT MONITORING INSTRUMENTATION, Table 3.3.3-1, Function 8 • 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION • 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION SRO identifies: • TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables). • TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D. • TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D.

EXAMINER NOTE: TS 3.3.6 and 3.3.7 may not be written down, because their actions are met by TS 3.3.2 Condition D. Their tables (3.3.6-1 and 3.3.7-1 function 4) state "Refer to L.C.O. 3.3.2, ESFAS Instrumentation, Function 3.a, for all initiation functions and requirements." Table 3.3.2-1, function 3.a.3. directs to Function 1. From there, Function 1.e Condition D is identified. TS 3.3.2 Condition D was previously identified due to the actual instrument failure.

	SRO, ATC, BOP	SRO may direct ATC/BOP to verify Containment purge supply and exhaust valves in closed position per TS 3.3.6 Condition A.

Event termination: Instrument failure identified and selected out; Main Feed Reg Valve back in AUTO; SRO identified applicable Technical Specifications or at Lead Examiner Discretion.

Simulator Operator: Insert Key 3 at direction of Lead Examiner.

Op-Test No.: ______	Scenario No.: 1	Event No.: 3	Page 8 of 26

Event Description: Pressurizer pressure instrument, BB PI-456, fails low.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 3 at direction of Lead Examiner. Diagnostics: Meter BB PI-456 fails low, MCB alarm 83C, RX PARTIAL TRIP, illuminates. Bistables PZR LP PB456C, PZR LP PORV BLOC PS456E, PZR LP PB456D illuminate. Bistable PZR PRESS PB456B extinguishes.		
	SRO, ATC, BOP	Crew diagnoses instrument failure.
	SRO, ATC	(SRO direction/Memory Action) RO compares indications, and PZR PRESS MASTER CTRL, BB PK-455A, placed in manual. EXAMINER NOTE: Channels P457/P456 are selected on PZR PRESS CTRL SEL, BB PS-455F.
	SRO, ATC	Enter and Perform OFN SB-008, INSTRUMENT MALFUNCTIONS SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS
	SRO, ATC	1. Check For Malfunction: ∗ Check If Reactor Coolant System Instrument Channel Or Controller Is Malfunctioning: a. Perform appropriate attachment or malfunctioning channel or controller from table below.

VARIABLE	CHANNELS	ATTACHMENT
PZR Pressure (BB)	P-455, P-456, P-457, P-458	ATTACHMENT K

Time	Position	Applicant's Actions or Behavior
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
NOTE: Steps K1 through K4 are Memory Action Steps.		
	SRO, ATC	K1. Identify Failed Instrument Channel: a. Compare pressurizer pressure indications to confirm a pressurizer pressure channel failure: • BB PI-455A • BB PI-456 • BB PI-457 • BB PI-458

Op-Test No.: ______ Scenario No.: 1 Event No.: 3 Page 9 of 26

Event Description: Pressurizer pressure instrument, BB PI-456, fails low.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	K2. Check Failed Pressurizer Pressure Channel Selected On PZR PRESS CTRL SEL switch • BB PS-455F EXAMINER NOTE: P457/P456 is selected for control. BB PI-456 failed low.
	SRO, ATC	K3. Place PZR PRESS MASTER CTRL In Manual And Control Pressure. • BB PK-455A
	SRO, ATC	K4. Select Alternate Pressurizer Pressure Channel On PZR PRESS CTRL SEL Switch • BB PS-455F EXAMINER NOTE: Select from channel P457/P456 to channel P455/P458
	SRO, ATC	K5. Take Following Actions, As Appropriate To Stop Pressure Control Transient: a. Check Pressurizer Spray Valves – RESPONDING CORRECTLY b. Check PZR Control Heaters - OPERABLE c. Ensure PZR PORV - CLOSED • BB HIS-455A • BB HIS-456A
	SRO, ATC	K6. Return Pressurizer Pressure Control To Automatic: • Spray Valves • Control Heaters • Backup Heaters • Open PORV Block Valves • Pressurizer Pressure Control EXAMINER NOTE: BB PK-455A is returned to AUTO control
	SRO, ATC	K7. Monitor Pressurizer Pressure Response To Ensure Proper Control
	SRO, ATC, BOP	K8. Check Failed Pressure Channel Not Selected On PZR PRESS RECORD SEL. • BB PS-455G K8. RNO. Select alternate pressurizer pressure channel for input to recorder.

NOTE: Pressurizer pressure channels PT-455 and PT-457 are input to subcooling margin monitor Train A. Pressurizer pressure channels PT-456 and PT-458 are inputs to subcooling margin monitor Train B. Selecting alternate pressure control channels does not alter inputs to the subcooling monitors. However, once the affected pressure transmitter fails above or below the calibrated limit it will automatically be removed from subcooling margin calculation.

Op-Test No.: ______	Scenario No.: 1	Event No.: 3	Page 10 of 26

Event Description: Pressurizer pressure instrument, BB PI-456, fails low.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	K9. Check Failed Pressure Channel Not Selected On OP DT/OT DT LOOP RECORD SEL Switch. • SC TS-411E K9 RNO. Select alternate pressurizer pressure channel for input to recorder.
	SRO	K10. Monitor The Following Technical Specification LCOs And Comply With Action Statements, As Appropriate: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 6 and 8 • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Table 3.3.2-1, Functions 1.d, 3.a.3, 5.d, 6.e And 8.b • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 3 • 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION • 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION SRO identifies: • TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Conditions E and M are entered (both are 72 hours to trip bistables). • TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, 1.d, 3.a.3, 5.d, 6.e and 8.b, Conditions D (1.d, 3.a.3, 5.d, 6.e: 72 hours to place channel in bypass) and L (one hour to verify P-11 interlock in correct state). • TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D. • TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D.
	SRO, ATC, BOP	Direct ATC/BOP to verify P-11 in the correct state. (correct state: NOT LIT) May direct ATC/BOP to verify Containment purge supply and exhaust valves in closed position per TS 3.3.6 Condition A.

Event termination: Instrument failure identified; Alternate channel selected; Pressurizer pressure control returned to AUTO; SRO identified applicable Technical Specifications or at Lead Examiner Discretion.

Simulator Operator: Insert Key 4 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 1 Event No.: 4 Page 11 of 26

Event Description: Main Feed Regulating Valve "D" fails closed; manual control available using controller AE FK-540.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 4 at direction of Lead Examiner. Diagnostics: SG D MFW REG VLV CTRL, AE FK-540, decreasing. MCB alarms 111C, SG D FLOW MISMATCH and 111B, SG D LEV DEV illuminate.		
	SRO, BOP	Crew diagnoses component failure.
	SRO, BOP	(SRO direction/Memory Action steps) SG D MFW REG VLV CTRL, AE FK-540, placed in Manual and UP arrow depressed to OPEN the Main Feed Reg Valve, matching steam and feed flows and restoring narrow range level to ~50% (or program value).
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
	SRO, BOP	Enter ALR 00-111B, rev 9, SG D LEV DEV SRO directs procedure.
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, ATC, BOP	1. Check Steam Generator D Controlling Level Channel: ∗ 5% GREATER THAN PROGRAM LEVEL OR ∗ 5% LESS THAN PROGRAM LEVEL
	SRO, ATC, BOP	2. Check Instruments – OPERATING PROPERLY • Steam Generator D Controlling Level Channel – WITHIN 6% OF REMAINING S/G D NARROW RANGE LEVEL CHANNELS ∗ AE LI-549 ∗ AE LI-554 • Steam Generator D Controlling Steam Pressure Channel – WITHIN 100 PSIG OF REMAINING CHANNELS ∗ AB PI-544A ∗ AB PI-545A • Steam Generator D Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL • Steam Generator D Controlling Steam Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL

Op-Test No.: ______ Scenario No.: 1 Event No.: 4 Page 12 of 26

Event Description: Main Feed Regulating Valve "D" fails closed; manual control available using controller AE FK-540.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	3. Restore Steam Generator D Level To Program Value: a. Check Feedwater Control Valve – INSERVICE TO FEED S/G D • AE FK-540 b. Place Feedwater Control Valve in manual. c. Adjust Feedwater Control Valve, as necessary, to maintain program value.
	SRO, BOP	4. Check Secondary Plant Conditions - STABLE
	SRO, BOP	5. Check For S/G D Tube Leakage: ∗ S/G D Level – INCREASING IN AN UNCONTROLLED MANNER OR ∗ Unexpected Rise In S/G D Level No, perform RNO 5 RNO. Return to procedure and step in effect.

Event termination: Component failure identified, Main Feed Reg Valve AE FK-540 in manual and S/G D level being maintained or at Lead Examiner Discretion.

Simulator Operator: Insert Key 5 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 13 of 26

Event Description: Major: Seismic event with an inadvertent Reactor trip and Safety Injection (SI) signal and a Loss of all Auxiliary Feedwater.

CT – Manual Main Turbine trip

Time	Position	Applicant's Actions or Behavior

Simulator Operator: Insert Key 5 at direction of Lead Examiner.
Diagnostics: Audible noise, various Main Control Board alarms: Seismic: 00-098D, OBE;
Safety Injection: Main Control Board alarms 00-030A, NF039A LOCA SEQ ACTUATED; 00-031A, NF039B LOCA SEQ ACTUATED.
Reactor trip: At DRPI – all rod bottom lights on the bottom.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	Enter EMG E-0, rev 31, REACTOR TRIP OR SAFETY INJECTION SRO directs EMG E-0. ATC and BOP perform Immediate Actions of EMG E-0.
	BOP	At Immediate Action step 2 of EMG E-0: Recognized Main Turbine did not trip. **CT – Manual Main Turbine trip. BOP depressed both MAIN TURBINE MASTER TRIP 'A' and 'B' pushbuttons: AC HS-002A and AC HS-002B.**

CAUTION: Accident conditions can cause higher than normal radiation levels. Health Physics monitoring may be required while performing local operator actions.

NOTES:
- Steps 1 through 4 are immediate action steps.
- Foldout page shall be monitored through out this procedure.

FOLDOUT PAGE CRITERIA

1. RCP TRIP CRITERIA
2. SI ACTUATIN CRITERIA
3. FAULTED S/G ISOLATIN CRITERIA
4. RUPTURED S/G ISOLATION CRITERIA
5. COLD LEG RECIRULATION CRITERIA
6. AFW SUPPLY SWITCHOVER CRITERIA

7 RCS TEMPERATURE CONTROL

- ∗ If a Loss-Of-Offsite Power has occurred, THEN close MSIVs.
  - ∗ AB HS-79
  - ∗ AB HS-80
- ∗ IF no RCPs are tunning AND off-site power is available, THEN select STM PRESS mode on the steam dumps.
  - AB US-500Z
- ∗ IF RCS C/L temperature is less than 557°F AND decreasing , THEN control total feed flow to limit cooldown.
  - Maintain total feed flow greater than 270, 000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	Per Foldout Criteria #7, BOP throttles AFW to S/Gs to greater than 270, 000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G.

Op-Test No.: ______ Scenario No.: 1 Event No.: 6 Page 14 of 26

Event Description: Main turbine fails to trip (auto), manual trip available.
CT – Manual Main Turbine trip

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	1. Verify Reactor Trip: a. Check all rod bottom lights - LIT b. Check reactor trip breakers and bypass breakers - OPEN c. Check intermediate range neutron flux - DECREASING
EXAMINER NOTE: During performance of Immediate Actions, BOP diagnosed the Main Turbine did not trip and depressed both MAIN TURBINE MASTER TRIP 'A' and 'B' pushbuttons: AC HS-002A and AC HS-002B. Diagnostics: Main Stop Valves are not closed.		
	SRO, BOP	2. Verify Turbine Trip: a. Check Main Stop Valves – ALL CLOSED; No, Perform RNO 2RNO a. Perform the following: 1. Manually trip turbine **CT – Manual Main Turbine trip** **BOP depressed both MAIN TURBINE MASTER TRIP 'A' and 'B' pushbuttons, AC HS-002A and AC HS-002B, in order to trip the Main Turbine.** EXAMINER NOTE: MCB alarms 113A, UNIT TRIP TURB TRIP and 114A, TURB TRIP, illuminate. Turbine is tripped and Main Stop valves are closed.
	SRO, ATC	<u>3.</u> Check AC Emergency Busses – AT LEAST ONE ENERGIZED ∗ NB01 – ENERGIZED ∗ NB02 - ENERGIZED
	SRO, ATC	4. Check If Safety Injection Is Actuated: a. Check any indication SI is actuated - LIT ∗ Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT ∗ Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT ∗ ESFAS status panel SI section – ANY WHITE LIGHTS LIT ∗ Partial rip Status Permissive/Block status panel – SI RED LIGHT LIT
	SRO, ATC	b. Check both trains of SI actuated • Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT • Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
EXAMINER NOTE: In the scenario, a MSLIS may occur based on the 100 psig in 50 second rate – and the MSIVs will be closed.		

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 15 of 26

Event Description: Major event continued.

Time	Position	Applicant's Actions or Behavior
CAUTION: If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	SRO, ATC, BOP	5. Check if SI is required: ∗ SI was manually actuated AND was required ∗ Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG ∗ RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG ∗ Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG No, SI is not required, Perform RNO
	SRO, ATC, BOP	RNO 5. Perform the following: a. Reset SI • SB HS-42A • SB HS-43A b. IF ONE OR BOTH trains of SI failed to reset, THEN perform OFN SB-044, FAILURE OF SI TO RESET while continuing with this procedure. c. Close BIT inlet valves • EM HIS-8803A • EM HIS-8803B d. Close BIT outlet valves • EM HIS-8801A • EM HIS-8801B e. Stop all but one CCP and place in standby. ∗ BG HIS-1A ∗ BG HIS-2A f. IF any CCP is running, THEN stop NCP. • BG HIS-3 g. IF condenser steam dumps are available, THEN ensure steam dumps control RCS Tave at 557°F h. IF condenser steam dumps are NOT available, THEN adjust at least one S/G ARV to 557°F (1090 psig setpoint)
EXAMINER NOTE: SRO may divide the ATC and BOP actions. ATC actions: Reset SI, Close BIT inlet and outlet valves; secure one running CCP (probably 'A') and the NCP. BOP actions: IF steam dumps available, BOP adjusts STEAM HDR PRESS CTRL, AB PK-507, to control RCS Tave at 557°F. IF steam dumps NOT available, BOP adjusts ARV at least one controller (AB PIC-1A, AB PIC-2A, AB PIC, 3A, AB PIC-4A) to control RCS Tave at 557°F.		

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 16 of 26

Event Description: Major event continued. Loss of all Auxiliary Feedwater

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	6. Check Main Generator Breakers And Exciter Breaker – OPEN • MA ZL-3A • MA Zl-4A • MA ZL-2
	SRO, ATC, BOP	7. Verify Automatic Actions Using Attachment F, AUTOMATIC SIGNAL VERIFICATION
Simulator Operator: At step 8 of EMG E-0 and at direction of Lead Examiner, insert Key 6. – Loss of all Auxiliary Feedwater. Diagnostics: MD AFP 'B' and TDAFW trip. Main Control Board alarm annunciate: 00-130A, MDAFP B TROUBLE		
	SRO, ATC, BOP	8. Check Total AFW Flow – GREATER THAN 270, 000 LBM/HR; No, Perform RNO
	SRO, ATC, BOP	8. RNO Perform the following: a. IF S/G narrow range level in at least one S/G is greater than 6% [29%], THEN control feed flow to maintain narrow range level and go to step 9. b. Manually start pumps and align valves as necessary to establish greater than 270, 000 lbm/hr AFW flow. c. IF total AFW flow greater than 270, 000 lbm/hr can NOT be established, THEN perform the following:
	SRO, ATC, BOP	1) Direct operator to monitor Critical Safety Functions using EMG F-0, CRITICAL SAFETY FUNCITON STATUS TREES (CSFST) 2) Ensure BIT Inlet AND Outlet Valves are open • EM HIS-8803A • EM HIS-8803B • EM HIS-8801A • EM HIS-8801B 3) Continue with Attachment F and Go to EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.
EXAMINER NOTE: The BIT inlet and outlet valves were closed at step 5RNO and are reopened at step 8 RNO.		

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 17 of 26

Event Description: EMG E-0, REACTOR TRIP OR SAFETY INJECTION ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F1. Check AC Emergency Busses – ENERGIZED • NB01 – ENERGIZED • NB02 - ENERGIZED
	ATC, BOP	F2. Verify Feedwater Isolation a. Main feedwater pumps - TRIPPED • Annunciator 00-120A, MFP A TRIP – LIT • Annunciator 00-123A, MFP B TRIP – LIT b. Main feedwater reg valves - CLOSED • AE ZL-510 for S/G A • AE ZL-520 for S/G B • AE ZL-530 for S/G C • AE ZL-540 for S/G D c. Main feedwater reg bypass valves - CLOSED • AE ZL-550 for S/G A • AE ZL-560 for S/G B • AE ZL-570 for S/G C • AE ZL-580 for S/G D d. Main feedwater isolation valves – CLOSED • AE HIS-39 for S/G A • AE HIS-40 for S/G B • AE HIS-41 for S/G C • AE HIS-42 for S/G D e. Main feedwater chemical injection valves – CLOSED • AE HIS-43 for S/G A • AE HIS-44 for S/G B • AE HIS-45 for S/G C • AE HIS-46 for S/G D f. Check ESFAS status panel SGBSIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train
	ATC. BOP	F3. Verify Containment Isolation Phase A: a. Check ESFAS status panel CISA section – ALL WHITE LIGHTS LIT • Red train • Yellow train

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 18 of 26

Event Description: ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION continued

<table>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td></td><td>ATC, BOP</td><td>F4. Verify AFW Pumps Running:
a. Check motor driven AFW pumps – BOTH RUNNING; No perform RNO

F4 RNO a. Manually start pumps
• AL HIS-22A
• AL HIS-23A (tagged out)

EXAMINER NOTE: MD AFW ‘B’ and TDAFW pumps are tripped when Key 6 is inserted. SRO may give permission to attempt one start. No AFW pumps will start.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Simulator Operator: If dispatched as Building watch(es) to determine status of AFW pumps, report the following:
MDAFW pump ‘A’ is tagged out and MD AFW ‘B’ breaker will not reset.
TDAFW pump linkage broke on the overspeed trip device.

If WWM contacted, acknowledge request and report a team will be formed.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>ATC, BOP</td><td>F4 b. Check turbine driven AFW pump – RUNNING; No, Perform RNO

F4 RNO b. Perform the following:
1) Check if turbine driven AFW should be running:
∗ At least 2/4 S/G narrow range level channels on 2/4 S/Gs – LESS THAN 23.5% OR
∗ Loss on NB01 voltage has occurred OR
∗ Loss of NB02 voltage has occurred OR
∗ AMSAC actuation
2) IF turbine driven AFW pump should be running, THEN manually open steam supply valves
a. AB HIS-5A
b. AB HIS-6A
c. FC HIS-312A</td></tr>
<tr><td></td><td>ATC, BOP</td><td>F5. Verify ECCS Pumps Running:
a. Check CCPs – BOTH RUNNING; If No, Perform RNO

F5 RNO a. Perform ONE of the following:
∗ IF ONE CCP was secured due to an inadvertent safety injection signal, THEN go to step F5.b. OR
∗ IF BOTH CCPs should be running, THEN manually start both pumps.
• BG HIS-1A
• BG HIS-2A</td></tr>
</table>

Op-Test No.: ______ Scenario No.: 1 Event No.: 7 Page 19 of 26

Event Description: ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION continued

Containment Coolers 'A' and 'C' not running in SLOW speed. See Step F8 RNO.

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F5. b. Check SI pumps – BOTH RUNNING; No, Perform RNO F5. c. Check RHR pumps – BOTH RUNNING; No Perform RNO
EXAMINER NOTE: Recall the SIPs and RHR pumps are tripped and are unable to be started. SRO may give permission to attempt one start. Pumps will not start.		
	ATC, BOP	F6. Verify CCW Alignment a. Check CCW pumps – ONE RUNNING IN EACH TRAIN b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN ∗ EG ZL-15 AND EG ZL-53 OR ∗ EG ZL-16 AND EG ZL-54
	ATC, BOP	F7. Check ESW Pumps – BOTH RUNNING
	ATC, BOP	F8. Check Containment Fan Coolers – RUNNING IN SLOW SPEED; No, Perform RNO F8 RNO. Perform the following for each Containment Cooler Fan that is still running in Fast or is not running: a. Place Containment Cooler Fan Speed Selector switches in Slow ∗ GN HS-5 for cooler 1A ∗ GN HS-9 for cooler 1B ∗ GN HS-13 for cooler 1C ∗ GN HS-17 for cooler 1D b. Manually start containment cooler fans. ∗ GN HIS-5 for cooler 1A ∗ GN HIS-9 for cooler 1B ∗ GN HIS-13 for cooler 1C ∗ GN HIS-17 for cooler 1D EXAMINER NOTE: ATC/BOP must perform RNO for Containment Fan Coolers 'A' and 'C'.
	ATC, BOP	F9. Verify Containment Purge Isolation: a. Check ESFAS status panel CPIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train

Op-Test No.: ______	Scenario No.: 1	Event No.: 5

Event Description: ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION continued

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F10. Verify Both Trains Of Control Room Ventilation Isolation: a. Check ESFAS status panel CRIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train b. Ensure Control Room outer door - CLOSED
	ATC, BOP	F11. Verify Main Steamline Isolation Not Required: a. Check containment pressure – HAS REMAINED LESS THAN 17 PSIG • GN PR-934 b. Check either condition below - SATISFIED ∗ Low steamline pressure SI – NOT BLOCKED AND steam line pressure – HAS REMAINED GREATER THAN 615 PSIG OR ∗ Low steamline pressure SI – BLOCKED AND steamline pressure rate – HAS REMAINED LESS THAN 100 PSI/50 SEC
	ATC, BOP	F12. Verify Containment Spray Not Required: a. Containment pressure – HAS REMAINED LESS THAN 27 PSIG: • Annunciator 00-059A, CSAS - NOT LIT • Annunciator 00-059B, CISB – NOT LIT • GN PR-934
	ATC, BOP	F13. Verify ECCS Flow: a. Check Centrifugal Charging Pumps TO Boron Injection Tank Flow meters – FLOW INDICATED • EM FI-917A • EM FI-917B b. Check RCS pressure – LESS THAN 1700 PSIG; No, Perform RNO F13 RNO b. Go to Step F14.
	ATC, BOP	F14. Verify AFW Valves – PROPERLY ALIGNED: a. Check ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 21 of 26

Event Description: ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION continued

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F15. Verify SI Valves – PROPERLY ALIGNED a. Check ESFAS status panel SIS section – SYSTEM LEVEL WHITE LIGHTS ALL LIT • Red train • Yellow train
	ATC, BOP	F16. Check If NCP Should Be Stopped: a. CCPs – ANY RUNNING b. Stop NCP • BG HIS-3
	ATC, BOP	F17. Return To Procedure And Step In Effect

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 22 of 26

Event Description: EMG FR-H1, rev 29A, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Time	**Position**	**Applicant's Actions or Behavior**
EXAMINER NOTE: No Transition Brief should occur.		
CATUIONS • If total feed flow is less than 270, 000 lbm/hr due to operator action, this procedure shall not be performed. • If a non-faulted S/G is available, fed flow shall not be re-established to any faulted S/G. NOTE: Foldout page shall be monitored throughout this procedure.		
	SRO, ATC, BOP	Enter EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK. SRO directs EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.
	SRO, ATC	1. Check If Secondary Heat Sink Is Required: a. RCS Pressure – GREATER THAN ANY NON-FAULTED S/G PRESSURE b. RCS Hot Leg Temperature – GREATER THAN 350°F
	SRO, BOP	2. Check If RCS Bleed And Feed – NOT REQUIRED a. Check Wide Range Level In At Least Two S/G's – GREATER THAN OR EQUAL TO 12% [28%] ∗ AE LI-501, SG A WR LEV ∗ AE LI-502, SG B WR LEV ∗ AE LI-503, SG C WR LEV ∗ AE LI-504, SG D WR LEV
	SRO, ATC, BOP	3. Try To Establish AFW Flow To At Least One S/G a. Check ESFAS Status Panel SGBSIS Section – ALL WHITE LIGHTS LIT • Red Train • Yellow Train b. Check Control Room indications for cause of AFW failure: • CST Level • Motor Driven AFW Pump Power Supply • Turbine Driven AFW Pump Steam Supply • AFW Valve Alignment c. Try to restore AFW flow.

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 23 of 26

Event Description: EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Time	Position	Applicant's Actions or Behavior
Simulator Operator: If contacted as Building watch: MDAFW pump 'A' is tagged out and MD AFW 'B' breaker will not reset. TDAFW pump linkage broke on the overspeed trip device. If contacted as WWM: Acknowledge request; a team will be formed.		
	SRO, BOP	4. Check Total Flow To S/Gs – GREATER THAN 270, 000 LBM/HR; No, Perform RNO 4 RNO Perform the following: a. IF feed flow to at least one S/G can be verified, THEN perform the following: NO – move to b. b. IF feed flow can NOT be verified to at least one S/G, THEN perform the following 1) Dispatch operator to locally restore AFW flow. 2) IF all AFW flow has been lost, THEN close AFW throttle valves to prevent inadvertent feedwater addition to a hot/dry S/G. • AL HK-8A And AL HK-7A For SG A • AL HK-10A And AL HK-9A For SG B • AL HK-12A And AL HK-11A For SG C • AL HK-6A And AL HK-5A For SG D 3) Go to step 6.
Simulator Operator: Building watch has already reported AFW pump status.		
	SRO, ATC	6. Reduce Heat Input To RCS: a. Stop all RCPs • BB HIS-37 For RCP A • BB HIS-38 For RCP B • BB HIS-39 For RCP C • BB HIS-40 For RCP D b. Turn off all PZR heaters • BB HIS-50 • BB HIS-51A • BB HIS-52A

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 24 of 26

Event Description: EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

CT – FR-H1-A: to restore AFW to SG's

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	7. Establish S/G Pressure Control: a. Check Condenser – AVAILABLE; If No, Perform RNO • C-9 LIT • MSIV – OPEN • Circulating Water Pumps – RUNNING 7.a. RNO a. Perform the following: 1) Use the S/G ARVs. 2) Go to step 8. 7. b. Place Steam Header Pressure Control in manual. • AB PK-507 7. c. Manually set Steam Header Pressure Control output to zero • AB PK-507 7. d. Place Steam Dump Select Switch in STEAM PRESS position. • AB US-500Z 7. e. Place Steam Header Pressure Control in automatic. • AB PK-507
	SRO, BOP, ATC	8. Establish Flow From Non-Safety Related AFW Pump: a. Start non-safety AFW Pump per SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION
EXAMINER NOTE: SYS AP-122 procedure steps – on the next page.		
	SRO, BOP	**b. Open TD AFWP Flow Control Valves to establish total AFW flow to S/Gs greater than 270, 000 lbm/hr.** • **AL HK-8A for SG A** • **AL HK-10A For S/G B** • **AL HK-12A For S/G C** • **AL HK-6A For S/G D** **CT – FR-H1-A: to restore AFW to SG's; see EXAMINER NOTE.**
	SRO, ATC, BOP	c. Go to step 17.

EXAMINER NOTE: When actions of SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION, are complete, turbine driven flow control valves are opened to establish AFW flow to S/Gs greater than 270, 000 lbm/hr. Opening the valves to establish AFW flow to the Steam Generators completes the critical task. AFW flow can be monitored using NPIS, or meters AL FI-2A, AFW TO SG A FLOW, AL FI-3A, AFW TO SG B FLOW, AL FI-4A, AFW TO SG C FLOW and AL FI-1A, AFW TO SG D FLOW.

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 25 of 26

Event Description: SYS AP-122, rev 0, NON-SAFETY AUX FEED PUMP OPERATION

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	SYS AP-122, NON-SAFETY AUX FEED PUMP OPERATION 6.1 Starting NSAFP
	SRO, BOP	6.1.1 Place COND HOTWELL M/U LEV CTRL in manual and close. • AD LIC-79B – MANUAL/ CLOSED
	SRO, BOP	6.1.2 Locally start NSAFWP per ATTACHMENT B, Local Operations To Feed SGs With NSAFP.

EXAMINER NOTE: ATTACHMENT B is all local operator actions. The Simulator Operator inserts Key 7 to perform the actions.

Simulator Operator: As Building watch, acknowledge request. Insert Key 7 to locally start non-safety AFW pump. Report back when actions are completed.

	SRO, BOP	6.1.3 Return to the EMG/OFN in use.
	SRO, BOP	6.1.4 Section 6.1, Starting NSAFP, complete.

Op-Test No.: ______ Scenario No.: 1 Event No.: 5 Page 26 of 26

Event Description: EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	17. Check S/G Levels: a. Check RCS Bleed And Feed – NOT ESTABLISHED b. Check Narrow Range Level In At Least One S/G – GREATER THAN 6% [29]; No, Perform RNO
	SRO, ATC, BOP	17. b. RNO b. Perform the following: 1) Verify flow to S/Gs: a. Core Exit Temperatures – STABLE OR DECREASING b. Level In At Least One S/G – INCREASING ∗ Wide Range OR ∗ Narrow Range 2) IF feedwater flow to at least one S/G can NOT be verified, THEN go to step 18. 3) IF feedwater flow to as least one S/G verified, THEN maintain flow to restore narrow range level to greater than 6% [29%] while returning to procedure and step in effect.
EXAMINER NOTE: NPIS computer can be used to monitor core exit temperatures.		
EXAMINER NOTE: Scenario termination criteria: AFW has been established to the Steam Generators per EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, completion of all critical tasks or at Lead Examiner discretion.		
Simulator Operator: At direction of Lead Examiner, FREEZE simulator. Do not reset until directed from Lead Examiner. Collect any data needed.		

Facility: ____Wolf Creek_________ Scenario No.: ___3___ Op-Test No.: _______

Examiners: ____________________________ Operators: ____________________________

Initial Conditions: ~2% power – startup in progress. Beginning of Life.

Turnover: Crew across the hall is being briefed to continue power escalation. Your crew tasked to maintain current plant conditions stable steady state. GEN 00-003, HOT STANDBY TO MINIMUM LOAD, in progress at step 6.39. Main Turbine is not synced to the grid. Pre-heating in service.

Event No.	Malf. No.	Event Type*	Event Description
1	mBB21C	I SRO ATC	Pressurizer (PZR) pressure channel, BB PI-457, fails high. Technical Specification (TS) 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Condition E (72 hours to trip bistables) are identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.d, 3.a.3, 5.d, 6.e, and 8.b, Condition D (72 hours to trip bistables) and Condition L (one hour to verify interlock P-11 in correct state) are identified. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 condition D TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 condition D OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment K.

2	mAE15D3	I SRO BOP	Steam Generator “D” level channel, AE LI-549 (controlling channel), fails low. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 14 Condition E (72 hours to trip bistables) is identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 5.c and 6.d are identified. Conditions I and D (72 hours to trip bistables) respectively. ALR 00-111B, SG D LEV DEV or ALR 00-111A, SG D LEV HILO and/or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment F.
3	bkrPB00301	C SRO ATC	Normal Charging Pump (NCP) trip. ALR 00-042E, CHARGING PMP TROUBLE
4	mAB07B	C SRO BOP	Steam Generator “B” Atmospheric Relief Valve (ARV) fails open, manual closure available. TS 3.7.4, ATMOSPHERIC RELIEF VALVES (ARVs), Condition A (7 days to restore to OPERABLE status). AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7, or OFN AB-041, STEAM LINE OR FEEDLINE LEAK. Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly.
5	mAB04B	M SRO ATC BOP	“B” Steam Line break outside Containment. **(Critical Task (CT) - E-2-A)** OFN AB-041, STEAM LINE OR FEEDLINE LEAK, EMG E-0, REACTOR TRIP OR SAFETY INJECTION, EMG E-2, FAULTED STEAM GENERATOR ISOLATION. Time Critical Action (TCA): Isolate Auxiliary Feedwater to a faulted Steam Generator following a Steam Line Break event within twenty minutes (AI 21-016, OPERATOR TIMED CRITICAL ACTION VALIDATION, Attachment A, Time Critical Action List.)

6	mNB01 mEF05A	C SRO ATC	Preloaded and post trip: Emergency Bus NB01 trips, Emergency Diesel Generator (EDG) “A” starts and loads. **(CT – E-0-L)** Essential Service Water (ESW) “A” autostart failure, manual start available. AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F. Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly.
7	bkrDPEG01B mEG14D	C SRO ATC	Preloaded and post trip: Component Cooling Water (CCW) trip of “B” pump. CCW “D” autostart defeated, manual start available. **(CT – E-0-K)** AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F. Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SCENARIO SUMMARY

Turnover and Initial Conditions: ~2% power – startup in progress. Beginning of Life. Crew across the hall is being briefed to continue power escalation. Your crew tasked to maintain current plant conditions stable steady state. GEN 00-003, HOT STANDBY TO MINIMUM LOAD, in progress at step 6.39. Main Turbine is not synced to the grid. Pre-heating in service.

Event 1: Pressurizer (PZR) pressure channel, BB PI-457, fails high. The crew identifies and diagnoses the failure and enters OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment K, PZR Pressure Malfunction, is used to identify and mitigate the instrument failure. Memory Action steps are performed by the ATC (identify failed channel, select manual on PZR Pressure Master Controller, control pressure and select out the failed channel). Technical Specifications are identified by the SRO. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Condition E (72 hours to trip bistables) are identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.d, 3.a.3, 5.d, 6.e, and 8.b, Condition D (72 hours to trip bistables) and Condition L (one hour to verify interlock P-11 in correct state) are identified. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION and TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION are entered.

Event 2: Steam Generator “D” controlling level channel, AE LI-549, fails low. The crew identifies and diagnoses the level channel failure and enters Alarm Response procedure ALR 00-111B, SG D LEV DEV or ALR 00-111A, SG D LEV HILO and/or OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment F, S/G Level Channel Malfunction, is used to identify and mitigate the instrument failure. Memory Action steps are performed by the BOP (identify the failed instrument, place “D” Feed Regulating Bypass Valve in manual and control Steam Generator level manually). Technical Specifications are identified by the SRO. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 14 Condition E (72 hours to trip bistables) is identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 5.c and 6.d are identified. Conditions I and D (72 hours to trip bistables) are entered respectively.

Event 3: Normal Charging Pump (NCP) trip. The crew identifies and diagnoses the NCP trip and enters ALR 00-042E, CHARGING PMP TROUBLE, to mitigate the component failure. A Memory Action is performed by the ATC (isolate letdown by closing any open Letdown Orifice Isolation valves). A Centrifugal Charging pump is started and letdown re-established per actions of ALR 00-042E.

Event 4: Steam Generator “B” Atmospheric Relief Valve (ARV) fails open, manual closure available. The crew identifies and diagnoses the failure. The BOP closes the open ARV using AB-PIC-2A, SG B STEAM DUMP TO ATMS CTRL, per procedure AP 15C-003, step 6.1.7 or OFN AB-041, STEAM LINE OR FEEDLINE LEAK, step 5. Technical Specifications are identified by the SRO. TS 3.7.4, ATMOSPHERIC RELIEF VALVES (ARVs), Condition A (7 days to restore to OPERABLE status).

AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7, allows the Operator to take manual control of components not performing their intended function.

Event 5: Major event: A 1.2 E+6 lb/hr “B” Steam Line break outside Containment occurs. The crew identifies the Steam Line break outside Containment and may enter OFN AB-041, STEAM LINE OR FEEDLINE BREAK, to mitigate the consequences; however, a Reactor trip and Safety Injection are required and performed. The crew enters EMG E-0, REACTOR TRIP OR SAFETY INJECTION. The

Main Steam Isolation Valves are closed, and Steam Generator “B” is identified as the faulted Steam Generator. Auxiliary Feedwater is isolated to the faulted Steam Generator per EMG E-0 REACTOR TRIP OR SAFETY INJECTION’s Foldout page criteria #3, Faulted S/G Isolation Criteria. The crew transitions to EMG E-2, FAULTED STEAM GENERATOR ISOLATION and based on plant conditions transitions to EMG ES-03, SI TERMINATION or EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

Critical Task (CT) E-2-A is performed. (Isolate the faulted SG before a severe (orange-path) challenge develops and before the end of the scenario.)

Event 6: Post trip, Emergency Bus NB01 trips, Emergency Diesel Generator (EDG) “A” starts and loads. Essential Service Water (ESW) “A” autostart failure, manual start available. The ATC diagnoses ESW “A” must be started in order to supply cooling water to EDG “A” and the NB01 loads. ESW “A” is started using handswitch EF HIS-55A per AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, Automatic Signal Verification, step F7 RNO.

Critical Task E-0-L is performed. (Manually start at least the minimum required number of ESW pumps in an operating safeguards train before required Diesel Generator(s) trip or before the end of the scenario.).

Event 7: Post trip: Component Cooling Water (CCW) “B” pump trips. CCW “D” autostart is defeated, however manual start available using handswitch EG HIS-24. The ATC diagnoses the lack of running Component Cooling Water pumps. CCW “D” pump must be started in order to supply cooling water to safeguard components e.g. Centrifugal Charging Pump oil coolers, Safety Injection pump oil coolers etc.

AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, Automatic Signal Verification, step F6 RNO.

Critical Task E-0-K is performed. (Manually start at least one CCW pump in the train with required ECCS equipment operating before the end of the scenario.).

SCENARIO TERMINATION

Successful mitigation of the scenario requires the faulted Steam Generator is isolated and based on plant conditions, transition to EMG ES-03, SI TERMINATION or EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

CRITICAL TASKS (CT):

Event 5: E-2-A: Isolate the faulted SG before a severe (orange-path) challenge develops and before the end of the scenario. Auxiliary Feedwater is isolated to the faulted Steam Generator per EMG E-0 REACTOR TRIP OR SAFETY INJECTION’s Foldout page criteria #3, Faulted S/G Isolation Criteria. When the crew transitions to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, actions will be performed to ensure the faulted Steam Generator is isolated.

Event 6: E-0-L: Manually start at least the minimum required number of ESW pumps in an operating safeguards train before required Diesel Generator(s) trip or before the end of the scenario. ESW “A” pump is started.

Event 7: E-0-K: Manually start at least one CCW pump in the train with required ECCS equipment operating before the end of the scenario. “Bravo” train CCW pump “D” is started.

TECHNICAL SPECIFICATIONS:
Event 1: Pressurizer (PZR) pressure channel, BB PI-457, fails high.

- TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Condition E (72 hours to trip bistables) are identified.
- TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.d, 3.a.3, 5.d, 6.e, and 8.b, Condition D (72 hours to trip bistables) and Condition L (one hour to verify interlock P-11 in correct state) are identified.
- TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.
- TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.

Event 2: Steam Generator “D” controlling level channel, AE LI-549, fails low. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 14 Condition E (72 hours to trip bistables) is identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 5.c and 6.d are identified. Conditions I and D (72 hours to trip bistables) are entered respectively.

Event 4: Steam Generator “B” Atmospheric Relief Valve (ARV) fails open, manual closure available. TS 3.7.4, ATMOSPHERIC RELIEF VALVES (ARVs), Condition A (7 days to restore to OPERABLE status).

PRA/PSA: On March 31, 2013, NE 13-0022 provided the Notice of Probabilistic Risk Assessment (PRA) Model Revision 6.

Scenario	PRA application	Description
Scenario 1	Top Operator Action	Failure to Enter EMG FR-H1 Note: Crew does enter EMG FR-H1 and the success path is to feed the S/Gs using the NSAFW pump.
Scenario 2	Core Damage Frequency (CDF) by Initiating Event Large Early Release Frequency (LERF) by Initiating Event	Switchyard centered LOOP Note: This event is complicated when the only available EDG experiences a fuel failure and the crew enters EMG C-0.
Scenario 3	Core Damage Frequency (CDF) by Initiating Event	Large steamline break outside CTMT

TIME CRITICAL/TIME SENSITIVE ACTIONS:
Per AI 21-016, OPERATOR TIME CRITICAL ACTIONS VALIDATION, form AIF 21-016-02, Time Verification Form, will be used to capture the completion time and routed to Operations Support and Safety Analysis for review.

Time Critical Action (TCA): Isolate Auxiliary Feedwater to a faulted Steam Generator following a Steam Line Break event within twenty minutes (AI 21-016, OPERATOR TIMED CRITICAL ACTION VALIDATION, Attachment A, Time Critical Action List.)

Op-Test No.: ______ Scenario No.: 3 Event No.: 1 Page 1 of 35

Event Description: Pressurizer (PZR) pressure channel, BB PI-457, fails high.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td colspan="3">Simulator Operator: Insert Key 1 at Lead Examiner direction.

Diagnostics: Meter for Pressurizer (PZR) pressure BB PI-457 increasing; PZR Spray valves opening, RCS/PZR pressure decreasing (entry into DNB Technical Specification (TS) 3.4.1 Condition A); Main Control Board (MCB) alarms 00-033B. PZR HI PRESS DEV, 00-035B, PORV OPEN, 00-083C, RX PARTIAL TRIP annunciates; Bistable PZR HP PB 457A illuminates</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC</td><td>Crew diagnoses instrument failure.
ATC performs Memory Action steps of OFN SB-008, INSTRUMENT MALFUNCTIONS, ATTACHMENT K, PZR PRESSURE MALFUNCTION.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>ATC</td><td>(SRO direction/Memory Action) PZR pressure Instrument BB PI-457 failed high. Determined it is selected for control on PZR PRESS CTRL SEL BB PS-455F; Placed PZR PRESS MASTER CTRL, BB PK-455A in Manual and depressed the UP arrow pushbutton to restore pressure (Spray valves will close).</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC, BOP</td><td>Enter and Perform OFN SB-008, rev 34, INSTRUMENT MALFUNCTIONS
SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC</td><td>1. Check for malfunction:
* Check If Reactor Coolant System Instrument Channel Or Controller Is Malfunctioning:
a. Perform appropriate attachment for malfunctioning channel or controller from table below:
<table><tr><td>Variable</td><td>Channels</td><td>Attachment</td></tr><tr><td>PZR Pressure (BB)</td><td>P-455, P-456, P-457, P-458</td><td>Attachment K</td></tr></table></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.</td></tr>
<tr><td colspan="3">NOTE: Steps K1 and K3 are Memory Action steps.</td></tr>
<tr><td></td><td>SRO, ATC</td><td>K1. Identify Failed Instrument Channel:
a. Compare pressurizer pressure indications to confirm a pressure channel failure:
• BB PI-455A
• BB PI-456
• BB PI-457
• BB PI-458</td></tr>
</table>

Op-Test No.: ______ Scenario No.: 3 Event No.: 1 Page 2 of 35

Event Description: Pressurizer (PZR) pressure channel, BB PI-457, fails high.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	K2. Check Failed Pressurizer Pressure Channel Selected On PZR PRESS CTRL SEL Switch • BB PS-455F
	SRO, ATC	K3. Place PZR PRESS MASTER CTRL In Manual And Control Pressure. • BB PK-455A
	SRO, ATC	K4. Select Alternate Pressurizer Pressure Channel On PZR PRESS CTRL SEL Switch • BB PS-455F EXAMINER NOTE: ATC selects either P455/P456 or P455/P458 for control.
	SRO, ATC	K5. Take Following Actions: As Appropriate To Stop Pressure Control Transient: a. Check Pressurizer Spray Valves – RESPONDING CORRECTLY b. Check PZR Control Heaters - OPERABLE c. Ensure PZR PORV - CLOSED • BB HIS-455A • BB HIS-456A
	SRO, ATC	K6. Return Pressurizer Pressure Control To Automatic: • Spray Valves • Control Heaters • Backup Heaters • Open PORV Block Valves • Pressurizer Pressure Control AT SRO direction, ATC restores BB PK-455A to AUTO.
EXAMINER NOTE: As pressure recovers, and Block valves open, alarm 34C clears. As PZR pressure recovers and returns to normal operating band, Crew announces exit of DNB (TS 3.4.1.)		
	SRO, ATC	K7. Monitor Pressurizer Pressure Response To Ensure Proper Control
	SRO, ATC	K8. Check Failed Pressure Channel Not Selected on PZR PRESS RECORD SEL. • BB PS-455G; If No, Perform RNO K8. RNO Select alternate pressurizer pressure channel for input to recorder.

Op-Test No.: ______ Scenario No.: 3 Event No.: 1 Page 3 of 35

Event Description: Pressurizer (PZR) pressure channel, BB PI-457, fails high.

Time	Position	Applicant's Actions or Behavior
NOTE: Pressurizer pressure channels PT-455 and PT-457 are input to subcooling margin monitor Train A. Pressurizer pressure channels PT-456 and PT-458 are inputs to subcooling margin monitor Train B. Selecting alternate pressure control channel does not alter inputs to the subcooling monitors. However, once the affected pressure transmitter fails above or below the calibrated limit it will automatically be removed from the subcooling margin calculation.		
	SRO, ATC, BOP	K9. Check Failed Pressure Channel Not Selected On OP DT/OT DT LOOP RECORD SEL Switch • SC TS-411E; If No, Perform RNO K9. RNO Select alternate pressurizer pressure channel for input to recorder.
	SRO	K10. Monitor The Following Technical Specification LCOs An Comply With Action Statements, As Appropriate: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Functions 6 And 8 • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION, Table 3.3.2-1, Functions 1.d, 3.a.3, 5.d, 6.e, And 8.b • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 3 • 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION • 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION SRO identifies: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 6 and 8, Condition E (72 hours to trip bistables) are identified. • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.d, 3.a.3, 5.d, 6.e, and 8.b, Condition D (72 hours to trip bistables) and Condition L (one hour to verify interlock P-11 in correct state) are identified. • TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D. • TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D.

Op-Test No.: ______ Scenario No.: 3 Event No.: 1

Event Description: Pressurizer (PZR) pressure channel, BB PI-457, fails high.

Time	**Position**	**Applicant's Actions or Behavior**
	SRO, ATC, BOP	SRO directs ATC/BOP to verify P-11 interlock in correct state within one hour. EXAMINER NOTE: Correct state: P-11 light NOT LIT. SRO may direct ATC/BOP to verify Containment purge supply and exhaust valves in closed position per TS 3.3.6 Condition A.
EXAMINER NOTE: TS 3.3.6 and 3.3.7 may not be written down, because their actions are met by TS 3.3.2 Condition D. Their tables (3.3.6-1 and 3.3.7-1 function 4) state "Refer to L.C.O. 3.3.2, ESFAS Instrumentation, Function 3.a, for all initiation functions and requirements." Table 3.3.2-1, function 3.a.3. directs to Function 1. From there, Function 1.e Condition D is identified. TS 3.3.2 Condition D was previously identified due to the actual instrument failure.		
Event termination: Instrument failure identified; SRO identified applicable Technical Specifications or at Lead Examiner Discretion. Simulator Operator: Insert Key 2 at direction of Lead Examiner.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 2 Page 5 of 35

Event Description: Steam Generator 'D' level channel, AE LI-549 (controlling channel), fails low.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 2 at direction of Lead Examiner. Diagnostics: Meter SG D LEV AE LI-549 decreasing; MCB alarms 00-111B, SG D LEV DEV and 00-111A, SG D LEV HILO annunciate. Steam Generator D Main Feed Reg Bypass Valve AE LK-530 opening.		
	SRO, ATC, BOP	Crew diagnoses instrument failure. BOP performs Memory Actions of either ALR 00-111B, SG D LEV DEV; 00-111A, SG D LEV HILO; or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment F, S/G LEVEL CHANNEL MALFUNCTION.
	BOP	(SRO direction/Memory Action) Places SG D MFW REG BYPASS VLV, AE LK-580, in Manual and depresses the DOWN ARROW pushbutton to match steam and feed flow, restoring Steam Generator level. EXAMINER NOTE: SG D STEAM/FW FLOW/LEV, AE FR-540, may be used.
EXAMINER NOTE: ALRs 111B and 111A Operator Actions are very similar. ALR 111A is presented first as it is the higher tier alarm.		
	SRO, BOP	Enter and perform ALR 00-111A, rev 7A, SG D LEV HILO. SRO directs ALR 00-111A, SG D LEV HILO
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO BOP	1. Check Steam Generator D Controlling Level Channel: ∗ Less Than 30% OR ∗ Greater Than 70%
	SRO, ATC, BOP	2. Check Instruments – OPERATING PROPERLY a. Steam Generator D Controlling Level Channel – WITHIN 7% OF REMAINING S/G D LEVEL CHANNELS; No, Perform RNO ∗ AE LI-549 ∗ AE LI-554
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		

Op-Test No.: ______	Scenario No.: 3	Event No.: 2	Page 6 of 35

Event Description: Steam Generator 'D' level channel, AE LI-549 (controlling channel), fails low.

Time	**Position**	**Applicant's Actions or Behavior**
	SRO, BOP	2. RNO Perform the following: 1. Place Feedwater Reg Valve or Feedwater Reg Bypass Control Valve in manual. ∗ AE FK-540 ∗ AE LK-580 2. Adjust Feedwater Reg Valve or Feedwater Reg Bypass Control Valve, as necessary, to establish steam generator level at program value. ∗ AE FK-540 ∗ AE LK-580 3. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, step 1. EXAMINER NOTE: BOP placed AE LK-580 in Manual and depresses the DOWN ARROW pushbutton to match steam and feed flow, restoring Steam Generator level.
EXAMINER NOTE: ALR 00-111B, rev 9, SG D LEV DEV, is presented.		
	SRO, BOP	Enter and perform ALR 00-111B, SG D LEV DEV. SRO directs ALR 00-111B, SG D LEV DEV.
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, BOP	1. Check Steam Generator D Controlling Level Channel: ∗ 5% GREATER THAN PROGRAM LEVEL OR ∗ 5% LESS THAN PORGRAM LEVEL
	SRO, ATC, BOP	2. Check Instruments - OPERATING PROPERLY • Steam Generator D Controlling Level Channel – WITHIN 6% OF REMAINING S/G D NARROW RANGE LEVEL CHANNELS; No, Perform RNO ∗ AE LI-549 ∗ AE LI-554 • Steam Generator D Controlling Steam Pressure Channel – WITHIN 100 PSIG OF REMAINING S/G D NARROW RANGE LEVEL CHANNELS ∗ AB PI-544A ∗ AB PI-545A • Steam Generator D Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL • Steam Generator D Controlling Steam Flow Channel - WITHIN 0.2 MPPH OF OTHER CHANNEL

Op-Test No.: ______ Scenario No.: 3 Event No.: 2 Page 7 of 35

Event Description: Steam Generator 'D' level channel, AE LI-549 (controlling channel), fails low.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>SRO, BOP</td><td>2. RNO Perform the following:
a. Place Feedwater Reg Valve or Feedwater Reg Bypass Control Valve in manual.
∗ AE FK-540
∗ AE LK-580
b. Adjust Feedwater Reg Valve or Feedwater Reg Bypass Control Valve, as necessary, to establish Steam Generator level at program value.
∗ AE FK-540
∗ AE LK-580
c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, step 1.

EXAMINER NOTE: BOP placed AE LK-580 in Manual and depresses the DOWN ARROW pushbutton to match steam and feed flow, restoring Steam Generator level.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">EXAMINER NOTE: OFN SB-008, INSTRUMENT MALFUNCTIONS, may be entered directly.</td></tr>
<tr><td></td><td>SRO, BOP, ATC</td><td>Enter and Perform OFN SB-008, INSTRUMENT MALFUNCTIONS
SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, BOP</td><td>1. Check For Malfunction:
∗ Check If Secondary System Instrument Channel Is Malfunctioning:
a. Perform appropriate attachment for malfunctioning channel from table below
<table>
<tr><th>VARIABLE</th><th>CHANNEL</th><th>ATTACHMENT</th></tr>
<tr><td rowspan="3">S/G LEVEL (AE)</td><td>CONTROL CHANNELS
L-519, L-529, L-539, L-549, L-551, L-552, L-553, L-554</td><td rowspan="3">ATTACHMENT F</td></tr>
<tr><td>PROTECTION CHANNELS
L-517, L-518, L-527, L-528, L-537, L-538, L-547, L-548</td></tr>
<tr><td>WIDE RANGE CHANNELS
L-501, L-502, L-503, L-504</td></tr>
</table>
</td></tr>
</table>

Op-Test No.: ______ Scenario No.: 3 Event No.: 2 Page 8 of 35

Event Description: Steam Generator ‘D’ level channel, AE LI-549 (controlling channel), fails low.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td colspan="3">NOTE: Steps F1 through F3 are Memory Action steps.</td></tr>
<tr><td></td><td>SRO, BOP, ATC</td><td>F1. Identify Failed Narrow Range S/G Level Instrument Channel:
a. Compare narrow range S/G level indications to confirm a narrow range S/G level channel failure:
<table>
<tr><th>S/G</th><th>INDICATION</th><th>FUNCTION</th></tr>
<tr><td>D</td><td>AE LI-547
AE LI-548
AE LI-549
AE LI-554</td><td>Indication
Indication
Control
Control</td></tr>
</table></td></tr>
<tr><td></td><td>SRO, BOP</td><td>F2. Check Failed S/G Level Channel Selected On SG LEV CHANNEL SEL Switch
∗ AE LS-519C
∗ AE LS-529C
∗ AE LS-539C
∗ AE LS-549C</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, BOP</td><td>F3. Check Main Feed Reg Valve In Control; No, Perform RNO</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, BOP</td><td>F3 RNO Perform the following:
1. Place Affected SG MFW REG BYPASS CTRL – IN MANUAL
∗ AE LK-550
∗ AE LK-560
∗ AE LK-570
∗ AE LK-580
2. Adjust affected SG MFW REG BYPASS CTRL, as necessary, to establish Steam Generator level at program.
∗ AE LK-550
∗ AE LK-560
∗ AE LK-570
∗ AE LK-580

EXAMINER NOTE: BOP placed AE LK-580 in Manual and depresses the DOWN ARROW pushbutton to match steam and feed flow, restoring Steam Generator level.</td></tr>
</table>

Op-Test No.: ______ Scenario No.: 3 Event No.: 2 Page 9 of 35

Event Description: Steam Generator ‘D’ level channel, AE LI-549 (controlling channel), fails low.

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	F4. Select Alternate S/G Level Channel On SG LEV CHANNEL SEL Switch: * AE LS-519C * AE LS-529C * AE LS-539C * AE LS-549C EXAMINER NOTE: BOP selects channel L554 on SG D LEV CHANNEL SEL, AE LS-549C. Alarm 111A clears when alternate channel selected.
	SRO, BOP	F5. Restore Affected S/G MFW REG VLV CTRL To – AUTO EXAMINER NOTE: SRO may leave in Manual with BOP controlling level at program (45% - 55%). SRO may take a procedure variance and return the Bypass FRV to AUTO.
	SRO	F6. Monitor The Following Technical Specifications For LCOs And Comply With Action Statements, As Appropriate: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Function 14 • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION, Table 3.3.2-1, Functions 5.c And 6.d • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 8 • 3.3.3, ACCIDENT MONITORING INSTRUMENTATION, Table 3.3.3-1, Function 13 SRO identifies: TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 14 Condition E (72 hours to trip bistables) is identified. TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 5.c and 6.d are identified. Conditions I and D (72 hours to trip bistables) respectively.

Event termination: Instrument failure identified; SRO identified applicable Technical Specifications or at Lead Examiner Discretion.

Simulator Operator: Insert Key 3 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 3 Event No.: 3 Page 10 of 35

Event Description: Normal Charging Pump (NCP) trip.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td colspan="3">Simulator Operator: Insert Key 3 at direction of Lead Examiner.

Diagnostics: When NCP trips, MCB alarms 00-042A, CHG LINE FLOW HILO, 00-042E, CHARGING PUMP TROUBLE and 00-041E, SEAL INJ TO RCP FLOW LO annunciate.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">EXAMINER NOTE: ALR 00-042A, rev 15, CHG LINE FLOW HILO, the higher tier alarm, is included just in case the SRO enters it. ALR 42A directs the crew to ALR 42E at step 1 RNO.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC, BOP</td><td>Crew diagnoses component failure.
ALR 00-042A, CHG LINE FLOW HILO, entered.
SRO directs ALR 00-042A, CHG LINE FLOW HILO</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>ATC</td><td>(SRO direction/Memory Action) Close Letdown Orifice Isolation valves.
CLOSE pushbuttons for LTDN ORIFICE B VLV, BG HIS-8149BA and LTDN ORIFICE A VLV, BG HIS-8149AA, are depressed.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">CAUTION: If gas binding of pumps is suspected, performance of OFN BG-045, GAS BINDING OF CCPS OR SI PUMPS, should be considered.

NOTE: Step 1 is a Memory Action step.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC</td><td>1. Check Charging Pumps – ANY RUNNING; No, Perform RNO
* BG HIS-1A For CCP A
* BG HIS-2A For CCP B
* BG HIS-3 For NCP</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC</td><td>1 RNO Perform the following:
a. Close Letdown Orifice Isolation valves:
• BG HIS-8149AA
• BG HIS-8149BA
• BG HIS-8149CA
b. Go to ALR 00-042E, CHARGING PUMP TROUBLE.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status. If contacted as Electrical Maintenance, acknowledge request.</td></tr>
</table>

Op-Test No.: ______ Scenario No.: 3 Event No.: 3 Page 11 of 35

Event Description: Normal Charging Pump (NCP) trip.

ALR 00-042E, CHARGING PUMP TROUBLE

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	Crew diagnoses component failure. ALR 00-042E, rev 12, CHARGING PUMP TROUBLE, entered. SRO directs ALR 00-042E, CHARGING PUMP TROUBLE
	ATC	(SRO direction/Memory Actions) Determine NCP tripped and no charging pumps are running. Close Letdown Orifice Isolation valves: CLOSE pushbuttons for LTDN ORIFICE B VLV, BG HIS-8149BA and LTDN ORIFICE A VLV, BG HIS-8149AA, are depressed.
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, ATC	1. Check Previously Running Charging Pump - TRIPPED • BG HIS-1A For CCP A • BG HIS-2A For CCP B • BG HIS-3 For NCP
	SRO, ATC	2. Check Charging Pumps – NONE RUNNING • BG HIS-1A For CCP A • BG HIS-2A For CCP B • BG HIS-3 For NCP
	SRO, ATC	3. Close Letdown Orifice Isolation Valves. • BG HIS-8149AA • BG HIS-8149BA • BG HIS-8149CA
	SRO, ATC	4. Contact Electrical Maintenance To Determine Cause Of Pump Trip.
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status. If contacted as Electrical Maintenance, acknowledge request.		
CAUTION: If gas binding of pumps is suspected, performance of OFN BG-045, GAS BINDING OF CCPS OR SI PUMPS, should be considered. NOTE: Total pump flow should be maintained above 175 gpm to minimize the effects of low flow cavitation.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 3 Page 12 of 35

Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	5. Establish Charging Flow: a. Check RC Temperature – GREATER THAN 350°F b. Start CCP aligned for normal charging. ∗ BG HIS-1A For CCP A ∗ BG HIS-2A For CCP B EXAMINER NOTE: ATC should start CCP 'B.'
	SRO, ATC	5.c. Go to step 6
	SRO, ATC	6. Ensure RCP Seal Injection – BETWEEN 8 GPM AND 13 GPM EACH RCP • BG FR-157 For RCP A • BG FR-156 For RCP B • BG FR-155 For RCP C • BG FR-154 For RCP D
EXAMINER NOTE: To adjust seal flow, ATC uses CCP DISCH FLOW CTRL, BG FK-121 and CHG HDR BACK PRESS CTRL, BG HC-182. Nearby meters BG FI-215B, CHG PUMP TO RCP SEAL FLOW or BG FI-215A, CHG PUMP TO RCP SEAL FLOW, are used to monitor seal flow adjustment.		
	SRO, ATC	7. Reestablish Letdown a. Check RCS Letdown To Regen HX valves open. • BG HIS-459 • BG HIS-460
	SRO, ATC	b. Place letdown HX Outlet Pressure Control in manual. • BG PK-131
	SRO, ATC	c. Open Letdown HX Outlet Pressure Control between 90% and 100%. • BG PK-131
	SRO, ATC	d. Open desired Letdown Orifice Isolation Valve(s). ∗ BG HIS-8149AA ∗ BG HIS-8149BA ∗ BG HIS-8149CA EXAMINER NOTE: At a minimum, a 75-gpm orifice is opened, e.g. BG HIS-8149AA or BG HIS-8149BA. Since 120 gpm letdown at start of scenario, the CRS directs 120 gpm letdown restored.

Op-Test No.: ______ Scenario No.: 3 Event No.: 3 Page 13 of 35

Event Description: Normal Charging Pump (NCP) trip.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	e. Adjust Letdown HX Outlet Pressure Control to establish Letdown HX Outlet Pressure between 340 psig and 360 psig. • BG PI-131
	SRO, ATC	f. Place Letdown HX Outlet Pressure Control in auto. • BG PK-131
	SRO, ATC	8. Check Charging Header Flow And Letdown Flow – BALANCED; If No, Perform RNO 8. RNO. Adjust charging and letdown, as necessary, to maintain PZR level at program value.
	SRO, ATC	9. Verify CCP Adequate Flow: a. Check CCPs – ANY RUNNING ∗ BG HIS-1A For CCP A ∗ BG HIS-2A For CCP B b. Check CCP Recirc Valve - OPEN ∗ BG HIS-8110 For CCP A ∗ BG HIS-8111 For CCP B
	SRO	10. Ensure Compliance With Technical Specifications And TRM: a. Check Plant – IN MODES 1, 2 OR 3 b. Refer to TR 3.1.9 and Technical Specification 3.5.2 EXAMINER NOTE: Neither TR 3.1.9 or TS 3.5.2 apply.
	SRO	11. Return To Procedure And Step In Effect.

Event termination: CCP 'A' or 'B' running, Letdown restored, PZR level trending to program value; or at Lead Examiner Discretion.

Simulator Operator: Insert Key 4 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 3 Event No.: 4 Page 14 of 35

Event Description: Steam Generator “B” Atmospheric Relief Valve (ARV) fails open, manual closure available.

Time	Position	Applicant’s Actions or Behavior
Simulator Operator: Insert Key 4 at direction of Lead Examiner. Diagnostics: Audible noise, Steam dumps closing, ‘B’ ARV indications OPEN (SG B STEAM DUMP TO ATMS AB ZL-2A – Red light LIT), RCS/PZR temperature decreasing, PZR pressure decreasing.		
	SRO, ATC, BOP	Crew diagnoses component failure. SRO directs BOP to manually close ARV ‘B’
	BOP	At SG B STEAM DUMP TO ATMS CTRL, AB PIC, 2A, depresses the MAN pushbutton. Using the joystick lever, moves it to the left, to 0 output, CLOSING the ‘B’ ARV. EXAMINER NOTE: ‘B’ ARV indications CLOSE (SG B STEAM DUMP TO ATMS AB ZL-2A – Green light LIT)
EXAMINER NOTE: Per AP 15C-003, rev 29, step 6.1.7, the Operator should take manual control when components are not performing correctly.		
EXAMINER NOTE: Included is procedure guidance from OFN AB-041, rev 3A, STEAMLINE OR FEEDLINE LEAK. Step 5 identifies and closes the open ARV.		
	SRO, ATC, BOP	Crew diagnoses component failure. Crew enters procedure OFN AB-041, STEAMLINE OR FEEDLINE LEAK. SRO directs OFN AB-041, STEAMLINE OR FEEDLINE LEAK.
CAUTION: Caution is necessary when locating steam leaks. Leakage from high temperature, high pressure systems may not be visible. NOTE: When the leak location is identified, an announcement should be made, the area should be evacuated and flagged off to prevent entry.		
	SRO, ATC	1. Check Reactor Power – LESS THAN 100% • SE NI-41B • SE NI-42B • SE NI-43B • SE NI-44B

Op-Test No.: ______ Scenario No.: 3 Event No.: 4 Page 15 of 35

Event Description: Steam Generator "B" Atmospheric Relief Valve (ARV) fails open, manual closure available

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	2. Check Steam Generator Levels, - STABLE OR TRENDING TO PROGRAM
	SRO, ATC	3. Check Tref/Tavg Deviation – LESS THAN 3°F • 00-065D – NOT LIT
	SRO, BOP	4. Check Condenser Hot Well Level – STABLE OR INCREASING • AD LI-114
	SRO, BOP	5. Ensure SG ARVs – CLOSED and RNO • AB PIC-1A For S/G A • AB PIC-2A For S/G B • AB PIC-3A For S/G C • AB PIC-4A For S/G A At SG B STEAM DUMP TO ATMS CTRL, AB PIC, 2A, depresses the MAN pushbutton. Using the joystick lever, moves it to the left, to 0 output, CLOSING the 'B' ARV. EXAMINER NOTE: 'B' ARV indications CLOSE (SG B STEAM DUMP TO ATMS AB ZL-2A – Green light LIT)
	SRO, BOP	5. RNO Perform the following: a. IF any valve can NOT be closed, THEN dispatch operator to locally isolate affected S/G ARV. (MAIN STEAM ENCLOSURE ABOVE GRATING) • AB-V018 For S/G A • AB-V040 For S/G B • AB-V029 For S/G C • AB-V007 For S/G D b. Refer to Tech Spec 3.7.4
	SRO	SRO refers to Technical Specification 3.7.4 SRO identifies: TS 3.7.4, ATMOSPHERIC RELIEF VALVES (ARVs), Condition A (7 days to restore to OPERABLE status).

Event termination: 'B' ARV in manual and closed and SRO identified applicable Technical Specification or at Lead Examiner Discretion.

Simulator Operator: Insert Key 5 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 16 of 35

Event Description: Major event: 'B' Steamline break outside Containment

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 5 at direction of Lead Examiner. (Leak size is 1.2 E+6 lb/hr ramped in over three minutes) Diagnostics: Increased audible noise, Steam dumps closing, RCS temperature decreasing, RCS/PZR pressure decreasing. Main Control Board alarm: 00-096C, TURB BLD SUMP LEV HI.		
	SRO, ATC, BOP	Crew diagnoses steam line break. Crew may enter OFN AB-041, STEAM LINE OR FEEDLINE BREAK. Based on plant conditions, Crew determines a manual reactor trip is required. SRO directs reactor trip. Crew enters EMG E-0, rev 31, REACTOR TRIP OR SAFETY INJECTION. ATC and BOP perform Immediate Actions. EXAMINER NOTE: If SRO doesn't direct a manual Safety Injection (SI) actuation, an automatic SI occurs on steam line pressure 615 psig.
EXAMINER NOTE: While the ATC and BOP are required to know all Immediate Action steps, the ATC performs Immediate Action steps 1, 3, and 4 whereas the BOP performs Immediate Action step 2. Immediate Action steps are performed prior to the reading aloud of EMG E-0, REACTOR TRIP OR SAFETY INJECTION.		
CAUTION: Accident conditions can cause higher tan normal radiation levels. Health Physics monitoring may be required while performing local operator actions. NOTES: • Steps 1 through 4 are immediate action steps. • Foldout page shall be monitored throughout this procedure.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 17 of 35

Event Description: Major event: ‘B’ Steamline break outside Containment

Critical Task (CT): E-2-A - Isolate the faulted SG before a severe (orange-path) challenge develops and before the end of the scenario.

Time	Position	Applicant’s Actions or Behavior

FOLDOUT PAGE CRITERIA

1. RCP TRIP CRITERIA
2. SI ACTUATION CRITERIA
3. FAULTED S/G ISOLATION CRITERIA

   IF any S/G pressure decreasing in an uncontrolled manner OR any S/G is completely depressurized, THEN perform the following:

   a. Close main steam isolation valves
   b. Isolate feed flow to faulted S/G(s).
   c. Maintain total feed flow greater than 270, 000 lbm/hr until NR level in at least one S/G is greater than 6% [29%}
4. RUPTURED S/G ISOLATION CRITERIA
5. COLD LEG RECIRCULATIN CRITERIA
6. AFW SUPPLY SWITCHOVER CRITERIA
7. RCS TEMPERATURE CONTROL
   - IF a Loss-Of-Offsite Power has occurred, THEN close MSIVs.
     - AB HS-79
     - AB HS-80
   - IF no RCPs are running AND off-site power is available, THEN select STM PRESS mode on the steam dumps.
     - AB US-500Z.
   - IF RCS C/L temperature is less than 557°F AND decreasing, THEN control total feed flow to limit RCS cooldown.
   - Maintain total feed flow greater than 270, 000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G

EXAMINER NOTE: Simulator Operator will collect Time Critical data for Time Critical Task, Isolate AFW to Faulted Steam Generator.

EXAMINER NOTE: Once BOP Immediate Actions are complete and reported complete to the SRO, the BOP is directed to perform Foldout Page Criteria #3, FAULTED S/G ISOLATION CRITERIA, to isolate the faulted Steam Generator. Once the MSIV’s are closed, and based on higher steam flow, Steam Generator ‘B’ will be diagnosed as the faulted Steam Generator. Auxiliary Feedwater (AFW) flow is isolated to the faulted Steam Generator.

The BOP will also perform Foldout Page Criteria #7, RCS TEMPERATURE CONTROL, maintaining AFW to Steam Generators ‘A’, ‘C’ and ‘D’.

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	FAULTED S/G ISOLATION CRITERIA: Isolate Steam Generator ‘B’ Depress either MS ISO VLVS AB HS-79 or AB HS-80 to close the MSIVs. **CT E-2-A: Close AL HK-9A, SG B MD AFP AFW REG VLV CTRL and AL HK-10A, SG B TD AFP AFW REG VLV CTRL, move lever to left, 0 output displayed, CLOSED Green light LIT, isolating AFW to the faulted Steam Generator.**

Op-Test No.: ______ Scenario No.: 3 Event No.: 6 Page 18 of 35

Event Description: Start Essential Service Water (ESW) Pump ‘A’

CT - E-0-L: Manually start at least the minimum required number of ESW pumps in an operating safeguards train before required Diesel Generator(s) trip or before the end of the scenario.

Time	Position	Applicant’s Actions or Behavior
EXAMINER NOTE: After Immediate Actions completed by ATC, the ATC should identify that Essential Service Water (ESW) pump ‘A’ is not running. ESW ‘A’ is needed to provide cooling water to the Emergency Diesel Generator ‘A’ – running and loaded onto NB01 bus. The SRO directs the ATC to start ESW pump ‘A’. EXAMINER NOTE: The pump is started per AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, Automatic Signal Verification, step F7 RNO.		
	SRO, ATC	**Manipulate ESW PUMP A handswitch EF HIS-55A to RUN position, starting ESW ‘A’ pump.** **CT E-0-L: Manually start at least the minimum required number of ESW pumps in an operating safeguards train before required Diesel Generator(s) trip or before the end of the scenario.**

Op-Test No.: ______ Scenario No.: 3 Event No.: 7

Event Description: Start Component Cooling Water (CCW) Pump ‘D’

CT - E-0-K: Manually start at least one CCW pump in the train with required ECCS equipment operating before the end of the scenario.

Time	Position	Applicant’s Actions or Behavior
EXAMINER NOTE: After Immediate Actions completed by ATC, the ATC should identify that Component Cooling Water (CCW) Pump ‘B’ tripped and CCW Pump ‘D’ did not autostart. CCW ‘D’ is needed to provide cooling water to safeguards loads. The SRO may direct the ATC to start CCW pump ‘D’ or wait until the step in Attachment F, Automatic Signal Verification. EXAMINER NOTE: The pump is started per AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, Automatic Signal Verification, step F6 RNO.		
	SRO, ATC	**Manipulate CCW PUMP D handswitch EG HIS-24 to RUN position, starting CCW ‘D’ pump.** **CT E-0-K: Manually start at least one CCW pump in the train with required ECCS equipment operating before the end of the scenario.**

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 20 of 35

Event Description: Major event: ‘B’ Steamline break outside Containment

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC	1. Verify Reactor Trip: a. Check all rod bottom lights - LIT b. Check reactor trip breakers and bypass breakers - OPEN • SB ZL-1 • SB ZL-2 • SB ZL-3 • SB ZL-4 c. Check intermediate range neutron flux - DECREASING • SE NI-35B [GAMMA METRICS] • SE NI-36B [GAMMA METRICS]
	SRO, BOP	2. Verify turbine Trip: a. Check Main Stop Valves – ALL CLOSED
	SRO, ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED * NB01 – ENERGIZED * NB02 - ENERGIZED
EXAMINER NOTE: NB01 is energized by its EDG. NB02 is energized by offsite power.		
	SRO, ATC	4. Check If Safety Injection Is Actuated: a. Check any indication SI is actuated - LIT * Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT * Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT * ESFAS status panel SIS section – ANY WHITE LIGHTS LIT * Partial Trip Status Permissive/ Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated. • Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT • Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
EXAMINER NOTE: The crew may have decided to actuate Safety Injection (SI) earlier. It will automatically occur based on Steam line pressure.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 21 of 35

Event Description: Major event: 'B' Steamline break outside Containment

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	**Position**	**Applicant's Actions or Behavior**
CAUTION: If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	SRO, ATC, BOP	5. Check if SI is required: * SI was manually actuated AND was required * Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG * RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG * Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG
	SRO, BOP	6. Check Main Generator Breakers And Exciter Breaker – OPEN • MA ZL-3A • MA ZL-4A • MB ZL-2
	SRO, ATC, BOP	7. Verify Automatic Actions Using Attachment F, AUTOMATIC SIGNAL VERIFICATION
	SRO, BOP	8. Check Total AFW Flow – GREATHER THAN 270, 000 LBM/HR
EXAMINER NOTE: AFW is isolated to Steam Generator 'B'. Steam Generator levels recover faster at low power.		
	SRO, BOP	9. Check RCS Cold Leg Temperatures; If No, Perform RNO * Stable at or trending to 557°F for condenser steam dumps * Stable at or trending to 561°F for S/G ARVs * Stable at or trending to 557°F for S/G ARVs if recovering from an inadvertent SI.

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 22 of 35

Event Description: Major event: ‘B’ Steamline break outside Containment

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	9. RNO Perform the following: a. IF temperature is less than setpoint and decreasing, THEN perform the following: 1. Stop dumping steam. 2. IF any MSIV is open, THEN close Main Turbine Stop And Control Valves Startup Drains. • AC HIS-134 3. IF cooldown continues, THEN control total feed flow to limit RCS cooldown. Maintain total feed flow greater than 270, 000 lbm/hr until narrow range level greater than 6% [29%] in at least one S/G. 4. IF cooldown continues due to excessive steam flow, THEN isolate main steamlines by depressing MS ISO VLV ALL CLOSE pushbutton(s). ∗ AB HS-79 ∗ AB HS-80 b. IF temperature is greater than setpoint and increasing, THEN perform one of the following: ∗ Dump steam to condenser ∗ Dump steam using S/G ARV.
	SRO, BOP	10. Establish S/G Pressure Control: a. Check condenser – AVAILABLE; No, Perform RNO • C-9 LIT • MSIV – OPEN • Circulating water pumps – RUNNING 10. RNO a. Perform the following: 1. Use S/G ARVs. 2. Go to Step 11.
	SRO, ATC, BOP	11. Check PZR PORVs a. Check PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A b. Power to block valves - AVAILABLE • BB HIS-8000A • BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 23 of 35

Event Description: Major event: 'B' Steamline break outside Containment

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	12. Check Normal PZR Spray Valves – CLOSED • BB ZL-455B • BB ZL-455C
	SRO, ATC, BOP	13. Check PZR Safety Valves – CLOSED • BB ZL-8010A • BB ZL-8010B • BB ZL-8010C
NOTE: Seal injection flow shall be maintained to all RCPs.		
	SRO, ATC, BOP	14. Check If RCPs Should Be Stopped: a. Check RCPs – ANY RUNNING b. Check RCS pressure – LESS THAN 1400 PSIG; No, Perform RNO 14. b. RNO b. Go to step 15
	SRO	15. Direct Operator To Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST).
	SRO, BOP	16. Check If S/Gs Are Not Faulted: a. Check pressure in all S/Gs - • NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER • NO S/G COMPLETELY DEPRESSURIZED No, Perform RNO EXAMINER NOTE:S/G B is decreasing pressure in an uncontrolled manner and will eventually be completely depressurized. 16. RNO a. Perform the following: 1. Ensure BIT Inlet and Outlet Valves are open • EM HIS-8803A • EM HIS-8803B • EM HIS-8801A • EM HIS-8801B 2. Go to EMG E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 24 of 35

Event Description: EMG E-0 REACTOR TRIP OR SAFETY INJECTION, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F1. Check AC Emergency Busses – ENERGIZED • NB01 – ENERGIZED • NB02 - ENERGIZED
	ATC, BOP	F2. Verify Feedwater Isolation a. Main feedwater pumps - TRIPPED • Annunciator 00-120A, MFP A TRIP – LIT • Annunciator 00-123A, MFP B TRIP – LIT b. Main feedwater reg valves - CLOSED • AE ZL-510 for S/G A • AE ZL-520 for S/G B • AE ZL-530 for S/G C • AE ZL-540 for S/G D c. Main feedwater reg bypass valves - CLOSED • AE ZL-550 for S/G A • AE ZL-560 for S/G B • AE ZL-570 for S/G C • AE ZL-580 for S/G D d. Main feedwater isolation valves – CLOSED • AE HIS-39 for S/G A • AE HIS-40 for S/G B • AE HIS-41 for S/G C • AE HIS-42 for S/G D e. Main feedwater chemical injection valves – CLOSED • AE HIS-43 for S/G A • AE HIS-44 for S/G B • AE HIS-45 for S/G C • AE HIS-46 for S/G D f. Check ESFAS status panel SGBSIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train
	ATC. BOP	F3. Verify Containment Isolation Phase A: a. Check ESFAS status panel CISA section – ALL WHITE LIGHTS LIT • Red train • Yellow train

Op-Test No.: ____ Scenario No.: 3 Event No.: 6 and 7 Page 25 of 35

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

CT – E-0-K: Manually start at least one CCW pump in the train with required ECCS equipment operating before the end of the scenario.

CT – E-0-L: Manually start at least the minimum required number of ESW pumps in an operating safeguards train before required Diesel Generator(s) trip or before the end of the scenario,

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F4. Verify AFW Pumps Running: a. Check motor driven AFW pumps – BOTH RUNNING b. Check turbine driven AFW pump - RUNNING
	ATC, BOP	F5. Verify ECCS Pumps Running: a. Check CCPs – BOTH RUNNING b. Check SI pumps – BOTH RUNNING c. Check RHR pumps – BOTH RUNNING
	ATC, BOP	F6. Verify CCW Alignment: a. Check CCW pumps – ONE RUNNING IN EACH TRAIN; No, Perform RNO F6. a. RNO a. Manually start CCW pumps as necessary to establish one running in each train. • EG HIS 21 or EGHSI-23 for red train • EG HIS-22 or EG HIS-24 for yellow train **CT – E-0-K: ATC/BOP starts CCW 'D' pump by taking handswitch EG HIS-24 to RUN.**
	ATC, BOP	F6 Verify CCW Alignment b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN ∗ EG ZL-15 AND EG ZL-53 OR ∗ EG ZL-16 AND EG ZL-54
	ATC, BOP	F7. Check ESW Pumps – BOTH RUNNING; No, Perform RNO F7 RNO Manually start pumps. • EF HIS-55A • EF HIS-56A **CT – E-0-L: ATC/BOP starts ESW 'A' pump by taking handswitch EF HIS-55A to RUN.**

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 26 of 35

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F8. Check Containment Fan Coolers – RUNNING IN SLOW SPEED
	ATC, BOP	F9. Verify Containment Purge Isolation: a. Check ESFAS status panel CPIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train
	ATC, BOP	F10. Verify Both Trains Of Control Room Ventilation Isolation: a. Check ESFAS status panel CRIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train b. Ensure Control Room outer door - CLOSED
	ATC, BOP	F11. Verify Main Steamline Isolation Not Required: a. Check containment pressure – HAS REMAINED LESS THAN 17 PSIG • GN PR-934 b. Check either condition below - SATISFIED * Low steamline pressure SI – NOT BLOCKED AND steam line pressure – HAS REMAINED GREATER THAN 615 PSIG OR * Low steamline pressure SI – BLOCKED AND steamline pressure rate – HAS REMAINED LESS THAN 100 PSI/50 SEC
	ATC, BOP	F12. Verify Containment Spray Not Required: a. Containment pressure – HAS REMAINED LESS THAN 27 PSIG: • Annunciator 00-059A, CSAS - NOT LIT • Annunciator 00-059B, CISB – NOT LIT • GN PR-934
	ATC, BOP	F13. Verify ECCS Flow: a. Check Centrifugal Charging Pumps TO Boron Injection Tank Flow meters – FLOW INDICATED • EM FI-917A • EM FI-917B b. Check RCS pressure – LESS THAN 1700 PSIG; No, Perform RNO F13 RNO b. Go to Step F14.

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 27 of 35

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F14. Verify AFW Valves – PROPERLY ALIGNED: a. Check ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT
	ATC, BOP	F15. Verify SI Valves – PROPERLY ALIGNED a. Check ESFAS status panel SIS section – SYSTEM LEVEL WHITE LIGHTS ALL LIT • Red train • Yellow train
	ATC, BOP	F16. Check If NCP Should Be Stopped: a. CCPs – ANY RUNNING b. Stop NCP • BG HIS-3
	ATC, BOP	F17. Return To Procedure And Step In Effect

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 28 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	**Position**	**Applicant's Actions or Behavior**
EXAMINER NOTE: While waiting for Attachment F completion, SRO may lead a Transition Brief prior to entry into EMG E-2, rev 17, FAULTED STEAM GENERATOR ISOLATION.		
CAUTIONS • At least on S/G shall be maintained available for RCS cooldown. • If any faulted S/G or secondary break is not needed for RCS cooldown, it shall remain isolated during subsequent recovery actions. NOTE: Foldout page shall be monitored throughout this procedure.		
FOLDOUT PAGE CRITERIA 1. RCP TRIP CRITERIA 2. RCS TEMPERATURE CONTROL CRITERIA WHEN uncontrolled RCS cooldown has stopped, THEN control steam flow and feed flow as necessary to maintain stable RCS hot leg temperatures 3. COLD LEG RECIRULATION CRITERIA 4. AFW SUPPLY SWITCHOVER CRITERIA		
	SRO, BOP	1. Check Steamlines On All S/Gs - ISOLATED a. Ensure Main Steamline Isolation Valve(s) - CLOSED • AB HIS-14 For S/G A • AB HIS-17 For S/G B • AB HIS-20 For S/G C • AB HIS-11 For S/G D b. Ensure Main Steamline Isolation Bypass Valves - CLOSED • AB ZL-15A For S/G A • AB ZL-18A For S/G B • AB ZL-21A For S/G C • AB ZL-12A For S/G D c. Ensure Main Steamline Low Point Drain Valve(s) - CLOSED • AB HIS-9 For S/G A • AB HIS-8 For S/G B • AB HIS-7 For S/G C • AB HIS-10 For S/G D

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 29 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	2.Check If Limitations For Fault In Area 5 Are Required: a. Check if steam is issuing from vent openings at 2000 foot elevation on south end of Turbine Building. b. Warn local operators of adverse conditions in main steam enclosure. c. Use S/G ARV pressure indicating controllers on RL006 for S/G pressure indication during subsequent recovery actions. d. Use pressure and flow indications to determine valve position for valves located in the main steam enclosure. e. Do not reset AFAS-TD until Turbine Driven AFW Pump shutdown is required. f. Use manual initiation of AFAS-TD, as necessary, to restart Turbine Driven AFW Pump.
Simulator Operator: Respond as Building Watch – steam is issuing from vent opening at 2000 ft elevation, south end of Turbine Building.		
EXAMINER NOTE: RCS pressure will be cycling on the PORV.		
	SRO, BOP	3. Check If Any S/G Is Not Faulted: a. Check pressure in all S/Gs: ∗ ANY S/G PRESSURE STABLE OR ∗ ANY S/G PRESSURE INCREASING EXAMINER NOTE: S/Gs ‘A’, ‘C’ and ‘D’ are not faulted.
	SRO, BOP	4. Identify Faulted S/Gs: a. Check pressure in all SGs: ∗ ANY S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER OR ∗ ANY S/G COMPLETELY DEPRESSURIZED EXAMINER NOTE: S/G ‘B’ pressure is decreasing in an uncontrolled manner.
CAUTION: If the Turbine Driven AFW Pump is the only available source of feed flow, steam supply to the Turbine Driven AFW Pump must be maintained from at least one S/G.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 30 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Critical Task (CT): E-2-A - Isolate the faulted SG before a severe (orange-path) challenge develops and before the end of the scenario. This CT was performed earlier in EMG E-0.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	5. Isolate Faulted S/G(s): a. Close affected S/G(s) MD AFP Flow Control Valve(s). ∗ AL HK-7A For S/G A ∗ **AL HK-9A For S/G B** ∗ AL HK-11A For S/G C ∗ AL HK-5A For S/G D b. Close affected S/G(s) TD AFWP Flow Control Valve(s). ∗ AL HK-8A For S/G A ∗ **AL HK-10A For S/G B** ∗ AL HK-12A For S/G C ∗ AL HK-6A For S/G D c. Locally close steam supply to Turbine Driven AFW Pump from ruptured S/G(s). ∗ AB-V085 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING) ∗ AB-V087 For S/G C (MAIN STEAM ENCLOSURE BELOW GRATING) d. Ensure S/G ARV on faulted S/G(s) - CLOSED ∗ AB PIC-1A For S/G A ∗ AB PIC-2A For S/G B ∗ AB PIC-3A For S/G C ∗ AB PIC-4A For S/G D **CT E-2-A: AL HK-9A, AL HK-10A are closed (move lever to left, 0 output displayed, CLOSED Green light LIT) if not already closed per EMG E-0 Foldout page criteria, FAULTED S/G ISOLATION.**

Simulator Operator: When called as Building Watch to isolate AB-V085 For S/G B (MAIN STEAM ENCLOSURE BELOW GRATING), report that when Main Steam Enclosure area clears, the valve will be closed.

Monitor S/G pressure and level – when it is blown dry, insert Key 6 to close AB-V085. Report to Control Room when valve is closed.

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 31 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	6. Verify Feedline Isolated On Faulted S/G(s): a. Main Feedwater Reg Valve - CLOSED ∗ AE ZL-510 For S/G A ∗ AE ZL-520 For S/G B ∗ AE ZL-530 For S/G C ∗ AE ZL-540 For S/G D b. Main Feedwater Reg Bypass Valve - CLOSED ∗ AE ZL-550 For S/G A ∗ AE ZL-560 For S/G B ∗ AE ZL-570 For S/G C ∗ AE ZL-580 For S/G D c. Main Feedwater Isolation Valve – CLOSED ∗ AE HIS-39 For S/G A ∗ AE HIS-40 For S/G B ∗ AE HIS-41 For S/G C ∗ AE HIS-42 For S/G D d. Main feedwater chemical injection valves - CLOSED ∗ AE HIS-43 For S/G A ∗ AE HIS-44 For S/G B ∗ AE HIS-45 For S/G C ∗ AE HIS-46 For S/G D
	SRO, ATC, BOP	7. Verify Blowdown, Lower, And Upper Sampling Isolated On Faulted S/G(s): a. S/G Blowdown Containment Isolation Valves - CLOSED ∗ BM HIS-1A For S/G A ∗ BM HIS-2A For S/G B ∗ BM HIS-3A For S/G C ∗ BM HIS-4A For S/G D b. S/G Upper Sample Isolation Valves - CLOSED ∗ BM HIS-19 For S/G A ∗ BM HIS-20 For S/G B ∗ BM HIS-21 For S/G C ∗ BM HIS-22 For S/G D c. S/G Lower Sample Isolation Valves - CLOSED ∗ BM HIS-35 For S/G A ∗ BM HIS-36 For S/G B ∗ BM HIS-37 For S/G C ∗ BM HIS-38 For S/G D

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 32 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
CAUTION If any PZR PORV opens because of high pressure, the PORV shall be monitored to ensure it recloses after pressure decreases to less than 2235 psig.		
	SRO, ATC	8. Check PZR PORVs And Block Valves: a. Power To Block Valves - AVAILABLE • BB HIS-8000A • BB HIS-8000B b. PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A c. RCS Pressure – LESS THAN 2185 PSIG
	SRO, BOP	9. Check If Uncontrolled Cooldown Has Stopped: a. Check RCS Hot Leg Temperatures – STABLE OR INCREASING; If No, perform RNO 9.a. RNO a. WHEN uncontrolled RCS cooldown has stopped, THEN control steam flow and feed flow, as necessary, to maintain stable RCS hot leg temperatures. Observe cautions prior to step 10 and continue with step 10. b. Control steam flow and feed flow, as necessary, to maintain stable RCS hot leg temperatures. EXAMINER NOTE: Per 9. RNO a., When cooldown stopped, BOP uses the thumbwheel and ARV 'A' 'C' and 'D' setpoints are decreased to maintain current RCS Hot Leg temperatures stable or increasing.
CAUTIONS • If steamlines in area 5 of Aux Bldg are not intact, extreme caution will be necessary when performing local surveys. • If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 33 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	10. Determine Secondary Radiation Levels: a. Direct Health Physics to survey steamlines in area 5 of Aux Bldg. b. Check S/G Sampling - ISOLATED c. Ensure SI - RESET • SB HS-42A • SB HS-43A d. Ensure Temporary CCW Pump and Temporary CCW Chiller, as needed, are inservice per SYS EG-130, RADWASTE CCW SYSTEM OPERATION e. WHEN Temporary CCW Pump is inservice, THEN open all S/G sample isolation valves. • BM HIS-65 For S/G A • BM HIS-35 For S/G A • BM HIS-66 For S/G B • BM HIS-36 For S/G B • BM HIS-67 For S/G C • BM HIS-37 For S/G C • BM HIS-68 For S/G D • BM HIS-38 For S/G D f. Direct Chemistry to sample all S/Gs for activity.

Simulator Operator:
When contacted as Health Physics, acknowledge area 5 survey request.

If called as Radwaste Watch, respond that Temporary CCW Pump and Chiller are not in operation at this time (not modeled). Report that they will be placed into service per SYS EG-130, RADWASTE CCW SYSTEM OPERATION.

When contacted as Chemistry, acknowledge Steam Generator sample request.

NOTE:
Locally opening EF HV-43, ESW A TO AI COMPRESSOR or EF HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW Train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition.

	SRO, BOP	11. Verify Instrument Air Compressor Is Running: a. Ensure At Least One ESW TRN TO AIR COMPRESSOR Valve - OPEN ∗ EF HIS-43 ∗ EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET Switch Associated With Open ESW Valve (s) – CLOSED; If No, Perform RNO ∗ KA HIS-3C ∗ KA HIS-2C

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 34 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	11. b. RNO b. Reset and close AIR COMPRESSOR BRKR RESET Switch ∗ KA HIS-3C ∗ KA HIS-2C
	SRO, ATC, BOP	11. cont. 11. c. Check INST AIR PRESS – GREAER THAN 105 PSIG • KA PI-40 d. Check Neither ESW TO AIR COMPRESSOR Valve – Locally Opened • EF HV-43 • EF HV-44 e. Check Both ESW TRN TO AIR COMPRESSOR Valves – OPEN; If No, Perform RNO • EF HIS-43 • EF HIS-44 11. e. RNO e. Open the ESW TRN TO AIR COMPRESSOR Valve that is closed ∗ EF HIS-43 ∗ EF HIS-44
	SRO, ATC, BOP	11. cont. 11. f. Check Both AIR COMPRESSOR BRKR RESET Switches – CLOSED; If No, Perform RNO • KA HIS-3C • KA HIS-2C 11. f. RNO f. Reset and close the open AIR COMPRESSOR BRKE RESET Switch. ∗ KA HIS-3C ∗ KA HIS-2C
	SRO, ATC, BOP	12. Check If S/G Tubes Are Intact: a. Condenser Air Discharge Radiation – NORMAL BEFORE ISOLATION • GEG 925 b. S/G Blowdown And Sample Radiation - NORMAL • BML 256 • SJL 026 • Sample Results c. Turbine driven Auxiliary Feedwater Pump Exhaust Radiation - NORMAL • FCT 381

Op-Test No.: ______ Scenario No.: 3 Event No.: 5 Page 35 of 35

Event Description: EMG E-2, FAULTED STEAM GENERATOR ISOLATION

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	Step 12 cont. 12. d. S/G Steamline Radiation – NORMAL • ABS 114 For S/G A • ABS 113 For S/G B • ABS 112 For S/G C • ABS 111 For S/G D e. S/G Narrow Range Levels- NO LEVEL INCREASING IN AN UNCONTROLLED MANNER
	SRO, ATC, BOP	13. Check If Containment Spray Should Be Stopped: a. Check Spray Pumps – ANY RUNNING; No, Perform RNO 13. a. RNO a. Go to step 14.
	SRO, ATC, BOP	14. Check If ECCS Flow Should Be Reduced: a. RCS Subcooling – GREATER THAN 30°F [45°F] b. Secondary heat sink: * Total feed Flow To Intact S/Gs – GREATER THAN 270, 000 LBM/HR OR * Narrow Range Level In At Least One Intact S/G – GREATER THAN 6% [29%] c. RCS Pressure – STABLE OR INCREASING; If No, Perform RNO 14.c. RNO c. Go to step 15.
	SRO, ATC, BOP	Step 14 cont. 14. d. PZR Pressure – GREATER THAN 6% [33%]; If No, Perform RNO 14.d. RNO d. Go to step 15.
	SRO, ATC, BOP	Step 14 cont. 14. e. Go to EMG ES-03, SI TERMINATION, Step 1.
	SRO, ATC, BOP	15. Go To EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1

EXAMINER NOTE: Scenario termination criteria: Faulted Steam Generator 'B' is isolated, completion of all critical tasks or at Lead Examiner discretion.

Simulator Operator: At direction of Lead Examiner, FREEZE simulator. Do not reset until directed from Lead Examiner. Collect any data needed.

Facility: ____Wolf Creek_________ Scenario No.: ___4___ Op-Test No.: _______

Examiners: ______________________________ Operators: ______________________________

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Initial Conditions: 100%, Beginning of Life.

Turnover: Motor Driven Auxiliary Feedwater Pump (MDAFW) “A” tagged out for preventative maintenance activities. Technical Specification (TS) 3.7.5 Condition B.1 (restore AFW train to OPERABLE in 72 hours) was entered. Expected return is 24 hours.

Event No.	**Malf. No.**	**Event Type***	**Event Description**
1	mBB22A	I SRO ATC	Pressurizer (PZR) level channel, BB PI-459, fails low. Technical Specification (TS) 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 9, Condition M (72 hours to trip bistables) is identified. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment J.
2	mAE12C	I SRO BOP	Steam Generator “B” feed flow controlling channel, AE FT-520, fails high. ALR 00-109C, SG B FLOW MISMATCH, ALR 00-109B, SG B LEV DEV and/or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment E.
3	bkrWS01PA	C SRO ATC	Service Water Pump “A” trip. Technical Requirement Manual (TRM) 3.7.8, SERVICE WATER SYSTEM, Condition A (60 days to restore to FUNCTIONAL status) ALR 00-009B, SERV WTR PMP TRIP or ALR 00-008B, SERV WTR PRESS HI LO.

4	mAB01C 2	I SRO BOP	Steam Generator “C” controlling pressure channel, AB PI-535A, fails high. TS 3.3.2, ENGINEERED SAFETY FEATURES INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables respectively) are identified. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D. TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION – Fu 4; actions met by TS 3.3.2 Condition D. ALR 110C, SG C FLOW MISMATCH, ALR 00-110B, SG C LEV DEV and/or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment C.
5		R SRO ATC BOP	Reactivity event: Shift Manager declares Motor Driven Auxiliary Feedwater Pump “B” INOPERABLE but AVAILABLE. TS 3.7.5, Condition C, (Two AFW trains inoperable), Required Action C.1 (Be in MODE 3 within six hours). Crew utilizes pre-shift 10% downpower brief or OFN MA-038, RAPID PLANT SHUTDOWN.
6	mBB06C	M SRO ATC BOP	600 gpm Cold Leg break, Loop “C” – Loss Of Coolant Accident (LOCA). OFN BB-007, RCS LEAKAGE HIGH; EMG E-0, REACTOR TRIP OR SAFETY INJECTION; EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT; then based on plant conditions transitions to EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION.
7	mAL01 rAL11 rAL09	C SRO BOP	Preloaded and post trip: Turbine Driven Auxiliary Feedwater Pump (TDAFP) autostart failure, manual start available. MDAFW “B” AFW discharge to Steam Generator’s “A” and “D” throttled. **(Critical Task (CT) – E-0-F)** AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, step 8, RNO b. or Attachment F. Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly.

8	mSA18B mSA23B mSA27 GS16 mSA27 GS17	C SRO ATC	Preloaded and post trip: Train “Bravo” CPIS and CISA autostart failure, manual actuation available; however, CTMT ATMS MONITOR SPLY CTMT ISO VLV, GS HIS-36 and CTMT ATMS MONITOR RETURN CTMT ISO VLV, GS HIS-34, remain open, manual closure available. **(CT – E-0-O)** EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SCENARIO SUMMARY

Turnover and Initial Conditions: Unit is at 100%. Beginning of Life. Motor Driven Auxiliary Feedwater Pump (MDAFW) "A" tagged out for preventative maintenance activities. Technical Specification (TS) 3.7.5 Condition B.1 (restore AFW train to OPERABLE in 72 hours) was entered. Expected return is 24 hours.

Event 1: Pressurizer (PZR) level channel, BB PI-459, fails low. The crew identifies and diagnoses the failure and enters OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment J, PZR Level Channel Malfunction, is used to identify and mitigate the instrument failure. Technical Specifications are identified by the SRO. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 9, Condition M (72 hours to trip bistables) is identified.

Event 2: Steam Generator "B" feed flow controlling channel, AE FT-520, fails high. The crew identifies and diagnoses the failure and enters either ALR 00-109C, SG B FLOW MISMATCH, ALR 00-109B, SG B LEV DEV, and/or OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment E, Feedwater Flow Channel Malfunction is used to identify and mitigate the instrument failure. Memory Action steps are performed by the BOP (identify the failed instrument, place Main Feed Regulating Valve, AE FK-520, in manual and control Steam Generator level).

Event 3: Service Water Pump "A" trip. The crew identifies and diagnoses Service Water Pump "A" trip and enters either ALR 00-009B, SERV WTR PMP TRIP, or ALR 00-008B, SERV WTR PRESS HI LO, to mitigate the component failure. A standby Service Water Pump is started to establish discharge pressure greater than 85 psig. The SRO identifies Technical Requirement (TR) 3.7.8, SERVICE WATER SYSTEM, Condition A (60 days to restore to FUNCTIONAL status).

Event 4: Steam Generator "C" controlling pressure channel, AB PI-535A, fails high. The crew identifies and diagnoses the failure and enters ALR 110C, SG C FLOW MISMATCH, ALR 00-110B, SG C LEV DEV and/or OFN SB-008, INSTRUMENT MALFUNCTIONS. OFN SB-008, INSTRUMENT MALFUNCTIONS Attachment C, SG Pressure Channel Malfunction is used to identify and mitigate the instrument failure. Memory actions are performed by the BOP (identify the failure, place "C" Main Feed Regulating Valve, AE FK-530, in manual, and control Steam Generator level). Technical Specifications are identified by the SRO. TS 3.3.2, ENGINEERED SAFETY FEATURES INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables respectively) are identified. TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION and TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION are entered.

Event 5: Reactivity event: The Shift Manager (cue) informs the Control Room Supervisor that Motor Driven Auxiliary Feedwater Pump "B" has been declared INOPERABLE but AVAILABLE. The SRO determines per Technical Specification 3.7.5, Condition C, (Two AFW trains inoperable), Action C.1 (Be in MODE 3 within six hours), that a downpower must be initiated. If the pre-shift brief for a 10% downpower is not begun, the Shift Manager cues that the crew downpower using OFN MA-038, RAPID PLANT SHUTDOWN.

Event 6: Major event: 600 gpm Cold Leg break, Loop "C" – Loss Of Coolant Accident (LOCA). Once the downpower is initiated, a 600 gpm LOCA occurs. The crew diagnoses the LOCA per OFN BB-007, RCS LEAKAGE HIGH, and determines that a Reactor Trip and Safety Injection must be actuated. The crew enters EMG E-0, REACTOR TRIP OR SAFETY INJECTION. The crew will transition to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT and then based on plant conditions, transition to EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION or EMG ES-03, SI TERMINATION.

Event 7: Preloaded and post trip: Turbine Driven Auxiliary Feedwater Pump (TDAFP) autostart failure, manual start available. MDAFW “B” AFW discharge to Steam Generator’s “A” and “D” are throttled. The BOP diagnoses the TDAFW pump did not autostart and that MDAFW “B” discharge to Steam Generators “A” and “D” is low. AFW total flow must be greater than 270,000 lbm/hr until narrow range level in at least one Steam Generator is greater than 6 %. TDAFW pump must be started manually from the Control Room.

Critical Task E-0-F is performed. (Establish at least 270,000 lbm/hr auxiliary feedwater flow to the SGs before RCPs are manually tripped in accordance with step 3 of EMG FR-H1 AND before 3 SG wide range levels reach 8%.)

AP 15C-003, PROCEDURE USER’S GUIDE ABNORMAL OPERATIONS, step 6.1.7 or EMG E-0, REACTOR TRIP OR SAFETY INJECTION, step 8 RNO b (start the pumps and throttle AFW) and/or Attachment F, Automatic Signal Verification, step F4 RNO b (starts TDAFW pump).

Event 8: Preloaded and post trip: Train “Bravo” CPIS and CISA autostart failure occurs; however, manual actuation available using SA HS-15 and SB HS-48 respectively; additionally, upon manual actuation, CTMT ATMS MONITOR SPLY CTMT ISO VLV, GS HV-36 and CTMT ATMS MONITOR RETURN CTMT ISO VLV, GS HV-34, remain open, manual closure available using GS HIS-36 and GS HIS-34.

Per EMG E-0, REACTOR TRIP OR SAFETY INJECTION, Attachment F, Automatic Signal Verification, step F3 RNOa, the ATC actuates CISA for Train “Bravo” using SB HS-48 and at step F9 RNOa actuates CPIS, SA HS-15 for Train “Bravo” and closes GS HV-36 and GS HV-34, isolating Containment.

Critical Task E-0-O is performed. (Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.)

SCENARIO TERMINATION:
Successful mitigation of the scenario requires the crew identify and mitigate the LOCA per EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT and then based on plant conditions, transition to EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION or EMG ES-03, SI TERMINATION.

CRITICAL TASKS (CT):
Event 7: E-0-F: Establish at least 270,000 lbm/hr auxiliary feedwater flow to the SGs before RCPs are manually tripped in accordance with step 3 of EMG FR-H1 AND before 3 SG wide range levels reach 8%. AFW total flow must be greater than 270,000 lbm/hr until narrow range level in at least one Steam Generator is greater than 6 %. TDAFW pump must be started manually from the Control Room.

Event 8: E-0-O: Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario. Close CTMT ATMS MONITOR SPLY CTMT ISO VLV, GS HV-36 and CTMT ATMS MONITOR RETURN CTMT ISO VLV, GS HV-34, isolating Containment.

TECHNICAL SPECIFICATIONS:

Event 1: Pressurizer (PZR) level channel, BB PI-459, fails low. TS 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 9, Condition M (72 hours to trip bistables) is identified.

Event 3: Service Water Pump trip. TR 3.7.8, SERVICE WATER SYSTEM, Condition A (60 days to restore to FUNCTIONAL status) is identified.

Event 4: Steam Generator "C" pressure channel, AB PI-535A, fails high.

- TS 3.3.2, ENGINEERED SAFETY FEATURES INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables respectively) are identified.
- TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.
- TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION, Fu 4 is entered. Actions are met by TS 3.3.2 Condition D.

Event 5: The SRO determines per Technical Specification 3.7.5, Condition C, (Two AFW trains inoperable), Action C.1 (Be in MODE 3 within six hours), that a downpower must be initiated.

PRA/PSA: On March 31, 2013, NE 13-0022 provided the Notice of Probabilistic Risk Assessment (PRA) Model Revision 6.

While the official Top Ten risk significant systems have not been officially determined, by analyzing the Core Damage Frequency (CDF) by Initiating Event and Large Early Release Frequency (LERF) by Initiating Event tables, the following systems are very important:

∗	Service Water	see Scenario 4

Op-Test No.: ______ Scenario No.: 4 Event No.: 1 Page 1 of 40

Event Description: Pressurizer (PZR) level channel, BB PI-459, fails low.

Time	Position	Applicant's Actions or Behavior
Simulator Operator: Insert Key 1 at Lead Examiner direction. Diagnostics: Meter PZR LEV BB LI-459A decreasing. Main Control Board (MCB) alarms 00-032B, PZR 17% HTRS OFF LTDN ISO and 00-032C, PZR LO LEV DEV and 00-032E, PZR HTR CTRL TROUBLE annunciate. PZR HTS B/U GROUP B and PZR HTR CTRL GROUP C trip. Letdown orifice isolation valves close.		
	SRO, ATC, BOP	Crew diagnoses failure.
	SRO, ATC	Per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly. ATC places PZR LEV MASTER CTRL, BB LK-459, in manual.
	SRO, ATC, BOP	Enter and Perform OFN SB-008, rev 34, INSTRUMENT MALFUNCTIONS SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS
	SRO, ATC	1. Check for malfunction: ∗ Check If Reactor Coolant System Instrument Channel Or Controller Is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel or controller from table below:
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
	SRO, ATC	J1. Identify Failed Instrument Channel: a. Compare pressurizer level indications to confirm a pressurizer level channel failure: • BB LI-459A • BB LI-460A • BB LI-461

Variable	Channels	Attachment
RCS Level (BB)	L-459, L-460, L-461	Attachment J

Op-Test No.: ______	Scenario No.: 4	Event No.: 1	Page 2 of 40

Event Description: Pressurizer (PZR) level channel, BB PI-459, fails low.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC	J2. Ensure Alternate Pressurizer Level Channel On PZR LEV CTRL SEL Switch Is Selected. • BB LI-459D EXAMINER NOTE: ATC selects L460 or L461 for control.
	SRO, ATC	J3. Check Failed Pressurizer Level Channel Failed Low
NOTE: Letdown flow is isolated and pressurizer control heaters are deenergized if the controlling level falls below 17%. Both must be manually realigned once level control is re-established.		
	SRO, ATC	J4. Check Letdown Flow – ESTABLISHED; No, Perform RNO. J4 RNO Reestablish letdown flow, as follows: a. Open LTDN SYS CTMT ISO VLVs. • BG HV-8152 • BG HV-8160 b. Open RCS LTDN TO REGEN HX Valves. • BG HIS-459 • BG HIS-460 c. Place LTDN HX OUTLET PRESS CTRL in manual and full open. • B PK-131 d. Open LTDN ORIFIC VLVs, as necessary, to establish desired letdown flow. ∗ BG HIS-8149AA ∗ BG HIS-8149BA ∗ BG HIS-8149CA EXAMINER NOTE: At a minimum, a 75-gpm orifice is opened, e.g. BG HIS-8149AA or BG HIS-8149BA. Since 120 gpm letdown at start of scenario, the CRS directs 120 gpm letdown restored. e. Adjust LTDN HX OUTLET PRESS CTRL, to maintain between 300 psig and 350 psig and place in automatic. • BG PK-131

Op-Test No.: ______ Scenario No.: 4 Event No.: 1 Page 3 of 40

Event Description: Pressurizer (PZR) level channel, BB PI-459, fails low.

Time	Position	Applicant's Actions or Behavior
NOTE: Refer to FIGURE 3 for PZR level control band.		
	SRO, ATC	J5. Manually Control Charging And Letdown To Stabilize Pressurizer Level At Level Appropriate For Plant Power.
	SRO, ATC	J6. Ensure Pressurizer Control Heaters - ON
	SRO, ATC	J7. Place Charging/Letdown Flow Control In Automatic
	SRO, ATC	J8. Monitor Pressurizer Level Response To Ensure Proper Control
	SRO, ATC	J9. Check Failed PZR Level Channel – NOT USED FOR RECORDER; If NO, Perform RNO J9. RNO Select alternate pressurizer level channel as input to recorder.
	SRO	J10. Monitor The Following Technical Specification LCOs And Comply With Action Statements, As Appropriate • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Table 3.3.1-1, Function 9 • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 12 • 3.3.3, ACCIDENT MONITORING INSTRUMENATION, Table 3.3.3-1, Function 11 SRO identifies: • 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION, Condition A (Immediately entered due to failure) and from Table 3.3.1-1, Fu 9, Condition M (72 hours to trip bistables) is identified.
Event termination: Instrument failure identified; SRO identified applicable Technical Specifications or at Lead Examiner Discretion. Simulator Operator: Insert Key 2 at direction of Lead Examiner.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 2 Page 4 of 40

Event Description: Steam Generator ‘B’ feed flow controlling channel, AE FT-520, fails high.

Time	Position	Applicant’s Actions or Behavior
Simulator Operator: Insert Key 2 at direction of Lead Examiner. Diagnostics: STEAM GENERATOR B FW FLOW meter AE FI-521A high. MCB alarms 00-109C SG B FLOW MISMATCH, 00-109B, SG B LEV DEV annunciate.		
	SRO, ATC, BOP	Crew diagnoses failure. BOP performs Memory Actions of either ALR 00-109C SG B FLOW MISMATCH; 00-109B, SG B LEV DEV; or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment E, FEEDWATER FLW CHANNEL MALFUNCTION.
	BOP	(SRO direction/Memory Action) Places SG B MFW REG VLV CTRL, AE FK-520, in Manual and depresses UP ARROW pushbutton, matching steam flow and feed flow. **PCT: BOP takes manual control using AE FK-520, adjusts and matches steam and feed flow.** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, ATC, BOP	Enter and Perform ALR 00-109C, rev 10A, SG B FLOW MISMATCH; or ALR 00-109B, rev 9, SG B LEV DEV. SRO directs the ALR.
EXAMINER NOTE: ALR 109C and 109B are very similar. As 109B is the higher tier ALR, only 109B is presented.		
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, BOP, ATC	1. Check Steam Generator A Controlling Level Channel: ∗ 5% GREATER THAN PROGRAM LEVEL OR ∗ 5% LESS THAN PROGRAM LEVEL

Op-Test No.: ______ Scenario No.: 4 Event No.: 2 Page 5 of 40

Event Description: Steam Generator 'B' feed flow controlling channel, AE FT-520, fails high.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	2. Check Instruments – OPERATING PROPERLY • Steam Generator B Controlling Level Channel – WITHIN 6% OF REMAINING S/G B NARROW RANGE LEVEL CHANNELS ∗ AE LI-529 ∗ AE LI-552 • Steam Generator B Controlling Steam Pressure Channel – WITHIN 80 PSIG OF REMAINING CHANNELS ∗ AB PI-524A ∗ AB PI-525A • Steam Generator B Controlling Feedwater Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL; No, Perform RNO • Steam Generator B Controlling Steam Flow Channel – WITHIN 0.2 MPPH OF OTHER CHANNEL
	SRO, BOP	2. RNO Perform the following: a. Place Feedwater Reg Valve or Feedwater Reg Bypass Control Valve in manual. ∗ AE FK-520 ∗ AE LK-560 b. Adjust Feedwater Reg Valve or Feedwater Reg Bypass Control Valve, as necessary, to establish Steam Generator level at program value. ∗ AE FK-520 ∗ AE LK-560 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow (UP ARROW).** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, BOP	2. RNO c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, step 1.
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.		
EXAMINER NOTE: The crew may enter OFN SB-008, INSTRUMENT MALFUNCTIONS, directly.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 2 Page 6 of 40

Event Description: Steam Generator ‘B’ feed flow controlling channel, AE FT-520, fails high.

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	Enter and Perform OFN SB-008, rev 34, INSTRUMENT MALFUNCTIONS SRO directs OFN SB-008, INSTRUMENT MALFUNCTION

CAUTION: Feedwater flow is an input to the thermal power program. A failed feedwater flow channel could cause the thermal program to be inaccurate.

NOTE: Steps E1 through E2 are Memory Action steps.

	SRO, ATC, BOP	1. Check For Malfunction: ∗ Check If Secondary System Instrument Channel Is Malfunctioning: a. Perform appropriate attachment for malfunctioning channel from table below

VARIABLE	CHANNELS	ATTACHMENT
Feedwater Flow (AE)	F-510, F-511, F-520 F-521, F-530, F-531 F-540, F-541	ATTACHMENT E

	SRO, ATC, BOP	E1. Identify Failed Instrument Channel: a. Compare feedwater flow indications to confirm feedwater flow channel failure: ∗ AE FI-510A ∗ AE FI-511A ∗ AE FI-520A ∗ AE FI-521A ∗ AE FI-530A ∗ AE FI-531A ∗ AE FI-540A ∗ AE FI-541A
	SRO, BOP	E2. Check Failed Feedwater Flow Channel Selected On SG FW FLOW CHANNEL SEL Switch: ∗ AE FS-510C ∗ AE FS-520C ∗ AE FS-530C ∗ AE FS-540C

Op-Test No.: ______ Scenario No.: 4 Event No.: 2 Page 7 of 40

Event Description: Steam Generator 'B' feed flow controlling channel, AE FT-520, fails high.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	E3. Check Main Feed Reg Valves In Control: a. Place Affected SG MFW REG VLV CTRL – IN MANUAL ∗ AE FK-510 ∗ AE FK-520 ∗ AE FK-530 ∗ AE FK-540 b. Adjust affected S/G MFW REG VLV CTRL, as necessary, to establish Steam generator level at program: ∗ AE FK-510 ∗ AE FK-520 ∗ AE FK-530 ∗ AE FK-540 **PCT: BOP takes manual control using AE FK-510, adjusts and matches steam and feed flow (UP ARROW).** **EXAMINER NOTE: Without Operator action, a SG LEV LOLO RX TRIP occurs.**
	SRO, BOP	E4. Select Alternate Feedwater Flow Channel On SG FW FLOW CHANNEL SEL Switch: ∗ AE FS-510C ∗ AE FS-520C ∗ AE FS-530C ∗ AE FS-540C EXAMINER NOTE: Alternate channel F521 selected. MCB alarm 109C clears when alternate channel selected.

NOTE: Feedwater flow is required to perform daily secondary calorimetrics above 15% of rated thermal power.

	SRO	E6. Check S/G feedwater Flow Channel Failure – REPAIRED OR ALTERNATE CHANNEL SELECTED
	SRO, BOP	Restore Affected S/G MFW REG VLV CTRL To – AUTO EXAMINER NOTE: AUTO pushbutton depressed, restoring AE FK-520 to automatic control. MCB alarm 109B clears when level within program band (45% -55%).

Op-Test No.: ______ Scenario No.: 4 Event No.: 2

Event Description: Steam Generator ‘B’ feed flow controlling channel, AE FT-520, fails high.

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	E8. Return To Procedure And Step In Effect.

Event termination: Instrument failure identified and selected out; Main Feed Reg Valve back in AUTO; or at discretion of Lead Examiner.

Simulator Operator: Insert Key 3 at direction of Lead Examiner.

Op-Test No.: ______ Scenario No.: 4 Event No.: 3 Page 9 of 40

Event Description: Service Water Pump ‘A’ trip.

Time	**Position**	**Applicant’s Actions or Behavior**
Simulator Operator: Insert Key 3 at direction of Lead Examiner. Diagnostics: SERVICE WTR PUMP IHS0IPA, IHS-WS001A, trips. SERVICE WTR PUMP 1WS01PB AMPS 1II-WS002 at zero. Main Control Board alarms 00-008B, SERV WTR PRESS HI LO and 00-009B, SERV WTR PMP TRIP, annunciate.		
	SRO, ATC, BOP	Crew diagnoses component failure. Crew enters ALR 00-009B, rev 8, SERV WTR PMP TRIP. SRO directs ALR 00-009B, SERV WTR PMP TRIP.
	SRO, ATC	1. Determine Affected Service Water Pump: a. Check Service Water Pumps – AT LEAST ONE TRIPPED ∗ 1HS-WS001A For Pump A ∗ 1HS-WS002A For Pump B ∗ 1HS-WS003A For Pump C ∗ 1HS-WS004A For Low Flow Pump
	SRO, ATC	2. Check Liquid Waste Release Using Service Water System For Dilution Flow – NOT IN SERVICE
	SRO, ATC	3. Start Standby Service Water Pumps, As Necessary, To Establish Discharge Pressure Greater Than 85 PSIG. • 1HS-WS001A For Pump A • 1HS-WS002A For Pump B • 1HS-WS003A For Pump C • 1HS-WS004A For Low Flow Pump
	SRO, ATC	Direct start of ‘B’ Service Water Pump. EXAMINER NOTE: Alarm 00-008B clears when pump started.
	SRO	4. Notify Electrical Maintenance To Determine And Correct Cause Of Service Water Pump Trip.

Op-Test No.: ______ Scenario No.: 4 Event No.: 3 Page 10 of 40

Event Description: Service Water Pump ‘A’ trip.

Time	Position	Applicant’s Actions or Behavior
Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status. If contacted as Electrical Maintenance, acknowledge requests.		
	SRO	5. Return To Procedure And Step In Effect.
	SRO	Determine Technical Requirements. SRO identifies: Technical Requirement Manual (TRM) 3.7.8, SERVICE WATER SYSTEM, Condition A (60 days to restore to FUNCTIONAL status)
Event termination: Component failure identified; Service Water Pump ‘B’ started; Technical Requirement identified or at Lead Examiner discretion. Simulator Operator: Insert Key 4 at direction of Lead Examiner.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 4 Page 11 of 40

Event Description: Steam Generator ‘C’ controlling pressure channel, AB PI-535A, fails high.

Time	**Position**	**Applicant’s Actions or Behavior**
Simulator Operator: Insert Key 4 at direction of Lead Examiner. Diagnostics: SG C PRESS meter, AB PI-535A, increasing; Main Control Board alarms 00-110C, SG C FLOW MISMATCH and 00-110B, SG C LEV DEV, annunciate.		
	SRO, ATC, BOP	Crew diagnoses instrument failure. BOP performs Memory Actions of either ALR 00-110C, SG C FLOW MISMATCH; 00-110B, SG C LEV DEV; or OFN SB-008, INSTRUMENT MALFUNCTIONS, Attachment C, SG PRESSURE CHANNEL MALFUNCTION.
	BOP	(SRO direction/Memory Action) Places SG C MFW REG VLV CTRL, AE FK-530, in Manual and depresses DOWN ARROW pushbutton, matching steam flow and feed flow.
	SRO, ATC, BOP	Enter and Perform ALR 00-110C, rev 10A, SG A FLOW MISMATCH; or ALR 00-110B, rev 9, SG A LEV DEV. SRO directs the ALR.
EXAMINER NOTE: ALR 110C and 110B are very similar. As 110B is the higher tier ALR, only 110B is presented.		
NOTE: Steps 1 through 3 are Memory Action steps.		
	SRO, ATC, BOP	1. Check Steam Generator C Controlling Level Channel: ∗ 5% GREATER THAN PROGRAM LEVEL OR ∗ 5% LESS THAN PROGRAM LEVEL
	SRO, ATC, BOP	2. Check Instruments – OPERATING PROPERLY; If No, Perform RNO • Steam Generator C Controlling Level Channel – WITHIN 6% OF REMAINING S/G A NARROW RANGE LEVEL CHANNELS ∗ AE LI-539 ∗ AE LI-553 • Steam Generator C Controlling Steam Pressure Channel – WITHIN 100 PSIG OF REMAINING CHANNELS; No, Perform RNO ∗ AB PI-534A ∗ AB PI-535A

Op-Test No.: ______ Scenario No.: 4 Event No.: 4 Page 12 of 40

Event Description: Steam Generator ‘C’ controlling pressure channel, AB PI-535A, fails high.

<table>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td></td><td>SRO, BOP</td><td>2. RNO Perform the following:
a. Place Feedwater Reg Valve or Feedwater Reg Bypass Control Valve in manual.
∗ AE FK-530
∗ AE LK-570</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, BOP</td><td>2. RNO b. Adjust Feedwater Reg Valve or Feedwater Reg Bypass Control Valve, as necessary, to establish Steam Generator level at program value.
∗ AE FK-530
∗ AE LK-570
EXAMINER NOTE: BOP takes manual control using AE FK-530, adjusts and matches steam and feed flow (depressing the DOWN ARROW pushbutton).</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, BOP</td><td>2. RNO c. Go to OFN SB-008, INSTRUMENT MALFUNCTIONS, step 1.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Simulator Operator: If contacted as WWM, acknowledge requests. If contacted as Call Supt., acknowledge status.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">EXAMINER NOTE: The crew may enter OFN SB-008, INSTRUMENT MALFUNCTIONS, directly.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC, BOP</td><td>Enter and Perform OFN SB-008, INSTRUMENT MALFUNCTIONS
SRO directs OFN SB-008, INSTRUMENT MALFUNCTIONS</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC, BOP</td><td>1. Check For Malfunction:
∗ Check If Secondary System Instrument Channel Is Malfunctioning:
a. Perform appropriate attachment for malfunctioning channel from table below
<table>
<tr><th>VARIABLE</th><th>CHANNEL</th><th>ATTACHMENT</th></tr>
<tr><td>S/G Pressure (AB)</td><td>P-514, P-515, P-516
P-524, P-525, P-526
P-534, P-535, P-536
P-544, P-545, P-546</td><td>ATTACHMENT C</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Op-Test No.: ______ Scenario No.: 4 Event No.: 4 Page 13 of 40

Event Description: Steam Generator ‘C’ controlling pressure channel, AB PI-535A, fails high.

Time	Position	Applicant’s Actions or Behavior
CAUTION: SG steam pressure is an input to the thermal power program. A failed steam pressure channel could cause the thermal power program to be inaccurate. NOTES: • Steps C1 through C3 are Memory Action steps. • A steam flow channel compensated by failed pressure channel will affect Main Feed pump speed until the failed channel is selected out.		
EXAMINER NOTE: During Operator validation of 5-8-13, the SRO directed the RO to monitor NI’s for reactor power as both the steam flow and feed flow calorimetrics are suspect due to the instrument failures. Recall Event 2: Feed flow AE FT-520 failed high and now, Event 4, AB PI-535A pressure channel has failed high.		
	SRO, ATC, BOP	C1. Identify Failed Instrument Channel: • Compare S/G Pressure Indications To Confirm S/G Pressure Channel Failure: o AB PI-514A For S/G A o AB PI-515A For S/G A o AB PI-516A For S/G A o AB PI-524A For S/G B o AB PI-525A For S/G B o AB PI-526A For S/G B o AB PI-534A For S/G C o AB PI-535A For S/G C o AB PI-536A For S/G C
	SRO, BOP	C2. Check If Failed S/G Pressure Channel Used For Feedwater Control: a. Identify steam flow channel compensated by failed pressure channel from table below:

S/G	STEAM PRESSURE CHANNEL	ASSOCIATED STEAM FLOW CHANNEL
C	P-534 P-535	F-532 F-533

Op-Test No.: ______ Scenario No.: 4 Event No.: 4 Page 14 of 40

Event Description: Steam Generator ‘C’ controlling pressure channel, AB PI-535A, fails high.

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	C2. b. Check steam flow channel associated with failed steam pressure channel selected on SG STEAM FLOW CHANNEL SEL Switch. EXAMINER NOTE: Selector switch AB FS-532C has F-533 selected. P-535 corresponds to F-533.
	SRO, BOP	C3. Check Main Feed Reg Valves In Control: a. Place Affected SG MFW REG VLV CTRL – IN MANUAL ∗ AE FK-530 b. Adjust affected S/G MFW REG VLV CTRL, as necessary, Steam Generator level at program: ∗ AE FK-530 EXAMINER NOTE: BOP takes manual control using AE FK-530, adjusts and matches steam and feed flow (depressing the DOWN ARROW pushbutton).
	SRO, BOP	C4. Select Alternate Steam Flow Channel On SG STEAM FLOW CHANNEL SEL Switch: • AB FS-512C • AB FS-522C • AB FS-532C EXAMINER NOTE: Channel F532 selected as the alternate channel on switch AB FS-532C. Alarm 00-110C clears when alternate channel selected.
	SRO, BOP	C5. Restore Affected SG MFW REG VLV CTRL To – AUTO EXAMINER NOTE: AUTO pushbutton depressed, restoring AE FK-530 to automatic control. MCB alarm 110B clears upon restoration of SG level to program band (45% - 55%).
	SRO	C6. Monitor The Following Technical Specifications LCOs And Comply With Action Statements, As Appropriate: • 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION, Table 3.3.2-1, Functions 1.e And 4.e • 3.3.4, REMOTE SHUTDOWN INSTRUMENTATION, Table 3.3.4-1, Function 7 • 3.3.3, POST ACCIDENT MONITORING INSTRUMENTATION, Table 3.3.3-1, Function 8 • 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION • 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION

Op-Test No.: ______ Scenario No.: 4 Event No.: 4 Page 15 of 40

Event Description: Steam Generator ‘C’ controlling pressure channel, AB PI-535A, fails high.

Time	Position	Applicant’s Actions or Behavior
	SRO	C6. continued. SRO identifies: • TS 3.3.2, ENGINEERED SAFETY FEATURES ACTUATION INSTRUMENTATION, Condition A (Immediately due to failure) and from Table 3.3.2-1, Fu 1.e and 4.e, Condition D (72 hours to trip bistables). • TS 3.3.6, CONTAINMENT PURGE ISOLATION INSTRUMENTATION – actions met by TS 3.3.2 Condition D. • TS 3.3.7, CONTROL ROOM EMERGENCY VENTILATION SYSTEM ACTUATION INSTRUMENTATION - actions met by TS 3.3.2 Condition D.
EXAMINER NOTE: TS 3.3.6 and 3.3.7 may not be written down, because their actions are met by TS 3.3.2 Condition D. Their tables (3.3.6-1 and 3.3.7-1 function 4) state “Refer to L.C.O. 3.3.2, ESFAS Instrumentation, Function 3.a, for all initiation functions and requirements.” Table 3.3.2-1, function 3.a.3. directs to Function 1. From there, Function 1.e Condition D is identified. TS 3.3.2 Condition D was previously identified due to the actual instrument failure.		
	SRO, ATC, BOP	SRO directs ATC/BOP to verify Containment purge supply and exhaust valves in closed position per TS 3.3.6 Condition A.
Event termination: Instrument failure identified and selected out; Main Feed Reg Valve back in AUTO; SRO identified applicable Technical Specifications or at Lead Examiner Discretion. EXAMINER NOTE & Simulator Operator NOTE: Event 5 is a reactivity event. Provide Cue for Reactivity Downpower evolution at Lead Examiner direction.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 5 Page 16 of 40

Event Description: Reactivity Event: Common cause failure for MDAFW ‘A’ and MDAFW ‘B’. TS 3.7.5 Condition C required shutdown.

OFN MA-038, RAPID PLANT SHUTDOWN

Time	**Position**	**Applicant’s Actions or Behavior**
EXAMINER NOTE & Simulator Operator NOTE: Event 5 is a reactivity event. Provide Cue for Reactivity Downpower evolution at Lead Examiner direction. Simulator Operator: As Shift Manager: MDAFW ‘A’ is a common cause failure with MDAFW ‘B.’		
	SRO	Technical Specification 3.7.5, Condition C (Two AFW trains inoperable) identified: C.1 Be in MODE 3 in 6 hours and in MODE 4 in 12 hours.
Simulator Operator Cue If Needed: Shift Manager: Use OFN MA-038, RAPID PLANT SHUTDOWN at rate 1% per minute, using MW method. Simulator Operator Cue If Needed: SYS OPS: Acknowledge plant status – downpower commencing.		
	SRO, ATC, BOP	Enter and perform OFN MA-038, rev 18A, RAPID DOWNPOWER SRO directs OFN MA-038, RAPID DOWNPOWER
EXAMINER NOTE: SRO may direct RO to borate per 10% down power pre-shift brief.		
CAUTION: Fast unloading rates may result in increased turbine vibration. NOTES: • Foldout page shall be monitored throughout this procedure. • Steps 4 and 5 may be performed concurrently with steps 1 through 3. • Load reduction at greater than 65 MW (5%)/minute will arm condenser steam dumps.		
FOLDOUT PAGE CRITERIA 1. REACTOR TRIP CRITERIA: At any time during the rapid power reduction, the SM/CRS?RO may decide to initiate a manual reactor trip. This decision should be based on the following: • Plant stability during the power reduction • Time frame requirements of the shutdown IF a reactor trip occurs while performing this procedure, THEN go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION 2. TAVG CONTROL REQUIRMENTS: (ρ) During rapid power reduction, attempt to maintain a target Tavg/Tref temperature error between 0°F and +5°F, by adjusting control rods in automatic or manual.		

Op-Test No.: ______	Scenario No.: 4	Event No.: 5

Page 17 of 40

Event Description: Reactivity – downpower.

OFN MA-038, RAPID PLANT SHUTDOWN

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	1. Determine Turbine Unloading Method To Be Used a. Check Desired Unloading Rate – LESS THAN OR EQUAL TO 65 MW/MINUTE (5%) b. Check Automatic Turbine Unloading Desired. c. From Graphic 5551, TURBINE CONTROL SYSTEM – OPERATIONS PANEL, LOAD CONTROL section – Select method of Load Control as directed by CRS/SM ∗ First Stage Pressure OR ∗ Megawatts OR ∗ Open Loop/Vlv Mgmt
	SRO, BOP	2. (ρ) Reduce Turbine Load In Automatic: a. From Graphic 5551, TURBINE CONTROL SYSTEM – OPERATION PANEL, SETPOINTS section – Reduce Turbine Load 1) Select CHANGE. 2) Enter TARGET MW and select ENTER. 3) Enter RATE – DEC and select ENTER. 4) Select GO. b. Maintain desired turbine unloading rate. c. Go to Step 4.
	SRO, ATC	4. (ρ) Borate RCS And Adjust Control Rods, As Necessary, To Maintain The Following: • Target Tavg/Tref Temperature Error Between 0°F and +5°F • Control Rods Above The Rod Insertion Limits
	SRO, ATC	5. Energize PZR Backup Heaters. • BB HIS-51A • BB HIS-52A
	SRO, ATC, BOP	6. Check PZR PORVs: a. RCS Pressure – LESS THAN 2335 PSIG

Op-Test No.: ______ Scenario No.: 4 Event No.: 5 Page 18 of 40

Event Description: Reactivity – downpower.

OFN MA-038, RAPID PLANT SHUTDOWN

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	Step 6 cont. b. PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A c. RCS Pressure – GREATER THAN 2185 PSIG d. PORV Block Valves- OPEN • BB HIS-8000A • BB HIS-8000B
	SRO, ATC	7. Check PZR Pressure – STABLE AT OR TRENDING TO 2235 PSIG
	SRO, ATC	8. Check PZR Level – STABLE AT OR TRENDING TO PROGRAM LEVEL
	SRO, BOP	9. Check S/G Levels – CONTROLLING BETWEEN 45% AND 55%
	SRO	10. Notify Health Physics To Perform The Following: • Monitor RCS and other connecting systems for increasing Radiation levels due to unplanned crud burst. • Notify all personnel in the affected areas.
Simulator Operator: When Health Physics is called, acknowledge request.		
	SRO	11. Check If Sampling Is Required: a. Check if one of the following conditions is met: * Thermal Power Change – GREATER THAN 15% IN 1 HOUR * Mode Change from 2 To 3 b. Direct Chemistry to take samples per AP 02-007, ABNORMAL CONDITIONS GUIDELINES
Simulator Operator: When Chemistry is called, acknowledge request.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 5 Page 19 of 40

Event Description: Reactivity – downpower.

OFN MA-038, RAPID PLANT SHUTDOWN

Time	**Position**	**Applicant's Actions or Behavior**
	SRO	12. Check Reactor Power – LESS THAN 60%; No, Perform RNO. 12 RNO. Perform the following: a. IF final desired power level is greater than or equal to 60%, THEN go to step 40. b. IF final desired power level is less that 60%, THEN do not continue until reactor power is less than 60%.
EXAMINER NOTE: Crew hold at step 12 RNO b.		
LEAD EXAMINER NOTE: After downpower initiated and when desired, direct Simulator Operator to insert Key 6, 600 gpm LOCA – Cold Leg Loop 'C' (ramped in over 3 minutes). Simulator Operator: Insert Key 6 for the LOCA at the direction of the Lead Examiner.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 6

Event Description: Major: 600 gpm LOCA – Cold Leg Loop 'C'

OFN BB-007, RCS LEAKAGE HIGH

Time	**Position**	**Applicant's Actions or Behavior**
LEAD EXAMINER NOTE: After downpower initiated and when desired, direct Simulator Operator to insert Key 6, 600 gpm LOCA – Cold Leg Loop 'C' (ramped in over 3 minutes). Simulator Operator: Insert Key 6 for the LOCA at the direction of the Lead Examiner. Diagnostics: RCS/PZR pressure decreasing, PZR level decreasing, RCS temperature decreasing, Containment humidity increasing, DNB pressure (2220 psig) TS entry.		
EXAMINER NOTE: During 5-8-13 Operations validation, Crew stopped the downpower in order to make confirmatory diagnostics. Crew entered OFN BB-007, RCS LEAKAGE HIGH. Crew used FOLDOUT PAGE criteria, unable to maintain Pressurizer pressure to actuate Reactor Trip and Safety Injection.		
	SRO, ATC, BOP	Crew diagnoses Primary Loss of Coolant. Crew enters OFN BB-007, rev 14B, RCS LEAKAGE HIGH. SRO directs OFN BB-007, RCS LEAKAGE HIGH.
CAUTIONS • If safety injection actuates during this procedure, go to EMG E-0, REACTOR TIP OR SAFETY INJECTION, step 1. • If the reactor is tripped manually or automatically, stabilize the plant using EMGs while continuing with this procedure. NOTE Foldout page shall be monitored throughout this procedure.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 21 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

OFN BB-007, RCS LEAKAGE HIGH

Time	**Position**	**Applicant’s Actions or Behavior**

FOLDOUT PAGE CRITERIA

1. SI ACTUATION CRITERIA

IF any condition listed occurs, THEN trip the reactor, actuate SI, and go to EMG E-0, REACTOR TRIP OR SAFETY INJECTION, step 1.

- ∗ Both the following conditions exist:
  - Reactor is tripped AND
  - RCS Subcooling Based On Subcooling Monitor – LESS THAN 30°F

OR

- ∗ Pressurizer Pressure – CANNOT BE MAINTAINED

OR

- ∗ Pressurizer Level – CANNOT BE MAINTAINED GREATER THAN 6%

OR

- ∗ All of the following conditions exist:
  - Normal charging is maximized from one pump AND
  - Letdown is isolated AND
  - Pressurizer level is decreasing

2. LETDOWN ISOLATION CRITERIA

3. REACTOR TRIP CRITERIA

	SRO, ATC	1. Check Plant In Mode 1, 2, Or 3 With Accumulator Outlet Valves Open
	SRO, ATC	2. Check PZR Level – GREATER THAN 6%
	SRO, ATC	3. Check PZR Level – GREATER THAN 17%
	SRO, ATC	4. Check PZR Level – STABLE OR INCREASING; No, Perform RNO 4. RNO IF PZR level is less than program level, THEN perform the following:
	SRO, ATC	4 RNO a. Establish maximum required charging flow from one charging pump. EXAMINER NOTE: ATC places NORMAL CHARGING PMP FLOW CTRL, BG FK-462, in MANUAL and depresses UP ARROW pushbutton.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 22 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

OFN BB-007, RCS LEAKAGE HIGH, EMG E-0, REACTOR TRIP OR SAFETY INJECTION

<table>
<tr><th>Time</th><th>Position</th><th>Applicant’s Actions or Behavior</th></tr>
<tr><td></td><td>SRO, ATC</td><td>4. RNO b. IF pressurizer level can NOT be maintained, THEN perform the following:
1. Close Letdown Orifice Isolation Valves to establish stable PZR level.
• BG HIS-8149AA
• BG HIS-8149BA
• BG HIS-8146CA

2. Close RCS Letdown T Regen Hx isolation valves.
• BG HIS-459
• BG HIS-460</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">EXAMINER NOTE: Using the foldout page criteria (SI ACTUATION CRITERIA): (1) Unable to maintain Pressurizer pressure or (2) All of the following conditions exist: Normal charging maximized, letdown isolated and Pressurizer level decreasing, the SRO directs ATC to trip the reactor and actuate Safety Injection.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>ATC</td><td>Manipulates REACTOR TRIP MAN ACTUATION, SB HS-1, to TRIP position.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>ATC</td><td>Rotates J-handles for SB HS-27 and SB HS-28, SI MAN ACTUATION, to ACTUATE position.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO, ATC, BOP</td><td>Directs entry into EMG E-0, REACTOR TRIP OR SAFETY INJECTION
Perform Immediate Actions of EMG E-0, REACTOR TRIP OR SAFETY INJECTION</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">EXAMINER NOTE: While the ATC and BOP are required to know all Immediate Action steps, the ATC performs Immediate Action steps 1, 3, and 4 whereas the BOP performs Immediate Action step 2. Immediate Action steps are performed prior to the reading aloud of EMG E-0, REACTOR TRIP OR SAFETY INJECTION.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">CAUTION: Accident conditions can cause higher tan normal radiation levels. Health Physics monitoring may be required while performing local operator actions.

NOTES:
• Steps 1 through 4 are immediate action steps.
• Foldout page shall be monitored throughout this procedure.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Op-Test No.: ______ Scenario No.: 4 Event No.: 7 Page 23 of 40

Event Description: **Critical Task (CT) E-0-F: TDAFW autostart failure; manual start available. Necessary to meet total 270, 000 lbm/hr AFW flow to steam generators.**

EMG E-0, rev 31, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant's Actions or Behavior

FOLDOUT PAGE CRITERIA

1. RCP TRIP CRITERIA
2. SI ACTUATION CRITERIA
3. FAULTED S/G ISOLATION CRITERIA
4. RUPTURED S/G ISOLATION CRITERIA
5. COLD LEG RECIRCULATIN CRITERIA
6. AFW SUPPLY SWITCHOVER CRITERIA
7. RCS TEMPERATURE CONTROL
   - ∗ IF a Loss-Of-Offsite Power has occurred, THEN close MSIVs.
     - ∗ AB HS-79
     - ∗ AB HS-80
   - ∗ IF no RCPs are running AND off-site power is available, THEN select STM PRESS mode on the steam dumps.
     - AB US-500Z.
   - ∗ IF RCS C/L temperature is less than 557°F AND decreasing, THEN control total feed flow to limit RCS cooldown.
   - ∗ Maintain total feed flow greater than 270, 000 lbm/hr until narrow range is greater than 6% [29%] in at least one S/G

EXAMINER NOTE: MDAFW 'B' will autostart.

TDAFW pump will not autostart (manual start available). Total AFW flow to the steam generators is <270, 000 lbm/hr. The TDAFW must be started.

Time	Position	Applicant's Actions or Behavior
	SRO, BOP	Once BOP Immediate Actions are complete, BOP starts TDAFW pump. ∗ **Depress OPEN pushbutton for LOOP 3 STEAM TO AFP TURB, AB HIS-6A** ∗ **Depress OPEN pushbutton for LOOP 2 STEAM TO AFP TURB, AB HIS-5A** • **Depress OPEN pushbutton for AFP TURB MECH TRIP/THROT VLV, FC HIS-312A** **CT E-0-F: TDAFW autostart failure; manual start available.** **EXAMINER NOTE: BOP accomplishes this per AP 15C-003 step 6.1.7, the Operator should take manual control when components are not performing correctly OR EMG E-0 step 8 RNO b, OR Attachment F, step F4 RNO b.**

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 24 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
EXAMINER NOTE: When Immediate actions complete, BOP, per Foldout Page Criteria #7, RCS TEMPERATURE CONTROL, throttles AFW to S/Gs to limit the cooldown.		
	SRO, ATC	1. Verify Reactor Trip: a. Check all rod bottom lights – LIT b. Check reactor trip breakers and bypass breakers - OPEN • SB ZL-1 • SB ZL-2 • SB ZL-3 • SB ZL-4 c. Check intermediate range neutron flux - DECREASING • SE NI-35B [GAMMA METRICS] • SE NI-36B [GAMMA METRICS]
	SRO, BOP	2. Verify Turbine Trip a. Check Main Stop Valves – ALL CLOSED
	SRO, ATC	3. Check AC Emergency Busses – AT LEAST ONE ENERGIZED ∗ NB01 – ENERGIZED ∗ NB02 – ENERGIZED
	SRO, ATC	4. Check If Safety Injection Is Actuated: a. Check any indication SI is actuated - LIT ∗ Annunciator 00-030A, NF039A LOCA SEQ ACTUATED – LIT ∗ Annunciator 00-031A, NF039B LOCA SEQ ACTUATED – LIT ∗ ESFAS status panel SIS section – ANY WHITE LIGHTS LIT ∗ Partial Trip Status Permissive/ Block status panel – SI RED LIGHT LIT b. Check both trains of SI actuated. • Ann 00-030A, NF039A LOCA SEQ ACTUATED – LIT • Ann 00-031A, NF039B LOCA SEQ ACTUATED – LIT
CAUTION: If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 7 Page 25 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop 'C'
EMG E-0, REACTOR TRIP OR SAFETY INJECTION
CT E-0-F: TDAFW autostart failure; manual start available.

Time	Position	Applicant's Actions or Behavior
	SRO, ATC, BOP	5. Check if SI is required: ∗ SI was manually actuated AND was required ∗ Containment pressure is currently or has been – GREATER THAN OR EQUAL TO 3.5 PSIG ∗ RCS pressure is currently or has been – LESS THAN OR EQUAL TO 1830 PSIG ∗ Any S/G pressure is currently or has been – LESS THAN OR EQUAL TO 615 PSIG
	SRO, BOP	6. Check Main Generator Breakers And Exciter Breaker – OPEN • MA ZL-3A • MA ZL-4A • MB ZL-2
	SRO, ATC, BOP	7. Verify Automatic Actions Using Attachment F, AUTOMATIC SIGNAL VERIFICATION
	SRO, BOP	8. Check Total AFW Flow – GREATHER THAN 270, 000 LBM/HR; If NO, Perform RNO 8. RNO Perform the following: a. IF S/G narrow range level in at least one S/G is greater than 6% [29%], THEN control feed flow to maintain narrow range level and go to Step 9. b. Manually start pumps and align valves as necessary to establish greater than 270, 000 lbm AFW flow. **CT E-0-F: TDAFW autostart failure; manual start available.** **EXAMINER NOTE:** ∗ **Depress OPEN pushbutton for LOOP 3 STEAM TO AFP TURB, AB HIS-6A** ∗ **Depress OPEN pushbutton for LOOP 2 STEAM TO AFP TURB, AB HIS-5A** • **Depress OPEN pushbutton for AFP TURB MECH TRIP/THROT VLV, FC HIS-312A** c. IF total AFW flow greater than 270, 000 lbm/hr can NOT be established, THEN perform the following: 1) Direct operator to monitor Critical Safety Functions using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST).

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 26 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’
EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, BOP	8. RNO cont. 2) Ensure BIT Inlet AND Outlet Valves are open • EM HIS-8803A • EM HIS-8803B • EM HIS-8801A • EM HIS-8801B 3) Continue with Attachment F and Go to EMG FR-H1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.
	SRO, BOP	9. Check RCS Cold Leg Temperatures; If No, Perform RNO ∗ Stable at or trending to 557°F for condenser steam dumps ∗ Stable at or trending to 561°F for S/G ARVs ∗ Stable at or trending to 557°F for S/G ARVs if recovering from an inadvertent SI
	SRO, BOP	9. RNO Perform the following: a. IF temperature is less than setpoint and decreasing, THEN perform the following: 1. Stop dumping steam. 2. IF any MSIV is open, THEN close Main Turbine Stop And Control Valves Startup Drains. • AC HIS_134 3. IF cooldown continues, THEN control total feedflow to limit RCS cooldown. Maintain total feed flow greater than 270, 000 lbm/hr until narrow range level greater than 6% [29%] in at least one S/G. 4. IF cooldown continues due to excessive steam flow, THEN isolate main steamlines by depressing MS ISO VLV ALL CLOSE pushbutton(s). ∗ AB HS-79 ∗ AB HS-80 b. IF temperature is greater than setpoint and increasing, THEN perform one of the following: ∗ Dump steam to condenser ∗ Dump steam using S/G ARVs.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 27 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	10. Establish S/G Pressure Control: a. Check condenser - AVAILABLE • C-9 LIT • MSIV – OPEN • Circulating water pumps – RUNNING b. Place Steam header Pressure Control in Manual • AB PK-507 c. Manually set Steam Header Pressure Control output to zero • AB PK-507 d. Place Steam Dump Select Switch in STEAM PRESS position • AB US-500Z e. Place Steam Header Pressure Control in Automatic • AB PK-507
	SRO, ATC, BOP	11. Check PZR PORVs a. Check PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A b. Power to block valves - AVAILABLE • BB HIS-8000A • BB HIS-8000B c. RCS pressure – LESS THAN 2185 PSIG
	SRO, ATC, BOP	12. Check Normal {ZR Spray Valves – CLOSED • BB ZL-455B • BB ZL-455C
	SRO, ATC, BOP	13. Check PZR Safety Valves – CLOSED • BB ZL-8010A • BB ZL-8010B • BB ZL-8010C
NOTE: Seal injection flow shall be maintained to all RCPs.		

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 28 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	14. Check If RCPs Should Be Stopped: a. Check RCPs – ANY RUNNING b. Check RCS pressure – LESS THAN 1400 PSIG; No, Perform RNO 14.RNO b. Go to Step 15.
	SRO	15. Direct Operator To Monitor Critical Safety Functions Using EMG F-0, CRITICAL SAFETY FUNCTION STATUS TREES (CSFST).
	SRO, BOP	16. Check If S/Gs Are Not Faulted: a. Check pressures in all S/Gs - • NO S/G PRESSURES DECREASING IN AN UNCONTROLLED MANNER • NO S/G COMPLETELY DEPRESSURIZED
	SRO, BOP, ATC	17. Check If S/G Tubes Are Intact: ∗ Check S/G Levels – NOT INCREASING N AN UNCONTROLLED MANNER • Narrow Range • Wide Range ∗ Condenser air discharge radiation – NORMAL BEFORE ISOLATION • GEG 925 ∗ S/G blowdown and sample radiation – NORMAL BEFORE ISOLATION • BML 266 • SJL 026 ∗ Turbine driven auxiliary feedwater pump exhaust radiation – NORMAL • FCT 381 ∗ S/G steamline radiation – NORMAL • ABS 114 for S/G A • ABS 113 for S/G B • ABS 112 for S/G C • ABS 111 for S/G D

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 29 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-0, REACTOR TRIP OR SAFETY INJECTION

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	18. Check IF RCS Is Intact in Containment: ∗ Containment radiation – NORMAL BEFORE ISOLATION • GTP 311 • GTI 312 • GTG 313 • GTP 321 • GTI 322 • GTG 323 • GTA 591 • GTA 601 ∗ Containment pressure – NORMAL; If No, Perform RNO • GN PI-934 • GN PI-935 • GN PI-936 • GN PI-937 • GT PDI-40 • GN PR-934 ∗ Containment sump level – NORMAL; If No, Perform RNO • EJ LI-7 • EJ LI-8 • EJ LR-6 • LF LI-9 • LF LI-10 18. RNO Perform the following: a. Ensure BIT Inlet AND Outlet Valves are open • EM HIS-8803A • EM HIS-8803B • EM HIS-8801A • EM HIS-8801B b. Go to EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

EXAMINER NOTE: SRO leads a Transition Brief prior to performing EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 30 of 40

Event Description: EMG E-0 REACTOR TRIP OR SAFETY INJECTION, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F1. Check AC Emergency Busses – ENERGIZED • NB01 – ENERGIZED • NB02 - ENERGIZED
	ATC, BOP	F2. Verify Feedwater Isolation a. Main feedwater pumps - TRIPPED • Annunciator 00-120A, MFP A TRIP – LIT • Annunciator 00-123A, MFP B TRIP – LIT b. Main feedwater reg valves - CLOSED • AE ZL-510 for S/G A • AE ZL-520 for S/G B • AE ZL-530 for S/G C • AE ZL-540 for S/G D c. Main feedwater reg bypass valves - CLOSED • AE ZL-550 for S/G A • AE ZL-560 for S/G B • AE ZL-570 for S/G C • AE ZL-580 for S/G D d. Main feedwater isolation valves – CLOSED • AE HIS-39 for S/G A • AE HIS-40 for S/G B • AE HIS-41 for S/G C • AE HIS-42 for S/G D e. Main feedwater chemical injection valves – CLOSED • AE HIS-43 for S/G A • AE HIS-44 for S/G B • AE HIS-45 for S/G C • AE HIS-46 for S/G D f. Check ESFAS status panel SGBSIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train

Op-Test No.: ______ Scenario No.: 4 Event No.: 8 Page 31 of 40

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

CT E-0-O: Close containment isolation valves such that at least one valve is closed on each critical phase-A penetration before the end of the scenario.

Time	Position	Applicant's Actions or Behavior
	ATC. BOP	F3. Verify Containment Isolation Phase A: a. Check ESFAS status panel CISA section – ALL WHITE LIGHTS LIT • Red train • Yellow train; No, Perform RNO
	ATC, BOP	F3 RNO a. Perform the following: 1. IF containment isolation phase A has NOT actuated, THEN manually actuate containment isolation phase A. • SB HS-47 • SB HS-48 2. IF any CISA valve NOT closed, THEN manually close valve. If valve(s) can BOT be closed, THEN manually or locally isolate affected containment penetration. Refer to ATTACHMENT B, VALVES CLOSED BY CONTAINMENT ISOLATIONSIGNAL PHASE A. **CT E-0-O:** **ATC/BOP: Rotates J-handle for CISA SB HS-47 and CISA SB HS-48 to ACTUATE.** **ATC/BOP: At ESFAS status panels, determines CISA Yellow train status for CTMT ATMS MON VLV GSHV36 and CISA Red train status for CTMT ATMS MON VLV GSHV34 White light NOT LIT.** **ATC/BOP: On RL020 Panel, locates (Yellow train) CTMT ATMS MONITOR SPLY CTMT ISO VLV, GS HIS-36 – Depress CLOSE pushbutton.** **ATC/BOP: On RL020 panel, locates (Red train) CTMT ATMS MONITOR RETURN CTMT ISO VLV GS HIS-34 – Depresses CLOSE pushbutton.** Not critical: At ESFAS status panels, verifies CISA section – ALL WHITE LIGHTS LIT.

Op-Test No.: ______ Scenario No.: 4 Event No.: 7 Page 32 of 40

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

CT E-0-F: TDAFW autostart failure; manual start available.

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F4. Verify AFW Pumps Running: a. Check motor driven AFW pumps – BOTH RUNNING; No, Perform RNO F4. RNO a. Manually start pumps EXAMINER NOTE: Recall MD AFW 'A' tagged out. Unable to be started
	ATC/BOP	F4. cont. b. Check turbine driven AFW pump – RUNNING; If No, Perform RNO F4. RNO b. Perform the following: 1. Check if turbine driven AFW pump should be running: ∗ At least 2/4 S/G narrow range level channels on 2/4 S/Gs – LESS THAN 23.5% OR ∗ Loss of NB01 voltage has occurred OR ∗ Loss of NB02 voltage has occurred OR ∗ AMSAC actuation 2. IF turbine driven AFW pump should be running, THEN manually open steam supply valves: **a. AB HIS-5A** **b. AB HIS-6A** **c. FC HIS-312C** **CT E-0-F: TDAFW autostart failure; manual start available.** **EXAMINER NOTE:** **a. Depress OPEN pushbutton for LOOP 2 STEAM TO AFP TURB, AB HIS-5A** **b. Depress OPEN pushbutton for LOOP 3 STEAM TO AFP TURB, AB HIS-6A** **c. Depress OPEN pushbutton for AFP TURB MECH TRIP/THROT VLV, FC HIS-312A**
	ATC, BOP	F5. Verify ECCS Pumps Running: a. Check CCPs – BOTH RUNNING b. Check SI pumps – BOTH RUNNING c. Check RHR pumps – BOTH RUNNING

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 33 of 40

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F6. Verify CCW Alignment: a. Check CCW pumps – ONE RUNNING IN EACH TRAIN b. Check one pair of CCW service loop Supply And Return Valves for an operating CCW pump - OPEN ∗ EG ZL-15 AND EG ZL-53 OR ∗ EG ZL-16 AND EG ZL-54
	ATC, BOP	F7. Check ESW Pumps – BOTH RUNNING
	ATC, BOP	F8. Check Containment Fan Coolers – RUNNING IN SLOW SPEED
	ATC, BOP	F9. Verify Containment Purge Isolation: a. Check ESFAS status panel CPIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train; No, Perform RNO
	ATC/BOP	F9. RNO a. Perform the following: 1. IF containment purge isolation has NOT actuated, THEN manually actuate containment purge isolation. • SA HS-11 • SA HS-15 2. IF any CPIS component NOT properly aligned, THEN manually align component. 3. IF component(s) can NOT be manually aligned, THEN locally isolate instrument air to affected containment penetration. Refer to ATTACHMENT C, VALVES CLOSED BY CONTAINMENT POURGE ISOLATION SIGNAL. ATC/BOP: • At RL018 panel, (Red train) CTMT PURGE TRN A ISO, SA HS-11, ACTUATE pushbutton depressed. • At RL018 panel, (Yellow train) CTMT PURGE TRN B ISO, SA HS-15, ACTUATE pushbutton depressed. ATC/BOP reverifies ALL WHITE LIGHTS LIT for ESFAS status panels CPIS section, Red train and Yellow train.

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Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	Position	Applicant's Actions or Behavior
	ATC, BOP	F10. Verify Both Trains Of Control Room Ventilation Isolation: a. Check ESFAS status panel CRIS section – ALL WHITE LIGHTS LIT • Red train • Yellow train b. Ensure Control Room outer door - CLOSED
	ATC, BOP	F11. Verify Main Steamline Isolation Not Required: a. Check containment pressure – HAS REMAINED LESS THAN 17 PSIG • GN PR-934 b. Check either condition below - SATISFIED ∗ Low steamline pressure SI – NOT BLOCKED AND steam line pressure – HAS REMAINED GREATER THAN 615 PSIG OR ∗ Low steamline pressure SI – BLOCKED AND steamline pressure rate – HAS REMAINED LESS THAN 100 PSI/50 SEC
	ATC, BOP	F12. Verify Containment Spray Not Required: a. Containment pressure – HAS REMAINED LESS THAN 27 PSIG: • Annunciator 00-059A, CSAS - NOT LIT • Annunciator 00-059B, CISB – NOT LIT • GN PR-934
	ATC, BOP	F13. Verify ECCS Flow: a. Check Centrifugal Charging Pumps TO Boron Injection Tank Flow meters – FLOW INDICATED • EM FI-917A • EM FI-917B b. Check RCS pressure – LESS THAN 1700 PSIG; No, Perform RNO F13 RNO b. Go to Step F14.
	ATC, BOP	F14. Verify AFW Valves – PROPERLY ALIGNED: a. Check ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT b. Check white train ESFAS status panel AFAS section – ALL WHITE LIGHTS LIT

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 35 of 40

Event Description: EMG E-0, ATTACHMENT F, AUTOMATIC SIGNAL VERIFICATION

Time	**Position**	**Applicant's Actions or Behavior**
	ATC, BOP	F15. Verify SI Valves – PROPERLY ALIGNED a. Check ESFAS status panel SIS section – SYSTEM LEVEL WHITE LIGHTS ALL LIT • Red train • Yellow train
	ATC, BOP	F16. Check If NCP Should Be Stopped: a. CCPs – ANY RUNNING b. Stop NCP • BG HIS-3
	ATC, BOP	F17. Return To Procedure And Step In Effect

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 36 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-1, rev 21, LOSS OF REACTOR OR SECONDARY COOLANT

Time	Position	Applicant’s Actions or Behavior
NOTES • Foldout page shall be monitored throughout this procedure. • Seal injection flow shall be maintained to al RCPs.		
FOLDOUT PAGE CRITERIA 1. SI REINITIATIN CRITERIA 2. RCP TRIP CRITERIA 3. SECONDARY INTEGRITY CRITERIA 4. EMG E-3 TRANSITION CRITERIA 5. COLD LEG RECIRCULATION CRITERIA 6. AFW SUPPLY SWITCHOVER CRITERIA		
	SRO, ATC, BOP	Crew enters and performs EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT. SRO directs EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT.
	SRO, ATC, BOP	1. Check If RCPs Should Be Stopped: a. Check RCPS – ANY RUNNING b. Check RCS pressure – LESS THAN 1400 PSIG; No, Perform RNO 1. RNO b. Go to step 2.
	SRO, BOP	2. Check If S/Gs Are Not Faulted: a. Check pressures in all S/Gs. • NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER • NO S/G COMPLETELY DEPRESSURIZED
	SRO, BOP	3. Check Intact S/G Levels: a. Check Narrow Range Level In At Least One S/G – GREATER THAN 6% [29%]; If No, Perform RNO 3. RNO a. Maintain total feed flow greater than 270, 000 lbm/hr, until narrow range level greater than 6% [29%] in at least one S/G. Back to step 3. Control feed flow to maintain narrow range level in all S/Gs between 6% [29%} and 50%.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 37 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop 'C'

EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Time	Position	Applicant's Actions or Behavior
CAUTION If offsite power is lost after SI reset, manual action may be required to restore safeguards equipment to the required configuration.		
	SRO, ATC	4. Reset SI. • SB HS-42A • SB HS-43A
	SRO, ATC, BOP	5. Reset Containment Isolation Phase A And Phase B. • SB HS-56 For Phase A • SB HS-53 For Phase A • SB HS-55 For Phase B • SB HS-52 For Phase B
CAUTION If steamlines in Area 5 of Auxiliary Building are not intact, extreme caution will be necessary when performing local surveys.		
	SRO, ATC, BOP	6. Determine Secondary Radiation Levels: a. Direct Health Physics t survey steamlines in Area 5 of Aux Bldg b. Check S/G Sampling - ISOLATED c. Ensure Temporary CCW Pump and Temporary CCW Chiller, as needed, are inservice per SYS EG-130, RADWASTE CCW SYSTEM OPERATION. d. WHEN Temporary CCW Pump is inservice, THEN open all S/G sample isolation valves. • BM HIS-65 For S/G A • BM HIS-35 For S/G A • BM HIS-66 For S/G B • BM HIS-36 For S/G B • BM HIS-67 For S/G C • BM HIS-37 For S/G C • BM HIS-68 For S/G D • BM HIS-38 For S/G D e. Direct Chemistry to sample all S/Gs for activity.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 38 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop 'C'

EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Time	Position	Applicant's Actions or Behavior
Simulator Operator: If called as Health Physics: acknowledge survey request for Area 5. If called as Radwaste Operator, report Temporary CCW pump and chiller not in service. (not modeled) If called as Chemistry: acknowledge sample request for all steam generators.		
	SRO, ATC, BOP	7. Check Secondary Radiation a. Condenser Air Discharge Radiation – NORMAL BEFORE ISOLATION • GEG 925 b. S/G Blowdown Radiation – NORMAL BEFORE ISOLATION • BML 256 c. S/G Sampler Radiation - NORMAL • SJL 026 • Sample results d. Turbine Driven Auxiliary Feedwater Pump Exhaust Radiation - NORMAL • FCT 381 e. S/G Steamline Radiation - NORMAL • ABS 114 For S/G A • ABS 113 For S/G B • ABS 112 For S/G C • ABS 111 For S/G D • Local surveys
CAUTIN If any PZR PORV opens because of high PZR pressure, the PORV shall be monitored to ensure it recluses after pressure decreases to less than 2335 psig.		
	SRO, ATC, BOP	8. Check PZR PORVs And Block Valves: a. Power To Block Valves - AVAILABLE • BB HIS-8000A • BB HIS-8000B b. PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A c. RCS Pressure – LESS THAN 2185 PSIG
NOTE Locally opening EF HV-43, ESW A TO AIR COMPRESSOR or EF HV-44, ESW B TO AIR COMPRESSOR requires the associated ESW Train to be declared inoperable. Local opening of the valve, on 2000' NORTH END AUX BLDG, will preclude it from automatically isolating on a high flow condition.		

Op-Test No.: ______ Scenario No.: 4 Event No.: ______ Page 39 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	9. Verify Instrument Air Compressor Is Running: a. Ensure At Least One ESW TRN TO AIR COMPRESSOR Valve – OPEN ∗ EF HIS-43 ∗ EF HIS-44 b. Check AIR COMPRESSOR BRKR RESET Switch Associated With Open ESW Valve(s) – CLOSED; No, Perform RNO 9. RNO b. Reset and close AIR COMPRESSOR BRKR RESET Switch. ∗ KA HIS-3C ∗ KA HIS-2C Back to step 9. c. Check INST AIR PRESS – GREATER THAN 105 PSIG • KA PI-40 d. check Neither ESW TO AIR COMPRESSOR Valve – Locally Opened • EF HV-43 • EF HV-44 e. Check Both ESW TRN TO AIR COMPRESSOR Valves - OPEN • EF HIS-43 • EF HIS-44 f. Check Both AIR COMPRESSOR BRKR RESET Switches – CLOSED • KA HIS-3C • KA HIS-2C
	SRO, ATC, BOP	10. Verify Instrument Air To Containment: a. Check PZR PRESS MASER CTRL Output – LESS THAN 50% • BB PK-455A b. Open INST AIR SPLY CTMT ISO VLV. • KA HIS-29
	SRO, ATC, BOP	11. Check If ECCS Flow Should Be Reduced: a. RCS Subcooling – GREATER THAN 30°F [45°F] b. Secondary Heat Sink: ∗ Total Feed Flow To Intact S/Gs – GREATER THAN 270, 000 LBM/HR OR ∗ Narrow Range Level In At Least One Intact S/G – GREATER THAN 6% [29%] c. RCS Pressures – STABLE OR INCREASING; If No, Perform RNO. 11. RNO c. Go to step 12.

Op-Test No.: ______ Scenario No.: 4 Event No.: 6 Page 40 of 40

Event Description: Major: 600 gpm LOCA – Cold Leg Loop ‘C’

EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT

Time	Position	Applicant’s Actions or Behavior
	SRO, ATC, BOP	11. Cont. d. PZR Level – GREATER THAN 6% [33%]; If No, Perform RNO. 11. RNO d. Perform the following: 1. Try to stabilize RCS pressure using normal PZR spray. 2. Go to step 12. e. Go To EMG ES-03, SI TERMINATION
EXAMINER NOTE: If plant conditions are met, crew transitions to EMG ES-03, SI TERMINATION. If plant conditions are not met, crew continues to step 12 and transitions to EMG ES-11, POST LOCA COOLDOWNAND DEPRESSURIZATION, at step 24.		
EXAMINER NOTE: Scenario termination criteria: Completion of all critical tasks, crew performing EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, ready to transition to recovery procedure or at Lead Examiner discretion.		
Simulator Operator: At direction of Lead Examiner, FREEZE simulator. Do not reset until directed from Lead Examiner. Collect any data needed.		