DUKE ENERGY

Run 1

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 2

LOWER POWER, REMOVE 230KV LINE FROM SERVICE, ROD DRIFT, ADHR PP TRIP, RECIRC LOOP FLOW FAILURE, HDD PP TRIP, ATWS, SLC MODE SWITCH FAILURE, ARI FAIL TO RESET

REVISION 0

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REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

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1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1		R - ATC	Lower power to 850 MWe to remove 230 kV Line 30
2		N - BOP	Remove 230 kV Line 30 from service
3	RD001M (26-11)	C - ATC C - CRS	Rod Drift (TS)
4	K4526A	C - BOP C - CRS	ADHR Secondary pump trip (AOP)
5	NI063F	C - ATC C - CRS	Recirc Loop B Flow transmitter Failure (TS)
6	CF089F	C - BOP C - CRS	Heater Drain Deaerator Pump Trip (AOP)
7	CA008F	M	Small steam leak in DW results in an ATWS requiring terminate and prevent actions (RSP)(ATWS)
8	K2119A	C	SLC Mode Switch Failure
9	K2624A	C	Alternate Rod Insertion reset failure

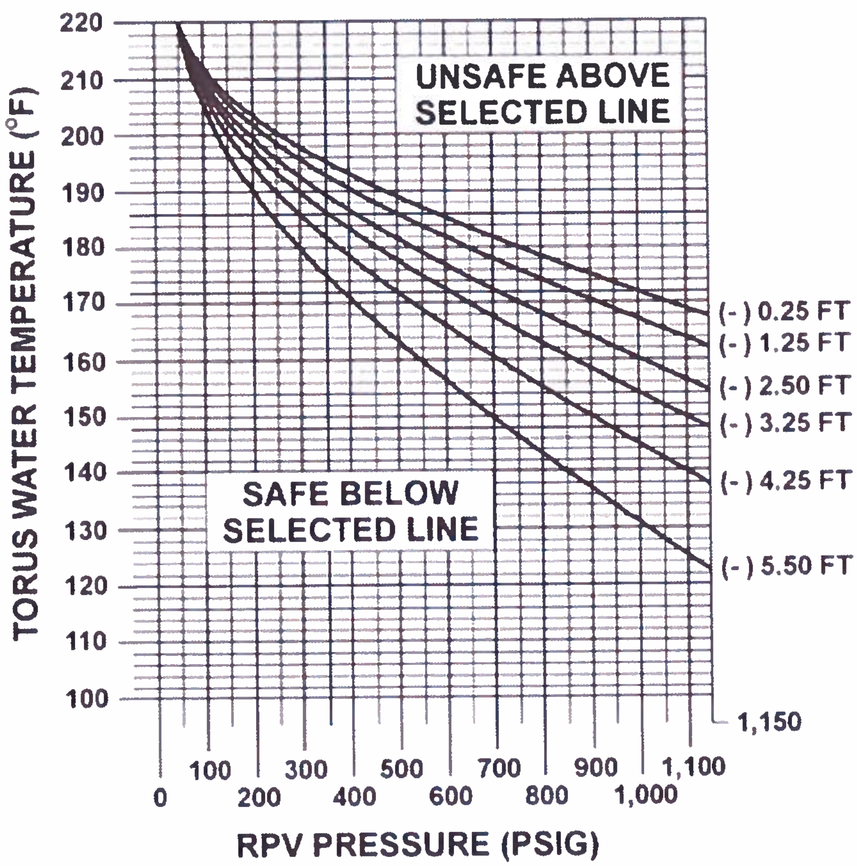
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	After taking the watch the CRS will direct power reduced to 850 MWe.
2	The BOP will isolate 230 kV Line 30.
3	Control Rod 26-11 will start to drift in. The crew will enter 0AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 to insert the control rod in 3 hours and C2 to disarm the control rod within 4 hours.
4	After Tech Specs are addressed the Alternate Decay Heat Removal (ADHR) Seconday pump will trip. AOP-38.0 will be entered
5	The Recirc Loop B flow transmitter to APRM Channel 4 will fail ~~down~~upscale resulting in a rod block and a trip input to each voter. The crew will respond per APPs and bypass APRM 4. The APRM will be declared Inoperable per TS 3.3.1.1, Condition A and placed in trip within 12 hours. APRM TS Actions to be taken requires the APRM mode selector switch to be place in INOP IAW 0OI-18
6	A motor overload will occur on Heater Drain Pump 2A. The crew will reference APP UA-06 1-7, Bus 2D 4KV Motor Ovld and determine which pump has the overload condition. The crew should start HDP 2C and secure HDP 2A. The crew may reference AOP-23.0.
7	A small steam leak in the DW results in rising Drywell pressure requiring a reactor scram. An ATWS will occur, conditions will require terminate and prevent actions to be performed.
8	When SLC is initiated, the mode switch will fail and the pumps will not start. LEP-03 will be executed to inject the boron into the core.
9	Alternate Rod Insertion (ARI) will not reset, the crew will perform LEP-02 to drive control rods into the core. When level is stabilized after terminating and preventing ARI will be repaired to allow the rods to be manually scrammed.

3.0 CREW CRITICAL TASKS

Critical Task #1
Prevent the automatic actuation of ADS (LL3) to prevent low pressure ECCS injection to the reactor.
Critical Task #2
Reduce reactor power/pressure to prevent exceeding Heat Capacity Temperature Limit (HCTL)



4.0 TERMINATION CRITERIA

When all rods are inserted and level is being controlled above TAF the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
A-05, 3-2	ROD DRIFT
0AOP-02.0	CONTROL ROD MALFUNCTION/MISPOSITION
UA-18, 6-1	BUS E4 4KV MOTOR OVLD.
UA-01, 2-3	ADHR PRIMARY LOOP TROUBLE
UA-01, 3-3	ADHR SECONDARY LOOP TROUBLE
0AOP-38.0	LOSS OF FUEL POOL COOLING
A-06, 2-8	APRM UPSCALE
A-06, 3-8	APRM UPSCALE TRIP/INOP
A-06, 5-7	FLOW REF OFF NORMAL
A-05, 2-2	ROD OUT BLOCK
A-05, 4-8	OPRM TRIP ENABLED
UA-5, 3-5	SBGT SYS B FAILURE
UA-5, 4-6	SBGT SYS A FAILURE

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-11.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE
10. **LOAD** Scenario File.
11. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Bypass APRM 2 RCC Pump D in service for ADHR RCC Pump A in service for RBCCW

12. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
13. **PLACE** a clearance on the following equipment.

Component	Position
APRM 2	Blue tag

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:

Protected Equipment
1. 2A and 2B NSW pumps 2. 2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-11 is in place.

16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials
Marked up of 2OP-50, Section 6.2.6

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.

19. **PROVIDE** Shift Briefing sheet for the CRS.

20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
1	Malfunction	RD001M - [CONTROL ROD SLOW INSERTION DRIFT]
2	Annunciator	ZA512 - [CRD HYD TEMP HIGH]
3	Trigger Command	MFD:RD001M,26-11
4	Remote Function	RD_RDELDIS - [ELECTRICAL DISARM OF ROD]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DO Override	Q4526AMW - [RBCCW PMP D ADHR MODE]
5	DO Override	Q4526LG4 - [RBCCW PMP D OFF G]
5	Malfunction	RP011F - [ATWS 4]
6	Remote Function	CC_MODE - [RBCCW/ADHR VALVE LINEUPS]
6	Remote Function	CC_MSS - [RBCCW/ADHR PUMP MODE SELECTOR SWITCH]
7	Remote Function	CC_PDV - [RBCCW PUMP DISCHARGE VALVE]
8	Malfunction	NI063F - [RECIRC LOOP B XMITTER FAILURE]
9	Malfunction	CF089F - [HEATER DRAIN PUMP MOTOR WINDING FAULT]
10	Malfunction	NB006F - [MSL BRK BEFORE FLOW RESTRICTOR]
11	Remote Function	EP_IAEOPJP1 - [BYPASS LL-3 GROUP I ISOL (SEP-10)]

Trig #	Trigger Text
3	KM118EDN - [SCRAM TEST SWITCH 26-11] true deletes RD001M

ANNUNCIATORS

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
1-2	CRD HYD TEMP HIGH	ZA512	ON	ON	OFF			2

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RD001M	26-11	CONTROL ROD SLOW INSERTION DRIFT	False	True				1
NI063F	APRM 4	RECIRC LOOP B XMITTER FAILURE	0.00	125.00				8
NB006F	A	MSL BRK BEFORE FLOW RESTRICTOR	0.00	1.0e-1	0:03:00			10
CF089F	A	HEATER DRAIN PUMP MOTOR WINDING FAULT	False	True				9
RP011F		ATWS 4	False	True				5
RP005F		AUTO SCRAM DEFEAT	True	True				
NI032F	APRM 2	APRM FAILS LO	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
RD_RDELDIS	26-11	ELECTRICAL DISARM OF ROD	ARM	DISARM			4
CC_MODE	PUMP-A	RBCCW/ADHR VALVE LINEUPS	RBCCW	ADHR			6
CC_MSS	A	RBCCW/ADHR PUMP MODE SELECTOR SWITCH	RBCCW	ADHR			6
CC_PDV	A_V38_V5114	RBCCW PUMP DISCHARGE VALVE	1.0000	1.0e-01			7
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
EP_IAEOPJP1		BYPASS LL-3 GROUP I ISOL (SEP-10)	OFF	ON			11

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4526A	RBCCW PUMP D OFF	OFF/RESET	OFF	ON				5
K4526A	RBCCW PMP D AUTO	AUTO	OFF	OFF				5
K4526A	RBCCW PMP D ON	ON	ON	OFF				5
Q4526LG4	RBCCW PMP D OFF G	ON/OFF	OFF	OFF				5
Q4526AMW	RBCCW PMP D ADHR MODE	ON/OFF	ON	OFF				5
K2119A	S/B LIQ PUMP A & B	PUMP_A	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_A&B	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_B	OFF	OFF				
K2624A	CS-5562 ARI	RESET	OFF	OFF				
K2625A	CS-5560 ARI	INOP	OFF	OFF				

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: LOWER POWER TO 850 MWE	
	Simulator Operator Actions
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

	Simulator Operator Role Play
	If asked as the NE, report that reactivity plan is to reduce power with recirc flow.
	If asked as the NE, report that 850 MWe gross is ~86% power and ~65 Mlb/hr core flow

Evaluator Notes	
Plant Response:	
Objectives:	SRO - Directs power to be reduced to 850 MWe BOP – Monitor the Plant RO – Reduces power to 850 MWe.
Success Path:	Power is lowered to 850 MWe
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: LOWER POWER TO 850 MWE

Time	Pos	EXPECTED Operator Response	NOTES
	SRO	Conduct shift turnover shift briefing.	
		Direct power to be reduced using recirc flow to ~850 MWe. (2OP-02, Section 6.2.1)	
		Contacts chemistry for samples due to 15% power change. May contact Load dispatcher to inform of power decrease. May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	RO	Reduces reactor power using recirc IAW 2OP-02 Section 6.2.1	
		May null the DVM meter.	
	BOP	Monitors the plant	

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6.2 Shutdown

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control

1. **Confirm** reactor recirculation pump in operation in accordance with Section 6.1.2. .... ______

NOTE

- Recirculation Pump speed changes are performed when directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. Other operating procedures are used simultaneously with this procedure as directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. .... ☐
- Speed changes are accomplished by depressing Lower Slow, Lower Medium, or Lower Fast pushbuttons. The Lower Slow pushbutton changes Recirc pump speed at 0.06%/decrement at 1 rpm/second. The Lower Medium pushbutton changes Recirc pump speed at 0.28%/decrement at 5 rpm/second. The Lower Fast pushbutton changes Recirc pump speed at 2.8%/decrement at 100 rpm/second. .... ☐

2. <u>**IF AT ANY TIME**</u> any of the following conditions exist, <u>**THEN**</u> **enter** 1AOP-04.0, Low Core Flow.{8.1.9} .... ______

   - Entry into Region A of Power to Flow Map
   - OPRM INOPERABLE <u>**AND**</u> any of the following
     - ◊ Entry into Region B of Power to Flow Map
     - ◊ Entry into 5% Buffer Region of Power to Flow Map
     - ◊ Entry into OPRM Enabled Region and indications of THI (Thermal Hydraulic Instability) exist

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

CAUTION

- The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations are governed by the limits of the applicable Power Flow Map, as specified in the COLR. {8.1.9} .... ☐
- Entry into the 5% Buffer Region warrants increased monitoring of reactor instrumentation for signs of Thermal Hydraulic Instability. Time in the 5% Buffer Region presents additional risk and is minimized.{8.1.9} .... ☐
- With core flow less than 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 10% (maximum indicated difference 6.0 x 10^6 lbs/hr). With core flow greater than or equal to 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 5% (maximum indicated difference 3.0 x 10^6 lbs/hr). .... ☐
- When Recirc Pump speeds are less than 40%, decreasing speed using a Lower Fast pushbutton can result in a Speed Hold condition due to exceeding the regen torque limit. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

3. **IF** desired to lower the speed of both recirculation pumps simultaneously,
   THEN depress Recirc Master Control Lower (Slow Medium Fast) pushbutton. .... ______

4. **IF** desired to lower the speed of an individual recirculation pump,
   THEN depress the Recirc VFD A(B) Lower (Slow Medium Fast) pushbutton. .... ______

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

5. **Confirm** the following, as applicable:

   - Recirc Pump A(B) Speed Demand, Calculated Speed, and Actual Speed have lowered .... ________
   - Reactor power lowers .... ________
   - B32-R617(R613) [Recirc Pump A(B) Discharge Flow] lowers..... ________
   - B32-VFD-IDS-003A(B) [Recirc VFD 2A(B) Output Wattmeter] lowers.................... ________
   - B32-VFD-IDS-001A(B)]Recirc VFD 2A(B) Output Frequency Meter] lowers.................... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ____________________

Performed By (Print)	Initials
____________________	______
____________________	______
____________________	______
____________________	______

Reviewed By: ____________________
Unit CRS/SRO

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30	
Simulator Operator Actions	

Simulator Operator Role Play	
	If contacted as the Load Dispatcher acknowledge report.

Evaluator Notes	
Plant Response:	230 kV Delco West line is isolated
Objectives:	SRO - Direct 230kV Delco West Line isolated ATC – Plant monitoring BOP – Performs 2OP-50 Section 6.2.6 for isolating ONLY the Delco West Line
Success Path:	230 kV Delco West (Line 30) isolated
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs 230kV Delco West Line isolated IAW marked up version of 2OP-50, Section 6.2.6.	
	BOP	Performs 2OP-50, Section 6.2.6	
	RO	Monitors the plant.	

6.2.6 De-energizing The 230 kV Switchyard

1. **Ensure** the Unit 2 230 kV switchyard is ENERGIZED. .... AD
2. **Ensure** the 4kV Auxiliary Electrical Systems are DE-ENERGIZED in accordance with Section 6.2.3. .... N-1 SRO
3. **Ensure** the SAT is DE-ENERGIZED in accordance with Section 6.2.4 .... N-1 SRO
4. **Ensure** Caswell Beach Pumping Station is DE-ENERGIZED in accordance with Section 6.2.5 .... N-1 SRO
5. **Ensure** required LCOs for Technical Specification Sections 3.8.1, 3.8.2, 3.8.7 and 3.8.8 are initiated .... SRO
6. **Obtain** Load Dispatcher's permission to de-energize the 230 kV switchyard. .... AD

   A Powers - the Delco West Line ONLY
   Person Contacted

7. **Place** Auto Reclose switches for the following PCBs in MAN:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ________
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ________
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

CAUTION

PCB Supervisory switch must be in LOCAL before the associated PCB is operated from Panel XU-5. ☐

8. **Place** Supervisory switches for the following PCBs in LOCAL:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO
9. **Open** 31B (Bus 2B Whiteville 230 kV PCB) .... N-1 SRO
10. **Confirm** 31B (Bus 2B Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
11. **Open** 31A (Bus 2A Whiteville 230 kV PCB) .... N-1 SRO
12. **Confirm** 31A (Bus 2A Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
13. **Open** 30B (Bus 2B Delco West Line 230 kV PCB) .... ______
14. **Confirm** 30B (Bus 2B Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
15. **Open** 30A (Bus 2A Delco West Line 230 kV PCB) .... ______
16. **Confirm** 30A (Bus 2A Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
17. **Open** 28B (Bus 2B Wallace 230 kV PCB) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

18. **Confirm** 28B (Bus 2B Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
19. **Open** 28A (Bus 2A Wallace 230 kV PCB). .... N-1 SRO
20. **Confirm** 28A (Bus 2A Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
21. **Open** 27B (Bus 2B Town Creek 230 kV PCB). .... N-1 SRO
22. **Confirm** 27B (Bus 2B Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
23. **Open** 27A (Bus 2A Town Creek 230 kV PCB). .... N-1 SRO
24. **Confirm** 27A (Bus 2A Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO

NOTE

If work is to be performed on a 230 kV bus, the manual disconnects are to be opened. .... ☐

25. **Place** Supervisory switches for the following PCBs in REMOTE:
    - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
    - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
    - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
    - 27B (Bus 2B Town Creek 230 kV Breaker .... N-1 SRO
    - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
    - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
    - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
    - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

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6.2.6 De-energizing The 230 kV Switchyard (continued)

Date/Time Completed ______

Performed By (Print) Initials

______________ ______

______________ ______

______________ ______

______________ ______

Reviewed By ______________

Unit CRS/SRO

N-1, Partial usage to isolate only the Delco West 230 kV Line (Line 30)

EVENT 3: ROD DRIFT	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to drift CR 26-11 into the core.
	When CR 26-11 is inserted to 00, **Initiate Trigger 2** to activate CRD High Temperature alarm.
	Two minutes after control rod is disarmed or scrammed, delete CRD HYD TEMP HIGH alarm.
	If asked to disarm CRD 26-11 **Initiate Trigger 4**.

Simulator Operator Role Play	
	If contacted as the RE to address thermal limits, acknowledge the request. When contacted for scramming control rod 26-11, report that Thermal Limits will NOT be exceeded by this single rod scram.
	If asked as the RBAO to investigate HCU for control 26-11, report that the HCU scram outlet riser is hot to the touch.
	When contacted as the RBAO and after high temperature alarm has been actuated, report that the CRD temperature is 390°F and slowly rising.
	When contacted as the System Engineer report that based on past history of this rod (26-11) scram times cannot be guaranteed.
	If contacted as the WCC to perform the single rod scram, report that there are no operators available to perform the task.
	If asked as the RBAO to disarm control rod, coordinate with Sim Operator after 5 minutes.
	If requested, close/reopen the 113 valve (Charging Header Isolation Valve) as necessary
	As RBAO, Report Accumulator pressure 980# after rod has been scrammed.

Evaluator Notes	
Plant Response:	Control Rod 26-11 will drift full in. Crew should enter AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received, Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 in 3 hours <u>and</u> C2 within 4 hours.
Objectives:	SRO - Direct actions in response to a drifting control rod and evaluate Tech Specs. RO - Respond to a drifting control rod.
Success Path:	The drifting control rod is fully inserted, determined that the control rod must be placed under clearance and electrically disarmed.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: ROD DRIFT

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of 2APP-A-05 (3-2) *ROD DRIFT*	
	SRO	Direct entry into 0AOP-02.0, Control Rod Malfunction/Misposition.	
	SRO	After System Engineer reports that the scram times cannot be guaranteed, according to Note 2 in TS Table 3.1.4-1 the rod must be declared inoperable. Tech Spec 3.1.3 Control Rod Operability Condition C. One or more control rods inoperable for reasons other than Condition A or B <u>Required Action</u> C.1 Fully insert inoperable control rod (3 hrs) C.2 Disarm the associated CRD (4 hrs)	
	SRO	Contact System Engineer on high temperature condition of control rod. Contact RE to inform of rod drift and to evaluate thermal limits	
	SRO	May direct the control rod to be scrammed to attempt to reseat the leaking outlet valve IAW A-05 (3-2) *ROD DRIFT* May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	BOP	Monitor reactor plant parameters during evolution. May read APP actions for the OATC to perform	

EVENT 3: ROD DRIFT

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Acknowledge alarms: A-05 (5-2) Rod Block RWM/RMCS Sys Trouble A-05 (3-2) Rod Drift Announce and enter 0AOP-02.0, Control Rod Malfunction/Misposition.	
	ATC	Perform the actions of APP-A-05 (3-2) ROD DRIFT as follows: ☐ Determine which control rod is drifting. ☐ Select the drifting control rod and determine direction of drift. ☐ Attempt to arrest the drift by giving a withdraw signal. ☐ If rod continues to drift in, apply an RMCS insert signal and fully insert to position 00. ☐ Attempt to locate and correct the cause of the rod malfunction as follows: ☐ Check and adjust cooling water header pressure if required. ☐ Direct AO to check for leaking scram valve. ☐ May direct an AO to check HCU temperature on RO18 temperature recorder (in the Rx Bldg.)	
	ATC	Monitor core parameters, main steam line radiation and off-gas activity.	
	ATC	Perform 2OP-07 Section 6.3.17, Single Rod Scram from RPS Test Panel. CRS will NA appropriate steps.	The examiner will **prompt** the performer that the "blue light is ON and indication is 00" when step 6.3.17.11 is performed.

6.3.17 Single Rod Scram From RPS Test Panel

1. **Confirm** the following initial conditions are met:

- All applicable prerequisites in Section 5.0 are met. .... ________
- Attachment 1 has been reviewed. .... ________
- Communications are established between RPS Test Panel and the Control Room. .... ________
- Reactor Engineer recommends performance of this section and has determined Technical Specification Thermal Limits will **NOT** be exceeded by this single rod scram.......................... ________

____
Reactor Engineer

2. **IF AT ANY TIME** it becomes necessary to scram a single control rod for operability concerns
THEN perform 0PT-14.2.1, Single Rod Scram Insertion Times Test for that control rod. .... ________

3. **Obtain** permission from the Unit CRS to perform this section. .... ________
CRS

4. **Document** applicable control rod to be scrammed in the space provided: .... ________

_____-_____
Control Rod

5. **IF** recommended by Reactor Engineering to support diagnostic data,
THEN record the following: .... ________

- Reactor pressure:.. ________

__________ psig

- Applicable accumulator pressure: .... ________

__________ psig

6.3.17 Single Rod Scram From RPS Test Panel (continued)

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

6. **Select** applicable control rod at P603. .... ____/____ CV

7. **Close** C12-113 (Charging Water Riser Isolation Valve) for the applicable control rod. .... ________

8. **IF** RWM scram time recording is recommended by Reactor Engineering, **THEN perform** the following: .... ________

   a. **Have** Reactor Engineering connect temporary scram time test cable to single rod scram interface box (located on terminal strip GM in P616-RMCS cabinet) and route cable up to RPS Test Panel P610 in accordance with Attachment 12, (Reference Use) - Test Cable Arrangement For RWM Scram Recording. .... ________

      ____
      Reactor Engineer

      (1) **Insert** black lead into NEUTRAL socket on the P610 test panel. .... ____/____ IV

      (2) **Insert** red lead into socket corresponding to control rod to be tested at P610. .... ____/____ IV

9. **Monitor** control rod position. .... ________

10. **IF AT ANY TIME** the control rod does **NOT** fully scram after lowering the scram test switch, **THEN** immediately **notify** the Unit CRS to determine operability of the rod (Technical Specification 3.1.3). .... ________

11. Using a currently licensed RO/SRO, **perform** the following:

    a. **Scram** the applicable control rod by lowering the scram test switch on RPS Test Panel P610 to the scram (down) position. .... ____/____ CV

6.3.17 Single Rod Scram From RPS Test Panel (continued)

b. **WHEN** the scrammed control rod is fully inserted **OR** 10 seconds have elapsed (whichever occurs first), **THEN return** applicable scram test switch to the normal (up) position. .... ____/____
IV

12. **Confirm** rod position display indicates "00" for scrammed rod and the GREEN "Full In" light is ON. .... ________

13. **IF** control rod did **NOT** fully insert, **THEN reference** Technical Specifications for OPERABILITY. .... ________
CRS

NOTE

Holding Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for a period of time will flush any ingested crud from the drive to help prevent double notching. .... ☐

14. **Hold** the Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for at least 15 seconds and **record** insert stall flow.

______ stall flow	______ stall flow	______ stall flow
1:____	2:____	3:____

15. **Repeat** Section 6.3.17 Step 14 two additional times. .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

16. Slowly **open** applicable C12-113 (Charging Water Riser Isolation Valve). .... ____/____
IV

17. **Confirm** associated accumulator pressure is greater than 955 psig. .... ________

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6.3.17 Single Rod Scram From RPS Test Panel (continued)

18. IF RWM scram time was recorded, THEN **perform** the following: .... ______

a. **Contact** Reactor Engineering to upload data .... ______

____
Reactor Engineer

b. **Remove** temporary scram timing cables from P616 and P610 .... ___/___
IV

c. **Perform** the following to delete RWM scram data buffers:

(1) **Select** SCRAM DATA screen on RWM Operator Display in the Control Room .... ______

(2) **Press** DELETE softkey to delete scram data .... ______

(3) **Confirm** SCRAM DATA screen displays: .... ______

- ROD SCRAM TIMING FUNCTION: READY
- ROD SCRAM TIMING DATA: NOT TRANSFERRED

EVENT 4: ADHR SECONDARY PUMP TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to trip the running ADHR Pump.
	When informed to align 2A RCC pump to ADHR mode **Initiate Trigger 6**
	If asked to throttle closed the RCC-V5114, **Initiate Trigger 7**. When asked to re-open the RCC-V5114, then adjust the remote to 1.0.

Simulator Operator Role Play	
	If directed to investigate the trip of RCC Pump D, report the pump is tripped on overcurrent.
	When directed to align RBCCW Pump 2A to ADHR mode IAW 2OP-21 Section 6.3.16 (steps 2b through 2i) have Sim Op align pump to ADHR mode and inform BOP Op that the steps are complete.
	When contacted as RBAO report radiation monitor is aligned per 2OP-21 Section 6.3.18 step 4. RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is throttled 90% closed. (2OP-21 Section 6.3.18 Step 5a)
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is full open. (2OP-21 Section 6.3.18 Step 5c)

Evaluator Notes	
Plant Response:	The running ADHR Secondary Loop Pump (RCC Pump D) will trip. The crew will have to start RCC Pump C. Shutdown RCC Pump A. Re-align RCC Pump A for ADHR mode and then start the pump for ADHR. (AOP-38.0 will be entered).
Objectives:	SRO – Direct swapping of RCC pumps and then direct starting of RCC Pump in ADHR Mode. RO – Swap RCC pumps, Place RCC Pump in ADHR Mode.
Success Path:	Standby ADHR Pump placed in service.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: ADHR SECONDARY PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct entry into 0AOP-38.0, Loss of Fuel Pool Cooling	
		Direct swapping of RBCCW pumps Start RBCCW Pump C, secure A.	
		Direct alignment of RBCCW Pump A to ADHR Mode.	
		Direct starting RBCCW Pump 2A in ADHR Mode.	
		Direct I/C to investigate trip of RBCCW Pump 2D.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 4: ADHR SECONDARY PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	RO	Plant Monitoring	
	BOP	Report trip of RBCCW Pump 2D (running in ADHR Mode) UA-01 3-3, ADHR SECONDARY LOOP TROUBLE May secure the primary pump IAW this APP	
		Announce and enter AOP-38.0, Loss of Fuel Pool Cooling	
		Perform 2OP-21, Section 6.3.10 (page 33) to swap RBCCW pumps. (Start C and secure A) Plant announcement for the start of 2C RCC Pump and securing of 2A RCC Pump.	
		Perform 2OP-21, Section 6.3.16 (page 34) to align RBCCW Pump A into ADHR Mode. Direct RB AO to perform steps 2b through 2i. Step 3 is N/A	
		Perform 2OP-21, Section 6.3.18 (page 37) to start RBCCW Pump A in ADHR Mode. Notifies E&C, starting ADHR pump Step 2 is N/A Step 3 is N/A Direct the RB AO to perform step 4 and 5a. Announce starting of RCC Pump 2A. Direct the RB AO to perform step 5c. May direct AO to ensure primary loop is operating IAW 2OP-13.1.	

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6.3.10 Transferring to the Standby RBCCW Pump - RBCCW Mode

1. **Ensure** the following initial conditions are met:
   - Applicable prerequisites listed in Section 5.0, Prerequisites are met .... ______
   - RBCCW System in operation with two pumps aligned for RBCCW Mode in service .... ______
2. **Start** the standby RBCCW pump by placing the associated pump control switch in ON:
   - RBCCW PUMP 2A .... ______
   - RBCCW PUMP 2B .... ______
   - RBCCW PUMP 2C .... ______
   - RBCCW PUMP 2D .... ______
3. **Secure** the desired RBCCW pump by placing the associated pump control switch in OFF:
   - RBCCW PUMP 2A .... ______
   - RBCCW PUMP 2B .... ______
   - RBCCW PUMP 2C .... ______
   - RBCCW PUMP 2D .... ______
4. <u>IF</u> a third RBCCW pump is aligned to RBCCW Mode, **<u>AND</u>** RBCCW discharge header pressure has stabilized,
   <u>THEN</u> place the pump control switch in AUTO .... ______

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode

1. **Ensure** the following initial condition is met:

   - One RBCCW Heat Exchanger is aligned to ADHR Mode per Section 6.3.14. .... ________
   - Key for RBCCW/ADHR Mode Selector Switch has been obtained from one of the following:
     - ◊ Control Rm Key Locker - key 98 .... ________
     - ◊ WCC Key Locker - key 167 or 168 .... ________

NOTE

RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐

2. **IF** aligning RBCCW Pump 2A to ADHR Mode, **THEN perform** the following: .... ________

   a. **Ensure** RBCCW Pump 2A control switch is in OFF. .... ________

   b. **Close** RCC-V32 (RBCCW Pump 2A RBCCW Suction) .... ________

   c. **Close** RCC-V38 (RBCCW Pump 2A RBCCW Mode Discharge Valve) .... ________

   d. **Open** RCC-V5105 (RBCCW Pump 2A ADHR Mode Suction Valve) .... ________

   e. **Open** RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________

   f. **Open** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... ________

   g. **WHEN** a steady stream of water is present, **THEN close** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... ________

   h. **Ensure** 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) located at MCC 2XE, in ADHR. .... ________

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

i. **Remove** key from 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) .... ______

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2A is ON. .... ______

3. **IF** aligning RBCCW Pump 2D to ADHR Mode, **THEN perform** the following: .... ______

a. **Ensure** RBCCW Pump 2D control switch is in OFF. .... ______

b. **Close** RCC-V5107 (RBCCW Pump 2D RBCCW Mode Suction Valve) .... ______

c. **Close** RCC-V5111 (RBCCW Pump 2D RBCCW Mode Discharge Valve) .... ______

d. **Open** RCC-V5104 (RBCCW Pump 2D ADHR Mode Suction Valve) .... ______

e. **Open** RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... ______

f. **Open** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) .... ______

g. **WHEN** a steady stream of water is present, **THEN close** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) .... ______

h. **Ensure** 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) located at MCC 2XD, in ADHR .... ______

i. **Remove** key from 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) .... ______

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2D is ON. .... ______

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

NOTE

ADHR Mode piping is placed either in Standby Mode or in service to ensure RBCCW circulation and proper chemistry control when **NOT** undergoing maintenance.. ☐

4. **Place** ADHR in service per Section 6.3.18, Starting an RBCCW Pump - ADHR Mode ____________

Date/Time Completed ____________

Performed By (Print) Initials

____________________ ________

____________________ ________

____________________ ________

____________________ ________

Reviewed By ____________________

Unit CRS/SRO

6.3.18 Starting an RBCCW Pump - ADHR Mode

1. **Ensure** the following initial conditions are met:

   - Designated RBCCW Pump is aligned to ADHR Mode per Section 6.3.16. .... ________
   - **IF NO** RBCCW pump is operating in ADHR Mode, **THEN** E&C notified commencing startup of ADHR Mode. .... ________

     ____
     Person Notified

NOTE

- RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐
- RBCCW Pump 2D will **NOT** auto re-start when power returns after a LOOP or bus under voltage condition with the control switch in ON or AUTO. The control switch must be placed in OFF/RESET prior to restarting the pump. .... ☐

CAUTION

Two pump operation in ADHR Mode subjects RCC-V37 (RBCCW Pump 1A Discharge Check Valve) and RCC-V5110 (RBCCW Pump 1D Discharge Check Valve) to accelerated wear. This lineup is expected to be utilized only when maximum ADHR capacity is required. [8.7.2] .... ☐

2. **IF** desired to start a second pump aligned to ADHR Mode, **THEN perform** the following: .... ________

   a. **Obtain** concurrence from Engineering to start a second pump in the ADHR Mode. .... ________

      ____
      Person Contacted

   b. **Go to** Step 5.b. .... ________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

3. IF the ADHR Mode has been shutdown for greater than 72 hours
OR maintenance has been performed,
THEN fill and **vent** the ADHR piping per Section 6.3.13 .... ________

4. **Ensure** the following valve alignment for system radiation monitoring:
   - RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED .... ________
   - RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN .... ________
   - RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN .... ________

5. For the RBCCW pump aligned to ADHR Mode to be started, **perform** the following:

   a. **Throttle** 80% to 95% closed the associated pump discharge valve:
      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... ________

   b. **Start** an RBCCW pump aligned to ADHR Mode by placing the associated pump control switch in ON:
      - RBCCW PUMP 2A .... ________
      - RBCCW PUMP 2D .... ________

   c. IF throttled in Step 5.a,
   THEN slowly **open** the associated pump discharge valve: .... ________
      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... ________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

d. **Ensure** a log entry is made stating two RBCCW pumps are in service in the ADHR Mode and Engineering has been notified.......... ________

NOTE

The normal parameters for Supplemental Spent Fuel Pool Cooling are provided in Attachment 1, Normal System Operation Parameters. Equipment manipulations to maintain these parameters are performed per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure .... ☐

6. **IF** a Primary Loop pump is operating, **THEN maintain** Primary Loop flow per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure.......... ________

7. **Ensure** Plant Process Computer setup as follows per 0OP-55, Plant Process and ERFIS Computer Systems Operating Procedure:.......... ________

- PPC U2RCCA111 point ENABLED.......... ________
- PPC U2RCCA095 Value Monitoring setup with the nominal flow values per Attachment 1 Section 2.5 for the number of RBCCW Pumps in ADHR Mode to provide audible alarms for ADHR secondary flow changes. .... ________

Date/Time Completed ________

Performed By (Print) Initials

________________ ________

________________ ________

________________ ________

________________ ________

Reviewed By ________________

Unit CRS/SRO

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 8** to activate Recirc Loop B Flow failure.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	After LCO entries have been determined and SRO is waiting for I&C, call as WCCSRO and request APRM 4 be placed in tripped condition to support I&C trouble shooting. The WCC will hang the status control tag paperwork.
	If asked to pull fuses (for TRM 3.3 actions, 2-C12A-F1 Labeled ROD OUT BLOCK RELAYS C12A in P616 panel) acknowledge the request

Evaluator Notes	
Plant Response:	Flow reference off normal alarm, rod block and scram signal to all 4 voters Flow transmitter signals are displayed on PC display 845, and on individual NUMACs by selecting Input Status.
Objectives:	SRO - Determine LCO for APRM 4 inoperability and direct placing channel in trip. RO - Respond To A Flow Unit/Transmitter Failure Per APP A-06 5-7.
Success Path:	APRM 4 TS 3.3.1.1 declaration and placed in trip condition IAW 0OI-18.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of APPs	
		Direct I&C to investigate	
		Evaluate Tech Spec 3.3.1.1 Reactor Protection System Instrumentation TS 3.3.1.1, Function 2b, Required Action A1. With one or more required channels inoperable, place in trip condition in **12 hours** Evaluate TRM 3.3 Control Rod Block Instrumentation TRM 3.3, Function 1a, Required Condition A1. With one of the required channels not operable - **24 hours** to restore to operable.	
		Refers to 0OI-18 for actions to place APRM 4 in a tripped condition.	
		Direct APRM 4 mode selector switch placed in INOP to allow I&C troubleshooting.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Monitors the plant.	
		May check back panel APRM indications.	
	ATC	Acknowledges, refers to & reports annunciators A-6 2-8 *APRM UPSCALE* 3-8 *APRM UPSCALE TRIP/INOP* 5-7 *FLOW REF OFF NORMAL* A-5 2-2 *ROD OUT BLOCK* 4-8 *OPRM TRIP ENABLED*	
		Diagnose and report failure of APRM 4 Flow Transmitter	
		Obtains key number 114 from the SRO key locker to place APRM 4 in trip.	
		Places APRM mode selector switch in INOP IAW 0OI-18.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP	
	Simulator Operator Actions
	At the direction of the Lead Evaluator, **Initiate Trigger 9** to trip a Heater Drain Pump.
	.

	Simulator Operator Role Play
	If contacted as AO to investigate, wait until pump is tripped and report over-current flags for all phases of 2A HDP 4KV breaker on Bus 2D
	If contacted as RE for reduced FW Temp, acknowledge any requests.
	If asked as I&C to investigate, acknowledge the request

	Evaluator Notes
Plant Response:	Heater Drain Pump 2A shaft seizes and trips on overcurrent. Heater Drain tank level will rise and the crew will throttle HD-V57 to stabilize HD Tank level. If the standby HDP is not started, RFP suction pressure will lower during the transient requiring power reduction to stabilize Condensate/feedwater.
Objectives:	SRO - Directs 0AOP-23, Condensate/Feedwater System Failures, and possible 0AOP-03.0, Positive Reactivity Addition, entry. RO - Diagnose HDP pump trip and start the standby HDP.
Success Path:	2C HDP started with HDD level recovered in the normal band.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct annunciator response for UA-04: 4-10 HD PUMP A TRIP 2-10 HD DEAERATOR LEVEL HIGH-LOW 3-10 HD DEAERATOR LEVEL HIGH TRIP Direct entry into 0AOP-23, Condensate/Feedwater System Failures Direct starting standby HDP.	
		May direct 2AOP-3.0, Positive Reactivity Addition, entry if power rises due to the HDD Ext Trip.	
		May direct monitoring of final feedwater temperature.	
		May direct maintenance to investigate trip	
		May conduct a brief (see Enclosure 1 on page 62 for format)	
	RO	Plant Monitoring	
		May reduce power IAW 0AOP-23 to stabilize reactor water level.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP			
	BOP	Recognize and report annunciators: UA-04 4-10 *HD PUMP A TRIP* 2-10 *HD DEAERATOR LEVEL HIGH-LOW* 3-10 *HD DEAERATOR LEVEL HIGH TRIP* UA-06 1-7 *BUS 2D 4 KV MOTOR OVLD*	
		Manually starts 2C HDP IAW APP or AOP.	
		Enter and announce 0AOP-23, Condensate/Feedwater System Failures. Monitors final feedwater temperature (FFWT) IAW 2OI-03.2	
		May open the HD-V57 to assist in HDD level recovery.	
		Directs an AO to 4.16 KV Switchgear Bus 2D to investigate 2A HDP trip	
		Verifies auto actions for *HD DEAERATOR LEVEL HIGH TRIP*, if it occurs. 1. Non-return valves (EX-V11 and EX-V12) to deaerator close. (Only close if turbine load is below 500 MWe) 2. HDD Extraction Line B moisture removal valves (MVD-LV-266 and MVD-LV-267) open. May reference 2OP-35 to recover MRVs following HDD level restoration.	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 10** to activate small steam leak in DW.
	If requested to defeat Group I LL3, wait 2 minutes, and install jumpers **(Trigger 11)**
	If requested to install LEP-02, Section 2.3 jumpers, wait 5 minutes, and inform the SRO that the jumpers are installed (RP005F already active).

Simulator Operator Role Play	
	Acknowledge request as I&C to investigate failure of SLC switch.
	If requested as I&C to investigate the failure of the ARI reset failure, acknowledge the request.
	Acknowledge request to perform LEP-03 actions.

Evaluator Notes	
Plant Response:	Most control rods will fail to insert on the scram. The crew will respond to the ATWS per EOP-01-ATWS. When SLC initiation is attempted, the switch positions will not work. The crew will enter LEP-03 and align for alternate boron injection using CRD. The scram cannot be reset due to failure of the ARI to reset.
Objectives:	SRO - Direct actions to control reactor power per EOP-01-ATWS.. RO - Perform actions for an ATWS per EOP-01-ATWS.
Success Path:	Lower level to control power, inject SLC, insert control rods.

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Enter RSP and transition to ATWS. Direct mode switch to shutdown when steam flow < 3 Mlbs/hr. Direct ARI initiation. ***Direct Recirc Pumps Tripped***. *Direct SLC initiation, then LEP-03, Alternate Boron Injection.* ***Direct ADS inhibited***. Direct RWCU isolation verification. ***Direct LEP-02, Alternate Rod Insertion***	***CRITICAL TASK #2*** ***CRITICAL TASK #1*** ***CRITICAL TASK #2***
		Direct Group 10 switches to override reset.	
		Direct terminate and prevent HPCI/Feedwater (CS/RHR when LOCA signal received) to lower level to 90 inches.	***CRITICAL TASK #2***
		When level reaches 90 inches, evaluate Table Q-2: If not met, establishes a level band of LL4 to +90 inches. If met, directs RPV injection to remain terminated.	
		Enters PCCP Directs Torus cooling when Torus temperature is greater than 95° F, (See Enclosure 5, page 68) Directs Torus Sprays before torus pressure reaches 11.5 psig (See Enclosure 8, page 77) Directs Drywell Sprays when torus pressure exceeds 11.5 psig (See Enclosure 7, page 71)	
		Direct injection established to maintain RPV level LL4 to TAF (or the level at which APRMs indicate downscale)	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Place mode switch to shutdown when steam flow < 3×10^6 lb/hr.	
		Initiates ARI.	
		Trips Recirc Pumps.	***CRITICAL TASK #2***
		Initiates SLC. Determines SLC switch failure. Directs LEP-03, Alternate Boron Injection	
		Recognizes failure of SLC switch and reports to CRS.	
		Monitor APRMs for downscale.	
		Performs LEP-02, Alternate Rod Insertion. Section 2.1, Initial Actions (see page 48) ***Section 2.3, Reset RPS and Initiate a Manual Scram*** (see page 51) ***Section 2.4, Reactor Manual Control System (RMCS)*** (see page 54) May also perform Section 2.5, Increasing Cooling Water Header Pressure (see page 56).	***CRITICAL TASK #2***
		Recognizes failure of ARI to reset, informs CRS	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	***Places ADS in inhibit.***	***CRITICAL TASK #1***
		Places Group 10 switches to override / reset	
		Terminate and prevent injection to RPV. Terminates and prevents HPCI IAW Hard Card. (Enclosure 2, page 63) Terminates and Prevents Feedwater IAW Hard Card. (Enclosure 3, page 64)	***CRITICAL TASK #2***
		May place HPCI in service for level control during ATWS when directed by the SRO. (Enclosure 6, page 70)	
		Restart RFP to maintain level as directed by SRO. (Enclosure 4, page 65)	
		When Torus temperature is greater than 95° F, places Torus Cooling in service. (Enclosure 5, page 68)	
		When directed, places Torus Sprays in service. (Enclosure 8, page 77)	
		When directed, places Drywell Sprays in service. (Enclosure 7, page 71)	

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)
- As directed by Severe Accident Management Guideline (SAMGs)

2.0 OPERATOR ACTIONS

2.1 Initial Actions

2.1.1 Manpower Required

- 1 Reactor Operator
- 1 Auxiliary Operator

2.1.2 Special Equipment

None

NOTE

- Two-handed operation is allowed during implementation of this procedure in order to minimize delay in control rod insertion. ☐
- Section 2.1.3 Step 1 through Step 6 may be performed concurrently with the rest of this procedure. ☐
- The system designation C11 is for Unit 1 and C12 for Unit 2. ☐

2.1.3 Operator Actions

1. **Monitor** reactor power on APRMs until IRM recorders on scale. ☐ RO

2. **Insert** IRMs and **monitor** reactor power on IRM recorders. ☐ RO

3. **Downrange** IRMs to bring them on scale. ☐ RO

4. <u>**WHEN**</u> IRMs on Range 3 <u>**OR**</u> below,
<u>**THEN**</u> **insert** SRMs. ☐ RO

5. **Monitor** reactor period. ☐ RO

2.1.3 Operator Actions (continued)

6. **Monitor** control rod position using:
   - Process computer .... ☐ RO
   - SPDS .... ☐ RO
   - RWM .... ☐ RO
   - Four rod .... ☐ RO
   - Full core display .... ☐ RO

7. **WHEN** either:
   - All control rods in .... ☐ RO
   - Only one control rod **NOT** fully inserted .... ☐ RO
   - **NO** more than 10 control rods withdrawn to position 02 **AND** **NO** control rod withdrawn beyond position 02 .... ☐ RO
   - Reactor engineering has determined the reactor will remain shutdown under all conditions without boron .... ☐ RO

   THEN perform Section 2.2, Control Rod Insertion Verification on Page 7 .... ☐ RO

2.1.3 Operator Actions (continued)

8. **Insert** control rods by one or more methods:

- Section 2.3, Reset RPS and Initiate a Manual Scram on Page 15 ☐ RO
- Section 2.4, Reactor Manual Control System (RMCS) on Page 18 ☐ RO
- Section 2.5, Increasing Cooling Water Header Pressure on Page 20 ☐ RO
- Section 2.6, Scram Individual Control Rods on Page 22 ☐ RO
- Section 2.7, De-energize Scram Solenoids and Vent Scram Air Header on Page 26 ☐ RO
- Section 2.8, Venting Over Piston Area on Page 32 ☐ RO

2.3 Reset RPS and Initiate a Manual Scram

2.3.1 Manpower Required

- 1 Reactor Operator

2.3.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 4 jumpers (15, 16, 17 and 18) .... ☐

2.3.3 Manual Scram Actions

NOTE

Section 2.3.3 Step 1 and Step 2 may be performed concurrently. .... ☐

1. **IF** an automatic scram signal present **AND** power available to RPS bus,
   THEN install jumpers to bypass reactor scram:
   - Jumper 15 in Panel H12-P609, Terminal Board DD, from right side of Fuse C71A(C72A)-F14A to Terminal 4 of Relay C71A(C72A)-K12E .... ☐ RO
   - Jumper 16 in Panel H12-P609, Terminal Board BB, from left side of Fuse C71A(C72A)-F14C to Terminal 4 of Relay C71A(C72A)-K12G .... ☐ RO
   - Jumper 17 in Panel H12-P611, Terminal Board DD, from right side of Fuse C71A(C72A)-F14B to Terminal 4 of Relay C71A(C72A)-K12F .... ☐ RO
   - Jumper 18 in Panel H12-P611, Terminal Board BB, from left side of Fuse C71A(C72A)-F14D to Terminal 4 of Relay C71A(C72A)-K12H .... ☐ RO

2. Inhibit ARI:
   a. Place C11(C12)-CS-5560 (ARI Auto/Manual Initiation Switch) to INOP. .... ☐ RO

2.3.3 Manual Scram Actions (continued)

b. **Place and hold** C11(C12)-CS-5562 (ARI Reset) switch in RESET. .... ☐ RO

c. **WHEN** 5 seconds have elapsed, **THEN release** .... ☐ RO

d. **Confirm** red TRIP light located above C11(C12)-CS-5561 (ARI Initiation) OFF. .... ☐ RO

3. **Ensure** Disch Vol Vent & Drain Test switch in ISOLATE.......... ☐ RO

4. **Confirm** CLOSED:

- C11(C12)-V139 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-CV-F010 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-V140 (Disch Vol Drain Vlv). .... ☐ RO
- C11(C12)-CV-F011 (Disch Vol Drain Vlv). .... ☐ RO

5. **Reset** RPS.......... ☐ RO

6. **IF** either RPS A **OR** B can be RESET, **THEN go to** Section 2.3.3 Step 8. .... ☐ RO

7. **IF** RPS **CANNOT** be RESET, **THEN return to** Section 2.1.3 Step 7. .... ☐ RO

8. **Place** Disch Vol Vent & Drain Test switch to NORMAL. .... ☐ RO

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2.3.3 Manual Scram Actions (continued)

9. **Confirm** OPEN:
   - C11(C12)-V139 (Disch Vol Vent Vlv). .... ☐ RO
   - C11(C12)-CV-F010 (Disch Vol Vent Vlv). .... ☐ RO
   - C11(C12)-V140 (Disch Vol Drain Vlv) .... ☐ RO
   - C11(C12)-CV-F011 (Disch Vol Drain Vlv). .... ☐ RO

10. **WHEN** the scram discharge volume has drained for approximately 2 minutes **OR** A-05 1-6, SDV Hi-Hi Level RPS Trip clears, **THEN continue**. .... ☐ RO

11. **IF** venting control rod over piston area per Section 2.8, **THEN notify** AO to secure venting prior to inserting a manual scram. .... ☐ RO

12. Manually **scram** the reactor. .... ☐ RO

13. **IF** control rods moved inward **AND** **all** control rods **NOT** inserted to **OR** beyond Position 00, **THEN return to** Section 2.3.3 Step 3. .... ☐ RO

14. **IF** **all** control rods inserted to **OR** beyond Position 00 **OR** control rods did **NOT** move inward, **THEN return to** Section 2.1.3 Step 7. .... ☐ RO

2.4 Reactor Manual Control System (RMCS)

2.4.1 Manpower Required

- 1 Reactor Operator

2.4.2 Special Equipment

- RO Desk Locked Drawer
  - **Unit 1 Only:** 1 5450 key for RWM .... ☐
  - **Unit 2 Only:** 1 5451 key for RWM .... ☐

2.4.3 RMCS Actions

1. **IF** a reactor scram sealed in,
   THEN ensure available CRD pumps operating .... ☐ RO

2. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN .... ☐ RO

3. **IF** a CRD pump **NOT** operating,
   THEN:

   a. **Close** the in-service C11(C12)-F002A(F002B) (Flow Control Vlv) .... ☐ RO

   b. **Start** one CRD pump .... ☐ RO

   c. **Adjust** C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm .... ☐ RO

   d. **IF** available,
      THEN start the second CRD pump .... ☐ RO

4. **IF NO** CRD pump can be started,
   THEN return to Section 2.1.3 Step 7 .... ☐ RO

2.4.3 RMCS Actions (continued)

5. **Insert** control rods with RMCS:

   a. **Throttle open** C11(C12)-F002A(F002B) (Flow Control Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   b. **IF** drive water differential pressure less than 260 psid, **THEN throttle closed** C11(C12)-PCV-F003 (Drive Pressure Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   c. **Bypass** RWM. .... ☐ RO

   d. **Insert** control rods with Emergency Rod In Notch Override switch. .... ☐ RO

6. **WHEN** all control rods inserted to **OR** beyond Position 00 **OR** **CANNOT** be inserted with RMCS, **THEN return to** Section 2.1.3 Step 7 .... ☐ RO

2.5 Increasing Cooling Water Header Pressure

2.5.1 Manpower Required

- 1 Reactor Operator

2.5.2 Special Equipment

None

2.5.3 Cooling Water Header Actions

1. IF a reactor scram sealed in,
   THEN ensure available CRD pumps operating. ☐ RO

2. IF a CRD pump **NOT** operating,
   THEN:

   a. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN. ☐ RO

   b. **Close** the in-service C11(C12)-F002A(F002B) (Flow Control Vlv) ☐ RO

   c. **Start** one CRD pump ☐ RO

   d. **Adjust** C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm. ☐ RO

   e. IF available,
      THEN start the second CRD pump. ☐ RO

3. IF NO CRD pump can be started,
   THEN return to Section 2.1.3 Step 7. ☐ RO

2.5.3 Cooling Water Header Actions (continued)

4. <u>**IF**</u> a reactor scram <u>**NOT**</u> sealed in,
   <u>**THEN**</u> **maximize** cooling water header pressure:

   a. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN and fully **open** the in service C11(C12)-F002A(F002B) (Flow Control Vlv) .... ☐ RO

   b. Fully **open** C11(C12)-PCV-F003 (Drive Pressure Vlv) .... ☐ RO

5. <u>**WHEN**</u> <u>**all**</u> control rods inserted to <u>**OR**</u> beyond Position 00 <u>**OR**</u> control rods <u>**NOT**</u> moving inward,
   <u>**THEN**</u> **return to** Section 2.1.3 Step 7 .... ☐ RO

TERMINATION	
	Simulator Operator Actions
	When directed by the Lead Evaluator, delete the following commands: Malfunction - K2624A, ARI Reset Malfunction - K2625A, ARI INOP Malfunction – RP011F, ATWS 4 (Make sure RPS is reset and scram air header pressurized before deleting)
	When directed by the Lead Evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

	Simulator Operator Role Play
	After Sim Operator has deleted SDV malfunction, Inform the CRS that a loose wire was found on ARI switch and it has been repaired.

Evaluator Notes	
Plant Response:	When actions are taken to control reactor water level during the ATWS after terminating and preventing, ARI will be repaired and rods can be inserted.
Objectives:	SRO - Directs actions for an ATWS. RO - Insert control rods IAW LEP-02.
Success Path:	Rods inserted with LEP-02, Alternate Rod Insertion.
Scenario Termination:	***When all rods are inserted and level is being controlled above TAF with injection established, the scenario may be terminated.***

Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.

TERMINATION

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Exit ATWS and enter RVCP when all rods are in.	
		Direct level restored to 170 – 200 inches after rods are all in.	
	RO	Confirms ARI reset when reported fixed.	
		Inserts a scram after discharge volume has drained for ~2 minutes.	
		Reports all rods in.	
	BOP	Maintains reactor pressure as determined by the CRS.	
		Maintains level as directed by the SCO.	
		Restores level to 170 – 200 inches after all rod inserted. (Enclosure 4, page 65, contains actions for restart of Condensate and Feedwater)	

ENCLOSURE 1

ATTACHMENT 8

<< Crew Brief Template >>

Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ENCLOSURE 2

SECURING HPCI INJECTION

1.0 INITIAL CONDITIONS

1. **WHEN DIRECTED** BY 2EOP-01-LPC TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

2. **WHEN DIRECTED** BY 0EOP-01-RXFP TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

3. **WHEN** PERMISSION GIVEN BY THE UNIT CRS TO SECURE HPCI INJECTION WITH A HPCI AUTO START SIGNAL PRESENT. .... ☐

2.0 PROCEDURAL STEPS

1. **IF** HPCI IS **NOT** OPERATING, **PERFORM** THE FOLLOWING:

   a. **PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

2. **IF** HPCI IS OPERATING, **PERFORM** THE FOLLOWING:

   b. **DEPRESS AND HOLD** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   c. **WHEN** HPCI TURBINE SPEED IS 0 RPM, **AND** HPCI TURBINE CONTROL VALVE, E41-V9 IS CLOSED, **THEN PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

   d. **WHEN** HPCI TURB BRG OIL PRESS LO, A-01 4- 2, IS SEALED IN, **THEN RELEASE** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   e. **ENSURE** HPCI TURBINE STOP VALVE, E41-V8, **AND** HPCI TURBINE CONTROL VALVE, E41-V9, REMAIN CLOSED, **AND** HPCI DOES **NOT** RESTART. .... ☐

ENCLOSURE 3

Terminating and Preventing Injection From Condensate and Feedwater During EOP's (2OP-32)

1. **IF** desired **TRIP** all operating RFPs. ☐

2. **IF** one or more RFPs are in service **IDLE** one RFP as follows:

   a. **IF** two RFPs are operating **THEN TRIP** one. ☐

   b. **PERFORM** either of the following for the operating RFP:

      1. **PLACE** MAN/DFCS control switch to MAN. ☐

      2. **RAPIDLY REDUCE** speed to approximately 1000 rpm with the LOWER/RAISE speed control switch. ☐

      OR

      1. **PLACE** RFPT Speed Control in M (MANUAL) ☐

      2. **SELECT** DEM and **RAPIDLY REDUCE** speed to approximately 2550 rpm. ☐

3. **CLOSE** the following valves:

   – FW HTR 5A OUTLET VLVS, FW-V6 ☐

   – FW HTR 5B OUTLET VLVS, FW-V8 ☐

   OR

   – FW HTR 4A INLET VLV, FW-V118 ☐

   – FW HTR 4B INLET VLV, FW-V119 ☐

4. **ENSURE** the SULCV is closed by performing the following:

   a. **PLACE** SULCV, in M (Manual). ☐

   b. **SELECT** DEM and **DECREASE** signal until VALVE DEM indicates 0%. ☐

5. **ENSURE** FW-V120, is closed. ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing

1. **Ensure** FW-FV-177 (Feedwater Recirc to Condenser Vlv) CLOSED ☐
2. **Ensure** FW Control Mode Select in 1 ELEM ☐
3. **Ensure** at least one valve OPEN: ☐
   - B21-F032A (Feedwater Isol Vlv) ☐
   - B21-F032B (Feedwater Isol Vlv) ☐
4. **IF NO** RFP operating,
   THEN: ☐
   a. **Ensure** RFPT A(B) Sp Ctl:
      (1) In M (manual) ☐
      (2) Pmp A(B) Dem at 0.0 PCT ☐
   b. **Place** FW-FV-46(47) [RFP (A/B) Recirc Vlv] in OPEN ☐
   c. **Ensure:** ☐
      - FW-V3(V4) [RFP (A/B) Disch Vlv] OPEN ☐
      - RFP A(B) Manual/DFCS control switch in MANUAL ☐
   d. **Depress:** ☐
      (1) Reactor Water Level High Reset A ☐
      (2) Reactor Water Level High Reset B ☐
      (3) Reactor Water Level High Reset C ☐
      (4) RFP A(B) Reset ☐
   e. **Confirm** OPEN: ☐
      - RFP A(B) LP Stop Vlvs ☐
      - RFP A(B) HP Stop Vlvs ☐
   f. **Depress** RFP A(B) RFPT Start ☐
   g. **WHEN** at 1000 rpm,
      THEN raise RFP A(B) to at least 2550 rpm ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing (continued)

5. IF desired to transfer RFP A(B) to DFCS, THEN: .... ☐
   a. **Ensure** speed at least 2550 rpm .... ☐
   b. **Depress** DFCS Ctrl Reset .... ☐
   c. **Place** Manual/DFCS control switch in DFCS .... ☐
6. **Raise** RFP A(B) speed until discharge pressure approximately 100 psig above RPV pressure band .... ☐

0/1550
S/1372

ENCLOSURE 4 Page 3 of 3

Injection After Terminating and Preventing Condensate and Feedwater

1. **WHEN** RPV injection directed,
   THEN as needed: ☐
   - **Adjust** SULCV Valve Dem ☐
   - **Throttle** FW-V120 (FW Htrs 4&5 Byp Vlv) ☐
2. **WHEN** automatic control desired,
   THEN: ☐

   a. **Confirm** RPV level greater than +170 inches ☐

   b. **Ensure** FW-V120 (FW Htrs 4&5 Byp Vlv) CLOSED ☐

   c. **Open** FW-V10 (FW Recirc To Cond Isol Vlv) ☐

   d. **Adjust** SULCV to between 25 PCT and 55 PCT using: ☐
   - SULCV Valve Dem ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

   e. **Ensure** Mstr RFPT Sp/Rx Lvl Ctl: ☐

   (1) In M (manual) ☐

   (2) Level Setpoint at current RPV level ☐

   f. **Place** SULCV in A (automatic) ☐

   g. **Adjust** as needed to control RPV level: ☐
   - Mstr RFPT Sp/Rx Lvl Ctl Level Setpoint ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

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ENCLOSURE 5 Page 1 of 2

ATTACHMENT 8A
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop A (2OP-17)

NOTE:	This attachment is **NOT** to be used for normal system operations.

START RHR SW A LOOP (CONV)

- OPEN *SW-V101* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW A LOOP (NUC)

- OPEN *SW-V105* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START PUMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP A

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015A* IS OPEN, THEN CLOSE *E11-F017A* ☐
- START LOOP A RHR PMP ☐
- OPEN *E11-F028A* ☐
- THROTTLE *E11-F024A* ☐
- THROTTLE *E11-F048A* ☐
- START ADDITIONAL LOOP A RHR PMP AND ADJUST FLOW AS NEEDED ☐

ENCLOSURE 5 Page 2 of 2

ATTACHMENT 8B
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop B (2OP-17)

NOTE: This attachment is **NOT** to be used for normal system operations.

START RHR SW B LOOP (NUC)

- OPEN *SW-V105* ☐
- CLOSE *SW-V143* ☐
- START PMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW B LOOP (CONV)

- OPEN *SW-V101* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP B

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015B* IS OPEN, THEN CLOSE *E11-F017B* ☐
- START LOOP B RHR PMP ☐
- OPEN *E11-F028B* ☐
- THROTTLE *E11-F024B* ☐
- THROTTLE *E11-F048B* ☐
- START ADDITIONAL LOOP B RHR PMP AND ADJUST FLOW AS NEEDED ☐

ENCLOSURE 6

HPCI INJECTION IN EOPs

1. **IF** HPCI IS TRIPPED ON HIGH WATER LEVEL, **DEPRESS** HIGH WATER LEVEL SIGNAL RESET, E41-S25, PUSH BUTTON, **AND ENSURE** THE INDICATING LIGHT IS OFF. ☐
2. **ENSURE** AUXILIARY OIL PUMP IS **NOT** RUNNING ☐
3. **ENSURE** E41-V9 AND E41-V8 ARE CLOSED ☐
4. **OPEN** E41-F059 ☐
5. **PLACE** HPCI FLOW CONTROL, E41-FIC-R600, IN MANUAL (M), **AND ADJUST** OUTPUT DEMAND TO APPROXIMATELY MIDSCALE, USING THE MANUAL LEVER. ☐
6. **START** VACUUM PUMP **AND LEAVE** IN START ☐
7. **OPEN** E41-F001 ☐
8. **START** AUXILIARY OIL PUMP **AND LEAVE** IN START ☐
9. **OPEN** E41-F006, IMMEDIATELY AFTER E41-V8 HAS DUAL INDICATION ☐
10. **ENSURE** E41-V9 AND E41-V8 ARE OPEN ☐
11. **WHEN** SPEED STOPS INCREASING, **THEN ADJUST** SPEED TO APPROXIMATELY 2100 RPM ☐
12. **ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, TO OBTAIN DESIRED FLOW RATE ☐
13. **ENSURE** E41-F012 IS CLOSED WHEN FLOW IS GREATER THAN 1400 GPM ☐
14. **ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, SETPOINT TO MATCH SYSTEM FLOW, AND THEN PLACE E41-FIC-R600 IN AUTO (A) ☐
15. **ENSURE** E41-F025 AND E41-F026 ARE CLOSED ☐
16. **START** SBGT (OP-10) ☐
17. **ENSURE** BAROMETRIC CNDSR CONDENSATE PUMP IS OPERATING ☐

ENCLOSURE 7

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 Drywell Spray Initiation

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 2 3095 keys .... ☐

2.1.3 Drywell Spray Actions

1. **Ensure** both reactor recirculation pumps tripped. .... ☐ RO

2. **IF** E-bus load stripping has occurred,
THEN:

   a. **Confirm** electrical power has been aligned per EOP-01-SBO-14........ ☐ RO

   b. **Secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 2.c. .... ☐ RO

   c. **IF** RHR Loop A will be used for sprays,
   THEN go to Section 2.1.3 Step 9........ ☐ RO

   d. **IF** RHR Loop B will be used for sprays,
   THEN go to Section 2.1.3 Step 10. .... ☐ RO

3. **Place** all drywell cooler control switches to OFF (L/O)........ ☐ RO

2.1.3 Drywell Spray Actions (continued)

4. <u>**Unit 1 Only:**</u> <u>**IF**</u> drywell coolers continue to run,
   <u>**THEN:**</u>

   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. .... ☐ RO

   - In Panel XU-28, west side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. .... ☐ RO

5. <u>**Unit 2 Only:**</u> <u>**IF**</u> drywell coolers continue to run,
   <u>**THEN:**</u>

   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. .... ☐ RO

   - In Panel XU-28, east side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. .... ☐ RO

6. <u>**IF**</u> drywell coolers continue to run,
   <u>**THEN**</u> **secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 7. .... ☐ RO

7. **Ensure** SW-V141 (Well Water to Vital Header Vlv) CLOSED. .... ☐ RO

8. **Ensure** <u>one</u> valve OPEN:

   - SW-V111 (Conv SW To Vital Header Vlv) .... ☐ RO

   - SW-V117 (Nuc SW To Vital Header Vlv) .... ☐ RO

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2.1.3 Drywell Spray Actions (continued)

9. <u>IF</u> Loop A RHR will be used for drywell spray,
<u>THEN</u>:

NOTE

E11-F017A will remain OPEN for five minutes following a LOCA signal. .... ☐

a. <u>IF</u> E11-F015A (Inboard Injection Vlv) OPEN,
<u>THEN</u> **close** E11-F017A (Outboard Injection Vlv)............................... ☐
RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐
RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. .... ☐
RO

d. **Ensure** E11-F024A (Torus Cooling Isol Vlv) CLOSED. .... ☐
RO

e. **Ensure** one Loop A RHR Pump running. .... ☐
RO

f. **Confirm** requirements for Drywell Spray Initiation met:

- Safe region of Drywell Spray Initiation Limit .... ☐
RO

- Torus level below +21 inches .... ☐
RO

g. **Open** E11-F021A (Drywell Spray Inbd Isol Vlv). .... ☐
RO

h. **Throttle open** E11-F016A (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. .... ☐
RO

i. <u>IF</u> E-bus load stripping has occurred,
<u>THEN</u> **go to** Section 2.1.3 Step 11. .... ☐
RO

2.1.3 Drywell Spray Actions (continued)

j. <u>IF</u> additional flow required,
<u>**THEN**</u> **start** the other RHR pump and **limit** flow to less than or equal to 11,500 gpm. .... ☐ RO

k. **Ensure** RHRSW Loop A operating:

(1) **Place** E11-S19A (RHR SW Booster Pumps A & C LOCA Override Switch) in MANUAL OVERRD. .... ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). .... ☐ RO

l. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047A (Hx A Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003A (Hx A Outlet Vlv) OPEN. .... ☐ RO

NOTE
E11-F048A will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048A (Hx A Bypass Vlv). .... ☐ RO

10. <u>IF</u> Loop B RHR will be used for drywell spray,
<u>**THEN**</u>:

NOTE
E11-F017B will remain OPEN for five minutes following a LOCA signal. .... ☐

a. <u>IF</u> E11-F015B (Inboard Injection Vlv) OPEN,
<u>**THEN**</u> **close** E11-F017B (Outboard Injection Vlv). .... ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL. ☐ RO

d. **Ensure** E11-F024B (Torus Cooling Isol Vlv) CLOSED. ☐ RO

e. **Ensure** one Loop B RHR Pump running. ☐ RO

f. **Confirm** requirements for Drywell Spray Initiation are met:

- Safe region of the Drywell Spray Initiation Limit ☐ RO
- Torus level below +21 inches ☐ RO

g. **Open** E11-F021B (Drywell Spray Inbd Isol Vlv). ☐ RO

h. **Throttle open** E11-F016B (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. ☐ RO

i. **IF** E-bus load stripping has occurred,
THEN go to Section 2.1.3 Step 11. ☐ RO

j. **IF** additional flow required,
THEN start the other RHR pump and limit flow to less than or equal to 11,500 gpm. ☐ RO

k. **Ensure** RHRSW Loop B operating:

(1) **Place** E11-S19B (RHR SW Booster Pumps B & D LOCA Override Switch) in MANUAL OVERRD. ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). ☐ RO

2.1.3 Drywell Spray Actions (continued)

I. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047B (Hx B Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003B (Hx B Outlet Vlv) OPEN.............................. ☐ RO

NOTE

E11-F048B will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048B (Hx B Bypass Vlv). .... ☐ RO

ENCLOSURE 8

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 Torus Spray

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

None

2.1.3 Torus Spray Actions

1. **Confirm** torus pressure above 2.5 psig. ☐ RO

2. IF Loop A RHR will be used,
THEN:

> **NOTE**
>
> E11-F017A will remain OPEN for five minutes following a LOCA signal. ☐

a. IF RPV injection NOT needed,
THEN **ensure** at least one valve CLOSED:

- E11-F015A (Inboard Injection Vlv). ☐ RO
- E11-F017A (Outboard Injection Vlv). ☐ RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. ☐ RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. ☐ RO

d. **Ensure** one Loop A RHR Pump running. ☐ RO

ENCLOSURE 8 Page 2 of 2

TORUS SPRAY PROCEDURE	0EOP-01-SEP-03
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2.1.3 Torus Spray Actions (continued)

e. **Ensure** E11-F028A (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027A (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling or Drywell Spray mode ☐ RO

3. <u>IF</u> Loop B RHR will be used,
<u>THEN:</u>

NOTE
E11-F017B will remain OPEN for five minutes following a LOCA signal ☐

a. <u>IF</u> RPV injection <u>NOT</u> needed,
<u>THEN</u> **ensure** <u>at least</u> one valve CLOSED:

- E11-F015B (Inboard Injection Vlv) ☐ RO
- E11-F017B (Outboard Injection Vlv) ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD ☐ RO

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL ☐ RO

d. **Ensure** one Loop B RHR Pump running ☐ RO

e. **Ensure** E11-F028B (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027B (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling <u>OR</u> Drywell Spray mode ☐ RO

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	7
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	2
Major Transients	1-2	1
EOPs Used	1-2	2
EOP Contingency	0-2	2
Run Time	60-90 min	90
Crew Critical Tasks	2-3	3
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	100%	Gross*/Net MWe*:	977 / 951
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	49.7 hrs			Days Online:	82 days
Turnover:					
Protected Equipment:	2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump for Fuel Pool Decay Heat Removal and inventory makeup. 2A/B NSW Pumps due to 1A NSW pump maintenance.				
Comments:	1A NSW Pump is under clearance for planned maintenance. APRM 2 has failed downscale and is bypassed. 2C TCC Pump is in service on Unit One.				
Shift Activities	The Load Dispatcher has called to perform the following as soon as possible due to an emergent repairs required on the Delco West Line: The OATC is to reduce power to ~850 MWe Gross The BOP operator will then Isolate 230 kV Delco West (Line 30) IAW the marked up of 2OP-50, Section 6.2.6.				

DUKE ENERGY

Run 2

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 2

LOWER POWER, REMOVE 230KV LINE FROM SERVICE, ROD DRIFT, ADHR PP TRIP, RECIRC LOOP FLOW FAILURE, HDD PP TRIP, ATWS, SLC MODE SWITCH FAILURE, ARI FAIL TO RESET

REVISION 0

Developer: Bob Bolin	**Date:** 07/07/2016
Technical Review: Dan Hulgin	**Date:** 9/12/2016
Validators: Kyle Cooper Grant Newton Hunter Morris	**Date:** 09/06/16
Facility Representative: Craig Oliver	**Date:** 09/22/16

REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

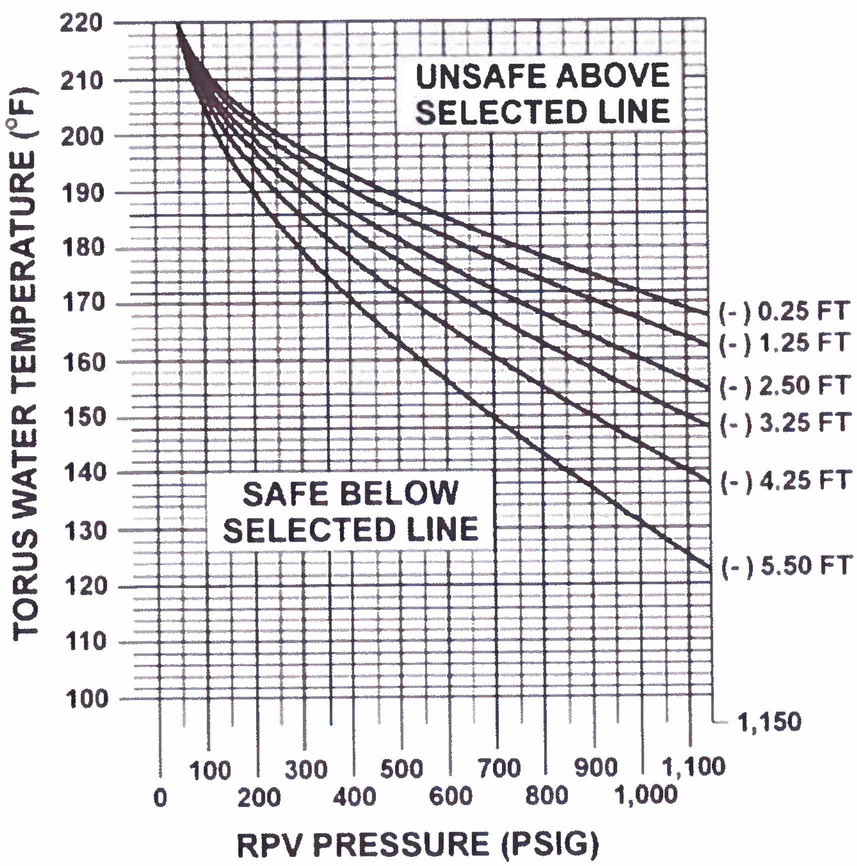
Event	Malf. No.	Type*	Event Description
1		R - ATC	Lower power to 850 MWe to remove 230 kV Line 30
2		N - BOP	Remove 230 kV Line 30 from service
3	RD001M (26-11)	C - ATC C - CRS	Rod Drift (TS)
4	K4526A	C - BOP C - CRS	ADHR Secondary pump trip (AOP)
5	NI063F	C - ATC C - CRS	Recirc Loop B Flow transmitter Failure (TS)
6	CF089F	C - BOP C - CRS	Heater Drain Deaerator Pump Trip (AOP)
7	CA008F	M	Small steam leak in DW results in an ATWS requiring terminate and prevent actions (RSP)(ATWS)
8	K2119A	C	SLC Mode Switch Failure
9	K2624A	C	Alternate Rod Insertion reset failure
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	After taking the watch the CRS will direct power reduced to 850 MWe.
2	The BOP will isolate 230 kV Line 30.
ran concurrently 3	Control Rod ~~26-11~~ 26-43 will start to drift in. The crew will enter 0AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 to insert the control rod in 3 hours and C2 to disarm the control rod within 4 hours.
4	After Tech Specs are addressed the Alternate Decay Heat Removal (ADHR) Seconday pump will trip. AOP-38.0 will be entered
5	The Recirc Loop B flow transmitter to APRM Channel 4 will fail ~~down~~ up scale resulting in a rod block and a trip input to each voter. The crew will respond per APPs and bypass APRM 4. The APRM will be declared Inoperable per TS 3.3.1.1, Condition A and placed in trip within 12 hours. APRM TS Actions to be taken requires the APRM mode selector switch to be place in INOP IAW 0OI-18
6	A motor overload will occur on Heater Drain Pump 2A. The crew will reference APP UA-06 1-7, Bus 2D 4KV Motor Ovld and determine which pump has the overload condition. The crew should start HDP 2C and secure HDP 2A. The crew may reference AOP-23.0.
7	A small steam leak in the DW results in rising Drywell pressure requiring a reactor scram. An ATWS will occur, conditions will require terminate and prevent actions to be performed.
8	When SLC is initiated, the mode switch will fail and the pumps will not start. LEP-03 will be executed to inject the boron into the core.
9	Alternate Rod Insertion (ARI) will not reset, the crew will perform LEP-02 to drive control rods into the core. When level is stabilized after terminating and preventing ARI will be repaired to allow the rods to be manually scrammed.

3.0 CREW CRITICAL TASKS

Critical Task #1
Prevent the automatic actuation of ADS (LL3) to prevent low pressure ECCS injection to the reactor.
Critical Task #2
Reduce reactor power/pressure to prevent exceeding Heat Capacity Temperature Limit (HCTL)



4.0 TERMINATION CRITERIA

When all rods are inserted and level is being controlled above TAF the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
A-05, 3-2	ROD DRIFT
0AOP-02.0	CONTROL ROD MALFUNCTION/MISPOSITION
UA-18, 6-1	BUS E4 4KV MOTOR OVLD.
UA-01, 2-3	ADHR PRIMARY LOOP TROUBLE
UA-01, 3-3	ADHR SECONDARY LOOP TROUBLE
0AOP-38.0	LOSS OF FUEL POOL COOLING
A-06, 2-8	APRM UPSCALE
A-06, 3-8	APRM UPSCALE TRIP/INOP
A-06, 5-7	FLOW REF OFF NORMAL
A-05, 2-2	ROD OUT BLOCK
A-05, 4-8	OPRM TRIP ENABLED
UA-5, 3-5	SBGT SYS B FAILURE
UA-5, 4-6	SBGT SYS A FAILURE

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-11.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE
10. **LOAD** Scenario File.
11. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Bypass APRM 2 RCC Pump D in service for ADHR RCC Pump A in service for RBCCW

12. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
13. **PLACE** a clearance on the following equipment.

Component	Position
APRM 2	Blue tag

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:

Protected Equipment
1. 2A and 2B NSW pumps 2. 2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-11 is in place.
16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.
17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials
Marked up of 2OP-50, Section 6.2.6

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.
19. **PROVIDE** Shift Briefing sheet for the CRS.
20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
1	Malfunction	RD001M - [CONTROL ROD SLOW INSERTION DRIFT]
2	Annunciator	ZA512 - [CRD HYD TEMP HIGH]
3	Trigger Command	MFD:RD001M,26-11
4	Remote Function	RD_RDELDIS - [ELECTRICAL DISARM OF ROD]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DO Override	Q4526AMW - [RBCCW PMP D ADHR MODE]
5	DO Override	Q4526LG4 - [RBCCW PMP D OFF G]
5	Malfunction	RP011F - [ATWS 4]
6	Remote Function	CC_MODE - [RBCCW/ADHR VALVE LINEUPS]
6	Remote Function	CC_MSS - [RBCCW/ADHR PUMP MODE SELECTOR SWITCH]
7	Remote Function	CC_PDV - [RBCCW PUMP DISCHARGE VALVE]
8	Malfunction	NI063F - [RECIRC LOOP B XMITTER FAILURE]
9	Malfunction	CF089F - [HEATER DRAIN PUMP MOTOR WINDING FAULT]
10	Malfunction	NB006F - [MSL BRK BEFORE FLOW RESTRICTOR]
11	Remote Function	EP_IAEOPJP1 - [BYPASS LL-3 GROUP I ISOL (SEP-10)]

Trig #	Trigger Text
3	KM118EDN - [SCRAM TEST SWITCH 26-11] true deletes RD001M

ANNUNCIATORS

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
1-2	CRD HYD TEMP HIGH	ZA512	ON	ON	OFF			2

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RD001M	26-11	CONTROL ROD SLOW INSERTION DRIFT	False	True				1
NI063F	APRM 4	RECIRC LOOP B XMITTER FAILURE	0.00	125.00				8
NB006F	A	MSL BRK BEFORE FLOW RESTRICTOR	0.00	1.0e-1	0:03:00			10
CF089F	A	HEATER DRAIN PUMP MOTOR WINDING FAULT	False	True				9
RP011F		ATWS 4	False	True				5
RP005F		AUTO SCRAM DEFEAT	True	True				
NI032F	APRM 2	APRM FAILS LO	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
RD_RDELDIS	26-11	ELECTRICAL DISARM OF ROD	ARM	DISARM			4
CC_MODE	PUMP-A	RBCCW/ADHR VALVE LINEUPS	RBCCW	ADHR			6
CC_MSS	A	RBCCW/ADHR PUMP MODE SELECTOR SWITCH	RBCCW	ADHR			6
CC_PDV	A_V38_V5114	RBCCW PUMP DISCHARGE VALVE	1.0000	1.0e-01			7
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
EP_IAEOPJP1		BYPASS LL-3 GROUP I ISOL (SEP-10)	OFF	ON			11

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4526A	RBCCW PUMP D OFF	OFF/RESET	OFF	ON				5
K4526A	RBCCW PMP D AUTO	AUTO	OFF	OFF				5
K4526A	RBCCW PMP D ON	ON	ON	OFF				5
Q4526LG4	RBCCW PMP D OFF G	ON/OFF	OFF	OFF				5
Q4526AMW	RBCCW PMP D ADHR MODE	ON/OFF	ON	OFF				5
K2119A	S/B LIQ PUMP A & B	PUMP_A	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_A&B	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_B	OFF	OFF				
K2624A	CS-5562 ARI	RESET	OFF	OFF				
K2625A	CS-5560 ARI	INOP	OFF	OFF				

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: LOWER POWER TO 850 MWE	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

Simulator Operator Role Play	
	If asked as the NE, report that reactivity plan is to reduce power with recirc flow.
	If asked as the NE, report that 850 MWe gross is ~86% power and ~65 Mlb/hr core flow

Evaluator Notes	
Plant Response:	
Objectives:	SRO - Directs power to be reduced to 850 MWe BOP – Monitor the Plant RO – Reduces power to 850 MWe.
Success Path:	Power is lowered to 850 MWe
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: LOWER POWER TO 850 MWE

Time	Pos	EXPECTED Operator Response	NOTES
	SRO	Conduct shift turnover shift briefing.	
		Direct power to be reduced using recirc flow to ~850 MWe. (2OP-02, Section 6.2.1)	
		Contacts chemistry for samples due to 15% power change. May contact Load dispatcher to inform of power decrease. May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	RO	Reduces reactor power using recirc IAW 2OP-02 Section 6.2.1	
		May null the DVM meter.	
	BOP	Monitors the plant	

6.2 Shutdown

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control

1. **Confirm** reactor recirculation pump in operation in accordance with Section 6.1.2. ________

NOTE

- Recirculation Pump speed changes are performed when directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. Other operating procedures are used simultaneously with this procedure as directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. ☐
- Speed changes are accomplished by depressing Lower Slow, Lower Medium, or Lower Fast pushbuttons. The Lower Slow pushbutton changes Recirc pump speed at 0.06%/decrement at 1 rpm/second. The Lower Medium pushbutton changes Recirc pump speed at 0.28%/decrement at 5 rpm/second. The Lower Fast pushbutton changes Recirc pump speed at 2.8%/decrement at 100 rpm/second. ☐

2. **IF AT ANY TIME** any of the following conditions exist, **THEN enter** 1AOP-04.0, Low Core Flow.{8.1.9} ________
   - Entry into Region A of Power to Flow Map
   - OPRM INOPERABLE **AND** any of the following
     - ◊ Entry into Region B of Power to Flow Map
     - ◊ Entry into 5% Buffer Region of Power to Flow Map
     - ◊ Entry into OPRM Enabled Region and indications of THI (Thermal Hydraulic Instability) exist

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

CAUTION

- The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations are governed by the limits of the applicable Power Flow Map, as specified in the COLR. {8.1.9} ☐
- Entry into the 5% Buffer Region warrants increased monitoring of reactor instrumentation for signs of Thermal Hydraulic Instability. Time in the 5% Buffer Region presents additional risk and is minimized.{8.1.9} ☐
- With core flow less than 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 10% (maximum indicated difference 6.0 x 10^6 lbs/hr). With core flow greater than or equal to 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 5% (maximum indicated difference 3.0 x 10^6 lbs/hr). ☐
- When Recirc Pump speeds are less than 40%, decreasing speed using a Lower Fast pushbutton can result in a Speed Hold condition due to exceeding the regen torque limit. ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

3. IF desired to lower the speed of both recirculation pumps simultaneously, **THEN depress** Recirc Master Control Lower (Slow Medium Fast) pushbutton. ________

4. IF desired to lower the speed of an individual recirculation pump, **THEN depress** the Recirc VFD A(B) Lower (Slow Medium Fast) pushbutton. ________

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6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

5. **Confirm** the following, as applicable:

   - Recirc Pump A(B) Speed Demand, Calculated Speed, and Actual Speed have lowered.......... ________
   - Reactor power lowers .... ________
   - B32-R617(R613) [Recirc Pump A(B) Discharge Flow] lowers.......... ________
   - B32-VFD-IDS-003A(B) [Recirc VFD 2A(B) Output Wattmeter] lowers.......... ________
   - B32-VFD-IDS-001A(B)]Recirc VFD 2A(B) Output Frequency Meter] lowers.......... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ____________________

Performed By (Print)	Initials
____________________	______
____________________	______
____________________	______
____________________	______

Reviewed By: ____________________
Unit CRS/SRO

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30	
Simulator Operator Actions	

Simulator Operator Role Play	
	If contacted as the Load Dispatcher acknowledge report.

Evaluator Notes	
Plant Response:	230 kV Delco West line is isolated
Objectives:	SRO - Direct 230kV Delco West Line isolated ATC – Plant monitoring BOP – Performs 2OP-50 Section 6.2.6 for isolating ONLY the Delco West Line
Success Path:	230 kV Delco West (Line 30) isolated
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs 230kV Delco West Line isolated IAW marked up version of 2OP-50, Section 6.2.6.	
	BOP	Performs 2OP-50, Section 6.2.6	
	RO	Monitors the plant.	

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6.2.6 De-energizing The 230 kV Switchyard

1. **Ensure** the Unit 2 230 kV switchyard is ENERGIZED. .... AD
2. **Ensure** the 4kV Auxiliary Electrical Systems are DE-ENERGIZED in accordance with Section 6.2.3. .... N-1 SRO
3. **Ensure** the SAT is DE-ENERGIZED in accordance with Section 6.2.4 .... N-1 SRO
4. **Ensure** Caswell Beach Pumping Station is DE-ENERGIZED in accordance with Section 6.2.5 .... N-1 SRO
5. **Ensure** required LCOs for Technical Specification Sections 3.8.1, 3.8.2, 3.8.7 and 3.8.8 are initiated .... SRO
6. **Obtain** Load Dispatcher's permission to de-energize the 230 kV switchyard. .... AD

   A Powers - the Delco West Line ONLY
   Person Contacted

7. **Place** Auto Reclose switches for the following PCBs in MAN:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ________
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ________
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

CAUTION

PCB Supervisory switch must be in LOCAL before the associated PCB is operated from Panel XU-5. ☐

8. **Place** Supervisory switches for the following PCBs in LOCAL:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO
9. **Open** 31B (Bus 2B Whiteville 230 kV PCB) .... N-1 SRO
10. **Confirm** 31B (Bus 2B Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
11. **Open** 31A (Bus 2A Whiteville 230 kV PCB) .... N-1 SRO
12. **Confirm** 31A (Bus 2A Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
13. **Open** 30B (Bus 2B Delco West Line 230 kV PCB) .... ______
14. **Confirm** 30B (Bus 2B Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
15. **Open** 30A (Bus 2A Delco West Line 230 kV PCB) .... ______
16. **Confirm** 30A (Bus 2A Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
17. **Open** 28B (Bus 2B Wallace 230 kV PCB) .... N-1 SRO

6.2.6 **De-energizing The 230 kV Switchyard (continued)**

18. **Confirm** 28B (Bus 2B Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
19. **Open** 28A (Bus 2A Wallace 230 kV PCB). .... N-1 SRO
20. **Confirm** 28A (Bus 2A Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
21. **Open** 27B (Bus 2B Town Creek 230 kV PCB). .... N-1 SRO
22. **Confirm** 27B (Bus 2B Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
23. **Open** 27A (Bus 2A Town Creek 230 kV PCB). .... N-1 SRO
24. **Confirm** 27A (Bus 2A Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO

NOTE

If work is to be performed on a 230 kV bus, the manual disconnects are to be opened. .... ☐

25. **Place** Supervisory switches for the following PCBs in REMOTE:
    - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
    - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
    - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
    - 27B (Bus 2B Town Creek 230 kV Breaker .... N-1 SRO
    - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
    - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
    - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
    - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

Date/Time Completed ________

Performed By (Print) Initials

______________________ ________

______________________ ________

______________________ ________

______________________ ________

Reviewed By ______________________________

Unit CRS/SRO

N-1, Partial usage to isolate only the Delco West 230 kV Line (Line 30)

EVENT 3: ROD DRIFT

Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to drift CR 26-11 into the core.
	When CR 26-11 is inserted to 00, **Initiate Trigger 2** to activate CRD High Temperature alarm.
	Two minutes after control rod is disarmed or scrammed, delete CRD HYD TEMP HIGH alarm.
	If asked to disarm CRD 26-11 **Initiate Trigger 4**.

Simulator Operator Role Play	
	If contacted as the RE to address thermal limits, acknowledge the request. When contacted for scramming control rod 26-11, report that Thermal Limits will NOT be exceeded by this single rod scram.
	If asked as the RBAO to investigate HCU for control 26-11, report that the HCU scram outlet riser is hot to the touch.
	When contacted as the RBAO and after high temperature alarm has been actuated, report that the CRD temperature is 390°F and slowly rising.
	When contacted as the System Engineer report that based on past history of this rod (26-11) scram times cannot be guaranteed.
	If contacted as the WCC to perform the single rod scram, report that there are no operators available to perform the task.
	If asked as the RBAO to disarm control rod, coordinate with Sim Operator after 5 minutes.
	If requested, close/reopen the 113 valve (Charging Header Isolation Valve) as necessary
	As RBAO, Report Accumulator pressure 980# after rod has been scrammed.

Evaluator Notes	
Plant Response:	Control Rod 26-11 will drift full in. Crew should enter AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received, Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 in 3 hours <u>and</u> C2 within 4 hours.
Objectives:	SRO - Direct actions in response to a drifting control rod and evaluate Tech Specs. RO - Respond to a drifting control rod.
Success Path:	The drifting control rod is fully inserted, determined that the control rod must be placed under clearance and electrically disarmed.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: ROD DRIFT			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of 2APP-A-05 (3-2) *ROD DRIFT*	
	SRO	Direct entry into 0AOP-02.0, Control Rod Malfunction/Misposition.	
	SRO	After System Engineer reports that the scram times cannot be guaranteed, according to Note 2 in TS Table 3.1.4-1 the rod must be declared inoperable. Tech Spec 3.1.3 Control Rod Operability Condition C. One or more control rods inoperable for reasons other than Condition A or B <u>Required Action</u> C.1 Fully insert inoperable control rod (3 hrs) C.2 Disarm the associated CRD (4 hrs)	
	SRO	Contact System Engineer on high temperature condition of control rod. Contact RE to inform of rod drift and to evaluate thermal limits	
	SRO	May direct the control rod to be scrammed to attempt to reseat the leaking outlet valve IAW A-05 (3-2) *ROD DRIFT* May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	BOP	Monitor reactor plant parameters during evolution. May read APP actions for the OATC to perform	

EVENT 3: ROD DRIFT

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Acknowledge alarms: A-05 (5-2) Rod Block RWM/RMCS Sys Trouble A-05 (3-2) Rod Drift Announce and enter 0AOP-02.0, Control Rod Malfunction/Misposition.	
	ATC	Perform the actions of APP-A-05 (3-2) ROD DRIFT as follows: ☐ Determine which control rod is drifting. ☐ Select the drifting control rod and determine direction of drift. ☐ Attempt to arrest the drift by giving a withdraw signal. ☐ If rod continues to drift in, apply an RMCS insert signal and fully insert to position 00. ☐ Attempt to locate and correct the cause of the rod malfunction as follows: ☐ Check and adjust cooling water header pressure if required. ☐ Direct AO to check for leaking scram valve. ☐ May direct an AO to check HCU temperature on RO18 temperature recorder (in the Rx Bldg.)	
	ATC	Monitor core parameters, main steam line radiation and off-gas activity.	
	ATC	Perform 2OP-07 Section 6.3.17, Single Rod Scram from RPS Test Panel. CRS will NA appropriate steps.	The examiner will **prompt** the performer that the "blue light is ON and indication is 00" when step 6.3.17.11 is performed.

6.3.17 Single Rod Scram From RPS Test Panel

1. **Confirm** the following initial conditions are met:

   - All applicable prerequisites in Section 5.0 are met. .... ________
   - Attachment 1 has been reviewed. .... ________
   - Communications are established between RPS Test Panel and the Control Room. .... ________
   - Reactor Engineer recommends performance of this section and has determined Technical Specification Thermal Limits will **NOT** be exceeded by this single rod scram. .... ________

   ____
   Reactor Engineer

2. **IF AT ANY TIME** it becomes necessary to scram a single control rod for operability concerns
   THEN perform 0PT-14.2.1, Single Rod Scram Insertion Times Test for that control rod. .... ________

3. **Obtain** permission from the Unit CRS to perform this section. .... ________
   CRS

4. **Document** applicable control rod to be scrammed in the space provided: .... ________

   _____-_____
   Control Rod

5. **IF** recommended by Reactor Engineering to support diagnostic data,
   THEN record the following: .... ________

   - Reactor pressure: .... ________

     __________ psig

   - Applicable accumulator pressure: .... ________

     __________ psig

6.3.17 Single Rod Scram From RPS Test Panel (continued)

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

6. **Select** applicable control rod at P603. .... ____/____ CV

7. **Close** C12-113 (Charging Water Riser Isolation Valve) for the applicable control rod. .... ________

8. **IF** RWM scram time recording is recommended by Reactor Engineering, **THEN perform** the following: .... ________

   a. **Have** Reactor Engineering connect temporary scram time test cable to single rod scram interface box (located on terminal strip GM in P616-RMCS cabinet) and route cable up to RPS Test Panel P610 in accordance with Attachment 12, (Reference Use) - Test Cable Arrangement For RWM Scram Recording. .... ________

   ____
   Reactor Engineer

      (1) **Insert** black lead into NEUTRAL socket on the P610 test panel. .... ____/____ IV

      (2) **Insert** red lead into socket corresponding to control rod to be tested at P610. .... ____/____ IV

9. **Monitor** control rod position. .... ________

10. **IF AT ANY TIME** the control rod does **NOT** fully scram after lowering the scram test switch, **THEN** immediately **notify** the Unit CRS to determine operability of the rod (Technical Specification 3.1.3). .... ________

11. Using a currently licensed RO/SRO, **perform** the following:

   a. **Scram** the applicable control rod by lowering the scram test switch on RPS Test Panel P610 to the scram (down) position. .... ____/____ CV

6.3.17 Single Rod Scram From RPS Test Panel (continued)

b. **WHEN** the scrammed control rod is fully inserted **OR** 10 seconds have elapsed (whichever occurs first), **THEN return** applicable scram test switch to the normal (up) position. .... ____/____ IV

12. **Confirm** rod position display indicates "00" for scrammed rod and the GREEN "Full In" light is ON. .... ________

13. **IF** control rod did **NOT** fully insert, **THEN reference** Technical Specifications for OPERABILITY. .... ________ CRS

NOTE

Holding Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for a period of time will flush any ingested crud from the drive to help prevent double notching. .... ☐

14. **Hold** the Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for at least 15 seconds and **record** insert stall flow.

______ stall flow	______ stall flow	______ stall flow
1:____	2:____	3:____

15. **Repeat** Section 6.3.17 Step 14 two additional times. .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

16. Slowly **open** applicable C12-113 (Charging Water Riser Isolation Valve). .... ____/____ IV

17. **Confirm** associated accumulator pressure is greater than 955 psig. .... ________

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6.3.17 Single Rod Scram From RPS Test Panel (continued)

18. **IF** RWM scram time was recorded,
THEN perform the following: ________

a. **Contact** Reactor Engineering to upload data ________

____
Reactor Engineer

b. **Remove** temporary scram timing cables from P616 and P610 ____/____
IV

c. **Perform** the following to delete RWM scram data buffers:

(1) **Select** SCRAM DATA screen on RWM Operator Display in the Control Room ________

(2) **Press** DELETE softkey to delete scram data ________

(3) **Confirm** SCRAM DATA screen displays: ________

- ROD SCRAM TIMING FUNCTION: READY
- ROD SCRAM TIMING DATA: NOT TRANSFERRED

EVENT 4: ADHR SECONDARY PUMP TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to trip the running ADHR Pump.
	When informed to align 2A RCC pump to ADHR mode **Initiate Trigger 6**
	If asked to throttle closed the RCC-V5114, **Initiate Trigger 7**. When asked to re-open the RCC-V5114, then adjust the remote to 1.0.

Simulator Operator Role Play	
	If directed to investigate the trip of RCC Pump D, report the pump is tripped on overcurrent.
	When directed to align RBCCW Pump 2A to ADHR mode IAW 2OP-21 Section 6.3.16 (steps 2b through 2i) have Sim Op align pump to ADHR mode and inform BOP Op that the steps are complete.
	When contacted as RBAO report radiation monitor is aligned per 2OP-21 Section 6.3.18 step 4. RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is throttled 90% closed. (2OP-21 Section 6.3.18 Step 5a)
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is full open. (2OP-21 Section 6.3.18 Step 5c)

Evaluator Notes	
Plant Response:	The running ADHR Secondary Loop Pump (RCC Pump D) will trip. The crew will have to start RCC Pump C. Shutdown RCC Pump A. Re-align RCC Pump A for ADHR mode and then start the pump for ADHR. (AOP-38.0 will be entered).
Objectives:	SRO – Direct swapping of RCC pumps and then direct starting of RCC Pump in ADHR Mode. RO – Swap RCC pumps, Place RCC Pump in ADHR Mode.
Success Path:	Standby ADHR Pump placed in service.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: ADHR SECONDARY PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct entry into 0AOP-38.0, Loss of Fuel Pool Cooling	
		Direct swapping of RBCCW pumps Start RBCCW Pump C, secure A.	
		Direct alignment of RBCCW Pump A to ADHR Mode.	
		Direct starting RBCCW Pump 2A in ADHR Mode.	
		Direct I/C to investigate trip of RBCCW Pump 2D.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 4: ADHR SECONDARY PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	RO	Plant Monitoring	
	BOP	Report trip of RBCCW Pump 2D (running in ADHR Mode) UA-01 3-3, ADHR SECONDARY LOOP TROUBLE May secure the primary pump IAW this APP	
		Announce and enter AOP-38.0, Loss of Fuel Pool Cooling	
		Perform 2OP-21, Section 6.3.10 (page 33) to swap RBCCW pumps. (Start C and secure A) Plant announcement for the start of 2C RCC Pump and securing of 2A RCC Pump.	
		Perform 2OP-21, Section 6.3.16 (page 34) to align RBCCW Pump A into ADHR Mode. Direct RB AO to perform steps 2b through 2i. Step 3 is N/A	
		Perform 2OP-21, Section 6.3.18 (page 37) to start RBCCW Pump A in ADHR Mode. Notifies E&C, starting ADHR pump Step 2 is N/A Step 3 is N/A Direct the RB AO to perform step 4 and 5a. Announce starting of RCC Pump 2A. Direct the RB AO to perform step 5c. May direct AO to ensure primary loop is operating IAW 2OP-13.1.	

6.3.10 Transferring to the Standby RBCCW Pump - RBCCW Mode

1. **Ensure** the following initial conditions are met:
   - Applicable prerequisites listed in Section 5.0, Prerequisites are met .... ________
   - RBCCW System in operation with two pumps aligned for RBCCW Mode in service .... ________
2. **Start** the standby RBCCW pump by placing the associated pump control switch in ON:
   - RBCCW PUMP 2A .... ________
   - RBCCW PUMP 2B .... ________
   - RBCCW PUMP 2C .... ________
   - RBCCW PUMP 2D .... ________
3. **Secure** the desired RBCCW pump by placing the associated pump control switch in OFF:
   - RBCCW PUMP 2A .... ________
   - RBCCW PUMP 2B .... ________
   - RBCCW PUMP 2C .... ________
   - RBCCW PUMP 2D .... ________
4. <u>IF</u> a third RBCCW pump is aligned to RBCCW Mode, **<u>AND</u>** RBCCW discharge header pressure has stabilized,
   <u>THEN</u> place the pump control switch in AUTO .... ________

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode

1. **Ensure** the following initial condition is met:

   - One RBCCW Heat Exchanger is aligned to ADHR Mode per Section 6.3.14. .... _______
   - Key for RBCCW/ADHR Mode Selector Switch has been obtained from one of the following:
     - ◊ Control Rm Key Locker - key 98 .... _______
     - ◊ WCC Key Locker - key 167 or 168 .... _______

NOTE

RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐

2. IF aligning RBCCW Pump 2A to ADHR Mode, **THEN perform** the following: .... _______

   a. **Ensure** RBCCW Pump 2A control switch is in OFF. .... _______

   b. **Close** RCC-V32 (RBCCW Pump 2A RBCCW Suction) .... _______

   c. **Close** RCC-V38 (RBCCW Pump 2A RBCCW Mode Discharge Valve) .... _______

   d. **Open** RCC-V5105 (RBCCW Pump 2A ADHR Mode Suction Valve) .... _______

   e. **Open** RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... _______

   f. **Open** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... _______

   g. **WHEN** a steady stream of water is present, **THEN close** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... _______

   h. **Ensure** 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) located at MCC 2XE, in ADHR. .... _______

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

i. **Remove** key from 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) .... _______

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2A is ON. .... _______

3. **IF** aligning RBCCW Pump 2D to ADHR Mode, **THEN perform** the following: .... _______

a. **Ensure** RBCCW Pump 2D control switch is in OFF. .... _______

b. **Close** RCC-V5107 (RBCCW Pump 2D RBCCW Mode Suction Valve) .... _______

c. **Close** RCC-V5111 (RBCCW Pump 2D RBCCW Mode Discharge Valve) .... _______

d. **Open** RCC-V5104 (RBCCW Pump 2D ADHR Mode Suction Valve) .... _______

e. **Open** RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... _______

f. **Open** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) .... _______

g. **WHEN** a steady stream of water is present, **THEN close** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) .... _______

h. **Ensure** 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) located at MCC 2XD, in ADHR .... _______

i. **Remove** key from 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) .... _______

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2D is ON. .... _______

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

NOTE

ADHR Mode piping is placed either in Standby Mode or in service to ensure RBCCW circulation and proper chemistry control when <u>**NOT**</u> undergoing maintenance.. ☐

4. **Place** ADHR in service per Section 6.3.18, Starting an RBCCW Pump - ADHR Mode ____________

Date/Time Completed ____________

Performed By (Print) Initials

____________________ ________

____________________ ________

____________________ ________

____________________ ________

Reviewed By ____________________

Unit CRS/SRO

6.3.18 Starting an RBCCW Pump - ADHR Mode

1. **Ensure** the following initial conditions are met:

   - Designated RBCCW Pump is aligned to ADHR Mode per Section 6.3.16. .... ________

   - **IF NO** RBCCW pump is operating in ADHR Mode, **THEN** E&C notified commencing startup of ADHR Mode. .... ________

     ____
     Person Notified

NOTE

- RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐
- RBCCW Pump 2D will **NOT** auto re-start when power returns after a LOOP or bus under voltage condition with the control switch in ON or AUTO. The control switch must be placed in OFF/RESET prior to restarting the pump. .... ☐

CAUTION

Two pump operation in ADHR Mode subjects RCC-V37 (RBCCW Pump 1A Discharge Check Valve) and RCC-V5110 (RBCCW Pump 1D Discharge Check Valve) to accelerated wear. This lineup is expected to be utilized only when maximum ADHR capacity is required. [8.7.2] .... ☐

2. **IF** desired to start a second pump aligned to ADHR Mode, **THEN perform** the following: .... ________

   a. **Obtain** concurrence from Engineering to start a second pump in the ADHR Mode. .... ________

      ____
      Person Contacted

   b. **Go to** Step 5.b. .... ________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

3. IF the ADHR Mode has been shutdown for greater than 72 hours OR maintenance has been performed, **THEN fill** and **vent** the ADHR piping per Section 6.3.13 .... ________

4. **Ensure** the following valve alignment for system radiation monitoring:

   - RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED .... ________
   - RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN .... ________
   - RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN .... ________

5. For the RBCCW pump aligned to ADHR Mode to be started, **perform** the following:

   a. **Throttle** 80% to 95% closed the associated pump discharge valve:

      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... ________

   b. **Start** an RBCCW pump aligned to ADHR Mode by placing the associated pump control switch in ON:

      - RBCCW PUMP 2A .... ________
      - RBCCW PUMP 2D .... ________

   c. IF throttled in Step 5.a, **THEN** slowly **open** the associated pump discharge valve: .... ________

      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... ________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

d. **Ensure** a log entry is made stating two RBCCW pumps are in service in the ADHR Mode and Engineering has been notified. ________

NOTE

The normal parameters for Supplemental Spent Fuel Pool Cooling are provided in Attachment 1, Normal System Operation Parameters. Equipment manipulations to maintain these parameters are performed per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure. ☐

6. **IF** a Primary Loop pump is operating,
THEN maintain Primary Loop flow per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure. ________

7. **Ensure** Plant Process Computer setup as follows per 0OP-55, Plant Process and ERFIS Computer Systems Operating Procedure: ________

- PPC U2RCCA111 point ENABLED. ________
- PPC U2RCCA095 Value Monitoring setup with the nominal flow values per Attachment 1 Section 2.5 for the number of RBCCW Pumps in ADHR Mode to provide audible alarms for ADHR secondary flow changes. ________

Date/Time Completed ________

Performed By (Print)	Initials
________	________
________	________
________	________
________	________

Reviewed By ________________

Unit CRS/SRO

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 8** to activate Recirc Loop B Flow failure.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	After LCO entries have been determined and SRO is waiting for I&C, call as WCCSRO and request APRM 4 be placed in tripped condition to support I&C trouble shooting. The WCC will hang the status control tag paperwork.
	If asked to pull fuses (for TRM 3.3 actions, 2-C12A-F1 Labeled ROD OUT BLOCK RELAYS C12A in P616 panel) acknowledge the request

Evaluator Notes	
Plant Response:	Flow reference off normal alarm, rod block and scram signal to all 4 voters Flow transmitter signals are displayed on PC display 845, and on individual NUMACs by selecting Input Status.
Objectives:	SRO - Determine LCO for APRM 4 inoperability and direct placing channel in trip. RO - Respond To A Flow Unit/Transmitter Failure Per APP A-06 5-7.
Success Path:	APRM 4 TS 3.3.1.1 declaration and placed in trip condition IAW 0OI-18.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of APPs	
		Direct I&C to investigate	
		Evaluate Tech Spec 3.3.1.1 Reactor Protection System Instrumentation TS 3.3.1.1, Function 2b, Required Action A1. With one or more required channels inoperable, place in trip condition in **12 hours** Evaluate TRM 3.3 Control Rod Block Instrumentation TRM 3.3, Function 1a, Required Condition A1. With one of the required channels not operable - **24 hours** to restore to operable.	
		Refers to 0OI-18 for actions to place APRM 4 in a tripped condition.	
		Direct APRM 4 mode selector switch placed in INOP to allow I&C troubleshooting.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Monitors the plant.	
		May check back panel APRM indications.	
	ATC	Acknowledges, refers to & reports annunciators A-6 2-8 *APRM UPSCALE* 3-8 *APRM UPSCALE TRIP/INOP* 5-7 *FLOW REF OFF NORMAL* A-5 2-2 *ROD OUT BLOCK* 4-8 *OPRM TRIP ENABLED*	
		Diagnose and report failure of APRM 4 Flow Transmitter	
		Obtains key number 114 from the SRO key locker to place APRM 4 in trip.	
		Places APRM mode selector switch in INOP IAW 0OI-18.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 9** to trip a Heater Drain Pump.
	.

Simulator Operator Role Play	
	If contacted as AO to investigate, wait until pump is tripped and report over-current flags for all phases of 2A HDP 4KV breaker on Bus 2D
	If contacted as RE for reduced FW Temp, acknowledge any requests.
	If asked as I&C to investigate, acknowledge the request

Evaluator Notes	
Plant Response:	Heater Drain Pump 2A shaft seizes and trips on overcurrent. Heater Drain tank level will rise and the crew will throttle HD-V57 to stabilize HD Tank level. If the standby HDP is not started, RFP suction pressure will lower during the transient requiring power reduction to stabilize Condensate/feedwater.
Objectives:	SRO - Directs 0AOP-23, Condensate/Feedwater System Failures, and possible 0AOP-03.0, Positive Reactivity Addition, entry. RO - Diagnose HDP pump trip and start the standby HDP.
Success Path:	2C HDP started with HDD level recovered in the normal band.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct annunciator response for UA-04: 4-10 HD PUMP A TRIP 2-10 HD DEAERATOR LEVEL HIGH-LOW 3-10 HD DEAERATOR LEVEL HIGH TRIP Direct entry into 0AOP-23, Condensate/Feedwater System Failures Direct starting standby HDP.	
		May direct 2AOP-3.0, Positive Reactivity Addition, entry if power rises due to the HDD Ext Trip.	
		May direct monitoring of final feedwater temperature.	
		May direct maintenance to investigate trip	
		May conduct a brief (see Enclosure 1 on page 62 for format)	
	RO	Plant Monitoring	
		May reduce power IAW 0AOP-23 to stabilize reactor water level.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP			
	BOP	Recognize and report annunciators: UA-04 4-10 *HD PUMP A TRIP* 2-10 *HD DEAERATOR LEVEL HIGH-LOW* 3-10 *HD DEAERATOR LEVEL HIGH TRIP* UA-06 1-7 *BUS 2D 4 KV MOTOR OVLD*	
		Manually starts 2C HDP IAW APP or AOP.	
		Enter and announce 0AOP-23, Condensate/Feedwater System Failures. Monitors final feedwater temperature (FFWT) IAW 2OI-03.2	
		May open the HD-V57 to assist in HDD level recovery.	
		Directs an AO to 4.16 KV Switchgear Bus 2D to investigate 2A HDP trip	
		Verifies auto actions for *HD DEAERATOR LEVEL HIGH TRIP,* if it occurs. 1. Non-return valves (EX-V11 and EX-V12) to deaerator close. (Only close if turbine load is below 500 MWe) 2. HDD Extraction Line B moisture removal valves (MVD-LV-266 and MVD-LV-267) open. May reference 2OP-35 to recover MRVs following HDD level restoration.	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

	Simulator Operator Actions
	At the direction of the Lead Evaluator, **Initiate Trigger 10** to activate small steam leak in DW.
	If requested to defeat Group I LL3, wait 2 minutes, and install jumpers **(Trigger 11)**
	If requested to install LEP-02, Section 2.3 jumpers, wait 5 minutes, and inform the SRO that the jumpers are installed (RP005F already active).

	Simulator Operator Role Play
	Acknowledge request as I&C to investigate failure of SLC switch.
	If requested as I&C to investigate the failure of the ARI reset failure, acknowledge the request.
	Acknowledge request to perform LEP-03 actions.

Evaluator Notes	
Plant Response:	Most control rods will fail to insert on the scram. The crew will respond to the ATWS per EOP-01-ATWS. When SLC initiation is attempted, the switch positions will not work. The crew will enter LEP-03 and align for alternate boron injection using CRD. The scram cannot be reset due to failure of the ARI to reset.
Objectives:	SRO - Direct actions to control reactor power per EOP-01-ATWS.. RO - Perform actions for an ATWS per EOP-01-ATWS.
Success Path:	Lower level to control power, inject SLC, insert control rods.

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Enter RSP and transition to ATWS. Direct mode switch to shutdown when steam flow < 3 Mlbs/hr. Direct ARI initiation. ***Direct Recirc Pumps Tripped***. *Direct SLC initiation, then LEP-03, Alternate Boron Injection*. ***Direct ADS inhibited***. Direct RWCU isolation verification. ***Direct LEP-02, Alternate Rod Insertion***	*CRITICAL TASK #2* *CRITICAL TASK #1* *CRITICAL TASK #2*
		Direct Group 10 switches to override reset.	
		Direct terminate and prevent HPCI/Feedwater (CS/RHR when LOCA signal received) to lower level to 90 inches.	*CRITICAL TASK #2*
		When level reaches 90 inches, evaluate Table Q-2: If not met, establishes a level band of LL4 to +90 inches. If met, directs RPV injection to remain terminated.	
		Enters PCCP Directs Torus cooling when Torus temperature is greater than 95° F, (See Enclosure 5, page 68) Directs Torus Sprays before torus pressure reaches 11.5 psig (See Enclosure 8, page 77) Directs Drywell Sprays when torus pressure exceeds 11.5 psig (See Enclosure 7, page 71)	
		Direct injection established to maintain RPV level LL4 to TAF (or the level at which APRMs indicate downscale)	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	RO	Place mode switch to shutdown when steam flow < $3x10^6$ lb/hr.	
		Initiates ARI.	
		Trips Recirc Pumps.	***CRITICAL TASK #2***
		Initiates SLC. Determines SLC switch failure. Directs LEP-03, Alternate Boron Injection	
		Recognizes failure of SLC switch and reports to CRS.	
		Monitor APRMs for downscale.	
		Performs LEP-02, Alternate Rod Insertion. Section 2.1, Initial Actions (see page 48) ***Section 2.3, Reset RPS and Initiate a Manual Scram*** (see page 51) ***Section 2.4, Reactor Manual Control System (RMCS)*** (see page 54) May also perform Section 2.5, Increasing Cooling Water Header Pressure (see page 56).	***CRITICAL TASK #2***
		Recognizes failure of ARI to reset, informs CRS	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	***Places ADS in inhibit.***	***CRITICAL TASK #1***
		Places Group 10 switches to override / reset	
		Terminate and prevent injection to RPV. Terminates and prevents HPCI IAW Hard Card. (Enclosure 2, page 63) Terminates and Prevents Feedwater IAW Hard Card. (Enclosure 3, page 64)	***CRITICAL TASK #2***
		May place HPCI in service for level control during ATWS when directed by the SRO. (Enclosure 6, page 70)	
		Restart RFP to maintain level as directed by SRO. (Enclosure 4, page 65)	
		When Torus temperature is greater than 95° F, places Torus Cooling in service. (Enclosure 5, page 68)	
		When directed, places Torus Sprays in service. (Enclosure 8, page 77)	
		When directed, places Drywell Sprays in service. (Enclosure 7, page 71)	

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)
- As directed by Severe Accident Management Guideline (SAMGs)

2.0 OPERATOR ACTIONS

2.1 <u>Initial Actions</u>

2.1.1 Manpower Required

- 1 Reactor Operator
- 1 Auxiliary Operator

2.1.2 Special Equipment

None

NOTE

- Two-handed operation is allowed during implementation of this procedure in order to minimize delay in control rod insertion. ☐
- Section 2.1.3 Step 1 through Step 6 may be performed concurrently with the rest of this procedure. ☐
- The system designation C11 is for Unit 1 and C12 for Unit 2. ☐

2.1.3 Operator Actions

1. **Monitor** reactor power on APRMs until IRM recorders on scale. ☐ RO
2. **Insert** IRMs and **monitor** reactor power on IRM recorders. ☐ RO
3. **Downrange** IRMs to bring them on scale. ☐ RO
4. **<u>WHEN</u>** IRMs on Range 3 **<u>OR</u>** below, **<u>THEN</u> insert** SRMs. ☐ RO
5. **Monitor** reactor period. ☐ RO

2.1.3 Operator Actions (continued)

6. **Monitor** control rod position using:

- Process computer .... ☐ RO
- SPDS .... ☐ RO
- RWM .... ☐ RO
- Four rod .... ☐ RO
- Full core display .... ☐ RO

7. **WHEN** either:

- All control rods in .... ☐ RO
- Only one control rod **NOT** fully inserted .... ☐ RO
- **NO** more than 10 control rods withdrawn to position 02 **AND** **NO** control rod withdrawn beyond position 02 .... ☐ RO
- Reactor engineering has determined the reactor will remain shutdown under all conditions without boron .... ☐ RO

THEN perform Section 2.2, Control Rod Insertion Verification on Page 7 .... ☐ RO

2.1.3 Operator Actions (continued)

8. **Insert** control rods by one or more methods:

- Section 2.3, Reset RPS and Initiate a Manual Scram on Page 15 ☐ RO
- Section 2.4, Reactor Manual Control System (RMCS) on Page 18 ☐ RO
- Section 2.5, Increasing Cooling Water Header Pressure on Page 20 ☐ RO
- Section 2.6, Scram Individual Control Rods on Page 22 ☐ RO
- Section 2.7, De-energize Scram Solenoids and Vent Scram Air Header on Page 26 ☐ RO
- Section 2.8, Venting Over Piston Area on Page 32 ☐ RO

2.3 Reset RPS and Initiate a Manual Scram

2.3.1 Manpower Required

- 1 Reactor Operator

2.3.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 4 jumpers (15, 16, 17 and 18) .... ☐

2.3.3 Manual Scram Actions

NOTE

Section 2.3.3 Step 1 and Step 2 may be performed concurrently. .... ☐

1. IF an automatic scram signal present AND power available to RPS bus,
   THEN install jumpers to bypass reactor scram:

   - Jumper 15 in Panel H12-P609, Terminal Board DD, from right side of Fuse C71A(C72A)-F14A to Terminal 4 of Relay C71A(C72A)-K12E .... ☐ RO

   - Jumper 16 in Panel H12-P609, Terminal Board BB, from left side of Fuse C71A(C72A)-F14C to Terminal 4 of Relay C71A(C72A)-K12G .... ☐ RO

   - Jumper 17 in Panel H12-P611, Terminal Board DD, from right side of Fuse C71A(C72A)-F14B to Terminal 4 of Relay C71A(C72A)-K12F .... ☐ RO

   - Jumper 18 in Panel H12-P611, Terminal Board BB, from left side of Fuse C71A(C72A)-F14D to Terminal 4 of Relay C71A(C72A)-K12H .... ☐ RO

2. **Inhibit ARI:**

   a. **Place** C11(C12)-CS-5560 (ARI Auto/Manual Initiation Switch) to INOP. .... ☐ RO

2.3.3 Manual Scram Actions (continued)

b. **Place and hold** C11(C12)-CS-5562 (ARI Reset) switch in RESET. .... ☐ RO

c. **WHEN** 5 seconds have elapsed, **THEN release**. .... ☐ RO

d. **Confirm** red TRIP light located above C11(C12)-CS-5561 (ARI Initiation) OFF. .... ☐ RO

3. **Ensure** Disch Vol Vent & Drain Test switch in ISOLATE. .... ☐ RO

4. **Confirm** CLOSED:

- C11(C12)-V139 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-CV-F010 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-V140 (Disch Vol Drain Vlv). .... ☐ RO
- C11(C12)-CV-F011 (Disch Vol Drain Vlv). .... ☐ RO

5. **Reset** RPS. .... ☐ RO

6. **IF** either RPS A **OR** B can be RESET, **THEN go to** Section 2.3.3 Step 8. .... ☐ RO

7. **IF** RPS **CANNOT** be RESET, **THEN return to** Section 2.1.3 Step 7. .... ☐ RO

8. **Place** Disch Vol Vent & Drain Test switch to NORMAL. .... ☐ RO

2.3.3 Manual Scram Actions (continued)

9. **Confirm** OPEN:
   - C11(C12)-V139 (Disch Vol Vent Vlv). ☐ RO
   - C11(C12)-CV-F010 (Disch Vol Vent Vlv). ☐ RO
   - C11(C12)-V140 (Disch Vol Drain Vlv). ☐ RO
   - C11(C12)-CV-F011 (Disch Vol Drain Vlv). ☐ RO

10. **WHEN** the scram discharge volume has drained for approximately 2 minutes **OR** A-05 1-6, SDV Hi-Hi Level RPS Trip clears, **THEN continue**. ☐ RO

11. **IF** venting control rod over piston area per Section 2.8, **THEN notify** AO to secure venting prior to inserting a manual scram. ☐ RO

12. Manually **scram** the reactor. ☐ RO

13. **IF** control rods moved inward **AND all** control rods **NOT** inserted to **OR** beyond Position 00, **THEN return to** Section 2.3.3 Step 3. ☐ RO

14. **IF all** control rods inserted to **OR** beyond Position 00 **OR** control rods did **NOT** move inward, **THEN return to** Section 2.1.3 Step 7. ☐ RO

2.4 Reactor Manual Control System (RMCS)

2.4.1 Manpower Required

- 1 Reactor Operator

2.4.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ **Unit 1 Only:** 1 5450 key for RWM ☐
  - ◊ **Unit 2 Only:** 1 5451 key for RWM ☐

2.4.3 RMCS Actions

1. **IF** a reactor scram sealed in,
   THEN ensure available CRD pumps operating ☐ RO

2. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN ☐ RO

3. **IF** a CRD pump **NOT** operating,
   THEN:

   a. **Close** the in-service C11(C12)-F002A(F002B) (Flow Control Vlv) ☐ RO

   b. **Start** one CRD pump ☐ RO

   c. **Adjust** C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm ☐ RO

   d. **IF** available,
      THEN start the second CRD pump ☐ RO

4. **IF NO** CRD pump can be started,
   THEN return to Section 2.1.3 Step 7 ☐ RO

2.4.3 RMCS Actions (continued)

5. **Insert** control rods with RMCS:

   a. **Throttle open** C11(C12)-F002A(F002B) (Flow Control Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   b. **IF** drive water differential pressure less than 260 psid, **THEN throttle closed** C11(C12)-PCV-F003 (Drive Pressure Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   c. **Bypass** RWM. .... ☐ RO

   d. **Insert** control rods with Emergency Rod In Notch Override switch. .... ☐ RO

6. **WHEN all** control rods inserted to **OR** beyond Position 00 **OR CANNOT** be inserted with RMCS, **THEN return to** Section 2.1.3 Step 7 .... ☐ RO

2.5 Increasing Cooling Water Header Pressure

2.5.1 Manpower Required

- 1 Reactor Operator

2.5.2 Special Equipment

None

2.5.3 Cooling Water Header Actions

1. **IF** a reactor scram sealed in,
   THEN ensure available CRD pumps operating. ☐ RO

2. **IF** a CRD pump **NOT** operating,
   THEN:

   a. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN. ☐ RO

   b. **Close** the in-service C11(C12)-F002A(F002B) (Flow Control Vlv). ☐ RO

   c. **Start** one CRD pump. ☐ RO

   d. **Adjust** C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm. ☐ RO

   e. **IF** available,
      THEN start the second CRD pump. ☐ RO

3. **IF NO** CRD pump can be started,
   THEN return to Section 2.1.3 Step 7. ☐ RO

2.5.3 Cooling Water Header Actions (continued)

4. **IF** a reactor scram **NOT** sealed in,
   THEN maximize cooling water header pressure:

   a. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN and fully **open** the in service C11(C12)-F002A(F002B) (Flow Control Vlv). .... ☐ RO

   b. Fully **open** C11(C12)-PCV-F003 (Drive Pressure Vlv). .... ☐ RO

5. **WHEN all** control rods inserted to **OR** beyond Position 00 **OR** control rods **NOT** moving inward,
   THEN return to Section 2.1.3 Step 7. .... ☐ RO

TERMINATION	
Simulator Operator Actions	
	When directed by the Lead Evaluator, delete the following commands: Malfunction - K2624A, ARI Reset Malfunction - K2625A, ARI INOP Malfunction – RP011F, ATWS 4 (Make sure RPS is reset and scram air header pressurized before deleting)
	When directed by the Lead Evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

Simulator Operator Role Play	
	After Sim Operator has deleted SDV malfunction, Inform the CRS that a loose wire was found on ARI switch and it has been repaired.

Evaluator Notes	
Plant Response:	When actions are taken to control reactor water level during the ATWS after terminating and preventing, ARI will be repaired and rods can be inserted.
Objectives:	SRO - Directs actions for an ATWS. RO - Insert control rods IAW LEP-02.
Success Path:	Rods inserted with LEP-02, Alternate Rod Insertion.
Scenario Termination:	***When all rods are inserted and level is being controlled above TAF with injection established, the scenario may be terminated.***

Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.

TERMINATION

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Exit ATWS and enter RVCP when all rods are in.	
		Direct level restored to 170 – 200 inches after rods are all in.	
	RO	Confirms ARI reset when reported fixed.	
		Inserts a scram after discharge volume has drained for ~2 minutes.	
		Reports all rods in.	
	BOP	Maintains reactor pressure as determined by the CRS.	
		Maintains level as directed by the SCO.	
		Restores level to 170 – 200 inches after all rod inserted. (Enclosure 4, page 65, contains actions for restart of Condensate and Feedwater)	

ENCLOSURE 1

ATTACHMENT 8

<< Crew Brief Template >>

Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ENCLOSURE 2

SECURING HPCI INJECTION

1.0 INITIAL CONDITIONS

1. **WHEN DIRECTED** BY 2EOP-01-LPC TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

2. **WHEN DIRECTED** BY 0EOP-01-RXFP TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

3. **WHEN** PERMISSION GIVEN BY THE UNIT CRS TO SECURE HPCI INJECTION WITH A HPCI AUTO START SIGNAL PRESENT. .... ☐

2.0 PROCEDURAL STEPS

1. **IF** HPCI IS **NOT** OPERATING, **PERFORM** THE FOLLOWING:

   a. **PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

2. **IF** HPCI IS OPERATING, **PERFORM** THE FOLLOWING:

   b. **DEPRESS AND HOLD** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   c. **WHEN** HPCI TURBINE SPEED IS 0 RPM, **AND** HPCI TURBINE CONTROL VALVE, E41-V9 IS CLOSED, **THEN PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

   d. **WHEN** HPCI TURB BRG OIL PRESS LO, A-01 4- 2, IS SEALED IN, **THEN RELEASE** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   e. **ENSURE** HPCI TURBINE STOP VALVE, E41-V8, **AND** HPCI TURBINE CONTROL VALVE, E41-V9, REMAIN CLOSED, **AND** HPCI DOES **NOT** RESTART. .... ☐

ENCLOSURE 3

Terminating and Preventing Injection From Condensate and Feedwater During EOP's (2OP-32)

1. **IF** desired **TRIP** all operating RFPs. ☐
2. **IF** one or more RFPs are in service **IDLE** one RFP as follows:
   a. **IF** two RFPs are operating **THEN TRIP** one. ☐
   b. **PERFORM** either of the following for the operating RFP:
      1. **PLACE** MAN/DFCS control switch to MAN. ☐
      2. **RAPIDLY REDUCE** speed to approximately 1000 rpm with the LOWER/RAISE speed control switch. ☐

      OR

      1. **PLACE** RFPT Speed Control in M (MANUAL) ☐
      2. **SELECT** DEM and **RAPIDLY REDUCE** speed to approximately 2550 rpm. ☐
3. **CLOSE** the following valves:
   – FW HTR 5A OUTLET VLVS, FW-V6 ☐
   – FW HTR 5B OUTLET VLVS, FW-V8 ☐

   OR

   – FW HTR 4A INLET VLV, FW-V118 ☐
   – FW HTR 4B INLET VLV, FW-V119 ☐
4. **ENSURE** the SULCV is closed by performing the following:
   a. **PLACE** SULCV, in M (Manual). ☐
   b. **SELECT** DEM and **DECREASE** signal until VALVE DEM indicates 0%. ☐
5. **ENSURE** FW-V120, is closed. ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing

1. **Ensure** FW-FV-177 (Feedwater Recirc to Condenser Vlv) CLOSED .... ☐
2. **Ensure** FW Control Mode Select in 1 ELEM .... ☐
3. **Ensure** at least one valve OPEN: .... ☐
   - B21-F032A (Feedwater Isol Vlv) .... ☐
   - B21-F032B (Feedwater Isol Vlv) .... ☐
4. **IF NO** RFP operating,
   THEN: .... ☐
   a. **Ensure** RFPT A(B) Sp Ctl:
      (1) In M (manual) .... ☐
      (2) Pmp A(B) Dem at 0.0 PCT .... ☐
   b. **Place** FW-FV-46(47) [RFP (A/B) Recirc Vlv] in OPEN .... ☐
   c. **Ensure:** .... ☐
      - FW-V3(V4) [RFP (A/B) Disch Vlv] OPEN .... ☐
      - RFP A(B) Manual/DFCS control switch in MANUAL .... ☐
   d. **Depress:** .... ☐
      (1) Reactor Water Level High Reset A .... ☐
      (2) Reactor Water Level High Reset B .... ☐
      (3) Reactor Water Level High Reset C .... ☐
      (4) RFP A(B) Reset .... ☐
   e. **Confirm** OPEN: .... ☐
      - RFP A(B) LP Stop Vlvs .... ☐
      - RFP A(B) HP Stop Vlvs .... ☐
   f. **Depress** RFP A(B) RFPT Start .... ☐
   g. **WHEN** at 1000 rpm,
      THEN raise RFP A(B) to at least 2550 rpm .... ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing (continued)

5. IF desired to transfer RFP A(B) to DFCS, **THEN:** .... ☐

   a. **Ensure** speed at least 2550 rpm .... ☐

   b. **Depress** DFCS Ctrl Reset .... ☐

   c. **Place** Manual/DFCS control switch in DFCS .... ☐

6. **Raise** RFP A(B) speed until discharge pressure approximately 100 psig above RPV pressure band .... ☐

0/1550
S/1372

ENCLOSURE 4

Injection After Terminating and Preventing Condensate and Feedwater

1. **WHEN** RPV injection directed,
   THEN as needed: ☐
   - **Adjust** SULCV Valve Dem ☐
   - **Throttle** FW-V120 (FW Htrs 4&5 Byp Vlv) ☐
2. **WHEN** automatic control desired,
   THEN: ☐
   a. **Confirm** RPV level greater than +170 inches ☐
   b. **Ensure** FW-V120 (FW Htrs 4&5 Byp Vlv) CLOSED ☐
   c. **Open** FW-V10 (FW Recirc To Cond Isol Vlv) ☐
   d. **Adjust** SULCV to between 25 PCT and 55 PCT using: ☐
   - SULCV Valve Dem ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

   e. **Ensure** Mstr RFPT Sp/Rx Lvl Ctl: ☐
   (1) In M (manual) ☐
   (2) Level Setpoint at current RPV level ☐
   f. **Place** SULCV in A (automatic) ☐
   g. **Adjust** as needed to control RPV level: ☐
   - Mstr RFPT Sp/Rx Lvl Ctl Level Setpoint ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

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ENCLOSURE 5 Page 1 of 2

ATTACHMENT 8A
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop A (2OP-17)

NOTE:	This attachment is **NOT** to be used for normal system operations.

START RHR SW A LOOP (CONV)

- OPEN *SW-V101* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW A LOOP (NUC)

- OPEN *SW-V105* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START PUMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP A

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015A* IS OPEN, THEN CLOSE *E11-F017A* ☐
- START LOOP A RHR PMP ☐
- OPEN *E11-F028A* ☐
- THROTTLE *E11-F024A* ☐
- THROTTLE *E11-F048A* ☐
- START ADDITIONAL LOOP A RHR PMP AND ADJUST FLOW AS NEEDED ☐

ENCLOSURE 5 Page 2 of 2

ATTACHMENT 8B
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop B (2OP-17)

NOTE: This attachment is **NOT** to be used for normal system operations.

START RHR SW B LOOP (NUC)

- OPEN *SW-V105* ☐
- CLOSE *SW-V143* ☐
- START PMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW B LOOP (CONV)

- OPEN *SW-V101* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP B

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015B* IS OPEN, THEN CLOSE *E11-F017B* ☐
- START LOOP B RHR PMP ☐
- OPEN *E11-F028B* ☐
- THROTTLE *E11-F024B* ☐
- THROTTLE *E11-F048B* ☐
- START ADDITIONAL LOOP B RHR PMP AND ADJUST FLOW AS NEEDED ☐

ENCLOSURE 6

HPCI INJECTION IN EOPs

1. **IF** HPCI IS TRIPPED ON HIGH WATER LEVEL, **DEPRESS** HIGH WATER LEVEL SIGNAL RESET, E41-S25, PUSH BUTTON, **AND ENSURE** THE INDICATING LIGHT IS OFF. ☐
2. **ENSURE** AUXILIARY OIL PUMP IS **NOT** RUNNING ☐
3. **ENSURE** E41-V9 AND E41-V8 ARE CLOSED ☐
4. **OPEN** E41-F059 ☐
5. **PLACE** HPCI FLOW CONTROL, E41-FIC-R600, IN MANUAL (M), **AND ADJUST** OUTPUT DEMAND TO APPROXIMATELY MIDSCALE, USING THE MANUAL LEVER. ☐
6. **START** VACUUM PUMP **AND LEAVE** IN START ☐
7. **OPEN** E41-F001 ☐
8. **START** AUXILIARY OIL PUMP **AND LEAVE** IN START ☐
9. **OPEN** E41-F006, IMMEDIATELY AFTER E41-V8 HAS DUAL INDICATION ☐
10. **ENSURE** E41-V9 AND E41-V8 ARE OPEN ☐
11. **WHEN** SPEED STOPS INCREASING, **THEN ADJUST** SPEED TO APPROXIMATELY 2100 RPM ☐
12. **ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, TO OBTAIN DESIRED FLOW RATE ☐
13. **ENSURE** E41-F012 IS CLOSED WHEN FLOW IS GREATER THAN 1400 GPM ☐
14. **ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, SETPOINT TO MATCH SYSTEM FLOW, AND THEN PLACE E41-FIC-R600 IN AUTO (A) ☐
15. **ENSURE** E41-F025 AND E41-F026 ARE CLOSED ☐
16. **START** SBGT (OP-10) ☐
17. **ENSURE** BAROMETRIC CNDSR CONDENSATE PUMP IS OPERATING ☐

ENCLOSURE 7

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 Drywell Spray Initiation

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 2 3095 keys .... ☐

2.1.3 Drywell Spray Actions

1. **Ensure** both reactor recirculation pumps tripped. .... ☐ RO

2. **IF** E-bus load stripping has occurred,
   THEN:

   a. **Confirm** electrical power has been aligned per EOP-01-SBO-14. .... ☐ RO

   b. **Secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 2.c. .... ☐ RO

   c. **IF** RHR Loop A will be used for sprays, **THEN go to** Section 2.1.3 Step 9. .... ☐ RO

   d. **IF** RHR Loop B will be used for sprays, **THEN go to** Section 2.1.3 Step 10. .... ☐ RO

3. **Place** all drywell cooler control switches to OFF (L/O). .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

4. **Unit 1 Only: IF** drywell coolers continue to run, **THEN:**
   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. ☐ RO
   - In Panel XU-28, west side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. ☐ RO

5. **Unit 2 Only: IF** drywell coolers continue to run, **THEN:**
   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. ☐ RO
   - In Panel XU-28, east side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. ☐ RO

6. **IF** drywell coolers continue to run, **THEN secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 7. ☐ RO

7. **Ensure** SW-V141 (Well Water to Vital Header Vlv) CLOSED. ☐ RO

8. **Ensure** one valve OPEN:
   - SW-V111 (Conv SW To Vital Header Vlv) ☐ RO
   - SW-V117 (Nuc SW To Vital Header Vlv) ☐ RO

2.1.3 Drywell Spray Actions (continued)

9. IF Loop A RHR will be used for drywell spray,
THEN:

> **NOTE**
> E11-F017A will remain OPEN for five minutes following a LOCA signal. .... ☐

a. IF E11-F015A (Inboard Injection Vlv) OPEN,
THEN **close** E11-F017A (Outboard Injection Vlv) .... ☐ RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** E11-F024A (Torus Cooling Isol Vlv) CLOSED. .... ☐ RO

e. **Ensure** one Loop A RHR Pump running. .... ☐ RO

f. **Confirm** requirements for Drywell Spray Initiation met:

- Safe region of Drywell Spray Initiation Limit .... ☐ RO
- Torus level below +21 inches .... ☐ RO

g. **Open** E11-F021A (Drywell Spray Inbd Isol Vlv). .... ☐ RO

h. **Throttle open** E11-F016A (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. .... ☐ RO

i. IF E-bus load stripping has occurred,
THEN **go to** Section 2.1.3 Step 11. .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

j. IF additional flow required,
THEN **start** the other RHR pump and **limit** flow to less than or equal to 11,500 gpm. .... ☐ RO

k. **Ensure** RHRSW Loop A operating:

(1) **Place** E11-S19A (RHR SW Booster Pumps A & C LOCA Override Switch) in MANUAL OVERRD. .... ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). .... ☐ RO

l. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047A (Hx A Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003A (Hx A Outlet Vlv) OPEN. .... ☐ RO

NOTE

E11-F048A will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048A (Hx A Bypass Vlv). .... ☐ RO

10. IF Loop B RHR will be used for drywell spray,
THEN:

NOTE

E11-F017B will remain OPEN for five minutes following a LOCA signal. .... ☐

a. IF E11-F015B (Inboard Injection Vlv) OPEN,
THEN **close** E11-F017B (Outboard Injection Vlv). .... ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** E11-F024B (Torus Cooling Isol Vlv) CLOSED. .... ☐ RO

e. **Ensure** one Loop B RHR Pump running. .... ☐ RO

f. **Confirm** requirements for Drywell Spray Initiation are met:

- Safe region of the Drywell Spray Initiation Limit .... ☐ RO
- Torus level below +21 inches .... ☐ RO

g. **Open** E11-F021B (Drywell Spray Inbd Isol Vlv). .... ☐ RO

h. **Throttle open** E11-F016B (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. .... ☐ RO

i. <u>IF</u> E-bus load stripping has occurred,
<u>**THEN**</u> **go to** Section 2.1.3 Step 11. .... ☐ RO

j. <u>IF</u> additional flow required,
<u>**THEN**</u> **start** the other RHR pump and **limit** flow to less than or equal to 11,500 gpm. .... ☐ RO

k. **Ensure** RHRSW Loop B operating:

(1) **Place** E11-S19B (RHR SW Booster Pumps B & D LOCA Override Switch) in MANUAL OVERRD. .... ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). .... ☐ RO

ENCLOSURE 7

2.1.3 Drywell Spray Actions (continued)

I. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047B (Hx B Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003B (Hx B Outlet Vlv) OPEN. .... ☐ RO

NOTE
E11-F048B will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048B (Hx B Bypass Vlv). .... ☐ RO

ENCLOSURE 8

Page 1 of 2

TORUS SPRAY PROCEDURE	0EOP-01-SEP-03
	Rev. 012
	Page 4 of 7

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 <u>Torus Spray</u>

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

None

2.1.3 Torus Spray Actions

1. **Confirm** torus pressure above 2.5 psig. .... ☐ RO

2. <u>IF</u> Loop A RHR will be used,
<u>**THEN:**</u>

NOTE
E11-F017A will remain OPEN for five minutes following a LOCA signal. .... ☐

a. <u>IF</u> RPV injection <u>**NOT**</u> needed,
<u>**THEN**</u> **ensure** <u>at least</u> one valve CLOSED:

- E11-F015A (Inboard Injection Vlv). .... ☐ RO

- E11-F017A (Outboard Injection Vlv). .... ☐ RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** one Loop A RHR Pump running. .... ☐ RO

ENCLOSURE 8 Page 2 of 2

TORUS SPRAY PROCEDURE	0EOP-01-SEP-03
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2.1.3 Torus Spray Actions (continued)

e. **Ensure** E11-F028A (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027A (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling or Drywell Spray mode ☐ RO

3. **IF** Loop B RHR will be used,
THEN:

NOTE

E11-F017B will remain OPEN for five minutes following a LOCA signal ☐

a. **IF** RPV injection **NOT** needed,
THEN ensure at least one valve CLOSED:

- E11-F015B (Inboard Injection Vlv) ☐ RO
- E11-F017B (Outboard Injection Vlv) ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD ☐ RO

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL ☐ RO

d. **Ensure** one Loop B RHR Pump running ☐ RO

e. **Ensure** E11-F028B (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027B (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling **OR** Drywell Spray mode ☐ RO

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	7
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	2
Major Transients	1-2	1
EOPs Used	1-2	2
EOP Contingency	0-2	2
Run Time	60-90 min	90
Crew Critical Tasks	2-3	3
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	100%	Gross*/Net MWe*:	977 / 951
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	49.7 hrs			Days Online:	82 days
Turnover:					
Protected Equipment:	2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump for Fuel Pool Decay Heat Removal and inventory makeup. 2A/B NSW Pumps due to 1A NSW pump maintenance.				
Comments:	1A NSW Pump is under clearance for planned maintenance. APRM 2 has failed downscale and is bypassed. 2C TCC Pump is in service on Unit One.				
Shift Activities	The Load Dispatcher has called to perform the following as soon as possible due to an emergent repairs required on the Delco West Line: The OATC is to reduce power to ~850 MWe Gross The BOP operator will then Isolate 230 kV Delco West (Line 30) IAW the marked up of 2OP-50, Section 6.2.6.				

DUKE ENERGY

Run 3

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 2

LOWER POWER, REMOVE 230KV LINE FROM SERVICE, ROD DRIFT, ADHR PP TRIP, RECIRC LOOP FLOW FAILURE, HDD PP TRIP, ATWS, SLC MODE SWITCH FAILURE, ARI FAIL TO RESET

REVISION 0

Developer: Bob Bolin	**Date:** 07/07/2016
Technical Review: Dan Hulgin	**Date:** 9/12/2016
Validators: Kyle Cooper Grant Newton Hunter Morris	**Date:** 09/06/16
Facility Representative: Craig Oliver	**Date:** 09/22/16

REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

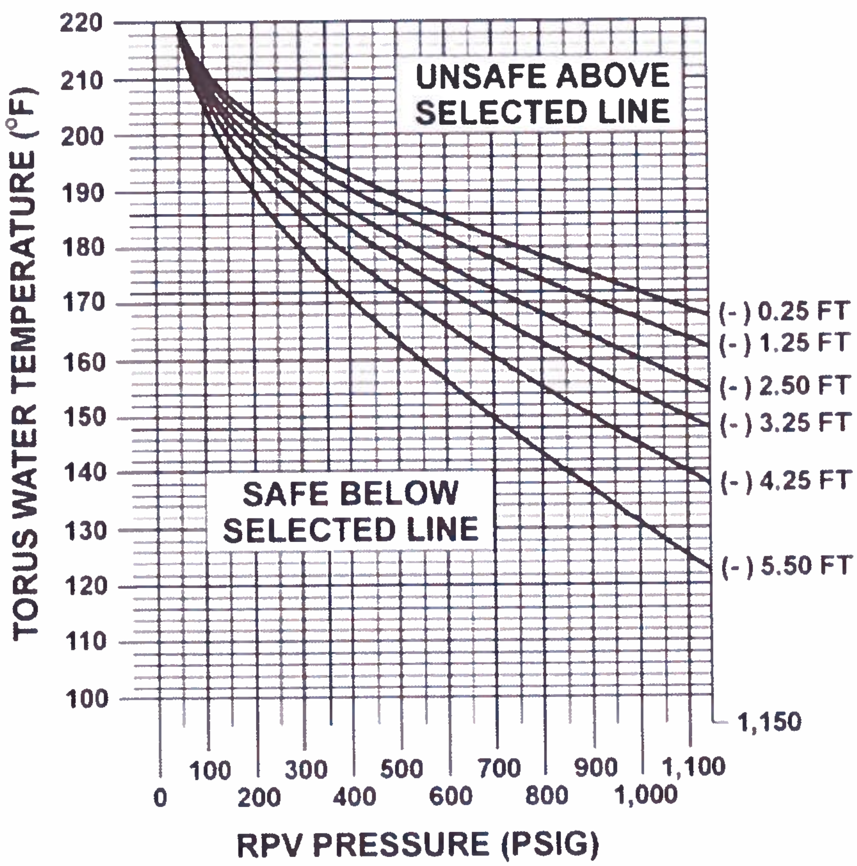
Event	Malf. No.	Type*	Event Description
1		R - ATC	Lower power to 850 MWe to remove 230 kV Line 30
2		N - BOP	Remove 230 kV Line 30 from service
3	RD001M (26-11)	C - ATC C - CRS	Rod Drift (TS)
4	K4526A	C - BOP C - CRS	ADHR Secondary pump trip (AOP)
5	NI063F	C - ATC C - CRS	Recirc Loop B Flow transmitter Failure (TS)
6	CF089F	C - BOP C - CRS	Heater Drain Deaerator Pump Trip (AOP)
7	CA008F	M	Small steam leak in DW results in an ATWS requiring terminate and prevent actions (RSP)(ATWS)
8	K2119A	C	SLC Mode Switch Failure
9	K2624A	C	Alternate Rod Insertion reset failure
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	After taking the watch the CRS will direct power reduced to 850 MWe.
2	The BOP will isolate 230 kV Line 30.
3	Control Rod ~~26-11~~ 26-43 will start to drift in. The crew will enter 0AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 to insert the control rod in 3 hours and C2 to disarm the control rod within 4 hours.
4	After Tech Specs are addressed the Alternate Decay Heat Removal (ADHR) Seconday pump will trip. AOP-38.0 will be entered
5	The Recirc Loop B flow transmitter to APRM Channel 4 will fail ~~down~~ up scale resulting in a rod block and a trip input to each voter. The crew will respond per APPs and bypass APRM 4. The APRM will be declared Inoperable per TS 3.3.1.1, Condition A and placed in trip within 12 hours. APRM TS Actions to be taken requires the APRM mode selector switch to be place in INOP IAW 0OI-18
6	A motor overload will occur on Heater Drain Pump 2A. The crew will reference APP UA-06 1-7, Bus 2D 4KV Motor Ovld and determine which pump has the overload condition. The crew should start HDP 2C and secure HDP 2A. The crew may reference AOP-23.0.
7	A small steam leak in the DW results in rising Drywell pressure requiring a reactor scram. An ATWS will occur, conditions will require terminate and prevent actions to be performed.
8	When SLC is initiated, the mode switch will fail and the pumps will not start. LEP-03 will be executed to inject the boron into the core.
9	Alternate Rod Insertion (ARI) will not reset, the crew will perform LEP-02 to drive control rods into the core. When level is stabilized after terminating and preventing ARI will be repaired to allow the rods to be manually scrammed.

3.0 CREW CRITICAL TASKS

Critical Task #1
Prevent the automatic actuation of ADS (LL3) to prevent low pressure ECCS injection to the reactor.
Critical Task #2
Reduce reactor power/pressure to prevent exceeding Heat Capacity Temperature Limit (HCTL)



4.0 TERMINATION CRITERIA

When all rods are inserted and level is being controlled above TAF the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
A-05, 3-2	ROD DRIFT
0AOP-02.0	CONTROL ROD MALFUNCTION/MISPOSITION
UA-18, 6-1	BUS E4 4KV MOTOR OVLD.
UA-01, 2-3	ADHR PRIMARY LOOP TROUBLE
UA-01, 3-3	ADHR SECONDARY LOOP TROUBLE
0AOP-38.0	LOSS OF FUEL POOL COOLING
A-06, 2-8	APRM UPSCALE
A-06, 3-8	APRM UPSCALE TRIP/INOP
A-06, 5-7	FLOW REF OFF NORMAL
A-05, 2-2	ROD OUT BLOCK
A-05, 4-8	OPRM TRIP ENABLED
UA-5, 3-5	SBGT SYS B FAILURE
UA-5, 4-6	SBGT SYS A FAILURE

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-11.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE
10. **LOAD** Scenario File.
11. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Bypass APRM 2 RCC Pump D in service for ADHR RCC Pump A in service for RBCCW

12. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
13. **PLACE** a clearance on the following equipment.

Component	Position
APRM 2	Blue tag

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:

Protected Equipment
1. 2A and 2B NSW pumps 2. 2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-11 is in place.

16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials
Marked up of 2OP-50, Section 6.2.6

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.

19. **PROVIDE** Shift Briefing sheet for the CRS.

20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
1	Malfunction	RD001M - [CONTROL ROD SLOW INSERTION DRIFT]
2	Annunciator	ZA512 - [CRD HYD TEMP HIGH]
3	Trigger Command	MFD:RD001M,26-11
4	Remote Function	RD_RDELDIS - [ELECTRICAL DISARM OF ROD]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DI Override	K4526A - [RBCCW PMP D AUTO]
5	DO Override	Q4526AMW - [RBCCW PMP D ADHR MODE]
5	DO Override	Q4526LG4 - [RBCCW PMP D OFF G]
5	Malfunction	RP011F - [ATWS 4]
6	Remote Function	CC_MODE - [RBCCW/ADHR VALVE LINEUPS]
6	Remote Function	CC_MSS - [RBCCW/ADHR PUMP MODE SELECTOR SWITCH]
7	Remote Function	CC_PDV - [RBCCW PUMP DISCHARGE VALVE]
8	Malfunction	NI063F - [RECIRC LOOP B XMITTER FAILURE]
9	Malfunction	CF089F - [HEATER DRAIN PUMP MOTOR WINDING FAULT]
10	Malfunction	NB006F - [MSL BRK BEFORE FLOW RESTRICTOR]
11	Remote Function	EP_IAEOPJP1 - [BYPASS LL-3 GROUP I ISOL (SEP-10)]

Trig #	Trigger Text
3	KM118EDN - [SCRAM TEST SWITCH 26-11] true deletes RD001M

ANNUNCIATORS

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
1-2	CRD HYD TEMP HIGH	ZA512	ON	ON	OFF			2

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RD001M	26-11	CONTROL ROD SLOW INSERTION DRIFT	False	True				1
NI063F	APRM 4	RECIRC LOOP B XMITTER FAILURE	0.00	125.00				8
NB006F	A	MSL BRK BEFORE FLOW RESTRICTOR	0.00	1.0e-1	0:03:00			10
CF089F	A	HEATER DRAIN PUMP MOTOR WINDING FAULT	False	True				9
RP011F		ATWS 4	False	True				5
RP005F		AUTO SCRAM DEFEAT	True	True				
NI032F	APRM 2	APRM FAILS LO	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
RD_RDELDIS	26-11	ELECTRICAL DISARM OF ROD	ARM	DISARM			4
CC_MODE	PUMP-A	RBCCW/ADHR VALVE LINEUPS	RBCCW	ADHR			6
CC_MSS	A	RBCCW/ADHR PUMP MODE SELECTOR SWITCH	RBCCW	ADHR			6
CC_PDV	A_V38_V5114	RBCCW PUMP DISCHARGE VALVE	1.0000	1.0e-01			7
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
EP_IAEOPJP1		BYPASS LL-3 GROUP I ISOL (SEP-10)	OFF	ON			11

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4526A	RBCCW PUMP D OFF	OFF/RESET	OFF	ON				5
K4526A	RBCCW PMP D AUTO	AUTO	OFF	OFF				5
K4526A	RBCCW PMP D ON	ON	ON	OFF				5
Q4526LG4	RBCCW PMP D OFF G	ON/OFF	OFF	OFF				5
Q4526AMW	RBCCW PMP D ADHR MODE	ON/OFF	ON	OFF				5
K2119A	S/B LIQ PUMP A & B	PUMP_A	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_A&B	OFF	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_B	OFF	OFF				
K2624A	CS-5562 ARI	RESET	OFF	OFF				
K2625A	CS-5560 ARI	INOP	OFF	OFF				

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: LOWER POWER TO 850 MWE	
	Simulator Operator Actions
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

	Simulator Operator Role Play
	If asked as the NE, report that reactivity plan is to reduce power with recirc flow.
	If asked as the NE, report that 850 MWe gross is ~86% power and ~65 Mlb/hr core flow

Evaluator Notes	
Plant Response:	
Objectives:	SRO - Directs power to be reduced to 850 MWe BOP – Monitor the Plant RO – Reduces power to 850 MWe.
Success Path:	Power is lowered to 850 MWe
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: LOWER POWER TO 850 MWE

Time	Pos	EXPECTED Operator Response	NOTES
	SRO	Conduct shift turnover shift briefing.	
		Direct power to be reduced using recirc flow to ~850 MWe. (2OP-02, Section 6.2.1)	
		Contacts chemistry for samples due to 15% power change. May contact Load dispatcher to inform of power decrease. May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	RO	Reduces reactor power using recirc IAW 2OP-02 Section 6.2.1	
		May null the DVM meter.	
	BOP	Monitors the plant	

6.2 Shutdown

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control

1. **Confirm** reactor recirculation pump in operation in accordance with Section 6.1.2. .... ______

NOTE

- Recirculation Pump speed changes are performed when directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. Other operating procedures are used simultaneously with this procedure as directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. .... ☐
- Speed changes are accomplished by depressing Lower Slow, Lower Medium, or Lower Fast pushbuttons. The Lower Slow pushbutton changes Recirc pump speed at 0.06%/decrement at 1 rpm/second. The Lower Medium pushbutton changes Recirc pump speed at 0.28%/decrement at 5 rpm/second. The Lower Fast pushbutton changes Recirc pump speed at 2.8%/decrement at 100 rpm/second. .... ☐

2. **<u>IF AT ANY TIME</u>** any of the following conditions exist, **<u>THEN</u> enter** 1AOP-04.0, Low Core Flow.{8.1.9} .... ______

   - Entry into Region A of Power to Flow Map
   - OPRM INOPERABLE **<u>AND</u>** any of the following
     - ◊ Entry into Region B of Power to Flow Map
     - ◊ Entry into 5% Buffer Region of Power to Flow Map
     - ◊ Entry into OPRM Enabled Region and indications of THI (Thermal Hydraulic Instability) exist

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

CAUTION

- The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations are governed by the limits of the applicable Power Flow Map, as specified in the COLR. {8.1.9} .... ☐
- Entry into the 5% Buffer Region warrants increased monitoring of reactor instrumentation for signs of Thermal Hydraulic Instability. Time in the 5% Buffer Region presents additional risk and is minimized.{8.1.9} .... ☐
- With core flow less than 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 10% (maximum indicated difference 6.0 x 10^6 lbs/hr). With core flow greater than or equal to 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 5% (maximum indicated difference 3.0 x 10^6 lbs/hr). .... ☐
- When Recirc Pump speeds are less than 40%, decreasing speed using a Lower Fast pushbutton can result in a Speed Hold condition due to exceeding the regen torque limit. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

3. IF desired to lower the speed of both recirculation pumps simultaneously,
   THEN depress Recirc Master Control Lower (Slow Medium Fast) pushbutton. .... ________

4. IF desired to lower the speed of an individual recirculation pump,
   THEN depress the Recirc VFD A(B) Lower (Slow Medium Fast) pushbutton. .... ________

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6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

5. **Confirm** the following, as applicable:

- Recirc Pump A(B) Speed Demand, Calculated Speed, and Actual Speed have lowered .... ________
- Reactor power lowers .... ________
- B32-R617(R613) [Recirc Pump A(B) Discharge Flow] lowers .... ________
- B32-VFD-IDS-003A(B) [Recirc VFD 2A(B) Output Wattmeter] lowers .... ________
- B32-VFD-IDS-001A(B)]Recirc VFD 2A(B) Output Frequency Meter] lowers .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ____________________

Performed By (Print) Initials

____________________ ______

____________________ ______

____________________ ______

____________________ ______

Reviewed By: ____________________
Unit CRS/SRO

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30	
Simulator Operator Actions	

Simulator Operator Role Play	
	If contacted as the Load Dispatcher acknowledge report.

Evaluator Notes	
Plant Response:	230 kV Delco West line is isolated
Objectives:	SRO - Direct 230kV Delco West Line isolated ATC – Plant monitoring BOP – Performs 2OP-50 Section 6.2.6 for isolating ONLY the Delco West Line
Success Path:	230 kV Delco West (Line 30) isolated
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: ISOLATE 230 KV DELCO WEST LINE 30			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Directs 230kV Delco West Line isolated IAW marked up version of 2OP-50, Section 6.2.6.	
	BOP	Performs 2OP-50, Section 6.2.6	
	RO	Monitors the plant.	

6.2.6 De-energizing The 230 kV Switchyard

1. **Ensure** the Unit 2 230 kV switchyard is ENERGIZED. .... AD
2. **Ensure** the 4kV Auxiliary Electrical Systems are DE-ENERGIZED in accordance with Section 6.2.3. .... N-1 SRO
3. **Ensure** the SAT is DE-ENERGIZED in accordance with Section 6.2.4 .... N-1 SRO
4. **Ensure** Caswell Beach Pumping Station is DE-ENERGIZED in accordance with Section 6.2.5 .... N-1 SRO
5. **Ensure** required LCOs for Technical Specification Sections 3.8.1, 3.8.2, 3.8.7 and 3.8.8 are initiated .... SRO
6. **Obtain** Load Dispatcher's permission to de-energize the 230 kV switchyard. .... AD

   A Powers - the Delco West Line ONLY
   Person Contacted

7. **Place** Auto Reclose switches for the following PCBs in MAN:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

CAUTION

PCB Supervisory switch must be in LOCAL before the associated PCB is operated from Panel XU-5. ☐

8. **Place** Supervisory switches for the following PCBs in LOCAL:
   - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
   - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
   - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
   - 27B (Bus 2B Town Creek 230 kV Breaker) .... N-1 SRO
   - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
   - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
   - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
   - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO
9. **Open** 31B (Bus 2B Whiteville 230 kV PCB) .... N-1 SRO
10. **Confirm** 31B (Bus 2B Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
11. **Open** 31A (Bus 2A Whiteville 230 kV PCB) .... N-1 SRO
12. **Confirm** 31A (Bus 2A Whiteville 230 kV PCB) is OPEN by observing the indicating lights .... N-1 SRO
13. **Open** 30B (Bus 2B Delco West Line 230 kV PCB) .... ______
14. **Confirm** 30B (Bus 2B Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
15. **Open** 30A (Bus 2A Delco West Line 230 kV PCB) .... ______
16. **Confirm** 30A (Bus 2A Delco West Line 230 kV PCB) is OPEN by observing the indicating lights .... ______
17. **Open** 28B (Bus 2B Wallace 230 kV PCB) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

18. **Confirm** 28B (Bus 2B Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
19. **Open** 28A (Bus 2A Wallace 230 kV PCB). .... N-1 SRO
20. **Confirm** 28A (Bus 2A Wallace 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
21. **Open** 27B (Bus 2B Town Creek 230 kV PCB). .... N-1 SRO
22. **Confirm** 27B (Bus 2B Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO
23. **Open** 27A (Bus 2A Town Creek 230 kV PCB). .... N-1 SRO
24. **Confirm** 27A (Bus 2A Town Creek 230 kV PCB) is OPEN by observing the indicating lights. .... N-1 SRO

NOTE

If work is to be performed on a 230 kV bus, the manual disconnects are to be opened. .... ☐

25. **Place** Supervisory switches for the following PCBs in REMOTE:
    - 31B (Bus 2B Whiteville 230 kV Breaker) .... N-1 SRO
    - 30B (Bus 2B Delco West Line 230 kV Breaker) .... ______
    - 28B (Bus 2B Wallace 230 kV Breaker) .... N-1 SRO
    - 27B (Bus 2B Town Creek 230 kV Breaker .... N-1 SRO
    - 31A (Bus 2A Whiteville 230 kV Breaker) .... N-1 SRO
    - 30A (Bus 2A Delco West Line 230 kV Breaker) .... ______
    - 28A (Bus 2A Wallace 230 kV Breaker) .... N-1 SRO
    - 27A (Bus 2A Town Creek 230 kV Breaker) .... N-1 SRO

6.2.6 De-energizing The 230 kV Switchyard (continued)

Date/Time Completed ________

Performed By (Print)	Initials
____________	______
____________	______
____________	______
____________	______

Reviewed By ____________________

Unit CRS/SRO

N-1, Partial usage to isolate only the Delco West 230 kV Line (Line 30)

EVENT 3: ROD DRIFT	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to drift CR 26-11 into the core.
	When CR 26-11 is inserted to 00, **Initiate Trigger 2** to activate CRD High Temperature alarm.
	Two minutes after control rod is disarmed or scrammed, delete CRD HYD TEMP HIGH alarm.
	If asked to disarm CRD 26-11 **Initiate Trigger 4**.

Simulator Operator Role Play	
	If contacted as the RE to address thermal limits, acknowledge the request. When contacted for scramming control rod 26-11, report that Thermal Limits will NOT be exceeded by this single rod scram.
	If asked as the RBAO to investigate HCU for control 26-11, report that the HCU scram outlet riser is hot to the touch.
	When contacted as the RBAO and after high temperature alarm has been actuated, report that the CRD temperature is 390°F and slowly rising.
	When contacted as the System Engineer report that based on past history of this rod (26-11) scram times cannot be guaranteed.
	If contacted as the WCC to perform the single rod scram, report that there are no operators available to perform the task.
	If asked as the RBAO to disarm control rod, coordinate with Sim Operator after 5 minutes.
	If requested, close/reopen the 113 valve (Charging Header Isolation Valve) as necessary
	As RBAO, Report Accumulator pressure 980# after rod has been scrammed.

Evaluator Notes	
Plant Response:	Control Rod 26-11 will drift full in. Crew should enter AOP-02.0 and take action IAW 2APP-A-05 (3-2). When the high temperature alarm is received, Engineering will report that scram times cannot be assured based on past history of the control rod. Determine TS 3.1.3 condition C1 in 3 hours <u>and</u> C2 within 4 hours.
Objectives:	SRO - Direct actions in response to a drifting control rod and evaluate Tech Specs. RO - Respond to a drifting control rod.
Success Path:	The drifting control rod is fully inserted, determined that the control rod must be placed under clearance and electrically disarmed.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: ROD DRIFT

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of 2APP-A-05 (3-2) *ROD DRIFT*	
	SRO	Direct entry into 0AOP-02.0, Control Rod Malfunction/Misposition.	
	SRO	After System Engineer reports that the scram times cannot be guaranteed, according to Note 2 in TS Table 3.1.4-1 the rod must be declared inoperable. Tech Spec 3.1.3 Control Rod Operability Condition C. One or more control rods inoperable for reasons other than Condition A or B <u>Required Action</u> C.1 Fully insert inoperable control rod (3 hrs) C.2 Disarm the associated CRD (4 hrs)	
	SRO	Contact System Engineer on high temperature condition of control rod. Contact RE to inform of rod drift and to evaluate thermal limits	
	SRO	May direct the control rod to be scrammed to attempt to reseat the leaking outlet valve IAW A-05 (3-2) *ROD DRIFT* May conduct a brief (See Enclosure 1, page 62 for format of the brief.	
	BOP	Monitor reactor plant parameters during evolution. May read APP actions for the OATC to perform	

EVENT 3: ROD DRIFT

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Acknowledge alarms: A-05 (5-2) Rod Block RWM/RMCS Sys Trouble A-05 (3-2) Rod Drift Announce and enter 0AOP-02.0, Control Rod Malfunction/Misposition.	
	ATC	Perform the actions of APP-A-05 (3-2) ROD DRIFT as follows: ☐ Determine which control rod is drifting. ☐ Select the drifting control rod and determine direction of drift. ☐ Attempt to arrest the drift by giving a withdraw signal. ☐ If rod continues to drift in, apply an RMCS insert signal and fully insert to position 00. ☐ Attempt to locate and correct the cause of the rod malfunction as follows: ☐ Check and adjust cooling water header pressure if required. ☐ Direct AO to check for leaking scram valve. ☐ May direct an AO to check HCU temperature on RO18 temperature recorder (in the Rx Bldg.)	
	ATC	Monitor core parameters, main steam line radiation and off-gas activity.	
	ATC	Perform 2OP-07 Section 6.3.17, Single Rod Scram from RPS Test Panel. CRS will NA appropriate steps.	The examiner will **prompt** the performer that the "blue light is ON and indication is 00" when step 6.3.17.11 is performed.

6.3.17 Single Rod Scram From RPS Test Panel

1. **Confirm** the following initial conditions are met:

- All applicable prerequisites in Section 5.0 are met. .... ________
- Attachment 1 has been reviewed. .... ________
- Communications are established between RPS Test Panel and the Control Room. .... ________
- Reactor Engineer recommends performance of this section and has determined Technical Specification Thermal Limits will **NOT** be exceeded by this single rod scram. .... ________

____
Reactor Engineer

2. **IF AT ANY TIME** it becomes necessary to scram a single control rod for operability concerns
THEN perform 0PT-14.2.1, Single Rod Scram Insertion Times Test for that control rod. .... ________

3. **Obtain** permission from the Unit CRS to perform this section. .... ________
CRS

4. **Document** applicable control rod to be scrammed in the space provided: .... ________

______-______
Control Rod

5. **IF** recommended by Reactor Engineering to support diagnostic data,
THEN record the following: .... ________

- Reactor pressure: .... ________

__________ psig

- Applicable accumulator pressure: .... ________

__________ psig

6.3.17 Single Rod Scram From RPS Test Panel (continued)

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

6. **Select** applicable control rod at P603. .... ____/____ CV

7. **Close** C12-113 (Charging Water Riser Isolation Valve) for the applicable control rod. .... ________

8. **IF** RWM scram time recording is recommended by Reactor Engineering, **THEN perform** the following: .... ________

   a. **Have** Reactor Engineering connect temporary scram time test cable to single rod scram interface box (located on terminal strip GM in P616-RMCS cabinet) and route cable up to RPS Test Panel P610 in accordance with Attachment 12, (Reference Use) - Test Cable Arrangement For RWM Scram Recording. .... ________

      ____
      Reactor Engineer

      (1) **Insert** black lead into NEUTRAL socket on the P610 test panel. .... ____/____ IV

      (2) **Insert** red lead into socket corresponding to control rod to be tested at P610. .... ____/____ IV

9. **Monitor** control rod position. .... ________

10. **IF AT ANY TIME** the control rod does **NOT** fully scram after lowering the scram test switch, **THEN** immediately **notify** the Unit CRS to determine operability of the rod (Technical Specification 3.1.3). .... ________

11. Using a currently licensed RO/SRO, **perform** the following:

   a. **Scram** the applicable control rod by lowering the scram test switch on RPS Test Panel P610 to the scram (down) position. .... ____/____ CV

6.3.17 Single Rod Scram From RPS Test Panel (continued)

b. **WHEN** the scrammed control rod is fully inserted **OR** 10 seconds have elapsed (whichever occurs first), **THEN return** applicable scram test switch to the normal (up) position. .... ____/____ IV

12. **Confirm** rod position display indicates "00" for scrammed rod and the GREEN "Full In" light is ON. .... ________

13. **IF** control rod did **NOT** fully insert, **THEN reference** Technical Specifications for OPERABILITY. .... ________ CRS

NOTE

Holding Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for a period of time will flush any ingested crud from the drive to help prevent double notching. .... ☐

14. **Hold** the Emergency Rod In Notch Override switch in EMERGENCY ROD IN position for at least 15 seconds and **record** insert stall flow.

______ stall flow	______ stall flow	______ stall flow
1:____	2:____	3:____

15. **Repeat** Section 6.3.17 Step 14 two additional times. .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

16. Slowly **open** applicable C12-113 (Charging Water Riser Isolation Valve). .... ____/____ IV

17. **Confirm** associated accumulator pressure is greater than 955 psig. .... ________

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6.3.17 Single Rod Scram From RPS Test Panel (continued)

18. IF RWM scram time was recorded, THEN perform the following: .... ______

    a. **Contact** Reactor Engineering to upload data .... ______

    ____
    Reactor Engineer

    b. **Remove** temporary scram timing cables from P616 and P610 .... ___/___ IV

    c. **Perform** the following to delete RWM scram data buffers:

    (1) **Select** SCRAM DATA screen on RWM Operator Display in the Control Room .... ______

    (2) **Press** DELETE softkey to delete scram data .... ______

    (3) **Confirm** SCRAM DATA screen displays: .... ______

    - ROD SCRAM TIMING FUNCTION: READY
    - ROD SCRAM TIMING DATA: NOT TRANSFERRED

EVENT 4: ADHR SECONDARY PUMP TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to trip the running ADHR Pump.
	When informed to align 2A RCC pump to ADHR mode **Initiate Trigger 6**
	If asked to throttle closed the RCC-V5114, **Initiate Trigger 7**. When asked to re-open the RCC-V5114, then adjust the remote to 1.0.

Simulator Operator Role Play	
	If directed to investigate the trip of RCC Pump D, report the pump is tripped on overcurrent.
	When directed to align RBCCW Pump 2A to ADHR mode IAW 2OP-21 Section 6.3.16 (steps 2b through 2i) have Sim Op align pump to ADHR mode and inform BOP Op that the steps are complete.
	When contacted as RBAO report radiation monitor is aligned per 2OP-21 Section 6.3.18 step 4. RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is throttled 90% closed. (2OP-21 Section 6.3.18 Step 5a)
	When contacted report RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) is full open. (2OP-21 Section 6.3.18 Step 5c)

Evaluator Notes	
Plant Response:	The running ADHR Secondary Loop Pump (RCC Pump D) will trip. The crew will have to start RCC Pump C. Shutdown RCC Pump A. Re-align RCC Pump A for ADHR mode and then start the pump for ADHR. (AOP-38.0 will be entered).
Objectives:	SRO – Direct swapping of RCC pumps and then direct starting of RCC Pump in ADHR Mode. RO – Swap RCC pumps, Place RCC Pump in ADHR Mode.
Success Path:	Standby ADHR Pump placed in service.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: ADHR SECONDARY PUMP TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry into 0AOP-38.0, Loss of Fuel Pool Cooling	
		Direct swapping of RBCCW pumps Start RBCCW Pump C, secure A.	
		Direct alignment of RBCCW Pump A to ADHR Mode.	
		Direct starting RBCCW Pump 2A in ADHR Mode.	
		Direct I/C to investigate trip of RBCCW Pump 2D.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 4: ADHR SECONDARY PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	RO	Plant Monitoring	
	BOP	Report trip of RBCCW Pump 2D (running in ADHR Mode) UA-01 3-3, ADHR SECONDARY LOOP TROUBLE May secure the primary pump IAW this APP	
		Announce and enter AOP-38.0, Loss of Fuel Pool Cooling	
		Perform 2OP-21, Section 6.3.10 (page 33) to swap RBCCW pumps. (Start C and secure A) Plant announcement for the start of 2C RCC Pump and securing of 2A RCC Pump.	
		Perform 2OP-21, Section 6.3.16 (page 34) to align RBCCW Pump A into ADHR Mode. Direct RB AO to perform steps 2b through 2i. Step 3 is N/A	
		Perform 2OP-21, Section 6.3.18 (page 37) to start RBCCW Pump A in ADHR Mode. Notifies E&C, starting ADHR pump Step 2 is N/A Step 3 is N/A Direct the RB AO to perform step 4 and 5a. Announce starting of RCC Pump 2A. Direct the RB AO to perform step 5c. May direct AO to ensure primary loop is operating IAW 2OP-13.1.	

6.3.10 Transferring to the Standby RBCCW Pump - RBCCW Mode

1. **Ensure** the following initial conditions are met:
   - Applicable prerequisites listed in Section 5.0, Prerequisites are met .... ________
   - RBCCW System in operation with two pumps aligned for RBCCW Mode in service .... ________
2. **Start** the standby RBCCW pump by placing the associated pump control switch in ON:
   - RBCCW PUMP 2A .... ________
   - RBCCW PUMP 2B .... ________
   - RBCCW PUMP 2C .... ________
   - RBCCW PUMP 2D .... ________
3. **Secure** the desired RBCCW pump by placing the associated pump control switch in OFF:
   - RBCCW PUMP 2A .... ________
   - RBCCW PUMP 2B .... ________
   - RBCCW PUMP 2C .... ________
   - RBCCW PUMP 2D .... ________
4. **IF** a third RBCCW pump is aligned to RBCCW Mode, **AND** RBCCW discharge header pressure has stabilized,
   THEN place the pump control switch in AUTO .... ________

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode

1. **Ensure** the following initial condition is met:

   - One RBCCW Heat Exchanger is aligned to ADHR Mode per Section 6.3.14. .... ________

   - Key for RBCCW/ADHR Mode Selector Switch has been obtained from one of the following:

     ◊ Control Rm Key Locker - key 98 .... ________

     ◊ WCC Key Locker - key 167 or 168 .... ________

NOTE

RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐

2. IF aligning RBCCW Pump 2A to ADHR Mode, **THEN perform** the following: .... ________

   a. **Ensure** RBCCW Pump 2A control switch is in OFF. .... ________

   b. **Close** RCC-V32 (RBCCW Pump 2A RBCCW Suction) .... ________

   c. **Close** RCC-V38 (RBCCW Pump 2A RBCCW Mode Discharge Valve) .... ________

   d. **Open** RCC-V5105 (RBCCW Pump 2A ADHR Mode Suction Valve) .... ________

   e. **Open** RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... ________

   f. **Open** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... ________

   g. **WHEN** a steady stream of water is present, **THEN close** RCC-V303 (RBCCW Pump 2A Casing Vent Valve) .... ________

   h. **Ensure** 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) located at MCC 2XE, in ADHR. .... ________

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

i. **Remove** key from 2-RCC-SS-7667 (Pump 2A RBCCW/ADHR Mode Selector Switch) ____________

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2A is ON ____________

3. **IF** aligning RBCCW Pump 2D to ADHR Mode, **THEN perform** the following: ____________

a. **Ensure** RBCCW Pump 2D control switch is in OFF. ____________

b. **Close** RCC-V5107 (RBCCW Pump 2D RBCCW Mode Suction Valve) ____________

c. **Close** RCC-V5111 (RBCCW Pump 2D RBCCW Mode Discharge Valve) ____________

d. **Open** RCC-V5104 (RBCCW Pump 2D ADHR Mode Suction Valve) ____________

e. **Open** RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) ____________

f. **Open** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) ____________

g. **WHEN** a steady stream of water is present, **THEN close** RCC-V5139 (RBCCW Pump 2D Casing Vent Valve) ____________

h. **Ensure** 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) located at MCC 2XD, in ADHR ____________

i. **Remove** key from 2-RCC-SS-7668 (Pump 2D RBCCW/ADHR Mode Selector Switch) ____________

j. **Confirm** the ADHR white indicating light on the RTGB for RBCCW Pump 2D is ON ____________

6.3.16 Alignment of RBCCW Pump from RBCCW Mode to ADHR Mode (continued)

NOTE

ADHR Mode piping is placed either in Standby Mode or in service to ensure RBCCW circulation and proper chemistry control when **NOT** undergoing maintenance.. .... ☐

4. **Place** ADHR in service per Section 6.3.18, Starting an RBCCW Pump - ADHR Mode .... ________

Date/Time Completed

Performed By (Print)	Initials
____________	______
____________	______
____________	______
____________	______

Reviewed By ____________________
Unit CRS/SRO

6.3.18 Starting an RBCCW Pump - ADHR Mode

1. **Ensure** the following initial conditions are met:

   - Designated RBCCW Pump is aligned to ADHR Mode per Section 6.3.16. .... ________

   - **IF NO** RBCCW pump is operating in ADHR Mode, **THEN** E&C notified commencing startup of ADHR Mode. .... ________

     ____
     Person Notified

NOTE

- RBCCW Pump 2A and RBCCW Pump 2D can support either RBCCW Mode or ADHR Mode. A Mode Selector Switch is located on the pump breaker and a white ADHR Mode indicating light is on the RTGB. This switch determines which of the two header pressures (RBCCW or ADHR) will be monitored for the pump auto start on low header pressure when the pump control switch is placed in AUTO. When the Mode Selector Switch is placed in the ADHR Mode position, the white light is ON on the RTGB. .... ☐
- RBCCW Pump 2D will **NOT** auto re-start when power returns after a LOOP or bus under voltage condition with the control switch in ON or AUTO. The control switch must be placed in OFF/RESET prior to restarting the pump. .... ☐

CAUTION

Two pump operation in ADHR Mode subjects RCC-V37 (RBCCW Pump 1A Discharge Check Valve) and RCC-V5110 (RBCCW Pump 1D Discharge Check Valve) to accelerated wear. This lineup is expected to be utilized only when maximum ADHR capacity is required. [8.7.2] .... ☐

2. **IF** desired to start a second pump aligned to ADHR Mode, **THEN perform** the following: .... ________

   a. **Obtain** concurrence from Engineering to start a second pump in the ADHR Mode. .... ________

      ____
      Person Contacted

   b. **Go to** Step 5.b. .... ________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

3. IF the ADHR Mode has been shutdown for greater than 72 hours OR maintenance has been performed, THEN fill and vent the ADHR piping per Section 6.3.13 .... _________

4. **Ensure** the following valve alignment for system radiation monitoring:

   - RCC-V5154 (Rad Monitor Bypass Standby Isolation Valve) is CLOSED .... _________
   - RCC-V5116 (Rad Monitor Bypass ADHR Isolation Valve) is OPEN .... _________
   - RCC-V5115 (Rad Monitor Bypass Common Mode Isolation Valve) is OPEN .... _________

5. For the RBCCW pump aligned to ADHR Mode to be started, **perform** the following:

   a. **Throttle** 80% to 95% closed the associated pump discharge valve:

      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... _________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... _________

   b. **Start** an RBCCW pump aligned to ADHR Mode by placing the associated pump control switch in ON:

      - RBCCW PUMP 2A .... _________
      - RBCCW PUMP 2D .... _________

   c. IF throttled in Step 5.a, THEN slowly **open** the associated pump discharge valve: .... _________

      - RCC-V5114 (RBCCW Pump 2A ADHR Mode Discharge Valve) .... _________
      - RCC-V5113 (RBCCW Pump 2D ADHR Mode Discharge Valve) .... _________

6.3.18 Starting an RBCCW Pump - ADHR Mode (continued)

d. **Ensure** a log entry is made stating two RBCCW pumps are in service in the ADHR Mode and Engineering has been notified.......... ________

NOTE

The normal parameters for Supplemental Spent Fuel Pool Cooling are provided in Attachment 1, Normal System Operation Parameters. Equipment manipulations to maintain these parameters are performed per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure .... ☐

6. **IF** a Primary Loop pump is operating, **THEN maintain** Primary Loop flow per 2OP-13.1, Alternate Decay Heat Removal System Primary Loop Operating Procedure.......... ________

7. **Ensure** Plant Process Computer setup as follows per 0OP-55, Plant Process and ERFIS Computer Systems Operating Procedure:.......... ________

- PPC U2RCCA111 point ENABLED.......... ________
- PPC U2RCCA095 Value Monitoring setup with the nominal flow values per Attachment 1 Section 2.5 for the number of RBCCW Pumps in ADHR Mode to provide audible alarms for ADHR secondary flow changes.......... ________

Date/Time Completed ________

Performed By (Print)	Initials
________	________
________	________
________	________
________	________

Reviewed By ________________

Unit CRS/SRO

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 8** to activate Recirc Loop B Flow failure.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	After LCO entries have been determined and SRO is waiting for I&C, call as WCCSRO and request APRM 4 be placed in tripped condition to support I&C trouble shooting. The WCC will hang the status control tag paperwork.
	If asked to pull fuses (for TRM 3.3 actions, 2-C12A-F1 Labeled ROD OUT BLOCK RELAYS C12A in P616 panel) acknowledge the request

Evaluator Notes	
Plant Response:	Flow reference off normal alarm, rod block and scram signal to all 4 voters Flow transmitter signals are displayed on PC display 845, and on individual NUMACs by selecting Input Status.
Objectives:	SRO - Determine LCO for APRM 4 inoperability and direct placing channel in trip. RO - Respond To A Flow Unit/Transmitter Failure Per APP A-06 5-7.
Success Path:	APRM 4 TS 3.3.1.1 declaration and placed in trip condition IAW 0OI-18.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of APPs	
		Direct I&C to investigate	
		Evaluate Tech Spec 3.3.1.1 Reactor Protection System Instrumentation TS 3.3.1.1, Function 2b, Required Action A1. With one or more required channels inoperable, place in trip condition in **12 hours** Evaluate TRM 3.3 Control Rod Block Instrumentation TRM 3.3, Function 1a, Required Condition A1. With one of the required channels not operable - **24 hours** to restore to operable.	
		Refers to 0OI-18 for actions to place APRM 4 in a tripped condition.	
		Direct APRM 4 mode selector switch placed in INOP to allow I&C troubleshooting.	
		May conduct a brief (see Enclosure 1 on page 62 for format)	

EVENT 5: RECIRC LOOP B FLOW TRANSMITTER FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Monitors the plant.	
		May check back panel APRM indications.	
	ATC	Acknowledges, refers to & reports annunciators A-6 2-8 *APRM UPSCALE* 3-8 *APRM UPSCALE TRIP/INOP* 5-7 *FLOW REF OFF NORMAL* A-5 2-2 *ROD OUT BLOCK* 4-8 *OPRM TRIP ENABLED*	
		Diagnose and report failure of APRM 4 Flow Transmitter	
		Obtains key number 114 from the SRO key locker to place APRM 4 in trip.	
		Places APRM mode selector switch in INOP IAW 0OI-18.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP

	Simulator Operator Actions
	At the direction of the Lead Evaluator, **Initiate Trigger 9** to trip a Heater Drain Pump.
	.

	Simulator Operator Role Play
	If contacted as AO to investigate, wait until pump is tripped and report over-current flags for all phases of 2A HDP 4KV breaker on Bus 2D
	If contacted as RE for reduced FW Temp, acknowledge any requests.
	If asked as I&C to investigate, acknowledge the request

Evaluator Notes	
Plant Response:	Heater Drain Pump 2A shaft seizes and trips on overcurrent. Heater Drain tank level will rise and the crew will throttle HD-V57 to stabilize HD Tank level. If the standby HDP is not started, RFP suction pressure will lower during the transient requiring power reduction to stabilize Condensate/feedwater.
Objectives:	SRO - Directs 0AOP-23, Condensate/Feedwater System Failures, and possible 0AOP-03.0, Positive Reactivity Addition, entry. RO - Diagnose HDP pump trip and start the standby HDP.
Success Path:	2C HDP started with HDD level recovered in the normal band.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct annunciator response for UA-04: 4-10 HD PUMP A TRIP 2-10 HD DEAERATOR LEVEL HIGH-LOW 3-10 HD DEAERATOR LEVEL HIGH TRIP Direct entry into 0AOP-23, Condensate/Feedwater System Failures Direct starting standby HDP.	
		May direct 2AOP-3.0, Positive Reactivity Addition, entry if power rises due to the HDD Ext Trip.	
		May direct monitoring of final feedwater temperature.	
		May direct maintenance to investigate trip	
		May conduct a brief (see Enclosure 1 on page 62 for format)	
	RO	Plant Monitoring	
		May reduce power IAW 0AOP-23 to stabilize reactor water level.	

EVENT 6: HEATER DRAIN DEAERATOR PUMP TRIP			
	BOP	Recognize and report annunciators: UA-04 4-10 *HD PUMP A TRIP* 2-10 *HD DEAERATOR LEVEL HIGH-LOW* 3-10 *HD DEAERATOR LEVEL HIGH TRIP* UA-06 1-7 *BUS 2D 4 KV MOTOR OVLD*	
		Manually starts 2C HDP IAW APP or AOP.	
		Enter and announce 0AOP-23, Condensate/Feedwater System Failures. Monitors final feedwater temperature (FFWT) IAW 2OI-03.2	
		May open the HD-V57 to assist in HDD level recovery.	
		Directs an AO to 4.16 KV Switchgear Bus 2D to investigate 2A HDP trip	
		Verifies auto actions for *HD DEAERATOR LEVEL HIGH TRIP,* if it occurs. 1. Non-return valves (EX-V11 and EX-V12) to deaerator close. (Only close if turbine load is below 500 MWe) 2. HDD Extraction Line B moisture removal valves (MVD-LV-266 and MVD-LV-267) open. May reference 2OP-35 to recover MRVs following HDD level restoration.	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 10** to activate small steam leak in DW.
	If requested to defeat Group I LL3, wait 2 minutes, and install jumpers **(Trigger 11)**
	If requested to install LEP-02, Section 2.3 jumpers, wait 5 minutes, and inform the SRO that the jumpers are installed (RP005F already active).

Simulator Operator Role Play	
	Acknowledge request as I&C to investigate failure of SLC switch.
	If requested as I&C to investigate the failure of the ARI reset failure, acknowledge the request.
	Acknowledge request to perform LEP-03 actions.

Evaluator Notes	
Plant Response:	Most control rods will fail to insert on the scram. The crew will respond to the ATWS per EOP-01-ATWS. When SLC initiation is attempted, the switch positions will not work. The crew will enter LEP-03 and align for alternate boron injection using CRD. The scram cannot be reset due to failure of the ARI to reset.
Objectives:	SRO - Direct actions to control reactor power per EOP-01-ATWS.. RO - Perform actions for an ATWS per EOP-01-ATWS.
Success Path:	Lower level to control power, inject SLC, insert control rods.

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Enter RSP and transition to ATWS. Direct mode switch to shutdown when steam flow < 3 Mlbs/hr. Direct ARI initiation. ***Direct Recirc Pumps Tripped***. *Direct SLC initiation, then LEP-03, Alternate Boron Injection*. ***Direct ADS inhibited***. Direct RWCU isolation verification. ***Direct LEP-02, Alternate Rod Insertion***	***CRITICAL TASK #2*** ***CRITICAL TASK #1*** ***CRITICAL TASK #2***
		Direct Group 10 switches to override reset.	
		Direct terminate and prevent HPCI/Feedwater (CS/RHR when LOCA signal received) to lower level to 90 inches.	***CRITICAL TASK #2***
		When level reaches 90 inches, evaluate Table Q-2: If not met, establishes a level band of LL4 to +90 inches. If met, directs RPV injection to remain terminated.	
		Enters PCCP Directs Torus cooling when Torus temperature is greater than 95° F, (See Enclosure 5, page 68) Directs Torus Sprays before torus pressure reaches 11.5 psig (See Enclosure 8, page 77) Directs Drywell Sprays when torus pressure exceeds 11.5 psig (See Enclosure 7, page 71)	
		Direct injection established to maintain RPV level LL4 to TAF (or the level at which APRMs indicate downscale)	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	RO	Place mode switch to shutdown when steam flow < 3×10^6 lb/hr.	
		Initiates ARI.	
		Trips Recirc Pumps.	***CRITICAL TASK #2***
		Initiates SLC. Determines SLC switch failure. Directs LEP-03, Alternate Boron Injection	
		Recognizes failure of SLC switch and reports to CRS.	
		Monitor APRMs for downscale.	
		Performs LEP-02, Alternate Rod Insertion. Section 2.1, Initial Actions (see page 48) ***Section 2.3, Reset RPS and Initiate a Manual Scram*** (see page 51) ***Section 2.4, Reactor Manual Control System (RMCS)*** (see page 54) May also perform Section 2.5, Increasing Cooling Water Header Pressure (see page 56).	***CRITICAL TASK #2***
		Recognizes failure of ARI to reset, informs CRS	

EVENTS 7/8/9: STEAM LEAK IN DW - ATWS / SLC SWITCH FAILURE / ARI RESET FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	***Places ADS in inhibit.***	***CRITICAL TASK #1***
		Places Group 10 switches to override / reset	
		Terminate and prevent injection to RPV. Terminates and prevents HPCI IAW Hard Card. (Enclosure 2, page 63) Terminates and Prevents Feedwater IAW Hard Card. (Enclosure 3, page 64)	***CRITICAL TASK #2***
		May place HPCI in service for level control during ATWS when directed by the SRO. (Enclosure 6, page 70)	
		Restart RFP to maintain level as directed by SRO. (Enclosure 4, page 65)	
		When Torus temperature is greater than 95° F, places Torus Cooling in service. (Enclosure 5, page 68)	
		When directed, places Torus Sprays in service. (Enclosure 8, page 77)	
		When directed, places Drywell Sprays in service. (Enclosure 7, page 71)	

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)
- As directed by Severe Accident Management Guideline (SAMGs)

2.0 OPERATOR ACTIONS

2.1 Initial Actions

2.1.1 Manpower Required

- 1 Reactor Operator
- 1 Auxiliary Operator

2.1.2 Special Equipment

None

NOTE

- Two-handed operation is allowed during implementation of this procedure in order to minimize delay in control rod insertion. ☐
- Section 2.1.3 Step 1 through Step 6 may be performed concurrently with the rest of this procedure. ☐
- The system designation C11 is for Unit 1 and C12 for Unit 2. ☐

2.1.3 Operator Actions

1. **Monitor** reactor power on APRMs until IRM recorders on scale. ☐ RO

2. **Insert** IRMs and **monitor** reactor power on IRM recorders. ☐ RO

3. **Downrange** IRMs to bring them on scale. ☐ RO

4. **WHEN** IRMs on Range 3 **OR** below, **THEN insert** SRMs. ☐ RO

5. **Monitor** reactor period. ☐ RO

2.1.3 Operator Actions (continued)

6. **Monitor** control rod position using:

   - Process computer .... ☐ RO
   - SPDS .... ☐ RO
   - RWM .... ☐ RO
   - Four rod .... ☐ RO
   - Full core display .... ☐ RO

7. **WHEN** either:

   - All control rods in .... ☐ RO
   - Only one control rod **NOT** fully inserted .... ☐ RO
   - **NO** more than 10 control rods withdrawn to position 02 **AND** **NO** control rod withdrawn beyond position 02 .... ☐ RO
   - Reactor engineering has determined the reactor will remain shutdown under all conditions without boron .... ☐ RO

   THEN perform Section 2.2, Control Rod Insertion Verification on Page 7. .... ☐ RO

2.1.3 Operator Actions (continued)

8. **Insert** control rods by one or more methods:

- Section 2.3, Reset RPS and Initiate a Manual Scram on Page 15 .... ☐ RO
- Section 2.4, Reactor Manual Control System (RMCS) on Page 18 .... ☐ RO
- Section 2.5, Increasing Cooling Water Header Pressure on Page 20 .... ☐ RO
- Section 2.6, Scram Individual Control Rods on Page 22 .... ☐ RO
- Section 2.7, De-energize Scram Solenoids and Vent Scram Air Header on Page 26 .... ☐ RO
- Section 2.8, Venting Over Piston Area on Page 32 .... ☐ RO

2.3 Reset RPS and Initiate a Manual Scram

2.3.1 Manpower Required

- 1 Reactor Operator

2.3.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 4 jumpers (15, 16, 17 and 18) .... ☐

2.3.3 Manual Scram Actions

> **NOTE**
>
> Section 2.3.3 Step 1 and Step 2 may be performed concurrently. .... ☐

1. **IF** an automatic scram signal present **AND** power available to RPS bus,
   THEN install jumpers to bypass reactor scram:

   - Jumper 15 in Panel H12-P609, Terminal Board DD, from right side of Fuse C71A(C72A)-F14A to Terminal 4 of Relay C71A(C72A)-K12E .... ☐ RO

   - Jumper 16 in Panel H12-P609, Terminal Board BB, from left side of Fuse C71A(C72A)-F14C to Terminal 4 of Relay C71A(C72A)-K12G .... ☐ RO

   - Jumper 17 in Panel H12-P611, Terminal Board DD, from right side of Fuse C71A(C72A)-F14B to Terminal 4 of Relay C71A(C72A)-K12F .... ☐ RO

   - Jumper 18 in Panel H12-P611, Terminal Board BB, from left side of Fuse C71A(C72A)-F14D to Terminal 4 of Relay C71A(C72A)-K12H .... ☐ RO

2. **Inhibit ARI:**

   a. **Place** C11(C12)-CS-5560 (ARI Auto/Manual Initiation Switch) to INOP. .... ☐ RO

2.3.3 Manual Scram Actions (continued)

b. **Place and hold** C11(C12)-CS-5562 (ARI Reset) switch in RESET. .... ☐ RO

c. **WHEN** 5 seconds have elapsed, **THEN release**. .... ☐ RO

d. **Confirm** red TRIP light located above C11(C12)-CS-5561 (ARI Initiation) OFF. .... ☐ RO

3. **Ensure** Disch Vol Vent & Drain Test switch in ISOLATE. .... ☐ RO

4. **Confirm** CLOSED:

- C11(C12)-V139 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-CV-F010 (Disch Vol Vent Vlv). .... ☐ RO
- C11(C12)-V140 (Disch Vol Drain Vlv). .... ☐ RO
- C11(C12)-CV-F011 (Disch Vol Drain Vlv). .... ☐ RO

5. **Reset** RPS. .... ☐ RO

6. **IF** either RPS A **OR** B can be RESET, **THEN go to** Section 2.3.3 Step 8. .... ☐ RO

7. **IF** RPS **CANNOT** be RESET, **THEN return to** Section 2.1.3 Step 7. .... ☐ RO

8. **Place** Disch Vol Vent & Drain Test switch to NORMAL. .... ☐ RO

2.3.3 Manual Scram Actions (continued)

9. **Confirm** OPEN:

   - C11(C12)-V139 (Disch Vol Vent Vlv). ☐ RO
   - C11(C12)-CV-F010 (Disch Vol Vent Vlv). ☐ RO
   - C11(C12)-V140 (Disch Vol Drain Vlv). ☐ RO
   - C11(C12)-CV-F011 (Disch Vol Drain Vlv). ☐ RO

10. **WHEN** the scram discharge volume has drained for approximately 2 minutes **OR** A-05 1-6, SDV Hi-Hi Level RPS Trip clears, **THEN continue**. ☐ RO

11. **IF** venting control rod over piston area per Section 2.8, **THEN notify** AO to secure venting prior to inserting a manual scram. ☐ RO

12. Manually **scram** the reactor. ☐ RO

13. **IF** control rods moved inward **AND** all control rods **NOT** inserted to **OR** beyond Position 00, **THEN return to** Section 2.3.3 Step 3. ☐ RO

14. **IF** all control rods inserted to **OR** beyond Position 00 **OR** control rods did **NOT** move inward, **THEN return to** Section 2.1.3 Step 7. ☐ RO

2.4 Reactor Manual Control System (RMCS)

2.4.1 Manpower Required

- 1 Reactor Operator

2.4.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ **Unit 1 Only:** 1 5450 key for RWM .... ☐
  - ◊ **Unit 2 Only:** 1 5451 key for RWM .... ☐

2.4.3 RMCS Actions

1. **IF** a reactor scram sealed in,
   THEN ensure available CRD pumps operating .... ☐ RO

2. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN .... ☐ RO

3. **IF** a CRD pump **NOT** operating,
   THEN:

   a. **Close** the in-service C11(C12)-F002A(F002B) (Flow Control Vlv) .... ☐ RO

   b. **Start** one CRD pump .... ☐ RO

   c. **Adjust** C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm .... ☐ RO

   d. **IF** available,
      THEN start the second CRD pump .... ☐ RO

4. **IF NO** CRD pump can be started,
   THEN return to Section 2.1.3 Step 7 .... ☐ RO

2.4.3 RMCS Actions (continued)

5. **Insert** control rods with RMCS:

   a. **Throttle open** C11(C12)-F002A(F002B) (Flow Control Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   b. **IF** drive water differential pressure less than 260 psid, **THEN throttle closed** C11(C12)-PCV-F003 (Drive Pressure Vlv) until drive water differential pressure greater than or equal to 260 psid .... ☐ RO

   c. **Bypass** RWM. .... ☐ RO

   d. **Insert** control rods with Emergency Rod In Notch Override switch. .... ☐ RO

6. **WHEN** **all** control rods inserted to **OR** beyond Position 00 **OR** **CANNOT** be inserted with RMCS, **THEN return to** Section 2.1.3 Step 7 .... ☐ RO

2.5 Increasing Cooling Water Header Pressure

2.5.1 Manpower Required

- 1 Reactor Operator

2.5.2 Special Equipment

None

2.5.3 Cooling Water Header Actions

1. IF a reactor scram sealed in,
THEN ensure available CRD pumps operating .... ☐ RO

2. IF a CRD pump NOT operating,
THEN:

   a. Ensure C11(C12)-FC-R600 (CRD Flow Control) in MAN .... ☐ RO

   b. Close the in-service C11(C12)-F002A(F002B) (Flow Control Vlv) .... ☐ RO

   c. Start one CRD pump .... ☐ RO

   d. Adjust C11(C12)-FC-R600 (CRD Flow Control) to greater than or equal to 30 gpm .... ☐ RO

   e. IF available,
THEN start the second CRD pump .... ☐ RO

3. IF NO CRD pump can be started,
THEN return to Section 2.1.3 Step 7 .... ☐ RO

2.5.3 Cooling Water Header Actions (continued)

4. **IF** a reactor scram **NOT** sealed in,
THEN maximize cooling water header pressure:

   a. **Ensure** C11(C12)-FC-R600 (CRD Flow Control) in MAN and fully **open** the in service C11(C12)-F002A(F002B) (Flow Control Vlv) .... ☐ RO

   b. Fully **open** C11(C12)-PCV-F003 (Drive Pressure Vlv) .... ☐ RO

5. **WHEN all** control rods inserted to **OR** beyond Position 00 **OR** control rods **NOT** moving inward,
THEN return to Section 2.1.3 Step 7 .... ☐ RO

TERMINATION	
Simulator Operator Actions	
	When directed by the Lead Evaluator, delete the following commands: Malfunction - K2624A, ARI Reset Malfunction - K2625A, ARI INOP Malfunction – RP011F, ATWS 4 (Make sure RPS is reset and scram air header pressurized before deleting)
	When directed by the Lead Evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

Simulator Operator Role Play	
	After Sim Operator has deleted SDV malfunction, Inform the CRS that a loose wire was found on ARI switch and it has been repaired.

Evaluator Notes	
Plant Response:	When actions are taken to control reactor water level during the ATWS after terminating and preventing, ARI will be repaired and rods can be inserted.
Objectives:	SRO - Directs actions for an ATWS. RO - Insert control rods IAW LEP-02.
Success Path:	Rods inserted with LEP-02, Alternate Rod Insertion.
Scenario Termination:	***When all rods are inserted and level is being controlled above TAF with injection established, the scenario may be terminated.***

Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.

TERMINATION

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Exit ATWS and enter RVCP when all rods are in.	
		Direct level restored to 170 – 200 inches after rods are all in.	
	RO	Confirms ARI reset when reported fixed.	
		Inserts a scram after discharge volume has drained for ~2 minutes.	
		Reports all rods in.	
	BOP	Maintains reactor pressure as determined by the CRS.	
		Maintains level as directed by the SCO.	
		Restores level to 170 – 200 inches after all rod inserted. (Enclosure 4, page 65, contains actions for restart of Condensate and Feedwater)	

ENCLOSURE 1

ATTACHMENT 8

<< Crew Brief Template >>

Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ENCLOSURE 2

SECURING HPCI INJECTION

1.0 INITIAL CONDITIONS

1. **WHEN DIRECTED** BY 2EOP-01-LPC TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

2. **WHEN DIRECTED** BY 0EOP-01-RXFP TO "TERMINATE AND PREVENT" HPCI INJECTION, **OR** .... ☐

3. **WHEN** PERMISSION GIVEN BY THE UNIT CRS TO SECURE HPCI INJECTION WITH A HPCI AUTO START SIGNAL PRESENT. .... ☐

2.0 PROCEDURAL STEPS

1. **IF** HPCI IS **NOT** OPERATING, **PERFORM** THE FOLLOWING:

   a. **PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

2. **IF** HPCI IS OPERATING, **PERFORM** THE FOLLOWING:

   b. **DEPRESS AND HOLD** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   c. **WHEN** HPCI TURBINE SPEED IS 0 RPM, **AND** HPCI TURBINE CONTROL VALVE, E41-V9 IS CLOSED, **THEN PLACE** HPCI AUXILIARY OIL PUMP CONTROL SWITCH IN PULL-TO-LOCK. .... ☐

   d. **WHEN** HPCI TURB BRG OIL PRESS LO, A-01 4- 2, IS SEALED IN, **THEN RELEASE** THE HPCI TURBINE TRIP PUSHBUTTON. .... ☐

   e. **ENSURE** HPCI TURBINE STOP VALVE, E41-V8, **AND** HPCI TURBINE CONTROL VALVE, E41-V9, REMAIN CLOSED, **AND** HPCI DOES **NOT** RESTART. .... ☐

ENCLOSURE 3

Terminating and Preventing Injection From Condensate and Feedwater During EOP's (2OP-32)

1. **IF** desired **TRIP** all operating RFPs. ☐
2. **IF** one or more RFPs are in service **IDLE** one RFP as follows:
   a. **IF** two RFPs are operating **THEN TRIP** one. ☐
   b. **PERFORM** either of the following for the operating RFP:
      1. **PLACE** MAN/DFCS control switch to MAN. ☐
      2. **RAPIDLY REDUCE** speed to approximately 1000 rpm with the LOWER/RAISE speed control switch. ☐

      OR

      1. **PLACE** RFPT Speed Control in M (MANUAL) ☐
      2. **SELECT** DEM and **RAPIDLY REDUCE** speed to approximately 2550 rpm. ☐
3. **CLOSE** the following valves:
   - FW HTR 5A OUTLET VLVS, FW-V6 ☐
   - FW HTR 5B OUTLET VLVS, FW-V8 ☐

   OR

   - FW HTR 4A INLET VLV, FW-V118 ☐
   - FW HTR 4B INLET VLV, FW-V119 ☐
4. **ENSURE** the SULCV is closed by performing the following:
   a. **PLACE** SULCV, in M (Manual). ☐
   b. **SELECT** DEM and **DECREASE** signal until VALVE DEM indicates 0%. ☐
5. **ENSURE** FW-V120, is closed. ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing

1. **Ensure** FW-FV-177 (Feedwater Recirc to Condenser Vlv) CLOSED .... ☐
2. **Ensure** FW Control Mode Select in 1 ELEM .... ☐
3. **Ensure** at least one valve OPEN: .... ☐
   - B21-F032A (Feedwater Isol Vlv) .... ☐
   - B21-F032B (Feedwater Isol Vlv) .... ☐
4. **IF NO** RFP operating,
   THEN: .... ☐
   a. **Ensure** RFPT A(B) Sp Ctl:
      (1) In M (manual) .... ☐
      (2) Pmp A(B) Dem at 0.0 PCT .... ☐
   b. **Place** FW-FV-46(47) [RFP (A/B) Recirc Vlv] in OPEN .... ☐
   c. **Ensure:** .... ☐
      - FW-V3(V4) [RFP (A/B) Disch Vlv] OPEN .... ☐
      - RFP A(B) Manual/DFCS control switch in MANUAL .... ☐
   d. **Depress:** .... ☐
      (1) Reactor Water Level High Reset A .... ☐
      (2) Reactor Water Level High Reset B .... ☐
      (3) Reactor Water Level High Reset C .... ☐
      (4) RFP A(B) Reset .... ☐
   e. **Confirm** OPEN: .... ☐
      - RFP A(B) LP Stop Vlvs .... ☐
      - RFP A(B) HP Stop Vlvs .... ☐
   f. **Depress** RFP A(B) RFPT Start .... ☐
   g. **WHEN** at 1000 rpm,
      THEN raise RFP A(B) to at least 2550 rpm .... ☐

ENCLOSURE 4

Aligning Condensate and Feedwater After Terminating and Preventing (continued)

5. IF desired to transfer RFP A(B) to DFCS, **THEN:** .... ☐

   a. **Ensure** speed at least 2550 rpm .... ☐

   b. **Depress** DFCS Ctrl Reset .... ☐

   c. **Place** Manual/DFCS control switch in DFCS .... ☐

6. **Raise** RFP A(B) speed until discharge pressure approximately 100 psig above RPV pressure band .... ☐

0/1550
S/1372

ENCLOSURE 4

Injection After Terminating and Preventing Condensate and Feedwater

1. **WHEN** RPV injection directed,
   THEN as needed: ☐
   - **Adjust** SULCV Valve Dem ☐
   - **Throttle** FW-V120 (FW Htrs 4&5 Byp Vlv) ☐

2. **WHEN** automatic control desired,
   THEN: ☐

   a. **Confirm** RPV level greater than +170 inches ☐

   b. **Ensure** FW-V120 (FW Htrs 4&5 Byp Vlv) CLOSED ☐

   c. **Open** FW-V10 (FW Recirc To Cond Isol Vlv) ☐

   d. **Adjust** SULCV to between 25 PCT and 55 PCT using: ☐
   - SULCV Valve Dem ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

   e. **Ensure** Mstr RFPT Sp/Rx Lvl Ctl: ☐

   (1) In M (manual) ☐

   (2) Level Setpoint at current RPV level ☐

   f. **Place** SULCV in A (automatic) ☐

   g. **Adjust** as needed to control RPV level: ☐
   - Mstr RFPT Sp/Rx Lvl Ctl Level Setpoint ☐
   - FW-FV-177 (Feedwater Recirc To Condenser Vlv) ☐

0/1551
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ENCLOSURE 5 Page 1 of 2

ATTACHMENT 8A
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop A (2OP-17)

NOTE:	This attachment is **NOT** to be used for normal system operations.

START RHR SW A LOOP (CONV)

- OPEN *SW-V101* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW A LOOP (NUC)

- OPEN *SW-V105* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START PUMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068A* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP A

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015A* IS OPEN, THEN CLOSE *E11-F017A* ☐
- START LOOP A RHR PMP ☐
- OPEN *E11-F028A* ☐
- THROTTLE *E11-F024A* ☐
- THROTTLE *E11-F048A* ☐
- START ADDITIONAL LOOP A RHR PMP AND ADJUST FLOW AS NEEDED ☐

ATTACHMENT 8B
Page 1 of 1
Emergency Suppression Pool Cooling Using Loop B (2OP-17)

NOTE: This attachment is **NOT** to be used for normal system operations.

START RHR SW B LOOP (NUC)

- OPEN *SW-V105* ☐
- CLOSE *SW-V143* ☐
- START PMPS ON NSW HDR AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR SW B LOOP (CONV)

- OPEN *SW-V101* ☐
- OPEN *SW-V102* ☐
- CLOSE *SW-V143* ☐
- START CSW PUMPS AS NEEDED ☐
- IF LOCA SIGNAL IS PRESENT THEN PLACE RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- START RHR SW PMP ☐
- ADJUST *E11-PDV-F068B* ☐
- ESTABLISH CLG WTR TO VITAL HDR ☐
- START ADDITIONAL RHR SW PUMP AND ADJUST FLOW AS NEEDED ☐

START RHR LOOP B

- IF LOCA SIGNAL IS PRESENT, THEN VERIFY COOLING LOGIC IS MADE UP ☐
- IF *E11-F015B* IS OPEN, THEN CLOSE *E11-F017B* ☐
- START LOOP B RHR PMP ☐
- OPEN *E11-F028B* ☐
- THROTTLE *E11-F024B* ☐
- THROTTLE *E11-F048B* ☐
- START ADDITIONAL LOOP B RHR PMP AND ADJUST FLOW AS NEEDED ☐

ENCLOSURE 6

HPCI INJECTION IN EOPs

1.	**IF** HPCI IS TRIPPED ON HIGH WATER LEVEL, **DEPRESS** HIGH WATER LEVEL SIGNAL RESET, E41-S25, PUSH BUTTON, **AND ENSURE** THE INDICATING LIGHT IS OFF.	☐
2.	**ENSURE** AUXILIARY OIL PUMP IS **NOT** RUNNING	☐
3.	**ENSURE** E41-V9 AND E41-V8 ARE CLOSED	☐
4.	**OPEN** E41-F059	☐
5.	**PLACE** HPCI FLOW CONTROL, E41-FIC-R600, IN MANUAL (M), **AND ADJUST** OUTPUT DEMAND TO APPROXIMATELY MIDSCALE, USING THE MANUAL LEVER.	☐
6.	**START** VACUUM PUMP **AND LEAVE** IN START	☐
7.	**OPEN** E41-F001	☐
8.	**START** AUXILIARY OIL PUMP **AND LEAVE** IN START	☐
9.	**OPEN** E41-F006, IMMEDIATELY AFTER E41-V8 HAS DUAL INDICATION	☐
10.	**ENSURE** E41-V9 AND E41-V8 ARE OPEN	☐
11.	**WHEN** SPEED STOPS INCREASING, **THEN ADJUST** SPEED TO APPROXIMATELY 2100 RPM	☐
12.	**ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, TO OBTAIN DESIRED FLOW RATE	☐
13.	**ENSURE** E41-F012 IS CLOSED WHEN FLOW IS GREATER THAN 1400 GPM	☐
14.	**ADJUST** HPCI FLOW CONTROL, E41-FIC-R600, SETPOINT TO MATCH SYSTEM FLOW, AND THEN PLACE E41-FIC-R600 IN AUTO (A)	☐
15.	**ENSURE** E41-F025 AND E41-F026 ARE CLOSED	☐
16.	**START** SBGT (OP-10)	☐
17.	**ENSURE** BAROMETRIC CNDSR CONDENSATE PUMP IS OPERATING	☐

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 Drywell Spray Initiation

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

- RO Desk Locked Drawer
  - ◊ 2 3095 keys .... ☐

2.1.3 Drywell Spray Actions

1. **Ensure** both reactor recirculation pumps tripped. .... ☐ RO

2. **IF** E-bus load stripping has occurred, **THEN:**

   a. **Confirm** electrical power has been aligned per EOP-01-SBO-14 .... ☐ RO

   b. **Secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 2.c. .... ☐ RO

   c. **IF** RHR Loop A will be used for sprays, **THEN go to** Section 2.1.3 Step 9 .... ☐ RO

   d. **IF** RHR Loop B will be used for sprays, **THEN go to** Section 2.1.3 Step 10. .... ☐ RO

3. **Place** all drywell cooler control switches to OFF (L/O). .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

4. **Unit 1 Only: IF** drywell coolers continue to run, **THEN:**
   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. ☐ RO
   - In Panel XU-28, west side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. ☐ RO

5. **Unit 2 Only: IF** drywell coolers continue to run, **THEN:**
   - In Panel XU-27, west side, **place** VA-CS-5993 (D/W Clr A&D Override Switch) in STOP. ☐ RO
   - In Panel XU-28, east side, **place** VA-CS-5994 (D/W Clr B&C Override Switch) in STOP. ☐ RO

6. **IF** drywell coolers continue to run, **THEN secure** drywell coolers per Attachment 1 and **continue** at Section 2.1.3 Step 7. ☐ RO

7. **Ensure** SW-V141 (Well Water to Vital Header Vlv) CLOSED. ☐ RO

8. **Ensure** one valve OPEN:
   - SW-V111 (Conv SW To Vital Header Vlv) ☐ RO
   - SW-V117 (Nuc SW To Vital Header Vlv) ☐ RO

2.1.3 Drywell Spray Actions (continued)

9. <u>IF</u> Loop A RHR will be used for drywell spray,
<u>**THEN**</u>:

NOTE
E11-F017A will remain OPEN for five minutes following a LOCA signal. .... ☐

a. <u>IF</u> E11-F015A (Inboard Injection Vlv) OPEN,
<u>**THEN**</u> **close** E11-F017A (Outboard Injection Vlv) .... ☐ RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** E11-F024A (Torus Cooling Isol Vlv) CLOSED. .... ☐ RO

e. **Ensure** one Loop A RHR Pump running. .... ☐ RO

f. **Confirm** requirements for Drywell Spray Initiation met:

- Safe region of Drywell Spray Initiation Limit .... ☐ RO
- Torus level below +21 inches .... ☐ RO

g. **Open** E11-F021A (Drywell Spray Inbd Isol Vlv). .... ☐ RO

h. **Throttle open** E11-F016A (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. .... ☐ RO

i. <u>IF</u> E-bus load stripping has occurred,
<u>**THEN**</u> **go to** Section 2.1.3 Step 11. .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

j. __IF__ additional flow required,
__THEN__ **start** the other RHR pump and **limit** flow to less than or equal to 11,500 gpm. .... ☐ RO

k. **Ensure** RHRSW Loop A operating:

(1) **Place** E11-S19A (RHR SW Booster Pumps A & C LOCA Override Switch) in MANUAL OVERRD. .... ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). .... ☐ RO

l. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047A (Hx A Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003A (Hx A Outlet Vlv) OPEN. .... ☐ RO

NOTE
E11-F048A will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048A (Hx A Bypass Vlv). .... ☐ RO

10. __IF__ Loop B RHR will be used for drywell spray,
__THEN__:

NOTE
E11-F017B will remain OPEN for five minutes following a LOCA signal. .... ☐

a. __IF__ E11-F015B (Inboard Injection Vlv) OPEN,
__THEN__ **close** E11-F017B (Outboard Injection Vlv). .... ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** E11-F024B (Torus Cooling Isol Vlv) CLOSED. .... ☐ RO

e. **Ensure** one Loop B RHR Pump running. .... ☐ RO

f. **Confirm** requirements for Drywell Spray Initiation are met:

- Safe region of the Drywell Spray Initiation Limit .... ☐ RO
- Torus level below +21 inches .... ☐ RO

g. **Open** E11-F021B (Drywell Spray Inbd Isol Vlv). .... ☐ RO

h. **Throttle open** E11-F016B (Drywell Spray Otbd Isol Vlv) to obtain between 8,000 gpm and 10,000 gpm flow. .... ☐ RO

i. **<u>IF</u>** E-bus load stripping has occurred,
<u>THEN</u> go to Section 2.1.3 Step 11. .... ☐ RO

j. **<u>IF</u>** additional flow required,
<u>THEN</u> start the other RHR pump and **limit** flow to less than or equal to 11,500 gpm. .... ☐ RO

k. **Ensure** RHRSW Loop B operating:

(1) **Place** E11-S19B (RHR SW Booster Pumps B & D LOCA Override Switch) in MANUAL OVERRD. .... ☐ RO

(2) **Align** RHRSW to the heat exchanger (OP-43). .... ☐ RO

2.1.3 Drywell Spray Actions (continued)

I. **Establish** RHR flow through the heat exchanger:

(1) **Ensure** E11-F047B (Hx B Inlet Vlv) OPEN. .... ☐ RO

(2) **Ensure** E11-F003B (Hx B Outlet Vlv) OPEN.............................. ☐ RO

NOTE

E11-F048B will remain OPEN for three minutes following a LOCA signal. .... ☐

(3) **Close** E11-F048B (Hx B Bypass Vlv). .... ☐ RO

ENCLOSURE 8

1.0 ENTRY CONDITIONS

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 Torus Spray

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

None

2.1.3 Torus Spray Actions

1. **Confirm** torus pressure above 2.5 psig. .... ☐ RO

2. IF Loop A RHR will be used,
   THEN:

NOTE
E11-F017A will remain OPEN for five minutes following a LOCA signal. .... ☐

a. IF RPV injection NOT needed,
   THEN **ensure** at least one valve CLOSED:

- E11-F015A (Inboard Injection Vlv). .... ☐ RO
- E11-F017A (Outboard Injection Vlv). .... ☐ RO

b. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. .... ☐ RO

c. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. .... ☐ RO

d. **Ensure** one Loop A RHR Pump running. .... ☐ RO

ENCLOSURE 8 Page 2 of 2

TORUS SPRAY PROCEDURE	0EOP-01-SEP-03
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2.1.3 Torus Spray Actions (continued)

e. **Ensure** E11-F028A (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027A (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling or Drywell Spray mode ☐ RO

3. IF Loop B RHR will be used,
THEN:

NOTE

E11-F017B will remain OPEN for five minutes following a LOCA signal ☐

a. IF RPV injection NOT needed,
THEN **ensure** at least one valve CLOSED:

- E11-F015B (Inboard Injection Vlv) ☐ RO
- E11-F017B (Outboard Injection Vlv) ☐ RO

b. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD ☐ RO

c. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL ☐ RO

d. **Ensure** one Loop B RHR Pump running ☐ RO

e. **Ensure** E11-F028B (Torus Discharge Isol Vlv) OPEN ☐ RO

f. **Open** E11-F027B (Torus Spray Isol Vlv) ☐ RO

g. **Ensure** operation in LPCI, Torus Cooling OR Drywell Spray mode ☐ RO

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	7
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	2
Major Transients	1-2	1
EOPs Used	1-2	2
EOP Contingency	0-2	2
Run Time	60-90 min	90
Crew Critical Tasks	2-3	3
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	100%	Gross*/Net MWe*:	977 / 951
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	49.7 hrs			Days Online:	82 days
Turnover:					
Protected Equipment:	2A FPC Pump/Hx, 2D RCC Pump, and 2C Demin Transfer Pump for Fuel Pool Decay Heat Removal and inventory makeup. 2A/B NSW Pumps due to 1A NSW pump maintenance.				
Comments:	1A NSW Pump is under clearance for planned maintenance. APRM 2 has failed downscale and is bypassed. 2C TCC Pump is in service on Unit One.				
Shift Activities	The Load Dispatcher has called to perform the following as soon as possible due to an emergent repairs required on the Delco West Line: The OATC is to reduce power to ~850 MWe Gross The BOP operator will then Isolate 230 kV Delco West (Line 30) IAW the marked up of 2OP-50, Section 6.2.6.				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 3

PT-40.2.11, DWEDT FAILURE, VFD CELL BYPASS, NSW PUMP TRIP, CWIP PUMP TRIP, RWCU LEAK, SBGT START FAILURE, ED, ADS VLV FAILURE

REVISION 0

Developer: Bob Bolin	**Date:** 07/07/2016
Technical Review: Dan Hulgin	**Date:** 9/12/2016
Validators: Dwayne Wolf Shawn Zander Grant Newton	**Date:** 09/07/16
Facility Representative: Craig Oliver	**Date:** 09/22/16

REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1		N-BOP	Perform PT-40.2.11, Main Generator Voltage Regulator Manual And Automatic Operational Check
2	ZA411	C-ATC C-CRS	DWEDT Pump failure
3	RC053F	C-ATC C-CRS	VFD Cell Failure (TS)(AOP)
4		R-ATC	Power maneuver
5	CW019F	C-BOP C-CRS	NSW Pump 2B Trip (failure of standby to start) (TS)(AOP)
6	CW039F	C-BOP C-CRS	CWIP Trip (AOP)
7	RW013F	M C	RWCU leak / Scram SBGT Fails to start (AOP)(RSP)(SCCP)
8	K1507A	M C	ED Failure of 2 ADS valves to open (EDP)
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	Perform PT-40.2.11, Main Generator Voltage Regulator Manual And Automatic Operational Check.
2	Annunciator A-04 1-1, Drywell Equip Drain Sump Lvl Hi, will annunciate and the sumps will not auto start. One of the sump pumps will need to be manually started
3	A power cell in VFD A will fail. Recirc Pump 2A speed will lower and a speed hold will initiate. Loop flows will be outside mismatch limits.
4	The crew will reset the speed hold and match loop flows.
5	NSW Pump B will trip and the crew will start NSW Pump A. Since 1A NSW Pump is out of service, Tech Specs will apply. Crew will enter 0AOP-18.0, Nuclear Service Water System failure, and carry out appropriate actions.
6	Circulating Water Pump 2A will trip on motor winding fault, and the standby Circulating Water Intake Pump will be started. 0AOP-37.0 will be entered due to lowering vacuum.
7	A large un-isolable RWCU leak will occur. Crew will enter AOP-5.0 and SCCP. The CRS should direct a SCRAM. SBGT train A will fail to auto start and should be manually started.
8	Secondary containment conditions will worsen, forcing the CRS to direct an Emergency Depressurization (or Anticipation of Emergency Depressurization) due to high water levels. If Anticipation is performed, the second area high water level will annunciate requiring the emergency depressurization. Two ADS SRV's will fail to manually open. The CRS should direct opening two additional SRV's.

3.0 CREW CRITICAL TASKS

Critical Task #1
Insert a reactor scram prior to any area reaching its Max Safe Operating Temperature Limit
Critical Task #2
Isolate fire protection (PIC-33) to the Reactor Building within 15 minutes following a High Energy Line Break.

4.0 TERMINATION CRITERIA

When emergency depressurization has been performed and the reactor has been depressurized to <100 psig the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
A-04, 1-1	DRYWELL EQUIP DRAIN SUMP LVL HI
A-06, 3-1	RECIRC VFD A ALARM UNACK
A-06, 4-5	RECIRC LOOP A ONLY OUT OF SERV
0AOP-04.0	Low Core Flow
2OP-02, 6.1.3 6.2.1 6.3.4	Reactor Recirculation System Operating Procedure
UA-01, 1-10	NUCLEAR HEADER SERV WTR PRESS-LOW
UA-01, 4-10	NUCLEAR HDR SW PUMP B TRIP
UA-18, 6-1	BUS E4 4KV MOTOR OVLD.
0AOP-18.0	NUCLEAR SERVICE WATER SYSTEM FAILURES
UA-01, 1-7	CIRC WATER PUMP A TRIP
0AOP-37.0	Low Condenser Vacuum
UA-03, 2-7	AREA RAD RX BLDG HIGH
0AOP-05.0	Radioactive Spills, High Radiation, And Airborne Activity
UA-5, 4-6	SBGT SYS A FAILURE

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-11.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE
10. **LOAD** Scenario File.
11. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Loaded in Scenario File
Ensure 2B NSW pump is running, 2A in standby
Bypass APRM 2

12. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
13. **PLACE** a clearance on the following equipment.

Component	Position
APRM 2	Blue Tag

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:

Protected Equipment
1. 2A and 2B NSW pumps
2. 2A FPC Pump/Hx, 2D RCC Pump, and 2A Demin Transfer Pump.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-11 is in place.

16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials
0PT-40.2.11

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.

19. **PROVIDE** Shift Briefing sheet for the CRS.

20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
1	Annunciator	ZA411 - [DRYWELL EQUIP DRAIN SUMP LVL HI]
4	DI Override	K2721K - [VFD A LOWER FAST]
4	Malfunction	RC053F - [VFD A POWER CELL COMMUNICATION FAILURE]
5	Malfunction	CW019F - [NUC SERVICE WATER PUMP MOTOR WINDING FAULT]
6	Malfunction	CW039F - [CIRC WATER INTAKE PUMP MOTOR WINDING FAULT]
7	Malfunction	RW013F - [RWCU BRK IN TRIANGLE ROOM 77`]
9	Remote Function	RW_ZVRW004M - [G31-F004 OUTBOARD ISOLATION VALVE]
10	Annunciator	ZUA1214 - [SOUTH RHR RM FLOOD LEVEL HI-HI]

Trig #	Trigger Text
9	K1410JCK - [RWCU VLV G31-F004]
11	K6101WOV - [SBGT SYS A]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RW015F		G31-F001 FAILURE TO AUTO CLOSE	True	True				
RW016F		G31-F004 FAILURE TO AUTO CLOSE	True	True				
RC053F	CELL B1	VFD A POWER CELL COMMUNICATION FAILURE	False	True		00:00:01		4
CW019F	B	NUC SERVICE WATER PUMP MOTOR WINDING FAULT	False	True				5
CW039F	A	CIRC WATER INTAKE PUMP MOTOR WINDING FAULT	False	True				6
RW013F		RWCU BRK IN TRIANGLE ROOM 77`	0.00	100.00	00:10:00			7
RW017F	G31-F001	REACTOR WTR CLEANUP * VLV G31-F001	True	True				
NI032F	APRM 2	APRM FAILS LO	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
RW_ZVRW004M		G31-F004 OUTBOARD ISOLATION VALVE	ON	OFF			9

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K6101B	SBGT SYS A	PREF	ON	OFF				
Q6101ARV	SBGT SYS A CONT PREF R 4	ON/OFF	OFF	ON				
K1505A	AUTO DEPRESS VLV B21-F013D	OPEN	OFF	OFF				
K1511A	AUTO DEPRESS VLV B21-F013A	OPEN	OFF	OFF				
K4B20A	NUC HDR SW PMP A DISCH VLV	AUTO	ON	OFF				
K2721K	VFD A LOWER FAST	LOWER FAST	OFF	ON			00:00:01	4
Q2721LWF	VFD A LOWER FAST	ON/OFF	OFF	OFF				

ANNUNCIATORS

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
3-1	DRYWELL EQUIP DRAIN SUMP LEAK HI	ZA431	OFF	OFF	OFF			
1-1	DRYWELL EQUIP DRAIN SUMP LVL HI	ZA411	ON	ON	OFF			1
1-4	SOUTH RHR RM FLOOD LEVEL HI-HI	ZUA1214	ON	ON	OFF			10

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: PT-40.2.11	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

Simulator Operator Role Play	
	Acknowledge any requests for the Load Dispatcher.
	When asked the voltage regulator operation was smooth and in the same direction of of the rheostat.

Evaluator Notes	
Plant Response:	
Objectives:	SRO - Directs BOP to perform PT-40.2.11 BOP – Performs PT-40.2.11 RO – Monitor Balance of Plant
Success Path:	PT-40.2.11 is completed.
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: PT-40.2.11

Time	Pos	EXPECTED Operator Response	NOTES
	SRO	Conduct shift turnover shift briefing.	
		Direct performance of PT-40.2.11	
		May conduct a brief (see Enclosure 1 on page 45 for format)	
	RO	Monitors the plant	
	BOP	Performs PT-40.2.11 See attached procedure.	

1.0 PURPOSE

The purpose of this test is to demonstrate the OPERABILITY of the voltage regulator transfer circuitry and exercise the regulator potentiometers.

2.0 SCOPE

1. This test is performed once every 92 days and demonstrates OPERABILITY of voltage regulator transfer circuitry and exercises the regulator potentiometers.

2. This test may also be used to demonstrate proper operation of the voltage regulator potentiometer and transfer circuitry, after completion of maintenance.

3.0 PRECAUTIONS AND LIMITATIONS

1. Main generator loading is within the limits of the Generator Reactive Capability Curve shown on Attachment 1, Estimated Capability Curve, and with a minimum of 20 MVAR (positive). .... ☐

2. This test is **NOT** performed if erratic operation of the voltage regulator is noted immediately prior to the performance of this test. .... ☐

3. The Load Dispatcher is to be informed when the main generator automatic voltage regulator is **NOT** in service. Log entries are made documenting the notification. {9.1.1} .... ☐

4.0 GENERAL INFORMATION

None

5.0 ACCEPTANCE CRITERIA

1. This test may be considered satisfactory when the following criteria are met:

   a. DC regulator output variation is smooth and in the same direction as the rheostat movement.

   b. AC regulator output variation is smooth and in the same direction as the rheostat movement.

6.0 PREREQUISITES

1. **Confirm** Generator and Exciter System in operation in accordance with 1(2)OP-27, Generator and Exciter System Operating Procedure .... _______
2. **Confirm** Plant Electrical System in operation in accordance with 1(2)OP-50, Plant Electric System Operating Procedure .... _______
3. **Confirm** DC Electrical System in operation in accordance with 1(2)OP-51, DC Electrical System Operating Procedure .... _______
4. **Confirm** 120 Volt AC UPS, Emergency, and Conventional Electrical Systems in operation in accordance with 1(2)OP-52, 120 Volt AC UPS, Emergency, and Conventional Electrical Systems Operating Procedure .... _______
5. **Confirm** <u>NO</u> system load changes are anticipated.................................... _______

7.0 INSTRUCTIONS

7.1 General

1. **Obtain** permission from Unit CRS to perform this test. .... _______
2. **Ensure** all Prerequisites listed in Section 5.0 are met. .... _______

7.2 Operate 70CS (Gen Manual Volt Adj Rheo)

1. **Ensure** 43CS (Regulator Mode Selector) in AUTO. .... _______
2. **Station** an operator at the Excitation Regulator and Control cubicle in the Turbine Building on the 70 ft elevation west to monitor regulator output during the following steps. .... _______

NOTE

- Section 7.2 Step 3 and Section 7.2 Step 4 are repeated as necessary to ensure proper operation/indication of the manual rheostat. .... ☐
- DC regulator output is locally monitored using D1VM (D.C. Reg. Output). .... ☐

3. **Raise** 70CS (Gen Manual Volt Adj Rheo) until the Upper Limit light comes ON. .... _______

NOTE

The Intermed light will come ON during lowering of 70CS (Gen Manual Volt Adj Rheo) and will remain ON after the Low Limit light is ON. .... ☐

4. **Lower** 70CS (Gen Manual Volt Adj Rheo) until the Low Limit light comes ON. .... _______
5. Using 70CS (Gen Manual Volt Adj Rheo) on the RTGB, **null** Gen Volt Reg Diff Volt meter. .... _______
6. **IF** D1VM (D.C. Reg. Output) variation was **NOT** smooth **AND** in the same direction as rheostat movement,
   THEN go to Section 7.3 Step 7. .... _______

7.2 Operate 70CS (Gen Manual Volt Adj Rheo) (continued)

7. IF D1VM (D.C. Reg. Output) variation was smooth **AND** in the same direction as rheostat movement,
THEN perform the following: {9.1.1}

a. **Notify** the Load Dispatcher the main generator voltage regulator is being placed in MANUAL. .... ______

____
Person Notified

b. **Document** the Load Dispatcher notification in the log. .... ______

c. **Place** 43CS (Regulator Mode Selector) in MAN. .... ______

7.3 Operate 90CS (Gen Auto Volt Adj Rheo)

NOTE

- Section 7.3 Step 1 and Section 7.3 Step 2 may be repeated as necessary to ensure proper operation/indication of the automatic rheostat. ☐
- AC regulator output may be locally monitored using A1VM (A.C. Reg. Output). ☐

1. **Raise** 90CS (Gen Auto Volt Adj Rheo) until the Upper Limit light comes ON. _______
2. **Lower** 90CS (Gen Auto Volt Adj Rheo) until the Low Limit light comes ON. _______
3. **Null** Gen Volt Reg Diff Volt meter on the RTGB using 90CS (Gen Auto Volt Adj Rheo). _______
4. **IF** A1VM (A.C. Reg. Output) variation was **NOT** smooth **AND** in the same direction as rheostat movement,
   THEN go to Section 7.3 Step 6. _______
5. **IF** A1VM (A.C. Reg. Output) variation was smooth **AND** in the same direction as rheostat movement,
   THEN perform the following: {9.1.1}
   a. **Place** 43CS (Regulator Mode Selector) in AUTO. _______
   b. **Notify** the Load Dispatcher the main generator voltage regulator is in AUTOMATIC. _______

      ____
      Person Notified

   c. **Document** Load Dispatcher notification in the log. _______
6. **IF** extended manual voltage regulator operation becomes necessary,
   THEN coordinate with the Load Dispatcher to maintain minimum generator MVAR load and generator voltage in accordance with the System Operation section of 1(2)OP-27, Generator and Exciter System Operating Procedure. _______
7. **IF** either regulator output variation was **NOT** smooth **AND** in the same direction as the rheostat,
   THEN prepare a W/R for the regulator. _______

7.4 Restoration

1. **Perform** review of completed procedure sections to verify Section 5.0, Acceptance Criteria, for tests performed, have been met. .... _______

   ____
   IV

2. **IF** Acceptance Criteria is **NOT** met, **THEN perform** following:

   a. **Report** any equipment found INOPERABLE or **NOT** meeting Acceptance Criteria to Supervisor. .... _______

   b. **Ensure** CR has been initiated. .... _______

3. **Ensure** required information has been recorded on Attachment 2, Certification and Review Form. .... _______

4. **Notify** Unit CRS when this procedure is complete or found to be unsatisfactory. .... _______

EVENT 2: DWEDT PUMP FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator or at simulator time 35 minutes, **Initiate Trigger 1** to activate the DWED Sump Lvl Hi Annunciator.
NOTE	If the simulator is left in run the DWED Sump Lvl Hi Alarm will annunciate on its own after approximately 40 minutes. (The sumps will automatically start pumping if allowed to annunciate)
	When either sump pump has been running for ~30 seconds delete malfunction for the DWED Sump Lvl Hi Annunciator.

Simulator Operator Role Play	
	Acknowledge requests as I&C for troubleshooting DWED Sump Pump auto start failure.
	If asked, the last time the sumps were pump was ~4 hours ago.

Evaluator Notes	
Plant Response:	Annunciator A-04 (1-1), Drywell Equip Drain Sump Lvl Hi.
Objectives:	RO - Pump the DWEDT
Success Path:	Pumps the DWEDT.
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: DWEDT PUMP FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of APPs Direct RO to start DWEDS Pump, if asked. Contact I/C for troubleshooting the failure of the DWEDS to auto start.	
	RO	Refer to APP: A-04 (1-1), Drywell Equip Drain Sump Lvl Hi	
		Diagnose failure of DWEDS Pump	
		Start a DWEDS Pump (may use 0OP-47 Section 5.3.5) Verifies pump shuts off after a period of time.	
	BOP	Monitors the plant	

5.3.5 Manually Pumping Drywell Floor Or Equipment Drain Sumps

1. **Ensure** the following:

   a. Drywell Floor or Equipment Drain sump needs to be manually pumped to determine in-leakage rates.. ________

   OR

   b. Drywell Floor or Equipment Drain sump needs to be manually pumped as determined by the Unit CRS... ________

2. On Panel P603, **place** control switches for the applicable sump pump(s) in START **AND** then in AUTO:

   - G16-C001A (Drywell Floor Drain Pump 1(2)A) .... ________
   - G16-C001B (Drywell Floor Drain Pump 1(2)B) .... ________
   - G16-C006A (Drywell Equip Drain Pump 6A)................................ ________
   - G16-C006B (Drywell Equip Drain Pump 6B)................................ ________

Date/Time Completed ____________________

Performed By (Print)	Initials
____________________	____
____________________	____
____________________	____
____________________	____

Reviewed By ____________________
Unit CRS/SRO

EVENT 3/4: VFD A CELL FAILURE / MANEUVER POWER	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 4** to activate VFD A Cell failure.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	If asked as Reactor Engineer for guidance on restoring Loop flow limits, ask the CRS for their recommendations, then concur with that recommendation.
	If contacted as TBAO, report local indications consistant for a VFD Cell Bypass.

Evaluator Notes	
Plant Response:	A power cell in VFD A will fail. Recirc Pump 2A speed will lower and a speed hold will initiate. Loop flows will be outside mismatch limits. The crew will respond per AOP-04.0, reset the speed hold and match loop flows or lower the speed of 2B to get within Tech Spec limits.
Objectives:	SRO - Direct Shift Response To A Recirculation Flow Control Failure Causing A Decreasing Flow Per AOP-04.0 RO - Respond To A Recirc Flow Control Failure Decreasing Per AOP-04.0
Success Path:	Reset the speed hold condition and match recirc loop flows.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 3/4: VFD A CELL FAILURE / MANEUVER POWER

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct entry into AOP-04.0	
		With recirculation loops flows mismatched, enter LCO 3.4.1 Condition A. NOTE: May balance loops and not enter Tech. Specs. Question examinee about Tech Spec actions if not entered. <u>TS 3.4.1 Condition A.1.</u> Satisfy the requirements of the LCO within 6 hours by restoring matched flows or impose limits specified by the LCO. NOTE: Declare the loop with lower flow not in operation.	
		Direct speed hold reset on VFD A	
		Direct loop flow mismatch restored to within limit	
		Direct I&C to investigate cell failure	
		May conduct a brief (see Enclosure 1 on page 45 for format)	
	BOP	Monitors the plant.	
		Determine cause to be cell failure at HMI	

EVENT 3/4: VFD A CELL FAILURE / MANEUVER POWER

Time	Pos	EXPECTED Operator Response	Comments
	RO	Reference applicable APPs: A-06, 3-1, Recirc VFD A Alarm Unack A-06, 4-5, Recirc Loop A Only Out Of Serv	
		Recognize/report lowering Recirc A speed/speed hold	
		Enter/announce 2AOP-04.0, Low Core Flow	
		Determine Loop flow outside mismatch limits Core flow >57.5 Mlbs, Jet Pump flows must be within 3 Mlbs.	
		Reset speed hold on VFD A IAW 2OP-02 Section 6.3.4. (see page 26)	
		Restore loop flows to within limits as directed by CRS. Lower the B Recirc Pump Speed IAW 2OP-02 Section 6.2.1. (see page 27) or Raise the A Recirc Pump Speed IAW 2OP-02 Section 6.1.3. (see page 28)	

6.3.4 Recovery From Recirc VFD Speed Hold Condition

1. **Confirm** Recirc VFD A(B) Speed Hold yellow light ON at Panel P603. .... ________
2. **Ensure** the cause of the Speed Hold condition has been identified. .... ________
3. **Ensure** Plant conditions have stabilized. .... ________
4. **Check** the following parameters are approximately the same:
   - Recirc Pump A(B) Speed Demand .... ________
   - Recirc Pump A(B) Actual Speed .... ________
   - Recirc Pump A(B) Calculated Speed .... ________
5. **Depress** Recirc VFD A(B) SP Hold Reset to reset the speed hold condition. .... ________
6. **Confirm** Recirc VFD A(B) Speed Hold yellow status light is OFF. .... ________
7. **Check** flow conditions stable. .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

8. **Adjust** Recirc VFD speed and Recirc flow as directed by the Unit CRS. .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ________________

Performed By (Print)	Initials
________________	______
________________	______
________________	______
________________	______

Reviewed By: ________________
Unit CRS/SRO

6.2 Shutdown

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control

1. **Confirm** reactor recirculation pump in operation in accordance with Section 6.1.2. .... ________

NOTE

- Recirculation Pump speed changes are performed when directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. Other operating procedures are used simultaneously with this procedure as directed by 0GP-05, Unit Shutdown, and 0GP-12, Power Changes. .... ☐
- Speed changes are accomplished by depressing Lower Slow, Lower Medium, or Lower Fast pushbuttons. The Lower Slow pushbutton changes Recirc pump speed at 0.06%/decrement at 1 rpm/second. The Lower Medium pushbutton changes Recirc pump speed at 0.28%/decrement at 5 rpm/second. The Lower Fast pushbutton changes Recirc pump speed at 2.8%/decrement at 100 rpm/second. .... ☐

2. **<u>IF AT ANY TIME</u>** any of the following conditions exist, **<u>THEN</u> enter** 1AOP-04.0, Low Core Flow.{8.1.9} .... ________

   - Entry into Region A of Power to Flow Map
   - OPRM INOPERABLE **<u>AND</u>** any of the following
     - ◊ Entry into Region B of Power to Flow Map
     - ◊ Entry into 5% Buffer Region of Power to Flow Map
     - ◊ Entry into OPRM Enabled Region and indications of THI (Thermal Hydraulic Instability) exist

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6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

CAUTION

- The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations are governed by the limits of the applicable Power Flow Map, as specified in the COLR. {8.1.9} .... ☐
- Entry into the 5% Buffer Region warrants increased monitoring of reactor instrumentation for signs of Thermal Hydraulic Instability. Time in the 5% Buffer Region presents additional risk and is minimized.{8.1.9} .... ☐
- With core flow less than 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 10% (maximum indicated difference 6.0 x 10^6 lbs/hr). With core flow greater than or equal to 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 5% (maximum indicated difference 3.0 x 10^6 lbs/hr). .... ☐
- When Recirc Pump speeds are less than 40%, decreasing speed using a Lower Fast pushbutton can result in a Speed Hold condition due to exceeding the regen torque limit. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

3. IF desired to lower the speed of both recirculation pumps simultaneously,
   THEN depress Recirc Master Control Lower (Slow Medium Fast) pushbutton. .... ________

4. IF desired to lower the speed of an individual recirculation pump,
   THEN depress the Recirc VFD A(B) Lower (Slow Medium Fast) pushbutton. .... ________

6.2.1 Lowering Speed/Power Using Individual Recirculation Pump Control Or Recirc Master Control (continued)

5. **Confirm the following, as applicable:**

- Recirc Pump A(B) Speed Demand, Calculated Speed, and Actual Speed have lowered .... ________
- Reactor power lowers .... ________
- B32-R617(R613) [Recirc Pump A(B) Discharge Flow] lowers..... ________
- B32-VFD-IDS-003A(B) [Recirc VFD 2A(B) Output Wattmeter] lowers .... ________
- B32-VFD-IDS-001A(B)]Recirc VFD 2A(B) Output Frequency Meter] lowers .... ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ____________________

Performed By (Print)	Initials
____________________	______
____________________	______
____________________	______
____________________	______

Reviewed By: ____________________
Unit CRS/SRO

6.1.3 Raising Speed/Power Using Individual Recirculation Pump Control or Recirc Master Control

1. **Ensure** the following Initial Conditions are met:

   a. Reactor Recirculation Pumps in operation in accordance with Section 6.1.2 .... ________

   b. Recirculation Pump flow limits are CLEAR .... ________

NOTE

- Recirculation Pump speed changes are performed when directed by 0GP-04, Increasing Turbine Load to Rated Power, and 0GP-12, Power Changes. Other operating procedures are used simultaneously with this procedure as directed by 0GP-04, Increasing Turbine Load to Rated Power, 0GP-12, Power Changes, or the Unit CRS. .... ☐
- Speed changes are accomplished by depressing Raise Slow or Raise Medium pushbuttons. The Raise Slow pushbutton changes Recirc pump speed at 0.06%/increment at 1 rpm/second. The Raise Medium pushbutton changes Recirc pump speed at 0.28%/increment at 5 rpm/second. .... ☐

CAUTION

The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations are governed by the limits of the applicable Power Flow Map, as specified in the COLR. {8.1.9} .... ☐

2. **IF AT ANY TIME** any of the following conditions exist, **THEN enter** 2AOP-04.0, Low Core Flow. {8.1.9} .... ________

   - Entry into Region A of Power to Flow Map
   - OPRM INOPERABLE **AND** any of the following
     - ◊ Entry into Region B of Power to Flow Map
     - ◊ Entry into 5% Buffer Region of Power to Flow Map
     - ◊ Entry into OPRM Enabled Region and indications of THI (Thermal Hydraulic Instability) exist

6.1.3 Raising Speed/Power Using Individual Recirculation Pump Control or Recirc Master Control (continued)

CAUTION

- The OPRM System monitors LPRMs for indication of thermal hydraulic instability (THI). When greater than or equal to 25% power and less than or equal to 60% recirculation flow, alarms and automatic trips are initiated upon detection of THI. Pump operations is be within the limits of the applicable Power-Flow Map, as specified in the COLR. The Scram Avoidance Region is avoided. {8.1.9} .... ☐
- With core flow less than 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 10% (maximum indicated difference 6.0 x 10^6 lbs/hr). With core flow greater than or equal to 57.5 x 10^6 lbs/hr, jet pump loop flows are required within 5% (maximum indicated difference 3.0 x 10^6 lbs/hr). .... ☐
- If total reactor feedwater flow lowers to less than 16.4% of rated flow, Speed Limiter Number 1 will cause the Recirculation Pumps to run back to 34% speed. This signal must be manually reset in accordance with Section 6.3.3. .... ☐
- When total core flow is greater than 43 mlb/hr, Speed Limiter Number 2 will cause a runback to approximately 48% speed if reactor water level is less than 182 inches and either reactor feed pump A or B suction flow is less than 14.9% of individual RFP rated suction flow. This signal must be manually reset using Section 6.3.3. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

3. IF desired to raise the speed of both Recirc Pumps simultaneously, as directed by the Unit CRS, <u>THEN</u> **depress** Recirc Master Control Raise Slow or Raise Medium pushbutton. .... ______

4. <u>IF</u> desired to raise the speed of an individual Recirc Pump, as directed by the Unit CRS, <u>THEN</u> **depress** the VFD A(B) Raise Slow or Raise Medium pushbutton for the Recirc Pump. .... ______

5. **Confirm** the following, as applicable:

   - A rise in Recirc Pump A(B) Speed Demand, Calculated Speed, and a rise in Actual Speed .... ______
   - A rise in Reactor power .... ______
   - A rise in B32-R617(R613) [Recirc Pump A(B) Discharge Flow] .... ______

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6.1.3 Raising Speed/Power Using Individual Recirculation Pump Control or Recirc Master Control (continued)

- A rise in B32-VFD-IDS-003A(B) [Recirc VFD 2A(B) Output Wattmeter] .... ______
- A rise in B32-VFD-IDS-001A(B) [Recirc VFD 2A(B) Output Frequency Meter] .... ______

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

Date/Time Completed ______________

Performed By (Print) Initials

______________________ ______

______________________ ______

______________________ ______

______________________ ______

Reviewed By: ______________________

Unit CRS/SRO

EVENT 5: NSW PUMP B TRIP (FAILURE OF STANDBY TO START)	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to trip the 2B NSW Pump.

Simulator Operator Role Play	
	If contacted as OAO to investigate NSW pump and breaker, After the pump has tripped report 51 devices on all three phases are tripped at the breaker on E4
	If contacted as I&C to investigate, acknowledge the request.

Evaluator Notes	
Plant Response:	The running NSW pump will TRIP on motor overload. The STBY NSW pump will fail to AUTO start. The BOP operator should recognize the failure and manually start the STBY NSW pump. With a U1 NSW pump under clearance will require entry into TS.
Objectives:	SRO - Direct actions for loss of NSW Determine actions required for LCO per Technical Specifications RO - Respond to the failure of an automatic start of the A NSW pump
Success Path:	Determine TS required actions and Start 2A NSW Pump.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 5: NSW PUMP B TRIP (FAILURE OF STANDBY TO START)			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry into 0AOP-18.0, NSW System Failure.	
		Contact maintenance to investigate trip of 2B NSW Pump. May also report to I/C that 2A NSW Pump did not auto start.	
		Evaluate Tech Spec 3.7.2 Service Water System and Ultimate Heat Sink. • Determine 2B NSW pump inoperable • Determine 1A NSW Pump inoperable due to clearance. • Per the Bases, 3 NSW pumps required site wide. • 3.7.2 Condition B. One required NSW pump inoperable for reasons other than condition A. Required Action B.1 Restore required NSW pump to Operable status in 7 days NOTE: Auto start feature for a NSW pump is not TS required, only that a NSW is available, so the 2A NSW pump is still operable.	
		May direct 2C CSW pump to be placed on the NSW header.	
		May conduct a brief (see Enclosure 1 on page 45 for format)	

EVENT 5: NSW PUMP B TRIP (FAILURE OF STANDBY TO START)

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Monitor reactor plant parameters during evolution.	
	BOP	Acknowledge / reference UA-18 (6-1) BUS E4 4KV MOTOR OVLD	
		Recognize trip of 2B NSW pump and lowering NSW system pressure.	
		Announce and execute 0AOP-18.0, NSW System Failure.	
		Recognize the failure of the STBY NSW pump to start and starts standby pump. • Places 2A NSW pump in Manual. • Starts 2A NSW Pump.	
		Refer to alarms. • UA-01 (1-10) NUCLEAR HEADER SERV WTR PRESS-LOW • UA-01 (4-10) NUCLEAR HDR SW PUMP B TRIP • UA-05 (1-9) FAN CLG UNIT CS PUMP RM A INL PRESS LO • UA-05 (2-9) FAN CLG UNIT CS PUMP RM B INL PRESS LO	
		May align the 2C CSW pump to the NSW header.	

EVENT 6: CWIP TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 6** to activate CW Pump A trip

Simulator Operator Role Play	
	If asked as Outside AO, acknowledge request to check pump. After 2-3 minutes, call back and report no abnormalities noted.
	If asked as TBAO, identify that breaker AB8 on 4160 V Switchgear 2C is tripped on overcurrent. No other abnormalities.
	If asked as I&C to investigate, acknowledge the request
	If asked for prestart checks for the 2C CWIP, report prestart checks are SAT.
	If asked to verify no personnel are around the 2C Bus, report all clear.

Evaluator Notes	
Plant Response:	Circ Water Pump A will trip and annunciator UA-01, 1-7, CIRC WATER PUMP A TRIP, will alarm. After investigating the cause of the alarm, another Circ Water Pump should be started IAW the APP.
Objectives:	SRO - Direct actions of APP-UA-01, 1-7, CIRC WATER PUMP A TRIP Direct Emergency Depressurization BOP – Perform action of APP UA-01, 1-7, CIRC WATER PUMP A TRIP RO – Monitor plant parameters
Success Path:	Another Circ Water pump is be started.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator

EVENT 6: CWIP TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of APP-UA-01, 1-7, CIRC WATER PUMP A TRIP.	
		May direct entry into enter 0AOP-37.0, Loss Of Condenser Vacuum	
		May direct power lowered to 90%	
		May conduct a brief on when Reactor Scram is required (see Enclosure 1 on page 45 for format)	
	ATC	Plant Monitoring	
		May lower power as directed by the CRS. (See page 27)	
	BOP	Take actions IAW APP-UA-01, 1-7, CIRC WATER PUMP A TRIP (see page 38) NOTE: CW ISOL VALVES MODE SELECTOR SWITCH will need to be placed into position D to start C CWIP May announce and enter 0AOP-37.0, Loss Of Condenser Vacuum	
		Direct AOs to investigate pump and pump breaker to determine cause of pump trip.	

CW PUMP A TRIP

AUTO ACTIONS

1. CW Pump A trips

CAUSE

1. Instantaneous overcurrent
2. Time overcurrent
3. Phase overcurrent
4. Differential overcurrent or phase angle (lockout relay)
5. Condenser pit flood level hi-hi
6. Low lube water flow
7. High traveling screen A dP (48 in. water) **AND** screen A stopped
8. High traveling screen A dP (48 in. water) **AND** high screen B, C or D dP (18 in. water)
9. LOCA Load Shed
10. Unit Trip Load Shed
11. Circuit malfunction

OBSERVATIONS

1. Condenser vacuum decreasing (process computer points T000, T001, Recorder OG-PR-23 on XU-2, and 1-OG-PI-23-1A, -2A on XU-80)
2. Generator output decreasing
3. Local relay indication at the breaker compartment
4. Circulating water discharge temperature increasing (BOP typer)
5. CW PUMP LUBE WATER FLOW-LOW (UA-01 5-7) alarm
6. TURB BLDG NW CNDSR PIT FLOOD LVL HI (UA-28 6-6) alarm
7. TURB BLDG E CNDSR PIT FLOOD LVL HI (UA-28 6-5) alarm
8. TURB BLDG SW CNDSR PIT FLOOD LVL HI (UA-28 6-7) alarm
9. CW SCREEN DIFF HI - HI (UA-01 1-4) alarm
10. CW SCREEN A DIFF HIGH OR STOPPED (UA-01 1-5) alarm
11. CW SCREEN B DIFF HIGH OR STOPPED (UA-01 2-5) alarm
12. CW SCREEN C DIFF HIGH OR STOPPED (UA-01 3-5) alarm
13. CW SCREEN D DIFF HIGH OR STOPPED (UA-01 4-5) alarm

ACTIONS

1. If a radioactive liquid release is in progress, terminate the release.
2. If reactor power is less than 90% **OR** a CWIP pump can be started within 5 minutes, **THEN START** an available CWIP.
3. If reactor power is greater than 90% **AND** an available CWIP pump was **NOT** started within 5 minutes, then power must be reduced to 90 to 92% prior to starting a CWIP.

EVENT 7: RWCU LEAK / SBGT FAILS TO START	
Simulator Operator Actions	
	At the discretion of the lead evaluator, **Initiate Trigger 7** to activate the RWCU Leak.

Simulator Operator Role Play	
	If contacted as engineering, acknowledge request for EQ envelopes for the U2 Reactor Building.
	If HP's contacted to perform field surveys acknowledge the request.
	If directed to reset breakers for the RWCU isolation valves, wait 2 minutes and report HP has restricted access to the reactor building. If directed to co-ordinate entry with the HP's, wait 15 minutes and report the breakers will not reset.

Evaluator Notes	
Plant Response:	A large un-isolable RWCU leak will occur. Crew will enter AOP-5.0 and SCCP. SRO should direct a SCRAM.
Objectives:	SRO - Direct response to un-isolable primary system breach in secondary containment. RO - Respond to un-isolable primary system breach in secondary containment. Perform SCRAM actions.
Success Path:	Reactor scram is inserted before max norm operating value is exceeded.
Event Termination:	When a reactor scram is inserted and SCCP entered.

EVENT 7: RWCU LEAK / SBGT FAILS TO START

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct entry into 0AOP-5.0, Radioactive Spills, High Radiation, And Airborne Activity May direct entry into AOP-05.4, Radiological Releases	
		Direct RO to trip and isolate RWCU.	
		Announce and enter SCCP procedure	
		Direct a reactor manual scram prior to any area reaching its Max Safe Operating Temperature Limit	***Critical Task #1***
		May direct a cool down at normal cool down rates (<100°F/hr).	
		Request EQ envelopes for the U2 Rx Bldg	
		Enter and execute RVCP. ☐ Direct RO/BOP to stabilize reactor pressure below 1050 psig. ☐ Verify Instrument operability per Caution 1. ☐ Direct crew to not use N026A/B due to 50' temperatures after 50' alarm reported. ☐ Direct verification of group isolations, ECCS initiations and DG starts as appropriate. ☐ Direct RO/BOP to restore and maintain reactor water level 170"-200"	
		Recognize when alarm A-2 6-8, RB 20/50 FT ELEV TEMP HI, is reported that if 50' elevation is greater than 140°F that the Wide Range (N026) level indicators are inaccurate.	
		Contact I/C for assistance with RWCU isolation valve failures	

EVENT 7: RWCU LEAK / SBGT FAILS TO START

Time	Pos	EXPECTED Operator Response	Comments
	ATC	***Insert Reactor scram as directed by CRS*** Depresses both of the manual scram pushbuttons. Place mode switch to shutdown when steam flow < $3x10^6$ lb/hr. **IF** reactor power is below 2% (APRM downscale trip), **THEN** TRIP the main turbine. ENSURE the master reactor level controller setpoint is +170". **IF** two reactor feed pumps are running, **AND** reactor vessel level is above 160" **AND** rising, **THEN** TRIP one.	***Critical Task #1***
	ATC/ BOP	Maintain reactor pressure as directed by CRS.	
	ATC/ BOP	Maintain reactor water level as directed by SRO.	

EVENT 7: RWCU LEAK / SBGT FAILS TO START			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Respond to UA-03 2-7, AREA RAD RX BLDG HI. Enter and execute 0AOP-5.0, Radioactive Spills, High Radiation, And Airborne Activity. ☐ Evacuate Unit 2 Reactor Bldg. ☐ ***Direct AO to close PIV-33 RB Sprinkler Shutoff Valve***. ☐ Direct E&RC to take applicable 0AOP-5.0 actions. ☐ Check area radiation readings at back panels. ☐ Diagnose source of radiation as RWCU leak.	***Critical Task #2***
		Recognize and report to CRS alarm A-2 6-8, RB 20/50 FT ELEV TEMP HI.	
		Responds to UA-5, 4-6, SBGT SYSA Failure Recognize failure of SBGT to start, places SBGT train A switches to start	
	ATC/ BOP	Maintain reactor pressure as directed by CRS.	
	ATC/ BOP	Maintain reactor water level as directed by SRO.	

EVENT 8: EMERG DEPRESS / ADS VALVE FAILURE / TERMINATION	
Simulator Operator Actions	
	2 minutes after receiving Annunciator UA-12 (2-4) SOUTH RHR RM FLOOD HI, or when anticipation of emergency depressurization is performed, **Initiate TRIGGER 10** (South RHR RM Flood HI-HI)
	When directed by the lead evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	Secondary containment conditions will worsen, forcing the SRO to direct an Emergency Depressurization due to high water levels. Two ADS SRV's will fail to manually open. SRO should direct opening two additional SRV's. Scenario will end when reactor pressure reaches 100#.
Objectives:	SRO - Evaluate plant conditions and direct an Emergency Depressurization. RO - Performs actions for Emergency Depressurization.
Success Path:	ED has been performed.
Scenario Termination:	***When emergency depressurization has been performed and the reactor has been depressurized to <100 psig the scenario may be terminated.*** Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.

EVENT 8: EMERG DEPRESS / ADS VALVE FAILURE / TERMINATION

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Continue reactor cooldown per SCCP direction.	
		May direct anticipation of emergency depressurization after second flood level hi alarm. Directs Emergency Depressurization when RHR RM FLOOD LEVEL HI-HI alarm (Two plant areas with water levels above Max Safe – South CS and RHR)	
		Direct RO/BOP to open 7 ADS valves.	
		If informed by RO/BOP that 2 SRVs failed to open, direct opening additional SRVs until 7 SRVs are open.	
		Enter PCCP when torus temperature exceeds 95°F. Directs all available loops to be placed in suppression pool cooling.	
	ATC/ BOP	Recognize and report South CS and South RHR Room Flood Hi-Hi alarms.	
		Open seven ADS valves as directed by SRO.	
		Recognize failure of 2 ADS valves to OPEN and report to SRO.	
		Open 2 additional SRVs as directed by SRO.	
		Maintain reactor water level as directed by SRO.	
		Place available loops in suppression Pool Cooling IAW hard card. (see page 40)	

ENCLOSURE 1 Page 1 of 1

CONDUCT OF OPERATIONS	AD-OP-ALL-1000
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ATTACHMENT 8
Page 1 of 1

<< Crew Brief Template >>

Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	7
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	4
Major Transients	1-2	2
EOPs Used	1-2	2
EOP Contingency	0-2	1
Run Time	60-90 min	90
Crew Critical Tasks	2-3	2
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	100%	Mode:	1
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	49.7 hrs			Days Online:	80 days
Turnover:					
Protected Equipment:	2A FPC Pump/Hx, 2D RCC Pump, and 2A Demin Transfer Pump for Fuel Pool Decay Heat Removal and inventory makeup. 2A/B NSW Pumps due to 1A NSW pump maintenance				
Comments:	1A NSW Pump is under clearance for planned maintenance. 2C TCC Pump is in service on Unit One. APRM 2 has failed downscale and is bypassed. The BOP will perform PT-40.2.11, Main Generator Voltage Regulator Manual And Automatic Operational Check.				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 4

START CREV, N004A FAILURE, CRD FCV FAILURE , RCIC STEAM LEAK, TCC FAILURE, STATOR COOLING TRIP, LOOP, DG3 FAILURE, SRV TAILPIPE, ED

REVISION 0

Developer: Bob Bolin	**Date:** 07/07/2016
Technical Review: Dan Hulgin	**Date:** 9/12/2016
Validators: Alan Shultz Rob Mehs Seth Roberts	**Date:** 11/03/16
Facility Representative: Craig Oliver	**Date:** 11/03/16

REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1		N-BOP	Manual start of CREV in area high radiation mode.
2	NB007F		C32-LT-N004A Fails high (TS)
2a	RD017F	C-ATC C-CRS	CRD Flow Control Valve failure
3	ES025F	C-ATC C-CRS	RCIC steam leak (AOP)(TS)
4	K4516A	C-BOP C-CRS	TCC Pump Failure (AOP)
5		R-ATC	Power Reduction
6	EE030M-2TD	C-BOP C-CRS	MCC 2TD trip / Standby Stator Water Cooling Pump fails to auto start
7	EE009F	M C	Loss of Off-Site Power / Scram DG3 Diff O/C / DG4 failure to auto start (RSP)(PCCP)(AOP)
8	ES004F CA020F	C M	SRV Failure / Tailpipe Break / DW Spray Logic Failure ED on PSP (AOP)(EDP)
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

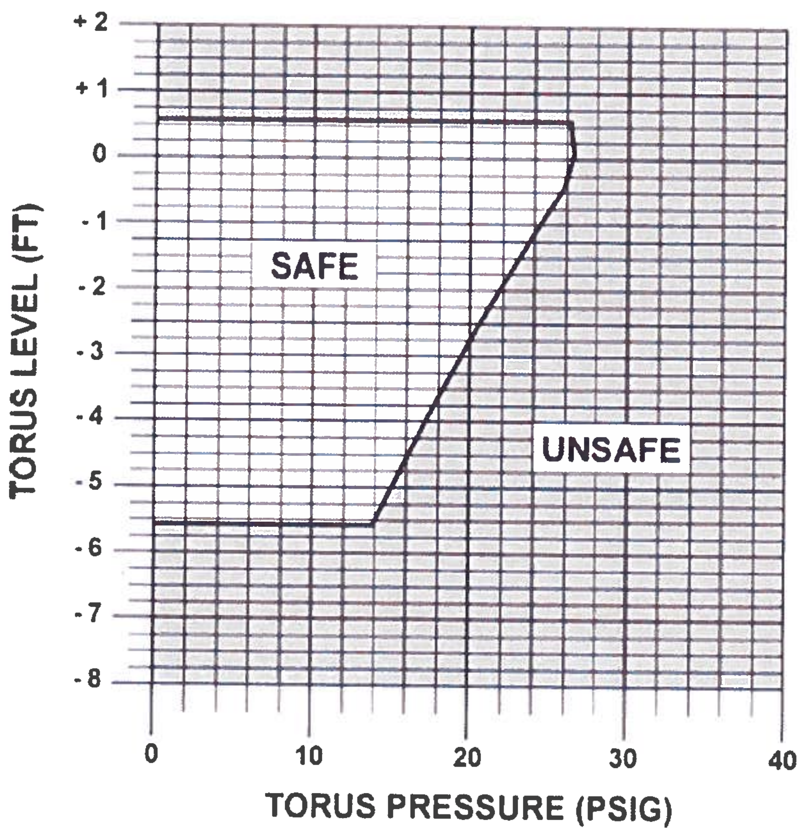
2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	The BOP will start CREV in the area high radiation mode IAW 0OP-37, Section 6.1.3.
2	After CREV is started, C32-LT-N004A will fail high. The crew will reference Tech Spec 3.3.2.2 and determine a 7 day LCO exists to place the failed channel in the tripped condition. The crew should select level B per OP-32.
2a	The CRD flow control valve 2A will fail closed. The crew will place the standby CRD flow control valve 2B in service per OP-08.
3	A break in the RCIC steam line in the south RHR room will occur. The break can be isolated by closing either the E51-F007 or the E51-F008. The crew will respond to the steam leak IAW AOP-05.0.
4	TBCCW Pump 2B will trip and TBCCW low header pressure will alarm. The crew will respond per 0AOP-17.0. TBCCW pressure will recover and actions for partial loss of TBCCW will be performed.
5	A power reduction will be required IAW AOP-17.0.
6	MCC 2TD will trip and the standby stator cooling water pump will fail to auto start. The standby stator cooling water pump can be manually started. The 2D air compressor will also be lost and 0AOP-20.0 may be entered. Unit One may be contacted to place the 1D Air Compressor in lead.
7	A Loss of Offsite Power will occur. The crew will respond per 0AOP-36.1. DG3 will trip on Diff O/C and DG4 will fail to auto start, can be started manually.
8	SRV F will fail open. AOP-30 will be entered. The SRV will not reset using the control switch. Pulling fuses IAW AOP-30 results in loss of indication but the SRV remains open. SRV F tailpipe will rupture, pressurizing containment. The DW Spray logic (think switch) will fail causing an inability to spray the torus or drywell. Emergency Depressurization is required when PSP is violated.

3.0 CREW CRITICAL TASKS

Critical Task #1
Start DG4 to re-energize E4 within 60 minutes of Loss of Offsite Power.
Critical Task #2
Emergency Depressurize the Reactor when Pressure Suppression Pressure (PSP) cannot be maintained in the safe region within 30 minutes.

<< Pressure Suppression Pressure >>



Critical Task #3
Isolate RCIC or Insert a manual reactor scram prior to exceeding Max Safe Operating Temperature Limit.

4.0 TERMINATION CRITERIA

When all rods are inserted and level is being controlled above TAF the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
UA-14 (4-2)	CB MACH ROOM VENT FAN TRIP
A-07 (4-2)	FW CTL SYS TROUBLE
0AOP-23.0	CONDENSATE/FEEDWATER SYSTEM FAILURE
UA-06 (2-5)	SUB 2F 480V FEEDER BKR TRIP
UA-13 (6-6)	RFP B CONTROL TROUBLE
UA-02 (1-8)	STAT COOLANT INLET FLOW-LOW
UA-02 (1-9)	LOSS OF STAT COOLANT TRIP CKT ENER
UA-02 (2-8)	STAT COOLANT PRESS-LOW
UA-02 (6-9)	EXCITER COOLANT FLOW-LOW
UA-03 (2-4)	TBCCW PUMP DISCH HEADER PRESS LOW
0AOP-17.0	TURBINE BUILDING CLOSED COOLING WATER SYSTEM FAILURE
A-03 (4-8)	OPRM TRIP ENABLED
0AOP-36.1	LOSS OF ANY 4160V BUSES OR 480V E-BUSES
2OP-08	CONTROL ROD DRIVE HYDRAULIC SYSTEM OPERATING PROCEDURE

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-11.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE
10. **LOAD** Scenario File.
11. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Loaded in Scenario File
Ensure 2B Stator Cooling Pump running and 2A in standby
Bypass APRM 2

12. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
13. **PLACE** a clearance on the following equipment.

Component	Position
APRM 2	Blue Tag

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:

Protected Equipment
1. 2A and 2B NSW pumps 2. 2A FPC Pump/Hx, 2D RCC Pump, and 2A Demin Transfer Pump.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-11 is in place.

16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.

19. **PROVIDE** Shift Briefing sheet for the CRS.

20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
1	Malfunction	NB007F - [RX LVL TRANSMITTER C32-N004A FAILS]
2	Malfunction	EE030M - [INDIVIDUAL BUS FAILURE]
4	Malfunction	ES025F - [RCIC STM BRK - SOUTH RHR]
5	Annunciator	ZUA324 - [TBCCW PUMP DISCH HEADER PRESS LOW]
5	AO Override	G4H11G14 - [TBCCW DISCHARGE PRESS TOC-PI-556]
5	DI Override	K4517A - [TB CCW PMP B ON]
5	DI Override	K4517A - [TB CCW PMP B ON]
5	DO Override	Q4517LG4 - [TB CCW PMP B OFF G]
6	Malfunction	EE009F - [LOSS OF OFF-SITE POWER]
7	Remote Function	SW_IAVSW193 - [SW-V193 MAN ISOL NSW TO RBCCW]
7	Remote Function	SW_VHSW146L - [CONV SW TO RBCCW HXS V146]
8	Remote Function	RP_IAEPAMGA - [RPS M-G SET A EPA BKRS]
8	Remote Function	RP_IARPSA - [RESTART RPS MG SET A]
9	Remote Function	RP_IAEPAMGB - [RPS M-G SET B EPA BKRS]
9	Remote Function	RP_IARPSB - [RESTART RPS MG SET B]
10	Remote Function	ED_ZIEDH11 - [PNL 2AB-RX PWR (E7=NORM/E8=ALT)]
10	Remote Function	ED_ZIEDH08 - [PNL 2AB PWR (E7=NORM/E8=ALT)]
10	Remote Function	ED_ZIEDHX0 - [PNL 32AB PWR (E7=NORM/E8=ALT)]
11	Malfunction	ES004F - [ADS VALVE F FAILS OPEN]
12	DO Override	Q1508RRJ - [SRV VLV B21-F013F RED]
12	DO Override	Q1520SA9 - [AMBER LED +5V]
12	DO Override	Q1508LGJ - [SRV VLV B21-F013F GREEN]
12	Malfunction	CA020F - [SRV F TAIL PIPE RUPTURE]
13	Remote Function	MI_ZVACS918_1 - [UNIT 1 CB MECHANICAL EQUIP ROOM VENT FANS CS]
14	Remote Function	MI_IACBLRM1 - [UNIT 1 CABLE SPREAD ROOM VENT FANS]
15	Remote Function	ED_IARKAI0 - [X-TIE BKR E8-E7 (AI0) RACK STATUS]
15	Remote Function	ED_IARKAX5 - [X-TIE BKR E7-E8 (AX5) RACK STATUS]
16	Malfunction	RD017F - [CRD FCV FAILS CLOSED]
17	Remote Function	RD_VHRD47BL - [CRD FCV B ISOLATION VALVE]
17	Remote Function	RD_IACRDFVA - [CRD FCV A CONTROL]
17	Remote Function	RD_IACRDFVB - [CRD FCV B CONTROL]
18	Remote Function	RD_VHRD47AL - [CRD FCV A ISOLATION VALVE]
19	Trigger Command	mfd:dg005f

Trig #	Trigger Text
19	K4G14AB8 - [DIESEL GENERATOR AUTO-MODE START]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
DG005F		DG4 AUTO START FAILURE	True	True				
DG026F		DG3 DIFFERENTIAL FAULT	False	True				
NB007F		RX LVL TRANSMITTER C32-N004A FAILS	0.00	100.0	00:02:00			1
EE030M	2TD	INDIVIDUAL BUS FAILURE	False	True				2
ES025F		RCIC STM BRK - SOUTH RHR	0.00	5.0	00:10:00			4
EE009F		LOSS OF OFF-SITE POWER	False	True				6
ES004F		ADS VALVE F FAILS OPEN	False	True				11
CA020F		SRV F TAIL PIPE RUPTURE	False	True		00:01:00		12
RD017F	FCV A	CRD FCV FAILS CLOSED	False	True				16
NI032F	APRM 2	APRM FAILS LO	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
SW_VHSW146L		CONV SW TO RBCCW HXS V146	SHUT	OPEN			7
SW_IAVSW193		SW-V193 MAN ISOL NSW TO RBCCW	OPEN	CLOSE			7
RP_IARPSA		RESTART RPS MG SET A	NORMAL	RESET			8
RP_IAEPAMGA		RPS M-G SET A EPA BKRS	SET	SET		00:00:05	8
RP_IARPSB		RESTART RPS MG SET B	NORMAL	RESET			9
RP_IAEPAMGB		RPS M-G SET B EPA BKRS	SET	SET		00:00:05	9
ED_ZIEDH08		PNL 2AB PWR (E7=NORM/E8=ALT)	NORMAL	ALT		00:00:30	10
ED_ZIEDH11		PNL 2AB-RX PWR (E7=NORM/E8=ALT)	NORMAL	ALT		00:02:30	10
ED_ZIEDHX0		PNL 32AB PWR (E7=NORM/E8=ALT)	NORMAL	ALT		00:04:30	10
MI_ZVACS918_1		UNIT 1 CB MECHANICAL EQUIP ROOM VENT FANS CS	NEUT	STOP			13
MI_IACBLRM1		UNIT 1 CABLE SPREAD ROOM VENT FANS	AUTO	OFF			14
ED_IARKAX5		X-TIE BKR E7-E8 (AX5) RACK STATUS	OUT	IN		00:05:00	15
ED_IARKAI0		X-TIE BKR E8-E7 (AI0) RACK STATUS	OUT	IN		00:02:30	15
RD_VHRD47BL		CRD FCV B ISOLATION VALVE	CLOSE	OPEN			17
RD_IACRDFVA		CRD FCV A CONTROL	AUTO	MANUAL		00:00:01	17
RD_IACRDFVB		CRD FCV B CONTROL	MANUAL	AUTO		00:00:01	17
RD_VHRD47AL		CRD FCV A ISOLATION VALVE	OPEN	CLOSE			18

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4517A	TB CCW PMP B ON	OFF	OFF	ON				5
K4517A	TB CCW PMP B ON	ON	ON	OFF				5
Q4517LG4	TB CCW PMP B OFF G	ON/OFF	OFF	OFF				5
Q1508LGJ	SRV VLV B21-F013F GREEN	ON/OFF	ON	OFF				12
Q1508RRJ	SRV VLV B21-F013F RED	ON/OFF	OFF	OFF				12
Q1520SA9	AMBER LED +5V	ON/OFF	OFF	OFF				12
K5412A	STAT COOLANT PMP A	AUTO	OFF	OFF				
G4H11G14	TBCCW DISCHARGE PRESS TOC-PI-556	39	80.2739	39				5
K1727A	CONT SPRAY VLV CONTROL	NORMAL	ON	OFF				
K1727A	CONT SPRAY VLV CONTROL	MANUAL	OFF	OFF				
K1727A	CONT SPRAY VLV CONTROL	RESET	OFF	OFF				
K1227A	CONT SPRAY VLV CONTROL	NORMAL	ON	OFF				
K1227A	CONT SPRAY VLV CONTROL	MANUAL	OFF	OFF				
K1227A	CONT SPRAY VLV CONTROL	RESET	OFF	OFF				

ANNUNCIATORS

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
2-4	TBCCW PUMP DISCH HEADER PRESS LOW	ZUA324	ON	ON	OFF			5

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: Manual Start of CREV	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.
	When contacted to secure the U1 CB Mech Equipment Room Vent Fans **Initiate Trigger 13**
	When contacted to stop the Cable Spread Room 1 Vent Fans **Initiate Trigger 14**

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	
Objectives:	SRO - Directs BOP to manually start CREV BOP – Manual Start of CREV RO – Monitors the plant
Success Path:	CREV manually started
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: Manual Start of CREV			
Time	**Pos**	**EXPECTED Operator Response**	**NOTES**
	SRO	Conduct shift turnover shift briefing.	
		Direct CREV to be started in the area high radiation mode IAW OP-37.	
		May conduct a brief (see Enclosure 1 on page 51 for format)	
	RO	Monitors the plant	
	BOP	Manually starts CREV in the area high radiation mode IAW 0OP-37, Section 6.1.3.	

6.1.3 Manual Startup of the Control Building Emergency Recirculation System

1. **Confirm** the following initial conditions are met:

   - All applicable prerequisites as listed in Section 5.0 are met .... ______
   - The Control Building Emergency Recirculation System has failed to start after an initiation signal, ... ______

     or

   - A manual start in accordance with 0AOP-05.0, Radioactive Spills, High Radiation, and Airborne Activity, is required {8.1.1} .... ______

     or

   - Surveillance or inspection tests are required .... ______

NOTE

- Indications for the Control Building Ventilation System are located on Panel XU-3 on both units .... ☐
- Controls for the Mechanical Equipment Room Ventilation Fans and the Control Building Wash Room Exhaust Fan are on XU-3 on Units 1 and 2 .... ☐
- Controls for the Cable Spread Room ventilation fans are on Panel XU-3 for the respective unit .... ☐

2. **Perform** the following to place the Control Building Emergency Recirculation System in the area high radiation mode (includes Secondary Containment Isolation):

NOTE

- Placing one of the 2A(B)-ERF-CB (CB Emerg Recirc Fans) in ON will INOP the automatic start function of the non-operating fan .... ☐
- Controls for the Control Building Emergency Recirculation Fans are on Panel XU-3 on Unit 2 .... ☐

   a. **Place** one of the 2A(B)-ERF-CB (CB Emerg Recirc Fans) in ON .... ______

6.1.3 Manual Startup of the Control Building Emergency Recirculation System (continued)

CAUTION

Detection of heat in the charcoal bed, detectors 2-FP-CB-4-20 and 2-FP-CB-4-21 for A or detectors 2-FP-CB-4-14 and 2-FP-CB-4-15 for B, will trip the associated Emergency Recirculation Fan. .... ☐

b. **Confirm** 2L-D-CB (Ctl RM Norm Mu Air Dmpr) closes. .... ______

c. **Confirm** VA-2J-D-CB (CB Emerg Recirc Damper) opens. .... ______

d. **Stop** 2D-EF-CB (CB Washroom Exhaust Fan) and **confirm** associated damper closes. .... ______

NOTE

The Control Building Mechanical Equipment Room Vent Fans can be stopped only by simultaneously placing both Units' control switches in OFF. .... ☐

e. Simultaneously **place** both Units' control switches in OFF, for 2F-SF-CB and 2E-EF-CB (CB Mechanical Equip Room Vent Fans) to stop the fans and **confirm** associated supply and exhaust dampers close. .... ______

f. **Stop** 2A-SF-CB and 2A-EF-CB (Cable Spread Room 2 Vent Fans) and **confirm** associated supply and exhaust dampers close .... ______

g. **Stop** 1A-SF-CB and 1A-EF-CB (Cable Spread Room 1 Vent Fans) and **confirm** associated supply and exhaust dampers close .... ______

6.1.3 Manual Startup of the Control Building Emergency Recirculation System (continued)

> **NOTE**
>
> The Control Building Emergency Recirculation System is now in operation for high radiation conditions. .... ☐

3. **Perform** the following to place the Control Building Emergency Recirculation System in the fire mode:

> **NOTE**
>
> Placing <u>one</u> of the 2A(B)-ERF-CB (CB Emerg Recirc Fans) in ON will INOP the automatic start function of the non-operating fan. .... ☐

a. **Place** <u>one</u> of the 2A(B)-ERF-CB (CB Emerg Recirc Fans) in ON. .... ______

> **CAUTION**
>
> Detection of heat in the charcoal bed, detectors 2-FP-CB-4-20 and 2-FP-CB-4-21 for A or detectors 2-FP-CB-4-14 and 2-FP-CB-4-15 for B, will trip the associated Emergency Recirculation Fan. .... ☐

b. **Confirm** 2L-D-CB (Ctl RM Norm Mu Air Dmpr) closes. .... ______

c. **Confirm** VA-2J-D-CB (CB Emerg Recirc Damper) opens. .... ______

d. **Stop** 2D-EF-CB (CB Washroom Exhaust Fan) and **confirm** associated damper closes. .... ______

> **NOTE**
>
> The Control Building Emergency Recirculation System is now in operation for fire conditions. .... ☐

4. **<u>WHEN</u>** the initiating conditions have cleared, **<u>THEN</u> place** Control Building Ventilation System in operation in accordance with Section 6.1.4. .... ______

EVENT 2: C32-LT-N004A FAILS HIGH	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to fail C32-LT-N004A upscale.

Simulator Operator Role Play	
	If contacted as TB AO to check UPS Panel V10, Ckt #3, acknowledge request, then report no tripped breakers on UPS Panel V10. If asked, the inverters on the trip cabinets are energized.
	If contacted as maintenance or I&C to investigate trip, acknowledge request

Evaluator Notes	
Plant Response:	C32-LT-N004A will fail high. The crew will reference Tech Spec 3.3.2.2 and determine a 7 day LCO exists to place the failed channel in the tripped condition. The crew should select level B per OP-32.
Objectives:	SRO - Determine TS LCO for C32-LT-N004A failing high RO - Transfer DFCS to control to B
Success Path:	TS LCO 3.3.2.2, Condition A One feedwater and main turbine high water level trip channel inoperable. Required Action A.1 Place channel in trip within 7 days. DFCS Feedwater Level Select transferred to B
Event Termination:	Go to Event 2A at the direction of the Lead Evaluator.

EVENT 2: C32-LT-N004A FAILS HIGH

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Acknowledges annunciator report A-07 4-2 *FW CTL SYS TROUBLE*	
		Contacts I&C to investigate.	
		May direct FWCS Level control to be selected to Level B.	
		Determines TS 3.3.2.2 Condition A A.1 Place channel in trip in 7 days.	
		May conduct a brief (see Enclosure 1 on page 51 for format)	
	RO	Acknowledges and reports annunciator report of A-07 4-2 *FW CTL SYS TROUBLE*	
		Diagnose failure of the C32-N004A	
		If directed by the CRS, shifts LEVEL A/B select switch to Position B.	
	BOP	Monitors the plant	

EVENT 2A: CRD FCV 2A FAILS CLOSED	
Simulator Operator Actions	
	At the discretion of the Lead Evaluator, **Initiate Trigger 16** to fail CRD FCV 2A closed
	Transfer FCVs by Initiating **Trigger 17** to open CRD FCV B Isol valves, place CRD FCV A Control in Manual, and place CRD FCV B Control in Auto. Initiate **Trigger 18** to close CRD FCV A Isol valves.

Simulator Operator Role Play	
	If asked to investigate the CRD flow controller failure, as the RBAO report that the A FCV is in service but no flow indicated and no apparent cause for the failure is seen.
	If asked to check the R018 temperature recorder, report as the RBAO that none of the CRDs indicate an alarm present.
	If asked as RBAO to transfer CRD FCV per OP-08 (steps 6.3.3.7a-i, when control room has placed CRD Flow Control to Manual @ zero output, then after SIM OP has initiated trigger 16 report OP-08 completed up to step 6.3.3.7g. After control room has completed step 6.3.3.7h. report step 6.3.3.7i is complete.
	When requested, isolate CRD FCV A, after trigger 17 initiated report 2OP-08 step 6.3.3.13 is complete.
	If asked as I&C to investigate, acknowledge the request.

Evaluator Notes	
Plant Response:	The crew will receive CRD charging header pressure high alarm and drive header pressure will be lost. The crew will place the standby CRD flow control valve in service per 2OP-08.
Objectives:	SRO - Direct action to swap CRD Flow Control Valves RO/BOP - Performs actions to swap CRD Flow Control Valves.
Success Path:	CRD FCV swapped and CRD parameters back to normal.
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2A: CRD FCV 2A FAILS CLOSED

Time	Pos	EXPECTED Operator Response	Comments
	SRO	May direct entry into 0AOP-02.0, Control Rod Misposition/Malfunction, for inability to move control rods	
		Direct standby CRD FCV placed in service IAW OP-08.	
		Contact I&C to investigate 2A CRD FCV Failure	
	BOP	Plant Monitoring .	
	RO	Diagnose and report failure of CRD FCV	
		Enter and announce 0AOP-02.0, if directed by the SRO.	
		Addresses Annunciator: A-5 2-2, CRD Charging Wtr Press Hi	
		Determines failure of CRD FCV A. and swaps to standby FCV IAW 2OP-08, Section 6.3.3, Shifting CRD Flow Control Valves. Step 6.3.3.6 will have to be noted by the CRS due to the failure of the in service FCV. Steps 6.3.3.7a-g is performed locally by the AO. Step 6.3.3.7i is performed locally by the AO. Step 6.3.3.8 is N/A Step 6.3.3.13 is performed locally by the AO. Step 6.3.3.14 is N/A	

6.3.3 Shifting CRD Flow Control Valves

1. **Ensure** the CRD System in operation per Section 6.1.1. .... ______
2. **Station** an operator in direct communication with the Control Room at CRD Master Flow Control Station. .... ______
3. **Shift** C12-FC-R600 (CRD Flow Control) to BAL. .... ______
4. **Null** C12-FC-R600 (CRD Flow Control) using manual potentiometer. .... ______
5. **Shift** C12-FC-R600 (CRD Flow Control) to MAN. .... ______
6. **Maintain** CRD flow rate between 30 and 60 gpm, using manual potentiometer. .... ______
7. <u>IF</u> desired to shift from 2-C12-F002A (CRD Flow Control Valve) to 2-C12-F002B (CRD Flow Control Valve), <u>THEN</u> **perform** the following: .... ______
   a. **Confirm** local 2-C12-FK-D009B (CRD Flow Control Valve Controller) in MAN. .... ______
   b. **Ensure** local 2-C12-FK-D009B (CRD Flow Control Valve Controller) manual potentiometer at minimum. .... ______
   c. **Open** 2-C12-F046B (Flow Control Valve 2B Inlet Isolation Valve) .... ____/____ IV
   d. **Open** 2-C12-F047B (Flow Control Valve 2B Outlet Isolation Valve) .... ____/____ IV
   e. **Null** local 2-C12-FK-D009A (CRD Flow Control Valve Controller) using manual potentiometer. .... ______
   f. **Shift** local 2-C12-FK-D009A (CRD Flow Control Valve Controller) to MAN. .... ______

6.3.3 Shifting CRD Flow Control Valves (continued)

NOTE
Two handed operation is allowed in the following step. .... ☐

g. **WHILE** maintaining CRD flow rate in normal band, simultaneously, slowly **open** 2-C12-F002B (CRD Flow Control Valve) and **close** 2-C12-F002A (CRD Flow Control Valve) using manual potentiometers on 2-C12-FK-D009B and 2-C12-FK-D009A (CRD Flow Control Valve Controllers). .... ________

h. **WHEN** 2-C12-F002A (CRD Flow Control Valve) is CLOSED **AND** 2-C12-F002B (CRD Flow Control Valve) is controlling CRD flow rate, **THEN** at the RTGB **null** 2-C12-FK-D009B (CRD Flow Controller) using manual potentiometer on C12-FC-R600 (CRD Flow Control) .... ________

i. **Shift** local 2-C12-FK-D009B (CRD Flow Controller) to AUTO. ... ________

8. **IF** desired to shift from 2-C12-F002B (CRD Flow Control Valve) to 2-C12-F002A (CRD Flow Control Valve), **THEN** **perform** the following .... ________

a. **Confirm** local 2-C12-FK-D009A (CRD Flow Control Valve Controller) in MAN .... ________

b. **Ensure** local 2-C12-FK-D009A (CRD Flow Control Valve Controller) manual potentiometer is at minimum .... ________

c. **Open** 2-C12-F046A (Flow Control Valve 2A Inlet Isolation Valve) .... ____/____ IV

d. **Open** 2-C12-F047A (Flow Control Valve 2A Outlet Isolation Valve) .... ____/____ IV

e. **Null** local 2-C12-FK-D009B (CRD Flow Control Valve Controller) using manual potentiometer. .... ________

f. **Shift** local 2-C12-FK-D009B (CRD Flow Control Valve Controller) to MAN. .... ________

6.3.3 Shifting CRD Flow Control Valves (continued)

NOTE

Two handed operation is allowed in the following step. ☐

g. __WHILE__ maintaining CRD flow rate in normal band, simultaneously, slowly **open** 2-C12-F002A (CRD Flow Control Valve) and **close** 2-C12-F002B (CRD Flow Control Valve) using manual potentiometers on 2-C12-FK-D009A and 2-C12-FK-D009B (CRD Flow Control Valve Controllers). ________

h. __WHEN__ 2-C12-F002B (CRD Flow Control Valve) is CLOSED __AND__ 2-C12-F002A (CRD Flow Control Valve) is controlling CRD flow rate, __THEN__ **null** 2-C12-FK-D009B (CRD Flow Controller) using manual potentiometer on C12-FC-R600 (CRD Flow Control) ________

i. **Shift** local 2-C12-FK-D009A (CRD Flow Controller) to AUTO. ________

9. **Null** C12-FC-R600 (CRD Flow Control) using setpoint tape ________

10. **Shift** C12-FC-R600 (CRD Flow Control) to AUTO ________

NOTE

If reactor vessel temperature is less than 250°F, then cooling water differential pressure may be less than 10 psid. ☐

11. **Adjust** setpoint tape on C12-FC-R600 (CRD Flow Control) to maintain cooling water differential pressure between 10 and 26 psid ________

12. **Ensure** CRD flow rate is between 30 and 60 gpm ________

13. __IF__ 2-C12-F002B (CRD Flow Control Valve) was placed in service per Step 7, __THEN__ **perform** the following: ________

    a. **Close** 2-C12-F046A (Flow Control Valve 2A Inlet Isolation Valve) ____/____ IV

    b. **Close** 2-C12-F047A (Flow Control Valve 2A Outlet Isolation Valve) ____/____ IV

6.3.3 Shifting CRD Flow Control Valves (continued)

14. IF 2-C12-F002A (CRD Flow Control Valve) was placed in service per Step 8,
THEN **perform** the following: ________

    a. **Close** 2-C12-F046B (Flow Control Valve 2B Inlet Isolation Valve). ____/____ IV

    b. **Close** 2-C12-F047B (Flow Control Valve 2B) Outlet Isolation Valve). ____/____ IV

15. **Monitor** operation of CRD System per Attachment 1. ________

Date/Time Completed ________

Performed By (Print)	Initials
____________________	________
____________________	________
____________________	________
____________________	________

Reviewed By ____________________

Unit CRS/SRO

<< Normal System Operation Parameters >>

INSTRUMENT	INSTRUMENT DESCRIPTION	PARAMETERS
	Panel P603	
C12-FC-R600	CRD Flow Rate	• 30 to 60 gpm during normal power operations • up to 199 gpm (max flow) during various other applications, such as vessel fill, accumulator charging, etc.
C12-PDI-R602	Drive Δ Press	260 psid (260 to 275) (2OP-07, Reactor Manual Control System Operating Procedure, allows reducing dp to a minimum of 180 psid when moving control rods with a history of double notching.)
C12-PDI-R603	Cooling Δ Pressure	• 10 to 26 psid • 0 to 26 psid if reactor vessel temperature is less than 250°F
C12-PI-R601	Charging Pressure	Less than or equal to 1500 psig (Section 3.0 Precaution and Limitation 11)
C12-FI-R604	Drive Flow	Approximately 0 gpm (flow rate < 5.0 gpm during rod movement)
C12-FI-R605	Cooling Flow	30 to 60 gpm (flow rates greater than 50 gpm must be obtained from C12-FC-R600 on Panel P603)
	H21-P007	
2-C12-TR-R018	CRD Temperature Control Panel H21-P007	Less than 250°F
	Radwaste Bldg - 23 ft Elev - Northwest	
2-CO-PI-4106	2-CO-PCV-4105 Outlet Pressure	15 to 35 psig

EVENT 3: RCIC STEAM LEAK	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 4** to initiate a RCIC steam leak. (Increase as necessary to have room temperatures slowly rising until system is isolated)

Simulator Operator Role Play	
	After the initial alarms for the steam leak are received, report as RB AO steam is blowing out of the -17 foot in South RHR room and you are leaving the building.
	If contacted as I&C to investigate, acknowledge the request.
	If contacted to close 2-FP-PIV33, Unit 2 Reactor Building Sprinkler Shutoff Valve, wait three minutes and report that the valve is closed.
	If contacted as HP's, acknowledge any request.

Evaluator Notes	
Plant Response:	A break in the RCIC steam line in the south RHR room will occur. The break can be isolated. If the system is delayed from being isolated, observe temperatures in the Reactor Building (specifically South RHR Room temperature), before any area exceeds MSOTL, a Reactor Manual Scram should be inserted. The RCIC system should be declared inoperable and Tech Specs entered.
Objectives:	SRO - Determine RCIC should be isolated and actions required for LCO per Technical Specifications RO - Respond to an isolable RCIC steam line break.
Success Path:	Evaluate Tech Specs to determine required actions as outlined in SRO actions below.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: RCIC STEAM LEAK			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Diagnose RCIC leak and ***direct RCIC isolation***	***CRITICAL TASK #3***
		May direct entry into 0AOP-05.0	
		May direct reactor building evacuated	
		Contact maintenance about the RCIC steam leak	
		Refers to Tech Spec 3.5.3 RCIC System and determines: CONDITION A. RCIC System inoperable. REQUIRED ACTION: A.1 Verify by administrative means HPCI System is OPERABLE. Immediately AND A.2. Restore RCIC System to OPERABLE status. 14 days	
		May conduct a brief (see Enclosure 1 on page 51 for format)	

EVENT 3: RCIC STEAM LEAK			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Respond to alarms: UA-03 3-5, PROCESS RX BLDG VENT RAD HI-HI UA-03 2-7, AREA RAD RX BLDG HIGH UA-05 6-10, RX BLDG ISOLATED	
		Diagnose RCIC steam line leak	
		Isolate RCIC by closing either isolation valve: E51-F007 (Steam Supply Inboard Isol Vlv) and/or E51-F008 (Steam Supply Outboard Isol Vlv)	***CRITICAL TASK #3***
		May reference procedure 2OP-16, Section 6.3.4. (see page 30)	
	BOP	Monitors the plant.	
		May announce and enter AOP-05 May direct AO to close 2-FP-PIV33	

6.3.4 Isolating the RCIC System Steam Supply

1. **Confirm** all applicable prerequisites listed in Section 5.0 are met. .... ______

2. IF rapid isolation of RCIC steam line is desired,
   THEN **perform** the following: .... ______

   a. **Close** E51-F007 (Steam Supply Inboard Isol Vlv). .... ______

   b. **Close** E51-F008 (Steam Supply Outboard Isol Vlv). .... ______

CAUTION

Opening the E51-F045 (Turbine Steam Supply Vlv) to de-pressurize the RCIC steam line will roll the RCIC turbine. .... ☐

3. IF rapid isolation is NOT desired,
   THEN **perform** the following to isolate and de-pressurize the RCIC steam supply line: .... ______

   a. **Close** E51-F007 (Steam Supply Inboard Isol Vlv). .... ______

   b. **Open** MVD-V5002 (HPCI/RCIC Cond Drn Line Back Press Orifice Bypass Valve). .... ______

   c. **Open** E51-F045 (Turbine Steam Supply Vlv) and **monitor** turbine response. .... ______

   d. **Close** E51-F025 (Supply Drain Pot Inbd Drain Vlv) .... ______

   e. **Close** E51-F026 (Supply Drain Pot Otbd Drain Vlv) .... ______

   f. WHEN RCIC steam line has been de-pressurized for approximately 2 minutes,
      THEN **close** E51-F008 (Steam Supply Outboard Isol Vlv). .... ______

   g. **Close** E51-F045 (Turbine Steam Supply Vlv). .... ______

   h. **Close** MVD-V5002 (HPCI/RCIC Cond Drn Line Back Press Orifice Bypass Valve). .... ___/___
      IV

6.3.4 Isolating the RCIC System Steam Supply (continued)

NOTE

- Technical Specification 3.6.1.6.1 (MODES 1, 2, or 3) requires completion of 0PT-02.3.1B, Suppression Pool to Drywell Vacuum Breaker Position Check, within 6 hours after any discharge of steam to the suppression chamber from any source and within 6 hours following an operation that causes any of the vacuum breakers to open. ☐
- Section 6.3.4 Step 3.i ensures compliance with Technical Specifications and may be completed as required during the performance of the procedure. ☐

i. **IF** in MODES 1, 2, or 3,
THEN ensure 0PT-02.3.1B, Suppression Pool to Drywell Vacuum Breaker Position Check, is completed within 6 hours after any discharge of steam to the suppression chamber from any source. {8.1.7} ______

Date/Time Completed ______________

Performed By (Print) Initials

______________ ______

______________ ______

______________ ______

______________ ______

Reviewed By ______________
Unit CRS/SRO

EVENT 4/5: TCC PUMP B TRIP / POWER REDUCTION	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to trip the 2B TCC Pump.
	When power is reduced change TCC pressure override to current value and activate over one minute then delete annunciator override, when pressure is at current value delete override.

Simulator Operator Role Play	
	If contacted as the TB AO, wait one minute and report that 2B TCC pump is hot to the touch and the breaker is tripped (magnetic).
	If contacted as Unit One CRS, report Unit One is using the 2C TCC Pump and cannot be released to Unit Two operation
	If contacted as I&C to investigate 2B TCC Pump, acknowledge request.
	If contacted as Unit One to start the 1D air compressor, report 1D Air Compressor is running.
	If contacted as RE for power reduction or Reactivity Plan, ask the CRS what their recommendation is, then concur with that recommendation.
	If contacted as chemistry acknowledge request for sample due to a 15% power change.

Evaluator Notes	
Plant Response:	TBCCW Pump 2B will trip and TBCCW low header pressure will alarm. The crew will respond per 0AOP-17.0. With 2C TBCCW Pump supplying Unit 1, a power reduction will be required. TBCCW pressure will recover and actions for partial loss of TBCCW will be performed.
Objectives:	SRO - Direct entry into 0AOP-17.0 RO - Power reduction with Recirc flow and restoration of TCC pressure Perform actions for a partial loss of TCC.
Success Path:	TCC pressures restored to normal with reactor power reduced to the recirc flow limit.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 4/5: TCC PUMP B TRIP / POWER REDUCTION			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Acknowledge report of annunciator UA-03 2-4 *TBCCW PUMP DISCH HEADER PRESS LOW*	
		Direct entry into 0AOP-17.0, Turbine Building Closed Cooling Water System Failure.	
		Direct power reduction IAW 0ENP-24.5 May direct a Manual Runback or provide a power level to reduce power to using recirc flow.	
		Directs I&C to investigate loss of 2B TCC pump.	
		Acknowledge report of annunciator A-03 4-8 *OPRM TRIP ENABLED*	
		Contact chemistry to sample coolant because of the power reduction (>15%)	
		Briefs crew on reactor scram if TCC pressure is not restored above 42 psig within 4 minutes of reaching 47Mlbm/hr.	
		May conduct a brief (see Enclosure 1 on page 51 for format)	

EVENT 4/5: TCC PUMP B TRIP / POWER REDUCTION			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Plant Monitoring.	
		Reduces reactor power as directed by CRS with Recirc Flow. May use the Manual Runback for flow (see page 39)	
		Acknowledge and report annunciator A-03 4-8 *OPRM TRIP ENABLED*	
	BOP	Acknowledge and Report annunciator UA-03 2-4 *TBCCW PUMP DISCH HEADER PRESS LOW*	
		Diagnose loss of 2B TCC Pump. Announce and enter 0AOP-17.0, Turbine Building Closed Cooling Water System Failure. (see page 30) Performs step 4.2.3 (page 35) Performs Step 4.2.6 (page 36)	
		Report annunciator UA-03 2-4 *TBCCW PUMP DISCH HEADER PRESS LOW* clear.	

4.2 Supplementary Actions (continued)

NOTE

TBCCW pump power supplies are as follows: ☐

- TBCCW Pump 1A, MCC 1TJ
- TBCCW Pump 1B, MCC 1TM
- TBCCW Pump 2A, MCC 2TJ
- TBCCW Pump 2B, MCC 2TM
- TBCCW Pump 2C, MCC 2TH, with an automatic transfer switch to select MCC 1TH as the power supply on loss of power to 2TH

NOTE

In accordance with 0AP-013, Plant Equipment Control, tripped breakers (thermally or magnetically) should **NOT** be reset except in an emergency situation until an evaluation of the circuit condition has been performed. Breakers that have tripped thermally may be reset as deemed necessary by the Unit CRS for continued reliable operation of the plant. ☐

b. **IF** TBCCW pump breakers local thermal or magnetic trips have activated,
THEN perform the following:

(1) **Initiate** a WO for evaluation of the affected circuit. ☐

(2) **WHEN** directed by the Unit CRS,
THEN reset tripped breakers. ☐

3. **IF** only one TBCCW pump is in service
AND TBCCW pressure is less than 42 psig,
THEN perform the following:

a. **Reduce** reactor power with recirc flow in accordance with 0ENP-24.5, Form 2, Immediate Reactor Power Reduction Instructions. ☐

b. **IF** TBCCW pressure is greater than 42 psig within 4 minutes,
THEN perform Section 4.2 Step 6, on page 7. ☐

c. **IF** TBCCW pressure is **NOT** greater than 42 psig within 4 minutes,
THEN perform Section 4.2 Step 7, on page 9. ☐

4.2 Supplementary Actions (continued)

4. IF a TBCCW system leak is suspected,
   THEN:

   a. **Monitor** TBCCW Head Tank level. ☐

   b. **Maintain** TBCCW Head Tank level in accordance with 2OP-44, Turbine Building Closed Cooling Water System Operating Procedure. ☐

   c. **Check** system piping to locate leakage. ☐

   d. **Isolate** any leakage found. ☐

   e. **Monitor** temperatures on equipment cooled by TBCCW. ☐

5. IF TBCCW heat exchanger outlet temperature is greater than 110°F
   OR component temperatures are rising,
   THEN **reduce** reactor power as necessary to reduce TBCCW temperature. ☐

NOTE

A partial loss of TBCCW or service water is defined as reduced cooling available with the expectation that normal cooling can be quickly re-established. ☐

6. IF there is a partial loss of TBCCW or service water,
   THEN **perform** the following:

   a. **Ensure** all available TBCCW pumps are operating. ☐

NOTE

High temperature indications on equipment cooled by TBCCW in conjunction with CSW header pressure approaching 90 psig are indications of a Conventional Service Water System failure. {7.1.1} ☐

   b. IF a failure of CSW is indicated,
      THEN **enter** 0AOP-19.0, Conventional Service Water System Failure, AND **perform** concurrently with this procedure. ☐

4.2 Supplementary Actions (continued)

c. **Reduce** system heat load by removing the following loads as plant conditions permit:

(1) Out-of-service equipment .... ☐

(2) Sample coolers .... ☐

(3) Bus-duct cooling .... ☐

NOTE

- If only the main or standby compressor is operating on the unaffected unit and the idle compressor is available, there should be sufficient compressed air capacity to support air demand. .... ☐
- Service Air Compressors 1B and 2B are **NOT** designed to individually carry the full system demand of both units when the cross tie valves are open. .... ☐

d. **IF** air pressure can **NOT** be maintained, **THEN enter** 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures **AND perform** concurrently with this procedure .... ☐

e. **IF** Unit 1 and Unit 2 Service Air Systems are cross-tied, **THEN**:

(1) **Ensure** the unaffected unit's air compressors have sufficient capacity to support air demand. .... ☐

(2) **Ensure** the unaffected unit's Service Air Compressor D is operating. .... ☐

f. **IF** Unit 1 and Unit 2 Service Air Systems are **NOT** cross-tied **AND** it is possible to cross-tie, **THEN**:

NOTE

- If only the main or standby compressor is operating on the unaffected unit and the idle compressor is available, there should be sufficient compressed air capacity to support air demand. .... ☐
- Service Air Compressors 1B and 2B are **NOT** designed to individually carry the full system demand of both units when the cross tie valves are open. .... ☐

(1) **Obtain** permission from the unaffected unit's CRS to cross-tie the Service Air Systems. .... ☐

4.2 Supplementary Actions (continued)

(2) **Ensure** 2-SA-PV-5071 (Cross-Tie Valve) on Unit 2 Panel XU-2, is OPEN ☐

(3) **Ensure** 1-SA-PV-5071 (Cross-Tie Valve) on Unit 1 Panel XU-2, is OPEN ☐

(4) IF the uninvolved unit's air systems are adversely affected,
THEN perform the following at the direction of the Unit CRS or Reactor Operator:

- IF Service Air Dryer 1B is in standby,
  OR in service on Unit 1,
  THEN close 2-SA-PV-5071 (Cross-Tie Valve), using the control switch located on Unit 2 Panel XU-2 ☐

  OR

- IF Service Air Dryer 1B is in service on Unit 2,
  THEN close 1-SA-PV-5071 (Cross Tie Valve), using the control switch located on Unit 1 Panel XU-2. ☐

g. **Trip** the affected unit's air compressors ☐

NOTE

A total loss of TBCCW is defined as system pressure less than 42 psig with all available pumps operating and expectations are that normal cooling can **NOT** be quickly re-established ☐

7. IF there has been a total loss of TBCCW,
THEN:

a. **Insert** a manual scram ☐

b. **Enter** 1EOP-01-RSP(2EOP-01-RSP), Reactor Scram Procedure **AND perform** concurrently with this procedure ☐

6.3.16 Initiation Of A Manual Runback

NOTE

The Man Runback feature is enabled only when both Recirc Pumps are operating at greater than 54.8% speed. ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

1. **Confirm** the following Initial Conditions are met:
   - Manual Runback Enabled white light on Panel P603 is ON ________
   - Immediate power reduction is required, which reduces total core flow to 47 mlb/hr, or ________
   - The Unit CRS directs initiation of a Manual Runback ________

NOTE

A Manual Runback lowers both Recirc Pump speeds at 100 rpm/second to 53.6% speed, which results in approximately 47mlb/hr core flow. The Manual Runback can be reset by depressing the Man Runback pushbutton a second time. ☐

2. **Depress** the Man Runback pushbutton ________
3. **Confirm** the following:
   a. Both Recirc Pump speeds are lowering ________
   b. The Manual Runback Enabled light is flashing ________
   c. 2-A-06, 3-2 (2-A-07, 2-4), Recirc Flow A(B) Limit, annunciator is ON ________
   d. Resultant Core Flow is approximately 47 mlb/hr, unless manually RESET ________

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

4. **Go to** 2AOP-04.0, Low Core Flow ________

EVENT 6: MCC 2TD LOSS / STATOR COOLING STANDBY PUMP FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 2** to trip the feeder breaker to MCC 2TD.
	If requested to place the 1D Air Compressor in lead **Activate Remote AI_2DLEAD**, DELTA SA-CS-7892 (LEAD/LAG SWITCH) to 1D LEAD, 2D LAG

Simulator Operator Role Play	
	When asked as the TB AO to investigate the 2F feeder breaker trip, report a trip of the feeder breaker to MCC 2TD, (ATO) on 480V Substation 2F is tripped with the white overcurrent indicating flag protruding from the breaker.
	If asked as I&C to investigate, acknowledge any requests for MCC trip / Auto start failure. If asked do not recommend re-energizing 2TD until an investigation can be completed.
	If asked to investigate/acknowledge the 2B RFP alarm, acknowledge the local panel alarm and report that the alarm on the local panel is “HPU Pump 2 Running in Stby”. If asked the standby pump is operating with no problems noted.
	If dispatched to verify proper operation of the standby Stator Water Cooling Water Pump or the 2B air compressor, report no problems with the operation of the pump/compressor are noted.
	If contacted as U1, report that the 1D air compressor is running as lag compressor. If asked to place the 1D Air Compressor in lead, after SIM OP activates remote, report 1D air compressor has been placed in lead.

Evaluator Notes	
Plant Response:	The crew will respond to a trip of MCC 2TD with the standby stator cooling water pump failure to auto start. The standby stator cooling water pump can be manually started. The 2D air compressor will also be lost (loss of controls) and 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures, may be entered.
Objectives:	SRO - Direct the standby Stator Cooling Water pump to be started. RO - Start the standby Stator Water Cooling pump identify 2D air compressor failure.
Success Path:	Standby Stator Cooling Water Pump started and actions of 0AOP-20.0 Pneumatic (Air/Nitrogen) System Failures, addressed.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: MCC 2TD LOSS / STATOR COOLING STANDBY PUMP FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Acknowledges report of alarms received/cleared for the BOP/RO.	
		Directs BOP operator to start the standby stator water cooling pump.	
		May ask for I&C to investigate 1) The trip of the feeder breaker to 2TD 2) The failure of the standby Stator Water Cooling pump to auto-start.	
		May direct entry into 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures,.	
		May review the load list for MCC 2TD (0OI-50.11).	
		May conduct a brief (see Enclosure 1 on page 51 for format)	
	ATC	Monitors the plant.	

EVENT 6: MCC 2TD LOSS / STATOR COOLING STANDBY PUMP FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Report alarms to the CRS. UA-6, 2-5 – Sub 2F 480V Feeder Bkr Trip UA-13, 6-6 – RFP B Control Trouble UA-2, 1-8 – Stat coolant Inlet Flow-Low UA-2, 1-9 – Loss of Stat Coolant Trip Ckt Ener UA-2, 2-8 – Stat Coolant Press-Low UA-2, 6-9 – Exciter Coolant Flow-Low	
		Start the standby Stator Water Cooling Pump. UA-2, 4-9 – Stator Cool Reserve Pump Running will annunciate on starting of the standby pump and then will clear when the 2B pump is placed in off.	
		Dispatch an AO to investigate the Sub 2F Feeder Breaker Trip.	
		May dispatch an AO to verify proper operation of the Stator Water Cooling pump that was started.	
		May Dispatch an AO to investigate the alarm on the 2B RFP.	
		May enter and announce 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures, for the trip of 2D Air Compressor. May ask Unit One to place the 1D Air Compressor in the lead position. May place the 2D A/C in Stop.	

EVENT 7: LOOP / SCRAM / DG FAILURES	
Simulator Operator Actions	
	At the discretion of the lead evaluator, **Initiate Trigger 6** to active the LOOP.
	Acknowledge and silence Fireworks alarms Acknowledge Unit 1 alarms as needed.
	If directed to align RBCCW to CSW cooling, wait 4 minutes and **Initiate Trigger 7.**
	If directed to restart RPS MG sets, wait 3 minutes and insert the following as requested: For RPS A **Initiate Trigger 8** and/or for RPS B **Initiate Trigger 9**.
	If directed to swap AB panels **Initiate Trigger 10** and inform Sim Role Player when timed out.
	If directed to rack in 480V cross-tie breakers **Initiate Trigger 15**

Simulator Operator Role Play	
	If requested to monitor DGs, acknowledge alarms on DG local Alarm Panel (Instructor Aids/Panels) and report alarms if requested
	If directed to align RBCCW to CSW cooling, wait 4 minutes and inform Sim Operator to align RBCCW to CSW cooling then report valve open.
	If directed to restart RPS MG sets, wait 3 minutes and inform Sim Operator to restart RPS then report actions complete.
	If directed as RBAO to ensure BFIV latching mechanisms are disengaged, wait two minutes, then report latches are disengaged.
	If requested to transfer 2AB, 32AB, 2AB-RX, acknowledge request, inform Sim operator and when the remotes are timed out inform the control room the action is complete.
	If directed to cross-tie 480V after remote timers time out report breakers racked in.

Evaluator Notes	
Plant Response:	The crew will respond to a Loss of Offsite Power. The reactor will scram on MSIV closure on the LOOP. DG 4 will fail to auto start on the LOOP signal. DG3 will trip on Diff O/C. The BOP operator will start DG 4 to energize Bus E4.
Objectives:	SRO - Direct actions of AOP-36.1 RO - Start DG4. Perform scram immediate operator actions.
Success Path:	Scram immediate operator actions are complete and E4 energized.

EVENT 7: LOOP / SCRAM / DG FAILURES			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct AOP-36.1 entry.	
		Direct DG4 started.	***CRITICAL TASK #1***
		Contacts Maintenance for failure of DG3 and failure of DG4 to auto start.	
		Enters and directs actions of RVCP: ☐ Direct control of reactor pressure using SRVs (establishes pressure band 800 – 1000 psig) ☐ Direct water level band of 170 – 200 inches	
		Enters and directs actions of PCCP: ☐ Monitor and control Suppression Pool temperature below 95 deg F. ☐ Direct starting available RHR Loops in Suppression pool Cooling as necessary to maintain temp below 95 F. ☐ Monitor HCTL ☐ Direct operation of available drywell coolers ☐ Verify RCC operation and alignment to the drywell	

EVENT 7: LOOP / SCRAM / DG FAILURES

Time	Pos	EXPECTED Operator Response	Comments
	ATC	**Unit 2 SCRAM Immediate Actions** 1. **Ensure** SCRAM valves OPEN by manual SCRAM or ARI initiation. 2. **WHEN** steam flow less than 3.0 Mlb/hr, **THEN place** reactor mode switch in SHUTDOWN. 3. **IF** reactor power below 2% (APRM downscale trip), **THEN trip** main turbine. 4. **Ensure** master RPV level controller setpoint at +170 inches. 5. **IF** Two reactor feed pumps running **AND** • RPV level above +160 inches **AND** • RPV level rising, **THEN trip** one.	
		Communicate scram report to CRS Place SULCV in service (See Enclosure 4 page 55) Insert Nuclear Instrumentation Ensure Turbine Oil System Operating Ensure Reactor Recirculation Pumps at 34% Ensure Heater Drain Pumps tripped Maintain reactor water level between 170 – 200 inches	
		Place RHR Loops in Suppression pool Cooling as necessary (see Enclosure 3 page 53)	
		Control reactor pressure 800 – 1000 psig	

EVENT 7: LOOP / SCRAM / DG FAILURES

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Diagnose failure of DG4	
		Start DG4	***CRITICAL TASK #1***
		Diagnose and report to the SRO DG3 tripped and Locked out.	
		Perform the following 0AOP-36.1 actions:	
		Dispatch AO to monitor DGs	
		Momentarily place DIV I NON-INTRPT RNA, SV-5262 control switch to OVERRIDE/RESET, then to OPEN, and ensure DIV I NON-INTRPT RNA, SV-5262 opens.	
		May start the CRD system in accordance with OP-08, Section 8.17, or it may be started IAW SEP-09.	
		Ensure the associated NSW and CSW pumps are operating.	
		Direct an AO to swap the AB panels to their alternate source.	
		Ensure 125V and 24V DC battery chargers return to service for each energized 480V E Bus.	
		Perform the following to transfer RBCCW HXs from the NSW header to the CSW header: ☐ Confirm CSW system available. Ensure at least one of the following is closed: ☐ RBCCW HX SERVICE WATER INLET VALVE,SW-V103 ☐ RBCCW HX SERVICE WATER INLET VALVE, SW-V106 ☐ Direct an AO to open CONVENTIONAL HEADER TO RBCCW HEAT EXCHANGERS SUPPLY VALVE,SW-V146.	

EVENT 7: LOOP / SCRAM / DG FAILURES

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Continue 0AOP-36.1 actions:	
		Ensure Control Building Ventilation started on the affected unit:	
		Perform the following to restore drywell cooling: ☐ If three RBCCW pumps are running, then STOP one RBCCW pump, and place its control switch in AUTO. ☐ If only one RBCCW pump is running, then START a second pump, if available. ☐ If no RBCCW pump is running, then place all RBCCW pump control switches in OFF, and perform one of the following:	
		IF any local drywell temperature is currently greater than the starting temperature limit OR has exceed the starting temperature limit since the initiation of the event, then perform 2OP-21, Section 8.6. IF all local drywell temperatures have remained less than the starting temperature limit since the initiation of the event, then perform 2OP-21, Section 5.2.	
		ENSURE all available drywell coolers on the affected unit are operating.	
		IF HPCI is running with suction from the CST AND CST level indication is NOT available in the Control Room or Radwaste, then monitor CST level locally and report level every hour.	
		Start RPS MG Sets A(B) in accordance with OP-03, Section 5.2	
		May direct for 480V busses to be cross-tied. (E8 to E7). Closes breakers after they are racked in by the AO.	

EVENT 7: LOOP / SCRAM / DG FAILURES

Time	Pos	EXPECTED Operator Response	Comments
	BOP	Continue 0AOP-36.1 actions:	
		Perform the following to start the Reactor Building HVAC: ☐ If PROCESS OG VENT PIPE RAD HI-HI (UA-03, 5-4) is in alarm, and is NOT the result of a valid high radiation signal, then place CAC PURGE VENT ISOL OVRD, CAC-CS-5519, in OVERRIDE Reset the following Reactor Building Ventilation Radiation Monitors on Panel H12-P606: ☐ PROCESS REACTOR BLDG VENTILATION RADIATION MONITOR A, D12-RM-K609A ☐ PROCESS REACTOR BLDG VENTILATION RADIATION MONITOR B, D12-RM-K609B. Depress the following Isolation Reset Groups push buttons: ☐ ISOLATION RESET GROUPS 1, 2, 3, 6, 8, A71-S32 ☐ ISOLATION RESET GROUPS 1, 2, 3, 6, 8, A71-S33. ☐ Ensure Instrument Air header pressure is greater than 95 psig. ☐ Ensure BFIV latching mechanisms are disengaged. (Local). ☐ Open RB VENT INBD ISOL VALVES, A-BFIV-RB and C-BFIV-RB. ☐ Open RB VENT OTBD ISOL VALVES, B-BFIV-RB and D-BFIV-RB. Start three sets of Reactor Building Ventilation Fans in accordance with OP-37.1, Section 8.8 to maintain Reactor Building static pressure negative.	

EVENT 8: SRV FAILURE /TAILPIPE BREAK / ED - PSP / TERMINATION	
	Simulator Operator Actions
	Initiate Trigger 11, to fail the SRV (before reactor pressure lowers below 565 psig).
	When contacted to pull SRV F fuses **Initiate Trigger 12**. (this also fails the downcomer)
	When directed by the Lead Evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

	Simulator Operator Role Play
	If contacted to pull fuses for SRV F IAW AOP-30.0, wait 2 minutes have SIM OP **Initiate Trigger 12** and report that the Fuses for SRV F have been pulled.

Evaluator Notes	
Plant Response:	An SRV will fail open and then the tailpipe will break causing a violation of PSP requiring the plant to be emergency depressurized.
Objectives:	SRO - Directs actions for Emergency Depressurization. RO - Perform Emergency depressurization.
Success Path:	Emergency depressurization performed.
Scenario Termination:	***When emergency depressurization has been performed and RPV pressure is less than 100 psig, the scenario may be terminated.***
Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.	

EVENT 8: SRV FAILURE /TAILPIPE BREAK / ED - PSP / TERMINATION

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs announcement of 0AOP-30.0.	
		Direct level maintained 170 – 200 inches.	
		Directs Emergency Depressurization when PSP is violated. (see Enclosure 2 on page 52)	***CRITICAL TASK #2***
	ATC	Maintains level as directed by the CRS.	
		Maintains reactor pressure as determined by the CRS. Informs CRS of SRV F failure to close.	
		Announces and enters 0AOP-30.0. Attempts to cycle control switch for stuck open SRV. Directs WCCSRO to pull fuses for SRV F	
		Performs Emergency Depressurization when directed by the CRS. ☐ Controls RPV Injection as reactor pressure lowers. ☐ Defeat Group 10 isolation. ☐ Open 7 ADS Valves.	***CRITICAL TASK #2***
	BOP	Continues 0AOP-36.1 actions. (see actions in event 7)	

ENCLOSURE 1 Page 1 of 1

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ATTACHMENT 8
Page 1 of 1

<< Crew Brief Template >>

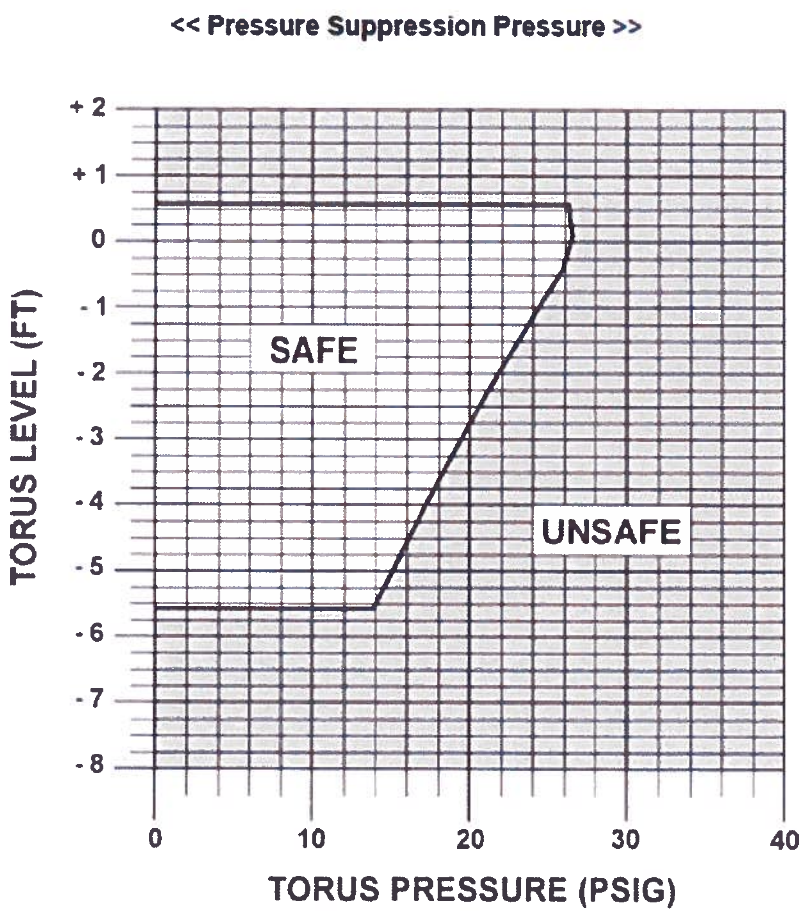
Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ENCLOSURE 2



<< Pressure Suppression Pressure >>
+ 2
+ 1
0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
TORUS LEVEL (FT)
SAFE
UNSAFE
0
10
20
30
40
TORUS PRESSURE (PSIG)

ENCLOSURE 3

<< Emergency Suppression Pool Cooling Using Loop A (2OP-17) >>

NOTE

This attachment is not to be used for normal system operations. .... ☐

Start RHR SW A LOOP (CONV)

Open SW-V101 ☐

Close SW-V143 ☐

Start CSW PUMPS AS NEEDED ☐

IF LOCA SIGNAL IS PRESENT,
THEN place RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐

Start RHR SW PMP ☐

Adjust E11-PDV-F068A ☐

Establish CLG WTR TO VITAL HDR ☐

Start ADDITIONAL RHR SW PUMP and **adjust** FLOW AS NEEDED ☐

Start RHR SW A LOOP (NUC)

Open SW-V105 ☐

Open SW-V102 ☐

Close SW-V143 ☐

Start PUMPS ON NSW HDR AS NEEDED ☐

IF LOCA SIGNAL IS PRESENT,
THEN place RHR SW BOOSTER PUMPS A & C LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐

Start RHR SW PMP ☐

Adjust E11-PDV-F068A ☐

Establish CLG WTR TO VITAL HDR ☐

Start ADDITIONAL RHR SW PUMP and **adjust** FLOW AS NEEDED ☐

Start RHR LOOP A

IF LOCA SIGNAL IS PRESENT,
THEN ☐
Verify COOLING LOGIC IS MADE UP

IF E11-F015A IS OPEN,
THEN close E11-F017A ☐

Start LOOP A RHR PMP ☐

Open E11-F028A ☐

Throttle E11-F024A ☐

Throttle E11-F048A ☐

Start ADDITIONAL LOOP A RHR PMP and **adjust** FLOW AS NEEDED ☐

ENCLOSURE 3 Page 2 of 2

<< Emergency Suppression Pool Cooling Using Loop B (2OP-17) >>

NOTE

This attachment is not to be used for normal system operations. .... ☐

Start RHR SW B LOOP (NUC)

- **Open** SW-V105 ☐
- **Close** SW-V143 ☐
- **Start** CSW PUMPS AS NEEDED ☐
- **IF** LOCA SIGNAL IS PRESENT, **THEN place** RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- **Start** RHR SW PMP ☐
- **Adjust** E11-PDV-F068B ☐
- **Establish** CLG WTR TO VITAL HDR ☐
- **Start** ADDITIONAL RHR SW PUMP and **adjust** FLOW AS NEEDED ☐

Start RHR SW B LOOP (CONV)

- **Open** SW-V101 ☐
- **Open** SW-V102 ☐
- **Close** SW-V143 ☐
- **Start** PUMPS ON NSW HDR AS NEEDED ☐
- **IF** LOCA SIGNAL IS PRESENT, **THEN place** RHR SW BOOSTER PUMPS B & D LOCA OVERRIDE SWITCH TO MANUAL OVERRIDE ☐
- **Start** RHR SW PMP ☐
- **Adjust** E11-PDV-F068B ☐
- **Establish** CLG WTR TO VITAL HDR ☐
- **Start** ADDITIONAL RHR SW PUMP and **adjust** FLOW AS NEEDED ☐

Start RHR LOOP B

- **IF** LOCA SIGNAL IS PRESENT, **THEN** ☐ **Verify** COOLING LOGIC IS MADE UP
- **IF** E11-F015B IS OPEN, **THEN close** E11-F017B ☐
- **Start** LOOP B RHR PMP ☐
- **Open** E11-F028B ☐
- **Throttle** E11-F024B ☐
- **Throttle** E11-F048B ☐
- **Start** ADDITIONAL LOOP A RHR PMP and **adjust** FLOW AS NEEDED ☐

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2 S/1064

ENCLOSURE 4

Feedwater Level Control Following a Reactor Scram (EOP)

NOTE:	**This attachment is not to be used for routine system operation**

1. **ENSURE** the following:
   - FW-V6 **AND** FW-V8 **OR** FW-V118 **AND** FW-V119 closed ☐
   - FW-FV-177 closed ☐
   - FW-V120 closed ☐
   - FW control MODE SELECT in 1 ELEM ☐
   - SULCV in M (MANUAL) closed ☐
   - B21-F032A **AND/OR** B21-F032B open ☐
2. **PLACE** the MSTR RFPT SP/RX LVL CTL in M (MANUAL), THEN: ☐
   - **ADJUST** to 187" ☐
3. **IF** any RFP is running, **THEN**:
   a. **PLACE** RFP A(B) Recirc Vlv, control switch to open ☐
   b. **PLACE** RFPT A(B) SP CTL in M (MANUAL) ☐
4. **IF** no RFP is running, **THEN**:
   a. **PLACE** RFP A(B) RECIRC VLV, control switch to open ☐
   b. **ENSURE** the following:
      - FW-V3(V4) [RFP A(B) Disch Vlv] open ☐
      - RFPT A(B) SP CTL in M (MANUAL) at lower limit ☐
      - RFPT A(B) Man/DFCS control switch in MAN ☐
      - Reactor water level is less than +206 inches **AND** RFPT A&B HIGH LEVEL TRIP reset ☐
   c. **DEPRESS** RFPT A(B) RESET ☐

ENCLOSURE 4

Feedwater Level Control Following a Reactor Scram (EOP)

d. **ENSURE** RFPT A(B) LP **AND** HP STOP VLVS open .... ☐

e. **ROLL** RFPT A(B) to 1000 rpm by depressing RFP A(B) START .... ☐

f. **RAISE** RFPT A(B) to at least 2550 rpm using the LOWER/RAISE control switch .... ☐

g. **DEPRESS** RFPT A(B) DFCS CTRL RESET .... ☐

5. **ENSURE** MAN/DFCS control switch in DFCS .... ☐

6. **RAISE** RFPT A(B) SP CTL speed until discharge pressure is greater than or equal to 100 psig above reactor pressure .... ☐

7. **ADJUST** SULCV to establish desired injection .... ☐

8. **IF** desired, **THEN PLACE** SULCV in A (AUTO) .... ☐

9. **IF** needed, **THEN THROTTLE** FW-V120 .... ☐

10. **IF** needed, **THEN GO TO** 2OP-32, Condensate And Feedwater System Operating Procedure, for level control .... ☐

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	8
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	4
Major Transients	1-2	2
EOPs Used	1-2	2
EOP Contingency	0-2	1
Run Time	60-90 min	90
Crew Critical Tasks	2-3	3
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	100%	Mode:	1
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	49.7 hrs			Days Online:	80 days
Turnover:	Feedwater Temperature Reduction will be implemented this weekend				
Protected Equipment:	2A FPC Pump/Hx, 2D RCC Pump, and 2A Demin Transfer Pump for Fuel Pool Decay Heat Removal and inventory makeup. 2A/B NSW Pumps due to 1A NSW pump maintenance				
Comments:	1A NSW Pump is under clearance for planned maintenance. 2C TCC Pump is in service on Unit One. APRM 2 failed downscale and bypassed. The BOP is to start CREV in the area high radiation mode for inspection testing IAW 0OP-37, Section 6.1.3. (The inspection is scheduled to take three hours)				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2016 NRC SCENARIO 5

PLACE RFP IN AUTO, DIFF TO MOVE ROD, SPE TRIP, IRM FAILURE, DG3/E3/E7 CP LOSS, LOWERING TORUS LEVEL, RHR/CS FAILURES, ED (TORUS LVL)

REVISION 0

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REVISION SUMMARY	
0	Scenario developed for 2016 NRC Exam.

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1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1		N-BOP	Place 2A RFPT level control in automatic
2		R-ATC	Raise reactor power using control rods
3	RD032M	C-ATC C-CRS	Difficult to move control rod (AOP)
4	K4510C	C-BOP C-CRS	Steam Packing Exhauster Trip
5	NI018F	C-ATC C-CRS	IRM Failure (TS)
6	ED_IADCGJ6	C-BOP C-CRS	DG3 / E3 / E7 Control Power loss (AOP)(TS)
7	CA002F	M C	Lowering Torus Level / RHR F028A mech trip / RHR F024B thermal trip / CS F020A Handwheel broke (PCCP)
8	RP008F	M	Scram / Emergency Depressurization (RSP)(ATWS)(EDP)
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	Step 6.3.46 of 0GP-02, Approach to Criticality and Pressurizations of the Reactor will be completed starting at Step 6.3.46.
2	The crew will raise power by pulling control rods in preparation for placing the Mode switch to RUN. Rod pulls will commence at Step 161 (42-39 @ 12) of the A2X sequence.
3	Control rods will continue to be withdrawn raising power. When control rod 42-23 is selected for withdrawal, it will be stuck at position 12. AOP-02 may be entered and 2OP-07, Section 8.2 actions are required to withdraw a difficult intermediate control rod.
4	SPE 2A will trip causing a loss of gland sealing header pressure. SPE 2B will be placed in service
5	While withdrawing control rods, IRM C will fail upscale causing a rod block and half scram. SRO will address IRM A and C inoperability IAW TS 3.3.1.1. Once addressed, I&C will report IRM A is ready to be returned to service following proper channel check. The crew will take the actions of the APP and bypass IRM C and reset the half scram.
6	DC Panel 2A will trip resulting in loss of control power to DG3, Bus E3 and Bus E7. The crew will respond per 0AOP-39.0 and transfer the control power to alternate. DG3, Bus E3 and Bus E7 are inoperable until transferred to alternate supply. Once control power is transferred, a 7 day action is required to restore to the normal source. The BOP operator will return DG3 to AUTO IAW AOP-39.0.
7	Torus level will begin to lower due to an unisolable leak on RHR suction. If attempted to raise torus water level, on RHR A loop the E11-F028A (Torus Discharge Isol Vlv) will trip when opened, on RHR B loop the E11-F024B (Torus Cooling Isol Vlv) will thermal trip when opened, and on Core Spray the E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank) handwheel will be broke.
8	Before level reaches -5.5 feet in the torus a reactor scram is required. When torus water level reaches -5.5 feet emergency depressurization is required. The crew can anticipate emergency depressurization.

3.0 CREW CRITICAL TASKS

Critical Task #1
Insert a reactor manual scram before torus water level drops below -5.5 feet.
Critical Task #2
Place seven SRV switches in open before torus water level drops below -8 feet.

4.0 TERMINATION CRITERIA

When all rods are inserted and the reactor has been depressurized to less than 100 psig the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

NOTE: Refer to the most current revision of each Implementing Reference.

Number	Title
UA-02, 4-5	GLAND SEAL VACUUM LOSS
2OP-26.1, Section 8.1	SHIFTING STEAM PACKING EXHAUSTERS
A-05, 2-4	IRM UPSCALE
A-05, 3-4	IRM A UPSCALE/INOP
A-05, 1-7	REACTOR AUTO SCRAM SYS A
A-05, 4-7	NEUT MON SYS TRIP
A-05, 2-2	ROD OUT BLOCK
UA-17, 2-3	DG-3/E3 ESS LOSS OF NORM POWER
UA-19, 6-3	DG-1 CTL PWR SUPPLY LOST
UA-21, 6-2	DG-3 LO START AIR PRESS
UA-21, 6-3	DG-3 CTL POWER SUPPLY LOST
0AOP-39.0	LOSS OF DC POWER
A-01, 3-7	SUPPRESSION CHAMBER LVL HI/LO
A-05, 5-5	PRI CMT HI/LO PRESS
0EOP-01-SEP-18	FILLING THE TORUS
0EOP-01-SEP-15	ANTICIPATE EMERGENCY DEPRESSURIZATION

6.0 SETUP INSTRUCTIONS

1. **PERFORM** TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 5, Checklist for Simulator Exam Security.
2. **RESET** the Simulator to IC-06.
3. **ENSURE** the RWM is set up as required for the selected IC.
4. **ENSURE** appropriate keys have blanks in switches.
5. **RESET** alarms on SJAE, MSL, and RWM NUMACs.
6. **ENSURE** no rods are bypassed in the RWM.
7. **PLACE** all SPDS displays to the Critical Plant Variable display (#100).
8. **ENSURE** hard cards and flow charts are cleaned up
9. **TAKE** the SIMULATOR OUT OF FREEZE,
10. **CLOSE** the CS B Loop valves
11. **LOAD** Scenario File.
12. **ALIGN** the plant as follows:

Manipulation
Insert control rods up to Step 160 of GP-10, Sequence A2X is completed.
Raise pressure set to 900 psig
Verify level is stable
Verify drive water pressure is at 260 psid.
Set V177 to approximately ½ Mlbms flow

13. **IF desired**, take a **SNAPSHOT** and save into an available IC for later use.
14. **PLACE** a clearance on the following equipment.

Component	Position
IRM A (Blue Tag)	Bypassed
Core Spray Loop B	Red Tag

15. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:
    a. ADHR / FPC/ Demin Transfer Pump
    b. All remaining LP ECCS systems

16. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

17. **ENSURE** all materials in the table below are in place and marked-up to the step identified.

Required Materials
0GP-02 up to Step 6.3.46 (excluding step 42) (mark step 47 complete)
0GP-10 up to step 161

18. **ADVANCE** the recorders to prevent examinees from seeing relevant scenario details.

19. **PROVIDE** Shift Briefing sheet for the CRS.

20. **VERIFY** all actions contained in TAP-409, Miscellaneous Simulator Training Guidelines, Attachment 4, Simulator Training Instructor Checklist, are complete.

7.0 INTERVENTIONS

TRIGGERS

Trig	Type	ID
4	DI Override	K4510C - [STM PACKING EXHAUSTER A CLOSE DI]
4	DI Override	K4510C - [STM PACKING EXHAUSTER A CLOSE DI]
4	DI Override	K4510C - [STM PACKING EXHAUSTER A CLOSE DI]
5	Malfunction	NI018F - [IRM C FAILS HI]
6	Remote Function	ED_IADCGJ6 - [LOAD BKR GJ6 SBD 2A TO 125V P 2A (DG)]
7	Remote Function	ED_IADCAPD3 - [DG-3 DC BKR CTL PWR ON/OFF]
7	Remote Function	EG_0003 - [DG-3 LOCKOUT RESET]
7	Remote Function	ED_IADCADG3 - [DG-3 DC BKR CTL PWR (NML=2A ALT=U1)]
8	Remote Function	ED_IADCABE3 - [SWGR E3 DC BKR CTL PWR (NML=2A ALT=U1)]
10	Malfunction	CA002F - [TORUS WATER LEAK]
11	Trigger Command	DOD:Q1217LGN
12	Trigger Command	DOD:Q1707LGN

Trig #	Trigger Text
11	K1217ENN - [TORUS ISO VLV E11-F028A]
12	K1707JNN - [FULL FLOW VLV E11-F024B]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RD032M	42-23	CONTROL ROD WITHDRAWAL SLUGGISH	True	True				
NI018F		IRM C FAILS HI	False	True				5
CA002F		TORUS WATER LEAK	False	True				10
RD012M	42-23	STUCK CONTROL ROD	True	True				

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
_IABKCF06		BKR CTL DC FUSES CORE SPRAY PUMP 2B	OUT	OUT			
CS_ZVCS31BT		E21-F031B MIN FLOW	OFF	OFF			
CS_ZVCS15BT		E21-F015B FULL FLOW TEST	OFF	OFF			
CS_ZVCS05BT		E21-F005B INBD INJ VLV	OFF	OFF			
CS_ZVCS04BM		E21-F004B OTBD INJ VLV	OFF	OFF			
CS_ZVCS01BT		E21-F001B TORUS SUCTION	OFF	OFF			
CS_VHCS10B		E21-F010B OPEN/CLOSE	CLOSE	CLOSE			
ED_IADCGJ6		LOAD BKR GJ6 SBD 2A TO 125V P 2A (DG)	CLOSE	OPEN			6
ED_IADCADG3		DG-3 DC BKR CTL PWR (NML=2A ALT=U1)	NORMAL	ALT			7
ED_IADCABE3		SWGR E3 DC BKR CTL PWR (NML=2A ALT=U1)	NORMAL	ALT			8
EG_0003	DG-3	DG-3 LOCKOUT RESET	NORMAL	RESET		00:00:02	7
RH_ZVRH24BT		E11-F024B FULL FLOW TEST	OFF	OFF			
RH_ZVRH28AM		E11-F028A TORUS ISOLATION	OFF	OFF			
ED_IADCAPD3		DG-3 DC BKR CTL PWR ON/OFF	ON	ON		00:00:01	7

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4510C	STM PACKING EXHAUSTER A CLOSE DI	NORMAL	ON	OFF				4
K4510C	STM PACKING EXHAUSTER A CLOSE DI	START	OFF	OFF				4
K4510C	STM PACKING EXHAUSTER A CLOSE DI	STOP	OFF	ON				4
Q1217LGN	TORUS ISO VLV E11-F028A GREEN	ON/OFF	OFF	ON				
Q1707LGN	FULL FLOW E11-FO24B GREEN	ON/OFF	OFF	ON				

OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: PLACING 2A RFPT CONTROLLER IN AUTOMATIC	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	Place RFPT Master Controller in Automatic IAW 0GP-02, Step 6.3.46
Objectives:	SRO – Direct BOP to perform Step 6.3.46 of 0GP-02 BOP – Place RFPT Level Controller is placed in Automatic ATC – Monitors plant
Success Path:	RFPT Master Level Controller is in Automatic and Reactor water level is controlled in band.
Event Termination:	Go to Event 2 at the direction of the Lead Evaluator.

EVENT 1: PLACING 2A RFPT CONTROLLER IN AUTOMATIC

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct BOP to perform Step 6.3.46 of 0GP-02	
	RO	Monitors the plant	
	BOP	Place RFPT Master Controller in Automatic IAW 0GP-02, Step 6.3.46.	

6.3 Heating And Pressurization Of The Reactor (continued)

e. B21-F019 (Main Steam Line Drain Otbd Isol Vlv) .... ____/____
IV

f. B21-F016 (Main Steam Line Drain Inbd Isol Vlv) .... ____/____
IV

46. **WHEN** reactor feed pump discharge pressure is greater than 900 psig, **THEN place** C32-SIC-R600 (Mstr RFPT Sp/Rx Lvl Ctl) in A (automatic) as follows: .... ________

a. **Ensure** C32-SIC-R600 (Mstr RFPT Sp/Rx Lvl Ctl), in M (manual) .... ________

b. **Ensure** Feedwater Control Mode Select in 1 ELEM .... ________

c. **Depress** SEL pushbutton on C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] until A(B) BIAS is indicated and **ensure** bias is set to 0% .... ________

d. **Depress** SEL pushbutton on C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] until PMP A(B) DEM is displayed .... ________

e. **Depress** SEL pushbutton on C32-SIC-R600 (Mstr RFPT Sp/Rx Lvl Ctl), until MASTR DEM is displayed .... ________

f. Using the raise and lower pushbuttons on C32-SIC-R600 (Mstr RFPT Sp/Rx Lvl Ctl), **set** MASTR DEM to equal the PMP A(B) DEM value displayed on C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] .... ________

g. **Depress** A/M pushbutton on C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] and **confirm** the following:

- Indicator on control station changes to A (automatic) .... ________
- PMP DEM signal remains unchanged .... ________

h. **Depress** SEL pushbutton on the out-of-service C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] until LVL ERROR is indicated and **confirm** LVL ERROR is approximately 0 inches .... ________

i. **Depress** A/M pushbutton on C32-SIC-R600 (Mstr RFPT Sp/Rx Lvl Ctl) and **confirm** the indicator on the control station changes to A (automatic) .... ________

6.3 Heating And Pressurization Of The Reactor (continued)

j. **Confirm** signals for PMP A(B) DEM on C32-SIC-R601A(B) [RFPT A(B) Sp Ctl] and VALVE DEM on FW-LIC-3269 (SULCV Ctl) remain unchanged .... ________

k. **Depress** A/M pushbutton on FW-LIC-3269 (SULCV Ctl) and **confirm** the indicator on the control station changes to M (manual) .... ________

CAUTION

Momentarily depressing the raise or lower pushbuttons on FW-LIC-3269 (SULCV Ctl) will cause valve demand to change in increments of 0.1%. Continually depressing the raise or lower pushbuttons will cause valve demand to change at an exponential rate. .... ☐

l. Using raise pushbutton on FW-LIC-3269 (SULCV Ctl), slowly **open** the SULCV until VALVE DEM is 100% .... ________

m. **Confirm** reactor water level is being maintained between 182 and 192 inches .... ________

EVENTS 2/3: RAISE REACTOR POWER / DIFF TO MOVE ROD	
Simulator Operator Actions	

Simulator Operator Role Play	
	If asked as the RE, continuous rod withdrawal is allowed.

Evaluator Notes	
Plant Response:	Control rods will continue to be withdrawn until control rod 42-23 which is difficult to move, requires OP-07 actions to move.
Objectives:	SRO - Directs and monitor reactor power ascension with control rods Direct actions for a difficult to move control rod. RO - Withdraw control rods to raise reactor power Perform 2OP-07 actions for difficult to move control rod
Success Path:	Control rod 42-23 withdrawn to position 48 by use of increase drive water DP.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENTS 2/3: RAISE REACTOR POWER / DIFF TO MOVE ROD

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs RO to continue to raise reactor power by withdrawing control rods. (Continuous withdrawal allowed).	
		Directs RO to perform 2OP-07.	
		May direct AOP-02 (Control Rod malfunction) – Provides notifying RE and Using 2OP-07 to move rod.	
		May conduct a brief (see Enclosure 1 on page 56 for format)	
	BOP	Monitor reactor plant parameters during evolution.	
	ATC	Continues rod withdrawal per GP-10 (see page 18) IAW guidance of 2OP-07 (see page 20).	
		Report A-6 2-7 *APRM DOWNSCALE* when annunciator clears.	
		Recognizes control rod 42-23 will not move.	
		Notifies SRO control rod 42-23 will not move.	
		Identifies 2OP-07, Reactor Manual Control System Operating Procedure, Section 6.3.2 (Control Rod Difficult to Withdraw, Control Rod NOT at Position 00) is required. (page 23)	
		Continues rod withdrawal per GP-10 IAW guidance of 2OP-07.	

ATTACHMENT 3A
Page 2 of 26
Rod Sequence A2X Withdraw Check Off Sheet (Expanded Group A2)

NOTES:

1. Concurrent verification of rod selection is required PRIOR to rod movement.

2. The initials in "O. T." column verify and document the following control rod coupling integrity checks have been performed:

   WHEN a control rod is withdrawn to the FULL OUT position, a continuous withdraw signal has been maintained for at least 3 to 5 seconds, **OR** a separate notch out signal has been applied, **AND**

   - *ROD OVER TRAVEL (A-05, 4-2)* annunciator does **NOT** alarm
   - *ROD DRIFT (A-05 3-2)* annunciator does **NOT** alarm
   - The Full Out light indication for the selected control rod is not lost
   - The four-rod display indicates 48 for the selected control rod

3. Initials in the "Rod P. I." column confirm that the rod position indications for those positions covered by that item of the check off sheet are operable. The RWM Inferred Rod Position capability may be used as an alternate method to determine Rod Position.

4. During manipulation of control rods a second Licensed Operator shall monitor control rod selection and movement. This individual shall ensure correct placement of control rods, and document these verifications by initialing the Rod Sequence Check Off Sheet. **IF** inoperable Rod Position indication necessitates inserting the rod in question one notch further than its insert/withdraw limit and bypassing the rod on the RWM, **THEN** the second Licensed Operator's initials also documents verification of this action.

R8 5. Any deviation from the original rod move sequence should be reviewed by the Reactor Engineer, authorized by the Unit CRS, and documented on the proper rod sequence check off sheet. For changes in direction or control rod double notches, the affected page(s) of the sequence pull sheet must be copied, rod move documented, then the documentation must be included with the original rod sequence attachment.

ATTACHMENT 3A
Page 10 of 26
Rod Sequence A2X Withdraw Check Off Sheet (Expanded Group A2)

Item	Rod Number	Correct Rod Selected And Verified [Note 1]	Position From/To	Actual Position	Initials	Over Travel [Note 2]	Rod P.I. [Note 3]	Initials [Note 4]	Comments
STEP 9 (BPWS 4)									
137	50-31	/	08 to 12			N/A			
138	42-07	/	08 to 12			N/A			
139	10-07	/	08 to 12			N/A			
140	02-31	/	08 to 12			N/A			
141	10-39	/	08 to 12			N/A			
142	18-47	/	08 to 12			N/A			
143	34-47	/	08 to 12			N/A			
144	42-39	/	08 to 12			N/A			
145	42-23	/	08 to 12			N/A			
146	34-15	/	08 to 12			N/A			
147	26-07	/	08 to 12			N/A			
148	18-15	/	08 to 12			N/A			
149	10-23	/	08 to 12			N/A			
150	18-31	/	08 to 12			N/A			
151	26-39	/	08 to 12			N/A			
152	34-31	/	08 to 12			N/A			
153	26-23	/	08 to 12			N/A			
STEP 10 (BPWS 4)									
154	50-31	/	12 to 48						
155	42-07	/	12 to 48						
156	10-07	/	12 to 48						
157	02-31	/	12 to 48						
158	10-39	/	12 to 48						
159	18-47	/	12 to 48						
160	34-47	/	12 to 48						
161	42-39	/	12 to 48						
162	42-23	/	12 to 48						
163	34-15	/	12 to 48						
164	26-07	/	12 to 48						
165	18-15	/	12 to 48						
166	10-23	/	12 to 48						
167	18-31	/	12 to 48						
168	26-39	/	12 to 48						
169	34-31	/	12 to 48						
170	26-23	/	12 to 48						

Notes (for further details, see Page 2 of this attachment):

1. Concurrent Verification of rod selection is required PRIOR to rod movement.
2. Initials in the "Over Travel" column signify completion of control rod coupling integrity checks for fully withdrawn control rods.
3. Initials in the "Rod P. I." column confirm that the rod position indications for those positions covered by that item of the check off sheet are operable.
4. Column used by a second Licensed Operator to document monitoring of control rod selection and movement to ensure correct placement of control rods.

<< (Reference Use) - Section 6.1.1 Continuous Control Rod Withdrawal >>

NOTE

The purpose of this attachment is to provide the Reactor Operator with guidance for control rod movement and use 0ENP-24.5, Reactivity Control Planning, and General Operating Procedure pull sheets as the place keeping tool for execution of steps. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

1. **Select** control rod by depressing its Control Rod Select pushbutton.

2. **Confirm** the following:

   - The backlighted Control Rod Select pushbutton is brightly ILLUMINATED.
   - The white indicating light on the full core display is ON.
   - Rod Withdrawal Permissive indication is ON

3. Continuously **withdraw** control rod to position designated on General Operating Procedure or 0ENP-24.5, Reactivity Control Planning, pull sheets by holding Emergency Rod In Notch Override switch to OVERRIDE, while simultaneously holding Rod Movement switch to NOTCH OUT.{8.1.2}

4. **Monitor** control rod position and nuclear instrumentation while withdrawing the control rod.

5. **IF** control rod fails to withdraw, **THEN go to** Section 6.3.1, Section 6.3.2, Section 6.3.7, or Section 6.3.8 to free the control rod and **return to** Attachment 15 Step 6.

<< (Reference Use) - Section 6.1.1 Continuous Control Rod Withdrawal >>

6. **IF** the control rod is being withdrawn to an intermediate position **THEN perform** the following:

   a. Before control rod reaches the position designated on General Operating Procedure or 0ENP-24.5, Reactivity Control Planning, pull sheets, **release** Rod Movement and Emergency Rod In Notch Override control switches.{8.1.2}.

   b. **Ensure** control rod settles into desired position.

   c. **Confirm** rod settle light is OFF.

7. **IF** the control rod is being fully withdrawn to position "48" **THEN perform** the following:

NOTE

A continuous withdraw signal of approximately 3 to 5 seconds is sufficient time to ensure the control rod remains coupled. Longer continuous withdraw signals may be utilized if a control rod flush is desired. .... ☐

   a. **WHEN** control rod reaches position "48", **THEN perform** either of the following:

      - **Maintain** a continuous withdraw signal for the desired time.

      - **Apply** a separate notch withdraw signal.

   b. **Confirm** control rod does **NOT** retract beyond position "48" (Technical Specification SR 3.1.3.4).

   c. **Release** Rod Movement and Emergency Rod In Notch Override switches, if used.

   d. **Ensure** control rod settles at position "48".

   e. **Confirm** rod settle light is OFF.

   f. **Confirm** control rod reed switch position indicators agree with FULL OUT indication on full core display.

<< (Reference Use) - Section 6.1.1 Continuous Control Rod Withdrawal >>

8. **Repeat** Attachment 15 Step 1 through Attachment 15 Step 7.f, of this Attachment, for the remainder of the control rods requiring movement, using General Operating Procedure or 0ENP-24.5, Reactivity Control Planning, pull sheets.{8.1.2}.

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

9. **WHEN** control rod movement is **NO** longer required **THEN** go to Section 6.1.1 Step 7.

6.3.2 Control Rod Difficult To Withdraw And Control Rod NOT At Position 00

Control Rod ________________

1. **Record** Control Rod Number above. .... ________

2. **Confirm** the following initial conditions are met:

   - All applicable prerequisites in Section 5.0 are met. .... ________
   - Control rod will **NOT** withdraw in accordance with Section 6.1.1. .... ________
   - Control rod is **NOT** at position "00". .... ________
   - Unit CRS has consulted Technical Specifications 3.1.3, Control Operability, and 3.3.2.1 Control Rod Block Instrumentation for the required actions prior to the performance of Section 6.3.2, Control Rod Difficult To Withdraw And Control Rod NOT At Position 00 .... ________ CRS

3. **Ensure** failure of the control rod to withdraw is **NOT** the result of a rod block from the RWM or RBM. .... ________

4. Notify the Reactor Engineer. .... ________

____
Reactor Engineer

CAUTION
If reactor pressure is less than or equal to 800 psig <u>and</u> higher than normal CRD drive water pressure is used to withdraw a control rod, then the latching function of the CRD may be lost. .... ☐

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

5. **Attempt** to withdraw the control rod using 300 psid drive header differential pressure as follows:

   a. **Raise** CRD drive differential pressure to 300 psid .... ________

   b. **Attempt** to withdraw control rod. .... ________

6.3.2 Control Rod Difficult To Withdraw And Control Rod NOT At Position 00 (continued)

c. IF control rod moves,
THEN immediately **restore** drive pressure to 260 to 275 psid and **attempt** to withdraw rod in accordance with Section 6.1.1. .... _______

- IF control rod will NOT continue to withdraw at normal drive pressure,
THEN return drive differential pressure to 300 psid and **withdraw** rod in accordance with Section 6.1.1. .... _______

d. IF control rod withdraws,
THEN go to Section 6.3.2 Step 16. .... _______

e. **Repeat** Section 6.3.2 Step 5.b and Section 6.3.2 Step 5.c, as necessary. .... _______

6. **Attempt** to withdraw control rod using 350 psid drive header differential pressure as follows:

a. **Raise** CRD drive differential pressure to 350 psid .... _______

b. **Attempt** to withdraw control rod .... _______

c. IF control rod moves,
THEN immediately **restore** drive pressure to 260 to 275 psid and **attempt** to withdraw rod in accordance with Section 6.1.1. .... _______

- IF control rod will NOT continue to withdraw at normal drive pressure,
THEN return drive differential pressure to 350 psid and **withdraw** the rod in accordance with Section 6.1.1. .... _______

d. IF control rod withdraws,
THEN go to Section 6.3.2 Step 16. .... _______

16. **Lower** control rod drive differential pressure to between 260 and 275 psid .... _______

EVENT 4: STEAM PACKING EXHAUSTER (SPE) TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 4** to trip the A SPE.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	If asked to investigate MCC 2TA for the SPE, report that compartment CA6, OG-SPEM-A (Steam Seal SPE Motor 2A) is tripped.
	If asked as AO to Open 2-MVD-V52 float trap outlet valve for 2B SPE report that the valve is Open.
	If asked as AO to Close 2-MVD-V51 float trap outlet valve for 2A SPE report that the valve is Closed.

Evaluator Notes	
Plant Response:	The SPE trips and the exhauster valves close. APP UA-2 4-5 Gland Seal Vacuum Loss annunciates. The BOP will start the B SPE and place in service to maintain vacuum.
Objectives:	SRO - Direct B SPE started. RO - Diagnose A SPE failure and Starts B SPE.
Success Path:	SPE B is started and vacuum returned to normal.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: STEAM PACKING EXHAUSTER (SPE) TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	CRS	Direct I&C to investigate	
		May direct entry into 0AOP-37.0, Loss of Condenser Vacuum.	
		Direct the B SPE to be started	
		May conduct a brief (see Enclosure 1 on page 56 for format)	
	ATC	Monitors the plant.	
	BOP	Acknowledges, refers to & reports annunciator UA-2 4-5 *GLAND SEAL VACUUM LOSS* May announce and enter 0AOP-37.0, Loss of Condenser Vacuum. Performs actions of APP (page 27) Starts standby SPE IAW 2OP-26.1 Section 6.3.1 (See page 28) Closes OG-MOV-D1 (Steam Seal SPE 2A MO Disch Vlv)	

GLAND SEAL VACUUM LOSS

AUTO ACTIONS

NONE

CAUSE

1. Steam packing exhauster not operating.
2. Steam packing exhauster suction/discharge valve throttled closed, so gland seal vacuum cannot be maintained.
3. Tube leaks in gland exhauster condenser.
4. Steam Seal Feed Valve or the Steam Packing Unloading valves are not controlling steam seal header pressure correctly.
5. Insufficient condensate flow through the steam packing exhauster.
6. Circuit malfunction.

OBSERVATIONS

1. Gland seal vacuum on OG-PI-EPT9-SPE below 5 inches of water.
2. Main condenser vacuum decreasing.
3. Increased off-gas flow.
4. Steam seal header pressure high.

ACTIONS

1. Start standby exhauster and adjust its discharge valve to maintain vacuum between 10 and 20 inches H_2O per 2OP-26.1.
2. If gland seal regulator is not operating properly, refer to 2APP-UA-02 3-5, STEAM SEAL REGULATOR PRESS-LOW.
3. Drain the loop seals on the in-service steam packing exhauster.
4. If steam seal header pressure is above 7 psig, check the Steam Seal Feed Valve MS-SSFV operating correctly as follows:
   a. Throttle closed, Mn Steam to Seals Vlv MVD-S1 to restore steam seal header pressure between 1.5 and 4.0 psig.
   b. If throttling the MVD-S1 was successful in restoring steam seal header pressure, then bypass the Steam Seal Feed Valve per 2OP-26.1 Section 6.3.
   c. If throttling the MVD-S1 was not successful then reopen MVD-S1 and bypass the Steam Seal Unloading Valve by throttling open Steam Seal Bypass Unload Vlv, MVD-B.
5. If moisture is suspected in Steam Packing Exhauster instrument lines, drain per 2OP-26.1 Section 6.2.

DEVICE/SETPOINTS

Pressure Switch OG-PS-VS-SPE	5 inches of water

6.3 <u>Infrequent Operation</u>

6.3.1 Shifting Steam Packing Exhausters

1. **Confirm** the following initial conditions are met:

   a. Gland Sealing Steam System is in operation per Section 6.1 ..... ________

   b. Condensate System is in service and is aligned to supply adequate flow to the SPE per 2OP-30 section for Swapping Off-Gas Trains During Normal Conditions .... ________

2. <u>IF</u> Steam Packing Exhauster SPE 2A is operating, <u>**THEN**</u> **perform** the following: .... ________

   a. **Open** 2-MVD-V52 (Float Trap Outlet Valve) for SEP 2B. .... ________

   b. **Start** Steam Packing Exhauster SPE 2B. .... ________

   c. **Ensure** OG-MOV-E2 (Steam Seal SPE 2B MO Inlet Vlv) is OPEN. .... ________

   d. **Throttle closed** OG-MOV-D1 (Steam Seal SPE 2A MO Disch Vlv) and **throttle open** OG-MOV-D2 (Steam Seal SPE 2B MO Disch Vlv) while maintaining OG-PI-EPT-9 (Steam Packing Exhauster Vacuum) located on Panel XU-2, between 10 and 20 inches water vacuum .... ________

   e. **Ensure** OG-MOV-D1 (Steam Seal SPE 2A MO Disch Vlv) is CLOSED. .... ________

   f. **Stop** Steam Packing Exhauster SPE 2A. .... ________

   g. **Close** 2-MVD-V51 (Float Trap Outlet Valve) for SPE 2A. .... ________

   h. **Ensure** OG-MOV-E1 (Steam Seal SPE 2A MO Inlet Vlv) is CLOSED. .... ________

EVENT 5: IRM C FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5**, to fail IRM C upscale.

Simulator Operator Role Play	
	If contacted as the RE for IRM C inoperability, acknowledge request.
	When IRM C inoperability has been addressed and by Lead Examiners direction, contact the control room as WCC SRO and report IRM A can be declared Operable following a satisfactory channel check. Once declared operable the off normal tag can be removed and the WCC will follow up with the paperwork.

Evaluator Notes	
Plant Response:	The crew will continue raising power by pulling control rods in preparation for placing the Mode switch to RUN. IRM C will fail upscale causing a rod block and half scram.
Objectives:	SRO - Determine Technical Specification application. RO - Perform actions for IRM C failure
Success Path:	Declare IRM A operable by channel check and bypass IRM C.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 5: IRM C FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs APP reference.	
		Contacts I&C for IRM C failure. May contact Shift Manager also.	
		References TS 3.3.1.1 and determines with IRMs A & C inoperable: Condition A is applicable for Function 1a <u>Required Action</u> A.1 Place channel in trip is required within 12 hours or A.2 Place associated trip system in trip is required in 12 hours. May enter TRM 3.3 (Control Rod Block Instrumentation) Function 3 Condition A, Tracking LCO	
		May conduct a brief (see Enclosure 1 on page 56 for format)	
		Evaluates IRM A operability following satisfactory channel check . 2OP-09, Attachment 4, 2.3.4 (Operability Guidance). **<u>NOTE:</u>** WCC provides cue that IRM A can be declared operable after channel check is SAT. Channel Check definition in the RO DSR. Channel Checks are a sufficient WO PMT for SRMs and IRMs at power unless a component failure is suspected in which case an I/V curve and TDR trace is desirable	
		Directs IRM A channel check be performed.	
	BOP	Plant Monitoring:	

EVENT 5: IRM C FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Determines IRM C failed upscale.	
		Responds and reports applicable alarms for IRM C failing upscale. *A-05* *1-7 REACTOR AUTO SCRAM SYS A* *4-7 NEUT MON SYS TRIP* *2-4 IRM UPSCALE* *2-2 ROD OUT BLOCK* *3-4 IRM A UPSCALE/INOP*	
		A-5 *IRM A UPSCALE/INOP* actions: May Reposition range switch for IRM C to bring indicated power to between 15 and 50 on the 0-125 scale. May verify IRM C Drawer Selector switch (Control Panel H12-P606) is in OPERATE. May notify CRS of Tech Spec applicability	
		May inform CRS IRM C cannot be bypassed and half scram cannot be reset due to IRM A being bypassed.	
		Performs channel check of IRM A for operability. RO DSR Item # 9 (IRM channel check) 2OI-03.2, Definition 5.1.	
		Removes IRM A from Bypass	
		Bypasses IRM C per APP guidance.	
		Resets half scram per APP guidance.	

IRM A UPSCALE/INOP

AUTO ACTIONS

1. Rod withdrawal block (bypassed when reactor mode switch is in RUN).
2. Reactor half-Scram (bypassed when reactor mode switch is in RUN.

CAUSE

1. IRM Channel(s) A, C, E, or G indicating greater than or equal to 117 on the 0-125 scale.
2. IRM Channel(s) A, C, E, or G inoperative signals:
   a. IRM drawer selector switch not in operate.
   b. IRM drawer module unplugged.
   c. IRM detector high voltage power supply low voltage.
3. IRM A, C, E, or G detector failure.
4. Improper ranging of IRM A, C, E, or G range switches during reactor startup or shutdown.
5. Circuit malfunction.

OBSERVATIONS

1. IRM Channel A, C, E, or G indicating greater than or equal to 117 on the 0-125 scale.
2. REACTOR AUTO SCRAM SYS A (A-05 1-7) alarm.
3. ROD OUT BLOCK (A-05 2-2) alarm.
4. NEUT MON SYS TRIP (A-05 4-7) alarm.
5. IRM UPSCALE (A-05 2-4) alarm.
6. IRM Channel A, C, E, or G upscale trip or inop (UPSC TR OR INOP) red indicating light is on.
7. The rod withdrawal permissive indicating light will be off.

ACTIONS

1. Monitor IRM Channels A, C, E, and G to determine affected channel(s).
2. If a sudden rise in indicated reactor power occurred in more than one channel, insert in sequence control rods as necessary to turn the power increase and verify that the correct rod withdrawal sequence is being used.
3. Reposition range switch for IRM A, C, E, or G to bring indicated power to between 15 and 50 on the 0-125 scale.
4. Verify that IRM A, C, E, and G Drawer Selector switches (Control Panel H12-P606) are in OPERATE.

ACTIONS (Continued)

5. If the alarm still exists and one channel is affected, perform the following:

   a. Refer to Technical Specifications and TRM for IRM channel operability requirements.
   b. Notify the Unit CRS.
   c. Bypass the affected channel using the IRM bypass switch
   d. Reset half Scram using the Reactor Scram Reset Switch (C72-S5).

6. If IRM detector failure or circuit malfunction is suspected, ensure that a W/R is prepared.

DEVICE/SETPOINTS

Relay C51-Z20-K90	Deenergized
IRM A, C, E, or G upscale trip unit	More than or equal to 117/125
IRM A, C, E, or G inop trip unit	a. IRM drawer selector switch not in operate b. IRM drawer module unplugged c. High voltage power supply less than or equal to 90 VDC

POSSIBLE PLANT EFFECTS

1. Reactor Scram if RPS Trip System B is tripped.
2. If an IRM channel is bypassed or inoperable, a Technical Specification LCO or TRM Compensatory Measure may result.

REFERENCES

1. LL-9364 - 79
2. FP-5552 - 8
3. Technical Specification 3.3.1.1, TRM 3.3
4. APP A-05 1-7, REACTOR AUTO SCRAM SYS A
5. APP A-05 2-2, ROD OUT BLOCK
6. APP A-05 2-4, IRM UPSCALE
7. APP A-05 4-7, NEUT MON SYS TRIP

EVENT 6: DG3 / E3 / E7 LOSS OF CONTROL POWER	
	Simulator Operator Actions
	At the direction of the Lead Evaluator, **Initiate Trigger 6** to trip 125 VDC Panel 2A.
	When requested to align alternate control power: **Initiate Trigger 7**, to align alternate control power to the DG3 and to reset DG3 local DG engine control panel lockout. **Initiate Trigger 8**, to align alternate control power to E3/E7.

	Simulator Operator Role Play
	Acknowledge/reset Unit One alarms, as necessary
	If contacted as TBAO, report Switchboard 2A load breaker GJ6, Feed to Panel 2A, is tripped.
	If contacted as I&C, report problem is a due to GJ6 breaker failure, not a fault on the system.
	If contacted as I&C to verify alternate power to ESS cabinet, report ESS cabinet has transferred to alternate power.
	If system engineer contacted concerning the low limit light remaining on after control power is transferred, provide that the low limit light will remain on after a loss of control power until excitation is established.

Evaluator Notes	
Plant Response:	DC Panel 2A will trip resulting in loss of control power to DG 3, Bus E3 and Bus E7. The crew will respond per 0AOP-39.0 and transfer the control power to alternate. DG3, Bus E3 and Bus E7 are inoperable until transferred to alternate supply. Once control power is transferred, a 7 day action is required to restore to the normal source. The BOP operator will return DG 3 to AUTO IAW AOP-39.0.
Objectives:	SRO - Directs AOP-39 and APP actions Evaluate TS 3.8.1 and 3.8.7. RO - Perform AOP-39 actions.
Success Path:	Restore DG3 control power and then return DG3 to Auto.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: DG3 / E3 / E7 LOSS OF CONTROL POWER

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of APPs: *UA-21 6-2, DG-3 LO START AIR PRESS* *UA-21 6-3, DG-3 CTL POWER SUPPLY LOST* *UA-19 6-3, DG-1 CTL PWR SUPPLY LOST* *UA-17, 2-3, DG-3/E3 ESS LOSS OF NORM POWER*	
		Direct actions of 0AOP-39.0, Loss Of DC Power	
		Contact I&C to verify ESS cabinets have transferred to alternate power.	
		Direct transfer of control power to alternate source	
		Direct returning DG3 to Auto	
		Determine Tech Specs **3.8.1 AC Sources - Operating, Condition D applies**. (until alt power established) D.1 Perform SR 3.8.1.1 – within 2 hrs and once per 12 hrs <u>AND</u> D.2 Evaluate availability of supplemental diesel generator - within 2 hrs and once per 12 hrs <u>AND</u> D.3 Declare required features supported by the inoperable DG, inoperable when the redundant required features are inoperable - 4 hours. <u>AND</u> D.4.1 Determine OPERABLE DGs not inoperable due to common cause failure – 24 hrs <u>OR</u> D.4.2 Perform SR 3.8.1.2 for OPERABLE DGs – 24 hrs <u>AND</u> D.5 Restore DG to OPERABLE status – 14 days **3.8.7 Distribution Systems - Operating, Condition C applies**. C.1 Declare required features supported by the inoperable DC electrical power distribution system inoperable - Immediately. <u>AND</u> C.2 Initiate action to transfer DC electrical power distribution subsystem to its alternate DC source - Immediately <u>AND</u> C.3 Declare required features supported by the inoperable DC electrical power distribution subsystem OPERABLE – Upon completion of transfer of the required feature's DC electrical power distribution subsystem to its OPERABLE DC source. <u>AND</u> C.4 Restore DC electrical power distribution subsystem to OPERABLE status – 7 Days.	
		May conduct a brief (see Enclosure 1 on page 56 for format)	

EVENT 6: DG3 / E3 / E7 LOSS OF CONTROL POWER

Time	Pos	EXPECTED Operator Response	Comments
	ATC	Monitors the plant.	
	BOP	Report annunciators and review APPs: *UA-21 6-2, DG-3 LO START AIR PRESS* *UA-21 6-3, DG-3 CTL POWER SUPPLY LOST* *UA-19 6-3, DG-1 CTL PWR SUPPLY LOST* *UA-17, 2-3, DG-3/E3 ESS LOSS OF NORM POWER*	
		Announce and enter 0AOP-39.0, Loss of DC Power. (see page 37)	

4.2 **Supplementary Actions**

1. Loss of Battery Chargers:

   a. **Monitor** 125V and 24V DC battery voltages. ☐

   b. **IF** power has been removed from the battery chargers for greater than 1 hour,
   THEN remove selected loads from the battery based on 0OI-50, 125/250 and 24/48 VDC Electrical Load List and Unit CRS direction. ☐

   c. Before 125V DC battery voltage reaches the low voltage limit of 105 volts, **remove** loads as directed by the Unit CRS as necessary to maintain battery voltage greater than 105 volts. ☐

   d. Before 24V battery voltage reaches the low voltage limit of 21 volts, **remove** loads as directed by the Unit CRS as necessary to maintain battery voltage greater than 21 volts. ☐

   e. **IF** battery charger AC power has been lost due to Station Blackout,
   THEN enter 1EOP-01-SBO(2EOP-01-SBO), Station Blackout. ☐

2. Loss of Any DC Panel:

   a. **Determine** which panel has been lost using Attachment 3, Annunciators Associated with Losses of Various DC Panels, if necessary. ☐

   b. **Dispatch** an operator to investigate the cause of the loss of DC power. ☐

   c. **Contact** Duty I&C to determine actual electrical system ground conditions prior to transferring any panel to alternate source or reenergizing from the normal source. ☐

   d. **IF** I&C determines a panel is faulted,
   THEN DO NOT reenergize the panel until the fault is isolated. ☐

   e. **Refer to** 0OI-50, 125/250 and 24/48 VDC Electrical Load List, for specific load information. ☐

   f. **IF** switchyard control power
   OR 4KV bus control power is lost,
   THEN request the Load Dispatcher to minimize grid operations. ☐

4.2 Supplementary Actions (continued)

g. Using the following table, **determine** the appropriate section based on the DC panel lost. ☐

(1) **Go to** the appropriate section for additional actions. ☐

Unit	Div.	DC Panel Lost	Normal Power Supply to Panel	Procedure Section
1	I	3A, 5A, 11A	1A-1	Section 4.2 Step 3 on page 8
		1A, 7A	1A-2	Section 4.2 Step 4 on page 10
	II	1B, 7B, 3AB	1B-1	Section 4.2 Step 5 on page 14
		3B, 11B, 9A	1B-2	Section 4.2 Step 6 on page 20
2	I	4A, 6A, 12A, 17	2A-1	Section 4.2 Step 3 on page 8
		2A, 8A	2A-2	Section 4.2 Step 4 on page 10
	II	2B, 8B, 4AB, 13, MWT	2B-1	Section 4.2 Step 5 on page 14
		4B, 12B, 10A	2B-2	Section 4.2 Step 6 on page 20

4.2 Supplementary Actions (continued)

(3) **WHEN** directed,
THEN perform the following at Sub E5: ☐

(a) **Open** Sub E5 1-E5-FM9-72-NORM (Normal Control Power Circuit Breaker), inside Compt. FM9. ☐

(b) **Close** Sub E5 1-E5-FM9-72-ALT (Alternate Control Power Circuit Breaker), inside Compt. FM9. ☐

b. **IF** loss of DC Distribution Panel 2A has occurred,
THEN dispatch an operator to the Diesel Generator Building. ☐

(1) **WHEN** directed,
THEN perform the following for DG3: ☐

(a) **Open** DG3 Normal Feed 8, normal diesel generator control power breaker, in the rear upper right inside of the Excitation Control Panel. ☐

(b) **Close** DG3 Alternate Feed 8A, alternate diesel generator control power breaker, in the rear upper right inside of the Excitation Control Panel. ☐

(c) **Confirm** the Governor Control At Setpoint light is LIT within 10 seconds after control power has been restored. ☐

(d) **IF** the Governor Control At Setpoint light does **NOT** light
THEN initiate a WO/WR ☐

(e) **Depress** Lockout Reset pushbutton, on the local diesel generator engine control panel ☐

(f) **Confirm** diesel generator Avail light on Panel XU-2 is ON. ☐

(g) **Depress** DG3 Auto Switch push button on RTGB Panel XU-2. ☐

4.2 Supplementary Actions (continued)

(2) **WHEN** directed,
THEN perform the following at Bus E3: ☐

(a) **Open** Bus E3 125 Volt E3 Bus Normal Control Power breaker inside Compt. AI4. ☐

(b) **Close** Bus E3 125 Volt E3 Bus Alternate Control Power breaker inside Compt. AI4. ☐

(3) **WHEN** directed,
THEN perform the following at Sub E7: ☐

(a) **Open** Sub E7 2-E7-FN1-72-NORM (Swgr 125V DC Normal Control Power Circuit Breaker), inside Compt. FN1. ☐

(b) **Close** Sub E7 2-E7-FN1-72-ALT (Swgr 125V DC Alternate Control Power Circuit Breaker), inside Compt. FN1. ☐

4.2 Supplementary Actions (continued)

d. IF loss of DC Distribution Panel 2A has occurred, THEN **confirm** ESS Panel H60 is OPERABLE by performing the following: ☐

(1) Alternate source from Battery Bus 1A-1, Panel 3A, is OPERABLE. ☐

NOTE

- Loadside is the right side of the terminal strip. ☐
- Drawing F-09118-1 is the interconnection wiring diagram for ESS Panel H60. ☐

(2) **Request** I&C to determine power is available indicated by measurement of 125 VDC system voltage between the following points in ESS Panel H60:

- Loadside of FU-2 to loadside of FU-4 ☐
- Loadside of FU-6 to loadside of FU-8 ☐
- Loadside of FU-10 to loadside of FU-12 ☐
- Loadside of FU-14 to loadside of FU-16 ☐
- Loadside of FU-18 to loadside of FU-20 ☐

EVENT 7: LOWERING TORUS WATER LEVEL / ATTEMPT TO FILL TORUS	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 10** to start Torus Water Leak
	NOTE: It will take ~24 minutes to reach -5.5 feet in the torus.

Simulator Operator Role Play	
	If contacted to look for leaks in the RB -17' elevation, after 5 minutes report none found.
	When directed to open E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank), wait 3 minutes and report that the handwheel is broken, the valve cannot be opened.
	When directed to align RHR Loop A, wait 3 minutes and report SEP-18 Section 2.2.3 Steps 5a-c are complete. If directed to investigate F028A breaker, report overcurrent trip, will not reset if asked.
	When directed to align RHR Loop B, wait 3 minutes and report SEP-18 Section 2.2.3 Steps 6a-c are complete. If directed to investigate F024B breaker, report magnetic trip, will not reset if asked.

Evaluator Notes	
Plant Response:	Torus level will begin to lower due to an unisolable leak on RHR suction. If attempted to raise torus water level, on RHR A loop the E11-F028A (Torus Discharge Isol Vlv) will trip when opened, on RHR B loop the E11-F024B (Torus Cooling Isol Vlv) will will trip when opened, and on Core Spray the E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank) handwheel will be broke.
Objectives:	SRO -Direct actions for a lowering torus water level IAW PCCP RO - Respond to a lowering torus water level IAW PCCP.
Success Path:	Attempts to add water to torus through RHR and Core Spray systems.
Event Termination:	When torus fill through RHR / CS has been attempted or a reactor scram inserted.

EVENT 7: LOWERING TORUS WATER LEVEL / ATTEMPT TO FILL TORUS

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Direct actions of PCCP.	
		Direct torus fill IAW 0EOP-01-SEP-18	
		May conduct a brief on when Reactor Scram is required (see Enclosure 1 on page 56 for format)	
	ATC	Report annunciator A-01 3-7, Suppression Chamber Lvl Hi/Lo	
		Diagnose lowering torus water level.	
		When directed by the CRS, perform 0EOP-01-SEP-18, Filling the Torus. (page 45) If RHR Loop A is selected, report unable to fill due to E11-F028A (Torus Discharge Isol Vlv) breaker magnetic trip. If RHR Loop B is selected, report unable to fill due to E11-F024B (Torus Cooling Isol Vlv) breaker magnetic trip. If CS Loop A is selected, report unable to fill due to E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank) handwheel broken.	

EVENT 7: LOWERING TORUS WATER LEVEL / ATTEMPT TO FILL TORUS

	BOP	Monitors the plant	
		Report A-05 5-5, Pri Cmt Hi/Lo Press	
		Dispatch AO to look for the leak.	

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1.0 ENTRY CONDITION

- As directed by Emergency Operating Procedures (EOPs)
- As directed by Severe Accident Management Guidelines (SAMGs)

2.0 INSTRUCTIONS

2.1 <u>Core Spray Torus Fill</u>

2.1.1 Manpower Required

- 1 Reactor Operator
- 2 Auxiliary Operators

2.1.2 Special Equipment

None

2.1.3 Core Spray Torus Fill Actions

1. **Select** Core Spray loop to be used: .... ☐ RO

   A B

2. **Confirm** Core Spray loop to be used:

   - <u>**NOT**</u> in operation .... ☐ RO
   - Suction aligned to torus .... ☐ RO

3. **Monitor and control** CST level greater than 11 feet .... ☐ AO

4. **Monitor** torus level .... ☐ RO

2.1.3 Core Spray Torus Fill Actions (continued)

NOTE
Normal torus level is -27 to -31 inches. ☐

5. IF Core Spray Loop A selected,
   THEN:

   a. **Unlock** and slowly **throttle open** E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank). ☐ AO

   b. **WHEN** at desired torus level,
      THEN: ☐ RO

      - **Close** E21-F002A (Core Spray Pump A Suction Valve From The Condensate Storage Tank). ☐ AO

2.2 RHR Torus Fill

2.2.1 Manpower Required

- 1 Reactor Operator
- 2 Auxiliary Operators

2.2.2 Special Equipment

None

2.2.3 RHR Torus Fill Actions

1. **Select** RHR loop to be used: ☐ RO

   A B

2. **Confirm** RHR loop to be used **NOT** in operation ☐ RO

3. **Monitor** and **control** MUD tank level greater than 14 feet. ☐ AO

4. **Monitor** torus level. ☐ RO

NOTE
Normal torus level is -27 to -31 inches. ☐

5. IF RHR Loop A selected,
   THEN:

NOTE
Valves located on HPCI mezzanine. ☐

   a. **Close** E11-V195 (RHR Keepfill Station Outlet Isolation Valve) ☐ AO

   b. **Close** E11-V194 (RHR Keepfill Station Inlet Isolation Valve) ☐ AO

   c. **Open** E11-F082A (RHR Loop A Keepfill Station Bypass Valve) ☐ AO

2.2.3 RHR Torus Fill Actions (continued)

d. **Place** E11-CS-S18A (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. ☐ RO

e. Momentarily **place** E11-CS-S17A (Containment Spray Valve Control Switch) to MANUAL. ☐ RO

f. **Open** E11-F028A (Torus Discharge Isol Vlv). ☐ RO

g. Slowly **throttle open** E11-F024A (Torus Cooling Isol Vlv). ☐ RO

h. **WHEN** at desired torus level, **THEN close** E11-F024A (Torus Cooling Isol Vlv). ☐ RO

i. **Close** E11-F028A (Torus Discharge Isol Vlv). ☐ RO

j. **Close** E11-F082A (RHR Loop A Keepfill Station Bypass Valve). ☐ AO

6. **IF** RHR Loop B selected, **THEN:**

NOTE

Valves located on Reactor Building 50' west. ☐

a. **Close** E11-F098 (RHR Keepfill Station Outlet Isolation Valve). ☐ AO

b. **Close** E11-F099 (RHR Keepfill Station Inlet Isolation Valve). ☐ AO

c. **Open** E11-F088 (RHR Loop B Keepfill Station Bypass Valve). ☐ AO

d. **Place** E11-CS-S18B (2/3 Core Height LPCI Initiation Override Switch) to MANUAL OVERRD. ☐ RO

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2.2.3 RHR Torus Fill Actions (continued)

e. Momentarily **place** E11-CS-S17B (Containment Spray Valve Control Switch) to MANUAL ☐ RO

f. **Open** E11-F028B (Torus Discharge Isol Vlv) ☐ RO

g. Slowly **throttle open** E11-F024B (Torus Cooling Isol Vlv) ☐ RO

h. **WHEN** at desired torus level,
THEN close E11-F024B (Torus Cooling Isol Vlv) ☐ RO

i. **Close** E11-F028B (Torus Discharge Isol Vlv) ☐ RO

j. **Close** E11-F088 (RHR Loop B Keepfill Station Bypass Valve) ☐ AO

7. **Exit** this section and **go to** Section 2.4 ☐ RO

EVENT 8: SCRAM / EMERGENCY DEPRESSURIZATION	
	Simulator Operator Actions
	When directed by the Lead Evaluator, place the simulator in FREEZE
	DO NOT RESET THE SIMULATOR PRIOR TO RECEIPT OF CONCURRENCE TO DO SO FROM THE LEAD EXAMINER

	Simulator Operator Role Play

Evaluator Notes	
Plant Response:	Before level reaches -5.5 feet in the torus a reactor scram is required. When torus water level reaches -5.5 feet emergency depressurization is required. The crew can anticipate emergency depressurization.
Objectives:	SRO - Direct ED or Anticipate ED based on torus water level. RO - Perform ED or Anticipate ED.
Success Path:	Reactor depressurized.
Scenario Termination:	***When all rods are inserted and RPV pressure is less than 100 psig, the scenario may be terminated.***
Remind students not to erase any charts and not to discuss the scenario until told to do so by the evaluator/instructor.	

EVENT 8: SCRAM / EMERGENCY DEPRESSURIZATION

Time	Pos	EXPECTED Operator Response	Comments
	CRS	***Direct a reactor scram before torus level reaches -5.5 feet.***	***CRITICAL TASK #1***
		Direct 0EOP-01-SEP-15, Anticipate Emergency Depressurization. ***OR*** ***Direct Emergency Depressurization***	***CRITICAL TASK #2***
	ATC	***When directed to scram performs scram immediate actions*** (see page 52) Performs Scram Hard Card (see page 53)	***CRITICAL TASK #1***
		Reports all rods in.	
	BOP	Maintains reactor pressure as determined by the CRS.	
		Maintains level as directed by the CRS. May align condensate and feedwater IAW hard card. (See Enclosure 2 page 57)	
		If directed performs 0EOP-01-SEP-15, Anticipate Emergency Depressurization. (see page 56)	***CRITICAL TASK #2***
		If directed opens 7 ADS valves.	

Unit 2 SCRAM Immediate Actions

1. **Ensure** SCRAM valves OPEN by manual SCRAM or ARI initiation.

2. **WHEN** steam flow less than 3.0 Mlb/hr,
   THEN place reactor mode switch in SHUTDOWN.

3. **IF** reactor power below 2% (APRM downscale trip),
   THEN trip main turbine.

4. **Ensure** master RPV level controller setpoint at +170 inches.

5. **IF:**

   - Two reactor feed pumps running

     AND

   - RPV level above +160 inches

     AND

   - RPV level rising,

   THEN trip one.

SCRAM Card

Enter applicable leg: .... ☐

Scram	ATWS
All Control Rods FULL-IN .... ☐	Indications of Hydraulic/Electrical ATWS .... ☐
RPV Water Level .... ☐ __________ inches	**Ensure** ARI initiated .... ☐
RPV Pressure .... ☐ __________ psig	Reactor Power .... ☐ __________ %
Communicate scram report to CRS .... ☐	**Communicate** ATWS report to CRS .... ☐
Place SULCV in service .... ☐	**IF** enabled, **THEN initiate** a recirc pump manual runback .... ☐
Insert Nuclear Instrumentation .... ☐	**IF** reactor power above **2%** **OR** **CANNOT** be determined, **THEN trip** both recirc pumps .... ☐
Ensure Turbine Oil System Operating .... ☐	**Report** reactor power to CRS .... ☐
Ensure Reactor Recirculation Pump speed at 34% .... ☐	**Exit** scram card and **perform** EOP-01-LEP-02 .... ☐
Ensure Heater Drain Pumps tripped .... ☐	
Exit scram card .... ☐	

1.0 ENTRY CONDITION

- As directed by Emergency Operating Procedures (EOPs)

2.0 INSTRUCTIONS

2.1 <u>Reactor Vessel Depressurization</u>

2.1.1 Manpower Required

- 1 Reactor Operator

2.1.2 Special Equipment

None

2.1.3 Operator Actions

1. **Ensure:**

   - Flow path available from RPV to condenser .... ☐ RO
   - EHC System in operation .... ☐ RO
   - Circulating water in operation .... ☐ RO
   - Vacuum System in operation .... ☐ RO
   - Turbine Shaft Sealing System in operation .... ☐ RO

2. <u>**IF AT ANY TIME**</u> Main Steam Line Break indicated by:

   - A-06 3-6, Stm Tunnel Hi Temp Sys A .... ☐ RO
   - A-06 4-6, Stm Tunnel Hi Temp Sys B .... ☐ RO

ANTICIPATE EMERGENCY DEPRESSURIZATION	0EOP-01-SEP-15
	Rev. 0
	Page 5 of 5

2.1.3 Operator Actions (continued)

- A-06 6-7, MSIV Pit/TB/TB Tunnel Hi Temp .... ☐ RO
- A-06 5-6, Mn Stm Line Hi Flow Sys A .... ☐ RO
- A-06 6-6, Mn Stm Line Hi Flow Sys B .... ☐ RO

<u>**THEN**</u> **terminate** RPV depressurization.......... ☐ RO

3. <u>**IF AT ANY TIME**</u> fuel failure indicated by:
   - UA-23 2-6, Main Steam Line Rad Hi .... ☐ RO
   - UA-03 5-2, Process Off-Gas Rad Hi .... ☐ RO
   - UA-03 6-4, Process OG Vent Pipe Rad Hi.......... ☐ RO

   <u>**THEN**</u> **terminate** RPV depressurization.......... ☐ RO

4. <u>**IF AT ANY TIME**</u> RPV pressure reduction will result in loss of injection required for adequate core cooling, <u>**THEN**</u> **terminate** RPV depressurization.......... ☐ RO

5. <u>**IF**</u> MSIV's CLOSED, <u>**THEN**</u> **equalize** pressure and **open** MSIV's (OP-25) .... ☐ RO

6. <u>**Unit 2 only:**</u> **Maintain** main steam line flow less than $3x10^6$ lbm/hr while performing Step 7. .... ☐ RO

7. Rapidly **depressurize** RPV with Main Turbine Bypass valves irrespective of cooldown rate.. .... ☐ RO

8. **Exit** this procedure and **continue** in procedure(s) in effect. .... ☐ RO

ENCLOSURE 1 Page 1 of 1

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ATTACHMENT 8
Page 1 of 1

<< Crew Brief Template >>

Begin Brief	☐ Announce "Crew Brief" ☐ All crew members acknowledge announcement

Recap	**(As Required)**
	☐ Update the crew as needed:
	☐ Describe what happened and major actions taken
	☐ Procedures in-progress
	☐ Notifications:
	    ☐ Maintenance
	    ☐ Engineering
	    ☐ Others (Dispatcher, Station Management, etc.)
	☐ Future Direction and priorities
	☐ Discuss any contingency plans

Input	**(As Required)**
	☐ Solicit questions/concerns from each crew member:
	    ☐ ROs
	    ☐ CRS
	    ☐ STA
	☐ Are there any alarms unexpected for the plant conditions?
	☐ What is the status of Critical Parameters?

EAL	**(As Required)** ☐ Provide EAL and potential escalation criteria
Finish Brief	☐ Restore normal alarm announcement? (Yes/No) ☐ Announce "End of Brief"

ENCLOSURE 2

Feedwater Level Control Following a Reactor Scram

NOTE	This attachment is **NOT** to be used for routine system operation.

1. **ENSURE** the following:
   - FW-V6 **AND** FW-V8 **OR** FW-V118 **AND** FW-V119 closed ☐
   - FW-FV-177 closed ☐
   - FW-V120 closed ☐
   - FW control MODE SELECT in 1 ELEM ☐
   - SULCV in M (MANUAL) closed ☐
   - B21-F032A **AND/OR** B21-F032B open ☐

2. **PLACE** the MSTR RFPT SP/RX LVL CTL in M (MANUAL), **THEN:** ☐
   - **ADJUST** to 187" ☐

3. **IF** any RFP is running, **THEN**:
   a. **PLACE** RFP A(B) RECIRC VLV, control switch to open ☐
   b. **PLACE** RFPT A(B) SP CTL in M (MANUAL) ☐

4. **IF** no RFP is running, **THEN**:
   a. **PLACE** RFP A(B) RECIRC VLV, control switch to open ☐
   b. **ENSURE** the following:
      - RFP A(B) DISCH VLV, FW-V3(V4) open ☐
      - RFPT A(B) SP CTL in M (MANUAL) at lower limit ☐
      - RFPT A(B) MAN/DFCS control switch in MAN ☐
      - Reactor water level is less than +206 inches **AND** RFPT A&B HIGH LEVEL TRIP reset ☐
   c. **DEPRESS** RFPT A(B) RESET ☐

Feedwater Level Control Following a Reactor Scram

d. **ENSURE** RFPT A(B) LP **AND** HP STOP VLVS open ☐

e. **ROLL** RFPT A(B) to 1000 rpm by depressing RFP A(B) START ☐

f. **RAISE** RFPT A(B) to approximately 2550 rpm using the LOWER/RAISE control switch ☐

g. **DEPRESS** RFPT A(B) DFCS CTRL RESET ☐

5. **ENSURE** MAN/DFCS control switch in DFCS ☐
6. **RAISE** RFPT A(B) SP CTL speed until discharge pressure is greater than or equal to 100 psig above reactor pressure ☐
7. **ADJUST** SULCV to establish desired injection ☐
8. **IF** desired, **THEN PLACE** SULCV in A (AUTO) ☐
9. **IF** needed, **THEN THROTTLE** FW-V120 ☐
10. **IF** needed, **THEN GO TO** 2OP-32 Section 8.17 for level control ☐

ATTACHMENT 1 - Scenario Quantitative Attribute Assessment

Category	NUREG 1021 Rev. 2 Supp. 1 Req.	Scenario Content
Total Malfunctions	5-8	7
Malfunctions after EOP Entry	1-2	2
Abnormal Events	2-4	2
Major Transients	1-2	2
EOPs Used	1-2	2
EOP Contingency	0-2	1
Run Time	60-90 min	90
Crew Critical Tasks	2-3	2
Tech Specs	2	2
Instrument / Component Failures before Major	2 – OATC 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

<< Neutron Monitoring Spiking Troubleshooting Form >>

1. Initiator's name Unit Two SRO
2. Check all instruments that are spiking and the associated Unit:

☐ Unit 1	☐ SRM A	☒ IRM A	☐ IRM E
☒ Unit 2	☐ SRM B	☐ IRM B	☐ IRM F
	☐ SRM C	☐ IRM C	☐ IRM G
	☐ SRM D	☐ IRM D	☐ IRM H

3. Time and date of event Today - previous shift
4. What is the duration of the spiking (duration of individual spike)? Add additional information below to characterize spiking event.

☐ Seconds ☒ Minutes ☐ Hours

1. Ensure all required observations to support operability are appropriately documented.

5. Has a WO or AR been initiated? If yes, list number(s): 00345765	☒ Yes	☐ No
6. Has a log entry been made?	☒ Yes	☐ No
7. Is there any welding occurring in the plant?	☒ Yes	☐ No
8. Are there any personnel under-vessel?	☐ Yes	☒ No
9. Are there any plant evolutions in progress?	☒ Yes	☐ No
10. Is there any electrical switching occurring?	☐ Yes	☒ No
11. Are any control rods being moved or selected?	☒ Yes	☐ No
12. Has there been a recent change in the mode switch?	☐ Yes	☒ No
13. Is there any major equipment being started?	☒ Yes	☐ No
14. Has there been any observed relay chatter?	☐ Yes	☒ No
15. Is there any refuel bridge movement?	☐ Yes	☒ No
16. Are the rod interlocks being affected?	☒ Yes	☐ No
17. Completed copy of this attachment sent to engineer	☒ Yes	☐ No

Note below any additional information that may aid troubleshooting (such as 2 instruments spiking but NOT in the same manner):

Multiple upscale and downscale alarms during startup over a 15 minute period
All other IRMs responded normally

ATTACHMENT 2 – Shift Turnover

Brunswick Unit 2 Plant Status					
Station Duty Manager:	E. Neal			Workweek Manager:	B. Craig
Mode:	2	Rx Power:	2%	Gross*/Net MWe*:	N/A
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	45.7 hrs			Days Online:	0 days
Turnover:	IAW the reactivity plan the OATC is to raise power to 6-10%. A2X sequence at step 161. Permission for continuous withdrawal has been granted for the rods going from 12-48.				
Protected Equipment:	ADHR / FPC Loop A / Demin Transfer Pump All remaining ECCS LP systems				
Comments:	IRM A was bypassed due to spiking and the paperwork is being evaluated by the WCC SRO for its return to service. Core Spray Loop B under clearance, expected return in 4 hours. The BOP operator is to complete Step 6.3.46 of 0GP-02, Approach to Criticality and Pressurization of the Reactor.				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

SIM JPM A - 2016 NRC INITIAL EXAM - RO/ISRO/USRO

LESSON TITLE: **Reset Recirc Pump Runback – Both Recirc Pumps Trip**

LESSON NUMBER: **LOT-SIM-JP-002-A09**

REVISION NO: **0**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/06/16
TECHNICAL REVIEWER / DATE

Grant Newton
Shawn Zander 9/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

202201B401
Recover from a Reactor Recirculation Pump Runback Per OP-02

K/A REFERENCE AND IMPORTANCE RATING:

202002 A2.01 3.4/3.4
Ability to predict the impacts of recirculation pump trip and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.

REFERENCES:

2OP-02, Section 6.3.3, Recovery From Reactor Recirculation Pump Runback
2OP-02, Section 6.1.3, Raising Speed Using Individual Recirculation Pump Control
2AOP-04.0, Low Core Flow

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

1 - Reactivity Control (Recirculation Flow Control System)

SETUP INSTRUCTIONS

SIMULATOR SETUP

Initial Conditions

1. Recommended Initial Conditions

   IC-10

2. Required Plant Conditions

   Recirculation Pump A at approximately 70% flow, Recirculation Pump B at Limiter #1. OPRM Trip Enabled annunciator in ALARM.

Malfunctions:

Insert the following malfunctions:

Malf ID	Mult ID	Description	Current Value	Target Value	Rmptime	Actime	Deactime	Trig
RC024F	VFD B	VFD B RUNBACK #1ACTUATES	False	True				
EE026F		Loss of 4160V Bus B	False	True				1

Set Trigger 1, Q2722RSM, VFD B Raise Medium pushbutton to TRUE.

Special Instructions

Initiate VFD B runback and allow plant conditions to stabilize. Once runback is complete, delete malfunction RC024F. If necessary, insert control rods to get below the MELLL Line on the Power-Flow map. Verify VFD B RUNBACK #1 ACTUATES is clear. Reset Speed Hold, if amber light is illuminated.

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. Reactor Recirculation Pump operation was previously in accordance with 2OP-02, Section 6.1.2.
2. Recirculation Pump 2B has run back to limiter number 1, and the cause has been corrected.
3. A reactivity management briefing is complete, and your reactivity management team is available in the Control Room
4. Another operator is monitoring Nuclear Instrumentation.

INITIATING CUE:

You are directed by the Unit CRS to reset the Recirculation Pump runback signal and raise flow of Reactor Recirculation Pump 2B to match flow of Recirculation Pump 2A.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 0 - May perform take a minute at job site prior to beginning task.
Examinee may cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Am I using appropriate gloves? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

Step 1 - Obtain current revision of 2OP-02 Sections 6.3.3 may also get Section 6.1.3.
Provide current revision of 2OP-02 Section 6.3.3, and if asked Section 6.1.3.

SAT/UNSAT

TIME START: ____________

Step 2 - Verify the conditions that caused the runback have cleared, or Recirc Pump speed has been lowered below the runback setpoint.
Verifies Recirc Pump speed below the runback setpoint, and condition is clear as part of Task Conditions.

SAT/UNSAT

Step 3 – **ENSURE** *RECIRC PUMP B SPEED DEMAND* signal is approximately the same as the following:
- *RECIRC PUMP B CALCULATED SPEED*
- *RECIRC PUMP B ACTUAL SPEED*

Ensures Calculated Speed and Actual Speed approximately the same.

SAT/UNSAT

Step 4 - **RESET** the Recirc Pump runback for Reactor Recirculation Pump B as follows:

a. **DEPRESS** Recirc VFD B *RUNBACK RESET* push button.
Runback Rest push button is depressed.

****CRITICAL STEP**   SAT/UNSAT**

b. **CONFIRM** yellow *AUTOMATIC RUNBA*CK light extinguished.
Yellow Automatic Runback light is confirmed extinguished

SAT/UNSAT

c. **CONFIRM** annunciator *RECIRC FLOW B LIMIT (A-07 2-4) is clear.*
Annunciator confirmed clear.

SAT/UNSAT

PROMPT:	If asked which VFD RAISE pushbutton to use, or if the VFD RAISE SLOW pushbutton is depressed, direct Examinee as the CRS to raise speed of the Recirculation Pump using the VFD RAISE MEDIUM pushbutton.

Step 5 - ADJUST flow as directed by the Unit CRS.
VFD RAISE MEDIUM push button is depressed in accordance with 2OP-02, Section 6.1.3, pages 38-40.

**** CRITICAL STEP **   SAT/UNSAT**

NOTE:	4160 V Bus B will trip when the VFD RAISE MEDIUM push button is depressed.

Step 6 – Determines that no Recirc Pumps are running.
Diagnosis failure of Bus B which causes both Recirc Pumps to lose power.

SAT/UNSAT

NOTE:	The examinee may enter and announce entry into 2AOP-04.0, Low Core Flow.

Step 7 – Inserts a manual reactor scram

IAW 2AOP-04.0, Immediate Operator Action, depresses both RPS Channel Manual Pushbuttons.

Performs the following scram immediate actions:

1. *Ensure SCRAM valves OPEN by manual SCRAM or ARI initiation.*
2. *WHEN steam flow less than 3.0 Mlb/hr,*
   THEN place reactor mode switch in SHUTDOWN.
3. *IF reactor power below 2% (APRM downscale trip),*
   THEN trip main turbine.
4. *Ensure master RPV level controller setpoint at +170 inches.*
5. *IF two reactor feed pumps running and RPV level is greater than 160 inches and rising,*
   THEN trip one reactor feed pump.

**** CRITICAL STEP **   SAT/UNSAT**

Step 8 – **Informs** CRS that all rods are in, RPV water level and RPV pressure.

Acknowledge scram report as the CRS.

SAT/UNSAT

TERMINATING CUE: Once a manual reactor scram is inserted and scram immediate actions are complete, the JPM can be terminated.

TIME COMPLETED: _______________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Given as initial conditions
3	Not Critical	Observation of indications
4a	Critical	Action required to reset the runback
4b	Not Critical	Observation of indications
4c	Not Critical	Observation of indications
5	Critical	Action required to meet Initiating Cue
6	Not Critical	Observation of indications
7	Not Critical	Observation of indications
8	Critical	Immediate Operator action from 2AOP-04.0
9	Not Critical	Communication

REVISION SUMMARY

0	New JPM written for 2016 Initial NRC exam.

Validation Time: 20 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	X	No	______		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

____

____

____

____

____

☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________

TASK CONDITIONS:

1. Reactor Recirculation Pump operation was previously in accordance with 2OP-02, Section 6.1.2.

2. Recirculation Pump 2B has run back to limiter number 1, and the cause has been corrected.

3. A reactivity management briefing is complete, and your reactivity management team is available in the Control Room

4. Another operator is monitoring Nuclear Instrumentation.

INITIATING CUE:

You are directed by the Unit CRS to reset the Recirculation Pump runback signal and raise flow of Reactor Recirculation Pump 2B to match flow of Recirculation Pump 2A.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

SIM JPM B - 2016 NRC INITIAL EXAM - RO/ISRO/USRO

LESSON TITLE: **MECHANICAL TRIP VALVE OIL TRIP TEST**

LESSON NUMBER: **LOT-SIM-JP-026.2-01**

REVISION NO: **0**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/06/16
TECHNICAL REVIEWER / DATE

Kyle Cooper
Shawn Zander 9/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

245202B101
Perform Mechanical Trip Valve Oil Trip Test Per OP-26

K/A REFERENCE AND IMPORTANCE RATING:

245000 A3.01 Ability to manually operate and/or monitor in the control room: Turbine Trip

REFERENCES:

2OP-26, Section 6.3.8, Mechanical Trip Valve Oil Trip Test

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

4 - Heat Removal (main Turbine Generator and Auxiliary Systems)

SETUP INSTRUCTIONS

SIMULATOR SETUP

Initial Conditions

1. Recommended Initial Conditions

   IC-11

2. Required Plant Conditions

   Turbine is at 1800 rpm.

Malfunctions:

None

Special Instructions

None.

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. All applicable prerequisites listed in Section 5 of 2OP-26 are met.
2. Last performance of 2OP-26 Section 6.3.15 was successful.

INITIATING CUE:

You are directed by the Unit CRS to perform 2OP-26, Section 6.3.8, Mechanical Trip Valve Oil Trip Test.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 0 - May perform take a minute at job site prior to beginning task.
Examinee may cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Am I using appropriate gloves? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

Step 1 - Obtain current revision of 2OP-26 Sections 6.3.8.
Provide current revision of 2OP-26 Section 6.3.8.

SAT/UNSAT

TIME START: ____________

Step 2 - Depress the Locked out pushbutton.
Depresses the Locked Out pushbutton on the XU-1 panel.

****CRITICAL STEP**   SAT/UNSAT**

Step 3 – **Confirms** Locked Out light illuminates and UA-23, 3-3, Overspeed Trip Locked annunciator is On
Confirms Locked Out white light illuminates and UA-23, 3-3, Overspeed Trip Locked annunciator is acknowledged and reported to Unit CRS.

SAT/UNSAT

Step 4 - **Depress and hold** the Oil Trip Pushbutton until Tripped light comes On, then release the Oil Trip pushbutton.
Oil Trip pushbutton is depressed and held until the Tripped light is illuminated.

****CRITICAL STEP**   SAT/UNSAT**

Step 5 - Depress and hold the Push to Reset pushbutton and confirm the Resetting light comes on.

Push to Reset pushbutton is depressed and the Resetting light illuminates.

**** CRITICAL STEP **   SAT/UNSAT**

Step 6 - When ~5 seconds have elapsed confirm the Reset light comes On and UA-23, 4-3 Turbine Overspeed Trip Reset, annunciator is received.

Confirms the Reset light illuminates and Turbine Overspeed Trip Reset annunciator is acknowledged and reported to Unit CRS.

SAT/UNSAT

Step 7 - When the Reset light comes On then release the Push to Reset pushbutton.

The Push to Reset pushbutton is released and annunciator UA-23, 4-3, Turbine Overspeed Trip Reset annunciator is reset and reported as cleared to the Unit CRS.

**** CRITICAL STEP **   SAT/UNSAT**

Step 8 - When at least10 seconds have elapsed then depress the Normal pushbutton.

The Normal pushbutton is depressed and the Normal light is confirmed On and the Locked Out Light extinguishes. Annunciator UA-23, 3-3, Overspeed Trip Locked annunciator is reset and reported as cleared to the Unit CRS.

**** CRITICAL STEP **   SAT/UNSAT**

Step 9 – **Informs** CRS Mechanical Trip Valve Oil Trip is complete.

Acknowledge report as the CRS.

SAT/UNSAT

TERMINATING CUE: All actions in 2OP-26, Section 6.3.8 have been completed.

TIME COMPLETED: _______________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Action required to complete the procedure without tripping the main turbine.
3	Not Critical	Observation of indications as a result of the previous step
4	Critical	Action required to complete the procedure
5	Critical	Action required to complete the procedure
6	Not Critical	Observation of indications as a result of the previous step
7	Critical	If released prior to the Reset light illuminating the trip will trip.
8	Critical	Required to restore the system to normal alignment and remove the overspeed trip locked out.
9	Not Critical	Communication

REVISION SUMMARY

0	New JPM written for 2016 Initial NRC exam.

Mechanical Trip Valve Oil Trip Test

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

____

____

____

____

____

☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

TASK CONDITIONS:

1. All applicable prerequisites listed in Section 5 of 2OP-26 are met.
2. Last performance of 2OP-26 Section 6.3.15 was successful.

INITIATING CUE:

You are directed by the Unit CRS to perform 2OP-26, Section 6.3.8, Mechanical Trip Valve Oil Trip Test.

SIM JPM C - 2016 NRC INITIAL EXAM - RO/ISRO/USRO

LESSON TITLE: **OPERATE THE HYDROGEN AND OXYGEN MONITOR USING THE HARD CARD**

LESSON NUMBER: **LOT-SIM-JP-024-A01**

REVISION NO: **5**

Daniel Hulgin 11/03/16
PREPARER / DATE

Bob Bolin 11/03/16
TECHNICAL REVIEWER / DATE

Rob Mehs 11/03/16
VALIDATOR / DATE

Craig Olvier 11/03/16
LINE SUPERVISOR / DATE

Ed Rau 11/03/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

223201B101, Startup the H2/O2 Analyzer (CAC-AT-4409/4410) IAW OP-24

K/A REFERENCE AND IMPORTANCE RATING:

223001	A4.04	3.5/3.6
223001	A4.05	3.6/3.6

Ability to manually operate and/or monitor containment hydrogen/oxygen concentrations.

REFERENCES:

2OP-24 Attachment 8, CAC-AT-4410 Startup In The EOPS - 2OP-24

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

5 – Containment Integrity

SETUP INSTRUCTIONS

Recommended Initial Conditions
IC-11
Rx Pwr 100%
BOC

Required Plant Conditions:
RPV level <166" (PCIS Group 6 Isolation Initiated)

Special Instructions:
None.

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section WILL be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. 0EOP-02-PCCP has been entered due to Primary Containment conditions.
2. Hydrogen/Oxygen monitor CAC-AT-4410 is isolated and was not previously in service.

INITIATING CUE:

You are directed by the Unit CRS to place the Primary Containment Hydrogen/Oxygen monitor CAC-AT-4410 in service using the hard card and inform him when step 6b has been completed.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

TIME START: ___________

Step 1 – Obtain Hard Card, CAC-AT-4410 Startup In The EOPS - 2OP-24.

2OP-24, attachment 8 obtained

SAT/UNSAT

Step 2 – Ensure recorder function of CAC-AR-4410 (Cont Atm H2 & O2 Percent Rec) is ON.

CAC-AR-4410 (Cont Atm H2 & O2 Percent Rec) recorder function verified ON.

SAT/UNSAT

Step 3 – IF an isolation signal is present, THEN place CAC-CS-3452 (CAM Div II Isol Ovrd) to ON.

CAC-CS-3452 (CAM Div II Isol Ovrd) placed in ON.

**** CRITICAL STEP ** SAT/UNSAT**

Step 4 – Ensure the following valves are OPEN: CAC-SV-1218A at X206A-A, CAC-SV-1227A at X73-A, CAC-SV-1227B at X73-B, CAC-SV-1227E at X73-E, CAC-SV-1231B at X244-B, and CAC-SV-4541

RIP valves opened by depressing associated pushbutton twice and verifying the red light is ON; CAC-SV-4540 opened by taking its control switch to CLOSE and back to OPEN

Valve	SAT	UNSAT
CAC-SV-1218A at X206A-A		
CAC-SV-1227A at X73-A		
CAC-SV-1227B at X73-B		
CAC-SV-1227E at X73-E		
CAC-SV-1231B at X244-B		
CAC-SV-4541		

.

**** CRITICAL STEP ** SAT/UNSAT**

Step 5 – IF available, THEN place Sample Select switch to Point 4.

Control switch CAC-CS-4410 is placed to position 4.

**** CRITICAL STEP ** SAT/UNSAT**

Step 6 – At Sample Control Module CAC AT 4410, depress Start Sample push button and ensure the following: Sample inlet valve OPENS, Red Start Sample light comes ON, Red MS Drn Active light comes ON, and WHEN 20 to 40 seconds have elapsed, THEN red MS Drn Active light goes OFF and green MS Drain Standby light comes ON

START SAMPLE push button depressed.

**** CRITICAL STEP ** SAT/UNSAT**

Step 7 – After sample pushbutton depressed ensure the following: Sample inlet valve OPENS, Red Start Sample light comes ON, Red MS Drn Active light comes ON, and WHEN 20 to 40 seconds have elapsed, THEN red MS Drn Active light goes OFF and green MS Drain Standby light comes ON

The following sequence is observed:

Sequence	*SAT*	*UNSAT*
Sample inlet valve OPENS		
Red Start Sample light comes ON		
Red MS Drn Active light comes ON		
WHEN 20 to 40 seconds have elapsed, THEN red MS Drn Active light goes OFF and green MS Drain Standby light comes ON		

SAT/UNSAT

Step 8 – IF the CAC-AT-4410 was NOT previously in service, THEN perform the following at Panel XU-79: Ensure system power Standby/Off switch in STANDBY and confirm the amber Standby light comes ON

Standby/Off switch verified in Standby

SAT/UNSAT

Step 9 – IF the CAC-AT-4410 was NOT previously in service, THEN perform the following at Panel XU-79: Ensure system power On/Off switch in ON

Power On/Off switch placed in ON

**** CRITICAL STEP ** SAT/UNSAT**

NOTE: The last two steps of the hard card (6c, and d) are after a 30 minute elapsed time.

Step 10 – Informs the CRS that Primary Containment Hydrogen/Oxygen monitor CAC-AT-4410 has been started using the hard card, and step 6b is complete

CRS informed 2OP-24 Attachment 8 is complete through step 6b.

SAT/UNSAT

TERMINATING CUE: CAC-AT-4410 has been started properly per the hard card up to step 6b.

TIME COMPLETED: _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Verification step
3	Critical	Necessary to unisolate theCAC-AT-4410.
4	Critical	Necessary for flowpath
5	Critical	Necessary for flowpath
6	Critical	Necessary for operation
7	Not Critical	Verification step
8	Not Critical	Verification step
9	Critical	Necessary for operation
10	Not Critical	Communication

REVISION SUMMARY

5	New Format Changed steps to reflect starting CAC-AT-4410
4	OLD JPM no record of revision from 2011. Based on CAC-AT-4409

(Provide sufficient detail for reviewers and evaluators to understand the scope of any technical and/or administrative changes).

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________

TASK CONDITIONS:

1. 0EOP-02-PCCP has been entered due to Primary Containment conditions.

2. Hydrogen/Oxygen monitor CAC-AT-4410 is isolated and was not previously in service.

INITIATING CUE:

You are directed by the Unit CRS to place the Primary Containment Hydrogen/Oxygen monitor CAC-AT-4410 in service using the hard card and inform him when step 6b has been completed.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

SIM JPM D - 2016 NRC INITIAL EXAM - RO/ISRO

LESSON TITLE: REDUCE RPV WATER LEVEL USING RWCU TO RADWASTE

LESSON NUMBER: LOT-SIM-JP-014-A03

REVISION NO: 0

Dan Hulgin 11/03/16
PREPARER / DATE

Bob Bolin 11/03/16
TECHNICAL REVIEWER / DATE

Rob Mehs 11/03/16
VALIDATOR / DATE

Craig Oliver 11/03/16
LINE SUPERVISOR / DATE

Ed Rau 11/03/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

204002B101
Place The RWCU System In Service With The Reactor Not In Cold Shutdown Per OP-14

K/A REFERENCE AND IMPORTANCE RATING:

204000 A4.08 Ability to manually operate and/or monitor in the control room: Reactor Water Level 3.4/3.4

REFERENCES:

2OP-14, Reactor Water Cleanup System Operating Procedure

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

2 – Inventory Control

SIMULATOR SETUP

Initial Conditions:
IC-11

Triggers:
Assign ZA424 ON to Trigger 1 (A-04 2-4, CLEANUP DISCH PRESS HI/LO)

Malfunctions:
None

Overrides:
None

Remotes:
None

Special Instructions
Insert a scram (perform immediate and hard card scram actions)
Allow RPV level to rise to ~ 200 inches. Ensure alarm A-07 2-2 is sealed in.

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit Two is in MODE 3 following a reactor scram.
2. RPV Water level band is 166 to 206 inches.
3. Radwaste Control Room has been notified, and sufficient capacity exists for reject.

INITIATING CUE:

You are directed by the Unit CRS to:

- Establish RWCU reject to Radwaste in accordance with the RWCU Hard Card (RWCU Instructional Aid RWCU Operation for EOPs).

- Lower RPV level to a target of 187 inches.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

NOTE: Once hard card has been obtained, provide candidate with paper copy of the RWCU Instructional Aid - RWCU Operation for EOPs

Step 1 - Obtain RWCU Instructional Aid RWCU Operation for EOPs.

Obtains current revision of RWCU Instructional Aid RWCU Operation for EOPs (Hard Card).

SAT/UNSAT

TIME START: ____________

Step 2 - **Open** one of the following valves as directed by the Unit CRS to align RWCU reject flow: **IF** condenser hotwells are **NOT** available, **OR** Unit CRS directs reject to Radwaste, **THEN open** G31-F035.

The control switch for G31-F035, Reject To Radwaste Vlv, is placed to OPEN and spring return to NEUT. The red light come is observed ON and the green light observed OFF.

****CRITICAL STEP** SAT/UNSAT**

Step 3 – **IF** rejecting to Radwaste, **THEN notify** the Radwaste Control Room

Identifies Radwaste Control has been notified or Radwaste Control Room is notified of aligning RWCU reject to Radwaste.

SAT/UNSAT

Step 4 - Slowly **throttle open** G31-F033 to establish less than or equal to 105 gpm reject flow rate.

The knob for the G31-F033, RWCU Reject Flow Control Vlv, is slowly rotated in the clockwise direction to establish flow at > 0 gpm but ≤ 105 gpm on G31-FI-R602, Reject Flow.

****CRITICAL STEP** SAT/UNSAT**

NOTE: **ALTERNATE PATH BEGINS HERE:** A-04 (2-4) will be received. G31-F033 will fail to close.

SIM OP: When reject flow has been established to Radwaste, insert Trigger 1.

Step 5 – **Acknowledge** and **report** A-04 (2-4), CLEANUP DISCH PRESS HI/LO.
A-04 (2-4) is acknowledged and CLEANUP DISCH PRESS HI/LO is reported to the CRS.

SAT/UNSAT

Step 6 – **Respond** per APP A-04 2-4 and **recognize** an auto action failed to occur (G31-F033 failed to close).
APP A-04 2-4 is obtained and RWCU Reject Flow Control Vlv, G31-F033 is verified to have not auto-closed.

SAT/UNSAT

Step 7 – **Close** the G31-F033.
The knob for the G31-F033, RWCU Reject Flow Control Vlv, is rotated in the counter-clockwise direction until it is at 0.

**** CRITICAL STEP **   SAT/UNSAT**

Step 8 – **Notify** the CRS that the G31-F033 failed to auto-close, but was manually closed.
The CRS is notified that the G31-F033 failed to auto-close, but was manually closed .

SAT/UNSAT

PROMPT: When reject flow has been secured and the CRS has been notified, inform the trainee that another operator will perform he rest of the APP actions.

TERMINATING CUE: When the G31-F033 has been closed, this JPM is complete

TIME COMPLETED: _______________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Action required to establish reject to Radwaste.
3	Not Critical	Communication
4	Critical	Action required to establish reject to Radwaste.
5	Not Critical	Communication
6	Not Critical	Observation of indications.
7	Critical	Necessary action per APP.
8	Not Critical	Communication

REVISION SUMMARY

0	New JPM written for 2016 Initial NRC exam.

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	X	No	_____		

EVALUATION

Performer: ______________________________________

JPM: Pass _____ Fail _____

Remedial Training Required: Yes _____ No _____

Comments: ____

____

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____

☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ____________

TASK CONDITIONS:

1. Unit Two is in MODE 3 following a reactor scram.
2. RPV Water level band is 166 to 206 inches.
3. Radwaste Control Room has been notified, and sufficient capacity exists for reject.

INITIATING CUE:

You are directed by the Unit CRS to:

- Establish RWCU reject to Radwaste in accordance with the RWCU Hard Card (RWCU Instructional Aid RWCU Operation for EOPs).

- Lower RPV level to a target of 187 inches.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

SIM JPM E - 2016 NRC INITIAL EXAM - RO/ISRO

LESSON TITLE: **VENT THE DRYWELL PER OP-10 W/ STACK RAD MONITOR INCREASE >50%**

LESSON NUMBER: **LOT-SIM-JP-010-A02**

REVISION NO: **8**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/06/16
TECHNICAL REVIEWER / DATE

Grant Newton 9/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

261008B101
Perform Normal Primary Containment Venting

K/A REFERENCE AND IMPORTANCE RATING:

261000 A4.01
Ability to manually operate and/or monitor in the Control Room Off site Release Rate

REFERENCES:

2OP-10,Section 6.3.2-Venting Containment Via SBGT

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

9 Radioactivity Release

SAFETY CONSIDERATIONS

None

SETUP INSTRUCTIONS

Recommended Initial Conditions

IC-11, 100% Power, BOC

Required Plant Conditions

1. Drywell Pressure above 0.5 psig SLOWLY rising or stable, AND below 1.8 psig.

Triggers

Trigger 1 Q6225LGT CAC-V23 Green Lamp = False.

Malfunctions

None

Overrides

Event	Panel	Tag	Title	Value (ramp rate)	Activate Time (sec)	Deactivate Time (sec)
E1	XU-3	G5B02G15	Main Stack Radiation	2.48 / 2 min	0 SEC	N/A

Remotes

None

Special Instructions

1. Secure Drywell Coolers 2C and 2D Fans 1 and 2
2. Allow drywell pressure to rise to 0.6 psig as indicated on CAC-PI-2685-1 on XU-51.
3. Restart Drywell Coolers 2D Fan 2 and allow Drywell pressure to stabilize.
4. Override Drywell Cooler 2C Fans 1 and 2 and Drywell Cooler 2D Fan 1 control switches OFF

SAFETY CONSIDERATIONS:

1. None.

EVALUATOR NOTES: (Do not read to performer)

1. A marked up copy of 2OP-10, Section 6.3.2 **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. Drywell pressure is above normal due to a partial loss of Drywell Cooling.
2. Standby Gas Treatment System is in the Standby Alignment.
3. The plant stack radiation monitor is in service and CAC-CS-5519, CAC Purge Vent Isolation Override is in OFF.
4. ERFIS is unavailable.

INITIATING CUE:

The Unit CRS directs you to vent the Drywell via Standby Gas Treatment, and inform him (her) when drywell pressure has been reduced below 0.5 psig**.**

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - Obtain copy of 2OP-10 Standby Gas Treatment System Operating Procedure, Section 6.3.2.

Copy of 2OP-10 Standby Gas Treatment System Operating Procedure, Section 6.3.2 is obtained.

SAT/UNSAT

TIME START: ___________

Step 2 – **Record** 2-D12-RR-R600B (Stack Rad Monitor) digital point display.

Records the 2-D12-RR-R600B (Stack Rad Monitor) digital point display in the space provided on step 6.3.2.2a (value of ~1.12 E1 or 11.2).

SAT/UNSAT

Step 3 – **Multiply** the value obtained in Step 2.a by 1.5 to obtain the value for a 50% rise in stack radiation monitor reading.

Records the value obtained in step 6.3.2.2a (~1.12 E1 or 11.2) in the space provided on step 6.3.2.2b. Multiplies the value by 1.5, and records the product (~1.68 E1 or 16.8) in the space provided in step 6.3.2.2b.

SAT/UNSAT

PROMPT: If asked, sign the procedure as the IV for the calculation. Do not change the value if calculated incorrectly.

Step 4 – **Close** 2-VA-2D-BFV-RB (Reactor Building SBGT Train 2A Inlet Valve).

Reactor Building SBGT Train 2A Inlet Valve 2-VA-2D-BFV-RB switch is rotated counterclockwise to the close position and held (throttle valve) for 10 seconds after the red light is extinguished and the green light is illuminated at which time it can be released to the neutral position. 2-VA-2D-BFV-RB is closed (****critical***).*

****CRITICAL STEP**SAT/UNSAT**

Step 5 – **Close** 2-VA-2H-BFV-RB (Reactor Building SBGT Train 2B Inlet Valve).

Reactor Building SBGT Train 2B Inlet Valve 2-VA-2H-BFV-RB switch is rotated counterclockwise to the close position and held (throttle valve) for 10 seconds after the red light is extinguished and the green light is illuminated at which time it can be released to the neutral position. 2-VA-2H-BFV-RB is closed (****critical***).*

****CRITICAL STEP**SAT/UNSAT**

Step 6 – **Open** 2-VA-2F-BFV-RB (SBGT DW Suct Damper).

SBGT DW Suction Damper 2-VA-2F-BFV-RB control switch is rotated clockwise to the open position and then released. Observes red light illuminates and the green light goes out. 2-VA-2F-BFV-RB is open (*__critical__).*

****CRITICAL STEP**SAT/UNSAT**

PROMPT:	If asked as CRS, direct performer to vent the drywell only.

Step 7 – **Open** 2-CAC-V9 (DW Purge Exh Vlv).

DW Purge Exh Vlv 2-CAC-V9 switch is rotated clockwise from the close position to the open position and then released to the neutral position. Observes the red light illuminates and the green light goes out. 2-CAC-V9 is open (*__critical__).*

****CRITICAL STEP**SAT/UNSAT**

SIM OP:	When CAC-V23 is opened, verify Trigger 1 initiates to ramp Main Stack Rad Monitor value.

Step 8 – **Open** 2-CAC-V23 (DW Purge Exh Vlv).

DW Purge Exh Vlv 2-CAC-V23 switch is rotated clockwise from the close position to the open position and then released to the neutral position. Observes the red light illuminates and the green light goes out. 2-CAC-V23 is open (*__critical__).*

****CRITICAL STEP**SAT/UNSAT**

PROMPT:	If requested as CRS, inform performer that it is desired to vent from the drywell head (additional vent capacity is desired).

Step 9 – **IF** additional vent capacity is desired, **THEN** **open** 2-CAC-V49 (DW Head Purge Exh Vlv).

2-CAC-V49 switch is rotated clockwise from the close position to the open position and then released to the neutral position. Observes the red light illuminates and the green light goes out. 2-CAC-V49 is open.

SAT/UNSAT

Step 10 – **IF** additional vent capacity is desired, **THEN** **open** 2-CAC-V50 (DW Head Purge Exh Vlv).

2-CAC-V50 switch is rotated clockwise from the close position to the open position and then released to the neutral position. Observes the red light illuminates and the green light goes out. 2-CAC-V50 is open.

SAT/UNSAT

Step 11 – On Panel XU-3, **monitor** 2-D12-RR-R600B (Stack Rad Monitor) for a rise in activity during the performance of this procedure.

Monitors 2-D12-RR-R600B for a rise in activity, and determines Stack Rad Monitor reading has risen by 50%.

SAT/UNSAT

NOTE: It is critical for at least one valve to be closed in each vent path that is open, i.e., CAC-V23 or CAC-V9, AND, CAC-V49 or CAC-V50, or that the primary containment suction valve VA-2F-BFV-RB is closed to isolate the release path.

SIM OP: When the vent path has been isolated, delete the meter override on the Main Stack Rad Monitor.

PROMPT: If the examinee informs the Unit CRS that the Main Stack has risen by >50%, direct examinee as Unit CRS to perform required actions for the increase.

NOTE: Either Step 12 OR Step 13 is CRITICAL.

PROMPT: Another operator is available to perform Independent Verifications.

****ALTERNATE PATH BEGINS AT STEP 12****

Step 12 – **IF** stack radiation rises to greater than the value determined in Section 6.3.2 Step 2.b, **THEN perform** the following to secure venting the drywell: **Close** 2-CAC-V23 (DW Purge Exh Vlv).

2-CAC-V23 control switch is rotated counterclockwise to the close position. Observes the red light goes out and the green light illuminates. 2-CAC-V23 is closed (****critical****).*

****CRITICAL STEP**SAT/UNSAT**

Step 13 – **IF** stack radiation rises to greater than the value determined in Section 6.3.2 Step 2.b, **THEN perform** the following to secure venting the drywell **Close** 2-CAC-V9 (Drywell Purge Exh Vlv).

2-CAC-V9 control switch is rotated counterclockwise to the close position. Observes the red light goes out and the green light illuminates. 2-CAC-V9 is closed (****critical****).*

****CRITICAL STEP**SAT/UNSAT**

NOTE: Either Step 14 OR Step 15 is **CRITICAL** if the 2-CAC-49 and V50 were opened.

Step 14 – **IF** stack radiation rises to greater than the value determined in Section 6.3.2 Step 2.b, **THEN perform** the following to secure venting the drywell **Ensure** 2-CAC-V49 (DW Head Purge Exh Vlv) is CLOSED.

2-CAC-V49 control switch is rotated counterclockwise to the close position. Observes the red light goes out and the green light illuminates. 2-CAC-V49 is closed (****critical***).*

****CRITICAL STEP**SAT/UNSAT**

Step 15 – **IF** stack radiation rises to greater than the value determined in Section 6.3.2 Step 2.b, **THEN perform** the following to secure venting the drywell **Ensure** 2-CAC-V50 (DW Head Purge Exh Vlv) is CLOSED.

2-CAC-V50 control switch is rotated counterclockwise to the close position. Observes the red light goes out and the green light illuminates. 2-CAC-V50 is closed (****critical***).*

****CRITICAL STEP**SAT/UNSAT**

PROMPT:	If asked, inform examinee as Unit CRS that E&RC has been notified to sample primary containment, and to reference E&RC 2020 Setpoint Determinations for Gaseous Radiation Monitors (Noble Gas Instantaneous Release Rate Determination).

NOTE:	Step 16 is not critical if either step 12 or 13 AND either 14 or 15 was completed SAT. Release path may be isolated by closing 1 valve in each vent path OR by closing the common isolation in Step 16.

Step 16 – **CLOSE** SBGT DW SUCT DAMPER, 2-VA-2F-BFV-RB.

SBGT DW Suction Damper 2-VA-2F-BFV-RB control switch is rotated counter-clockwise to the closed position and then released. Observes green light illuminates and the red light goes out. 2-VA-2F-BFV-RB is closed (****critical***).*

****CRITICAL STEP**SAT/UNSAT**

NOTE:	The following valves would auto open on SBGT Initiation therefore Steps 17 and 18 are NOT critical.

Step 17 – **Open** 2-VA-2H-BFV-RB (SBGT Train 2B Reactor Building Suction Valve).

Verifies 2-VA-2H-BFV-RB indicates full open. Observes green light out and the red light lit. 2-VA-2H-BFV-RB is full open.

SAT/UNSAT

Step 18 – **Open** 2-VA-2D-BFV-RB (SBGT Train 2A Reactor Building Suction Valve).
Verifies 2-VA-2D-BFV-RB indicates full open. Observes green light out and the red light lit. 2-VA-2D-BFV-RB is full open.

SAT/UNSAT

PROMT: If asked, inform examinee as Unit CRS that another operator is standing by to perform 0PT-02.3.1b, Suppression Pool to Drywell Vacuum Breaker Position Check.

Step 19 – **Inform** Unit CRS that venting is secured due to increase of 50% in Main Stack Rad Monitor reading.
Unit CRS is informed venting is secured due to increase of 50% in Main Stack Rad Monitor reading.

SAT/UNSAT

TERMINATING CUE: When Primary containment Venting has been secured and the Unit CRS is notified, this JPM is complete.

TIME COMPLETED: _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Readings
3	Not Critical	Readings
4	Critical	Necessary for venting alignment
5	Critical	Necessary for venting alignment
6	Critical	Necessary for venting alignment
7	Critical	Necessary for venting alignment
8	Critical	Necessary for venting alignment
9	Not Critical	Additional venting alignment
10	Not Critical	Additional venting alignment
11	Not Critical	Monitoring
12	Critical	Communication
13	Critical	Necessary for termination of release
14	Critical	Necessary for termination of release
15	Critical	Necessary for termination of release
16	Critical	Necessary for termination of release
17	Not Critical	Auto-action for securing vent
18	Not Critical	Auto-action for securing vent
19	Not Critical	Communication

REVISION SUMMARY

8	Enhanced Standards for JPM steps Added Critical Step delineation Fixed numbering
7	Updated to the new JPM template.

(Provide sufficient detail for reviewers and evaluators to understand the scope of any technical and/or administrative changes).

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	X	No	______		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

TASK CONDITIONS:

1. Drywell pressure is above normal due to a partial loss of Drywell Cooling.
2. Standby Gas Treatment System is in the Standby Alignment.
3. The plant stack radiation monitor is in service and CAC-CS-5519, CAC Purge Vent Isolation Override is in OFF.
4. ERFIS is unavailable.

INITIATING CUE:

The Unit CRS directs you to vent the Drywell via Standby Gas Treatment, and inform him (her) when drywell pressure has been reduced below 0.5 psig**.**

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

SIM JPM F - 2016 NRC INITIAL EXAM - RO/ISRO

LESSON TITLE: **Shifting Caswell Beach Lube Water Pumps From The RTGB**

LESSON NUMBER: **LOT-SIM-JP-029-01**

REVISION NO: **0**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/06/16
TECHNICAL REVIEWER / DATE

Dwayne Wolf
Grant Newton 9/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

275002B101 Startup The Circulating Water System Per OP-29

K/A REFERENCE AND IMPORTANCE RATING:

400000 A4.01 Ability to manually operate and/or monitor in the control room: CCW indications and control.

REFERENCES:

2OP-29, Section 6.3.27, Shifting Caswell Beach Lube Water Pumps From The RTGB

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

8 - Plant Service Systems (Component Cooling Water System)

SETUP INSTRUCTIONS

SIMULATOR SETUP

Initial Conditions

1. Recommended Initial Conditions

   IC-11

2. Required Plant Conditions

   None.

Malfunctions:

None.

Special Instructions

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. An Auxiliary operator is stationed at Caswell Beach.
2. All Section 5.0 prerequisites of 2OP-29, *Circulating Water System* are met.

INITIATING CUE:

You are directed by the Unit CRS to place Caswell Beach Bearing Lube Water pump 2B in service, and secure the Caswell Beach Bearing Lube Water pump 2A IAW 2OP-29 Section 6.3.27,*Shifting Caswell Beach Lube Water Pumps From The RTGB.* Inform the CRS when complete.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 0 - May perform take a minute at job site prior to beginning task.

Examinee may cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Am I using appropriate gloves? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

Step 1 - Obtain current revision of 2OP-29 Section 6.3.27.

Provide current revision of 2OP-29 Section 6.3.27.

SAT/UNSAT

TIME START: ______________

PROMPT: When contacted as the Auxiliary Operator at Caswell Beach, acknowledge the communication, and report that you are standing by for the pump shift.

Step 2 - **Establish** communication with Auxiliary Operator at Caswell Beach.

Contacts the AO at Caswell Beach.

SAT/UNSAT

NOTE: When the Point Select push button is depressed it initiates a 10 second window for starting or stopping Lube Water pumps. Place keeping of the pump start steps and pump stop steps may be deferred until after the Lube Water pump is running or stopped.

Step 3 – **Start** the non-operating Bearing Lube Water pump as follows:

a. **Depress** Point Select push button for the selected Bearing Lube Water pump.

Depresses Point Select push button for the Caswell Beach Bearing Lube Water pump 2B on Panel XU-2 and the checkback lamp comes ON.

****CRITICAL STEP**   SAT/UNSAT**

Step 4 - **Start** the non-operating Bearing Lube Water pump as follows:

b. **WHEN** checkback lamp in the selected point push button comes ON, **<u>THEN</u> place** the Bearing Lube Water pump control switch to START.

Places the control switch for the Caswell Beach Bearing Lube Water pump 2B to START, within 10 seconds of the checkback lamp for the Caswell Beach Bearing Lube Water pump 2B point push button coming ON and the Caswell Beach Bearing Lube Water pump 2B starts.

****CRITICAL STEP**   SAT/UNSAT**

<u>PROMPT</u>:	When contacted as the Auxiliary Operator at Caswell Beach, acknowledge the communication , and report a good start on the Caswell Beach Bearing Lube Water pump 2B.

Step 5 - **Start** the non-operating Bearing Lube Water pump as follows:

c. **Confirm** with the Auxiliary Operator that the pump starts without unusual noise or cavitation.

Confirms with the Auxiliary Operator that the Caswell Beach Bearing Lube Water pump 2B has started without unusual noise or cavitation.

SAT/UNSAT

Step 6 - **Stop** the previously operating Bearing Lube Water pump as follows:

a. **Depress** Point Select push button for the selected Bearing Lube Water pump.

Depresses Point Select push button for the Caswell Beach Bearing Lube Water pump 2A on Panel XU-2 and the checkback lamp comes ON.

**** CRITICAL STEP **   SAT/UNSAT**

Step 7 - **Stop** the previously operating Bearing Lube Water pump as follows:

b. **WHEN** checkback lamp in the selected point push button comes ON, **<u>THEN</u> place** the Bearing Lube Water pump control switch to STOP.

Places the control switch for the Caswell Beach Bearing Lube Water pump 2A to STOP, within 10 seconds of the checkback lamp for the Caswell Beach Bearing Lube Water pump 2A point push button coming ON and the Caswell Beach Bearing Lube Water pump 2A stops.

**** CRITICAL STEP **   SAT/UNSAT**

PROMPT:	When contacted as the Auxiliary Operator at Caswell Beach, acknowledge the communication , and report that the Caswell Beach Bearing Lube Water pump 2A has stopped, and that lube water flow is adequate for all CWOD pumps.

Step 8 – **Stop** the non-operating Bearing Lube Water pump as follows:

c. **Confirm** with the Auxiliary Operator that the pump stops.

Confirms with the Auxiliary Operator that the Caswell Beach Bearing Lube Water pump 2A has stopped.

SAT/UNSAT

Step 9 – **Informs** CRS that the Caswell Beach Lube Water Pumps have been shifted with the 2B pump now running and the 2A pump secured.

Informs CRS that the pump shift is complete.

SAT/UNSAT

TERMINATING CUE:	Once Caswell Beach Bearing Lube Water pump 2B is running ,pump 2A is secured, and the CRS has been notified , the JPM can be terminated.

TIME COMPLETED: _______________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Communication
3	Critical	Action required to start pump
4	Critical	Action required to start pump
5	Not Critical	Communication
6	Critical	Action required to stop pump
7	Critical	Action required to stop pump
8	Not Critical	Communication
9	Not Critical	Communication

REVISION SUMMARY

0	New JPM written for 2016 Initial NRC exam.

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

____

____

____

____

____

☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________

TASK CONDITIONS:

1. An Auxiliary operator is stationed at Caswell Beach.

2. All Section 5.0 prerequisites of 2OP-29, *Circulating Water System* are met.

INITIATING CUE:

You are directed by the Unit CRS to place Caswell Beach Bearing Lube Water pump 2B in service, and secure the Caswell Beach Bearing Lube Water pump 2A IAW 2OP-29 Section 6.3.27,*Shifting Caswell Beach Lube Water Pumps From The RTGB.* Inform the CRS when complete.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

SIM JPM G - 2016 NRC INITIAL EXAM - RO/ISRO

LESSON TITLE: **SUBSTITUTING A CONTROL ROD POSITION INTO THE RWM**

LESSON NUMBER: **LOT-SIM-JP-007-B02**

REVISION NO: **3**

Dan Hulgin 08/18/16
PREPARER / DATE

Bob Bolin 09/06/16
TECHNICAL REVIEWER / DATE

Dwayne Wolf 09/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

214202B101
Determine The RWM Substitute Rod Position For A Failed Reed Switch Position Indicator Per OP-07

K/A REFERENCE AND IMPORTANCE RATING:

201006 A4.06 3.2/3.2
Ability to manually operate and/or monitor in the control room: Selected rod position indication

REFERENCES:

2OP-07, Section 6.3.11 Determination Of The RWM Substitute Position
0OI-53, Rod Worth Minimizer (NUMAC-RWM)

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

7 Instrumentation

SAFETY CONSIDERATIONS

None

SETUP INSTRUCTIONS

Recommended Initial Conditions

IC-11, 100% Power, BOC

Required Plant Conditions

Fail the Reed switch for Control Rod 22-03 position 48.

Triggers

None

Malfunctions

System	Tag	Title	Value
RD	RD179M	Reed Switch Failure Rod 22-03	48

Overrides

None

Remotes

None

Special Instructions

None

SAFETY CONSIDERATIONS:

1. None.

EVALUATOR NOTES: (Do not read to performer)

1. The applicable copy of 2OP-07, Section 6.3.11 WILL be provided to the performer.
2. If requested, a copy of 0OI-53, WILL be provided to the performer.
3. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
4. This JPM will be performed in the simulator on Unit Two.

Read the following to the JPM performer.

TASK CONDITIONS:

1. Control Rod 22-03 has just been positioned at position 48.
2. A valid rod position has NOT been determined.
3. Prerequisites listed in Section 5.0 of 2OP-07 are met.
4. The on duty Reactor Engineer has been notified.
5. The Unit CRS has reviewed Technical Specifications for applicability and has given permission to perform this procedure.

INITIATING CUE:

You are directed to enter a substitute value for Control Rod 22 03 into the RWM, and inform the CRS when complete**.**

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - **Obtain** a copy of 2OP-07, Reactor Manual Control System Operating Procedure, Section 6.3.11.

Copy of 2OP-07, Reactor Manual Control System Operating Procedure, Section 6.3.11 is obtained.

SAT/UNSAT

TIME START: ___________

PROMPT:	Role play as a Concurrent Verification, if requested. DO NOT correct the performer.
PROMPT:	Role play as CRS, to initial Steps 6.3.11.2, 4 & 5 when asked.

Step 2 – Using Concurrent Verification, **Insert** or **withdraw** control rod one additional notch to an operable control rod reed switch position indicator.

- *Turns on Rod Select Power by placing the control switch to ON.*
- *Selects Control Rod 22-03 on the RTGB select matrix by depressing its* Control Rod Select pushbutton
- *Inserts Control Rod 22-03 to position 46 using the Rod Movement control switch in the IN position for one notch.*
- *Control Rod 22-03 is at position 46* (**critical***).*
- *Control Rod 22-03 is selected* (**critical***).*

****CRITICAL STEP**SAT/UNSAT**

Step 3 – **Record** the OPERABLE control rod reed switch position below**.**

Records Control Rod 22-03 at position 46 for step 6.3.11.6.c in the space labeled “Operable Control Rod Reed Switch Position”.

SAT/UNSAT

Step 4 – **Restore** control rod to the position of the failed control rod reed switch position indicator.

- *Withdraws Control Rod 22-03 to position 48 using the Rod Movement control switch.*
- *May use continuous withdraw and perform an over travel check -OR- May single notch out to 48 and then attempt to notch out past position 48.*
- *Control Rod 22-03 is at position 48* (**critical***).*

****CRITICAL STEP**SAT/UNSAT**

Step 5 – **Ensure** inferred position offered by the RWM deviates by one notch and in the correct direction from the position determined in Section 6.3.11 Step 6.c.

Verifies RWM infers substitute value of 48.

SAT/UNSAT

Step 6 – **Record** the inferred rod position below.

Records 48 for step 6.3.11.6.g in the space labeled "Inferred Position".

SAT/UNSAT

NOTE: 0OI-53 may be used for guidance in performance of step 7.

Step 7 – **IF** a valid inferred position from the RWM **OR** valid rod position determined by appropriate methods (as identified in Section 6.1.1) has been obtained, **THEN perform** the following: Substitute the valid rod position into RWM.

- *At the RWM Operator's Console on the RTGB, depresses the ETC softkey to obtain the SUBSTITUTE OPTIONS softkey.*
- *Depresses the SUBSTITUTE OPTIONS softkey to change to the SUBSTITUTE OPTION screen.*
- *Verifies RWM offers an inferred position of 48 as the substitute position or depresses the increment/decrement softkey to adjust the substitute position to 48.*
- *Depresses the ENTER SUBSTITUTE softkey.*
- *Depresses the EXIT softkey to return to the main menu screen*
- *48 substituted as the position for Control Rod 22-03* (**critical***).*

****CRITICAL STEP**SAT/UNSAT**

PROMPT: Inform trainee as the Unit CRS that Reactor Engineer will enter the substitute value in the PPC. Also another operator will execute a CORE MON, and make the Log entries.

Step 8 – **Notify** Unit CRS that a substitute value of 48 has been entered for Control Rod 22-03 per OP-7.0.

Unit CRS notified.

SAT/UNSAT

TERMINATING CUE: When Control rod 22-03 has been given a substitute position of 48 in the RWM, and the CRS has been notified, this JPM is complete.

TIME COMPLETED: _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Rod selected is necessary to substitute rod position in step 7. Rod at position 46 is necessary for RWM to infer correct position.
3	Not Critical	Recording value
4	Critical	Rod at position 48 is necessary for RWM to infer correct position.
5	Not Critical	Verification
6	Not Critical	Recording value
7	Critical	Necessary to substitute value.
8	Not Critical	Communication

REVISION SUMMARY

3	New Format. Critical Steps added based on necessity for RWM inferred position. Standards enhanced Critical Step delineation table added. Changed SCO to CRS. Corrected procedure section. Added additional Notes and Prompts Validation time changed to 15 minutes based on validators’ time.
2	Convert to Word, changed title from LOR to LOT

SUBSTITUTING A CONTROL ROD POSITION INTO THE RWM

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	X	Admin	___
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

____

____

____

____

____

☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

C
Continuous
Use

Control Rod Movement

The purpose of this attachment is to document the rod pattern prior to power change. Enter the rod position information or attach Display 810 Edit.

Unit: 2

51					48	48	48	48	48				
47			48	48	48	48	48	48	48	48	48		
43		48	48	48	48	48	36	48	48	48	48	48	
39		48	48	48	48	48	48	48	48	48	48	48	
35	48	48	48	48	08	48	00	48	08	48	48	48	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	48	36	48	00	48	48	48	00	48	36	48	48
23	48	48	48	48	48	48	48	48	48	48	48	48	48
19	48	48	48	48	08	48	00	48	08	48	48	48	48
15		48	48	48	48	48	48	48	48	48	48	48	
11		48	48	48	48	48	36	48	48	48	48	48	
07			48	48	48	48	48	48	48	48	48		
03					48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50

Prepared by: Bryan Wester Date Today
Reactor Engineer

Verified by: John Miller Date Today
Reactor Engineer or SRO

Approved by: Jake Beamer Date Today
Unit CRS

Control Rod Movement

C
Continuous
Use

Individual Rod Movement Instructions Sheet 1 of 1 SRO Initials: JB

Control Rod	Correct Rod Selected/Verified (CV) NOTE 3			Control Rod Position To	Licensed Operator	Overtravel Check NOTE 1	Full Out Position Check NOTE 2	Second Licensed Operator	Comments
22-03	/	/	/	46					
22-03	/	/	/	48					
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						
-	/	/	/						

Control Rod Movement

NOTE 1: **WHEN** a control rod is withdrawn to the Full Out position, either **MAINTAIN** the continuous withdrawal signal for at least 3 to 5 seconds **OR APPLY** a separate notch withdrawal signal, **AND PERFORM** the following rod coupling integrity check:

- **CONFIRM** *ROD OVER TRAVEL (A-05 4-2)* annunciator does **NOT** alarm. (SR 3.1.3.4)
- **CONFIRM** rod full out light is not lost.
- **CONFIRM** rod position indication on the four-rod display indicates position 48.
- **CONFIRM** *ROD DRIFT (A-05 3-2)* annunciator does **NOT** alarm.

NOTE 2: **VERIFY** the rod reed switch position indicator corresponds to the control rod position indicated by the Full Out reed switch.

NOTE 3: Concurrent Verification (CV) of rod selection required prior to rod movement.
Additional (CV) signoffs for subsequent rod selection following a deselect.

Control Rod Movement

Other Instructions: Performing movement of Control Rod 22-03 to determine RWM substitute position.

Date/Time Completed ______________________

Performed By (Print) Initials

Reviewed By: ______________________________ Unit CRS

TASK CONDITIONS:

1. Control Rod 22-03 has just been positioned at position 48.
2. A valid rod position has NOT been determined.
3. Prerequisites listed in Section 5.0 of 2OP-07 are met.
4. The on duty Reactor Engineer has been notified.
5. The Unit CRS has reviewed Technical Specifications for applicability and has given permission to perform this procedure.

INITIATING CUE:

You are directed to enter a substitute value for Control Rod 22-03 into the RWM, and inform the CRS when complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

SIM JPM H - 2016 NRC INITIAL EXAM – RO

LESSON TITLE: Test the Main Steam Isolation Valves

LESSON NUMBER: LOT-SIM-JP-025-A04

REVISION NO: 0

Lou Sosler 9/11/2015

PREPARER / DATE

John Biggs 9/15/2015

TECHNICAL REVIEWER / DATE

Brian Moschet 9/11/2015

Derek Pickett 9/10/2015

VALIDATOR / DATE

Jerry Pierce 9/24/2015

LINE SUPERVISOR / DATE

Jim Barry 9/25/2015

TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

239201B201, Test Main Steam Isolation Valves per 0PT-40.2.7

K/A REFERENCE AND IMPORTANCE RATING:

239001 A4.01 4.2/4.0
Ability to manually operate and/or monitor the MSIVs in the Control Room

REFERENCES:

0PT-40.2.7, Testing of Main Steam Line Isolation Valves After Maintenance
0PT-40.2.8, Main Steam Isolation Valve Closure Test

TOOLS AND EQUIPMENT:

Stop Watch **with calibration data**

SAFETY FUNCTION (from NUREG 1123):

3 – Pressure Control

SIMULATOR SETUP

Initial Conditions: Reactor power $\leq$50 RTP%

Place Feedwater Control Mode Select switch in 1-ELEM per 2OP-32.

SAFETY CONSIDERATIONS:

None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM may be performed on Unit 2.
4. Critical Step Basis
    1. Prevents Task Completion
    2. May Result in Equipment Damage
    3. Affects Public Health and Safety
    4. Could Result in Personal Injury
5. **Provide copy of 0PT-40.2.7, Acceptance Criteria, Prerequisites, Section 6.2, and Attachment 2, Post Maintenance Testing B21-F022A (Inboard MSIV A Vlv)**

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit Two startup is in progress following a forced outage to repair MSIV 2B21-F022A, Inboard MSIV A Valve.
2. Conditions are such that steam flow can be stopped in the main steam line of the MSIVs being tested.
3. It is not required to stop steam flow in MSL A to perform the slow closure test of B21-F022A, Inboard MSIV A Valve.
4. No other tests or maintenance activities are in progress that could provide a half scram signal to the RPS logic.
5. Another operator has placed Feedwater Control Mode Select switch in 1-ELEM per 2OP-32, Condensate and Feedwater System Operating Procedure.

INITIATING CUE:

You are directed by the Unit CRS to perform 0PT-40.2.7, Testing of Main Steam Isolation Valve after Maintenance, for MSIV 2B21-F022A, Inboard MSIV A Valve ONLY and inform the CRS if the stroke time meets the acceptance criteria.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - Perform take a minute at job site prior to beginning task.

Examinee should cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

SAT/UNSAT

TIME START: ___________

NOTE: The examinee should be provided a copy of 0PT-40.2.7, Testing of Main Steam Isolation Valve after Maintenance, and given time to review and pre-mark appropriate sections.

PROMPT If asked, a Reactivity Management Team is in place for this test.

Step 2 – Confirm Reactor power is less than 55% RTP

Confirmed power less than 55% RTP.

SAT/UNSAT

Step 2a – Confirm conditions are such that steam flow can be stopped in the main steam line of the MSIV being tested

Confirms steam flow can be stopped in the A Main Steam Line.

SAT/UNSAT

PROMPT If asked, No other tests or maintenance activities are in progress that could provide a half scram signal to the RPS logic.

Step 3 – Confirm all MSIVs are open.

Confirmed all MSIVs are open.

SAT/UNSAT

Step 4 – Confirm Reactor Recirculation system is **NOT** in single loop operation (SLO)

Confirmed Reactor Recirculation system not in single loop.

SAT/UNSAT

NOTE: Have stop watch ready to give to Examinee.

Step 5 – Obtain a stopwatch and record calibration information.
Stop watch obtained and calibration information recorded.

SAT/UNSAT

PROMPT If asked, As the CRS grant permission to perform the test.

Step 5a – Ensures all prerequisites are met.
Verifies all steps in Section 5.0 are met.

SAT/UNSAT

Step 5b – Ensures Feedwater Control Mode Select switch, in 1-ELEM per 2OP-32, Condensate and Feedwater System Operating Procedure.
Verifies Feedwater Control Mode Select control switch is in 1 ELEM.

SAT/UNSAT

NOTE: IF AT ANY TIME while performing this test in MODE 1, annunciator A-05, 4-6, Main Steam Isol Vlv Not Full Open, is received, THEN suspend this test and determine its cause.

Step 6 – Ensure the following annunciators are clear:

- A-05, 4-6, Main Steam Isol Vlv Not Full Open
- A-05, 1-7, Reactor Auto Scram Sys A
- A-05, 2-7, Reactor Auto Scram Sys B

Annunciators confirmed to be clear.

SAT/UNSAT

NOTE: When this test is performed in MODE 1, reactor pressure, power level, and steam flow are monitored while closing the MSIVs. Any deviation from expected plant response is cause for suspension of this test and notification of the Unit CRS prior to proceeding.
PROMPT It is NOT required to stop steam flow in Main Steam Line A.
NOTE: Performer should NA step 6.2.2.
PROMPT It IS required to perform slow closure (spring closure) test of B21-F022A.

Step 7 - **Depress** and **hold** B21-F022A (Inboard MSIV A Test) pushbutton until the valve goes CLOSED, approximately 45-60 seconds.

B21-F022A (Inboard MSIV A Test) pushbutton depressed and held until the valve is CLOSED, green light on, red light off.

****CRITICAL STEP** SAT/UNSAT**

Step 8 - **Release** B21-F022A (Inboard MSIV A Test) pushbutton and **confirm** the valve goes OPEN

Pushbutton for B21-F022A released and valve open confirmed.

****CRITICAL STEP** SAT/UNSAT**

PROMPT If asked, stroke time testing is required.

NOTE: Operation with both MSIVs closed in a main steam line is minimized to reduce the severity of differential pressure transients when reopening the Outboard MSIV.

Step 9 - **Perform** stroke time test as follows:

a. **Ensure** B21-F022A (Inboard MSIV A Vlv) OPEN.

B21-F022A verified open.

SAT/UNSAT

b. **Close** B21-F022A (Inboard MSIV A Vlv) utilizing the pistol grip switch.

B21-F022A pistol grip switch taken to close.

****CRITICAL STEP** SAT/UNSAT**

c. **Record** stroke time:

Stroke time recorded.

SAT/UNSAT

d. **Enter** the measured stroke time from Section 6.2 Step 4.c and **calculate** the corrected stroke time (Stroke Time from Section 6.2, Step 4.c X 1.1 = Corrected Stroke Time)

Corrected stroke time calculated (acceptance criteria per Att. 2 is 3 to 5 sec)

****CRITICAL STEP** SAT/UNSAT**

e. **Record** corrected stroke time on Attachment 1 or Attachment 2
Corrected Stroke Time recorded on Attachment 2

SAT/UNSAT

NOTE: Step 6.2.5 is NA, as the B21-F028A was not closed previously.

PROMPT If asked, it is required by plant conditions to open B21-F022A.

Step 10 – **IF** required by plant conditions, **THEN open** B21-F022A (Inboard MSIV A Vlv).
B21-F022A pistol grip switch taken to open.

SAT/UNSAT

NOTE: Step 6.2.7 is N/A

NOTE: Annunciator A-7, 4-2, FW Sys Ctrl Trbl, may alarm.

Step 11 – **Informs** CRS that the stroke time for the Inboard MSIV A is SAT
Determines from Attachment 2 that the stroke time for A MSIV is within the Acceptance Criteria.

SAT/UNSAT

PROMPT Inform Examinee that another operator will complete the Restoration section of the PT.

TERMINATING CUE: When the 2B21-F022A, Inboard MSIV A Valve, has been re-opened after testing and the CRS is notified that the stroke time meets the Acceptance Criteria of the PT this JPM is complete.

TIME COMPLETED: _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2-6	Not Critical	Verification of initial conditions and pre-requisites.
7-8	Critical	Required actions to complete the test.
9a	Not Critical	Verification step.
9b	Critical	Action required to complete the test.
9c	Not Critical	Recording time not critical to test completion.
9d	Critical	Calculation of Corrected Stroke Time required to complete task.
9e	Not Critical	Recording required information.
10	Not Critical	Re-opening valve not required to obtain results.

REVISION SUMMARY

0	New JPM.

Test the Main Steam Isolation Valves

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate ____		Actual	X	Unit:	2
Setting:	In-Plant ____		Simulator	X	Admin	___
Time Critical:	Yes ____		No	X	Time Limit	N/A
Alternate Path:	Yes ____		No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

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☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

TASK CONDITIONS:

1. Unit Two startup is in progress following a forced outage to repair MSIV 2B21-F022A, Inboard MSIV A Valve.

2. Conditions are such that steam flow can be stopped in the main steam line of the MSIVs being tested.

3. It is not required to stop steam flow in MSL A to perform the slow closure test of B21-F022A, Inboard MSIV A Valve.

4. No other tests or maintenance activities are in progress that could provide a half scram signal to the RPS logic.

5. Another operator has placed Feedwater Control Mode Select switch in 1-ELEM per 2OP-32, Condensate and Feedwater System Operating Procedure.

INITIATING CUE:

You are directed by the Unit CRS to perform 0PT-40.2.7, Testing of Main Steam Isolation Valve after Maintenance, for MSIV 2B21-F022A, Inboard MSIV A Valve ONLY and inform the CRS if the stroke time meets the acceptance criteria.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

IP JPM I - 2016 NRC INITIAL EXAM - RO/ISRO

LESSON TITLE: **ALTERNATE COOLANT INJECTION LEP-01 – HEATER DRAIN PUMPS**

LESSON NUMBER: **AOT-OJT-JP-300-J13**

REVISION NO: **6**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/07/16
TECHNICAL REVIEWER / DATE

Hunter Morris 9/07/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

200072B504
Perform Alternate Coolant Injection With Heater Drain Pumps Per LEP-01.

K/A REFERENCE AND IMPORTANCE RATING:

295031 AA1.08 3.8/3.9
Ability to operate alternate injection system systems as they apply to Reactor Water Level Low.

REFERENCES:

0EOP-01-LEP-01, ALTERNATE COOLANT INJECTION

TOOLS AND EQUIPMENT:

CR104P key for Unit Trip Load Shed Selector switch.

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

2 Inventory Control

SAFETY CONSIDERATIONS:

1. Notify SM/CRS of JPM performance prior to commencing In-plant JPM.
2. Determine actual radiological conditions and potentially contaminated areas to achieve ALARA.
3. Ensure all electrical safety requirements are observed.
4. Review Work Practices section prior to conduct of the JPM.
5. DO NOT OPERATE any plant equipment during performance of this JPM.

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee. 0EOP-01-LEP-01, will be provided to the examinee when asked for.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed on Unit 1or Unit 2.
4. Consider starting this JPM in the Control Room due to the need to obtain a CR104P key for Unit Trip Load Shed Selector Switch as well as for obtaining permission to enter the 4 KV Switchgear area in the Turbine Building
5. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. A low Reactor Water level condition exists on Unit _____.
2. The CRS is executing the Reactor Vessel Control Procedure (EOP-01-RVCP)
3. RVCP directs use of Alternate Coolant Injection per EOP-01-LEP-01.
4. RPV Pressure is 450 psig.
5. The main condenser is under vacuum.

INITIATING CUE:

You are directed to perform the Auxiliary Operator actions for Alternate Coolant Injection, Heater Drain Pump Injection per EOP-01-LEP-01, Section 2.2, and inform the Control Room when all required Auxiliary Operator actions are complete.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - Perform take a minute at job site prior to beginning task.

Examinee should cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

SAT / UNSAT

TIME START ___________

PROMPT: Inform examinee that LEP-01, Section 2.2.3 Steps 1 through 3 have been completed.

Step 2 – **Maintain** level in the heater drain tank: Place feedwater heater level controllers to MAN and decrease the air signal to 0% to open the associated feedwater heater level control valves: HD-LC-75 (Feedwater Heater 4A Level Controller).

Places HD-LC-75 Auto/Manual Selector to MAN .
Adjust Controller output to 0% using Manual Control Unit Thumbwheel.
HD-LC-75 in MAN with air signal at 0% (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 3 – **Maintain** level in the heater drain tank: Place feedwater heater level controllers to MAN and decrease the air signal to 0% to open the associated feedwater heater level control valves: HD-LC-83 (Feedwater Heater 5A Level Controller).

Places HD-LC-83 Auto/Manual Selector to MAN .
Adjust Controller output to 0% using Manual Control Unit Thumbwheel.
HD-LC-83 in MAN with air signal at 0% (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 4 – **Maintain** level in the heater drain tank: Place feedwater heater level controllers to MAN and decrease the air signal to 0% to open the associated feedwater heater level control valves: HD-LC-79 (Feedwater Heater 4B Level Controller).

Places HD-LC-79 Auto/Manual Selector to MAN .
Adjust Controller output to 0% using Manual Control Unit Thumbwheel.
HD-LC-79 in MAN with air signal at 0% (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 5 – **Maintain** level in the heater drain tank: Place feedwater heater level controllers to MAN and decrease the air signal to 0% to open the associated feedwater heater level control valves: HD-LC-87 (Feedwater Heater 5B Level Controller).

Places HD-LC-87 Auto/Manual Selector to MAN .
Adjust Controller output to 0% using Manual Control Unit Thumbwheel.
HD-LC-87 in MAN with air signal at 0% (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 6 - **Ensure** HD-LC-91 (Heater Drain Deaerator Level Controller) in AUTO.

Verifies HD-LC-91 in AUTO (Auto/Manual Selector in AUTO).
HD-LC-91 in AUTO.

SAT / UNSAT

Step 7 - **Unit 2 Only**: **Ensure** HD-LC-97 (Heater Drain Deaerator Level Controller) in AUTO.

Verifies HD-LC-97 in AUTO (Controller Mode (Manual or Auto) –A displayed on the controller).
HD-LC-97 in AUTO

SAT / UNSAT

PROMPT:	When informed that AO actions for step 4 are complete, inform examinee that LEP-01, Section 2.2.3 Step 5 through 6 have been completed. Inform Examinee that Heater Drain Pump 1(2)A is to be started for alternate coolant injection.

NOTE:	A CR104P key for Unit Trip Load Shed Selector Switch is located in the RO Desk locked drawer. A key can also be found in the Control room or WCC key lockers. Heater Drain Pump 1(2)A Unit Trip Load Selector Switch is on BOP Bus 1(2)D. Permission is required to enter the 4 KV Switchgear area in the Turbine Building. STEP 8a is to be performed if this JPM is performed on Unit 1. STEP 8b is to be performed if this JPM is performed on Unit 2.

Step 8a - **Place** Unit Trip Load Shed Selector Switch for heater drain pump to be started in DISABLED: At Bus 1D, Row H1, Compt AD8 (Htr Drain Pump 1A).

Heater Drain Pump 1A Unit Trip Load Selector Switch is placed in DISABLED.

**** CRITICAL STEP ** SAT / UNSAT**

Step 8b - **Place** Unit Trip Load Shed Selector Switch for heater drain pump to be started in DISABLED: At Bus 2D, Row I1, Compt AD8 (Htr Drain Pump 2A).

Heater Drain Pump 2A Unit Trip Load Selector Switch is placed in DISABLED.

**** CRITICAL STEP ** SAT / UNSAT**

Step 10 - **Inform** Control Room AO Actions for Alternate Coolant Injection using Heater Drain Pump Injection are complete.

Control Room informed AO actions per LEP-01, Section 2.2 are complete.

SAT / UNSAT

TERMINATING CUE: When AO Actions for Alternate Coolant Injection using Heater Drain Pump Injection are complete, this JPM is complete.

TIME COMPLETED _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Necessary for HDP alternate coolant injection
3	Critical	Necessary for HDP alternate coolant injection
4	Critical	Necessary for HDP alternate coolant injection
5	Critical	Necessary for HDP alternate coolant injection
6	Non Critical	Verification
7	Non Critical	Verification
8a	Critical	Necessary for HDP alternate coolant injection (UNIT 1)
8b	Critical	Necessary for HDP alternate coolant injection (UNIT 2)
9	Critical	Necessary for HDP alternate coolant injection
10	Critical	Communication

REVISION SUMMARY

6	New JPM template Critical Step Delineation table added Renumbered steps Corrected procedure section Enhanced standards
5	Added basis for critical steps Minor format changes to cover/signature page Change SCO title to CRS

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	Actual	______	Unit:	1/ 2
Setting:	In-Plant	X	Simulator	______	Admin	___
Time Critical:	Yes	_____	No	X	Time Limit	N/A
Alternate Path:	Yes	_____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: _______________

TASK CONDITIONS:

1. A low Reactor Water level condition exists on Unit ____.
2. The CRS is executing the Reactor Vessel Control Procedure (EOP-01-RVCP)
3. RVCP directs use of Alternate Coolant Injection per EOP-01-LEP-01.
4. RPV Pressure is 450 psig.
5. The main condenser is under vacuum.

INITIATING CUE:

You are directed to perform the Auxiliary Operator actions for Alternate Coolant Injection, Heater Drain Pump Injection per EOP-01-LEP-01, Section 2.2, and inform the Control Room when all required Auxiliary Operator actions are complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

IP JPM J - 2016 NRC INITIAL EXAM - RO/ISRO/USRO

LESSON TITLE: **REMOTE SHUTDOWN PANEL SRV OPERATION**

LESSON NUMBER: **LOT-OJT-JP-300-J25**

REVISION NO: **0**

Dan Hulgin 8/18/16

PREPARER / DATE

Bob Bolin 9/07/16

TECHNICAL REVIEWER / DATE

Grant Newton
Hunter Morris 9/07/16

VALIDATOR / DATE

Craig Oliver 9/22/16

LINE SUPERVISOR / DATE

Ed Rau 9/27/16

TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

239006B501 - Perform Remote Shutdown Panel SRV Operation per 0EOP-01-LEP-05.

K/A REFERENCE AND IMPORTANCE RATING:

295016 AA1.08 4.0/4.0
Ability to operate and/or monitor Reactor Pressure as it applies to Control Room Abandonment.

REFERENCES:

0EOP-01-LEP-05, REMOTE SHUTDOWN PANEL SRV OPERATION

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

7 Instrumentation

SAFETY CONSIDERATIONS:

1. Notify SM/CRS of JPM performance prior to commencing In-plant JPM.
2. Determine actual radiological conditions and potentially contaminated areas to achieve ALARA.
3. Ensure all electrical safety requirements are observed.
4. Review Work Practices section prior to conduct of the JPM.
5. DO NOT OPERATE any plant equipment during performance of this JPM.

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee. 0EOP-01-LEP-05, will be provided to the examinee when asked for.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed on Unit 1or Unit 2.
4. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit _____ is executing 0EOP-01-EDP.
2. Reactor Pressure is 500 psig
3. SRV operation from the Control Room is not successful.

INITIATING CUE:

You are directed by the Control Room Supervisor to rapidly depressurize the RPV by opening SRVs B, E, and G from the Unit _____ Remote Shutdown Panel (RSDP) IAW 0EOP-01-LEP-05.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - Perform take a minute at job site prior to beginning task.

Examinee should cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

SAT / UNSAT

TIME START ___________

NOTE: Special Equipment is located in the following areas:
RO Desk Locked Drawer:
1 LEP toolbox key (LSV-1)
ASSD Toolbox in Control Room:
1 sound-powered phone with extension cord for RO
Reactor Building 20' LEP Toolbox
4 T112 keys
1 sound-powered phone with extension cord for RO

Step 2 – **Notify** CRS: RTGB level indicators B21-LI-R604B and C32-PR-R609 (N026B) will be lost.

Notifies the CRS that level indicators B21-LI-R604B and C32-PR-R609 (N026B) will be lost .

SAT / UNSAT

Step 3 – **Notify** CRS: Control of SRV B, E and G from RTGB will be lost.

Notifies the CRS that Control of SRV B, E and G from RTGB will be lost.

SAT / UNSAT

Step 4 - **Establish** communication between RSDP and Control Room.

Establishes communication with the Control Room.

SAT / UNSAT

Step 5 - At the Remote Shutdown Panel: **Ensure** B21-F013E (Manual Relief E Vlv Close/Open) control switch in CLOSE.

Verifies B21-F013E Close/Open *control switch is in CLOSE .*

SAT / UNSAT

Step 6 - At the Remote Shutdown Panel: **Place** B21-F013E (Manual Relief E Vlv Normal/Local) control switch in LOCAL.

Inserts Key and places B21-F013E Normal/Local *control switch in LOCAL. B21-F013E* Normal/Local *control switch in LOCAL* (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 7 - At the Remote Shutdown Panel: **Ensure** B21-F013G (Manual Relief E Vlv Close/Open) control switch in CLOSE.

Verifies B21-F013G Close/Open *control switch is in CLOSE .*

SAT / UNSAT

Step 8 - At the Remote Shutdown Panel: **Place** B21-F013G (Manual Relief E Vlv Normal/Local) control switch in LOCAL.

Inserts Key and places B21-F013G Normal/Local *control switch in LOCAL. B21-F013G* Normal/Local *control switch in LOCAL* (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 9 - At the Remote Shutdown Panel: **Ensure** B21-F013B (Manual Relief B Vlv Close/Open) control switch in CLOSE.

Verifies B21-F013B Close/Open *control switch is in CLOSE .*

SAT / UNSAT

Step 10 - At the Remote Shutdown Panel: **Place** B21-F013B (Manual Relief E Vlv Normal/Local) control switch in LOCAL.

Inserts Key and places Normal/Local *control switch in LOCAL. B21-F013B* Normal/Local *control switch in LOCAL* (**critical***).*

**** CRITICAL STEP ** SAT / UNSAT**

Step 11 - At the Remote Shutdown Panel: **Place** B21-CS-3345 (Reactor Water Level Normal/Local Switch) in LOCAL to transfer level transmitter B21-LT-N026B output to B21-LI-R604BX.

Inserts Key and places B21-CS-3345 Normal/Local *control switch in LOCAL. B21-F013B* Normal/Local *control switch in LOCAL.*

SAT / UNSAT

PROMPT:	If asked, CAC-LI-3342 (Supp Pool Level) is -2 ft.
PROMPT:	If asked, *B21-LI-R604BX (Reactor Water Level) is* 150 inches and reading is valid IAW Caution 1.

Step 12 - **Confirm** torus water level is greater than -8 feet.

Verifies torus water level greater than -8 feet on CAC-LI-3342 (Supp Pool Level)

SAT / UNSAT

Step 13 - **Monitor** RPV level.

Monitors RPV level on B21-LI-R604BX (Reactor Water Level).

SAT / UNSAT

NOTE:	SRV B, E, and G can be opened in any sequence. Each SRV being opened is a critical step.
PROMPT:	Once SRVs are opened and if asked the status of pressure on C32-PI-3332 (Reactor Pressure). State pressure is lowering on C32-PI-3332 (Reactor Pressure) and is currently 350 psig.

Step 14 - **Monitor** and **control** RPV pressure using SRVs B, E and G as directed by Control Room.

Places OPEN/CLOSE control switches to OPEN for:

SRV	*SAT*	*UNSAT*
B		
E		
G		

Verifies Reactor Pressure is lowering on C32-PI-3332 (Reactor Pressure)

**** CRITICAL STEP **   SAT / UNSAT**

Step 15 - **Notify** the Control Room SRVs B, E, and G are open and reactor pressure is lowering**.**

Notifies the control room that SRVs B, E, and G are open, and RPV pressure is 350 psig and lowering.:

SAT / UNSAT

TERMINATING CUE: When SRVs B, E, and G have been opened, and the control room has been notified this JPM is complete.

TIME COMPLETED ______________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Non Critical	Communication related
3	Non Critical	Communication related
4	Non Critical	Communication related
5	Non Critical	Verification
6	Critical	Necessary to open SRV
7	Non Critical	Verification
8	Critical	Necessary to open SRV
9	Non Critical	Verification
10	Critical	Necessary to open SRV
11	Non Critical	Line up for parameter monitoring
12	Non Critical	Parameter monitoring
13	Non Critical	Parameter monitoring
14	Critical	Necessary to depressurize RPV
15	Non Critical	Communication related

REVISION SUMMARY

0	New JPM

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	Actual	______	Unit:	1/ 2
Setting:	In-Plant	X	Simulator	______	Admin	___
Time Critical:	Yes	_____	No	X	Time Limit	N/A
Alternate Path:	Yes	_____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: _______________

TASK CONDITIONS:

1. Unit _____ is executing 0EOP-01-EDP.
2. Reactor Pressure is 500 psig
3. SRV operation from the Control Room is not successful.

INITIATING CUE:

You are directed by the Control Room Supervisor to rapidly depressurize the RPV by opening SRVs B, E, and G from the Unit _____ Remote Shutdown Panel (RSDP) IAW 0EOP-01-LEP-05.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

IP JPM K - 2016 NRC INITIAL EXAM - RO/ISRO/USRO

LESSON TITLE: **Racking In E6 Cross-Tie with Breaker Charging Spring Failure**

LESSON NUMBER: **AOT-OJT-JP-303-13**

REVISION NO: **6**

Dan Hulgin 8/18/16
PREPARER / DATE

Bob Bolin 9/07/16
TECHNICAL REVIEWER / DATE

Hunter Morris 9/07/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

262605B104 - Rack in a 480 Volt Electrically Operated Breaker (K-3000) per 1(2)OP-50.

K/A REFERENCE AND IMPORTANCE RATING:

295003 AA1.01 3.7 / 3.8
Ability to Operate and/or Monitor AC Electrical Distribution System as it applies to a partial or complete loss of A.C. power.

REFERENCES:

0EOP-01-SBO-07, 480V E-bus Crosstie

TOOLS AND EQUIPMENT:

Racking tool for 480V Breakers
Manual charging handle for 480V Breaker

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

6 (Electrical Distribution)

SAFETY CONSIDERATIONS:

1. Notify SM/CRS of JPM performance prior to commencing In-plant JPM.
2. Determine actual radiological conditions and potentially contaminated areas to achieve ALARA.
3. Ensure all electrical safety requirements are observed.
4. Review Work Practices section prior to conduct of the JPM.
5. DO NOT OPERATE any plant equipment during performance of this JPM.

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee. 0EOP-01-SBO-07, Attachment 1, will be provided to the examinee when asked for.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed on Unit 1.
4. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. A complete Loss of Offsite Power has occurred on both Units.
2. 0EOP-01-SBO-07 is being executed, and Step 2.1.3.11 is ready to be performed.
3. A Flex DG is NOT supplying E6.
4. 480v Crosstie breaker on E5 has been racked in.

INITIATING CUE:

You are directed by the Reactor Operator to complete the Auxiliary Operator actions associated with cross-tying 480V Substation E5 to E6 IAW 0EOP-01-SBO-07, Step 2.1.3.11, and inform the Control Room when the E5 to E6 cross-tie breakers are ready to be closed.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

Step 1 - Perform take a minute at job site prior to beginning task.

Examinee should cover the following questions, as deemed necessary. What are the hazards in the area? What PPE is required? Tools/PPE inspected prior to use? Energy sources secured/isolated? Is Clearance/Tag Out sufficient? What's the worst that can happen? Any ALARA concerns? Will I affect plant status? HU Tools needed?

SAT / UNSAT

TIME START ___________

NOTE: A 480 V racking tool is contained in the DG Building 23' LEP Toolbox.

PROMPT: Inform Examinee that use of electrical safety equipment may be simulated, but that the examinee should state the location of this equipment. Inform Examinee that electrical equipment compartments are NOT to be breached.

NOTE: If requested, pictures will be provided of the internals of the 480 V breaker.

Step 2 – At E6, Row F1, rack in Compt AX1 (Tie Breaker To E5): **Confirm** locally breaker OPEN.

(Tie breaker to E5) Compt AX1 on Bus E6 verified open as indicated by the green open flag.

SAT / UNSAT

PROMPT: If asked, inform the examinee that the locking hasp position is as seen.

Step 3 - At E6, Row F1, rack in Compt AX1 (Tie Breaker To E5): **IF** necessary, **THEN depress** locking hasp to allow opening of racking shutter.

Locking hasp DEPRESSED or verified to already be depressed on E6 Compt. AX1.

****CRITICAL STEP** SAT / UNSAT**

Step 4 - At E6, Row F1, rack in Compt AX1 (Tie Breaker To E5):**Rotate** racking crank clockwise until breaker stops.

Breaker Compt AX1 on Bus E6 stops in the CONNECT position (racked in and shutter window closes when the racking tool is removed).

**** CRITICAL STEP ** SAT / UNSAT**

PROMPT:	As requested, inform the examinee that the closing springs failed to charge as indicated by lack of charging noise when toggle switch turned on and/or lack of spring charged indicator at front of breaker.
	****ALTERNATE PATH BEGINS AT STEP 5****

Step 5 - At E6, Row F1, rack in Compt AX1 (Tie Breaker To E5): Place Charging Power toggle switch to ON, determine springs failed to charge, and Attachment 1, Manually Charging 480v Breaker Charging Springs is required.

Charging power switch for E6 Compt AX1 placed to the ON position, springs determined not charged, and Attachment 1 determined to be used.

SAT / UNSAT

NOTE:	A manual charging handle for the 480 VAC cross-tie breaker springs is located in the DG Building 23' LEP Toolbox.

Step 6 – **Place** charging power toggle switch to OFF. (attachment 1)

Charging power toggle switch is OFF (down position).

SAT / UNSAT

PROMPT:	Provide a picture to the trainee to identify the location of the manual charging lever. The manual charging lever is located at the bottom middle of the 480 VAC breaker. The equipment enclosure should NOT be breached.

Step 7 - ***Describe*** the action to open breaker door, and insert manual charging handle behind the breaker compartment door, using 480v breaker pictures.

Manual charging handle is inserted in the breaker.

**** CRITICAL STEP ** SAT / UNSAT**

Step 8 – (Simulate) **Pump** manual charging handle until closing springs are charged (clicks into position) and **confirm** charge is satisfactory by Springs Charged indicator.

Closing springs are fully charged, as indicated by the yellow springs charged indication.

**** CRITICAL STEP ** SAT / UNSAT**

Step 9 – (Simulate) **Remove** manual charging handle and close compartment door.

Manual charging handle removed, compartment door closed.

SAT / UNSAT

Step 10 – **Place** charging power toggle switch to ON.

Charging power toggle switch is ON (up position).

SAT / UNSAT

NOTE: Step 2.1.3.12 is N/A, a Flex DG is not supplying E6.

Step 11 – **Inform** control room that E5-E6 tie breakers are ready to be closed.

Control room contacted and told E5-E6 tie breakers are ready to be closed.

SAT / UNSAT

PROMPT: When contacted as control room that E5-E6 tie breakers are ready to be closed, inform examinee to stand clear so the breakers can be closed.

TERMINATING CUE: Substation E6 crosstie breaker is racked in, closing springs charged and is ready to be closed then this JPM is complete.

TIME COMPLETED _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Non Critical	Verify only. No action required.
3	Critical	Required to complete task.
4	Critical	Required to complete task.
5	Non Critical	Since charging springs are not charged, turning power on accomplishes nothing.
6	Non Critical	Places system in original configuration, but does completes action.
7	Critical	Action required to complete task.
8	Critical	Action required to complete task.
9	Non Critical	Actions not required to accomplish task.
10	Non Critical	Actions not required to accomplish task.
11	Non Critical	Communicates results of actions.

REVISION SUMMARY

6	Changed 2.1.3.10 to 2.1.3.11 due to procedure numbering change (non-technical change). Changed wording on steps to match procedure verbiage (non-technical change).
5	Changed Duke logo. Revised from 0AOP-36.2 to 0EOP-01-SBO-07 Added pictures of the 480v Breaker

Racking In E6 Cross-Tie with Breaker Charging Spring Failure

Validation Time: 12 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	Actual	______	Unit:	1
Setting:	In-Plant	X	Simulator	______	Admin	___
Time Critical:	Yes	_____	No	X	Time Limit	N/A
Alternate Path:	Yes	X	No	______		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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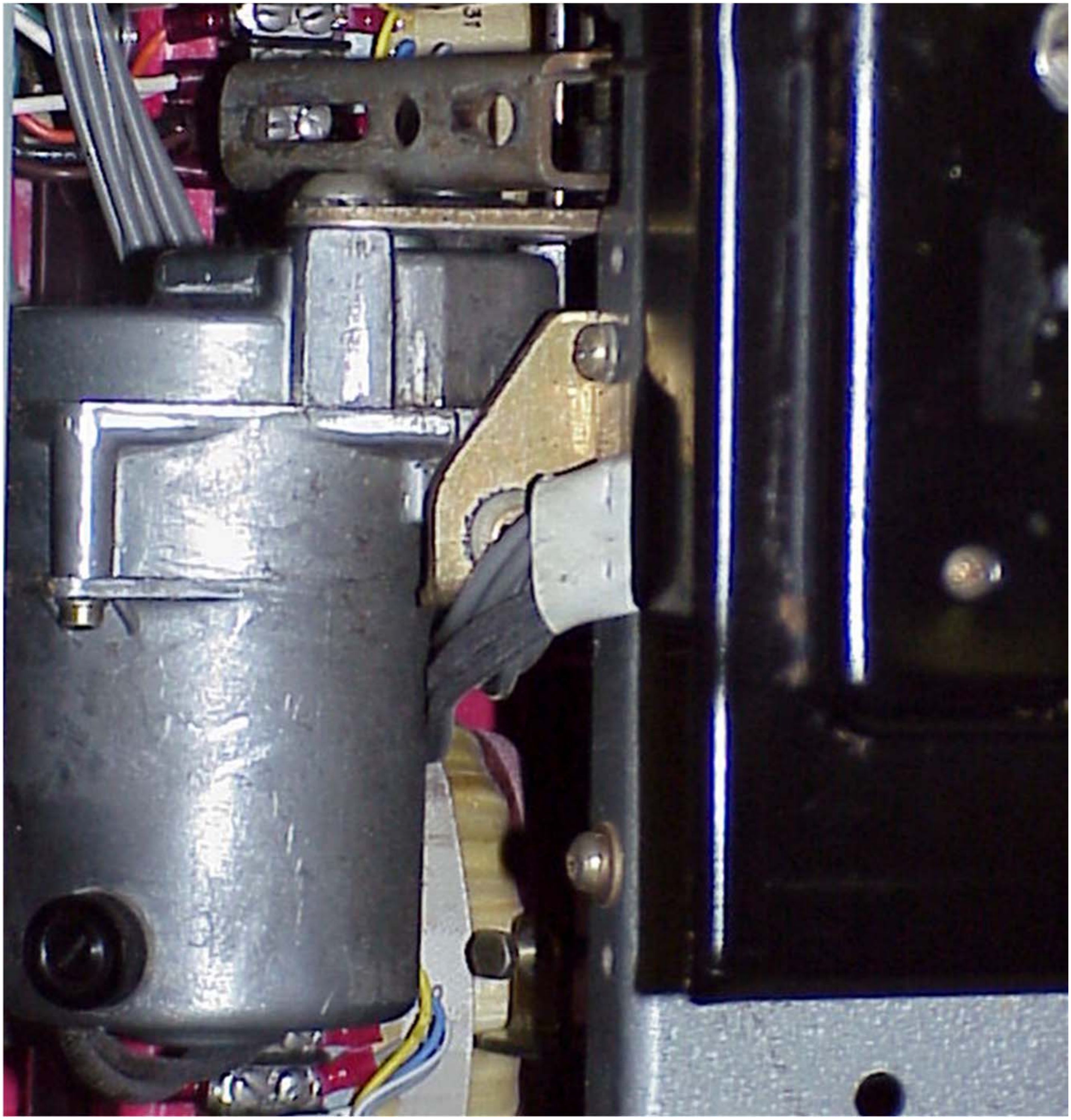
☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________




CAUTION
TRIP
OPEN
CLOSE
DANGER
Solid State Trip
Type SS

TASK CONDITIONS:

1. A complete Loss of Offsite Power has occurred on both Units.
2. 0EOP-01-SBO-07 is being executed, and Step 2.1.3.11 is ready to be performed.
3. A Flex DG is NOT supplying E6.
4. 480v Crosstie breaker on E5 has been racked in.

INITIATING CUE:

You are directed by the Reactor Operator to complete the Auxiliary Operator actions associated with cross-tying 480V Substation E5 to E6 IAW 0EOP-01-SBO-07, Step 2.1.3.11, and inform the Control Room when the E5 to E6 cross-tie breakers are ready to be closed.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: **PERFORM SJAE OFF-GAS RADIATION MONITORS CHANNEL CHECK CALCULATION**

LESSON NUMBER: **LOT-ADM-JP-201-D15**

REVISION NO: **0**

Daniel Hulgin 09/06/16
PREPARER / DATE

Bob Bolin 09/06/16
TECHNICAL REVIEWER / DATE

Kyle Cooper
Dwayne Wolf
Hunter Morris 09/06/16
VALIDATOR / DATE

Craig Oliver 09/22/16
LINE SUPERVISOR / DATE

Ed Rau 09/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

299201B201
Perform Daily Surveillance Report Per OI-3.1 or OI-3.2

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.1.25 3.9/4.2
Ability to interpret reference materials, such as graphs, curves, tables, etc.

REFERENCES:

2OI-03.2, *Reactor Operator Daily Surveillance Report*
ODCM

TOOLS AND EQUIPMENT:

Student may use calculator

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Generic (Administrative)

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. Readings for D12-RM-K601A, *SJAE Off Gas Rad Monitor A*, and D12-RM-K601B, *SJAE Off Gas Rad Monitor B,* have been recorded on the Unit 2 Dayshift RODSR for Saturday 0630-1230.
2. Main Condenser Air Ejector is in operation.
3. HP has reported a local survey reading of 300 mR

INITIATING CUE:

RO, and SRO candidates:

You are directed by the Control Room Supervisor to complete item 108, *SJAE Off-Gas Radiation Monitors Channel Check*, of 2OI-03.2, *Reactor Operator Daily Surveillance Report,* and circle the appropriate status of the channel check.

- SAT
- UNSAT

SRO ONLY:

Based on the above information, determine the required actions, if any.

____

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PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

TIME START: ___________

Step 1 – Record SJAE OFF-Gas Radiation Monitor readings from item 104 & 106 in Table 1.

__452__ for D12-RM-K601A recorded in SAT block of table 1, and __224__ for D12-RM-K601B recorded in SAT block of table 1 .

SAT/UNSAT

Step 2 – Determine D12-RM-K601A is the highest reading, and divide by 2.

Value for D12-RM-K601A divided by 2 determined to be __226__.

SAT/UNSAT

Step 3 – Compare lower reading monitor to value in step 3.

Determines D12-RM-K601B value of __224__ is < value in step 3 (__226)__. Determines the channel check is not yet satisfactory.

****CRITICAL STEP** SAT/UNSAT**

Step 4 – Contact E&RC health physics to obtain a local reading with an appropriate survey instrument.

Determines Information from the E&RC survey is needed.

SAT/UNSAT

Step 5 – Record local survey instrument reading

Records __300__ in local survey instrument reading SAT block in attachment 1 .

SAT/UNSAT

Step 6 – Multiply local survey instrument reading by 0.75

Determines local instrument times 0.75 *is __225__.*

SAT/UNSAT

Step 7 – Compare lower reading monitor to local survey results

*Determines D12-RM-K601B value of **224** is <0.75 of the local survey results (**225**), and therefore, the channel check is unsatisfactory.*

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE:	When the results of the survey have been compared to D12-RM-K601B and the evaluation of the channel check has been made, this JPM is complete for **RO** candidates.

TIME COMPLETED: _____________

SRO Candidates ONLY:

NOTE: Candidate may initiate a tracking LCO for operable rad monitor.

Step 8 – Determines the deviation is non-conservative, and instrument is declared inoperable.

One rad monitor declared inoperable. ODCM 7.3.2 Condition A is applicable and table7.3.2-1 is referenced with no additional required compensatory measures.

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When evaluation of the channel check has been made, and ODCM condition has been determined, this JPM is complete for SRO candidates.

TIME COMPLETED _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Documentation of data in block
2	Not Critical	Math not documented
3	Critical	Error would prevent correct channel check
4	Not Critical	From task conditions
5	Not Critical	Documentation of data in block
6	Not Critical	Math not documented
7	Critical	Error would prevent correct channel check
8	Critical	Correct ODCM actions required

REVISION SUMMARY

0	New JPM

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	____	Admin	X
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________

TASK CONDITIONS:

1. Readings for D12-RM-K601A, *SJAE Off Gas Rad Monitor A*, and D12-RM-K601B, *SJAE Off Gas Rad Monitor B,* have been recorded on the Unit 2 Dayshift RODSR for Saturday 0630-1230.
2. Main Condenser Air Ejector is in operation.
3. HP has reported a local survey reading of 300 mR

INITIATING CUE:

RO, and SRO candidates:

You are directed by the Control Room Supervisor to complete item 108, *SJAE Off-Gas Radiation Monitors Channel Check*, of 2OI-03.2, *Reactor Operator Daily Surveillance Report,* and circle the appropriate status of the channel check.

- SAT
- UNSAT

SRO ONLY:

Based on the above information, determine the required actions, if any.

____

____

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DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: **DETERMINE PRIMARY CONTAINMENT WATER LEVEL AND EVALUATE PCPL-A**

LESSON NUMBER: **LOT-ADM-JP-300-B00**

REVISION NO: **4**

Daniel Hulgin 09/6/16
PREPARER / DATE

Bob Bolin 09/6/16
TECHNICAL REVIEWER / DATE

Hunter Morris 09/06/16
Kyle Cooper 09/06/16
VALIDATOR / DATE

Craig Oliver 9/22/16
LINE SUPERVISOR / DATE

Ed Rau 9/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

200602B501
Determine Primary Containment water level per EOP-01-UG

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.1.7 4.4/4.7
Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.

REFERENCES:

0EOP-01-UG
0AOP-36.1

TOOLS AND EQUIPMENT:

Student may use calculator

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Administrative – Conduct Of Operations

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. Notify SM/CRS of JPM performance prior to commencing In-plant JPM.
2. Determine actual radiological conditions and potentially contaminated areas to achieve ALARA.
3. Ensure all electrical safety requirements are observed.
4. Review Work Practices section prior to conduct of the JPM.
5. DO NOT OPERATE any plant equipment during performance of this JPM.

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM will be performed Unit 2
4. This is an administrative JPM designed to be administered in any setting and may be administered to multiple candidates simultaneously in a classroom setting
5. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. An accident is in progress on Unit Two. The Unit CRS is directing actions of EOP-01-RVCP and EOP-02-PCCP.
2. 480 VAC Substation E7 is de-energized due to a fault. All other electrical buses are energized.
3. ERFIS is unavailable
4. See Attachment 1 for the Containment parameter readings that are available on the RTGB.

INITIATING CUE:

You are directed to determine Primary Containment water level per EOP-01-UG, Attachment 36. Determine the current region of operation (Safe/Unsafe) on Primary Containment Pressure Limit A (PCPL-A)

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

TIME START: ___________

Step 1 – Determine suppression pool water level instruments cannot be used to determine primary containment water level since CAC-LI-2601-1 is above +2 feet and CAC-LR-2602 is powered from E7 and is de-energized.

Determine suppression pool water level instruments cannot be used to determine primary containment water.

SAT/UNSAT

Step 2 – Determine suppression chamber pressure instruments cannot be used to determine primary containment water level since CAC-PI-1257-2B is not less than 75 psig and CAC-PI-1257-2A is powered from E7 and is de-energized

Determine suppression chamber pressure instruments cannot be used to determine primary containment water.

SAT/UNSAT

Step 3 – Determine primary containment water level should be calculated using CAC-PI-1230 and CAC-PI-4176 since both instruments have power and suppression chamber pressure is not less than 75 psig, determine CAC-PR-1257-1 is powered from E7 and should not be used.

Determine primary containment water level should be calculated using CAC-PI-1230 and CAC-PI-4176.

SAT/UNSAT

Step 4 – Calculate primary containment water level to be 2.3 ft/psi (72.5 – 67.5) + 28.5 ft.

Primary containment water level calculated to be 40 feet.

****CRITICAL STEP** SAT/UNSAT**

Step 5 – Determine operation to be in the safe region of PCPL-A using the PCPL-A graph, calculated primary containment water level and CAC-PI-4176 for drywell pressure, (or by using CAC-PI-1230 reading <70 psig).

Determine *PCPL-A is in the Safe region*

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When primary containment water level is calculated, and PCPL-A is determined to be in the Safe region, this JPM is complete

TIME COMPLETED: ____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	JPM can still be completed without performing this step.
2	Not Critical	JPM can still be completed without performing this step.
3	Not Critical	JPM can still be completed without performing this step.
4	Critical	Calculation required to complete this JPM.
5	Critical	Determination required to complete this JPM.

REVISION SUMMARY

4	New template incorporated. Modified torus press o read slightly >75 psig in att 1 Removed take a minute (step 1) reordered steps.
3	Changed Unit SCO to Unit CRS. No technical changes.
2	Revised to new JPM Template, Revision 3. No technical changes

EXAM KEY DO NOT GIVE TO STUDENTS

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	Rev. 067
	Page 153 of 156

ATTACHMENT 36
Page 2 of 3

<< Primary Containment Water Level Calculation >>

3. **IF** torus pressure is greater than 75 psig,
THEN calculate Primary Containment water level as follows:

- P_1 = Primary Containment pressure plus head of water
  - ◊ CAC-PI-4176 (XU-51)
  - ◊ ~~CAC-PR-1257-1 (XU-51)~~
- P_2 = Drywell pressure at greater than 85 ft. elevation
  - ◊ CAC-PI-1230 (P601)
- P_1 measured using CAC-PI-4176

  $PC_{wl} = \frac{2.3 \text{ feet}}{\text{psi}} (P_1 - P_2) + 28.5 \text{ feet}$
- ~~P_1 measured using CAC-PR-1257-1~~

  $\cancel{PC_{wl} = \frac{2.3 \text{ feet}}{\text{psi}} (P_1 - P_2) + 30.5 \text{ feet}}$

Using PI-4176

Time					
P_1 (psig)	72.5				
P_2 (psig)	67.5				
$P_1 - P_2$	5.0				
	x 2.3	x 2.3	x 2.3	x 2.3	x 2.3
x 2.3	11.5				
+28.5	+ 28.5	+28.5	+ 28.5	+28.5	+28.5
PC_{wl} (ft)	40				

EXAM KEY DO NOT GIVE TO STUDENTS

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	____	Admin	X
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ______________________________ Date: ______________

TASK CONDITIONS:

1. An accident is in progress on Unit Two. The Unit CRS is directing actions of EOP-01-RVCP and EOP-02-PCCP.

2. 480 VAC Substation E7 is de-energized due to a fault. All other electrical buses are energized.

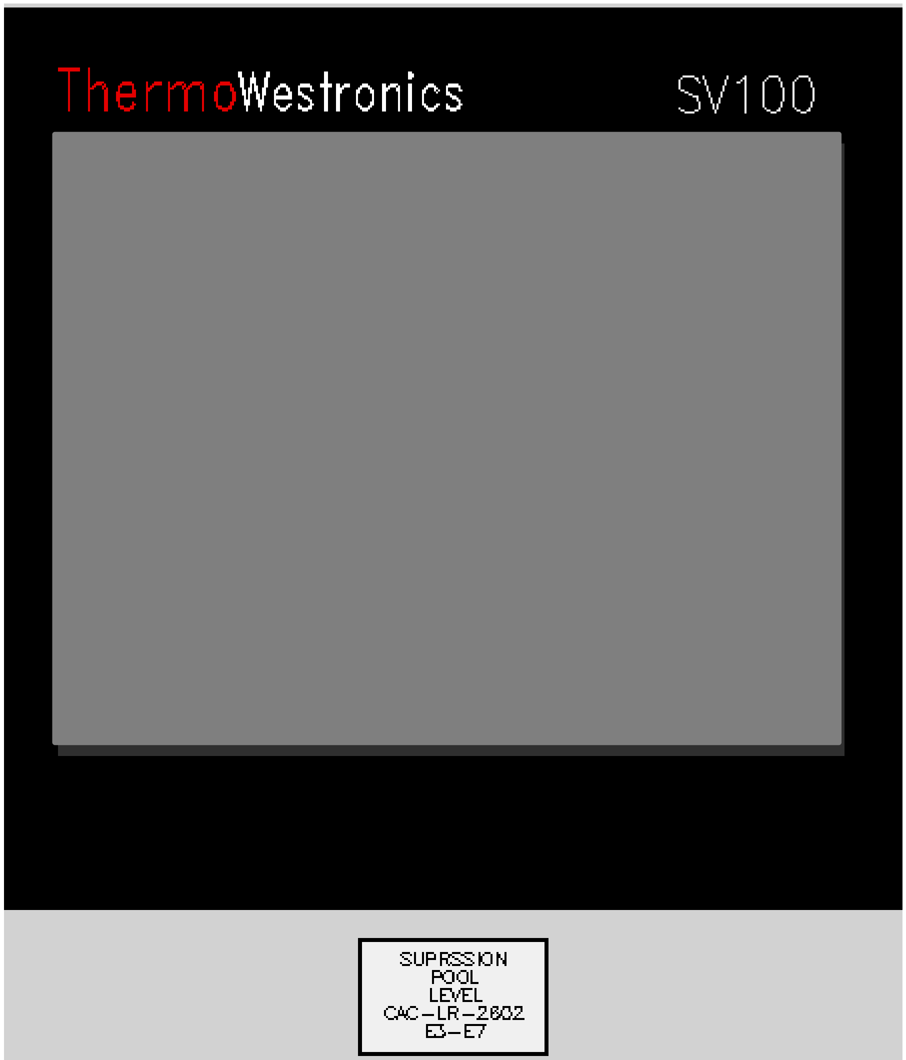
3. ERFIS is unavailable.

4. See Attachment 1 for the Containment parameter readings that are available on the RTGB.

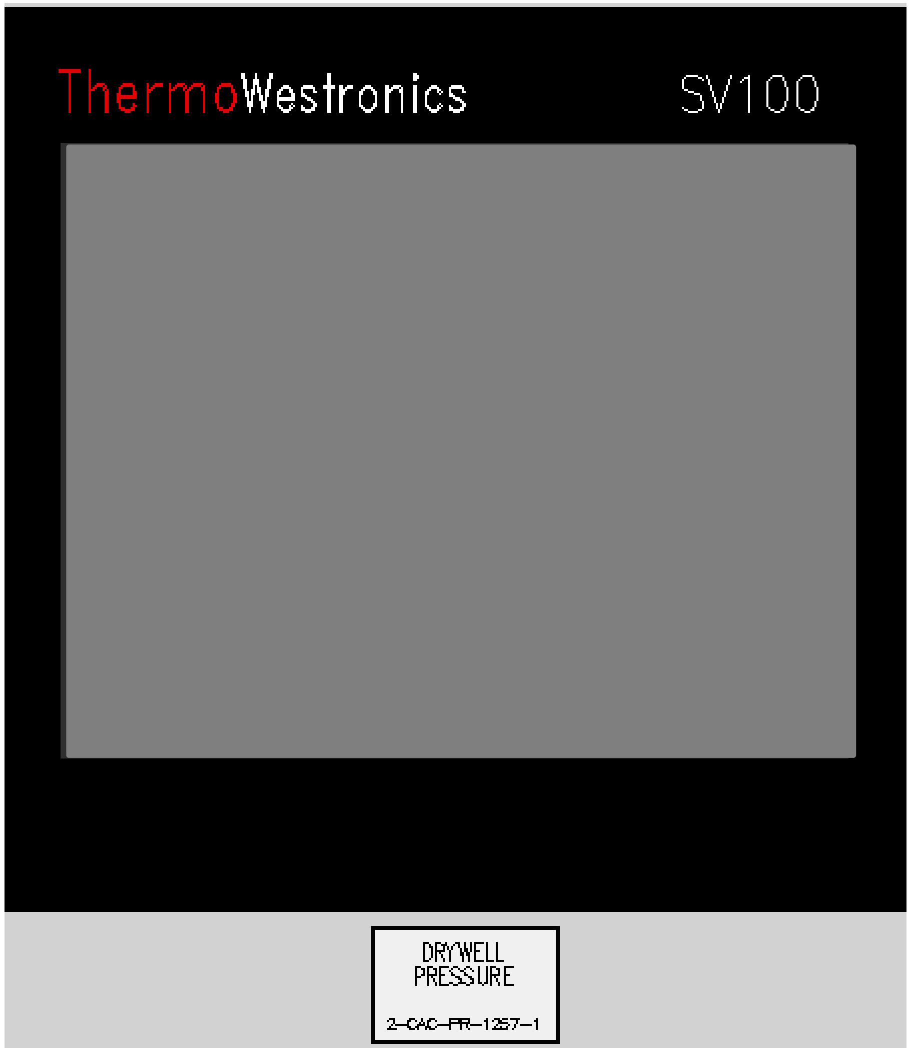
INITIATING CUE:

You are directed to determine Primary Containment water level per EOP-01-UG, Attachment 36. Determine the current region of operation (Safe/Unsafe) on Primary Containment Pressure Limit A (PCPL-A).

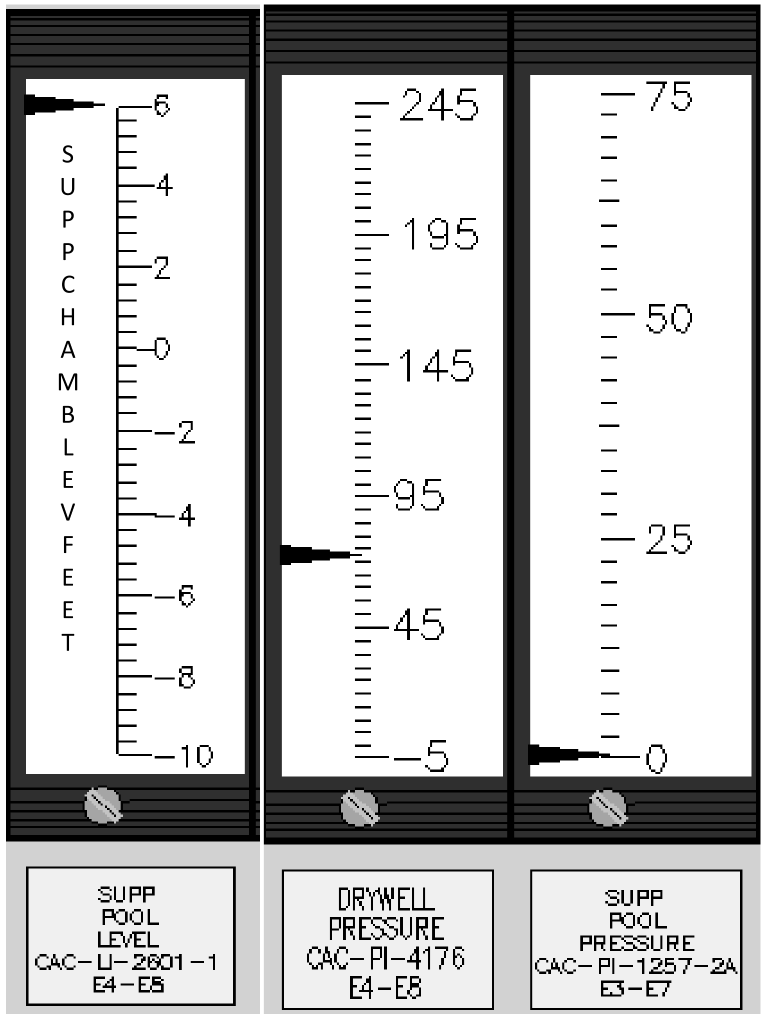
Attachment 1



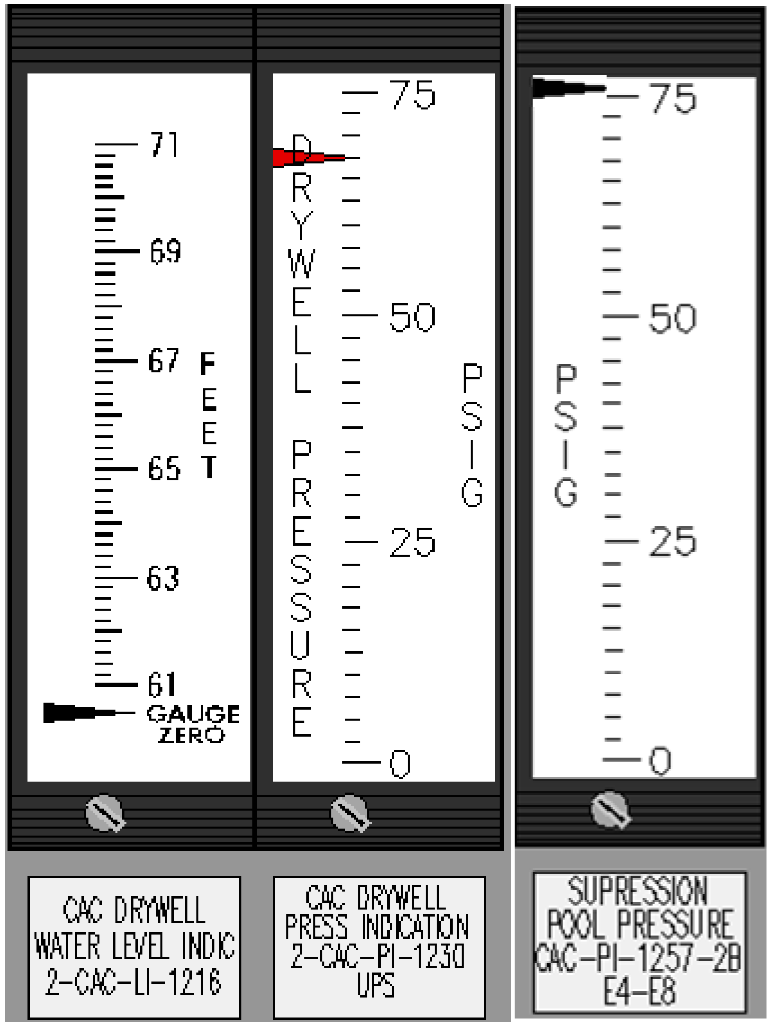
Attachment 1



Attachment 1



Attachment 1



DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: **CALCULATE DRYWELL LEAKAGE RATE**

LESSON NUMBER: **LOT-ADM-JP-201-D16**

REVISION NO: **0**

Daniel Hulgin 09/06/16
PREPARER / DATE

Bob Bolin 09/06/16
TECHNICAL REVIEWER / DATE

Hunter Morris
Kyle Cooper
Dwayne Wolf 09/06/16
VALIDATOR / DATE

Craig Oliver 09/22/16
LINE SUPERVISOR / DATE

Ed Rau 09/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.2.12 3.7/4.1
Knowledge of surveillance procedures.

REFERENCES:

2OI-03.2
T.S 3.4.4

TOOLS AND EQUIPMENT:

Student may use calculator

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Generic (Administrative)

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. This task will be performed on Unit 2.
2. Unit 2 is in MODE 1.
3. The Equipment Drain Sump was manually pumped to an integrator reading of 457620, and the pump stopped at 2000 on Sunday Nightshift.
4. The Floor Drain Sump was manually pumped to an integrator reading of 13944891, and the pump stopped at 2000 on Sunday Nightshift.

INITIATING CUE:

You are directed by the Control Room Supervisor to determine the 24 hour leak rate for the equipment and floor drains, and the 24 hour total leak rate to the drywell IAW Attachment 1, *Drywell Leakage Calculation*, of 2OI-03.2, *Reactor Operator Daily Surveillance Report*, for Sunday Nightshift at time 2000. If required, state any applicable LCOs which are NOT met.

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INITIATING CUE:

SRO ONLY:

Identify the **LATEST** time Unit 2 is required to be in MODE 3.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

TIME START: __________

Step 1 – Calculate time interval from equipment drain manual pump at 2000 on Saturday.

Subtracts time equipment drain sump pump stops on 2000 Sunday (20) from time equipment drain sump pump stops on 2000 Saturday (20) for a value of 1440 minutes .

****CRITICAL STEP** SAT/UNSAT**

Step 2 – Calculate difference in equipment drain integrator reading from manual pump at 2000 on Saturday.

Subtracts 2000 Saturday equipment drain integrator reading (423780) from 2000 Sunday equipment drain integrator reading (457620) for a value of 33840 gal .

****CRITICAL STEP** SAT/UNSAT**

Step 3 – Calculate 24 hour equipment drain leak rate .

Divides leakage (value from step 3) by time interval (value from step 2) for a value of 23.5 gpm.

****CRITICAL STEP** SAT/UNSAT**

Step 4 – Calculate time interval from floor drain manual pump at 2000 on Saturday.

Subtracts time floor drain sump pump stops on 2000 Sunday (20) from time floor drain sump pump stops on 2000 Saturday (20) for a value of 1440 minutes .

****CRITICAL STEP** SAT/UNSAT**

Step 5 – Calculate difference in floor drain integrator reading from manual pump at 2000 on Saturday.

Subtracts 2000 Saturday floor drain integrator reading (13942587) from 2000 Sunday floor drain integrator reading (13944891) for a value of 2304 gal .

****CRITICAL STEP** SAT/UNSAT**

Step 6 – Calculate 24 hour equipment drain leak rate .

Divides leakage (value from step 6) by time interval (value from step 5) for a value of 1.6 gpm.

****CRITICAL STEP** SAT/UNSAT**

Step 7 – Calculate 24 hour total leak rate to drywell.

Adds value from step 4 and step 7 for a value of 25.1 gpm.

****CRITICAL STEP** SAT/UNSAT**

NOTE:	LCO 3.4.4 is NOT met based on 24 hour total leak rate exceeding the T.S. 3.4.4 limit

Step 8 – Determine if LCO 3.4.4 is or is NOT met.

Determines that that LCO 3.4.4 is NOT met.

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE:	When the results for the 24 hour floor drain, equipment drain, and 24 hour total leak rate to drywell have been recorded, and the determination of any applicable LCO has been completed then this JPM is complete for RO candidates.

TIME COMPLETED: _____________

SRO Candidates ONLY:

> **NOTE:** If the applicant has determined that LCO 3.4.4 is NOT met, then provide SRO initiating cue to applicant.

Step 9 – IAW Tech Spec LCO 3.4.4, identify the LATEST time Unit 2 is required to be in MODE 3.

Determines that entry into MODE 3 would be required no later than 1600 on Monday.

****CRITICAL STEP** SAT/UNSAT**

> **TERMINATING CUE:** When the earliest time to MODE 3 has been determined, this JPM is complete for SRO candidates.

TIME COMPLETED ____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Critical	Math Critical for JPM solution
2	Critical	Math Critical for JPM solution
3	Critical	Math Critical for JPM solution
4	Critical	Math Critical for JPM solution
5	Critical	Math Critical for JPM solution
6	Critical	Math Critical for JPM solution
7	Critical	Math Critical for JPM solution
8	Critical	TS determination is Critical
9	Critical	Time to MODE 3 TS implementation is critical.

REVISION SUMMARY

0	New JPM

(Provide sufficient detail for reviewers and evaluators to understand the scope of any technical and/or administrative changes).

CALCULATE DRYWELL LEAKAGE RATE

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	____	Admin	X
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

EXAM KEY DO NOT GIVE TO STUDENTS

ATTACHMENT 1
Page 14 of 60

Reactor Operator Daily Surveillance Report (RODSR) – Unit 2
DRYWELL LEAKAGE CALCULATION

	20	00	04
MANUALLY PUMP EQUIPMENT DRAIN SUMP - RECORD TIME PUMP STOPS (LOW LEVEL TRIP).	20		
CALCULATE TIME INTERVAL (MINUTES) FROM MANUAL PUMP AT SAME TIME ON PREVIOUS DAY.	1440		
RECORD CURRENT INTEGRATOR READING.	0 0 4 5 7 6 2 0		
CALCULATE DIFFERENCE IN INTEGRATOR READING FROM MANUAL PUMP AT SAME TIME ON PREVIOUS DAY (LEAKAGE).	33840		
CALCULATE 24 HOUR EQUIPMENT DRAIN LEAK RATE (DIVIDE LEAKAGE BY TIME INTERVAL).	23.5		
MANUALLY PUMP FLOOR DRAIN SUMP USING ONE PUMP - RECORD TIME PUMP STOPS (LOW LEVEL TRIP)	20		
CALCULATE TIME INTERVAL (MINUTES) FROM MANUAL PUMP AT SAME TIME ON PREVIOUS DAY.	1440		
RECORD INTEGRATOR READING.	1 3 9 4 4 8 9 1		
CALCULATE DIFFERENCE IN INTEGRATOR READING FROM MANUAL PUMP AT SAME TIME ON PREVIOUS DAY (LEAKAGE).	2304		
CALCULATE 24 HOUR FLOOR DRAIN LEAK RATE (DIVIDE LEAKAGE BY TIME INTERVAL).	1.60		
24 HOUR EQUIPMENT DRAIN LEAK RATE.	23.50		
24 HOUR FLOOR DRAIN LEAK RATE. *	1.6		
24 HOUR TOTAL LEAK RATE TO DRYWELL. **	25.1		
CHECK TECH SPEC 3.4.4 LEAKAGE LIMITS MET	unsat		

EXAM KEY DO NOT GIVE TO STUDENTS

TASK CONDITIONS:

1. This task will be performed on Unit 2.
2. Unit 2 is in MODE 1.
3. The Equipment Drain Sump was manually pumped to an integrator reading of 457620, and the pump stopped at 2000 on Sunday Nightshift.
4. The Floor Drain Sump was manually pumped to an integrator reading of 13944891, and the pump stopped at 2000 on Sunday Nightshift.

INITIATING CUE:

You are directed by the Control Room Supervisor to determine the 24 hour leak rate for the equipment and floor drains, and the 24 hour total leak rate to the drywell IAW Attachment 1, *Drywell Leakage Calculation*, of 2OI-03.2, *Reactor Operator Daily Surveillance Report*, for Sunday Nightshift at time 2000. If required, state any applicable LCOs which are NOT met.

____

____

INITIATING CUE:

SRO ONLY:

Identify the **LATEST** time Unit 2 is required to be in MODE 3.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: **CLASSIFY AN EMERGENCY PER PEP-02.1.**

LESSON NUMBER: **SOT-ADM-JP-301-A16**

REVISION NO: **1**

Daniel Hulgin 09/06/16
PREPARER / DATE

Bob Bolin 09/06/16
TECHNICAL REVIEWER / DATE

Dwayne Wolf
Kyle Cooper 09/06/16
VALIDATOR / DATE

Craig Oliver 09/22/16
LINE SUPERVISOR / DATE

Ed Rau 09/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

344256B502
Direct initial emergency actions including emergency classification per 0PEP-02.1

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.4.29 3.1/4.4
Knowledge of the Emergency Plan

REFERENCES:

0PEP-02.1

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Admin – Emergency Procedures / Plan

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit One is operating at 100% power.
2. Unit Two is operating at 100% power with DG4 under clearance when the following event occurs (consider all items that exceed EAL thresholds occur at the same time).

Unit Two Event Description
• A seismic event greater than the Operating Basis Earthquake results in a loss of the PBX Telephone System, Commercial Telephones, and NRC Emergency Telecommunications System • A Manual Scram is inserted, the Mode Switch is in Shutdown, ARI is initiated, and reactor power indicates 20%. • Driving rods IAW LEP-02, *Alternate Control Rod Insertion,* and SLC injection are in progress. • Current indications: reactor power is 1%, reactor water level maintained +60 to +90 inches, and reactor pressure is 945 psig on EHC. • NO radiological releases in progress, and NO indications of an onsite security event.

INITIATING CUE:

You are to evaluate the above event as the Control Room Site Emergency Coordinator (SEC) and determine the **HIGHEST** required classification and its EAL Identifier for Unit Two ONLY:

1. Write the required Classification and its associated EAL identifier in the table below.
2. Classification SHALL NOT be based on SEC judgment.
3. Raise your hand when complete to have the evaluator stop the evaluation time and collect your cue sheet

This JPM is TIME CRITICAL.

CLASSIFICATION	EAL IDENTIFIER(s)

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

PROMPT: Ensure a clock is visible for candidates. Announce and Write the Start Time on the board. Add 15 minutes to the Start Time and write that in the JPM Completion Time. If all candidates have not Declared a classification, this is the time to STOP all work, put pencils/pens down, and collect all remaining cue

NOTE: Declaration of event must be made in 15 minutes from the Start Time.

TIME START: ___________

NOTE: Loss of PBX Telephone System, Commercial Telephones, and NRC Emergency Telecommunications System does not reach EAL classification threshold

NOTE: Candidate may base the ALERT on SA8.1 if they determine the ATWS was a result of the earthquake. Critical Step is that the ALERT is based on EITHER SA8.1 or SA6.1 **EITHER Step 2 OR 3 is critical**.

Step 1 – Determine required Classification threshold and associated EAL Number(s).

- *Alert – SA8.1*
  -The occurrence of any Table S-4 hazardous event (Seismic event).
  AND EITHER
  -Event damage has caused indications of degraded performance in at least one train of a safety system needed for the current operating mode (ATWS).
  -The event has caused visible damage to a safety system component or structure needed for the current operating mode.

****CRITICAL STEP** SAT/UNSAT**

Step 2 – Determine required Classification threshold and associated EAL Number(s).

- *Alert – SA6.1*

  -An automatic or manual scram fails to reduce reactor power <2% (APRM downscale).

  AND

  -Manual scram actions taken at the reactor control console (Manual PBs, Mode Switch, ARI) are not successful in shutting down the reactor as indicated by reactor power ≥ 2% (note 8)

  Note 8: A manual scram action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving control rods or boron injection strategies.

****CRITICAL STEP** SAT/UNSAT**

Step 3 – Classification made within required the required time (Declaration Time minus Start Time < 15 minutes).

- *Classification declared < 15 minutes of Start Time.*

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE:	When the event is classified with applicable EAL identifier(s) in the table, this JPM is complete.

TIME COMPLETED: _____________

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1or 2	Critical	Highest EAL classification and EAL designator
3	Critical	Time to declare is critical

REVISION SUMMARY

1	Incorporated new format. Modified initial conditions as follows: • Changed earthquake magnitude to OBE per AOP13 • Changed Voicenet to PBX • Removed turbine trip • Changed reactor power to 1% following SLC and driving rods Changed initiating cue to include EAL identifier(s) instead of EAL identifier Changed step 1 to reflect new standard instead of obtaining a procedure Step 2 EAL criteria updated to new PEP2.1 criteria Step 3 EAL criteria updated to new PEP2.1 criteria. This is now a critical step. Its EAL designation is now part of the highest classification Step 4 3 EAL criteria updated to new PEP2.1 criteria. This is now an ALERT and no longer a SAE Removed take a minute (step 1) and reordered steps.
0	New JPM

(Provide sufficient detail for reviewers and evaluators to understand the scope of any technical and/or administrative changes).

CLASSIFY AN EMERGENCY PER PEP-02.1.

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	____	Admin	X
Time Critical:	Yes	X	No	____	Time Limit	15 min
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

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☐ Comments reviewed with Performer

Evaluator Signature: __________________________________ Date: ______________

This JPM is TIME CRITICAL.

TASK CONDITIONS:

1. Unit One is operating at 100% power.
2. Unit Two is operating at 100% power with DG4 under clearance when the following event occurs (consider all items that exceed EAL thresholds occur at the same time).

Unit Two Event Description
• A seismic event greater than the Operating Basis Earthquake results in a loss of the PBX Telephone System, Commercial Telephones, and NRC Emergency Telecommunications System • A Manual Scram is inserted, the Mode Switch is in Shutdown, ARI is initiated, and reactor power indicates 20%. • Driving rods IAW LEP-02, *Alternate Control Rod Insertion,* and SLC injection are in progress. • Current indications: reactor power is 1%, reactor water level maintained +60 to +90 inches, and reactor pressure is 945 psig on EHC. • NO radiological releases in progress, and NO indications of an onsite security event.

INITIATING CUE:

You are to evaluate the above event as the Control Room Site Emergency Coordinator (SEC) and determine the **HIGHEST** required classification and its EAL Identifier for Unit Two ONLY:

1. Write the required Classification and its associated EAL identifier in the table below.
2. Classification SHALL NOT be based on SEC judgment.
3. Raise your hand when complete to have the evaluator stop the evaluation time and collect your cue sheet

CLASSIFICATION	EAL IDENTIFIER

This JPM is TIME CRITICAL.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

LESSON TITLE: **Determine Stay Time Limitations in High Radiation Areas**

LESSON NUMBER: **LOT-ADM-JP-102-A03**

REVISION NO: **3**

Daniel Hulgin 09/06/16
PREPARER / DATE

Bob Bolin 09/06/16
TECHNICAL REVIEWER / DATE

Hunter Morris
Kyle Cooper 09/06/16
VALIDATOR / DATE

Craig Oliver 09/22/16
LINE SUPERVISOR / DATE

Ed Rau 09/27/16
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

None

K/A REFERENCE AND IMPORTANCE RATING:

Generic 2.3.4 3.2/3.7
Knowledge of Radiation Exposure Limits under normal or emergency conditions
Generic 2.3.7 3.5/3/6
Ability to comply with radiation work permit requirements during normal and abnormal conditions

REFERENCES:

PD-RP-ALL-0001, Radiation Worker Responsibilities

TOOLS AND EQUIPMENT:

Calculator
Radiation Survey Map of 50' Reactor Building

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

A.3 Radiation Control

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL NOT** be provided to the trainee.
2. Prior to the first JPM of the JPM set, provide the JPM briefing contained in NUREG-1021, Appendix E, or similar briefing (for non-regulated exams) to the trainee(s).
3. This JPM may be performed on Unit 1 or Unit 2 as selected by the evaluator. Survey map must reflect correct unit.
4. Critical Step Basis
   a) Prevents Task Completion
   b) May Result in Equipment Damage
   c) Affects Public Health and Safety
   d) Could Result in Personal Injury

Read the following to the JPM performer.

TASK CONDITIONS:

Two workers will be performing a lube check and coupling alignment on the Unit 2 RWCU Pump 2A.

Worker #1 has accumulated 800 mrem this year.
Worker #2 has accumulated 970 mrem this year.
The elevator is out of service
The following times for each worker have been estimated for performance of the job.

1. Traversing Southeast stairwell 20' – 50' Rx Bldg: 6 minutes
2. Staging time in access area directly outside the RWCU room: 45 minutes
3. Staging time in area directly inside room access door: 20 minutes
4. Work time at the "A" RWCU pump: 2.5 hours
5. Following completion of the job, an additional 60 mrem per worker will be received during de-staging activities and transit back to the maintenance shop.

INITIATING CUE:

Using the information above and the provided radiological survey using best ALARA practices:

1. Determine the total dose accumulated for each worker. (Assume the same task times for both workers).
2. Determine if the Duke Fleet administrative dose limits will be exceeded.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless otherwise indicated, comments required for any step evaluated as UNSAT.

TIME START ___________

Step 1 - Determines dose for each worker as follows:

a. *Traversing SE stairwell 20' – 50' Rx Bldg (SE is the lowest dose stairwell)*
(6 min) 0.1 Hr X 5 mr/hr = ***0.5 mrem***
Estimate 0.5 mrem dose accumulation

****CRITICAL STEP** SAT/UNSAT**

b. *Staging time in access area directly outside the RWCU room*
(45 min) 0.75 Hr X 20 mr/hr = ***15 mrem***
Estimate 15 mrem dose accumulation

****CRITICAL STEP** SAT/UNSAT**

c. *Staging time in area directly inside room access door*
(20 min) 0.33 Hr X 80 mr/hr = ***26.7 mrem***
Estimates dose accumulation within the acceptable range of 26 to 27 mrem.

****CRITICAL STEP** SAT/UNSAT**

d. *Work time at the "A" RWCU pump*
2.5 Hrs X 200 mr/hr = ***500 mrem***
Estimate 500 millirem dose accumulation

****CRITICAL STEP** SAT/UNSAT**

NOTE: *An additional 60 mr will be accumulated once the job is done for de-staging activities.*

e. *Total = 0.5 + 15 + 26.7 + 500 + 60 = 602.2* ***mrem.***
Determines Total to be within the acceptable range of 601 to 603 mrem

****CRITICAL STEP** SAT/UNSAT**

Step 2 - Determines that neither worker would exceed the Brunswick administrative limit of 2 REM per calendar year if the estimated dose were accumulated.

Worker #1: 800 mr + 602.2 mr = 1402.2 mr (< 2R limit). Acceptable range 1401 to 1403 mr
Worker #2: 970 mr + 602.2 mr = 1572.2 mr (< 2R limit). Acceptable range 1571 to 1573 mr

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When the total dose for each worker has been determined and the administrative limits addressed, the JPM is complete.

TIME COMPLETED: __________

NOTE: Comments required for any step evaluated as UNSAT.

Step	Critical / Not Critical	Reason
1a	Critical	Each calculation is critical to determine total dose for personnel safety.
1b	Critical	Each calculation is critical to determine total dose.
1c	Critical	Each calculation is critical to determine total dose.
1d	Critical	Each calculation is critical to determine total dose.
1e	Critical	Each calculation is critical to determine total dose.
2	Critical	Total calculation and knowledge of Admin Dose Limit is required to complete JPM.

REVISION SUMMARY

3	Removed take a minute-step 1. Reordered steps
2	Revised to new JPM Template Revised times so that calculations are different than previous versions.
1	Revised to new JPM Template, Revision 3. No technical changes.

Determine Stay Time Limitations in High Radiation Areas

Validation Time: 15 Minutes (approximate)

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	2
Setting:	In-Plant	____	Simulator	____	Admin	X
Time Critical:	Yes	____	No	X	Time Limit	N/A
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: ____

JPM: Pass ______ Fail ______

Remedial Training Required: Yes ______ No ______

Comments: ____

____

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____

____

____

____

☐ Comments reviewed with Performer

Evaluator Signature: ________________________________ Date: ______________

TASK CONDITIONS:

Two workers will be performing a lube check and coupling alignment on the Unit 2 RWCU Pump 2A.

Worker #1 has accumulated 800 mrem this year.
Worker #2 has accumulated 970 mrem this year.
The elevator is out of service
The following times for each worker have been estimated for performance of the job.

1. Traversing Southeast stairwell 20' – 50' Rx Bldg: 6 minutes
2. Staging time in access area directly outside the RWCU room: 45 minutes
3. Staging time in area directly inside room access door: 20 minutes
4. Work time at the "A" RWCU pump: 2.5 hours
5. Following completion of the job, an additional 60 mrem per worker will be received during de-staging activities and transit back to the maintenance shop.

INITIATING CUE:

Using the information above and the provided radiological survey using best ALARA practices:

1. Determine the total dose accumulated for each worker. (Assume the same task times for each worker).
2. Determine if the Duke Fleet administrative dose limits will be exceeded.

Results: __________