DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Determine SRM/IRM Overlap Per GP-02

LESSON NUMBER: LOT-OJT-JP-307-A03

REVISION NO: 3

Lou Sosler 9/10/205
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

215201B101, Verify Correct Overlap Between SRMs And IRMs Per GP-02

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.1.7 3.7/4.4
Ability to evaluate plant performance and make operational judgments based on operating characteristics / reactor behavior / and instrument interpretation.

REFERENCES:

0GP-02

TOOLS AND EQUIPMENT:

None

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 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. 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 startup is being performed per 0GP-02.
2. Initial (pre-startup) SRM and IRM readings were recorded as follows:

SRM Channel	Reading	IRM Channel	Reading*
A	100 CPS	A	3%
B	150 CPS	B	2%
C	150 CPS	C	4%
D	100 CPS	D	5%
		E	8%
		F	6%
		G	7%
		H	5%

3. Current SRM and IRM readings are as follows:

SRM Channel	Reading	IRM Channel	Reading*
A	2×10^5 CPS	A	11%
B	9×10^4 CPS	B	14%
C	5×10^5 CPS	C	16%
D	3×10^5 CPS	D	10%
		E	15%
		F	18%
		G	13%
		H	17%

*** All IRM Readings taken on Range One From the Bar Graph Recorder (0-125)**

It is NOT desired to use the highest reading IRM (pre-startup) for overlap criteria for all IRMs.

INITIATING CUE:

RO, and SRO candidates:

You are directed to determine if proper SRM/IRM overlap exists in accordance with GP-02 and for each RPS trip system state the number of operable IRM inputs available.

IRM Channel	OVERLAP CRITERIA	
	IS MET	IS NOT MET
A		
B		
C		
D		
E		
F		
G		
H		

RPS trip system A has _____ operable IRMs.

RPS trip system B has _____ operable IRMs.

SRO ONLY:

Based on the above information, determine the required actions, if any.

_____

_____

_____

_____

_____

_____

_____

ANSWER KEY

RO, and SRO candidates:

You are directed to determine if proper SRM/IRM overlap exists in accordance with GP-02 and for each RPS trip system state the number of operable IRM inputs available.

IRM Channel	OVERLAP CRITERIA	
	IS MET	IS NOT MET
A		X
B	X	
C	X	
D		X
E		X
F	X	
G		X
H	X	

RPS trip system A has __1__ operable IRMs.

RPS trip system B has __3__ operable IRMs.

NOTE:

RPS trip system A consists of IRMs A, C, E, & G
RPS trip system B consists of IRMS B, D, F, & H.

SRO ONLY:

Based on the above information, determine the required actions, if any.

TS. 3.3.1.1 Condition A requires RPS Trip System A be placed in a tripped condition within 12 hours.

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: _____

Step 2 – Determine SRM/IRM overlap criteria is not met for IRM A and D based on not reading 10% of scale.

Determines that SRM/IRM overlap criteria is not met for IRM A and D based on not reading 10% of scale.

**** CRITICAL STEP ** SAT/UNSAT**

Step 3 – Determine SRM/IRM overlap criteria is not met for IRMs E and G based on not reading double the initial reading.

Determines that SRM/IRM overlap criteria is not met for IRM E and G based on not reading double the initial reading.

**** CRITICAL STEP ** SAT/UNSAT**

Step 4 – Determine RPS Trip System A has only 1 operable IRM inputs.

Determines that RPS Trip System A does not have sufficient IRM inputs.

**** CRITICAL STEP ** SAT/UNSAT**

Step 5 – Determine RPS Trip System B has 3 operable IRM inputs.

Determines that RPS Trip System A does not have sufficient IRM inputs.

**** CRITICAL STEP ** SAT/UNSAT**

TERMINATING CUE: When SRM/IRM overlap determination has been made, and RPS is evaluated, this JPM is complete for RO candidates.

TIME COMPLETED: _____

SRO Candidates ONLY:

NOTE: GP-02 directs maintaining reactor power on the SRMs by inserting control rods. This is acceptable information, but not required for the JPM.

Step 5 – Determine that TS. 3.3.1.1 Condition A requires RPS Trip System A be placed in a tripped condition within 12 hours.

Determines that RPS Trip System A be placed in a tripped condition within 12 hours.

**** CRITICAL STEP ** SAT/UNSAT**

TERMINATING CUE: When SRM/IRM overlap determination has been made, RPS is evaluated, and Tech Spec action statement is 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	Administrative
2	Critical	Required to complete JPM correctly.
3	Critical	Required to complete JPM correctly.
4	Critical	Required to complete JPM correctly.
5	Critical	Required to complete JPM correctly.

REVISION SUMMARY

3	Revise to new JPM format. Added Technical Specification determination as SRO only portion.

Validation Time: 20 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate ____	Actual X	Unit: 1
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: _____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit One startup is being performed per 0GP-02.
2. Initial (pre-startup) SRM and IRM readings were recorded as follows:

SRM Channel	Reading	IRM Channel	Reading*
A	100 CPS	A	3%
B	150 CPS	B	2%
C	150 CPS	C	4%
D	100 CPS	D	5%
		E	8%
		F	6%
		G	7%
		H	5%

4. Current SRM and IRM readings are as follows:

SRM Channel	Reading	IRM Channel	Reading*
A	2×10^5 CPS	A	11%
B	9×10^4 CPS	B	14%
C	5×10^5 CPS	C	16%
D	3×10^5 CPS	D	10%
		E	15%
		F	18%
		G	13%
		H	17%

*** All IRM Readings taken on Range One From the Bar Graph Recorder (0-125)**

It is NOT desired to use the highest reading IRM (pre-startup) for overlap criteria for all IRMs.

INITIATING CUE:

RO, and SRO candidates:

You are directed to determine if proper SRM/IRM overlap exists in accordance with GP-02 and for each RPS trip system state the number of operable IRM inputs available.

IRM Channel	OVERLAP CRITERIA	
	IS MET	IS NOT MET
A		
B		
C		
D		
E		
F		
G		
H		

RPS trip system A has _____ operable IRMs.

RPS trip system B has _____ operable IRMs.

SRO ONLY:

Based on the above information, determine the required actions, if any.

_____

_____

_____

_____

_____

_____

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Evaluate Overtime Eligibility

LESSON NUMBER: LOT-ADM-JP-201-D01

REVISION NO: 1

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

Conduct Shift Turnover and Relief

K/A REFERENCE AND IMPORTANCE RATING:

Gen 2.1.9 2.9/4.5
Ability to direct personnel activities inside the control room

REFERENCES:

AD-SY-ALL-0460, Managing Fatigue and Work Hour Limits

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Admin – Conduct of Operations

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. A startup of Unit 1 is planned for the following shift. One Reactor Operator must be held over three hours for startup.

2. The following is the work history (excluding shift turnover time) of the available Reactor Operators on shift (hours reflect those worked PRIOR to the 3 hour holdover). A break of at least 8 hours occurred between all working periods. All operators began their shift schedule at the same time each day.

DAY	1 Sun	2 Mon	3 Tue	4 Wed	5 Thu	6 Fri	7 Sat	8 Sun
Operator #1	0	4	12	10	10	14	10	11
Operator #2	0	12	10	12	3	12	8	13
Operator #3	0	0	12	12	12	8	8	14
Operator #4	0	8	12	10	10	8	10	11
Operator #5	0	0	13	14	13	10	13	10

NOTE: A break of at least 10 hours has occurred between all work periods

INITIATING CUE:

Evaluate the work history for all 5 operators. Determine which operator(s), if any, CANNOT be held over for three hours without prior overtime approval.

Also identify ALL deviations to AD-SY-ALL-0460 that may have already occurred (assume no authorization to exceed AD-SY-ALL-0460 limits)

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: It is Critical that the examinee correctly determines which operators can be held over for three hours, and which operators cannot without overtime authorization per AD-SY-ALL-0460.

It is not critical that the examinee identify the specific limit that would be exceeded for the operators who cannot be held over.

Step 2 – Determine Operator **#1** would exceed 72 hours in a 7 day period and would require overtime authorization.

*Determines Operator **#1** cannot be held over without overtime authorization.*

****CRITICAL STEP**** **SAT/UNSAT**

Step 3 – Determine Operator **#2** would exceed 72 hours in a 7 day period and would require overtime authorization.

*Determines Operator **#2** cannot be held over without overtime authorization.*

****CRITICAL STEP**** **SAT/UNSAT**

Step 4 – Determine Operator **#3** would exceed 16 hours in a 24 hour period (today) and would require overtime authorization.

*Determines Operator **#3** cannot be held over without overtime authorization.*

****CRITICAL STEP**** **SAT/UNSAT**

Step 5 – Determine Operator **#4** would not exceed any overtime restrictions and could be held over for the 3 hours.

*Determines that Operator **#4** would not exceed any overtime restrictions and could be held over for the 3 hours.*

SAT/UNSAT

Step 6 – Determine Operator **#5** has exceeded 72 hours in a 7 day period and requires overtime authorization.

*Determines Operator **#5** cannot be held over without overtime authorization and has exceeded 72 hours in a 7 day period.*

****CRITICAL STEP**** **SAT/UNSAT**

NOTE: If asked, inform examinee that no authorization to exceed AD-SY-ALL-0460 limits has been approved.

Step 7 – Determine Operator **#5** has exceeded 26 hours in a 48 hour period (day 3 and 4, and day 4 and 5) and requires overtime authorization.

*Determines that Operator **#5** exceeded 26 hours in a 48 hour period (day 3-4, and day 4-5).*

****CRITICAL STEP**** **SAT/UNSAT**

TERMINATING CUE: When the examinee has evaluated overtime restrictions, 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	Personnel safety and federal regulation
3	Critical	Personnel safety and federal regulation
4	Critical	Personnel safety and federal regulation
5	Not Critical	No limits violated
6	Critical	Personnel safety and federal regulation
	or	
7	Critical	Personnel safety and federal regulation

REVISION SUMMARY

1	Updated to new JPM template.

Evaluate Overtime Eligibility

Validation Time: 30 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	1
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: _____

_____

_____

_____

_____

_____

_____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

TASK CONDITIONS:

1. A startup of Unit 1 is planned for the following shift. One Reactor Operator must be held over three hours for startup.

2. The following is the work history (excluding shift turnover time) of the available Reactor Operators on shift (hours reflect those worked PRIOR to the 3 hour holdover). A break of at least 8 hours occurred between all working periods. All operators began their shift schedule at the same time each day.

DAY	1 Sun	2 Mon	3 Tue	4 Wed	5 Thu	6 Fri	7 Sat	8 Sun
Operator #1	0	4	12	10	10	14	10	11
Operator #2	0	12	10	12	3	12	8	13
Operator #3	0	0	12	12	12	8	8	14
Operator #4	0	8	12	10	10	8	10	11
Operator #5	0	0	13	14	13	10	13	10

NOTE: A break of at least 10 hours has occurred between all work periods

INITIATING CUE:

Evaluate the work history for all 5 operators. Determine which operator(s), if any, CANNOT be held over for three hours without prior overtime approval.

Also identify ALL deviations to AD-SY-ALL-0460 that may have already occurred (assume no authorization to exceed AD-SY-ALL-0460 limits)

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

LESSON TITLE: Perform 'Time-To-200°F' Calculation

LESSON NUMBER: LOT-ADM-JP-201-D14

REVISION NO: 0

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/10/2015

Thomas Baker 9/10/205
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

299202B201: Perform Daily Check Sheet Per OI-3.4.1

K/A REFERENCE AND IMPORTANCE RATING:

Generic 2.1.1 3.8/4.2
Knowledge of Conduct of Operations requirements

REFERENCES:

2OI-03.4.1, Unit 2 Reactor Operator Daily Check Sheets
0G41-0020, Refueling Outage Decay Heat Load Evaluation

TOOLS AND EQUIPMENT:

Calculator

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Generic – Conduct of Operations

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. Today is December 7, 2015.
2. Unit 2 is in Mode 2 preparing to perform a reactor startup.
3. Current Spent Fuel Pool (SFP) temperature is 96.8°F

INITIATING CUE:

Perform Item Number 80 of 2OI-03.4.1, Reactor Operator Daily Check Sheets.

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: From 2OI-03.4.1, Note KK
The "Time to 200°F" calculation is only required when the fuel pool gates are installed.
The "Time to 200°F" is calculated by subtracting the current SFP Temperature from 200°F to get the delta°F, which is then divided by the Unit SFP H/U Rate for today's date from Attachment P of Calculation 0G41-0020.
(200°F – current SFP temp = delta temp)/Unit SFP HUR = Time to 200°F
Example: (200°F – 98.1°F = 101.9°F)/0.91 = 111.97 hrs until 200°F

Step 2 – Determine the Unit 2 SFP HUR using 0G41-0020, Attachment P.

Unit 2 SFP HUR determined to be 1.24

****CRITICAL STEP** SAT/UNSAT**

Step 3 – Calculate "Time to 200°F".

"Time to 200°F"calculated using 200°F – 96.8°F = 103.2°F)/1.24 = 83.2 hours until 200°F

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When "Time to 200°F" is calculated and recorded, 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	Required to complete task.
3	Critical	Required to complete task.

REVISION SUMMARY

0	New JPM

Validation Time: 10 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. Today is December 7, 2015.
2. Unit 2 is in Mode 2 preparing to perform a reactor startup.
3. Current Spent Fuel Pool (SFP) temperature is 96.8°F

INITIATING CUE:

Perform Item Number 80 of 2OI-03.4.1, Reactor Operator Daily Check Sheets.

Time to 200°F = _____.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

LESSON TITLE: Evaluate Core Spray System Operability Test Data

LESSON NUMBER: LOT-ADM-JP-018-01

REVISION NO: 5

Lou Sosler 9/11/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/11/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

Evaluate Core Spray System Operability Test Data

RELATED TASKS:

209003B201 - Perform Core Spray System Operability Test Per PT-07.2.4A (07.2.4B)

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.2.12 3.7 / 4.1
Knowledge of surveillance procedures

REFERENCES:

0PT-07.2.4A, Core Spray System Operability Test - Loop A

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Admin – 2. Equipment Control

SETUP INSTRUCTIONS

None

SAFETY CONSIDERATIONS:

1. None

EVALUATOR NOTES: (Do not read to performer)

1. The applicable procedure section **WILL** be provided to the performer.
2. If this is the first JPM of the JPM set, read the JPM briefing contained NUREG 1021, Appendix E, or similar to the performer.
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
5. This is an administrative JPM designed to be administered in any setting and may be administered to multiple candidates simultaneously in a classroom setting.
6. Obtain copy of 0PT-07.2.4A and fill out Attachment 1 up to second performed by review.
7. Fill out Attachment 1 for Unit 1 Core Spray Loop A Valve Test Information Sheet. All data filled out should fall within acceptance range with the exception of:

   1-E21-F005A stoke open time should be filled out as greater than maximum value, but less than limiting value.

   1-E21-F031A stroke close time should be filled out as less than minimum value.
8. Fill out Attachment 3 for Core Spray Pump 1A Test Information. Data should be within acceptance range with exception of the following

   Fill out one vibration (1W A) as greater than maximum acceptance value but less than required action – in alert range.
9. Provide the filled out Attachments 1 & 3 and Acceptance Criteria from 0PT-07.2.4A to performer. Provide performer an entire copy of 0PT-07.2.4A if requested (examiner should have available copy for each examinee).

Task standards (i.e. pass/fail criteria) for each JPM step are *ITALICIZED* below the step

---

Read the following to the JPM performer.

TASK CONDITIONS:

1. 0PT-07.2.4A, Core Spray System Operability Test, has just been completed on Unit One for Core Spray Loop 1A by an operator.
2. The operator who completed the test has determined all acceptance criteria are met with no exceptions as certified on Attachments 1 and 3.
3. The operator who completed the test has requested a peer check of the data that was recorded on Attachments 1 and 3 to ensure all acceptance criteria are met.
4. Another operator is checking the remainder of the procedure, other than Attachments 1 and 3 for satisfactory completion.

INITIATING CUE:

You are directed to evaluate the data recorded in 0PT-07.2.4A, Attachments 1 and 3, against the acceptance criteria of the test. Inform the CRS of the results of your review and identify any actions that should be taken.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless denoted in the **Comments**.

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: If requested, provide copy of entire procedure 0PT-07.2.4A.

NOTE: The following steps are to evaluate data in the completed Attachments 1 and 3 and identify the following deficiencies and corrective actions:

Step 2 - Identify that Pump DP is incorrectly calculated and that actual DP is outside acceptance range and in required action range. (low)

Identified that Pump DP psid is outside acceptance range and in required action range

Declared Core Spray pump 1A INOPERABLE per procedure step 7.4.39.b.

****CRITICAL STEP**** **SAT / UNSAT**

NOTE: Testing is not required to be performed on inoperable equipment.

Step 3 - Identify that Pump vibration position 1W A is in the alert range.

Identified that Pump vibration position 1W A is in the alert range and less than the required action range / meets the acceptance criteria 5.1.3.

SAT / UNSAT

Step 4 - Identify that Valve 1-E21-F005A is outside acceptance range but within limiting time for opening.

Identified that Valve 1-E21-F005A is outside acceptance range but within limiting time for opening.

*Immediately re-test **OR** Declare 1-E21-F005A INOPERABLE per the guidance of Step 7.1.8.*

**** CRITICAL STEP ** SAT / UNSAT**

Step 5 - Identify that Valve 1-E21-F031A is outside (less than) minimum acceptance range for closing.

Identified that Valve 1-E21-F031A is outside (less than) minimum acceptance range for closing.

*Immediately re-test **OR** Declare 1-E21-F031A INOPERABLE per the guidance of Step 7.1.8.*

**** CRITICAL STEP ** SAT / UNSAT**

TERMINATING CUE: When the examinee has reviewed Attachments 1 & 3 of 0PT-07.2.4A and recommended corrective actions, this JPM is complete.

TIME COMPLETED: _____

NOTE: Comments required for any step evaluated as UNSAT.

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Note Critical	Administrative
2	Critical	Identification of out of specification pump D/P. Must declare the Pump INOP.
3	Not Critical	Identification of out of specification pump vibration
4	Critical	Valve is outside acceptance range. Re-test required or declared INOP
5	Critical	Identification of out of acceptance range for valve closing time. Re-test required or declare INOP.

REVISION SUMMARY

5	Revised to new JPM Template. Removed step to obtain a current revision of procedure as it is supplied now. Corrected faulted numbers to reflect changes to procedure acceptance criteria. Added critical step documentation table. Removed work practices criteria.
4	Revised to new JPM Template, Revision 3. Changed 0PT07.2.4A Attachments 1, 2, and 3, to Attachments 1 and 3.

Evaluate Core Spray System Operability Test Data

Validation Time: 10 Minutes (approximate)

Time Taken: _____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit: 1
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. 0PT-07.2.4A, Core Spray System Operability Test, has just been completed on Unit One for Core Spray Loop 1A by an operator.
2. The operator who completed the test has determined all acceptance criteria are met with no exceptions as certified on Attachments 1 and 3.
3. The operator who completed the test has requested a peer check of the data that was recorded on Attachments 1 and 3 to ensure all acceptance criteria are met.
4. Another operator is checking the remainder of the procedure, other than Attachments 1 and 3 for satisfactory completion.

INITIATING CUE:

You are directed to evaluate the data recorded in 0PT-07.2.4A, Attachments 1 and 3, against the acceptance criteria of the test. Inform the CRS of the results of your review and identify any actions that should be taken.

ATTACHMENT 1
Page 1 of 2

Unit 1 Core Spray System (Loop A) Valve Test Information Sheet

Valve Number	Stroke Direction	Remote Position Indication, (Initials)		Stroke Time Test (sec)	Stroke Time Acceptance Criteria, (Seconds)				Fail-Safe Test, (Initials)	Full-Stroke Exercise (Initials)	Check Valve Exercise (Initials)	Valve SAT/UNSAT
		Stem	Indicating Lights		Acceptable Range		Limiting	Ref. Stroke Time				
					Minimum (>)	Maximum (<)						
1-E21-F015A	OPEN	RO	RO	NA	NA	NA	NA	NA	NA	NA	NA	Sat
1-E21-F015A	CLOSED	RO	RO	37.0	35.90	48.50	52.70	42.20	NA	RO	NA	Sat
1-E21-F004A	CLOSED	RO	RO	12.0	9.85	13.33	14.49	11.59	NA	NA	NA	Sat
1-E21-F005A	OPEN	RO	RO	13.7	10.01	13.55	14.73	11.78	NA	NA	NA	Sat
1-E21-F005A	CLOSED	RO	RO	12.2	9.88	13.36	14.53	11.62	NA	RO	NA	Sat
1-E21-F004A	OPEN	RO	RO	13.4	9.99	13.51	14.69	11.75	NA	RO	NA	Sat
1-E21-F001A	CLOSED	RO	RO	84.7	68.51	92.69	100.75	80.60	NA	NA	NA	Sat
1-E21-F001A	OPEN	RO	RO	81.9	72.73	98.39	106.95	85.56	NA	RO	NA	Sat
1-E21-F031A	CLOSED	RO	RO	10.8	11.00	14.80	16.10	12.90	NA	NA	NA	Sat
1-E21-F031A	OPEN	RO	RO	14.2	12.30	16.50	18.00	14.40	NA	RO	NA	Sat
1-E21-F003A	CLOSED	NA	NA	NA	NA	NA	NA	NA	NA	NA	RO	Sat
1-E21-F029A	PART OPEN	NA	NA	NA	NA	NA	NA	NA	NA	NA	RO	Sat
1-E21-F030A	PART OPEN	NA	NA	NA	NA	NA	NA	NA	NA	NA	RO	Sat
1-E21-F029A 1-E21-F030A	CLOSED	NA	NA	NA	NA	NA	NA	NA	NA	NA	RO	Sat
1-E21-F003A	OPEN	NA	NA	NA	NA	NA	NA	NA	NA	NA	RO	Sat

Unit 1 Core Spray Pump A Test Information Data Sheet

1. The lubricant level (pump running) is normal: AO

2. Calculate pump dP as follows:

   Pump discharge pressure - suction pressure (run) = pump dP

   321 - 4 = 317

NOTE

- Reference values for pump suction and discharge pressures are provided for determining the suitability of alternate test gauges, if used. ☒
- Pump stopped suction pressure should normally be between 4 and 8 psig. Values outside of this range may indicate air in the instrument line. ☒
- Should quarterly pump test data exceed the CPT limits, the pump remains OPERABLE and the test results evaluated as part of the BNP IST trending program. ☒

UNIT 1 Core Spray Pump A TEST DATA

TEST PARAMETER	ACTUAL VALUE	REFERENCE VALUE	ACCEPTANCE VALUE RANGE	ALERT RANGE		REQUIRED ACTION RANGE	
				LOW	HIGH	LOW	HIGH
Suction Press, (Stopped) psig	6.0	6.0	NA	NA	NA	NA	NA
Suction Press, (Running) psig	4.0	4.0	NA	NA	NA	NA	NA
Discharge Press. Psig	321	290.0	NA	NA	NA	NA	NA
Quarterly Pump DP psid	317	290.9	261.9 to 319.9	NA	NA	< 261.9	> 319.9
CPT Pump DP psid	N/A	290.9	270.6 to 299.6	261.9 to <270.6	NA	< 261.9	> 299.6
Flow Rate gpm	4700	4,700	NA	NA	NA	NA	NA
Vibration-vel, (in/s peak) Position 1S H	0.225	0.133	0 to 0.325	NA	> 0.325 to 0.700	NA	> 0.700
Vibration-vel, (in/s peak) Position 1W A	0.352	0.195	0 to 0.325	NA	> 0.325 to 0.700	NA	> 0.700
Vibration-vel(in/s peak) Position 1W H	0.235	0.144	0 to 0.325	NA	> 0.260 to 0.624	NA	> 0.700

Performed By, (Signature): R. Operator Date: Today Time: Now

Reviewed, IST Group, (Signature): _____ Date: _____

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Safety Function Determination - Suppression Pool Cooling

LESSON NUMBER: SOT-OJT-JP-201-B01

REVISION NO: 1

Lou Sosler 9/11/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/11/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

341227B102,
Perform a Safety Function Determination per the Technical Requirements Manual (TRM)

K/A REFERENCE AND IMPORTANCE RATING:

Generic 2.2.223.4/4.1
Knowledge of limiting conditions for operations and safety limits

REFERENCES:

Unit Two Technical Specifications and Bases
TRM, Appendix F, Safety Function Determination Program

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

Generic - Equipment 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. 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 Two is operating at 100% power.

2. An Active 7 day LCO is in place for RHR Pump 2A being under clearance per Technical Specifications:
   3.5.1 - Condition A
   3.6.2.3 - Condition A.

3. It has just been reported that valve E11-F068B (*RHR HX 2B SW DISCHARGE VALVE),* supply breaker at MCC 2XB has tripped on magnetics. The valve is currently closed.

INITIATING CUE:

The Shift Manager has directed you to perform a Safety Function Determination, and assess the Technical Specification requirements for the current plant conditions and inform him of the required Technical Specification actions.

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: _____

Step 2 - Refer to TRM Appendix F, Safety Function Determination Program, Figure 2-1, Safety Function Determination Program Flowchart.

References Figure 2-1 to aid in the Safety Function Determination.

The flowchart does not have to be referenced, but it helps in following the process. The flowchart is embedded on the next page.

SAT/UNSAT

Step 3 - Is TS Support Feature Inoperable?

Refer to LCO 3.7.1 and Bases. Determine one RHR SW Subsystem is Inoperable for reasons other than Condition A and Condition B requires restore the Inoperable RHR SW subsystem in 7 days.

Determined that LCO 3.7.1 Condition B is required.

****CRITICAL STEP** SAT/UNSAT**

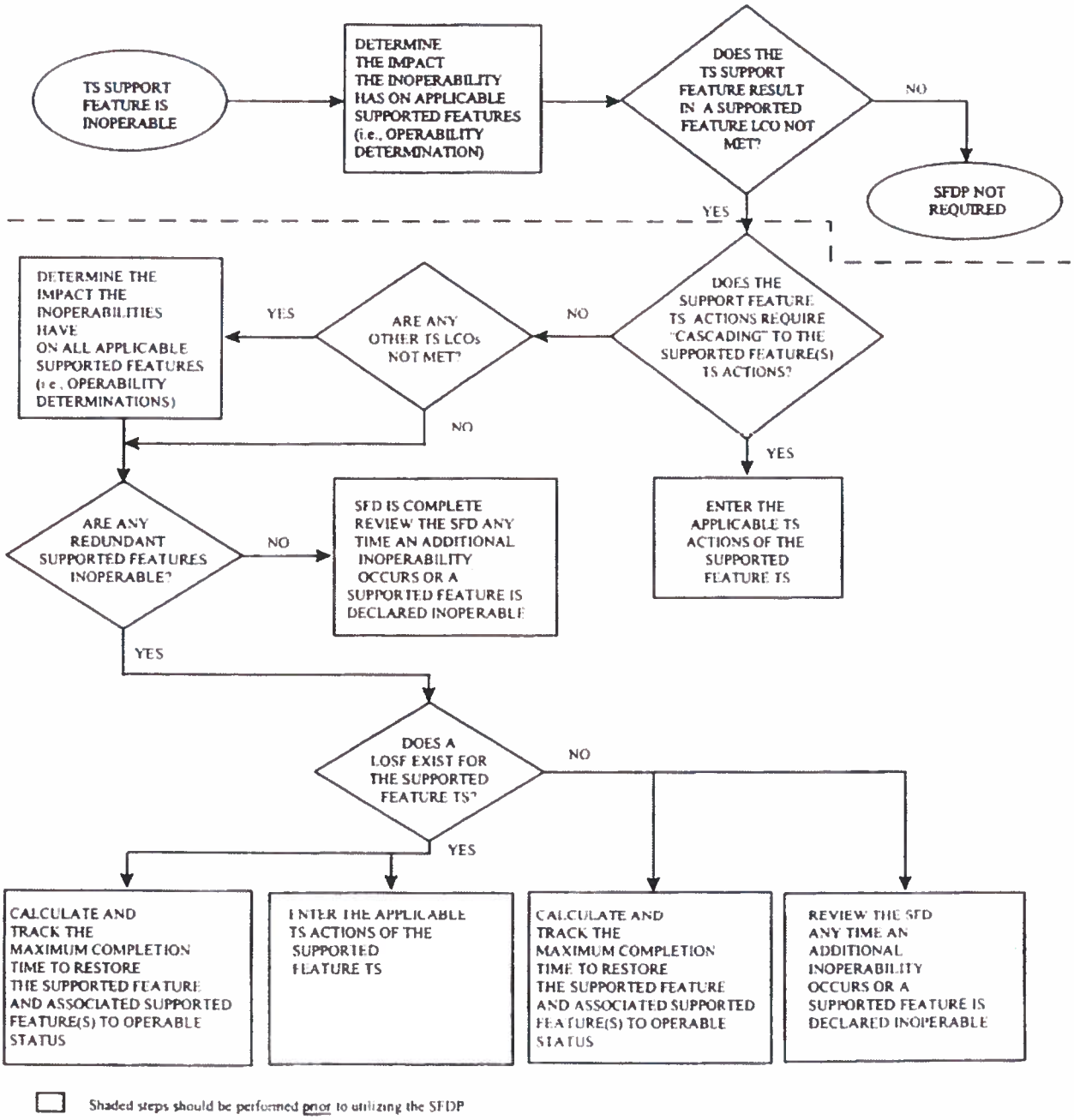


Figure 2-1 (page 1 of 1)
Safety Function Determination Program Flowchart

Step 4 – Determine the impact the inoperability has on applicable supported features.

Determines using Attachment 1, TS 3.7.1 supported TS are 3.4.7 and 3.6.2.3

TRM
Appendix F

SFDP
Attachment 1

Attachment 1 (continued)

Support System TS Number	Support System	Supported System TS Number	Supported System
3.6.4.2	SCIDs	3.6.4.1	Secondary Containment
3.6.4.3	SGT System	3.6.4.1	Secondary Containment
3.7.1	RHRSW System	3.4.7	RHR SDC System - Hot Shutdown
		3.6.2.3	RHR Suppression Pool Cooling

SAT/UNSAT

Step 5 – Does the TS support feature result in a supported feature LCO NOT met?

Reviews TS LCOs 3.4.7 and 3.6.2.3 for applicability.

SAT/UNSAT

Step 6 - Refer to LCO 3.4.7 and determine that applicability conditions do not exist

Determines LCO 3.4.7 is not applicable in MODE 1.
May state to enter a Tracking LCO for 3.4.7.

SAT/UNSAT

Step 7 - Refer to SFDP Attachment 4 for TS 3.6.2.3 and determine safety function is lost if two RHR SPC subsystems are inoperable.

Determined that loss of safety function exists.

A Loop inoperable due to RHR pump under clearance and B Loop for loss of cooling medium (E11-F068B closed).

TRM
Appendix F

SFDP
Attachment 4

SAFETY FUNCTION DETERMINATION PROGRAM (SFDP)

LOSF Table - Attachment 4

NOTE

In addition to the TS system being a Supported Feature, the TS systems denoted with an asterisk are also Support Features.

LCO No.	TECHNICAL SPECIFICATION SECTION
3.6.2.3	Residual Heat Removal (RHR) Suppression Pool Cooling (SPC)
	Two RHR SPC subsystems inoperable.

SAT/UNSAT

Step 8 – Does the support feature TS actions require "Cascading" to the supported features TS Action?.

Determines that based on LCO 3.0.6 that the answer is YES.

LCO 3.0.6	When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, additional evaluations and limitations may be required in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

SAT/UNSAT

Step 9 - Refer to Tech Spec 3.6.2.3 and Bases, determine Condition B now also applies and one loop of RHR SPC must be restored to operable within 8 hours.

Actions entered for both RHR SPC subsystems inoperable, LCO 3.6.2.3 Condition B.

****CRITICAL STEP** SAT/UNSAT**

Step 10 - Inform SM that LCO 3.7.1, Condition B and LCO 3.6.2.3, Condition B applies.
SM notified that LCO 3.7.1, Condition B and LCO 3.6.2.3, Condition B applies

SAT/UNSAT

TERMINATING CUE: When notified of LCO Conditions, Required Actions, and Completion Times, this JPM is complete.

*** Comments required for any step evaluated as UNSAT.**

TIME STOP _____

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Administrative
3	Critical	This is required to make the TS determination.
4	Not Critical	Administrative
5	Not Critical	Administrative
6	Not Critical	Administrative
7	Not Critical	Administrative
8	Not Critical	Administrative
9	Critical	This is required to make the TS determination.
10	Not Critical	Communication only.

REVISION SUMMARY

1	Updated to new format. No technical information change.

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: _____

_____

_____

_____

_____

_____

_____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

Read the following to the JPM performer.

TASK CONDITIONS:

1. Unit Two is operating at 100% power.

2. An Active 7 day LCO is in place for RHR Pump 2A being under clearance per Technical Specifications:
   3.5.1 - Condition A
   3.6.2.3 - Condition A.

3. It has just been reported that valve E11-F068B (*RHR HX 2B SW DISCHARGE VALVE),* supply breaker at MCC 2XB has tripped on magnetics. The valve is currently closed.

INITIATING CUE:

The Shift Manager has directed you to perform a Safety Function Determination, and assess the Technical Specification requirements for the current plant conditions and inform him of the required Technical Specification actions.

Response: _____

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Determine Protective Action Recommendations (PARs) IAW PEP-02.6.28

LESSON NUMBER: SOT-ADM-301-A20

REVISION NO: 0

Lou Sosler 9/11/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Kevin Kingston 9/11/2015

Brian Moschet 9/21/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

344236B502	Direct Emergency Response As Site Emergency Coordinator Following Declaration Of A General Emergency per PEP-2.1.1
344005B102	Recommend Protective Actions To States And Counties per PEP-02.6.28

K/A REFERENCE AND IMPORTANCE RATING:

GEN 2.4.44	2.4/4.4 Knowledge of Emergency Plan Protective Action Recommendations

REFERENCES:

0PEP-02.1 – Emergency Control – Notification of Unusual Event, Alert, Site Area Emergency and General Emergency
0PEP-02.6.28, Offsite Protective Action Recommendations (PAR)

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 examinee will have access to PEP procedures.
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. Emphasize to candidates that this is a Time Critical JPM and that following cue sheet review the evaluator will designate the START TIME on the board and stop the JPM at the applicable critical time.
4. A clock must be available and visible to examiner and examinees.
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
6. Explain to the examinees they should record their Protective Action Recommendation in the blocks provided beneath the Initiating Conditions.

Read the following to the JPM performer:

****This is a time critical JPM**.** Time begins when directed by the evaluator.

TASK CONDITIONS:

A General Emergency has been declared due to an on-going un-isolable RCIC steam line break, which began 12 hours ago, with indications of fuel failure. Weather data:

- Late fall evening
- Temperature 57°F
- Upper wind speed 16.7 mph
- Lower wind speed 15.8 mph
- Upper wind direction 36.4°
- Lower wind direction 40.8°
- Stability class D

Projected off-site dose per AD-EP-ALL-0202 is 450 mRem TEDE and 3500 mRem CDE. Off-site field survey readings are 280 mRem/hour. The highest reading on the Hi-Range DW Rad Monitors is 65 R/hr. The release is expected to drop rapidly due to the emergency depressurization of the Reactor in progress. County and State governments have been notified, and have prepared local evacuation routes.

INITIATING CUE:

A hard copy Emergency Notification Form (ENF) is being completed. Determine what Protective Action Recommendations (PARs) should be made to Off-Site Agencies and determine if Potassium Iodide should be recommended to the General Public.

****This is a time critical JPM** Time now is: _____.**

TIME	PARs

Potassium Iodide (circle one) SHOULD / SHOULD NOT be recommended to the General Public.

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

NOTE: Ensure a clock is visible for candidates. Announce and write the Start Time on the board. Start time is when the examinees have been given the initial conditions, initiating cue and state they understand the task (or state they have no questions)

The candidates will have 15 minutes to classify the event. The time, classification and EAL identifier should be recorded by the candidates in the blocks provided beneath the Initiating Conditions.

NOTE: PARs must be made in **15 minutes** from the Start Time.

START TIME _____

NOTE: IAW 0PEP-02.6.21, enter lower wind direction and wind speed if completing hard copy ENF.

Step 2 – Determine that Zones A, B, C, D, and E, should be evacuated.

Using 0PEP-2.6.28, Attachments 1 and 2, determines that Zones A, B, C, D, and E should be evacuated.

****CRITICAL STEP** SAT/UNSAT**

Step 3 – Determine that Zones F, G, H, J, K, L, M, and N, should be sheltered.

Using 0PEP-2.6.28, Attachments 1 and 2, determines that Zones F, G, H, J, K, L, M, and N, should be sheltered.

****CRITICAL STEP** SAT/UNSAT**

NOTE:	For actual or projected doses greater than 5 Rem CDE Thyroid, then recommend the consideration of KI use by the public.

Step 4 – Determine that KI should not be recommended for use by the General Public.
Determines that KI should NOT be recommended for use by the Public.

SAT/UNSAT

Step 5 – Determinations made within 15 minutes from start time.
Determinations made within 15 minutes.

**** CRITICAL STEP ** SAT/UNSAT**

TERMINATING CUE: When final determination of PARs and KI recommendation, 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	Evacuation Zones are critical for protection of the Public.
3	Critical	Shelter Zones are critical for protection of the Public.
4	Not Critical	Recommending KI will not harm the Public.
5	Critical	15- minute time limit is critical for protection of the Public.

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	X	No	____	Time Limit	15 min/15 min
Alternate Path:	Yes	____	No	X		

EVALUATION

Performer: _____

JPM: Pass _____ Fail _____

Remedial Training Required: Yes _____ No _____

Comments: _____

_____

_____

_____

_____

_____

_____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

TIME CRITICAL

TASK CONDITIONS:

A General Emergency has been declared due to an on-going un-isolable RCIC steam line break, which began 12 hours ago, with indications of fuel failure. Weather data:

- Late fall evening
- Temperature 57°F
- Upper wind speed 16.7 mph
- Lower wind speed 15.8 mph
- Upper wind direction 36.4°
- Lower wind direction 40.8°
- Stability class D

Projected off-site dose per AD-EP-ALL-0202 is 450 mRem TEDE and 3500 mRem CDE. Off-site field survey readings are 280 mRem/hour. The highest reading on the Hi-Range DW Rad Monitors is 65 R/hr. The release is expected to drop rapidly due to the emergency depressurization of the Reactor in progress. County and State governments have been notified, and have prepared local evacuation routes.

INITIATING CUE:

A hard copy Emergency Notification Form (ENF) is being completed. Determine what Protective Action Recommendations (PARs) should be made to Off-Site Agencies and determine if Potassium Iodide should be recommended to the General Public.

****This is a time critical JPM**** **Time now is: _____.**

TIME	PARs

Potassium Iodide (circle one) SHOULD / SHOULD NOT be recommended to the General Public.

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: 2

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/23/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
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 both workers. (Assume the same task times for both workers).
2. Determine if any Brunswick administrative dose limitations will be exceeded.

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 _____

Step 2 - 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***
Estimate 26.7 mrem dose accumulation.

****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***

****CRITICAL STEP** SAT/UNSAT**

Step 3 - 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)
Worker #2: 970 mr + 602.2 mr = 1572.2 mr (< 2R limit)

****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
1	Not Critical	Administrative
2a	Critical	Each calculation is critical to determine total dose for personnel safety.
2b	Critical	Each calculation is critical to determine total dose.
2c	Critical	Each calculation is critical to determine total dose.
2d	Critical	Each calculation is critical to determine total dose.
2e	Critical	Each calculation is critical to determine total dose.
3	Critical	Total calculation and knowledge of Admin Dose Limit is required to complete JPM.

REVISION SUMMARY

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.

Validation Time: 15 Minutes (approximate)

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	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: _____

_____

_____

_____

_____

_____

_____

☐ 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 both workers. (Assume the same task times for both workers).
2. Determine if any Brunswick administrative dose limitations will be exceeded.

Results:

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 1 (ALL)

LESSON TITLE: Manual Initiation of SLC System with RWCU Isolation Failure

LESSON NUMBER: LOT-SIM-JP-005-01

REVISION NO: 3

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/16/2015
TECHNICAL REVIEWER / DATE

Derek Lickett 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

211005B501
Manually Initiate Standby Liquid Control Per OP-05

K/A REFERENCE AND IMPORTANCE RATING:

211000 A4.08 4.2/4.2
Ability to operate and/or monitor in the control room: System Initiation

REFERENCES:

2EOP-01-LPC (Level Power Control)
2OP-05, Section 5.2

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

1 Reactivity Control

SETUP INSTRUCTIONS

Recommended Initial Conditions

IC-11, 100% Power, BOC

Required Plant Conditions

Initiate malfunctions to:

1. Defeat auto scrams.
2. Insert an ATWS.
2. Fail open an SRV.

Activate malfunctions/overrides to Fail ARI and then Initiate ARI.
Activate malfunction for RWCU G31-F004 valve to fail to auto close.

Place Simulator in RUN and insert manual Reactor Scram when Suppression Pool temperature is approximately 95°F. Carry out Immediate Operator Actions, and trip both Recirculation Pumps.

Triggers

Malfunctions

ES002F, ADS Valve E Fails Open, TRUE
RW016F, G31-F004 Failure to Auto Close, TRUE
RP005F, Auto Scram Defeat, TRUE
RP011F, ATWS 4

Overrides

ARI failed. Fail CS-5560 'AS IS' on P603.

Remotes

None

NOTE: When resetting simulator for multiple use, leave the ARI switch normal, use Switch Check Override to push through, then, after placing simulator in Run, place ARI to trip. (Otherwise a reactor scram will occur)

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. 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 may be performed in the Simulator on 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. SRV E failed open and cannot be closed.
2. 0AOP-30, Safety/Relief Valve Failures, directs a Reactor Scram.
3. The Manual Reactor Scram pushbuttons have failed to initiate a scram.
4. The Unit CRS has entered ATWS Flowchart.
5. ARI has been initiated.
6. The Recirculation Pumps have been tripped.

INITIATING CUE:

You are directed to manually initiate the Standby Liquid Control (SLC) System, verify proper indications, and inform the Unit CRS when the actions are complete.

PERFORMANCE CHECKLIST

NOTE: Sequence is assumed unless denoted in the **Comments**.

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 procedure may not be referenced for this task as it is considered skill of the craft, but the steps of the procedure are still required to be taken.

NOTE: The SLC Pump switch should be placed in the A&B position to start both pumps, although the reactor will shutdown if only one pump is started.

Step 2 - Unlock and place SLC Pumps A & B, C41-CS-S1, in the PUMP A & B RUN position.

Keylock switch in PUMP A & B RUN position.

****CRITICAL STEP**** **SAT/UNSAT**

NOTE: The following steps may be performed in any order.

Step 3 – **OBSERVE** the following indications:

Indication	SAT	UNSAT
SQUIB VALVE CONTINUITY LOSS Alarm		
SLC A/B SQUIB VALVE CONTINUITY Lights out		
SLC PUMP A red indicating light on		
SLC PUMP B red indicating light on		

SAT/UNSAT

NOTE: The G31-F004, RWCU OUTBOARD ISOL VLV is expected to automatically close when SLC is initiated. Either RWCU Isolation Valve, G31-F004, RWCU OUTBOARD ISOL VLV, or G31-F001, RWCU INBOARD ISOL VLV, will close when the switch is taken to close.

Step 4 – Ensure RWCU Isolated.

Recognizes that RWCU did not isolate.

SAT/UNSAT

Step 5 - Closes the RWCU OUTBOARD ISOL VLV, G31-F004, or the RWCU INBOARD ISOL VLV, G31-F001, or BOTH.

RWCU OUTBOARD ISOL VLV, G31-F004, or RWCU INBOARD ISOL VLV, G31-F001, or BOTH, taken to close.

**** CRITICAL STEP ** SAT/UNSAT**

Step 6 - Ensure SLC Injection by:

Indication	SAT	UNSAT
SLC STORAGE TANK LEVEL indicating controller, *C41-LI-R601,* indicates level decreasing		
SLC PUMP DISCHARGE PRESSURE, C41-PI-R600, is greater than reactor vessel pressure.		

SAT/UNSAT

Step 7 - Informs Unit CRS that SLC has been initiated and that the RWCU Isolation valve failed to close and had to manually close the valve.

Unit CRS informed.

SAT/UNSAT

TERMINATING CUE: When the SLC pumps have been started and the RWCU Isolation valve has been closed then this JPM is complete.

TIME COMPLETED: _____

NOTE: Comments required for any step evaluated as UNSAT.

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Required to complete task.
3	Not Critical	Observe step.
4	Not Critical	Ensure step.
5	Critical	Required to complete task.
6	Not Critical	Ensure step.
7	Not Critical	Communication to CRS.

REVISION SUMMARY

3	New JPM Format. Added Critical/Non Critical step explanation. Changed Critical Step 5 to allow closing G33-F001, RWCU INBOARD ISOL VLV.
2	Revised to new JPM Template, Revision 3. Changed from Manual Scram Failure to ATWS 4 malfunction.

Manual Initiation of SLC System with RWCU Isolation Failure.

Validation Time: 5 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:	_____

(Ensure reference section on previous page identifies the regulation or procedure that mandates this time limit requirement)

Alternate Path:	Yes	X	No	_____

EVALUATION

Performer: _____

JPM Results: Pass _____ Fail _____

Remedial Training Required: Yes _____ No _____

Comments: _____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

TASK CONDITIONS:

1. SRV E failed open and cannot be closed.
2. 0AOP-30, Safety/Relief Valve Failures, directs a Reactor Scram.
3. The Manual Reactor Scram pushbuttons have failed to initiate a scram.
4. The Unit CRS has entered ATWS Flowchart.
5. ARI has been initiated.
6. The Recirculation Pumps have been tripped.

INITIATING CUE:

You are directed to manually initiate the Standby Liquid Control (SLC) System, verify proper indications, and inform the Unit CRS when the actions are complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 2 (RO ONLY)

LESSON TITLE: RCIC Start – Steam Line Ruptures and RCIC Fails to Isolate

LESSON NUMBER: LOT-SIM-JP-016-A05

REVISION NO: 04

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Derek Pickett 9/10/205
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

217003B101, Manually Startup The RCIC System Per OP-16

K/A REFERENCE AND IMPORTANCE RATING:

217000A4.08 3.7 3.6

Ability to manually operate and/or monitor RCIC system flow

REFERENCES:

S/969 (RCIC Hard Card)

OP-16, Section 5.3

TOOLS AND EQUIPMENT:

None.

SAFETY FUNCTION (from NUREG 1123, Rev 2.):

2 - Inventory Control

SIMULATOR SETUP

Recommended Initial Conditions

Any 100% IC

Required Plant Conditions:

- RPV level <166 inches
- Inhibit ADS
- Place HPCI in PTL
- Trip RFPs

Triggers:

Auto: Q1619RRM, E51-F013 Red Light Equal to TRUE.

Malfunctions:

Event	System	Tag	Title	Value/ Ramp Rate	Activate Time (sec)	Deactivate Time (sec)
N/A	ES	ES055F	E51-F007, Failure to Auto Close	N/A	N/A	N/A
N/A	ES	ES056F	E51-F008, Failure to Auto Close	N/A	N/A	N/A
1	ES	ES025F	RCIC Stm Brk – S RHR Room	20%/ 0 sec.	40 sec	Trigger 1
N/A	ES	ES041F	RCIC Failure to Auto Start	N/A	N/A	N/A

Overrides:

None

Remotes

None

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
   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 performer.

TASK CONDITIONS:

1. Both Reactor Feed Pumps have tripped and are not available.
2. Reactor level is below 166 inches.
3. HPCI is not available.

INITIATING CUE:

You are directed by the Unit CRS to place RCIC in service per the Hard Card and restore Reactor level to 166 to 206 inches. Notify the Unit CRS when all required 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: _____

Step 2 - Ensure the following valves are open: Turbine Trip & Throttle Valve, E51-V8, and Turbine Trip & Throttle Valve Actuator, E51-V8, and Turbine Governor Valve, E51-V9.

E51-V8 (valve position) E51-V8 (actuator position) and E51-V9 are open.

SAT/UNSAT

Step 3 – Open Cooling Water Supply Valve, E51-F046.

E51-F046 is full open.

**** CRITICAL STEP ** SAT/UNSAT**

Step 4 - Start Vacuum Pump and leave switch in START.

Vacuum Pump running with switch in Start.

SAT/UNSAT

Step 5 - Open Turbine Steam Supply Valve, E51-F045.

E51-F045 is full open.

**** CRITICAL STEP ** SAT/UNSAT**

Step 6 – Open RCIC Injection Valve, E51-F013.

E51-F013 is full open.

**** CRITICAL STEP ** SAT/UNSAT**

Step 7 – Ensure that the RCIC turbine starts and comes up to speed as directed by RCIC FLOW CONTROL.
RCIC Turbine speed observed to come up to speed.

SAT/UNSAT

Step 7a – Raises flow to 500 gpm.
Raises RCIC FLOW CONTROLLER to500 gpm.

SAT/UNSAT

NOTE: When Reactor water level has started to rise and when directed by the evaluator activate Trigger 1 to initiate steam line break.

Step 8 – Recognize the RCIC isolation and trip signal.
RCIC isolation and trip is recognized.

SAT/UNSAT

Step 9 – Recognize the failure of the RCIC Steam Supply Valves, E51-F007 and E51-F008, to close.
Failure of E51-F007 and E51-F008 to close is recognized. Operator refers to 2APP-A-03 (5-2 and 6-2).

SAT/UNSAT

Step 10 – Manually close RCIC Steam Supply Valve, E51-F007 OR RCIC Steam Supply Valve, E51-F008 OR both.
E51-F007 or E51-F008 or both are closed.

**** CRITICAL STEP ** SAT/UNSAT**

Step 11 – Notify the Unit CRS that the RCIC Steam Pipe has ruptured and that E51-F007 and/or E51-F008 were manually closed to isolate the leak.
Unit CRS is notified

SAT/UNSAT

TERMINATING CUE: When the RCIC Steam Line rupture is isolated and the Unit CRS is notified, this JPM is complete.

Time Completed: _____

NOTE: Comments required for any step evaluated as UNSAT.

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Not required to complete task.
3	Critical	Pump will be damaged without cooling water.
4	Not Critical	Not required to complete task.
5-6	Critical	Required to complete task.
7-9	Not Critical	Ensure and Recognize steps.
10	Critical	Actions required to complete task.
11	Not Critical	Informing CRS of results.

REVISION SUMMARY

6	New JPM format. Added Critical/Non Critical step explanation.
5	New JPM format.

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	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: _____

Read the following to the performer.

TASK CONDITIONS:

1. Both Reactor Feed Pumps have tripped and are not available.
2. Reactor level is below 166 inches.
3. HPCI is not available.

INITIATING CUE:

You are directed by the Unit CRS to place RCIC in service per the Hard Card and restore Reactor level to 166 to 206 inches. Notify the Unit CRS when all required actions are complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 3

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 9/11/2015
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

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. No other tests or maintenance activities are in progress that could provide a half scram signal to the RPS logic.

4. 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

****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.

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. 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. No other tests or maintenance activities are in progress that could provide a half scram signal to the RPS logic.

4. 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

NRC 2015 SIM 4

LESSON TITLE: Shifting Stator Cooling Pumps – Pump Trip

LESSON NUMBER: LOT-SIM-JP-027.2-01

REVISION NO: 3

Lou Sosler 9/18/2015
PREPARER / DATE

John Biggs 9/18/2015
TECHNICAL REVIEWER / DATE

Brian Moschet 9/21/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

253 002 B1 01, Startup The Generator Stator Cooling System Per OP-27.2

K/A REFERENCE AND IMPORTANCE RATING:

245000 A4.03 2.7/2.8
Ability to manually operate and/or monitor in the control room: Stator water cooling pumps

REFERENCES:

2OP-27.2 Section 8.6
2APP UA-02 4-9

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev 2.):

4 – Heat Removal from Reactor Core (Main Turbine Generator and Auxiliary Systems)

SIMULATOR SETUP:

A. Initial Conditions:

Any power IC
Rx. Pwr. Any
Core Age Any

Required Plant Conditions:

2A Stator Cooling Pump running and 2B Stator Cooling Pump in standby

B. Triggers

None

C. Malfunctions

XY008F Stator Cooling Pump B Sheared Shaft (Active)

D. Overrides

Annunciator UA-02 1-9, Loss of Stat Coolant Trip Ckt Ener, OFF

E. Special Instructions

Load Malfunctions

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
   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. 2A Stator Cooling Pump is in operation.

2. All applicable prerequisites in OP-27.2, Section 5.0 are met.

INITIATING CUE:

You are directed to start 2B Stator Cooling pump and secure 2A Stator Cooling pump so that routine maintenance may be performed on 2A Stator Cooling Pump.

Inform the Unit CRS when the pump swap is 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: When AO is directed to close GSC-Y-34 to isolate GSC-63-P79, report that the valve has been closed.

Step 2 – Direct AO to close GSC-63-P79 Instrument Isolation Valve, GSC-Y-34.

AO directed to close GSC-Y-34.

SAT/UNSAT

PROMPT: When AO is directed to monitor Stator Cooling System pressure on GSC-PI-YGA-2 report that the AO is monitoring system pressure. Pressure is currently 46 psig.

Step 3 – Direct AO to monitor Stator Cooling System pressure on GSA-PI-YGA-2.

AO directed to monitor Stator Cooling System pressure on GSA-PI-YGA-2.

SAT/UNSAT

Step 4 – Start 2B Stator Cooling pump.

Rotates 2B Stator Cooling pump switch to ON without pausing in OFF and observes the red light illuminates and the green light goes off.

****CRITICAL STEP**** **SAT/UNSAT**

Step 5 – Acknowledges STATOR COOL RESERVE PUMP RUNNING (UA-02 4-9) alarm.

Silences and reports to CRS Stator Cool Reserve Pump Running in alarm.

SAT/UNSAT

PROMPT: After 2A Stator Cooling Pump is off, inform performer (as AO) that system pressure indicated on GSA-PI-YGA-2 is 30 psig and stable.

Step 6 – Stop 2AStator Cooling pump.

Places 2A Stator Cooling pump control switch in OFF and observes green light illuminates and red light goes off.

****CRITICAL STEP** SAT/UNSAT**

Step 7 – IMMEDIATELY START 2A Stator Cooling pump.

Places 2A Stator Cooling pump switch to ON and observes the red light illuminates and the green light goes off.

****CRITICAL STEP** SAT/UNSAT**

PROMPT: When informed that the Stator Coolant Pump B has failed, then inform the performer (as the CRS) to NA step 6.3.6.5e and complete rest of the procedure.

PROMPT: When asked, system pressure indicated on GSC-PI-YGA-2 is 47 psig.

Step 8 – Direct AO to check Stator Cooling System pressure is between 42 and 50 psig as indicated on GSC-PI-YGA-2.

Directs AO to check Stator Cooling System pressure is between 42 and 50 psig as indicated on GSC-PI-YGA-2.

SAT/UNSAT

PROMPT: When directed to open GSC-Y-34 report valve is open. This step is critical for restoring protection to the generator in case of Stator Cooling System failure.

Step 9 – Direct AO to open GSC-Y-34, GSC-63-P79 Instrument Isolation Valve.

AO directed to open GSC-Y-34.

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When 2A Stator Cooling pump is restarted and the GSC0Y-34 valve is reopened, this JPM is complete.

TIME COMPLETE: _____

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2-3	Not Critical	Task can be accomplished without these steps.
4	Critical	Required to complete task.
5	Not Critical	Acknowledge alarm
6-7	Critical	Required to complete task.
8-10	Not Critical	Task can be accomplished without these steps.
11	Critical	Restores protection to the generator in the event of Stator Cooling System failure.

REVISION SUMMARY

3	New JPM format. Added Critical/Non Critical step explanation.
2	Updated to new JPM template.

Validation Time: 10 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	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. 2A Stator Cooling Pump is in operation.

2. All applicable prerequisites in OP-27.2, Section 5.0 are met.

INITIATING CUE:

You are directed to start 2B Stator Cooling pump and secure 2A Stator Cooling pump so that routine maintenance may be performed on 2A Stator Cooling Pump.

Inform the Unit CRS when the pump swap is complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 5 (ALL)

LESSON TITLE: Secure Recirculation Pump IAW AOP-14 - THI

LESSON NUMBER: LOT-SIM-JP-302D-01

REVISION NO: 0

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Drek Picket 9/10/2015

Thomas Baker 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

223603B401 Respond to High Primary Containment Pressure per AOP-14.0

K/A REFERENCE AND IMPORTANCE RATING:

295024 High Drywell Pressure
EA1 Ability to operate and/or monitor the following as they apply to HIGH DRYWELL PRESSURE
1.21 Recirculation System 3.4/3.8

REFERENCES:

0AOP-14.0

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

5 - Containment Integrity (IAW ES-401-1)

SETUP INSTRUCTIONS

Insert seal failure:

RC007F (Seal #1, 100%)
RC009F (Seal #2, 5%)

Set up THI on Trigger 1: NB016F- IP-STDY

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 Simulator.
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. The following annunciators are sealed in:

   A-6, 5-3, Outer Seal Leakage Flow Detection High
   A-6, 6-3, Pump A Seal Staging Flow High/Low

2. Reactor Recirculation Pump A seals have been determined to be failing.
3. 0AOP-14.0 has been entered and is being executed.

INITIATING CUE:

You are directed by the CRS to isolate the Reactor Recirculation Pump A IAW 0AOP-14.0 Step 4.2.7.8.

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?

TIME START _____

NOTE: Steps 2 through 7 may be performed concurrently.

Step 2 – Stop Recirculation Pump A by depressing the Recirc Pump Emerg Stop pushbutton.

Emergency Stop Pushbutton for Recirc Pump A depressed.

****CRITICAL STEP** SAT/UNSAT**

Step 3 – Confirm Recirc VFD 2A 4KV Supply Bkr, is OPEN.

Observes Recirc VFD 4KV Supply Bkr is open indicated by green light on and red light off.

SAT/UNSAT

Step 4 – Confirm affected recirc pump Speed Demand is 0.00 AND pump speed is lowering.

Observes Recirc Pump A Speed Demand is 0.00 and Recirc Pump speed is lowering on P601 panel.

SAT/UNSAT

Step 5 – Close B32-F031A (Pump A Disch Vlv).

Recirc Pump A discharge valve is closed by rotating the control switch in the counterclockwise direction and indicated by the green light on and red light off.

****CRITICAL STEP** SAT/UNSAT**

NOTE: When the B32-F031A valve is full closed the Thermal Hydraulic Instability malfunction will initiate.

Step 6 – Close B32-V22 (Seal Injection Vlv).

Recirc Pump A Seal Injection valve is closed by rotating the control switch in the counterclockwise direction and indicated by the green light on and red light off.

****CRITICAL STEP** SAT/UNSAT**

Step 7 – Close B32-F032A (Disch Bypass Vlv).

Recirc Pump A discharge bypass valve is closed by rotating the control switch in the counterclockwise direction and indicated by the green light on and red light off.

****CRITICAL STEP** SAT/UNSAT**

Step 8 – Close B32-F023A (Pump A Suction Vlv).

Recirc Pump A suction valve is closed by rotating the control switch in the counterclockwise direction and indicated by the green light on and red light off.

****CRITICAL STEP** SAT/UNSAT**

NOTE: The examinee should determine that a reactor scram is required due to thermal hydraulic instabilities, the examinee may continue on to the OP until it is determined that a reactor scram is required.

Step 9 – Determines thermal hydraulic instabilities.

Observes indications of THI (Reactor period fluctuations, LPRM/APRM fluctuations, alarm?. Setup and run……..

SAT/UNSAT

Step 10 – Inserts a reactor manual scram by depressing both manual scram pushbuttons.

Depresses both manual scram pushbuttons on the P601 panel and observes all rods insert.

****CRITICAL STEP** SAT/UNSAT**

NOTE: If mode switch is placed in shutdown with greater than 3×10^6 lb/hr steam flow a Group I Isolation will occur.

Step 11 – Places reactor mode switch in SHUTDOWN when steam flow is less than 3×10^6 lb/hr.

Rotates reactor mode switch counter clockwise to the SHUTDOWN position.

****CRITICAL STEP** SAT/UNSAT**

TERMINATING CUE: When the mode switch has been placed in SHUTDOWN this JPM is complete.

TIME COMPLETE: _____

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Critical	Required to complete task.
3-4	Not Critical	Confirm steps.
5-8	Critical	Required to complete task.
9	Not Critical	Not measurable.
10	Critical	Required to complete task.

REVISION SUMMARY

0	New JPM.

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: _____

_____

_____

_____

_____

_____

_____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

TASK CONDITIONS:

1. Reactor Recirculation Pump A seals have been determined to be failing.
2. 0AOP-14.0 has been entered and is being executed.

INITIATING CUE:

You are directed by the CRS to isolate the Reactor Recirculation Pump A IAW 0AOP-14.0 Step 4.2.7.8.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 6

LESSON TITLE: Manual Transfer of Bus E3 from the Normal Feeder to the DG3

LESSON NUMBER: LOT-SIM-JP-050-B01

REVISION NO: 8

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Thomas Baker 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

262016B101
Complete a Control Room Manual Transfer of Emergency Bus Supply from Normal Feeder to Diesel Generator per OP-50.1

K/A REFERENCE AND IMPORTANCE RATING:

264000 A4.04 3.7/3.7
Ability to manually operate and/or monitor in the control room: Manual start, loading, and stopping of emergency generator.

REFERENCES:

0OP-50.1, Emergency Diesel Generator Power System Operating Procedure

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

6 - Electrical Distribution

SETUP INSTRUCTIONS

A. Initial Conditions:

Any IC w/o DG auto start signal

- Start DG3 in Control Room Manual
- Place DG3 Output Breaker (AI5) Synch Switch to ON.
- Adjust DG3 output voltage to less than E3 bus voltage
- Adjust DG frequency so that the Synch Scope is rotating slowly in the SLOW direction.
- Place DG3 Output Breaker (AI5) Synch Switch to OFF.
- Place RHRSW Pump A in service @ 4000gpm flow through the RHR heat exchanger. Start 2A NSW Pump. (Running these pumps places 1600 KW on Bus E3)

B. Malfunctions:
None

C. Overrides:
None

D. Triggers
None

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
   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. E3 is energized from BOP Bus 2D.
2. DG3 is running in Control Room Manual IAW 0OP-39, Diesel Generator Operating Procedure
3. The Load Dispatcher has been notified that E3 load will be shifted to DG3.
4. An AO is stationed at DG3.
5. An AO is stationed at compartment AI2 to monitor amperage.
6. Bus E3 is being placed on the diesel generator to facilitate work on the master supply breaker from Bus 2D.

INITIATING CUE:

You are directed by the Unit CRS to perform the Control Operator actions of 0OP-50.1, Diesel Generator Emergency Power System Operating Procedure, Section 6.3.5, Control Room Manual Transfer of 4160V Emergency Bus Supply from Normal Feeder to Diesel Generator, starting with step 6.3.5.3.

Notify the Unit CRS when all required 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: _____

NOTE: The AVAIL light indicates the DG is running at proper speed and voltage. The NO LOAD light indicates the DG output breaker is open.

PROMPT: If asked, respond as an AO that you are observing amperage at Compartment AI2 on E3. Reading approximately 300 amps.

Step 2 – Confirm AVAIL and NO LOAD lights are illuminated for DG3.

DG3 Avail and No Load lights are verified on.

SAT/UNSAT

NOTE: The generator voltage is monitored on diesel generator voltage output meter and emergency bus voltage is assumed to be the equivalent of the normal feeder supply.

Step 3 – Adjust DG3 voltage to slightly greater than Bus E3 voltage with the Auto Voltage Regulator.

DG3 voltage adjusted. Should indicate ~4160V.

SAT/UNSAT

Step 4 – Place synchroscope for DG3 output breaker (AI5) to ON.

DG3 synchroscope turned on.

****CRITICAL STEP**** **SAT/UNSAT**

Step 5 – Adjust DG3 speed with the GOVERNOR control switch until the synchroscope is rotating slowly in the FAST direction at approximately 3-6 rpm.

DG3 governor switch is adjusted until the synchroscope is rotating slowly in the FAST direction (clockwise) at approximately 3 – 6 rpm.

****CRITICAL STEP** SAT/UNSAT**

Step 6 – Adjust DG3 output voltage to match running-incoming AC voltage (Bus E3 voltage) using the Auto Voltage Regulator.

DG3 voltage adjusted until they are match.

****CRITICAL STEP** SAT/UNSAT**

WARNING: Failure to synchronize the DG correctly in the following step could result in equipment damage and possible personnel injury.

NOTE: After the output breaker is closed, the diesel should be loaded quickly to prevent a reverse power trip from occurring.

Step 7 – When the synchroscope is at 12 o'clock then close the DG output breaker and observe the following actions to occur:

a. Generator output breaker closes
b. Synchroscope remains at 12 o'clock

DG3 output breaker closed when the synchroscope is at "12 o'clock" and observes the generator output breaker is closed light indication and synchroscope remains at the 12 o'clock position.

****CRITICAL STEP** SAT/UNSAT**

Step 8 – Raise DG3 load to between 900-1000 KW by momentarily placing the Governor Switch to RAISE.

DG3 load is raised to 900 – 1000 KW.

****CRITICAL STEP** SAT/UNSAT**

Step 9 – Place synchroscope to OFF.

Synchroscope is placed in OFF.

SAT/UNSAT

Caution: The following operating limits are applicable to Emergency Diesel Generators:
- 3500 kW continuous; 3850 kW maximum for 2000 hours at 0.8 PF.
- 2640 kvars continuous; 2890 kvars maximum for 2000 hours.
- 668 amps - generator stator; 734 amps maximum.
- 214 amps - generator field.
- 4400V - generator stator.
- 125V - generator field.
- 125°C - generator stator.
- 170°F - machine bearings.

Step 10 – While raising DG load, maintain generator kvars approximately one-half the KW load, using Voltage adjusting rheostat

Voltage adjust is manipulated to maintain kvars ~one-half the KW load.

SAT/UNSAT

NOTE: Raising diesel generator load will minimize oscillations and droop of diesel generator when the diesel switches to auto regulation.
Upon opening of normal feeder breaker to an emergency bus, the diesel will shift to auto regulator control

PROMPT: As the performer raises generator amps, as the AO report the difference between generator amps reading and 280 amps.
(This will provide the performer with the amperage on the normal supply).

Step 11 – Raise generator load by momentarily placing the GOVERNOR motor control switch in RAISE, thus decreasing the normal supply amperage as reported by the AO.

Generator load is raised until zero amps reported.

****CRITICAL STEP** SAT/UNSAT**

PROMPT: After the performer raises generator amps to ~280 amps (~1600KW), inform them that there is zero amperage on the normal supply.

Step 12 – When zero amperage is reported then place and hold the control switch (Bus 2D to Bus E3) in TRIP until both MSTR and SLAVE breakers indicate open.

2AD1 and AI2 breakers are open.

****CRITICAL STEP** SAT/UNSAT**

Step 13 – Unit CRS is notified that DG3 is supplying E3.
Unit CRS notified.

SAT/UNSAT

TERMINATING CUE: When DG3 is supplying E3 and the normal supply breakers have been opened then this JPM is complete.

TIME COMPLETED: _____

NOTE: Comments required for any step evaluated as UNSAT.

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Confirm step.
3	Not Critical	Can still complete JPM without this action.
4-8	Critical	Cannot complete JPM without these actions.
9-10	Not Critical	Can still complete JPM without these actions.
11-12	Critical	Required to complete JPM
13	Not Critical	Reporting action.

REVISION SUMMARY

8	New JPM format. Added Critical/Non Critical step explanation.
7	Updated to new JPM format.
6	Added additional setup instructions to establish ~1600KW on E3. Added prompt for initial amperage on E3 before Step 2. Removed Rev. number form References. Added Time Required for Completion and Time Taken blanks on page 9.

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	____	No	X		

EVALUATION

Performer: _____

JPM: Pass _____ Fail _____

Remedial Training Required: Yes _____ No _____

Comments: _____

_____

_____

_____

_____

_____

_____

☐ Comments reviewed with Performer

Evaluator Signature: _____ Date: _____

TASK CONDITIONS:

1. E3 is energized from BOP Bus 2D.
2. DG3 is running in Control Room Manual IAW 0OP-39, Diesel Generator Operating Procedure
3. The Load Dispatcher has been notified that E3 load will be shifted to DG3.
4. An AO is stationed at DG3.
5. An AO is stationed at compartment AI2 to monitor amperage.
6. Bus E3 is being placed on the diesel generator to facilitate work on the master supply breaker from Bus 2D.

INITIATING CUE:

You are directed by the Unit CRS to perform the Control Operator actions of 0OP-50.1, Diesel Generator Emergency Power System Operating Procedure, Section 6.3.5, Control Room Manual Transfer of 4160V Emergency Bus Supply from Normal Feeder to Diesel Generator, starting with step 6.3.5.3.

Notify the Unit CRS when all required actions are complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 7

LESSON TITLE: **Restoration of APRM Rod Block and Scram Setpoints from Single Loop Operation to Two Loop Operation**

LESSON NUMBER: **LOT-SIM-JP-09.6-02**

REVISION NO: **3**

Lou Sosler 9/10/2015
PREPARER / DATE

John Biggs 9/15/2015
TECHNICAL REVIEWER / DATE

Thomas Baker 9/10/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

215209B401, Operate the Power Range Neutron Monitoring System per OP-09

K/A REFERENCE AND IMPORTANCE RATING:

201005 A1.04 4.1/4.1
Ability to predict and/or monitor changes in Scram and Rod Block trip setpoints associated with operating APRM system controls.

REFERENCES:

2OP-09, NEUTRON MONITORING SYSTEM OPERATING PROCEDURE.

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123):

7 - Instrumentation

SETUP INSTRUCTIONS:

SETUP:

A. Initial Conditions:

1. Recommended Initial Conditions

Any IC <75% Reactor Power

B. Malfunctions

None

C. Overrides

None

D. Remote Function

None

E. Special Instructions

Implement APRM rod block and scram setpoints for single loop operation IAW 2OP-09, Section 8.2 on APRM Channel 1.

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
   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. The 'A' Recirculation Pump has been returned to service from single loop.

2. APRM Channel 1 rod block and scram setpoints for single loop operation are in effect per 2OP-09, NEUTRON MONITORING SYSTEM OPERATING PROCEDURE.

3. The password, '1-2-3-4', has been obtained from the Work Release Center cyber security password locker.

INITIATING CUE:

You are directed by the Unit CRS to restore APRM Channel 1 Rod Block and Scram setpoints for two loop operation per 2OP-09, section 8.3. Notify the Unit CRS when all required 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: _____

Step 2 – NOTIFY the Unit CRS that APRM 1 will be bypassed.

Unit CRS is notified.

SAT/UNSAT

Step 3 – PLACE APRM 1 in BYPASS.

APRM 1 is placed in Bypass.

SAT/UNSAT

Step 4 – CONFIRM, at all four APRM 2/4 Voters, BYPASSED LED is on for APRM 1.

Bypassed LED is verified at all four 2/4 voters.

SAT/UNSAT

Step 5 – PRESS ETC soft key to obtain ENTER SET MODE soft key.

Enter Set Mode soft key is obtained.

****CRITICAL STEP**** **SAT/UNSAT**

Step 6 – PRESS ENTER SET MODE soft key.

Enter Set Mode soft key is pressed.

****CRITICAL STEP**** **SAT/UNSAT**

Step 7 – ENTER password "1 2 3 4" AND PRESS ENT.

Password is entered and ENT is pressed.

**** CRITICAL STEP ** SAT/UNSAT**

Step 8 – At the OPER-SET PARAMETERS INDEX display, SELECT SLO/BSP CONTROL using the cursor keys.

Single Loop Operation is selected.

****CRITICAL STEP** SAT/UNSAT**

Step 9 – PRESS SET PARAMETERS soft key.

Set Parameters soft key is pressed.

****CRITICAL STEP** SAT/UNSAT**

Step 10 – CHANGE the SLO ENABLED "DESIRED:" field to NO using the UP/DOWN cursor keys.

SLO Enabled "DESIRED:" field is changed to NO.

****CRITICAL STEP** SAT/UNSAT**

Step 11 – PRESS ACCEPT soft key.

ACCEPT soft key is pressed.

****CRITICAL STEP** SAT/UNSAT**

Step 12 – CONFIRM SLO Enabled "PRESENT:" field changed to NO.

SLO Enabled "PRESENT:" field is verified to display NO.

SAT/UNSAT

Step 13 – PRESS EXIT soft key.

Exit soft key is pressed.

SAT/UNSAT

Step 14 – PRESS EXIT SET MODE soft key.

Exit Set Mode soft key is pressed.

SAT/UNSAT

Step 15 – PRESS YES soft key.

Yes soft key is pressed.

SAT/UNSAT

Step 16 – CONFIRM the APRM display header does NOT indicate SLO.

APRM display is verified to NOT indicate SLO.

SAT/UNSAT

Step 17 – PRESS TRIP MEMORY RESET on all four 2/4 Voters AND CONFIRM TRIP and MEM LEDs are OFF for APRM 1.

Trip Memory Reset is pressed on all four 2/4 Voters and the Trip and Mem LEDs are verified OFF for APRM 1.

SAT/UNSAT

Step 18 – CONFIRM the applicable APRM A-06 alarms are clear.

APRM alarms are verified clear.

SAT/UNSAT

PROMPT: If notified, respond as the Unit CRS and direct APRM be removed from BYPASS.

Step 19 – REMOVE APRM 1 from BYPASS.

APRM 1 is removed from Bypass.

SAT/UNSAT

Step 20 – NOTIFY Unit CRS.

Unit CRS is notified.

SAT/UNSAT

TERMINATING CUE: When APRM 1 two loop rod block and scram setpoints have been restored 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
2-4	Not Critical	Not required to complete JPM.
6-11	Critical	Required to complete JPM.
12-20	Not Critical	Verification and communication steps, not required to accomplish task.

REVISION SUMMARY

3	New JPM format. Added Critical/Non Critical step explanation.
2	Updated to current revision of 0GP-01 Modified to perform actions of PT-01.6.2 only (GP-01 no longer directs placing mode switch to shutdown if PT is unsatisfactory)

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. The 'A' Recirculation Pump has been returned to service from single loop.

2. APRM Channel 1 rod block and scram setpoints for single loop operation are in effect per 2OP-09, NEUTRON MONITORING SYSTEM OPERATING PROCEDURE.

3. The password, '1-2-3-4', has been obtained from the Work Release Center cyber security password locker.

INITIATING CUE:

You are directed by the Unit CRS to restore APRM Channel 1 Rod Block and Scram setpoints for two loop operation per 2OP-09, section 8.3. Notify the Unit CRS when all required actions are complete.

DUKE ENERGY

BRUNSWICK TRAINING SECTION

JOB PERFORMANCE MEASURE

NRC 2015 SIM 9 (ALL)

LESSON TITLE: **SEP-04 – Restart RB HVAC with Failure to Isolate**

LESSON NUMBER: **LOT-SIM-JP-300-K11**

REVISION NO: **2**

Lou Sosler 9/11/2015
PREPARER / DATE

John Biggs 9/16/2015
TECHNICAL REVIEWER / DATE

Thomas Baker 9/11/2015
VALIDATOR / DATE

Jerry Pierce 9/24/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

288205B501
Restart Reactor Building HVAC per EOP-01-SEP-04

K/A REFERENCE AND IMPORTANCE RATING:

288000 A3.01 3.8, 3.8
Ability to monitor Plant Ventilation System automatic isolation/initiation signals in the control room

REFERENCES:

0EOP-SEP-04 Rev. 11

TOOLS AND EQUIPMENT:

Plant Page

SAFETY FUNCTION (from NUREG 1123, Rev 2):

9 – Radioactivity Release

SIMULATOR SETUP:

A. Initial Conditions:

Recommended Initial Conditions

IC	11
Rx. Pwr.	100%
Core Age	BOC

B. Required Plant Conditions

A Secondary Containment leak that results in tripping the D12-R609A/B monitors on high radiation, which isolates RB HVAC. RPV water level is below LL2 or DW pressure is >1.7 psig and the Rx Bldg Rad Monitors are tripped.

C. Malfunctions

Event	System	Tag	Title	Value (ramp rate)	Activate Time (sec)	Deactivate Time (sec)
A	RW	RH013F	RWCU Break in Triangle Room	100%/4 mins	00	NA
A	NB	NB006F	MSL D Break before flow restrictor	1%/0 mins	00	NA

E1: Manually initiated. G5B25G1G to 0.7 over 1 minute
Set up to cause the following:

RB Rad Monitor A indication (g5b25g1g) to start rising to 0.7 over a 1 minute time frame.
RB Rad Monitor B indication (g5b25g2g) to start rising to 0.7 over a 1 minute time frame.
PROCESS RX BLDG VENT RAD HI Annunciator (ZUA345) to actuate after 50 sec.
PROCESS RX BLDG VENT RAD HI-HI Annunciator (ZUA335) to actuate after 55 sec.

E2: trc:2,aod:g5b25g1g
Set up the RB Rad Monitor A meter override to be deleted on depressing the RB Isolation Dampers close switch (K5608JCV close is true).

E3: trc:3,aod:g5b25g2g
Set up the RB Rad Monitor B meter override to be deleted on depressing the RB Isolation Dampers close switch (K5608JCV close is true).

E. Special Instructions

1. Place simulator in RUN and activate malfunctions.
2. When drywell pressure rises to cause a reactor scram, carry out the RO immediate actions.

Make sure level set is at 187 inches (this will go back to 170 inches after coming out of freeze)
Make sure that SEP-04 is cleaned.

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
   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. EOP-03-SCCP has been entered on Unit Two.
2. A high-radiation condition sensed by the RB Vent Radiation Monitors (D12-R609A/B) resulted in the isolation of Reactor Building HVAC.
3. SBGT Trains are in operation.
4. Jumpers to bypass RPV low level and drywell high pressure interlocks have been installed.
5. Reactor Building Exhaust temperature has not exceeded 135°F.
6. The leak has been isolated and EOP-03-SCCP directs restoring RB HVAC.
7. Instrument air pressure to the latch actuators for the reactor building ventilation isolation valves was never lost.

INITIATING CUE:

The Unit CRS directs you to restart Reactor Building HVAC IAW SEP-04, starting at step 2.1.3.4, and inform him when your 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: If asked, indicate the peak radiation levels on D12-RR-R605 at 4mr/hr and the Reactor Building Exhaust temperature has not exceeded 135°F.

Step 2 Place the CAC PURGE VENT ISOL OVRD, CAC-CS-5519 switch to OVERRIDE.

CAC-CS-5519 switch in OVERRIDE.

****CRITICAL STEP** SAT/UNSAT**

NOTE: Process Reactor Building Vent Exhaust Rad Monitors at Panel H12-P606, D12-RM-K609A and D12-RM-K609B are reset.

Step 3 Ensure RESET at Panel H12-P606:

D12-RM-K609A (Process Reactor Bldg Ventilation Radiation Monitor A)

D12-RM-K609B (Process Reactor Bldg Ventilation Radiation Monitor B)

Monitors verified reset.

****CRITICAL STEP** SAT/UNSAT**

Step 4 - Reset the PCIS Group 6 Isolation on RTGB Panel P601.

PCIS Group 6 Isolation reset by depressing pushbuttons S32 and S33 on P601.

****CRITICAL STEP** SAT/UNSAT**

PROMPT:	If asked, inform examinee that instrument air pressure to the Reactor Building ventilation isolation valve latch actuators was never lost, **OR:**
PROMPT:	If requested, inform the examinee as Reactor Building Auxiliary Operator that the latches for the Reactor Building Ventilation Isolation Dampers are in the unlatched position.
PROMPT:	If asked, inform examinee that all personnel are clear of any equipment that is being started/opened.

Step 5 - Open RB Vent Isol Vlvs:

a. C-BFIV-RB and A-BFIV-RB

C-BFIV-RB, A-BFIV-RB are open (by depressing the upper lens cover for the valves).

****CRITICAL STEP** SAT/UNSAT**

b. D-BFIV-RB and B-BFIV-RB

D-BFIV-RB, B-BFIV-RB are open (by depressing the upper lens cover for the valves).

****CRITICAL STEP** SAT/UNSAT**

NOTE:	The RB HVAC Exhaust Fans should be started prior to starting a Supply Fan. (i.e. An exhaust should be started followed by a supply fan, then an exhaust fan should be started followed by a supply fan until all exhaust and supply fans are running.

Step 6 - Start as many Reactor Building Exhaust and Supply Fans as possible to provide maximum ventilation.

All four Reactor Building Exhaust and Supply Fans are running.

****CRITICAL STEP** SAT/UNSAT**

SIM OP:	When two RB HVAC Supply Fans have been started insert Event Trigger E1 to cause REACTOR BLDG VENT RAD Monitor to start to rise and go above 4 mr/hr.

Step 7 – Recognizes Reactor Building Vent Rad Monitor increasing.

Radiation monitor readings are rising.

SAT/UNSAT

NOTE:	Closing the BFIV-RBs will cause the Reactor Building Vent and Supply fans to automatically trip.

Step 8 – When Process Rad Hi-HI (UA-3, 3-5) alarms, manually stop the Reactor Building Supply and Exhaust Fans.

All Reactor Building Supply and Exhaust Fans are stopped.

SAT/UNSAT

NOTE:	Closing the BFIV-RBs will cause the RB Vent Rad Monitors overrides to be deleted and go to normal readings.

Step 9 – Manually close RB Vent Isol Vlvs:

a. C-BFIV-RB and A-BFIV-RB

C-BFIV-RB, A-BFIV-RB are closed (by depressing the lower lens cover for the valves).

****CRITICAL STEP** SAT/UNSAT**

b. D-BFIV-RB and B-BFIV-RB

D-BFIV-RB, B-BFIV-RB are closed (by depressing the lower lens cover for the valves).

****CRITICAL STEP** SAT/UNSAT**

Step 10 - Unit CRS informed that SEP-04, RB HVAC Restart procedure cannot be performed at this time.

Unit CRS informed.

SAT/UNSAT

TERMINATING CUE:	RB HVAC has been isolated and SBGT has been verified running.

TIME COMPLETED: _____

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2-6	Critical	Required to complete JPM.
7-8	Not Critical	JPM can be completed without performing these steps.
9	Critical	Required to complete JPM.
10-11	Not Critical	Verify and report. Not required to complete JPM.

REVISION SUMMARY

2	New JPM format. Added Critical/Non Critical step explanation.
1	Changed to rad signal vs high temperature for the alternate path.

(Provide sufficient detail for reviewers and evaluators to understand the scope of any technical and/or administrative changes).

Validation Time: 22 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. EOP-03-SCCP has been entered on Unit Two.
2. A high-radiation condition sensed by the RB Vent Radiation Monitors (D12-R609A/B) resulted in the isolation of Reactor Building HVAC.
3. SBGT Trains are in operation.
4. Jumpers to bypass RPV low level and drywell high pressure interlocks have been installed.
5. Reactor Building Exhaust temperature has not exceeded 135°F.
6. The leak has been isolated and EOP-03-SCCP directs restoring RB HVAC.
7. Instrument air pressure to the latch actuators for the reactor building ventilation isolation valves was never lost.

INITIATING CUE:

The Unit CRS directs you to restart Reactor Building HVAC IAW SEP-04, starting at step 2.1.3.4, and inform him when your actions are complete.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Resetting RCIC Mechanical Overspeed

LESSON NUMBER: AOT-OJT-JP-016-A01

REVISION NO: 3

Lou Sosler 9/24/2015
PREPARER / DATE

Matt Wooldridge 9/24/2015
TECHNICAL REVIEWER / DATE

John Biggs 9/24/2105
VALIDATOR / DATE

Jerry Pierce 9/25/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

217601B404, Reset RCIC Mechanical Overspeed Trip Per 1(2)OP-16

K/A REFERENCE AND IMPORTANCE RATING:

295031 Reactor Low Water Level
EA1 Ability to operate and/or monitor the following as they apply to REACTOR LOW WATER LEVEL : (CFR: 41.7 / 45.6)
05 Reactor core isolation system 4.3/ 4.3

REFERENCES:

1(2)OP-16

TOOLS AND EQUIPMENT:

None

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

2 – Reactor Water 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. Operating equipment hazards.
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 may be performed on Unit 1 or Unit 2 as selected by the evaluator.
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. This task will be performed on Unit ____.
2. The RCIC turbine has tripped due to the mechanical overspeed trip device.
3. RCIC speed has been verified to have stopped.
4. RCIC Turbine Trip and Throttle valve motor actuator is in the closed position.

INITIATING CUE:

You are directed by the Control Operator to locally reset the RCIC mechanical overspeed trip device in accordance with 1(2)OP-16, Section 8.3, Mechanical Overspeed Reset, and inform the control room when the required 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 _____

NOTE: IF the RCIC turbine trips on an overspeed condition, THEN TURBINE TRIP & THROTTLE VLV, E51-V8, should NOT be reset until turbine speed is less than 4000 rpm

Step 2 – **ENSURE** *TURBINE TRIP & THROTTLE VLV* motor actuator, is closed.

Verifies the TURBINE TRIP & THROTTLE VLV motor actuator, is closed.

SAT/UNSAT

Step 3 – **PUSH OR PULL**, depending on body position, the emergency connection rod against spring pressure in the direction of *TURBINE TRIP & THROTTLE VLV, E51-V8*, (approximately inch).

Moves the emergency connection rod in the direction of the TURBINE TRIP & THROTTLE VLV, E51-V8 and holds it in that position. The tappet and ball assembly have NOT dropped in place.

****CRITICAL STEP** SAT/UNSAT**

PROMPT: Inform examinee that the tappet assembly has NOT dropped into place.

Step 4 – **OBSERVE** the tappet assembly, which resembles a plunger, drop into place.

Determines that the tappet and ball assembly has NOT dropped in place.

SAT/UNSAT

PROMPT: After depressing the tappet assembly, Inform examinee that the tappet assembly HAS dropped into place.

Step 5 – **IF** the tappet assembly does **NOT** drop in place, **THEN LIGHTLY** depress the assembly.

Verifies the tappet and ball assembly has dropped in place.

****CRITICAL STEP** SAT/UNSAT**

Step 6 – **RELEASE** the emergency connection rod **AND ENSURE** the head lever is resting against the flat on the tappet nut. (approximately 1/16 inch of engagement will be provided).

Releases the emergency connection rod and verifies the tappet assembly remains reset.

****CRITICAL STEP** SAT/UNSAT**

Step 7 – **NOTIFIES** the Control Room that the RCIC Mechanical Overspeed device is reset.

Acknowledge the communication as the Control Operator.

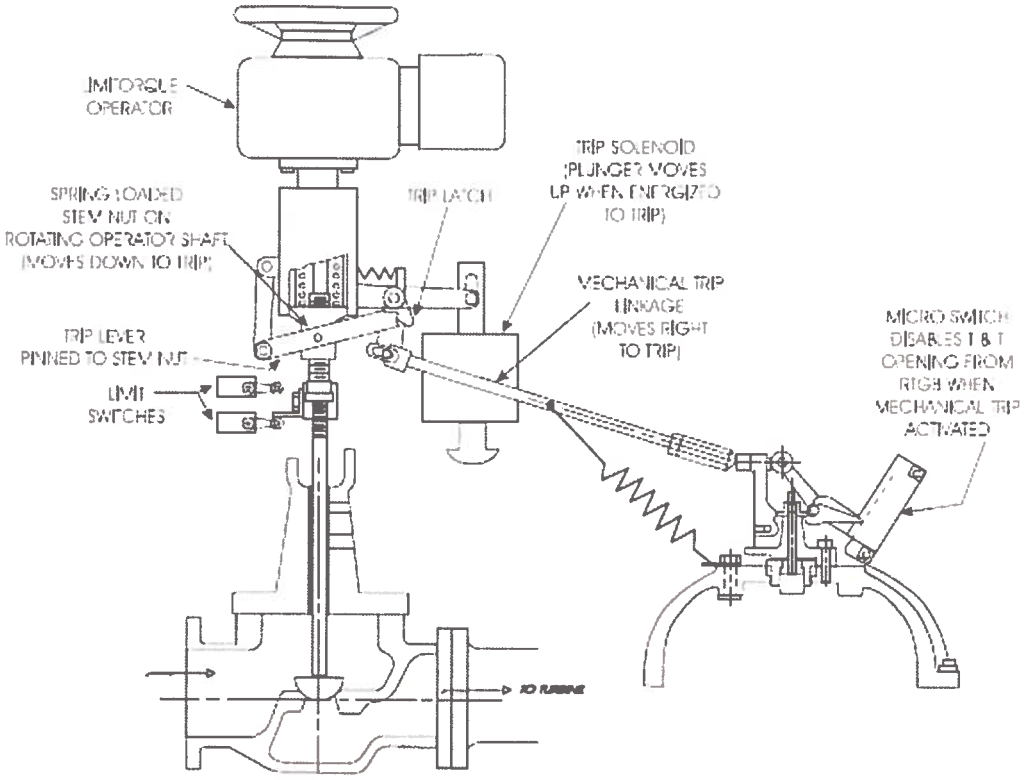
SAT/UNSAT

TERMINATING CUE: When the RCIC Mechanical Overspeed device head lever is resting against the flat on the tappet nut. this JPM is complete.

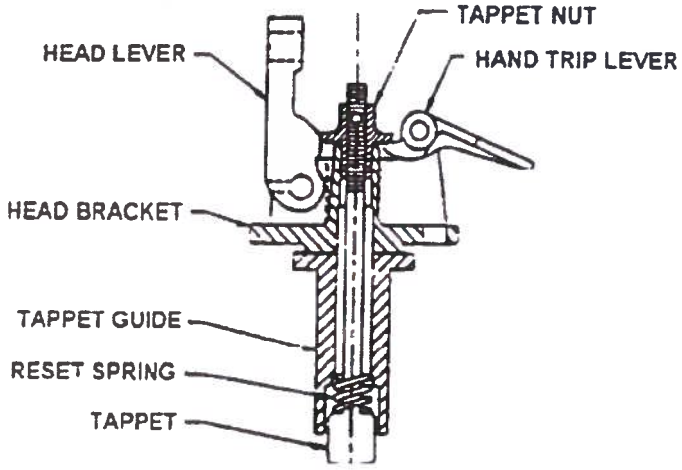
TIME COMPLETED _____

COLLECT AND CONTROL ALL JPM EXAM MATERIALS FOR EXAM SECURITY.

RCIC Turbine Trip and Throttle Valve



RCIC Overspeed Trip Device



Step	Critical / Not Critical	Reason
1	Not Critical	Administrative
2	Not Critical	Part of given conditions.
3	Critical	Required to complete task.
4	Not Critical	No action required.
5	Critical	Conditional step required to complete task.
6	Critical	Required to complete task.
7	Not Critical	Communicate results.

REVISION SUMMARY

3	Updated to new JPM template. Added Duke logo. Added statement to reinforce plant equipment will not be operated.

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. This task will be performed on Unit ____.
2. The RCIC turbine has tripped due to the mechanical overspeed trip device.
3. RCIC speed has been verified to be less than 4000 rpm.
4. RCIC Turbine Trip and Throttle valve motor actuator is in the closed position.
5. All applicable prerequisites have been satisfied.

INITIATING CUE:

You are directed by the Control Operator to locally reset the RCIC mechanical overspeed trip device in accordance with 1(2)OP-16 and inform the control room when the required actions are complete.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Unloaded Maintenance Start of the Supp DG

LESSON NUMBER: AOT-OJT-JP-039.1-01

REVISION NO: 0

Bob Bolin 9/24/2015
PREPARER / DATE

Matt Wooldridge 9/24/2015
TECHNICAL REVIEWER / DATE

John Biggs 9/24/2015
VALIDATOR / DATE

Jerry Pierce 9/25/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

(Specify, as applicable)

K/A REFERENCE AND IMPORTANCE RATING:

264000 A3.03 3.4 / 3.4
Ability to monitor automatic operations of the EMERGENCY GENERATORS (DIESEL/JET) including indicating lights, meters, and recorders.

REFERENCES:

0OP-39.1, Supplemental Diesel Generator Operating Procedure

TOOLS AND EQUIPMENT:

PPE

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

6 Electrical

SETUP INSTRUCTIONS

With the simulator shutdown, select Sim Load and check the "Use SDG Panel".
Startup the simulator and reset to IC 13.
Place the simulator in run.

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. 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 may be performed on Unit 1 or Unit 2 as selected by the evaluator.
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. This task will be performed on Unit Two.
2. 0OP-39.1 Section 6.1.2 has been completed through step 6.1.2.6.

INITIATING CUE:

You are directed by the Unit CRS to perform the field actions of 0OP-39.1, Section 6.1.2 starting at step 6.1.2.7 and inform the CRS when the Supp DG is at rated speed and voltage.

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 following steps are performed using the HMI (GEN OVERVIEW screen).

NOTE: The HMI will prompt for confirmation prior to performing certain actions

Step 2 – **Depress** Maint Start button

Main Start pushbutton is selected from the GEN OVERVIEW screen at the engine control panel HMI

****CRITICAL STEP** SAT / UNSAT**

Step 3 – At the prompt, **depress** Yes to acknowledge the diesel start at idle and all operations are manually initiated and **select** to confirm intention of Maintenance Start of Supp DG.

On the Prompt screen "YES" is selected to acknowledge the diesel start at idle and all operations are manually initiated.

****CRITICAL STEP** SAT / UNSAT**

Step 3a – At the prompt, **depress** Yes to confirm intention of Maintenance Start of Supp DG.

On the Prompt screen "YES" is selected to confirm the Maintenance Start of Supp DG.

****CRITICAL STEP** SAT / UNSAT**

PROMPT: If asked, inform the examinee that they hear engine noise from the DG starting.

Step 4 – **Check** Supp DG starts and ramps to idle speed of approximately 350 rpm

Checks to hear engine noise and HMI reads 350 RPM and steady

SAT / UNSAT

NOTE: The following step can be performed using the HMI (MCC hot button) with the exception of the louvers which will require a prompt.

PROMPT: If asked, inform the examinee that the following equipment is in the proper position.

Step 5 – **Confirm** the following:

The AC Lube Oil Soakback Pump is OFF		
The Lube Oil Circulating Oil Pump is OFF		
Radiator Fans Start:	#1	
	#2	
Enclosure Vent Fans Start:	#1	
	#2	
	#3	
	#4	
Diesel enclosure Intake louvers OPEN		
Diesel enclosure Exhaust louvers OPEN		

The operator can check the HMI to ensure the proper components are operating with the exception of the louvers.
The AC Lube Oil Soakback Pump is OFF.
The Lube Oil Circulating Oil Pump is OFF.
Both Radiator Fans are running.
All four enclosure vent fans are running.
The enclosure Intake and Exhaust louvers are open.

SAT / UNSAT

NOTE: The following steps are performed using the HMI (GEN OVERVIEW screen).

Step 6 – **Confirm** the following on the HMI:

Lube Oil Pump Pressure >30 psig	
Eng Fuel Pump Pressure >12psig	

Checks the HMI to ensure the proper pressures for required components. Inform the student they read as is.

SAT / UNSAT

NOTE: Engine will idle 4 minutes for warmup. After 4 minute warmup, engine will remain at idle until operator selects rated speed. If rated speed is selected during this 4 minute warmup, unit will accelerate to rated speed. Once rated speed is attained, the engine can be returned to idle speed by selection of Idle at the HMI.

NOTE: Maintenance activities may or may NOT require rated speed or voltage regulator operation. The steps NOT needed for the maintenance activity may be NA

PROMPT: If asked , It is required to obtain rated speed and voltage during this start of the Supp DG.

Step 7 - **WHEN** Idle Time Remaining indication reaches zero, **THEN depress** Rated Speed.

Waits until timer reaches 0 (zero) and then depresses the Rated Speed button on the HMI

SAT / UNSAT

Step 8 - At the prompt, **depress** Yes to acknowledge release to rated speed and **Check** the engine ramps to approximately 900 rpm.

Depresses "YES" to acknowledge release of engine to rated speed; hears and checks on HMI the engine ramp and steady out at 900 RPM

****CRITICAL STEP**** **SAT / UNSAT**

NOTE: The following step are performed using the HMI (GEN BUS screen).

PROMPT: If asked, inform the examinee to use VR1.

Step 9 - **Select** Turn On Regulator.

Selects pushbutton for turning on the Voltage Regulator.

SAT / UNSAT

Step 9a - **Depress** Yes to acknowledge voltage regulator operation.

Selects the "YES" acknowledgement pushbutton.

****CRITICAL STEP** SAT / UNSAT**

Step 10 – **Check** voltage of approximately 4160VAC on all three phases at the HMI screen.

Observes voltage of the Supp DG on the HMI screen to be ~4160VAC

SAT / UNSAT

PROMPT: If asked, inform the examinee not desired to close Aux Breaker.

Step 11 – **Inform** the CRS that the Supp DG is operating at rated speed and Voltage.

Contacts the CRS and informs him/her that the Supp DG is at rated speed and voltage.

SAT / UNSAT

TERMINATING CUE: When the Supp DG is at rated speed and voltage, 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	Procedural Compliance
3	Critical	Required to complete task
4	Not Critical	Check for normal equipment response
5	Not Critical	Confirm Step
6	Not Critical	Confirm Step
7	Not Critical	Procedural Compliance
8	Critical	Required to complete task
9	Critical	Required to complete task
10	Not Critical	Confirm Step
11	Not Critical	Communication step

REVISION SUMMARY

0	New JPM from recent plant mods. Incorporated into new JPM template.

Validation Time: 20 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	____	Actual	X	Unit:	0
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. This task will be performed on Unit Two.
2. 0OP-39.1 Section 6.1.2 has been completed through step 6.1.2.6.

INITIATING CUE:

You are directed by the Unit CRS to perform the field actions of 0OP-39.1, Section 6.1.2 starting at step 6.1.2.7 and inform the CRS when the Supp DG is at rated speed and voltage.

DUKE ENERGY
BRUNSWICK TRAINING SECTION
JOB PERFORMANCE MEASURE

LESSON TITLE: Local Deluge System Manual Operation for SBGT Train

LESSON NUMBER: AOT-OJT-JP-010-A01

REVISION NO: 4

Lou Sosler 9/24/2015
PREPARER / DATE

Matt Wooldridge 9/24/2015
TECHNICAL REVIEWER / DATE

John Biggs 9/24/2015
VALIDATOR / DATE

Jerry Pierce 9/25/2015
LINE SUPERVISOR / DATE

Jim Barry 9/25/2015
TRAINING SUPERVISION APPROVAL / DATE

RELATED TASKS:

261503B104 - Operate Deluge System (Locally) for the SBGT per 1(2)OP-10.

K/A REFERENCE AND IMPORTANCE RATING:

286000 A2.08 3.2 / 3.3
Ability to predict the impacts of the Failure of Fire Protection System to Actuate When Required on the FIRE PROTECTION SYSTEM and based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations.

REFERENCES:

1(2) OP-10, Standby Gas Treatment System Operating Procedure

TOOLS AND EQUIPMENT:

Plant page (or) Radio

SAFETY FUNCTION (from NUREG 1123, Rev. 2, Supp. 1):

8 - Plant Service Systems

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. 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 may be performed on Unit 1 or Unit 2 as selected by the evaluator.
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. This task will be performed on Unit ____.
2. A fire has occurred in the A train of the SBGT System during an extended run.
3. The SBGT train temperature is greater than 210°F.
4. The control room has started the B SBGT train.

INITIATING CUE:

You are directed by the CRS to manually initiate the deluge system for the Unit ____ A SBGT train IAW 1(2)OP-10 and inform the control room when the deluge system has been manually initiated and the A SBGT train can be stopped.

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 solenoid operated pilot valve bleeder valve is a small brass lever on the hexagonal connector on the valve neck just below the solenoid. On Train A, they are located on the back side of the hexagonal connectors.
NOTE:	Unit Two valves are in parenthesis.

Step 2 - **Open** the deluge valve solenoid-operated pilot valve bleeder valve FP-DVA-1A1 (FP-DVA-2A1), DELUGE VALVE, by rotating the small lever on solenoid-operated pilot valve neck 90°.

Bleeder valve rotated 90° CLOCKWISE.

****CRITICAL STEP**** **SAT / UNSAT**

Step 3 - **Unlock** and **Open** deluge valve, FP-DVA-1A1-B (FP-DVA-2A1-B), SBGT A-1 Deluge Valve Main Isolation Valve.

Main Isolation Valve is open.

****CRITICAL STEP**** **SAT / UNSAT**

PROMPT:	If steps to OPEN the solenoid-operated pilot valve bleeder valve and manual isolation valves are performed correctly, inform the examinee that water is flowing after each valve group is opened.

Step 4 - **Unlock** and **Open** deluge valve WW-V237, SBGT A-1 Deluge Valve Outlet Valve.

Outlet Valve is open.

****CRITICAL STEP** SAT / UNSAT**

Step 5 - **Open** the deluge valve solenoid-operated pilot valve bleeder valve FP-DVA-1A2 (FP-DVA-2A2), DELUGE VALVE, by rotating the small lever on solenoid-operated pilot valve neck 90°.

Bleeder valve rotated 90° CLOCKWISE.

****CRITICAL STEP** SAT / UNSAT**

Step 6 - **Unlock** and **Open** deluge valve, FP-DVA-1A2-B (FP-DVA-2A2-B), SBGT A-2 Deluge Valve Main Isolation Valve.

MAIN ISOLATION VALVE is open.

****CRITICAL STEP** SAT / UNSAT**

PROMPT:	If steps to OPEN the solenoid-operated pilot valve bleeder valve and manual isolation valves are performed correctly, inform the examinee that water is flowing after each valve group is opened.

Step 7 - **Unlock** and **Open** deluge valve WW-V235, SBGT A-2 Deluge Valve Outlet Valve.

OUTLET ISOLATION VALVE is open.

****CRITICAL STEP** SAT / UNSAT**

Step 8 - Contact the Control Room and report that manual deluge has been initiated on the A Train of SBGT and the SBGT train can be stopped.

Control Room contacted.

SAT / UNSAT

TERMINATING CUE: When a flowpath has been established via a deluge valve and 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	Critical	Required to complete task.
3	Critical	Required to complete task
4	Critical	Required to complete task
5	Critical	Required to complete task
6	Critical	Required to complete task
7	Critical	Required to complete task
8	Non Critical	Communication of task completion.

REVISION SUMMARY

4	Updated to new template. Added Duke logo. Updated safety considerations, prior to JPM performance. Added Core 4 to Work Practices section. Included electrical safety in work practices. Added statement to reinforce plant equipment will not be operated.

Validation Time: 15 Minutes (approximate).

Time Taken: ____ Minutes

APPLICABLE METHOD OF TESTING

Performance:	Simulate	X	Actual		Unit:		
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. This task will be performed on Unit _____.
2. A fire has occurred in the A train of the SBGT System.
3. The SBGT train temperature is greater than 210°F and a fire is indicated in the train.
4. The control room has started the B SBGT train.

INITIATING CUE:

You are directed by the CRS to manually initiate the deluge system for the Unit ____ A SBGT train IAW 1(2)OP-10 and inform the control room when the deluge system has been manually initiated and the A SBGT train can be stopped.

U.S. Nuclear Regulatory Commission

Site-Specific RO Written Examination

Applicant Information	
Name:	
Date: 12/15/15	Facility/Unit: Brunswick / Unit 1 & 2
Region: I ☐ II ☑ III ☐ IV ☐	Reactor Type: W ☐ CE ☐ BW ☐ GE ☑
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80.00 percent. Examination papers will be collected 6 hours after the examination begins.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results	
Examination Value	75 Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

Brunswick 2015 NRC RO Answer Key

#	ID	Answers 0
1	201001 1	C
2	201002 1	~~D~~ C | BJC 1-7-16
3	201003 1	B
4	203000 1	A
5	204000 1	B
6	205000 1	D
7	205000 2	C
8	206000 1	C
9	209001 1	D
10	211000 1	C
11	212000 1	D
12	215002 1	A
13	215003 1	A
14	215004 1	A
15	215005 1	C
16	217000 1	B
17	218000 1	A
18	218000 2	B
19	219000 1	B
20	223002 1	C
21	223002 2	A
22	233000 1	D
23	239002 1	A
24	241000 1	A
25	256000 1	D
26	259002 1	A
27	261000 1	B
28	262001 1	B
29	262002 1	A
30	262002 2	B
31	263000 1	A
32	264000 1	B
33	264000 2	D
34	271000 1	C
35	290002 1	D
36	290003 1	D
37	295001 1	C
38	295003 1	B
39	295004 1	A
40	295005 1	C
41	295006 1	B
42	295007 1	A
43	295008 1	D
44	295010 1	A
45	295014 1	D
46	295016 1	B
47	295017 1	C
48	295018 1	B
49	295019 1	C

		Answers
#	ID	0
50	295020 1	D
51	295021 1	B
52	295023 1	D
53	295024 1	C
54	295025 2	B
55	295026 1	B
56	295028 1	C
57	295030 1	C
58	295031 1	C
59	295037 1	C
60	295038 1	C
61	300000 1	C
62	400000 1	B
63	500000 1	A
64	600000 1	C
65	700000 1	B
66	CONDUCT OF OPERATION 1	A
67	CONDUCT OF OPERATION 2	C
68	EMERGENCY PROCEDURE 1	A
69	EMERGENCY PROCEDURE 2	C
70	EQUIPMENT CONTROL 1	D
71	EQUIPMENT CONTROL 2	D
72	EQUIPMENT CONTROL 3	C
73	RADIATION CONTROL 1	A
74	RADIATION CONTROL 2	B
~~75~~	~~RADIATION CONTROL 4~~	~~D~~ Deleted | BJC 1-7-16

1. Which one of the following completes the statement below?

   With Unit One operating at rated power, on a loss of air to 1-C11-F002A(B), CRD Flow Control Valve, the valve will fail __(1)__, causing __(2)__ cooling water to the CRD Mechanism.

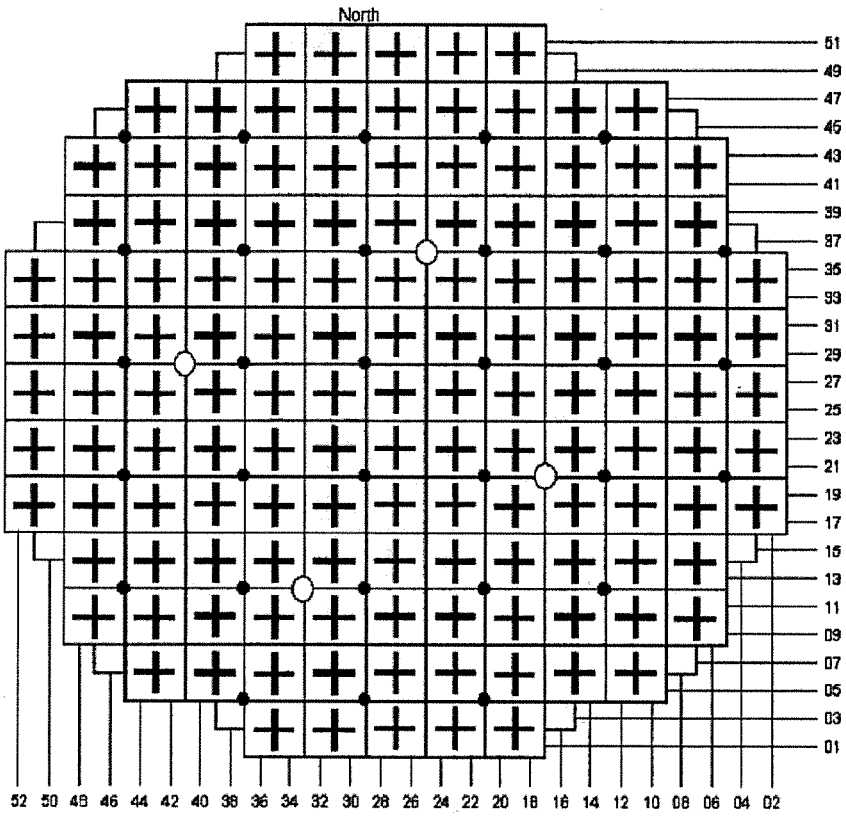
   A. (1) open
      (2) minimum

   B. (1) open
      (2) maximum

   C. (1) closed
      (2) minimum

   D. (1) closed
      (2) maximum

2. During a startup on Unit Two, control rod 30-39 is desired to be moved continuously from 12 to 48.



Which one of the following completes both statements below?

The minimum number of RMCS control switches needed to accomplish this control rod movement is __(1)__.

During this control rod movement the largest power change will be seen on SRM __(2)__.

A. (1) one
   (2) B

B. (1) one
   (2) C

C. (1) two
   (2) B

D. (1) two
   (2) C

3. During a reactor startup on Unit Two, a control rod at position 24 is difficult to move.

Which one of the following completes both statements below?

IAW 2OP-07, Reactor Manual Control System Operating Procedure, Drive Header DP is required to be adjusted by throttling __(2)__ C12-PCV-F003, Drive Pressure Valve.

If the control rod cannot be moved from postion 24, LCO 3.1.1, Shutdown Margin (SDM) __(1)__ met.

A. (1) open
   (2) is

B. (1) closed
   (2) is

C. (1) open
   (2) is NOT

D. (1) closed
   (2) is NOT

4. RHR has auto initiated and is no longer needed for Reactor water level control.

   Which one of the following identifies the required sequence for resetting a Core Spray initiation signal IAW 1OP-17, Residual Heat Removal System Operating Procedure, Section 7.1, Shutdown-Auto or Manual LPCI Mode?

   A. Reset both Divisions of Core Spray logic, then reset both Divisions of LPCI logic within 10 seconds.

   B. Reset both Divisions of LPCI logic, then reset both Divisions of Core Spray logic within 10 seconds.

   C. Reset Division I Core Spray Logic then Division I LPCI Logic within 10 seconds, and then reset Division II Core Spray Logic then Division II LPCI Logic within 10 seconds.

   D. Reset Division I LPCI Logic then Division I Core Spray Logic within 10 seconds, and then reset Division II LPCI Logic then Division II Core Spray Logic within 10 seconds.

5. Following a reactor scram on Unit One, a reject flow path to the condenser has been established to control reactor water level.

   Subsequently, the following conditions exist:

Reactor water level	198 inches
RWCU Diff flow	35 gpm
RWCU System discharge pressure	130 psig
RWCU room temperature	125°F
RWCU Pump flow	80 gpm
RWCU Filter Inlet Temperature	139°F

   Based on these conditions, which one of the following completes both statements below?

   The RWCU Pump(s) will __(1)__.

   The 1-G31-F001, RWCU Inlet Inboard Isolation Valve, will __(2)__.

A. (1) trip
   (2) close

B. (1) trip
   (2) remain open

C. (1) continue to run
   (2) close

D. (1) continue to run
   (2) remain open

6. Unit Two is in MODE 4. Both loops of RHR are in Shutdown Cooling mode when an inadvertent Group 8 isolation signal is received.

   IAW 0AOP-15.0, Loss of Shutdown Cooling, which one of the following completes both statements below?

   The minimum required reactor water level, unless otherwise directed by the CRS, is __(1)__.

   Recirc loop suction temperatures __(2)__ be used for vessel coolant temperature monitoring for indications of boiling.

   A. (1) 192 inches
      (2) can

   B. (1) 192 inches
      (2) can NOT

   C. (1) 200 inches
      (2) can

   D. (1) 200 inches
      (2) can NOT

7. Unit Two is in MODE 3 with RHR Loop A in Shutdown Cooling IAW 2OP-17, Section 5.7, Placing First RHR Loop in Shutdown Cooling Mode. RHR Pump 2A is running and RHR Pump 2C is in standby. A small leak results in the following conditions:

RPV water level	176 inches
RPV pressure	40 psig
Drywell pressure	1.9 psig

Which one of the following predicts how RHR Loop A will respond?

A. Group 8 isolation; RHR Pump 2A trips.

B. RHR Pump 2C auto starts; RHR Loop A cooldown rate rises.

C. RHR Pump 2C auto starts; RHR Loop A decay heat removal is lost.

D. RHR Pump 2A remains running; RHR Pump 2C remains off.

8. Unit Two HPCI is operating in pressure control mode. Reactor pressure band is 800-1000 psig. Current plant conditions are as follows:

Reactor pressure	990 psig, rising
HPCI flow controller	Auto
HPCI flow	3500 gpm
HPCI turbine speed	3700 RPM
HPCI controller output	80%

Which one of the following identifies two methods available to maintain Reactor pressure in band?

Throttle HPCI Bypass to the CST, E41-F008, in the __(1)__ direction, or __(2)__ the HPCI flow controller auto setpoint.

A. (1) open
   (2) raise

B. (1) open
   (2) lower

C. (1) closed
   (2) raise

D. (1) closed
   (2) lower

9. With Unit One in Mode 3, a steam line rupture occurs in the Drywell. Plant conditions are:

Drywell pressure	18 psig
Reactor water level	60 inches
Reactor pressure	350 psig

Which one of the following completes both statements below?

The Core Spray System injection valves are __(1)__.

The shutoff head of the Core Spray pumps is approximately __(2)__ psig.

A. (1) closed
(2) 200

B. (1) closed
(2) 300

C. (1) open
(2) 200

D. (1) open
(2) 300

10. An ATWS has occurred on Unit Two. Terminate and prevent actions have been completed.

Which one of the following completes both statements below IAW 0OI-37.5, ATWS Procedure Basis Document?

With SLC Tank level at 30%, __(1)__ Shutdown Boron Weight has been injected into the Reactor.

At this time, raising reactor water level __(2)__ required to ensure the reactor will remain shut down.

A. (1) Cold
   (2) is

B. (1) Cold
   (2) is NOT

C. (1) Hot
   (2) is

D. (1) Hot
   (2) is NOT

11. A Unit Two APRM ODA shows the following indications:

Which one of the following completes both statements below?

The cause of the indications for APRM 2 is a __(1)__.

As a result of this condition, Voter input status lights will show an APRM UPSC/INOP trip on __(2)__.

A. (1) Recirculation pump trip
   (2) Voter 2 **ONLY**

B. (1) Recirculation pump trip
   (2) all 4 Voters

C. (1) Recirculation flow unit failed downscale
   (2) Voter 2 **ONLY**

D. (1) Recirculation flow unit failed downscale
   (2) all 4 Voters

12. Which one of the following is the power supply to APRM Channel 4 NUMAC on P608?

A. 120 VAC RPS

B. 120 VAC UPS

C. 24/48 VDC Div I

D. 24/48 VDC Div II

13. Which one of the following distribution systems identifies the power supply to the Intermediate Range Monitor (IRM) channels?

A. 24/48 VDC

B. 125/250 VDC

C. 120 VAC UPS

D. 120 VAC RPS

Note: This question is asking about the IRM circuitry. It is NOT referring to drive mechanism or recorders

B/C
12-15-15

14. A plant startup is in progress. A control rod block has occurred. The following nuclear instrument indications are noted:

SRM	Counts	Position	IRM	Counts	Range
A	$3x10^5$	Full In	A	25/125	3
B	$5x10^4$	Partially Withdrawn	B	65/125	2
C	$6x10^4$	Full In	C	35/125	3
D	$5x10^4$	Partially Withdrawn	D	15/125	3
			E	50/125	2
			F	55/125	2
			G	30/125	3
			H	25/125	3

Which one of the following is the minimum required action(s) that will clear the control rod block?

A. Withdrawing SRM A ONLY.

B. Withdrawing SRM A and C.

C. Ranging IRM E to range 3.

D. Inserting SRM B and D.

15. A reactor startup is being performed on Unit Two. Reactor power is currently 18%. APRM Channels 1 and 2 have the following number of operable LPRM inputs:

Level	A	B	C	D
APRM 1	5	3	4	4
APRM 2	6	4	2	5

Which one of the following identifies the effect on the Reactor Manual Control System (RMCS), if any?

A. Rod Block. APRM 1 **ONLY** is INOPERABLE.

B. Rod Block. APRM 2 **ONLY** is INOPERABLE.

C. Rod Block. **BOTH** APRM 1 **AND** 2 are INOPERABLE.

D. No Rod Block. **BOTH** APRM 1 **AND** 2 are OPERABLE.

16. Which one of the following identifies two RCIC functions that remain available following a loss of 125 VDC Panel 4A on Unit Two?

A. automatic initiation and inboard isolation logic

B. automatic initiation and outboard isolation logic

C. automatic shutdown on high RPV water level and inboard isolation logic

D. automatic shutdown on high RPV water level and outboard Isolation logic

17. An automatic ADS actuation has occurred.

Which one of the following completes both statements concerning A-03 (1-10) *Safety / Relief Valve Open?*

This alarm is activated by __(1)__ .

After the reactor is automatically depressurized, the amber light for all the affected SRVs __(2)__ be illuminated on the apron section of RTGB Panel P601.

A. (1) a SRV sonic detector
   (2) will

B. (1) a SRV sonic detector
   (2) will NOT

C. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will

D. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will NOT

18. Which one of the following completes both statements below concerning the 125 VDC power supply to the Unit One ADS logic?

The normal power supply is from Distribution Panel __(1)__,

The backup power supply is from Distribution Panel __(2)__.

A. (1) 3A
   (2) 3B

B. (1) 3B
   (2) 3A

C. (1) 3A
   (2) 4A

D. (1) 3B
   (2) 4B

19. Unit Two is operating at rated power.

In preparation for a HPCI surveillance, RHR Loop 2B has been placed in Torus Cooling IAW 2OP-17, Section 5.9, Suppression Pool Cooling Mode, with all pumps running and cooling maximized.

A subsequent transient occurs with the following plant conditions:

Drywell Pressure	18.1 psig
Torus Pressure	13.7 psig
Reactor Pressure	20 psig
Reactor water level	100 inches

Which one of the following completes both statements below?

Procedurally, total RHR Loop B Torus Cooling flow is limited to __(1)__ .

Immediately after the transient, Torus Cooling __(2)__ remain in service.

A. (1) 11,500 gpm
(2) will

B. (1) 11,500 gpm
(2) will NOT

C. (1) 17,000 gpm
(2) will

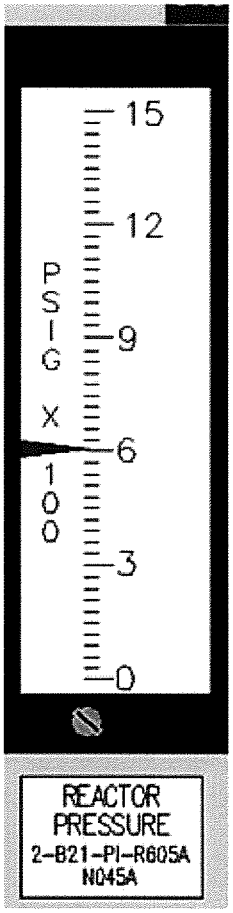
D. (1) 17,000 gpm
(2) will NOT

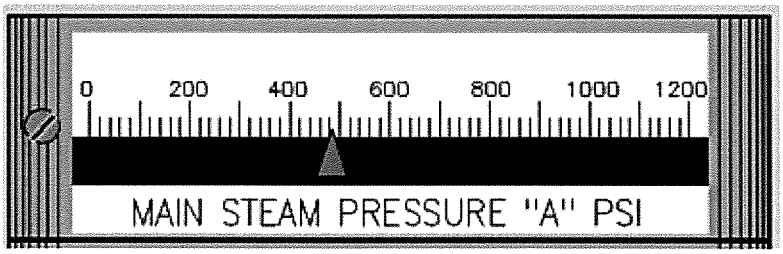
20. Unit Two Mode Switch is in Startup with reactor pressure at 600 psig.

Which one of the following completes both statements below?

High steam flow sensed in a minimum of __(1)__ steam lines will cause **ALL** the Group 1 Isolation valves to close.

If a Group 1 isolation occurs, the MSIVs __(2)__ be opened for a rapid recovery of the Main Condenser, IAW 2OP-25, Reopening the MSIVs Following a Scram, given the following indications:





A. (1) 2
(2) may

B. (1) 2
(2) may NOT

C. (1) 4
(2) may

D. (1) 4
(2) may NOT

21. Reactor Recirc pumps have auto tripped due to low Reactor water level.

At time = 0, the following indications are available:
G31-F001, RWCU Inboard Isol Vlv, is Closed
G31-F004, RWCU Outboard Isol Vlv, is Open

Which one of the following identifies what the GROUP 3 ISOL CMND status box on ERFIS will display at time = five minutes?

A. A green GROUP ISOL

B. A red NO GROUP ISOL

C. A yellow GROUP ISOL CMND

D. A green NO GROUP ISOL CMND

22. 2OP-17, Section 8.11, Fuel Pool Cooling Assist Mode with Fuel Pool Gates Removed, is being performed on Unit Two.

Which one of the following identifies the power supplies required for the RHR pumps that are utilized in this procedure section?

A. E1 and E2

B. E3 and E4

C. E1 and E3

D. E2 and E4

23. Which one of the following completes both statements below?

The SRVs discharge at approximately __(1)__ in the torus.

The __(2)__ provides even heat distribution in the suppression pool.

A. (1) -8 feet
   (2) T-Quencher

B. (1) -8 feet
   (2) Ring Vent Header Deflector

C. (1) -6.5 feet
   (2) T-Quencher

D. (1) -6.5 feet
   (2) Ring Vent Header Deflector

24. Unit Two is operating at 20% power during a plant startup.
2 Bypass Valves are open with the Main Turbine being rolled (currently at 500 RPM).

A complete loss of Uninterruptible Power Supply occurs.

Which one of the following identifies the plant response?

A. Reactor scram on high reactor pressure signal.

B. Reactor scram on turbine valve closure signal.

C. No reactor scram. Turbine valves close.

D. No reactor scram. Turbine roll continues with EHC transferred to the PMG power supply.

25. Unit Two is operating at 45% power when UA-04 (1-9) *FW Heater Level High Extr Trip* alarms for the 5A Feedwater Heater.

Which one of the following completes both statements below?

2-EX-V23, Non-Return Valve to Feedwater Heater 5A, will __(1)__.

2-HD-LV-83-2, FW Heater 5A Emergency Drain Valve, will route water to the __(2)__.

A. (1) open
   (2) condenser

B. (1) open
   (2) deaerator

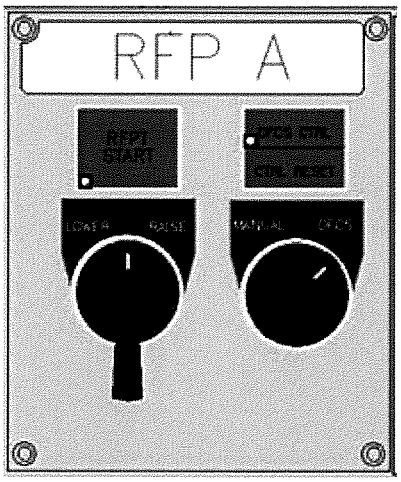
C. (1) close
   (2) condenser

D. (1) close
   (2) deaerator

26. Unit Two is operating at 40% power. Reactor Feed Pump (RFP) 2A is operating in automatic DFCS control when the following alarm is received:

UA-13 (6-5) *RFP A Control Trouble*

The RO observes the following indications for RFPT 2A on XU-1:



(all light indications are extinguished)

Which one of the following identifies how RFP 2A will respond and what actions are required to control RFP 2A under this condition?

RFP 2A will __(1)__.

The RO can manually control RFP 2A, IAW 0AOP-23, Condensate/Feedwater System Failure, by using the LOWER/RAISE __(2)__.

A. (1) remain at the current speed
   (2) Speed Control Switch on XU-1.

B. (1) remain at the current speed
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

C. (1) automatically lower to 1000 RPM
   (2) Speed Control Switch on XU-1.

D. (1) automatically lower to 1000 RPM
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

27. Unit Two is operating at rated power when a Group 1 Isolation occurs. The following plant conditions currently exist:

Reactor pressure	850 psig
Reactor water level	110 inches, HPCI/RCIC auto injecting
Drywell pressure	1 psig
Torus pressure	1.1 psig

Which one of the following predicts how the plant is affected if both SBGTs subsequently trip?

A. HPCI/RICI unavailable for injection.

B. High airborne activity on the -17' elevation.

C. Torus-to Drywell Vacuum breaker operation will occur.

D. Rx Bldg-to-Torus Vacuum breaker operation will occur.

28. Unit Two is shutdown with all switchyard PCBs closed except for generator PCBs 29A and 29B, which are open. A fault occurs on Line 31 (Whiteville) with a failure of PCB 31B to open.

Which one of the following is the expected status of 230 KV Bus 2B and the SAT?

A. 230 KV Bus 2B is energized; SAT is energized.

B. 230 KV Bus 2B is de-energized; SAT is energized.

C. 230 KV Bus 2B is energized; SAT is de-energized.

D. 230 KV Bus 2B is de-energized; SAT is de-energized.

29. During a Station Blackout with DG3 ONLY available, 4KV Emergency Buses cannot be cross-tied. On Unit One, DC voltage is 210 VDC and slowly lowering due to loss of battery chargers.

Which one of the following completes both statements below?

The Unit One Primary UPS inverter DC input breaker, CB 101, __(1)__ tripped.

IAW 1EOP-01-SBO, Station Blackout, MCC-1CA can be energized using __(2)__.

A. (1) is
(2) SAMA DG2

B. (1) is
(2) Cross-Tie E7 to E5

C. (1) is NOT
(2) SAMA DG2

D. (1) is NOT
(2) Cross-Tie E7 to E5

30. The indications and status of the Unit Two UPS system at the primary and standby inverters are as follows:

	Primary Inverter	Standby Inverter
Load on UPS light	Off	Off
Load on Inverter light	Off	On
Load on Alternate light	On	Off
Alt Source Failure light	Off	Off
Manual Bypass switch	Norm	Bypass Test

Which one of the following identifies the current status of UPS system loads?

A. Energized from MCC 2CA

B. Energized from MCC 2CB

C. Energized from 2E7

D. Energized from 2E8

31. Which one of the following completes both statements below regarding 125/250 VDC Station Distribution?

During a float charge, the charger output voltage to the battery will be at a __(1)__ voltage than when in the equalize mode.

Each division of the 125/250 VDC Station batteries are capable of supplying 150 amps for __(2)__ hours.

A. (1) lower
(2) 8

B. (1) lower
(2) 10

C. (1) higher
(2) 8

D. (1) higher
(2) 10

32. A dual unit Loss of Offsite Power has occurred and DG4 has tripped on differential overcurrent.

Which one of the following loads will lose power as the result of the trip of DG4?

A. RHR Pump 2D

B. RWCU Pump 2B

C. Fuel Pool Cooling Pump 2A

D. Conventional Service Water Pump 2C

33. DG1 was running in Control Room Manual for the performance of 0PT-12.2A, No. 1 Diesel Generator Monthly Load Test, and loaded to 2100 KW.

Subsequently off-site power was lost.

Which one of the following completes the statements below after the system has stabilized?

The DG1 governor is currently in __(1)__ mode of operation.

DG1 frequency is slightly __(2)__ 60 Hz.

A. (1) droop
   (2) less than

B. (1) droop
   (2) greater than

C. (1) isochronous
   (2) less than

D. (1) isochronous
   (2) greater than

34. The crew is placing the AOG System in service IAW 2OP-33, Section 6.1.1, AOG Charcoal Adsorber System Startup.
HCV-102, AOG System Bypass Valve, control switch on XU-80 is placed in AUTO, with the local control switch in the CLOSED position.
AOG-CS-3161, AOG Sys Vlv Cont Sel Sw, is in CENT position.

Subsequently, UA-45 (2-2) *Discharge H2 Conc High* alarms.

Which one of the following completes the statement below.

The HCV-102, AOG System Bypass Valve, __(1)__, and the XCV-142, AOG Guard Bed Isolation Valve __(2)__.

A. (1) auto opens
(2) auto closes

B. (1) auto opens
(2) remains open

C. (1) remains closed
(2) auto closes

D. (1) remains closed
(2) remains open

35. A second Recirc Pump startup is being performed on Unit One IAW 1OP-02, Section 6.1.2, Reactor Recirculation Pump Startup.

Which one of the following completes the statements below concerning the bottom head coolant temperature and the reactor pressure vessel (RPV) coolant temperature?

The maximum temperature difference is limited to __(1)__ .

These temperature limitations are required to be determined within no more than __(2)__ prior to startup of an idle recirculation loop, IAW 2OP-02, Reactor Recirculation System.

A. (1) $\leq$ 50°F
   (2) 15 minutes

B. (1) $\leq$ 50°F
   (2) 30 minutes

C. (1) $\leq$ 145°F
   (2) 15 minutes

D. (1) $\leq$ 145°F
   (2) 30 minutes

36. Which one of the following Unit One time-critical actions is required to be performed <u>within 30 minutes</u>, IAW 1-EOP-01-SBO, Station Blackout Procedure?

A. Load strip the batteries.

B. Cooldown to 150-300 psig.

C. Open Reactor Building roof hatch.

D. Open the Control Room panel doors.

37. Unit One is operating at 94% power with OPRMs Inoperable, when Recirculation Pump 1A trips.

The following conditions exist:

Total Core Flow (P603)	32.2 Mlbm/hr
Total Core Flow (U1CPWTCF)	33.9 Mlbm/hr
APRMs:	44%

Which one of the following completes both statements below?

The OPRM Inoperable, __(1)__ Operation Power to Flow map is required to be used to determine the current operating point.

The current operating point is in the __(2)__ Region.

(Reference provided)

A. (1) Single Loop
   (2) 5% Buffer

B. (1) Single Loop
   (2) Immediate Exit

C. (1) Two Loop
   (2) 5% Buffer

D. (1) Two Loop
   (2) Immediate Exit

38. Unit Two is operating at 84% power.
Reactor Recirculation Pump 2A & 2B speeds are 74%.
VFD 2A power cell failure and automatic cell bypass have occurred.

Subsequently the following alarms/indications are observed:
UA-17 (4-4), *SUB E7 XFMR SEC BKR TRIP*
A-06 (3-2), *RECIRC FLOW A LIMIT*

Which one of the following completes both statements below?

Reactor Recirculation Pump A has runback to Limiter __(1)__.

In order to raise Recirc Pump A speed the __(2)__ must be reset.

A. (1) #1
(2) runback signal ONLY

B. (1) #1
(2) runback and speed hold signals

C. (1) #2
(2) runback signal ONLY

D. (1) #2
(2) runback and speed hold signals

39. UA-23 (3-8) *250 VDC Battery B Ground* alarm is received and sealed in on Unit Two. An AO reports the following readings:

N Bus	1.1 ma
PN Bus	0.4 ma
P Bus	2.7 ma

Which one of the following completes both statements below?

The ground is located on the __(1)__ Bus.

IAW 0AI-115, 125/250 VDC System Ground Correction Guidelines, when ground resistance is between __(2)__, then plant procedures should be entered to locate and correct the ground condition.

A. (1) N
(2) 15 and 25 Kohms

B. (1) N
(2) 26 and 35 Kohms

C. (1) P
(2) 15 and 25 Kohms

D. (1) P
(2) 26 and 35 Kohms

40. Unit One is operating at rated power with DG1 running loaded for a monthly load test. A fault trips the Main Generator Primary Lockout relay.

BOP Bus 1C fails to transfer due to failure of its associated SAT supply breaker to close.

Which one of the following completes both statements below?

E1 is energized from __(1)__.

Entry into 0AOP-36.1, Loss of Any 4160V Buses or 480V E-Buses, __(2)__ required.

A. (1) DG1 ONLY; off-site power is available
   (2) is

B. (1) DG1 ONLY; off-site power is available
   (2) is NOT

C. (1) off-site power with DG1 running unloaded
   (2) is

D. (1) off-site power with DG1 running unloaded
   (2) is NOT

41. Following a loss of the Uninterruptible Power Supply on Unit One, a reactor scram occurs from 100% power.

Which one of the following completes both statements below?

Reactor power __(1)__ be determined to be below 2%.

The reactor __(2)__ be determined to be S/D Without Boron under <u>all</u> conditions.

A. (1) can
   (2) can

B. (1) can
   (2) can NOT

C. (1) can NOT
   (2) can

D. (1) can NOT
   (2) can NOT

42. Unit One was operating at rated power.
MSIV closure results in RPV pressure peaking at 1135 psig.
The reactor failed to scram.
The recirculation pumps are running with reactor power at 5%.

Which one of the following completes both statements below?

__(1)__ Safety Relief Valves have auto opened.

The operator __2__ required to trip the recirculation pumps.

A. (1) 4
(2) is

B. (1) 4
(2) is NOT

C. (1) 8
(2) is

D. (1) 8
(2) is NOT

43. Which one of the following completes both statements below?

IAW the Immediate Operator Actions in 0AOP-23.0, Condensate/Feedwater System Failure, IF reactor vessel level approaches __(1)__, THEN trip one reactor feed pump.

This condition could lead to __(2)__.

A. (1) 200 inches
   (2) jet pump vibration

B. (1) 200 inches
   (2) erosion wear of turbine blades

C. (1) 206 inches
   (2) jet pump vibration

D. (1) 206 inches
   (2) erosion wear of turbine blades

44. Following a line break in the drywell, Unit One conditions are:

Drywell pressure	6 psig
Drywell temperature	225°F
Torus pressure	7 psig
Torus level	-27 inches

Which one of the following completes both statements below?

The Suppression Chamber to Drywell Vacuum relief valves are __(1)__.

PCCP directs initiation of __(2)__ under the given conditions.

A. (1) open
   (2) Torus Spray

B. (1) closed
   (2) Torus Spray

C. (1) open
   (2) Drywell Spray

D. (1) closed
   (2) Drywell Spray

45. Unit Two was at 95% power when a loss of feedwater heating occurred. Following the transient, reactor power is 97%.

Which one of the following completes both statements below?

Thermal limits cannot be verified to be within the limits specified in the COLR when Final Feedwater Temperature is first reduced below __(1)__.

The most limiting thermal limit for loss of feedwater heating is __(2)__.

(Referenced Provided)

A. (1) 418.7°F
   (2) APLHGR

B. (1) 418.7°F
   (2) MCPR

C. (1) 319.3°F
   (2) APLHGR

D. (1) 319.3°F
   (2) MCPR

46. The Shift Manager has determined that Control Room evacuation is required. The RO has inserted a manual scram and placed the Mode Switch to Shutdown.

Which one of the following completes both statements below IAW 0AOP-32.0, Plant Shutdown From Outside Control Room?

The **next** Immediate Operator Action is to __(1)__.

IAW Attachment 17, Study of Manpower Needed and Sound Powered Phone Stations, a minimum of __(2)__ persons are required for a dual unit control room evacuation shutdown.

A. (1) Trip the Main Turbine
(2) 5

B. (1) Trip the Main Turbine
(2) 9

C. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 5

D. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 9

47. An unmonitored release from the Reactor Building is in progress and a hard copy Emergency Notification Form (ENF) is being completed IAW PEP-2.6.21, Emergency Communicator.

The following Met Tower Data is provided by the Process Computer:

Ambient Temp:	80 Deg F.
Upper Wind Direction:	18.00 Deg
Lower Wind Direction:	15.00 Deg
Upper Wind Speed:	8.00 MPH
Lower Wind Speed:	4.00 MPH
Stability Class:	D

Which one of the following completes both statements below?

The Wind Direction provided means that the wind is blowing __(1)__ the degree of direction.

When completing a hard copy ENF, __(2)__ wind speed and direction should be used IAW Attachment 3, Guidance for Completion of ENF.

A. (1) to
   (2) lower

B. (1) to
   (2) upper

C. (1) from
   (2) lower

D. (1) from
   (2) upper

48. Unit Two is operating at rated power when the following alarms and indications are observed:

Time = 0:
UA-03 (2-4) *TBCCW Pump Disch Header Press Low* alarm seals in
TBCCW Pump 2A is running.
TBCCW Pump 2B has tripped (no light indications)
TBCCW Pump 2C is aligned and running on Unit One
TBCCW Discharge Pressure, TCC-PI-566-1 on XU-2, indicates 38 psig

Which one of the following completes the statements below?

At time = 2 minutes, the <u>first</u> action required IAW 0AOP-17.0, Turbine Building Closed Cooling Water System Failure, is to __(1)__.

The 2-TCC-TV-609, TBCCW Heat Exchange Outlet Temperature Control Valve, __(2)__ to provide maximum cooling to TBCCW.

A. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) opens

B. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) closes

C. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) opens

D. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) closes

49. With Unit Two at rated power, the following alarms and indications are noted:

UA-01 (3-2) *Air Compr D Trip*	Alarm sealed in
UA-01 (4-4) *Inst Air Press Low*	Alarm sealed in
Air Compressor 2B	Running
Instrument Air header pressure	101 psig
Service Air header pressure	101 psig

Which one of the following is required IAW 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures?

The operator is required to:

A. close IA-PV-722-1 and IA-PV-722-2, Interruptible Air Isolation Valves.

B. open RNA-SV-5482 and RNA-SV-5481, Div I(II) Backup N2 Rack Isol Valves.

C. close SA-V8 and SA-V10, Inlet Isolation Valves To SA-PV-706-1/2.

D. open SA-PV-5067, Serv Air Dryer 2A Bypass Pressure Control Valve.

50. Unit Two is operating at rated power and the containment is being vented IAW 2OP-10, Section 6.3.2, Venting Containment via SBGT.

routinely (no abnormal rise in drywell pressure)
BJC 12-15-15

Subsequently, the RPS MG Set trips.

Which one of the following completes the following statement?

The reason drywell pressure __(1)__ is because __(2)__.

A. rises; a Group 6 isolation occurred

B. rises; a Group 10 isolation occurred

C. remains the same; venting is unaffected

D. remains the same; drywell cooling is unaffected

51. Unit Two has just entered MODE 4. RHR Loop A is operating in Shutdown Cooling. DG3 is under clearance.

Subsequently, a Loss Of Off-Site Power occurs and a Shutdown Cooling flowpath cannot be reestablished.

Which one of the following completes both statements below?

A Shutdown Cooling flowpath cannot be reestablished due to loss of power to the __(1)__.

An allowable method for feed and bleed operation IAW 0AOP-15.0, Loss of Shutdown Cooling is __(2)__.

A. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with CRD Pump 2B. Bleed by RWCU Reject.

B. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with CRD Pump 2B. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

C. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with Core Spray Loop 2A. Bleed by RWCU Reject.

D. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with Core Spray Loop 2A. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

52. Unit Two is performing refueling operations when the refueling SRO reports that a spent fuel bundle has been dropped in the cattle chute.
The following annunciators are in alarm on Panel 2-UA-3:

(2-3): *Rx Bldg Roof Vent Rad High*
(2-7): *Area Rad Rx Bldg High*
(3-7): *Area Rad Refuel Floor High*
(4-5): *Process Rx Bldg Vent Rad High*

Which one of the following is an Immediate Operator Action IAW 0AOP-5.0, Radioactive Spills, High Radiation, and Airborne Activity?

A. Enter 0EOP-04, RRCP

B. Isolate Reactor Building Ventilation.

C. Place Standby Gas Treatment (SBGT) trains in operation.

D. Ensure Control Room Emergency Ventilation System (CREVS) in operation.

53. Following a loss of feedwater on Unit One, HPCI initiated on low reactor water level then tripped on high reactor water level.

Current plant conditions are:

Reactor water level	150 inches, steady
A-01 (3-1) *HPCI Turb Trip*	alarm sealed in
A-01 (4-1) *HPCI Turb Trip Sol Ener*	alarm sealed in
A-05 (5-5) *Pri Ctmt Hi/Lo Press*	alarm sealed in
A-05 (5-6) *Pri Ctmt Press Hi Trip*	alarm sealed in
HPCI Initiation Signal/Reset white light	LIT
HPCI High Water Level Signal Reset white light	LIT

Which one of the following completes both statements below?

IAW A-1 (3-1), *HPCI Turb Trip,* the required operator action to commence HPCI injection to the reactor at this time is to __(1)__.

PCCP __(2)__ required to be entered.

A. (1) open 1-E41-F006, HPCI Injection Vlv
(2) is

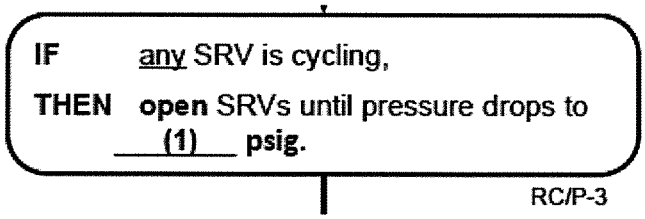
B. (1) open 1-E41-F006, HPCI Injection Vlv
(2) is NOT

C. (1) depress the High Water Level Signal Reset push button
(2) is

D. (1) depress the High Water Level Signal Reset push button
(2) is NOT

54. Following a MSIV closure on Unit One, RVCP is being executed. It is determined that SRVs are cycling.

Which one of the following completes both statements below?



The SRV opening sequence __(2)__ required while executing this step.

A. (1) 950
   (2) is

B. (1) 950
   (2) is NOT

C. (1) 1050
   (2) is

D. (1) 1050
   (2) is NOT

55. Unit One is operating at rated power. A Safety Relief Valve has failed open. Torus temperature is 96°F and rising.

Which one of the following completes the statement below?

IAW 0OI-37.8, Primary Containment Control Procedure Basis Document, __(1)__ torus water temperature reaches 110°F (Step T/T-6), Reactor Scram Required (Step T/T-7), to assure __(2)__.

A. (1) before
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

B. (1) before
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

C. (1) when
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

D. (1) when
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

56. A line break occurs in the Unit One Drywell with the following plant conditions:

RPV water level	180 inches steady on N026A/B, Wide Range Level
RPV water level	155 inches steady on N004A/B/C, Narrow Range Level
RPV water level	190 inches steady on N027A/B, Shutdown Range Level
RPV pressure	50 psig
Drywell ref leg temp	340°F
Drywell average temp	255°F
Reactor Building 50' temp	128°F

Which one of the following RPV water level indications are valid, if any?

(Reference provided)

A. None

B. N026A/B (Wide Range) **ONLY**

C. N026A/B (Wide Range) and N004A/B/C (Narrow Range) **ONLY**

D. N027A/B (Shutdown Range) and N004A/B/C (Narrow Range) **ONLY**

57. Following a LOCA on Unit Two, plant conditions are as follows:

Torus temperature	220°F
Torus pressure	10.5 psig
Torus level	- 43 inches
Core Spray (CS) Pump 2A Disch flow	5,000 gpm
RHR System B flow (2 pumps)	10,000 gpm loop flow (Torus Cooling mode)

BVC 12-15-15

Which one of the following identifies the ECCS pump(s), if any, that is (are) operating outside their associated NPSH limit?

(Reference provided)

A. Both RHR and CS are within NPSH limits.

B. Both RHR and CS are exceeding NPSH limits.

C. RHR is within NPSH limits. CS is exceeding NPSH limits.

D. RHR is exceeding NPSH limits. CS is within NPSH Limits.

58. Which one of the following completes both statements below concerning fuel zone reactor water level instruments (N036/N037)?

Jet pump flow will make fuel zone level instrumentation read __(1)__ than actual level.

Fuel zone level instruments __(2)__ valid with RHR LPCI flow.

A. (1) lower
   (2) are

B. (1) lower
   (2) are NOT

C. (1) higher
   (2) are

D. (1) higher
   (2) are NOT

59. While operating a rated power, a loss of Division I 250 VDC Switchboard 2A results in the following indications on Unit Two:

APRM readings:	16%
Control rods:	118 not full in
Blue scram lights:	137 illuminated

Given these conditions, which one of the following identifies a successful method of inserting control rods IAW Scram Immediate Actions or LEP-02, Alternate Control Rod Insertion?

A. Alternate Rod Insertion (ARI)

B. Scram Individual Control Rods

C. Reactor Manual Control System (RMCS)

D. De-energize Scram Solenoids and Vent Scram Air Header

60. A Site Area Emergency has been declared on Unit Two. Until the dose projection team arrives, the Control Room crew is performing 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings. Primary Containment Venting is in progress on Unit Two. The Main Stack flow instrument loop (2-VA-FT-3359) is not operational. The following conditions exist:

Main Stack Rad Recorder (2-D12-RR-4599):	3.8 E-2 µCi/cc
Total Unit 1 flow to Main Stack:	4450 cfm
Total Unit 2 flow to Main Stack	21400 cfm
Common systems discharging to Main Stack	AOG Bldg Exhaust RW Bldg Fan A

Which one of the following is the Source Term release rate estimation from the Main Stack IAW 0PEP-03.6.1?

(Reference attached)

A. 3.8 E-2 µCi/sec

B. 3.8 E+5 µCi/sec

C. 1.2 E+6 µCi/sec

D. 1.5 E+6 µCi/sec

61. Which one of the following is the power supply to Air Compressor 1D?

A. 480 V Substation 1E

B. 480 V Substation 1F

C. 4160 V Bus 1C

D. 4160 V Bus 1D

62. Which one of the following completes the statements below?

The highest CSW system pressure that will auto start the standby CSW pump is __(1)__.

If pressure remains below this setpoint for at least __(2)__ , the SW-V3(V4), SW TO TBCCW HXS OTBD(INBD) ISOL, will reposition to their throttled positions.

A. (1) 40 psig
   (2) 30 seconds

B. (1) 40 psig
   (2) 70 seconds

C. (1) 65 psig
   (2) 30 seconds

D. (1) 65 psig
   (2) 70 seconds

63. Which one of the following completes both statements below?

The hydrogen concentration entry condition setpoint for PCCP is above __(1)__.

If RPS A is de-energized, and CAC-AT-4409, Division I Hydrogen/Oxygen Monitor, is required to be placed in service, then it __(2)__ be unisolated using CAC-CS-2986 (CAM Div I Isol Ovrd).

A. (1) 1.5%
   (2) can

B. (1) 1.5%
   (2) can NOT

C. (1) 3.9%
   (2) can

D. (1) 3.9%
   (2) can NOT

64. Unit Two is operating at rated power.
The control room receives the following fire alarms/reports:

0900 HP reports an acrid smell in reactor building
0901 RX (-)17 FT SD NCS NE CORNER
0902 RBAO reports fire in NCS -17 foot
0903 RO makes PA announcement for the fire and initiates fire alarm
0905 RX (-)17 FT SD NCS ABV LANDING

Which one of the following completes both statements below?

The Electric Fire Pump will auto start when system pressure first drops below __(1)__.

IAW 0PFP-013, General Fire Plan, a PA announcement stating the location of the command post __(2)__ required.

A. (1) 90 psig
(2) is

B. (1) 90 psig
(2) is NOT

C. (1) 105 psig
(2) is

D. (1) 105 psig
(2) is NOT

65. Unit Two is operating at 30% power when the following sequence of events occurs:

Time	Generator Frequency
1208	59.8 Hz
1212	59.2 Hz
1216	58.8 Hz
1218	58.3 Hz

Which one of the following completes the statements below?

Of the times listed above, UA-06 (1-2) *Gen Under Freq Relay,* will first be alarming at __(1)__.

Given the conditions above, at 1220, the operator is required to __(2)__, IAW 0AOP-22.0, Grid Instability,.

A. (1) 1208
   (2) trip the main turbine ONLY

B. (1) 1208
   (2) manually scram the reactor and then trip the main turbine

C. (1) 1216
   (2) trip the main turbine ONLY

D. (1) 1216
   (2) manually scram the reactor and then trip the main turbine

66. IAW AD-OP-ALL-1000, Conduct of Operations, which one of the following identifies the requirements for manipulating a valve that has no label?

The valve can be manipulated ONLY after its identity has been confirmed by a __(1)__; SRO approval __(2)__ required.

A. (1) controlled document
(2) is

B. (1) controlled document
(2) is NOT

C. (1) peer check
(2) is

D. (1) peer check
(2) is NOT

67. Which one of the following identifies when fuel movement must FIRST be suspended IAW FH-11, Refueling?

Suspension of fuel movement and notification of the Reactor Engineer is required if a SRM rises by a factor of _____ relative to the SRM baseline count rate.

A. two

B. four

C. five

D. ten

68. Which one of the following completes the following definition IAW 0EOP-01, Users Guide?

Minimum Number of SRVs Required for Emergency Depressurization: The number of SRVs __(1)__ which corresponds to a minimum steam cooling pressure sufficiently low that __(2)__ .

A. (1) (five)
   (2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

B. (1) (five)
   (2) the clad temperature will not exceed 1800°F

C. (1) (seven)
   (2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

D. (1) (seven)
   (2) the clad temperature will not exceed 1800°F

69. IAW 0ERP-Radiological Emergency Response Plan, which one of the following completes the statements below?

The facility that has the primary function to facilitate in-plant repairs is the __(1)__.

The primary location for this facility is the __(2)__.

A. (1) Technical Support Center
   (2) O&M Building

B. (1) Technical Support Center
   (2) Operations Training Building

C. (1) Operational Support Center
   (2) O&M Building

D. (1) Operational Support Center
   (2) Operations Training Building

70. Which one of the following identifies the bases for the Minimum Critical Power Ratio (MCPR) Safety Limit IAW Technical Specifications Bases 2.1.1, Reactor Core Safety Limits?

The MCPR Safety Limit ensures that:

A. the calculated changes in core geometry shall be such that the core remains amenable to cooling.

B. plastic strain of the cladding does not exceed 1% during all modes of operation.

C. the calculated total oxidation shall no where exceed 0.17 times the total cladding thickness before oxidation.

D. during normal operation and during Anticipated Operational Occurrences, at least 99.9% of the fuel rods in the core do not experience transition boiling.

71. Given the following excerpt:

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCIC System inoperable.	A.1	Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately

Which one of the following completes both statements below IAW Tech Specs?

The phrase 'by administrative means', requires __(1)__.

When "Immediately" is used as a Completion Time, the required action __(2)__.

A. (1) performing the TS Surveillance
   (2) must be completed within 15 minutes

B. (1) performing the TS Surveillance
   (2) should be pursued without delay and in a controlled manner

C. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) must be completed within 15 minutes

D. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) should be pursued without delay and in a controlled manner

72. Which one of the following identifies the significance of the yellow dot affixed to an annunciator window IAW 0OI-01.01, BNP Conduct of Operations Supplement?

The yellow dot means that the alarm:

A. is a nuisance alarm.

B. has its annunciator card removed.

C. has one or more of its inputs disabled.

D. is lit because its associated equipment is under clearance.

73. Following a large line break in the drywell, H2/O2 monitors have been placed in service. Plant conditions:

Drywell pressure	40 psig
Drywell hydrogen	2.5% (ERFIS)
Drywell oxygen	3.5% (ERFIS)
Torus hydrogen	1.4% (ERFIS)
Torus oxygen	3.5% (ERFIS)
Torus level	-36 inches

Based on the above conditions, which one of the following completes both statements below?

PCCP directs to vent and purge Primary Containment __(1)__.

IAW 0OI-37.8, PCCP Basis Document, venting from the __(2)__ is preferred.

A. (1) ONLY if ODCM release rate limits are not exceeded
(2) torus

B. (1) ONLY if ODCM release rate limits are not exceeded
(2) drywell

C. (1) and exceed offsite radioactivity release rates if necessary
(2) torus

D. (1) and exceed offsite radioactivity release rates if necessary
(2) drywell

74. Which one of the following completes both statements below?

The Drywell High Range Area Radiation Monitors are designed to measure __(1)__ radiation.

These instruments are used to provide __(2)__.

A. (1) gamma
   (2) an entry condition into RRCP, Radioactivity Release Control Procedure

B. (1) gamma
   (2) estimates of core damage

C. (1) neutron
   (2) an entry condition into RRCP, Radioactivity Release Control Procedure

D. (1) neutron
   (2) estimates of core damage

75. In preparation for a valve manipulation in the drywell, the applicable RWP indicates that the highest dose rate in the area is 350 mR/hr.

A flashing red light is encountered at the entry location to the valve in the drywell.

Which one of the following completes both statements below?

The flashing red light indicates the area is a __(1)__.

This RWP __(2)__ be used to perform the valve manipulation.

A. (1) High Radiation Area
   (2) can

B. (1) High Radiation Area
   (2) can NOT

C. (1) Locked High Radiation Area
   (2) can

D. (1) Locked High Radiation Area
   (2) can NOT

Deleted RSS 1/7/2016 per 2014

RO Written Exam Reference Index

1. 0EOP-01-UG, User's Guide, Attachments 8 and 9

2. 0EOP-01-UG, User's Guide, Attachments 19, 20, 22, and 31 (Pages 1 and 2)

3. 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings, Attachments 1 and 6

4. 2OP-32, Attachment 4

5. COLR-U1-CYCLE-20 Power-to-Flow Maps

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2015 NRC SCENARIO 1

NSW PUMP TRIPS, RFPT TRIP, MTLO TEMPERATURE CONTROLLER FAILURE, TURBINE TRIP, HYDRAULIC ATWS

REVISION 0

Developer: *Lou Sosler*	**Date:** *9/11/2015*
Technical Review: *John Biggs*	**Date:** *9/23/215*
Validator: *Thomas Baker*	**Date:** *9/11/2015*
Validator: *Brian Moschet*	**Date:** *9/11/2015*
Facility Representative: *Jerry Pierce*	**Date:** *9/23/2015*

REVISION SUMMARY	
0	Scenario developed for 2015 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1	NA	N-BOP	Swap CRD Pumps.
2	CW019F	C-BOP C-SRO	NSW Pumps 2B Trips – **AOP-18.0.**
3	NI031F	C-RO C-SRO	APRM 2 fails upscale – **Tech Spec**.
4	IAUPB2A6	C-BOP C-SRO	Loss of power to Main Stack Rad Monitor-**Tech Spec**. SBGT fails to start
5	CF036F RC019F	C-BOP C-SRO C-RO R- RO	RFP A trip – **AOP-23.0.** Recirc Pump A fails to runback. Lower power.
6	MS031F	C-BOP C-SRO	MTLO temperature controller fails closed.
7	RP005F RP011F	M	Turbine Trip/Reactor Scram Auto Scram Defeat Hydraulic ATWS
8	K2119A	C	SLC Pump A&B position failure.
9	RD036F	C	SDV Vents and Drains fail closed.

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

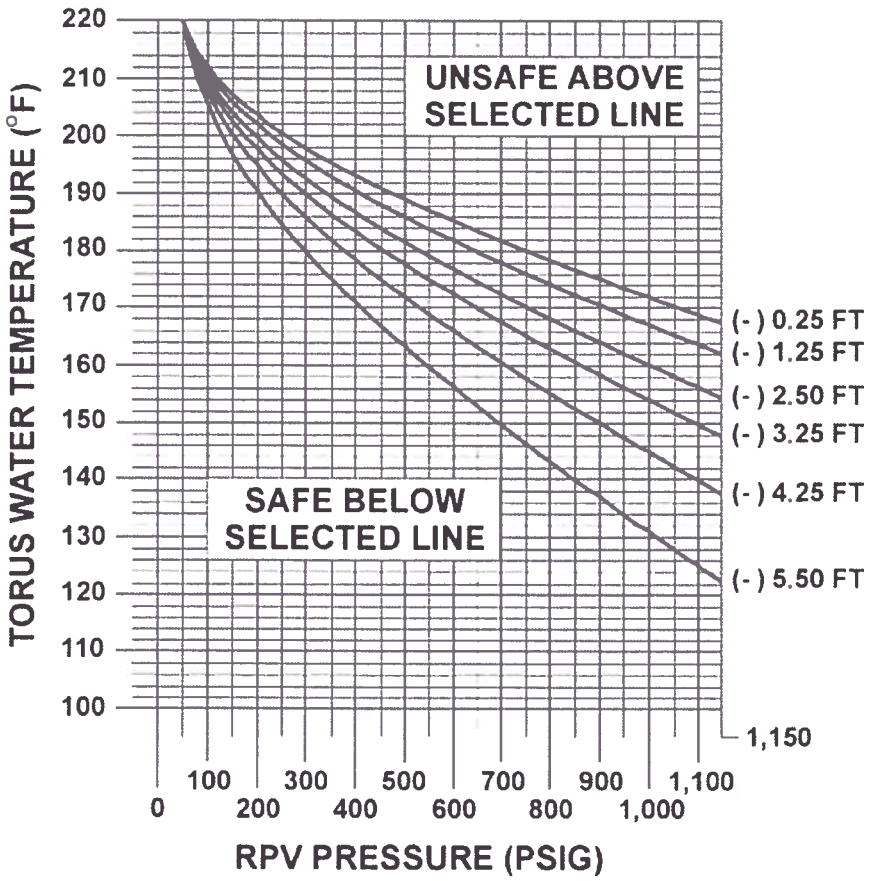
2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	Crew will swap CRD Pumps for rotation IAW 2OP-08. 'A' will be placed in service, 'B' in standby.
2	NSW Pump B will trip and the crew will start NSW Pump A. Since there are no NSW Pumps out of service on Unit 1, Tech Specs will not apply. Crew will enter 0AOP-18.0, Nuclear Service Water System failure, and carry out appropriate actions.
3	APRM 2 fails upscale resulting in a rod block. APRM 4 is already inop and bypassed. APRM 2 will be declared inoperable and the CRS will evaluate Tech Specs.
4	Power supply to Main Stack Rad Monitor will fail. Power loss will result in a Group 6 isolation but STBY Gas will fail to auto start. Crew will take action per APP and start SBGT system to maintain Secondary Containment. CRS will evaluate TS.
5	Reactor Feed Pump 2A will trip on low suction pressure. The crew will respond per 0AOP-23.0 Condensate/Feedwater System Failure. Reactor Recirc Pump A will fail to automatically run back to limiter #2. The crew will be required to manually runback the Recirculation Pumps to prevent approaching a Reactor Scram on low RPV water level. 0AOP-23.0 directs manual reduction of Recirc Pump speed to 48%. This action will stabilize Reactor Water Level without entering the scram avoidance region. Crew will be required to further reduce power using control rods to get below 60% for a single feed pump and verify location on the power to flow map.
6	Main Turbine Temperature Controller will fail closed and Turbine Lube Oil will heat up. The rising Lube Oil temperature will result in high Turbine Vibration. Vibration will approach the TSI setpoint requiring a manual scram and the turbine to be tripped.
7	Most control rods will fail to insert on the scram. The crew will respond per 0EOP-01-ATWS. When the main turbine is tripped EHC will control pressure
8	Crew will inject SLC per ATWS procedure. The SLC Control Switch will fail to work in the A&B pump position. Either position A or position B will work to inject boron.
9	Control rods can be manually driven into the core with RMCS per LEP-02. The SDV Vents & Drains will fail. When level has been lowered and level band has been established, the SDV V&D will be repaired. Control rods can then be inserted by repeated manual scram.

3.0 CREW CRITICAL TASKS

Critical Task #1

Initiate SLC with reactor power >2% such that HCTL is not exceeded.



Critical Task #2

If reactor power is greater than 2% and level is greater than 90 inches, then lower reactor water level by terminating and preventing injection IAW ATWS procedure.

Critical Task #3

Insert control rods IAW LEP-02, Alternate Control Rod Insertion, to insert all control rods.

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-5, 6-1	CRD FILTER PUMP INLET DP HI
A-5, 2-1	CHARGING WATER HI DP
UA-18, 6-1	BUS E4 4KV MOTOR OVLD.
UA-1, 1-10	NUCLEAR HDR SERV WATER PRESS LOW
UA-1, 4-10	NUCLEAR HDR SW PUMP B TRIP
0AOP-18.0	NUCLEAR SERVICE WATER SYSTEM FAILURES
A-06, 2-8	APRM UPSCALE
A-06, 3-7	APRM TROUBLE
A-06, 3-8	APRM UPSCALE TRIP/INOP
A-05, 2-2	ROD OUT BLOCK
A-06, 2-8	APRM UPSCALE TRIP/INOP
UA-5, 3-5	SBGT SYS B FAILURE
UA-5, 4-6	SBGT SYS A FAILURE
UA-4, 1-2	RFPT A TURBINE TRIPPED
UA-13, 6-5	RFPT A CONTROL TROUBLE
0AOP-23.0	CONDENSATE/FEEDWATER SYSTEM FAILURES
UA-23, 1-6	TURB OR RFP BRG TEMP HIGH
UA-23, 6-1	TURBINE VIBRATIONS HIGH

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-25.
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

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 4 (blue tag)	Bypassed

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

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-25 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. **ENSURE** Station Duty Manager and Work Week Manager names are filled in on the Shift Turnover Sheet.

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

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

21. **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	CW025F - [NUC SERVICE WATER PUMP MOTOR OVERLOAD]
1	Malfunction	CW023F - [NUC SERVICE WATER PUMP SHAFT SEIZURE]
2	Malfunction	NI031F - [APRM FAILS HI]
3	Remote Function	ED_IAUPB2A6 - [UPS LOAD BKR DIST PNL 2A TO SMPL DT SKD]
4	Malfunction	CF036F - [RFP A LOW SUCT PRESSURE]
5	Malfunction	MS031F - [MTLO TEMP CNTRLR FAILS]
6	Malfunction	RD036F - [SCRAM DISC VOL DRN FAILS CLOSED]
7	Malfunction	MS017F - [TURBINE BEARING VIBRATION]
7	Malfunction	MS017F - [TURBINE BEARING VIBRATION]
7	Malfunction	MS017F - [TURBINE BEARING VIBRATION]
10	Trigger Command	did:k6101A
11	Trigger Command	did:k6103a
12	Remote Function	EP_IAEOPJP1 - [BYPASS LL-3 GROUP I ISOL (SEP-10)]
13	Remote Function	EP_IACS994P - [DW CLR B & C OVERIDE - NORMAL/STOP]
13	Remote Function	EP_IACS993P - [DW CLR A & D OVERIDE - NORMAL/STOP]
14	Remote Function	ED_IAUPDSSW - [UPS SAMPLE DET SKD XFER SW (N=U2/A=U1)]

Trig #	Trigger Text
6	K2213BXD - [DISCH VOL TEST]
7	ZUA2316 - [TURB OR RFP BRG TEMP HIGH]
10	K6101WOV - [SBGT SYS A]
11	K6103WOV - [SBGT SYS B]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
NI032F	APRM 4	APRM FAILS LO	True	True				
RC019F	RFP A 1	RFP SUCTION FLOW SWITCH FAILS CLOSED	True	True				
RP011F		ATWS 4	True	True				
RP005F		AUTO SCRAM DEFEAT	True	True				
CW025F	B	NUC SERVICE WATER PUMP MOTOR OVERLOAD	False	True				1
CW023F	B	NUC SERVICE WATER PUMP SHAFT SEIZURE	False	True		03:00		1
NI031F	APRM 2	APRM FAILS HI	False	True				2
CF036F		RFP A LOW SUCT PRESSURE	False	True				4
MS031F		MTLO TEMP CNTRLR FAILS	False	True				5
RD036F		SCRAM DISC VOL DRN FAILS CLOSED	False	True				6
MS017F	2	TURBINE BEARING VIBRATION	0.00	7.0	05:00			7
MS017F	3	TURBINE BEARING VIBRATION	0.00	8.0	05:00			7
MS017F	4	TURBINE BEARING VIBRATION	0.00	6.0	05:00			7

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
ED_IAUPB2A6		UPS LOAD BKR DIST PNL 2A TO SMPL DT SKD	CLOSE	OPEN			3
EP_IAEOPJP1		BYPASS LL-3 GROUP I ISOL (SEP-10)	OFF	ON			12
EP_IACS993P		DW CLR A & D OVERIDE - NORMAL/STOP	NORMAL	STOP			13
EP_IACS994P		DW CLR B & C OVERIDE - NORMAL/STOP	NORMAL	STOP			13
ED_IAUPDSSW		UPS SAMPLE DET SKD XFER SW (N=U2/A=U1)	NORMAL	ALT			14

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4B20A	NUC HDR SW PMP A DISCH VLV	AUTO	ON	OFF				
K2119A	S/B LIQ PUMP A & B	PUMP_A&B	OFF	OFF				
K6101A	SBGT SYS A CONT PUSH OFF	OFF	OFF	ON				
K6103A	SBGT SYS B CONT PUSH OFF	OFF	OFF	ON				

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: SWAP CRD PUMPS	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.
	If requested adjust RD_VHRD14B, CRD PMP B DISC VLV, to .60 to lower CRD pressure.

Simulator Operator Role Play	
	Pre-start checks complete for CRD Pump B. Steps 3a-c of 2OP-08, Section 6.3.2.
	Report E4/E3 clear of personnel when asked.
	Step 9c of 2OP-08, Section 6.3.2 completed and IV'd.
	If asked, Stab Valve flow is 6 gpm.
	If asked after starting the 2B CRD Pump, report it is running normally
	If directed to throttle 2B CRD Pump discharge valve, after Sim Op makes adjustment, report discharge valve is throttle closed.

Evaluator Notes	
Plant Response:	Swap CRD Pumps
Objectives:	SRO - Directs RO to swap CRD Pumps BOP – Swap CRD Pumps RO – Monitor Balance of Plant
Success Path:	CRD Pumps are swapped
Event Termination:	When directed by the Lead Evaluator, go to Event 2.

EVENT 1: SWAP CRD Pumps			
Time	**Pos**	**EXPECTED Operator Response**	**NOTES**
	SRO	Conduct shift turnover shift briefing.	
		Direct CRD Pumps to be swapped. (2OP-08, Section 6.3.2)	
		May conduct a brief (see Enclosure 6 on page 47 for format)	
	RO	Monitors the plant	
	BOP	Swap CRD Pump IAW 2OP-08, Section 6.3.2: Make a PA announcement for starting 2B CRD Pump and Securing 2A CRD Pump. Should also check that E3 and E4 are clear of personnel. Goes to Section 6.3.32 to adjust CRD parameters	

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6.3.2 Shifting CRD Pumps

1. **Ensure** CRD System in operation per Section 6.1.1 _____

2. **IF** starting CRD Pump 2A **AND** securing CRD Pump 2B, **THEN perform** the following: _____

   a. **Ensure** C12-F013A (CRD Pump 2A Suction Isolation Valve) LOCKED OPEN _____

   b. **Ensure** C12-F014A (CRD Pump 2A Discharge Isolation Valve) LOCKED OPEN. _____

   c. **Ensure** C12-F015A (CRD Pump 2A Recirculation Line Isolation Valve) LOCKED OPEN. _____

3. **IF** starting CRD Pump 2B **AND** securing CRD Pump 2A, **THEN perform** the following: _____

   a. **Ensure** C12-F013B (CRD Pump 2B Suction Isolation Valve) LOCKED OPEN _____

   b. **Ensure** C12-F014B (CRD Pump 2B Discharge Isolation Valve) LOCKED OPEN. _____

   c. **Ensure** C12-F015B (CRD Pump 2B Recirculation Line Isolation Valve) LOCKED OPEN _____

CAUTION

Failure to reduce CRD flow rate prior to starting the non-operating CRD pump could cause rod drifts and require a manual reactor scram. ☐

4. **Shift** C12-FC-R600 (CRD Flow Control) to BAL _____

5. **Null** C12-FC-R600 (CRD Flow Control) using the manual potentiometer. _____

6. **Shift** C12-FC-R600 (CRD Flow Control) to MAN _____

NOTE

When CRD flow rate is set to 35 gpm, annunciator A-05, 2-1, CRD Charging Wtr Press Hi, may ALARM. ☐

7. **Set** CRD flow rate to 35 gpm. _____

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6.3.2 Shifting CRD Pumps (continued)

8. **IF** starting CRD Pump 2A **AND** securing CRD Pump 2B, **THEN perform** the following: _____

   a. **Start** CRD Pump 2A. _____

   b. **Stop** CRD Pump 2B. _____

   c. **Ensure** C12-F014B (CRD Pump 2B Discharge Isolation Valve) LOCKED OPEN. ____/____ IV

9. **IF** starting CRD Pump 2B **AND** securing CRD Pump 2A, **THEN perform** the following: _____

   a. **Start** CRD Pump 2B. _____

   b. **Stop** CRD Pump 2A. _____

   c. **Ensure** C12-F014A (CRD Pump 2A Discharge Isolation Valve) LOCKED OPEN. ____/____ IV

10. **Null** C12-FC-R600 (CRD Flow Control) using the setpoint tape. _____

11. **Shift** C12-FC-R600 (CRD Flow Control) to AUTO. _____

12. **Go to** Section 6.3.32 to adjust CRD parameters. _____

	Date/Time Completed	
	Performed By (Print)	Initials
	_____	_____
	_____	_____
	_____	_____
	_____	_____
Reviewed By	_____	
	Unit CRS/SRO	

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6.3.32 Adjusting CRDHS Parameters

1. **Ensure** the following Initial Conditions are met:

   - All applicable prerequisites listed in Section 5.0, Prerequisites are met. _____
   - CRD System is in operation per Section 6.1.1. _____
   - Two Auxiliary Operators available to throttle closed the operating CRD pump discharge valve. _____

NOTE

- If reactor vessel temperature is less than 250°F, then cooling water differential pressure may be less than 10 psid. ☐
- The actions in Step 2 may be repeated as needed. ☐

2. **Adjust** cooling water differential pressure, CRD flow rate and drive pressure as follows:

   - C12-FC-R600 (CRD Flow Control) to maintain cooling water differential pressure between 10 and 26 psid _____
   - CRD flow rate between 30 and 60 gpm _____

NOTE

2OP-07, Reactor Manual Control System Operating Procedure, allows lowering drive water differential pressure to a minimum of 180 psid when moving control rods that have a history of double-notching or having excessive rod speeds (Rods identified with Caution Tags placed on the RTGB select matrix). ☐

   - C12-PDI-R602 (Drive Δ Press) between 260 and 275 psid by throttling C12-PCV-F003 (Drive Pressure Vlv) _____

3. **Observe** C12-PI-R601 (Charging Press) on Panel 603. _____

4. **IF** C12-PI-R601 (Charging Press) exceeds 1500 psig, **THEN perform** the following: _____

   a. **Set** CRD flow rate to approximately 30 gpm, on C12-FC-R600 (CRD Flow Control). _____

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6.3.32 Adjusting CRDHS Parameters (continued)

b. **IF** C12-PI-R601 (Charging Press) exceeds 1500 psig indicated on Panel P603, **THEN perform** the following: _____

(1) **Unlock** C12-F014A(F014B) [CRD Pump 2A(2B) Discharge Isolation Valve] _____

(2) **Throttle closed** C12-F014A(F014B) [CRD Pump 2A(2B) Discharge Isolation Valve] to maintain pressure less than 1500 psig _____ / _____ CV

(3) **WHEN** charging water header pressure has stabilized, **THEN lock** C12-F014A(F014B) [CRD Pump 2A(2B) Discharge Isolation Valve] _____ / _____ CV

(4) **Hang** Plant Status Control Tags on the CRD pump discharge isolation valve and control switch _____

5. **Ensure** stabilizing valve flow rate is approximately 6 gpm locally on C12-FI-R004 (CRD Stabilizing Valve Flow Indicator) _____

6. **Monitor** normal operation of the CRD System per Attachment 1. _____

Date/Time Completed _____

Performed By (Print) Initials

_____ _____

_____ _____

_____ _____

_____ _____

Reviewed By _____

Unit CRS/SRO

EVENT 2: NSW PUMP 2B FAILURE

Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to trip the NSW Pump 2B.
	Note: Short time delay before first alarm (1min), followed by pump trip (1 min).

Simulator Operator Role Play	
	If contacted as OAO to investigate NSW pump and breaker, report 51 devices are tripped at NSW Pump B breaker on Bus E4.
	If requested, check 2B NSW in SW Bldg, no signs of any damage.
	If contacted as maintenance or I&C to investigate trip, acknowledge 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 Unit 1 NSW Pumps operable, Tech Spec actions are not required.
Objectives:	SRO - Direct actions for loss of NSW RO - Respond to the failure of an automatic start of the A NSW pump
Success Path:	Start Standby NSW Pump
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: NSW PUMP 2B FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry into AOP-18 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.	
		May direct 2C CSW pump to be placed on the NSW header.	
		May conduct a brief (see Enclosure 6 on page 47 for format)	
	RO	Monitor reactor plant parameters during evolution.	

EVENT 2: NSW PUMP 2B FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	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 2A 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 HDR SERV WATER PRESS-LOW • UA-01 (4-10) NUCLEAR HDR SW PUMP B TRIP	
		May align the 2C CSW pump to the NSW header. (2OP-43, Section 6.3.40) • Ensure Nuclear Service Water Pump 2A is in service. • Ensure Nuclear Service Water Pump 2B is NOT in service. • Place Conventional Service Water Pump 2C mode selector switch in MAN. • Place discharge valve selector switch Conventional Service Water Pump 2C in NUC HDR. • Place Conventional Service Water Pump 2C mode selector switch in AUTO .	

EVENT 3: APRM 2 FAILURE - UPSCALE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 2** to fail APRM 2.

Simulator Operator Role Play	
	If contacted as I&C to investigate, acknowledge the request.
	If asked to pull fuses (for TRM 3.3 actions) acknowledge the request.
	After LCO entries have been determined and SRO is waiting for I&C, call as WCCSRO and request that the RO place APRM 2 in a tripped condition to support I&C trouble shooting.
	If asked, APRM 4 won't be returned to service for another 8-10 hours.

Evaluator Notes	
Plant Response:	APRM 2 will fail upscale resulting in a rod block. The APRM will be declared Inoperable per TS 3.3.1.1, Condition A and placed in trip within 12 hours. WCCSRO will request APRM TS Actions be taken in order to troubleshoot which requires the APRM mode selector switch to be place in INOP IAW 0OI-18.
Objectives:	SRO - Determine LCO for APRM 2 inoperability and direct placing channel in trip. RO - Diagnose APRM 2 failure and place in INOP.
Success Path:	ARPM 2 declared inoperable IAW TS 3.3.1.1 and placed in trip condition IAW 0OI-18.
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: APRM 2 FAILURE - UPSCALE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct RO to perform/reference APPs	
		Direct I&C to investigate	
		Evaluate **Tech Spec 3.3.1.1** Reactor Protection System Instrumentation Determine APRM 4 and 2 are inoperable. Determine 2 of 4 the available channels are operable for Function 2. **Condition A.1**, Required Action with one or more required channels inoperable, place in trip condition in **12 hours** Evaluate **TRM 3.3** Control Rod Block Instrumentation Determine one of the required channels is not operable for Function 1 – **Condition A.1** - **24 hours** to restore to operable.	
		Refers to 0OI-18 for actions to place APRM 2 in a tripped condition.	
		Direct APRM 2 mode selector switch placed in INOP to allow I&C troubleshooting.	
		May conduct a brief (see Enclosure 6 on page 47 for format)	
	BOP	Monitors the plant.	

EVENT 3: APRM 2 FAILURE - UPSCALE

Time	Pos	EXPECTED Operator Response	Comments
	RO	Acknowledges, refers to & reports annunciators A-6 2-8 *APRM UPSCALE* 3-7 *APRM TROUBLE* 3-8 *APRM UPSCALE TRIP/INOP* A-5 2-2 *ROD OUT BLOCK*	
		Determines ARPM 2 has a critical fault (CPU Failure) and cannot be bypassed (APRM 4 already bypassed). On APRM 2 NUMAC, selects TRIP STATUS, then selects INOP STATUS. Determines APRM 2 has critical self-test fault as shown on NUMAC screen.	
		Places APRM 2 in the tripped condition by placing APRM OPER/INOP mode selector switch in "INOP" on Panel P608 IAW 0OI-18. (Will need Key #112 from Control room Key locker)	

EVENT 4: LOSS OF POWER TO STACK RAD MONITOR – SBGT FAILS TO START	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 3** to fail Stack Rad Monitor downscale (loss of power).
	Transfer Stack Rad Monitor to Unit 1 UPS if requested **(Trigger 14).**

Simulator Operator Role Play	
	If asked to investigate, report Ckt #6 on UPS Panel 2A to the Stack Rad Monitor is tripped
	If contacted as Unit One, report that Unit One has the same alarms present.
	If contacted as I&C to investigate, acknowledge the request. If asked, do not recommend transfer to the alternate power supply until the cause of the trip is investigated.

Evaluator Notes	
Plant Response:	Power failure to the Stack Rad Monitor will initiate a Group 6 Isolation. Group 6 valves will isolate, Reactor Building Ventilation will isolate, but SBGT will not start. It will require manual start.
Objectives:	SRO - Determine actions required for LCO per Technical Specifications RO - Respond to a process radiation monitoring downscale/inop annunciator
Success Path:	Evaluate Tech Specs to determine required actions as outlined in SRO actions below.
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: LOSS OF POWER TO STACK RAD MONITOR – SBGT FAILS TO START			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of the APPS for the Main Stack Rad Monitor	
		Direct SBGT start	
		May direct entry into 0AOP-12.0	
		Direct I/C to investigate loss of UPS 2A.	
		Technical Specification / TRM • 3.3.6.1 PCIS Instrumentation, Function 2c Condition A1, Place in trip condition in 24 hours. • 3.4.5 RCS Leakage Detection Instrumentation Condition B.1, Analyze grab samples every 12 hours Condition B.2, Restore operable in 30 days • TRM 3.4 Post Accident Monitoring, Functions 2, 5, and 6 Condition A.1 (F2/F6), Restore 31 days Condition B.1, (F2/F5), Restore one required channel in 7 days. • ODCM 7.3.2 Gaseous Effluent Monitoring, Function 1 A.1, Enter the Condition referenced in Table 7.3.2-1 B.1, Take a grab sample once per 12 hours B.2, Analyze the grab sample for gross noble gas activity within 24 hrs B.3, Restore the channel in 30 days C.1, C.1.1, Immediately Initiate actions to establish auxiliary sampling equipment to continuously collect samples from the associated effluent release pathway as required by Table 7.3.7-1 C.2, Restore the channel in 30 days D.1, Estimate the flow rate through the associated pathway in 8 hours D.2, Restore the channel in 30 days ▪ 7.3.7 and 7.3.13 do not apply	
		May conduct a brief (see Enclosure 6 on page 47 for format)	

EVENT 4: LOSS OF POWER TO STACK RAD MONITOR – SBGT FAILS TO START			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Plant Monitoring: May open the SW-V111 or V117 to supply cooling water to the vital header IAW 2APP-UA-05 1-9 or 2-9.	
	BOP	Report loss of Main Stack Rad Monitor and references the following APPs: <u>UA-03</u> 5-4, PROCESS OG VENT PIPE RAD HI-HI 6-3, PROCESS SMPL OG VENT PIPE DNSC/INOP 6-4, PROCESS OG VENT PIPE RAD – HI <u>UA-05</u> 3-5, SBGT SYS B FAILURE 4-6, SBGT SYS A FAILURE 6-10, RX BLDG ISOLATED <u>UA-25</u> 1-8, CTMT ATMOS RAD MON DNSC/INOP	
		Report TS review for the CRS from the Annunciator reviews. • 3.4.5 • 3.3.6.1 Table 3.3.6.1-1, function 2c • ODCM 7.3.2 Table 7.3.2-1 Function 1, 7.3.7, and 7.3.13 • TRM 3.4, Table 3.4.2 function 5	
		Determine that SBGT should have started. Start SBGTs by placing control switches in START.	
		Dispatch AO to investigate UPS 2A condition.	
		May depress RIP Isolation pushbuttons to match the solenoid status with the valve position.	

EVENT 5: 2A RFP TRIP – FAILURE OF VFD A TO RUNBACK	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 4** to trip the 2A RFP.
	Acknowledge the Woodward local alarm panel when directed. Provide the Sim Operator Role Player with the appropriate local alarms on the Woodward for reporting to the control room.

Simulator Operator Role Play	
	If contacted as the AO to acknowledge local Woodward alarms, wait 1 minute, have the Sim Operator acknowledge the local alarm and report the alarms on the local panel to the control room.
	If contacted as I&C to investigate, acknowledge the request.
	If contacted as the Reactor Engineer for recommendation for actions to get below the MELLL line, ask what the SRO recommendation would be and agree with the recommendation.

Evaluator Notes	
Plant Response:	Reactor Feed Pump A will trip with a failure to of Recirc Pump A to runback to limiter #2. Crew should enter 0AOP-23. Condensate/Feedwater System Failure, Immediate operator action to reduce Recirc controllers to 48% if a RFP trips and a runback does not occur. Crew may also enter 0AOP-4.0, Low Core Flow.
Objectives:	SRO - Direct actions to respond To A Condensate/Feedwater System Failure Per 0AOP-23. RO - Respond To A Condensate/Feedwater System Failure Per 0AOP-23. Respond to a Reactor Recirc pump runback failure.
Success Path:	The crew will respond per 0AOP-23 and lower recirc pump speeds to 48%. Rods may have to be inserted to maintain operation below the MELLL line.
Event Termination:	Go to Event 6 at the direction of the Lead Evaluator.

EVENT 5: 2A RFP TRIP – FAILURE OF VFD A TO RUNBACK			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct Recirc to be lowered to maintain level. (If AOP immediate actions were not performed will direct Recirc to be lowered to 48%)	
		Direct entry of 0AOP-23, Condensate/Feedwater System Failures.	
		Direct entry into 2AOP-4.0, Low Core Flow	
		Contact I/C for the RFP A trip and failure of Limiter #2 for Recirc A VFD.	
		Direct RO to insert rods per 0ENP-24.5 to get on or below the MELLL Line, if required. Power will need to be reduced to ≤60% with 1 RFP.	
		Direct chemistry to sample RCS activity due to power change greater than 15%.	
		May conduct a brief (see Enclosure 6 on page 47 for format)	

EVENT 5: 2A RFP TRIP – FAILURE OF VFD A TO RUNBACK			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	May report level decreasing, but recovering.	
		Performs immediate operator action of 0AOP-23, Determines a runback signal did not occur and Reduces 2A Recirc Pump speed to 48%.	
		Inserts control rods using 0ENP-24.5 to get below the MELLL line / reduce power, if required. Turns control rod power on. Selects control rod IAW ENP-24.5 sheet to get to desired power level. 14-27 38-27 26-39 Continuously drives selected rod in using RMCS Repeats steps until operation is below the MELLL line	
	BOP	Responds to annunciators: UA-13 (6-5) RFP A Control Trouble UA-04 (1-2) RFP A Turbine Tripped	
		Announce and enter AOP-23.0, Condensate/Feedwater System Failure	
		Announce and enter AOP-04.0, Low Core Flow	
		Dispatch an AO to acknowledge the local alarm panel for the RFP (Woodward).	
		Dispatches personnel to determine the cause of the RFP trip.	

EVENT 6: MTLO CONTOLLER FAILURE / REACTOR SCRAM – TURBINE TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to activate the Main Turbine Lube Oil Controller failure closed.
	Short time delay until response is seen.

Simulator Operator Role Play	
	If asked as the TB AO to investigate, report that the temperature control valve to the MTLO is closed. (There is no bypass valve).
	Verify turbine vibrations on 2, 3, and 4 begin to rise after receiving UA-23 1-6.
	If asked as I&C to investigate, acknowledge the request

Evaluator Notes	
Plant Response:	Main Turbine lube oil cooler controller fails closed. When high temperature alarm annunciates activate trigger to accelerate turbine vibrations.
Objectives:	SRO -Direct action in response to an abnormal turbine vibration per UA-23 6-1 and UA-23 6-3 RO - Respond to an abnormal turbine vibration per UA-23 6-1 and UA-23 6-3.
Success Path:	Reactor Scram and Turbine trip when vibrations reach setpoint IAW APPs.
Event Termination:	When a manual scram is inserted go to the next event.

EVENT 6: MTLO CONTOLLER FAILURE / REACTOR SCRAM – TURBINE TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of APP's.	
		When vibrations rise to above the TSI setpoint, direct manual scram and turbine trip per the vibration APP (12 mils on bearings 1-8, 10 mils on bearings 9-10) (As conservative decision making may insert before setpoint).	
		Direct breaking condenser vacuum.	
		May conduct a brief on when Reactor Scram is required (see Enclosure 6 on page 47 for format)	
	RO	Plant Monitoring	
		When directed by the CRS, insert a manual scram and trip the main turbine.	
		Recognize and report an ATWS.	

EVENT 6: MTLO CONTOLLER FAILURE / REACTOR SCRAM – TURBINE TRIP			
	BOP	Recognize and report rising lube oil temperatures.	
		Dispatch TB AO to investigate TCV.	
		Perform actions of APPs UA-23: 1-6 TURB OR RFP BRG TEMP HIGH 6-1 TURBINE VIBRATION HIGH 6-3 TSI HIGH VIBRATION TRIP If vibration is at or above 12 mils on bearings 1-8 or 10 mils on bearings 9 & 10 and an adjacent bearing has also exhibited a significant increase in vibration, then perform the following: (1) SCRAM the reactor (2) Trip the turbine (3) If directed by the Unit CRS, break condenser vacuum.	
		Monitor turbine bearing temperatures and vibrations (PC display 630)	
		May place the Main Turbine Lube Oil controller in manual and attempt to operate the valve.	

EVENTS 7, 8, 9: ATWS – SLC SWITCH FAILURE – SDV VENTS AND DRAINS FAIL	
Simulator Operator Actions	
	If requested to defeat Group I LL3, wait 2 minutes, and install jumpers **(Trigger 12)**
	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).
	If requested to defeat Drywell Cooler LOCA Lockout, wait three minutes, then install jumpers **(Trigger 13)**.

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 scram discharge volume vents and drains, acknowledge the request.

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 A&B switch position 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 SDV Vents and Drains.
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: ATWS – SLC SWITCH FAILURE – SDV VENTS AND DRAINS FAIL			
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.*** Direct ADS inhibited. Direct RWCU isolation verification. ***Direct LEP-02, Alternate Rod Insertion***	***CRITICAL TASK #1*** ***CRITICAL TASK #3***
		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. When met, direct injection be or remain terminated.	
		When Torus temperature is greater than 95° F, enters PCCP and directs Torus Cooling. (See Enclosure 5, page 45)	
		Directs Drywell cooling restored per SEP-10.	
		Direct injection established to maintain RPV level LL4 to TAF (or the level at which APRMs indicate downscale)	
		May conduct a brief (see Enclosure 6 on page 47 for format)	

EVENTS 7, 8, 9: ATWS – SLC SWITCH FAILURE – SDV VENTS AND DRAINS FAIL			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Place mode switch to shutdown when steam flow < $3x10^6$ lb/hr.	
		Initiates ARI.	
		Trips Recirc Pumps.	
		Initiates SLC. ***Verifies Isolation of RWCU***	***CRITICAL TASK #1***
		Recognizes failure of SLC switch and reports to SRO.	
		Monitor APRMs for downscale.	
		Performs LEP-02, Alternate Rod Insertion. (RMCS Section) Insert IRMs. When < range 3 on IRMs insert SRMs. Start both CRD pumps. Place CRD Flow Controller to Manual. Throttle open flow controller to establish > 260 drive water psid. Bypass RWM. ***Selects control rods and drives in using Emerg rod in notch override.***	***CRITICAL TASK #3***

EVENTS 7, 8, 9: ATWS – SLC SWITCH FAILURE – SDV VENTS AND DRAINS FAIL			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	***Performs LEP-02 Section 2.3:*** Inhibit ARI Places ARI Initiation Switch to INOP Places ARI Reset Switch to RESET and maintains for 5 seconds. Verifies red TRIP light above ARI Initiation is OFF Request LEP-02 Section 2.3 Jumpers be installed. Reset RPS when scram jumpers installed. Ensures Dish Vol Vent & Drain Test switch is in Isolate. Confirms Disch Vol Vent Valves V139 and CV-F010 are closed Confirms Disch Vol Drain valves V140 and CV-F011 are closed. Resets RPS. Place Disch Vol Vent & Drain Test switch to Normal Recognize/report failure of scram discharge volume vents and drains.	***CRITICAL TASK #3***

EVENTS 7, 8, 9: ATWS – SLC SWITCH FAILURE – SDV VENTS AND DRAINS FAIL			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Places ADS in inhibit.	
		Places Group 10 switches to override / reset	
		Terminate and prevent injection to RPV. Terminates and prevents HPCI IAW Hard Card. (Enclosure 1, page 40) Terminates and Prevents Feedwater IAW Hard Card. (Enclosure 3, page 42)	***CRITICAL TASK #2***
		May place HPCI in service for level control during ATWS when directed by the SRO. (Enclosure 2, page 41)	
		Restart RFP to maintain level as directed by SRO. (Enclosure 4, page 43)	
		When Torus temperature is greater than 95° F, places Torus Cooling in service. (Enclosure 5, page 45)	
		Break Condenser vacuum when directed by SRO	

ALL RODS IN	
Simulator Operator Actions	
	When directed by the Lead Evaluator, delete the following commands: Malfunction - RD036F, Scram Disch Vol Drn Fails Closed 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 the SDV vent and drain logic 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, the SDV vents and drains 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.	

EVENT 8: ALL RODS IN			
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 Disch Vol Vent & Drains are open when reported fixed.	
		Inserts a scram after discharge volume has drained for ~2 minutes.	***CRITICAL TASK #3***
		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 43, contains actions for restart of Condensate and Feedwater)	

ENCLOSURE 1

SECURING HPCI INJECTION

8.12.1 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. ☐

8.12.1 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:
   a. **DEPRESS AND HOLD** THE HPCI TURBINE TRIP PUSHBUTTON. ☐
   b. **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. ☐
   c. **WHEN** HPCI TURB BRG OIL PRESS LO, A-01 4-2, IS SEALED IN, **THEN RELEASE** THE HPCI TURBINE TRIP PUSHBUTTON. ☐
   d. **ENSURE** HPCI TURBINE STOP VALVE, E41-V8, **AND** HPCI TURBINE CONTROL VALVE, E41-V9, REMAIN CLOSED, **AND** HPCI DOES **NOT** RESTART. ☐

ENCLOSURE 2

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 3 Page 1 of 1

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 Page 1 of 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 ☐

ENCLOSURE 4 Page 2 of 2

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 ☐

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 Page 1 of 1

A Plant Status Brief is performed by the CRS utilizing the following format:

B *BEGIN*:
- Announce "Attention in the Control Room for a Plant Status Brief"
- Ensure all affected personnel are attentive, signified by each raising a hand

R *RECAP:*
- Provide overview of sequence of events and current plant status
- Identify major equipment failures
- Identify procedures that are in effect
- Discuss status of actions performed outside the MCR

I *INPUT*:
Each crew member discusses the following, as applicable:
- Critical parameters, including relevant trends (OAC/BOP)
- Manual control bands (OAC/BOP)
- Continuous action steps/carry over steps (OAC/BOP)
- Mitigation strategy and upcoming procedural transitions (STA)
- Time critical actions (STA)
- Limiting Technical Specification actions (STA/SM)
- Emergency Plan status including protective actions (SM)
- Any questions OR any observations not understood

E *EXPECTATION*:
- Identify anticipated plant conditions
- Identify critical upcoming activities, such as anticipated procedure transitions
- Discuss contingency actions
- Resume normal alarm response protocol (if desired)

F *FINISH*:
- Solicit any closing comments or questions
- Announce "End of brief."

When an Alignment Brief is used, it should contain the following elements:

1) CRS states "Attention in the Control Room for an Alignment Brief"

2) Ensure all affected personnel are attentive, signified by each raising a hand.

3) Discuss information as required for alignment. The discussion may include input/questions from crew members, provided that the discussion remains brief. Crew member input is not required.

4) The CRS announces "End of brief".

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	3
Abnormal Events	2-4	2
Major Transients	1-2	1
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:	J. Johnson			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	95%	Gross*/Net MWe*:	934 / 909
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	128.7 hrs			Days Online:	142 days
Turnover:	Feedwater Temperature Reduction will be implemented this weekend				
Protected Equipment:					
Comments:	APRM 4 has failed downscale and is bypassed. 2C TCC Pump is in service on Unit One. The BOP operator will swap CRD Pumps (place CRD Pump B in service and remove CRD Pump A from service for maintenance).				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2015 NRC SCENARIO 2

RBCCW PUMP TRIP, HPCI LOGIC POWER FAILURE, LOOP, LOCA, SRV TAILPIPE FAILURE, ED ON PSP

REVISION 0

Developer: *Lou Sosler*	**Date:** *9/11/2015*
Technical Review: *John Biggs*	**Date:** *9/23/2015*
Validator: *Thomas Baker*	**Date:** *9/11/2015*
Validator: *Brian Moschet*	**Date:** *9/11/2015*
Facility Representative: *Jerry Pierce*	**Date:** *9/23/1015*

REVISION SUMMARY	
0	Exam scenario for 2015 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

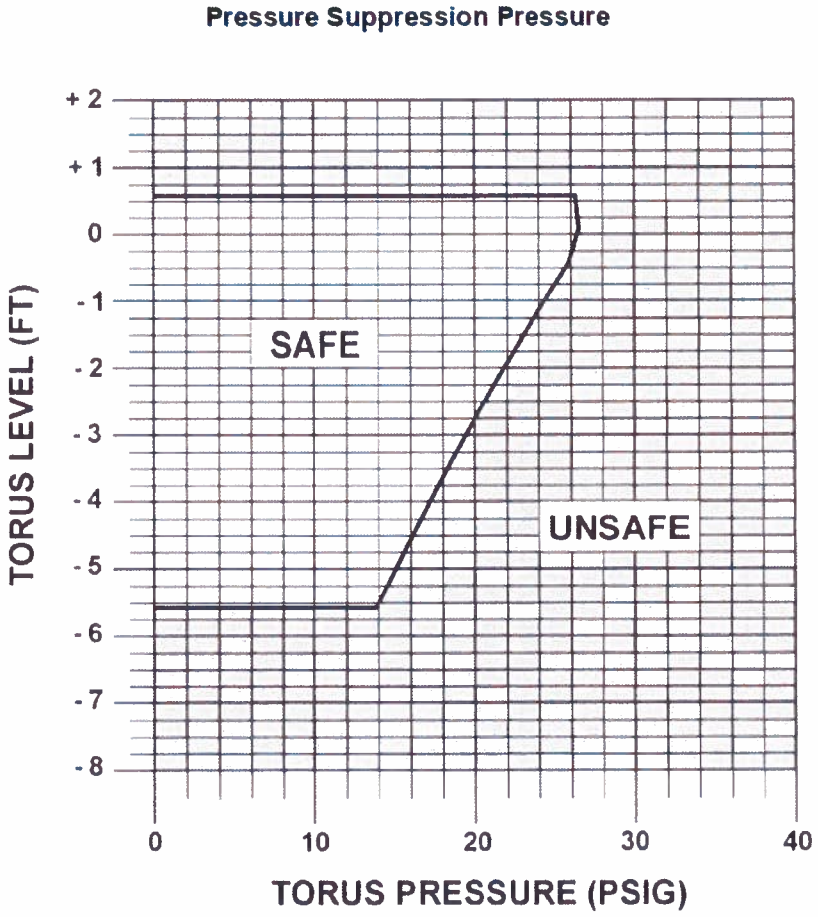
Event	Malf. No.	Type*	Event Description
1	NA	N-BOP	Perform 0PT-40.2.11
2	NA	R-RO	Raise power to 100% rated.
3	ZUA343	C-BOP C-SRO	Off Gas Filter Differential High
4	ES013F	C-RO C-SRO	HPCI Logic Bus A auto start fails – **Tech Spec**.
5	CW036F (A)	C-BOP C-SRO	CSW A trips on overcurrent – **AOP-19.0 - Tech Spec**. Failure of 2C CSW Pump to auto start
6	EE020F	C-RO C-SRO	SAT Relay Trip – Recirc Pumps Trip – **AOP-4.0**
7	NA	M	Reactor Scram
	EE009A	M	LOOP – **AOP-36.1**
	DG026F		DG3 auto starts and trips.
	DG006F	C	DG4 output breaker fails to auto close – closes when manually closed.
8	CA020F		SRV fails to close – tailpipe rupture – **AOP-30.0**
9	ES026F	C	RCIC Injection Valve motor thermal overload
10	RH020F	M	DW Sprays Fail – ED on PSP
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	Crew will perform 0PT-40.2.11, Main Generator Voltage Regulator Manual and Automatic Operational Check.
2	Crew will raise power from 80% to 100%.
3	A Clogged Off-gas filter will require a response IAW 2APP UA-03, 5-3 and 2OP-30 to place the standby filter in service.
4	The HPCI logic power fuse will blow requiring HPCI to be manually isolated per the APP and declared Inoperable per TS 3.5.1, Condition D and also Condition E (HPCI & CS Inop) which requires restoration of one of the two within 72 hours.
5	A 4KV Bus E3 motor overload alarm will be received, followed by a CSW Pump A trip alarm, but the pump will fail to trip. The crew should trip CSW Pump A and start CSW Pump C per the APPs. CSW Pump C will fail to auto start on low header pressure.
6	The SAT will trip and lockout on fault, resulting in a trip of both Reactor Recirculation Pumps. The crew is required to insert a manual reactor scram per AOP-04.0.
7	When the reactor scram is inserted and the turbine is tripped, a loss of off-site power will result since the SAT is not available. Diesel Generator #3 auto starts and energizes Bus E3. Diesel Generator #4 starts but the output breaker fails to close. Operator action is required to close the output breaker to energize E4. The crew will respond per AOP-36.1.
8	When SRV F is opened for pressure control it will not reclose. A downcomer failure will cause Drywell and Torus pressure to rise.
9	When RCIC is started for level control, the Injection Valve thermals out but can be reset locally.
10	When RHR 2A is placed in drywell spray, the outboard spray valve (F016A) will fail to open. When crew attempts to place RHR 2B in service spray logic will fail to energize and Drywell Spray will not immediately be available. Emergency Depressurization will be required based on PSP.

3.0 CREW CRITICAL TASKS

Critical Task #1
Ensure DG4 starts and close the output breaker to energize E4.
Critical Task #2
Emergency Depressurize the Reactor when Pressure Suppression Pressure (PSP) cannot be maintained in the safe region.



4.0 TERMINATION CRITERIA

Once the reactor is depressurized, and level is being restored to normal band, the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

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

Number	Title
0PT-40.2.11	MAIN GENERATOR VOLTAGE REGULATOR MANUALL AND AUTOMATIC OPERATIONS CHECK
2APP UA-03, 5-3	OFFGAS STBY FILTER DIFF-HIGH
APP 2A-1, 5-5	HPCI LOGIC BUS A PWR FAILURE
APP 2A-1, 6-4	HPCI COND STORAGE TNK WTR LVL LO
APP 2UA-17, 6-1	E3 4KV MOTOR OVLD
APP 2UA-01, 1-8	CSW PUMP A TRIP
2AOP-4.0	LOW CORE FLOW
0AOP-19.0	CONVENTIONAL SERVICE WATER SYSTEM FAILURE
0AOP-36.1	LOSS OF ANY 4160V BUSES OR 480V E-BUSES
0AOP-30.0	SAFETY/RELIEF VALVE FAILURES

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-25.
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. **ALIGN** the plant as follows:

Manipulation
1. Ensure 2C TCC pump is in service on Unit One. Part of Scenario load.
2. Lower power to 80% using Recirc Flow.
3. Null DVM after lowering power.

11. **LOAD** Scenario File.
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
Core Spray Pump A	

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

    All remaining low pressure ECCS Systems.

15. **VERIFY** 0ENP 24.5 Form 2 (Immediate Power Reduction Form) for IC-25 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
None

18. **ENSURE** Station Duty Manager and Work Week Manager names are filled in on the Shift Turnover Sheet.

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

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

21. **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	ZUA343 - [OFF GAS FILTER DIFF-HIGH]
2	Malfunction	ES013F - [HPCI LOGIC BUS A AUTO START FAILS]
2	Malfunction	ES014F - [INADVERTANT HPCI SYS INITIATION]
3	Annunciator	ZUA118 - [CONV HDR SW PUMP A TRIP]
3	Malfunction	CW036F - [CONV SERVICE WATER PUMP MOTOR OVERLOAD]
4	Malfunction	EE020F - [UNIT 2 SAT RELAY FAILURE]
5	Malfunction	CA020F - [SRV F TAIL PIPE RUPTURE]
6	Malfunction	ES026F - [RCIC INJECTION VLV MOTOR OVLD]
7	Malfunction	ES004F - [ADS VALVE F FAILS OPEN]
8	Malfunction	DG026F - [DG3 DIFFERENTIAL FAULT]
9	Malfunction	RH020F - [2-E11-V32 OPEN COMMAND]
10	Trigger Command	and:ZUA118
11	Annunciator	ZA322 - [AUTO DEPRESS CONTROL PWR FAILURE]
11	DO Override	Q1508LGJ - [SRV VLV B21-F013F GREEN]
11	DO Override	Q1508RRJ - [SRV VLV B21-F013F RED]
12	Remote Function	HP_ZVHP041M - [SUPP SUCTION VLV E41-F041]
13	Remote Function	HP_ZVHP042M - [TORUS SUCTION VLV E41-F042]
14	Remote Function	ED_ZIEDH08 - [PNL 2AB PWR (E7=NORM/E8=ALT)]
15	Remote Function	ED_ZIEDH11 - [PNL 2AB-RX PWR (E7=NORM/E8=ALT)]
16	Remote Function	ED_ZIEDHX0 - [PNL 32AB PWR (E7=NORM/E8=ALT)]
17	Remote Function	SW_VHSW146L - [CONV SW TO RBCCW HXS V146]
18	Remote Function	ED_IARKAI0 - [X-TIE BKR E8-E7 (AI0) RACK STATUS]
18	Remote Function	ED_IARKAX5 - [X-TIE BKR E7-E8 (AX5) RACK STATUS]

Trig #	Trigger Text
6	Q1619RRM - [RCIC INJECT VLV E51-F013 RED]
7	Q1508RRJ - [SRV VLV B21-F013F RED]
8	Q4F06DG8 - [LOADED (RED) DG-3]
9	K1D26ENN - [CONT SPRAY VLV E11-F016A]
10	K4B39EP4 - [CONV HDR SW PMP A DISCH VLVS]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
DG006F	DG 4	DG OUTPUT BREAKER FAIL TO AUTO CLOSE	True	True				
ES013F		HPCI LOGIC BUS A AUTO START FAILS	False	True				2
ES014F		INADVERTANT HPCI SYS INITIATION	False	True				2
CW036F	A	CONV SERVICE WATER PUMP MOTOR OVERLOAD	False	True				3
EE020F		UNIT 2 SAT RELAY FAILURE	False	True				4
CA020F		SRV F TAIL PIPE RUPTURE	False	True				5
ES026F		RCIC INJECTION VLV MOTOR OVLD	False	True				6
ES004F		ADS VALVE F FAILS OPEN	False	True				7
DG026F		DG3 DIFFERENTIAL FAULT	False	True		00:02:00		8
RH020F	E11-F016A	CONTAINMENT SPRAY * VLV E11-F016A	False	True				9

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
ED_IABKCF05		BKR CTL DC FUSES CORE SPRAY PUMP 2A	OUT	OUT			
CC_IACW4518		2C TBCCW PUMP UNIT ALIGNMENT	1	1			
HP_ZVHP041M		SUPP SUCTION VLV E41-F041	ON	OFF			12
HP_ZVHP042M		TORUS SUCTION VLV E41-F042	ON	OFF			13
ED_ZIEDH08		PNL 2AB PWR (E7=NORM/E8=ALT)	NORMAL	ALT			14
ED_ZIEDH11		PNL 2AB-RX PWR (E7=NORM/E8=ALT)	NORMAL	ALT			15
ED_ZIEDHX0		PNL 32AB PWR (E7=NORM/E8=ALT)	NORMAL	ALT			16
SW_VHSW146L		CONV SW TO RBCCW HXS V146	SHUT	OPEN			17
ED_IARKAX5		X-TIE BKR E7-E8 (AX5) RACK STATUS	OUT	IN			18
ED_IARKAI0		X-TIE BKR E8-E7 (AI0) RACK STATUS	OUT	IN			18

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K4B41A	CONV HDR SW PMP C DISCH VLVS	AUTO	ON	OFF				
K1727A	CONT SPRAY VLV CONTROL	NORMAL	ON	ON				
K1727A	CONT SPRAY VLV CONTROL	MANUAL	OFF	OFF				
K1727A	CONT SPRAY VLV CONTROL	RESET	OFF	OFF				
Q1508RRJ	SRV VLV B21-F013F RED	ON/OFF	OFF	OFF				11
Q1508LGJ	SRV VLV B21-F013F GREEN	ON/OFF	ON	OFF				11

ANNUCIATOR OVERRIDES

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
4-3	OFF GAS FILTER DIFF-HIGH	ZUA343	ON	ON	OFF			1
1-8	CONV HDR SW PUMP A TRIP	ZUA118	ON	ON	OFF	00:03:00		3
2-2	AUTO DEPRESS CONTROL PWR FAILURE	ZA322	ON	ON	OFF			11

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: SHIFT TURNOVER - 0PT-40.2.11	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.

Simulator Operator Role Play	
	As operator at the Excitation Regulator and Control cubicle in the Turbine Building on the 70 ft elevation west, monitor regulator output.
	As Load Dispatcher, provide name and acknowledge Main Generator Voltage Regulator will be placed in MANUAL.
	As Load Dispatcher, provide name and acknowledge Main Generator Voltage Regulator will be placed in AUTOMATIC.
	Alt Power performed SAT by NE.

Evaluator Notes	
Plant Response:	None
Objectives:	Perform 0PT-40.2.11, Main Generator Voltage Regulator Manual and Automatic Check
Success Path:	Perform PT IAW 0PT-40.2.11
Event Termination:	Go to Event 2 at the direction of the Lead Evaluator.

EVENT 1: SHIFT TURNOVER - 0PT-40.2.11			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Conduct shift turnover shift briefing.	
		Direct RO to perform 0PT-40.2.11, Main Generator Voltage Regulator Manual and Automatic Operational Check.	
	RO	Monitors the plant	
	BOP	Perform 0PT-40.2.11 (Make any required log entries into a rough operator log)	
		Operate 70CS (Gen Manual Volt Adj Rheo)	
		Ensure 43CS (Regulator Mode Selector) in AUTO. Station an operator at the Excitation Regulator and Control cubicle in the Turbine Building on the 70 ft elevation west to monitor regulatoroutput during the following steps Raise 70CS (Gen Manual Volt Adj Rheo) until the Upper Limit light comes ON Lower 70CS (Gen Manual Volt Adj Rheo) until the Low Limit light comes ON Using 70CS (Gen Manual Volt Adj Rheo) on the RTGB, null Gen Volt Reg Diff Volt meter	

EVENT 1: SHIFT TURNOVER - 0PT-40.2.11			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
		IF D1VM (D.C. Reg. Output) variation was smooth AND in the same direction as rheostat movement, THEN perform the following: Notify the Load Dispatcher the main generator voltage regulator is being placed in MANUAL. Person Notified Document the Load Dispatcher notification in the log Place 43CS (Regulator Mode Selector) in MAN.	
		Operate 90CS (Gen Auto Volt Adj Rheo) Raise 90CS (Gen Auto Volt Adj Rheo) until the Upper Limit light comes ON Lower 90CS (Gen Auto Volt Adj Rheo) until the Low Limit light comes ON. Null Gen Volt Reg Diff Volt meter on the RTGB using 90CS (Gen Auto Volt Adj Rheo). IF A1VM (A.C. Reg. Output) variation was smooth AND in the same direction as rheostat movement, THEN perform the following: Place 43CS (Regulator Mode Selector) in AUTO Notify the Load Dispatcher the main generator voltage regulator is in AUTOMATIC	

EVENT 2: RAISE POWER	
Simulator Operator Actions	

	Simulator Operator Role Play
	If contacted as the RE to address thermal limits, inform crew that you will monitor core performance on the computer and perform the Alt Power Calculation.
	If contacted as Chemistry for performing samples for >15% power change acknowledge the request.

Evaluator Notes	
Plant Response:	Power will be raised using Recirc flow from 80% toward 100%.
Objectives:	SRO - Direct actions for power increase using Recirc flow. RO – Raise power. BOP – Monitor balance of plant.
Success Path:	Power is raised using Recirc flow from 80% to 100% monitoring the Power-to-Flow Map and balance of plant.
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: RAISE POWER

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Directs power to be raised using recirculation flow	
		May contact chemistry to pull samples for a >15% power change.	
		Conducts reactivity briefing (May ask for reactivity team)	
	RO	May reference 2OP-02 section 6.1.3	
		Request peer checker / reactivity team.	
		Raises power using recirculation flow to ~100% power. Raise RR Pump speed by depressing the Master Raise Medium pushbutton 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 Confirm the following: • 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] • 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] Nulls DVM as power is being raised. Continues Raising Recirc pump speed until 100% power.	

EVENT 2: RAISE POWER			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Verifies operation on the Power to Flow Map	
		Monitors and adjusts balance of plant conditions	

EVENT 3: OFF GAS FILTER HIGH DP	
Simulator Operator Actions	
	At the direction of the lead evaluator, **Initiate Trigger 1** to bring in Off-Gas Filter Diff-Hi annunciator
	Once filter is swapped, delete malfunction (annunciator override).

Simulator Operator Role Play	
	IF contacted as Outside AO to verify Off-gas filter Diff pressure, report local DP indication is reading 13 inches water.
	IF contacted as Unit One report steps 6.3.3.2 and 3 are complete. (1-OG-FV-244-4, 1-OG-FV-244-5, and 1-AOG-HCV-101 are closed)
	IF contacted as AO report 1-OG-CD-V7 is CLOSED (Step 4)
	IF contacted as AO report 2-OG-CD-V7 is OPEN (Step 5)
	IF contacted as Outside AO to verify Off-gas filter Diff pressure after filter swap, report local DP indication is reading 3 inches water.
	2AOG-HCV-101 is in OPEN position.

Evaluator Notes	
Plant Response:	Off-Gas Filter Diff-Hi alarm annunciates
Objectives:	SRO -Direct actions in response to a Off-gas Filter Diff-Hi alarm RO – Monitor reactor BOP – Respond to clogged off-gas filter IAW APP and 2OP-30
Success Path:	Swap Off-gas filters per OP-30
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: OFF GAS FILTER HIGH DP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct crew to perform the actions of UA-3, 4-3, OFF GAS FILTER DIFF-HIGH alarm	
		Direct crew to swap Off-gas filters per OP-30 Section 6.3.3. Should identify that a PRR needs to be written for the APP (or verified that one has already been written) to reference the correct procedure section to swap off-gas filters (Section 6.3.3)	
		May conduct a brief (see Enclosure 5 on page 47 for format)	
	BOP	Respond to UA-3, 4-3, OFF GAS FILTER DIFF-HIGH alarm Dispatch Outside AO to verify Off-gas filter Diff Hi locally	
		Place Off-gas Stby filter in service per OP-30 Section 6.3.3 as follows: ☐ Ensure 1-OG-FV-244-4 and 244-5 are closed ☐ Ensure 1-AOG-HCV-101 is closed ☐ Ensure 1-OG-CD-V7 is closed (Local) ☐ OPEN 2-OG-CD-V7 (Local) ☐ OPEN 2-OG-FV-244-4 and 244-5 ☐ OPEN 2-AOG-HCV-101 Remove Off-gas Filter from service as follows: ☐ CLOSE 2-OG-FV-244-1,2,3 ☐ Ensure Filter d/P is less than 10" water Place 2-AOG-HCV-101 control switch to OPEN (Local)	
	RO	Monitor Plant	

EVENT 4: HPCI LOGIC BUS A FAILURE	
Simulator Operator Actions	
	When directed by lead evaluator, **Initiate Trigger 2** to activate HPCI fuse failure.
	If requested to open breakers for E41-F041 and F042 (MCC 2XDA) when valves are shut, monitor valve positions on panel mimic (P601 Section A2). At direction of RO, when E41-F041 indicates closed, OPEN breaker. At direction of RO, when E41-F042 indicates closed, OPEN breaker.

Simulator Operator Role Play	
	If asked as AO to investigate, report all circuit breakers in DC SWBD 2A & Panel 4A are closed
	If asked as I&C to investigate, wait 2 minutes and report fuse E41A-F1 in panel P620 is blown (blows again if replaced).
	If asked as WCC/OC SRO for clearance or Equipment Control tags, acknowledge request.
	If requested to open breakers for E41-F041 and F042 (MCC 2XDA) when valves are shut, monitor valve positions on panel mimic (P601 Section A2). **(Triggers 12 and 13).**

Evaluator Notes	
Plant Response:	The HPCI logic power fuse will blow requiring HPCI to be manually isolated per the APP and declared Inoperable per TS 3.5.1.
Objectives:	SRO - Declare HPCI Inoperable RO - Recognize logic failure and Isolate HPCI BOP – Monitor Plant
Success Path:	HPCI declared inoperable IAW TS 3.5.1 and isolated IAW APP
Event Termination:	Go to Event 5 at the direction of the Lead Evaluator.

EVENT 4: HPCI LOGIC BUS A FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct annunciator response for A-1: ☐ 5-5, HPCI LOGIC BUS A PWR FAILURE ☐ 6-4, HPCI COND STORAGE TNK WTR LVL LO	
		May identify requirement to initiate an impairment IAW 0PLP-01.5. (This action may be directed to Ops Center SRO / HPCI is considered a Train A system for ASSD.)	
		Directs BOP to monitor the plant.	
		Determines depressurization of steam supply is NOT required.	
		Contacts I&C to investigate HPCI LOGIC BUS A PWR FAILURE	

EVENT 4: HPCI LOGIC BUS A FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Refers to Tech Spec 3.5.1 ECCS —Operating and Determines: CONDITION A. One low pressure ECCS injection/spray subsystem inoperable. REQUIRED ACTION A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status within 7 days. CONDITION D REQUIRED ACTION: D.1 Verify by administrative means RCIC System is OPERABLE. Immediately AND D.2. Restore HPCI System to OPERABLE status. 14 days CONDITION E REQUIRED ACTION: E.1 Restore HPCI System to OPERABLE status. 72 hours OR E.2 Restore low pressure ECCS injection/spray subsystem to OPERABLE status. 72 hours	
		May request equipment control tags to support abnormal HPCI system alignment.	
		May conduct a brief (see Enclosure 5 on page 47 for format)	

EVENT 4: HPCI LOGIC BUS A FAILURE

Time	Pos	EXPECTED Operator Response	Comments
	RO	Acknowledge and report annunciators A-1: 5-5 HPCI LOGIC BUS A PWR FAILURE 6-4 HPCI COND STORAGE TNK WTR LVL LO	
		Report HPCI Suction is aligned to both the CST and Suppression Pool.	
		Performs **APP A-1 5-5 (HPCI LOGIC BUS A PWR FAILURE)** actions: 1. Close the Condensate Storage Tank Suction Valve, E41-F004. 2. Isolate the HPCI Steam Supply per **OP-19, Section 8.5.** 1) CLOSE STEAM SUPPLY INBOARD ISOL VLV, E41-F002. 2) CLOSE STEAM SUPPLY OUTBOARD ISOL VLV, E41-F003. 3) Depressurizing steam supply is NOT required, but if performed will require performance of 0PT-02.3.1b, Suppression Pool to Drywell Vacuum Breaker Position Check, within 6 hours Continues **APP A-1 5-5 (HPCI LOGIC BUS A PWR FAILURE)** actions: 3. Close the Turbine Exhaust Vacuum Breaker Valve, E41-F075. Contacts RBAO to standby for opening breakers on MCC 2XDA when the following valves indicate Full Closed. 4. Close the Torus Suction Valve, E41-F041. 5. Close the Torus Suction Valve, E41-F042.	Informs SRO of expected alarm A-1 1-1 HPCI VAC BKR VLV F075/F079 NOT FULL OPEN
		Notifies SRO APP actions are complete and to reference TS 3.5.1 and TRM 3.6.	No impact to TRM 3.6 BUS POWER MONITORS (alarm worked).
	BOP	Monitors the plant and reports CST at normal level.	

EVENT 5: 2A CSW PUMP TRIP / FAILURE OF 2C TO START	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 3** to activate CSW Pump A trip
	When CSW Pump 2A is tripped, ensure alarm override ZUA118 is deleted.

Simulator Operator Role Play	
	When asked as OAO to investigate, report 51 device actuation (phase B only before pump trip alarm, all 3 phases's after pump trip alarm) at breaker on E3. (Note: Phase B overcurrent brings in pump motor overload alarm, overcurrent on all 3 phases brings in pump trip alarm, but pump does not trip.)
	If requested as I&C to investigate CSW Pump malfunctions, acknowledge the request.

Evaluator Notes	
Plant Response:	E3 motor overload alarms. Two minutes later CSW 2A trip alarms, but pump fails to trip. CSW Pump 2C fails to auto start, can be manually started.
Objectives:	SRO - Direct entry into AOP-19.0. RO - Monitors reactor plant parameters BOP – Take actions IAW 0AOP-19. 0
Success Path:	CSW Pump A is tripped. CSW Pump C is started.
Event Termination:	Go to Event 6 at the discretion of the Lead Evaluator.

EVENT 5: 2A CSW PUMP TRIP / FAILURE OF 2C TO START			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry into AOP-19.0, Conventional Service Water Failures.	
		Direct CSW Pump 2A be tripped and CSW Pump 2C be started. (in any order)	
		Direct I&C to investigate CSW Pump 2A overcurrent and trip failure and failure of CSW Pump 2C to auto start.	
		Tech Spec 3.7.2 SW System and UHS Condition C.1 Verify the one OPERABLE CSW pump and one OPERABLE Unit 2 NSW pump are powered from separate 4.16 kV emergency buses Immediately. and C.2 Restore required CSW pump to OPERABLE Status within 7 days. The SW System is considered OPERABLE when it has two OPERABLE CSW pumps (specifically the CSW 2A and CSW 2C pumps), three site NSW pumps (any combination of Unit 1 and Unit 2 NSW pumps), and an OPERABLE flow path capable of taking suction from the intake structure and transferring the water to the ECCS equipment and the DGs. For a CSW pump to be considered OPERABLE, it must be capable of supplying the CSW header and the NSW header.	
		May conduct a brief (see Enclosure 5 on page 47 for format)	
	RO	Monitor plant parameters	

EVENT 5: 2A CSW PUMP TRIP / FAILURE OF 2C TO START			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Dispatch AO to investigate UA-17, 6-1, 4KV Motor Overload alarm.	
		When directed, announce and execute 0AOP-19.0, Conventional Service Water Failures.	
		Recognize/report trip alarm of CSW Pump 2A and Pump still running.	
		Manually trip CSW Pump 2A and manually start CSW Pump 2C.	

EVENTS 6 and 7: SAT RELAY TRIP – RECIRC PUMPS TRIP – MANUAL SCRAM	
Simulator Operator Actions	
	When directed by the lead evaluator, **Initiate Trigger 4** to trip the SAT.

Simulator Operator Role Play	
	If directed to investigate, report no signs of visible damage to the SAT.
	If asked as I&C or Maintenance to investigate, acknowledge the request

Evaluator Notes	
Plant Response:	SAT Fault, trip of both Recric Pumps, Manual Scram
Objectives:	SRO – Direct Reactor Scram – Enter RSP RO – Report trip of both Recirc Pumps, Scram Reactor BOP – Identify plant electrical response
Success Path:	Identify loss of BOP, trip of Recirc Pumps and Scram Reactor
Event Termination:	Go to Event 8 at the direction of the lead evaluator.

EVENTS 6 and 7: SAT RELAY TRIP – RECIRC PUMPS TRIP – MANUAL SCRAM			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Enter AOP-04.0 and direct a manual reactor scram	
		Enter EOP-01-RSP	
		Direct RPV level be controlled +166-206 inches	
		Direct group isolations, ECCS and DGs verified	
		May conduct a brief (see Enclosure 5 on page 47 for format)	
	RO	Diagnose and report SAT failure and loss of Recirc Pumps	
		Insert a manual scram	
		Perform scram Immediate Actions	Enclosure 1
		Operate RCIC/SRVs to maintain level and pressure as directed by CRS NOTE: RCIC has a thermal overload and will only obtain ~150 gpm.	
	BOP	Report status of plant electrical system,	

EVENT 7: LOSS OF OFF-SITE POWER – DG4 FAILURE	
Simulator Operator Actions	
	If requested to align RBCCW to CSW cooling, wait 4 minutes and modify Remote Function SW_VHSW146L, OPEN **(Trigger 17)**
	If requested restart RPS MG sets check status of EPA Breakers (RPS A EPA breakers will probably be Set status since DG3 will most likely be at rated speed/voltage when the turbine is tripped) Modify remote functions under RPS as necessary (will have to start RPS MG set B and close the associated EPA breakers)
	If requested to monitor running DGs, acknowledge alarms using DG Local Alarm Panel (Instructor Aids/Panels) and report alarms if requested
	If requested to swap AB panels, wait 5 minutes then initiate: **Trigger 14** - 2AB to alt. **Trigger 15** - 2AB-RX to alt. **Trigger 16** - 32AB to alt. Report panels swapped to alternate.

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	When Reactor is Scammed, without SAT, off-site power is lost.
Objectives:	SRO – Respond IAW 0AOP-36.1, RSP, PCCP BOP – Diagnose and report electrical plant status RO – Control Reactor level and pressure
Success Path:	Start DG4 and close breaker to E4

EVENT 7: LOSS OF OFF-SITE POWER – DG4 FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Enter and direct EOP-01-RSP	
		Enter and direct the activities of AOP-36.1, Loss of any 4160V Buses of 480V E-Buses	
		Direct a UAT backfeed be established	
		Identify DG4 output breaker failure to auto close and direct actions to close breaker to energize E4	***CRITICAL TASK #1***
		Direct leve to be maintain 166 – 206 inches and pressure to be maintained 800 – 100 psig.	
	RO	Control Reactor pressure and level as directed by the SRO	
		Start RHR in suppression pool cooling (See Enclosure 6, page 48)	
		May start CRD per OP-08	

EVENT 7: LOSS OF OFF-SITE POWER – DG4 FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Recognizes trip of DG3 on Differential Overcurrent	
		Enter and announce AOP-36.1, Loss of any 4160V Buses of 480V E-Buses	
		Close the output breaker of DG4 to energize E4	***CRITICAL TASK #1***
		Direct AO to monitor DG operation	
		Direct AO to align 2AB, 2AB-RX, and 32AB to their alternate power supply.	
		Direct actions for UAT backfeed	
		Align available pneumatics to the drywell	
		Start available Service Water pumps	
		Ensure SW-V103/106 closed and direct AO to open SW-V146 (RCC on CSW)	
		Start Control Building HVAC	
		Ensure available drywell cooling is operating	
		Direct AO to start available RPS MG Sets	
		Ensure Service Air cross-tie 2-SA-PV-5071 is open	

EVENTS 8: SRV FAILS TO CLOSE – TAILPIPE RUPTURE	
Simulator Operator Actions	
	Ensure that SRV F stays open when close is attempted, or **Initiate Trigger 11** to fail open SRV F if SRVs are opened in an alternate sequence.
	At the direction of the Lead Evaluator, **Initiate Trigger 5,** to initiate tailpipe rupture.

Simulator Operator Role Play	
	If approval for cross-tie requested from Unit 1, grant permission.
	If cross-tie actions are requested, rack in cross tie breakers for E7-E8, **Initiate Trigger 18.**

Evaluator Notes	
Plant Response:	
Objectives:	SRO – Failure of the tailpipe will cause Drywell and Torus pressures to rise RO – Identify and report SRV not closed, enter 0AOP-30.0 BOP – Continue to execute)AOP-36.1
Success Path:	Rising Drywell and Torus pressures are identified and PSP chart is monitored

EVENTS 8: SRV FAILS TO CLOSE – TAILPIPE RUPTURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Execute PCCP and direct Torus and Drywell sprays	
		Monitor PSP (Enclosure 2, page 38)	
		Direct entry into 0AOP-30.0, Safety/Relief Valve failures	
		Enter and direct action of PCCP Before Suppression Chamber pressure reaches 11.5 psig directs SP Spray IAW SEP-03 When Suppression Chamber exceeds 11.5 psig directs DW Spray IAW SEP-02	
		May conduct a brief (see Enclosure 5 on page 47 for format)	
	RO	Perform 0AOP-30.0 actions: NOTE: A full open SRV will not reseat until reactor pressure reduces to the reseat pressure for that SRV (approximately 900 to 1100 psig). CYCLE the control switch of the affected safety/relief valve to OPEN and CLOSE OR OPEN and AUTO several times. (Immediate Operator Action of AOP-30) ENSURE the affected safety/relief valve control switch is left in CLOSE OR AUTO. IF a safety/relief valve is stuck open, THEN PERFORM the following: Directs OPS Center to PULL the fuses for the affected safety/relief valve IAW 0AOP-30.0. MONITOR the following to determine safety/relief valve position: o Tailpipe Temperatures (ERFIS Screen 241 Other indications as available (feed/steam flow mismatch, generator	

		MWE, etc.)	
		Perform Torus and Drywell Sprays as directed SEP-03 Enclosure 3, page 39. SEP-02 Enclosure 4 page 41.	
		Continue to perform 0AOP-36.1 as directed by SRO	

EVENTSS 9 and 10: ED - RCIC INJECTION VALVE MOTOR OVERLOAD – RHR SPRAY FAILURE	
Simulator Operator Actions	
	Delete malfunction ES026F when thermal overload is reset for RCIC Injection Valve.
	Delete overrides for RHR Loop B spray logic once ED is commenced.
	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 asked to check breaker for E51-F013, RCIC Injection valve, on 2XDB, report thermal overload tripped. If asked to reset thermal overload, DELETE malfunction ES026F and report valve reset.
	If asked to check breaker for E11-F016A (MCC 2XC) report thermal overload tripped, if directed to reset thermal overload, report it trips again, if directed to manually open E11-F016A, report valve is bound.
	If asked as I&C, to investigate failure of spray logic for RHR Loop B, acknowledge request. Once PSP is exceeded and Emergency Depressurization is commenced, report loose wire found and deleted overrides for RHR Loop B so that Drywell and Torus sprays can be commenced.
	.

Evaluator Notes	
Plant Response:	
Objectives:	SRO – Direct ED when PSP is exceeded. RO – Perform ED when directed by the SRO BOP – Assist RO at direction of SRO
Success Path:	Reactor is depressurized and water level is in normal band.
Scenario Termination:	***Reactor is depressurized, level is being restored to normal band, and sprays have been directed.***

EVENTS 9 and 10: ED - RCIC INJECTION VALVE MOTOR OVERLOAD – RHR SPRAY FAILURES			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Monitor Containment parameters and identify PSP exceeded.	
		Direct Emergency Depressurization when PSP cannot be maintained in the safe region. ***PSP Graph Enclosure 2***	***CRITICAL TASK #2***
		Direct investigation of E51-F016	
		Direct investigation of RHR Loop B spray logic.	
		Manage controlled reflood after depressurization.	
	RO/ BOP	Recognize and report failure of E11-F016A to open as thermal overload.	
	RO/ BOP	Dispatch AO to check breaker and attempt to reset thermal overload per the APP.	
	RO/ BOP	***When directed by SRO, Open 7 ADS valves***	***CRITICAL TASK #2***
	RO/ BOP	Restore water level to normal band.	

ENCLOSURE 1 Page 1 of 1

SCRAM IMMEDIATE ACTIONS

1. **Ensure** SCRAM valves OPEN by manual SCRAM or ARI initiation.

2. **WHEN** steam flow less than 3 x 10^6 lb/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

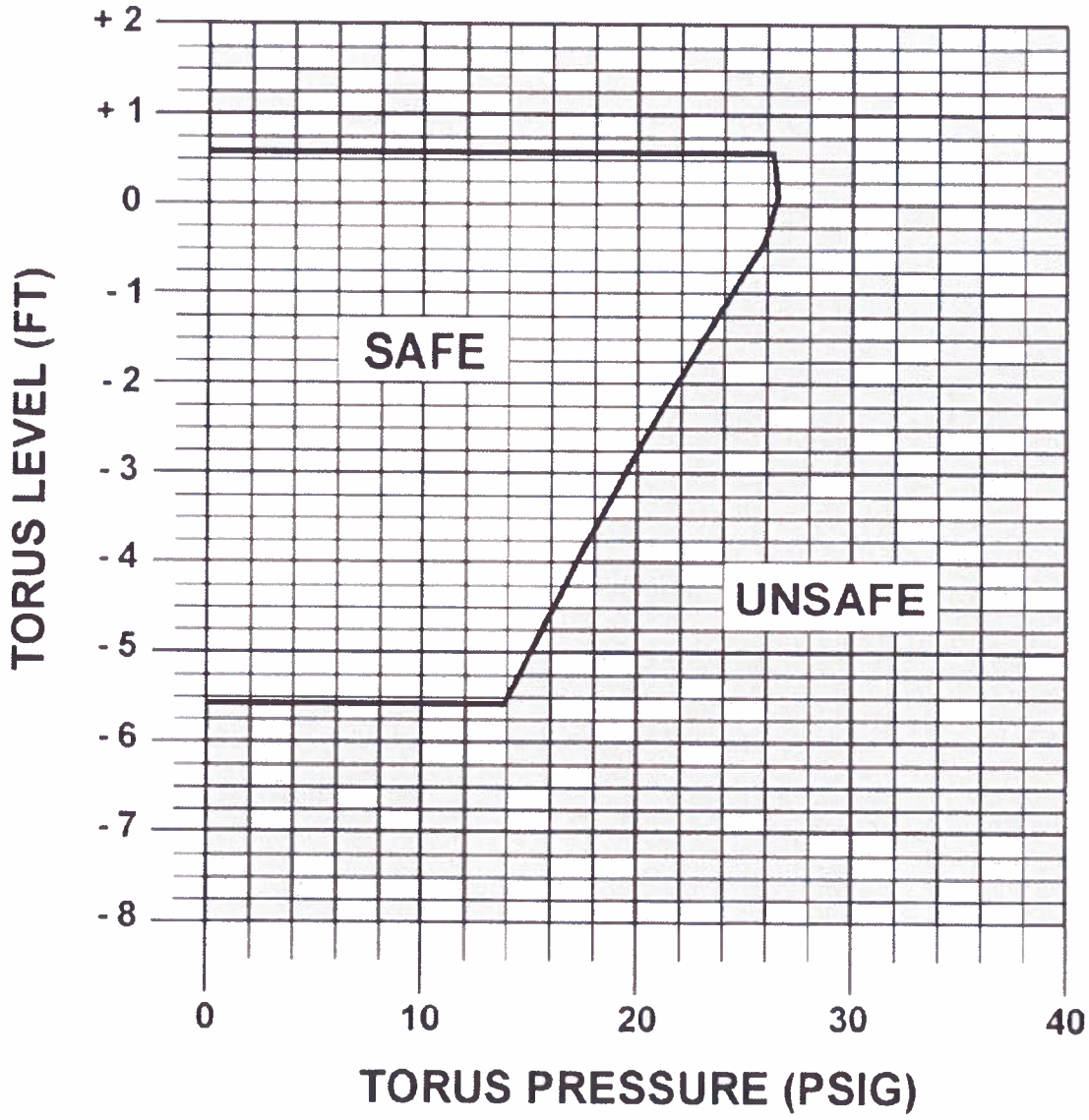
     AND

   - RPV level rising,

   THEN trip one.

ENCLOSURE 2

Pressure Suppression Pressure



ENCLOSURE 3

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:

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

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

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

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

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

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

ENCLOSURE 3 Page 2 of 2

2.1.3 Torus Spray Actions (continued)

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

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

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

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

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

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

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

4. **WHEN** torus pressure drops to 2.5 psig **OR** directed to terminate sprays,
THEN ensure CLOSED:

   - E11-F027A (Torus Spray Isol Vlv) ☐ RO
   - E11-F027B (Torus Spray Isol Vlv) ☐ RO

5. **IF** re-initiation of sprays required,
THEN return to Section 2.1.3 Step 1. ☐ RO

6. **WHEN** sprays **NO** longer required,
THEN go to Section 2.2 ☐ RO

ENCLOSURE 4 Page 1 of 6

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

ENCLOSURE 4 Page 3 of 6

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

ENCLOSURE 4 Page 4 of 6

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

ENCLOSURE 4 Page 5 of 6

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

ENCLOSURE 4

2.1.3 Drywell Spray Actions (continued)

l. **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

11. **WHEN** drywell pressure drops to 2.5 psig **OR** directed to terminate drywell spray,
THEN ensure CLOSED:

a. E11-F016A (Drywell Spray Otbd Isol Vlv) ..... ☐ RO

b. E11-F021A(Drywell Spray Inbd Isol Vlv). ..... ☐ RO

c. E11-F016B (Drywell Spray Otbd Isol Vlv) ..... ☐ RO

d. E11-F021B (Drywell Spray Inbd Isol Vlv). ..... ☐ RO

12. **Ensure** either:

- RHR operated in LPCI mode ..... ☐ RO
- RHR operated in Torus Cooling. ..... ☐ RO
- RHR pumps are secured ..... ☐ RO

13. **IF** re-initiation of drywell spray required,
THEN return to Section 2.1.3 Step 9. ..... ☐ RO

ENCLOSURE 5 Page 1 of 1

A Plant Status Brief is performed by the CRS utilizing the following format:

B *BEGIN*:
- Announce "Attention in the Control Room for a Plant Status Brief"
- Ensure all affected personnel are attentive, signified by each raising a hand

R *RECAP:*
- Provide overview of sequence of events and current plant status
- Identify major equipment failures
- Identify procedures that are in effect
- Discuss status of actions performed outside the MCR

I *INPUT*:
Each crew member discusses the following, as applicable:
- Critical parameters, including relevant trends (OAC/BOP)
- Manual control bands (OAC/BOP)
- Continuous action steps/carry over steps (OAC/BOP)
- Mitigation strategy and upcoming procedural transitions (STA)
- Time critical actions (STA)
- Limiting Technical Specification actions (STA/SM)
- Emergency Plan status including protective actions (SM)
- Any questions OR any observations not understood

E *EXPECTATION*:
- Identify anticipated plant conditions
- Identify critical upcoming activities, such as anticipated procedure transitions
- Discuss contingency actions
- Resume normal alarm response protocol (if desired)

F *FINISH*:
- Solicit any closing comments or questions
- Announce "End of brief."

When an Alignment Brief is used, it should contain the following elements:

1) CRS states "Attention in the Control Room for an Alignment Brief"

2) Ensure all affected personnel are attentive, signified by each raising a hand.

3) Discuss information as required for alignment. The discussion may include input/questions from crew members, provided that the discussion remains brief. Crew member input is not required.

4) The CRS announces "End of brief".

ENCLOSURE 6

Page 1 of 1

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 ☐

2 2/1063
2 S/1064

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	2
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:	J. Johnson			Workweek Manager:	B. Craig
Mode:	1	Rx Power:	80%	Gross*/Net MWe*:	840 / 800
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	128.7 hrs			Days Online:	142 days
Turnover:	Feedwater Temperature Reduction will be implemented this weekend. Evolutions this shift: The BOP operator will perform 0PT-40.2.11, Main Generator Voltage Regulator Manual and Automatic Operational Check The OATC will raise power to 100% using recirc. (Alt Power will be performed by the Nuclear Engineer)				
Protected Equipment:	RHR 2A and 2B, Core Spray 2B				
Comments:	2C TCC Pump is in service on Unit One. 2A Core Spray is under clearance for oil leak from last shift, declared inoperable at 0500, today.				

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2015 NRC SCENARIO 3

ROD DRIFT, HDD CONTROLLER FAILURE, INADVERTENT RCIC INITIATION, LOSS OF RPS, HPCI UN-ISOLABLE STEAM LEAK, SCCP, ED

REVISION 0

Developer: *Lou Sosler*	**Date:** *9/11/2015*
Technical Review: *John Biggs*	**Date:** *9/23/2015*
Validator: *Brian Moschet*	**Date:** *9/11/2015*
Validator: *Kevin Kingston*	**Date:** *9/11/2015*
Facility Representative: *Jerry Pierce*	**Date:** *9/23/2015*

REVISION SUMMARY	
0	Exam scenario for 2015 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1	NA	N-BOP	Swap Condensate Pumps
2	RD001M (26-11)	C-RO C-SRO	Rod Drift – **Tech Spec**
3		R-RO	Lower power for Thermal Limit verification
4	CF039F	C-BOP C-SRO	Heater Drain Level Controller Failure – **AOP-23.0**
5	ES022F	C-RO C-SRO	Inadvertent RCIC Initiation – **Tech Spec** – **AOP-03.0**
6	RP003F	C-BOP C-SRO	A RPS MG Set Trip – **Tech Spec**
7	ES048F	M	HPCI Unisolable Steam Leak – **AOP-5.0**
8	RP005F RP006F	M C	Scram - Auto and Manual Scam failure - ARI
9		C	RHR Room Coolers Trip
10		C M	Bypass Opening Jack failure ED
11		C	2 ADS Valves Fail to Open

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

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	Crew will swap Condensate pumps for maintenance.
2	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.
3	Reactor Engineering will request power lowered to 80% via Recirculation flow until thermal limits can be checked and for rod recovery.
4	The Heater Drain level controller will fail resulting in full opening of the pump discharge valves and lowering tank level. The crew will respond per AOP-23.0, reduce power per ENP-24.5, trip one Heater Drain Pump and open HD-V57 to control Deaerator level.
5	An inadvertent RCIC initiation will require the crew to respond IAW AOP-03.0 and trip RCIC.
6	RPS MG Set will trip requiring the crew to swap to alternate RPS power supply.
7	A HPCI steam line break will occur. The crew will enter AOP-05 and EOP-03-SCCP. HPCI will fail to isolate. The reactor will be manually scrammed when HPCI area exceeds its Maximum Safe Operating Temperature. Secondary Containment area temperatures will continue to rise. Multiple areas will exceed their Maximum Safe Operating Temperatures requiring emergency depressurization.
8	Reactor Scram
9	RHR Room Cooler Fans Trip
10	If the crew attempts to anticipate ED the Bypass Opening Jack will fail. 2 Areas will exceed Max Safe requiring the Crew to ED
11	2 ADS Valves will fail to come open on ED requiring an additional 2 SRV's be open

3.0 CREW CRITICAL TASKS

Critical Task #1
Insert a reactor scram when HPCI reaches its Max Safe Operating Value. (HPCI Area Temperature Max normal is equal to Max Safe.)
Critical Task #2
Perform Emergency Depressurization when more than one area exceeds the same Max Safe Operating Value or EQ Envelope for the same parameter.

4.0 TERMINATION CRITERIA

When the Reactor is depressurized and level being restored to normal level band, the scenario may be terminated.

5.0 IMPLEMENTING REFERENCES

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

Number	Title
2OP-32.0	CONDENSATE AND FEEDWATER SYSTEM OPERATING PROCEDURE
A5 (3-2)	ROD DRIFT
0AOP-02.0	CONTROL ROD MALFUNCTION/MISPOSITION
A-03 (1-10)	SAFETY/RELIEF VALVE OPEN
A-03 (1-1)	SAFETY OR DEPRESS VALVE LEAKING
UA-12 (5-4)	SPTMOS DIV I
UA-12 (5-5)	SPTMOS DIV II
A-2 (3-2)	RHR PUMP 2A SEAL CLR FLOW LOW
A-2 (4-2)	RHR PUMP 2C SEAL CLR FLOW LOW
A-3 (2-1)	CS OR RHR PUMPS RUNNING
UA-3 (2-7)	AREA RAD REACTOR BUILDING HIGH
A-2 (5-7)	STM LEAK DET AMBIENT TEMP HIGH
A-1 (4-1)	HPCI TURB TRIP SOL ENER
A-1 (3-5)	HPCI ISOL TRIP SIG A INITIATED
A-1 (4-5)	HPCI ISOL TRIP SIG B INITIATED

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-25.
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. **ALIGN** the plant as follows:

Manipulation
Ensure 2C TCC pump is in service on Unit One. Loaded in Scenario File. Verify drive water pressure is between 260-275 psid.

11. **LOAD** Scenario File.
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
Bypass APRM 2 (Blue Tag)	Bypassed

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:
15. **ENSURE** each Implementing References listed in Section 7 is intact and free of marks.

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

Required Materials
None

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

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

19. **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	Malfunction	CF039F - [HTR DRN DEAER LVL CNTRLR FAILURE]
3	Malfunction	ES022F - [RCIC INADVERTANT START]
4	Malfunction	RP003F - [RPS M.G. SET TRIP]
5	DI Override	K5624A - [RHR PMP ROOM VENT FAN B]
5	DI Override	K1507A - [AUTO DEPRESS VLV B21-F013C]
5	DI Override	K1511A - [AUTO DEPRESS VLV B21-F013A]
5	DI Override	K5624A - [RHR PMP ROOM VENT FAN B]
5	DI Override	K1507A - [AUTO DEPRESS VLV B21-F013C]
5	DI Override	K5624A - [RHR PMP ROOM VENT FAN B]
5	DI Override	K5623A - [RHR PMP RM VENT FAN A]
5	DI Override	K1511A - [AUTO DEPRESS VLV B21-F013A]
5	DI Override	K5623A - [RHR PMP RM VENT FAN A]
5	DI Override	K5623A - [RHR PMP RM VENT FAN A]
5	Malfunction	ES047F - [HPCI STM BRK HPCI ROOM]
8	Remote Function	HP_ZVMS402T - [E41-F002 INBD STM VLV]
9	Malfunction	HP001F - [BYP TO CONDS STG * VLV E41-F008]
10	Trigger Command	mfd:rd001m,26-11
11	Annunciator	ZA512 - [CRD HYD TEMP HIGH]
12	Remote Function	EE_LSHED2 - [LOCA LOAD SHED SEL SW, 2B CONDENSATE PUMP]
12	Remote Function	EE_UTSHED2 - [UNIT TRIP LOAD SHED SEL SW, 2B CONDENSATE PUMP]
13	Remote Function	EE_UTSHED3 - [UNIT TRIP LOAD SHED SEL SW, 2C CONDENSATE PUMP]
13	Remote Function	EE_LSHED3 - [LOCA LOAD SHED SEL SW, 2C CONDENSATE PUMP]
14	DI Override	K3C17A - [INCREASE]
15	Remote Function	RP_IBZNORM - [RPS ALT PWR (E7=NORM/E8=ALT)]

Trig #	Trigger Text
8	Q1116LG1 - [STM LINE VLV E41-F002 GREEN]
9	Q1117LG1 - [STM LINE VLV E41-F003 GREEN]
10	Q2BVNUGD - [FULL IN-ROD DISPLAY]
11	Q2BVNUGD - [FULL IN-ROD DISPLAY]
14	Q3C18SR6 - [BYP VLV OPEN JACK OPEN RED]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
RP005F		AUTO SCRAM DEFEAT	True	True				
RP006F		MANUAL SCRAM DEFEAT	True	True				
ES053F		E41-F002 FAILURE TO AUTO CLOSE	True	True				
NI032F	APRM2	APRM FAILS LO	True	True				
RD001M	26-11	ROD DRIFT	FALSE	TRUE				1
CF039F		HTR DRAIN CONTROL FAIL	FALSE	TRUE				2
ES022F		RCIC INADVERTENT START	FALSE	TRUE				3
RP003F		RPS MG SET TRIP	FALSE	TRUE				4
ES047F		HPCI STEAM LINE BREAK	0.00	15.00	20:00			5
HP001F	E41-F003	STEAM SUPPLY LINE VLV E41-F003	FALSE	TRUE				9

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
CC_IACW4518		2C TBCCW PUMP UNIT 1 ALIGNMENT	1	1			
HP_ZVMS402T		E41-F002 INBD STM VLV	ON	OFF			8
EE_LSHED2		LOCA LOAD SHED SEL SW, 2B CONDENSATE PUMP	DISABLE	ENABLE			12
EE_UTSHED2		UNIT TRIP LOAD SHED SEL SW, 2B CONDENSATE PUMP	DISABLE	ENABLE			12
EE_LSHED3		LOCA LOAD SHED SEL SW, 2C CONDENSATE PUMP	ENABLE	DISABLE			13
EE_UTSHED3		UNIT TRIP LOAD SHED SEL SW, 2C CONDENSATE PUMP	ENABLE	DISABLE			13
RP_IBZNORM		RPS ALT PWR (E7=NORM/E8=ALT)	NORMAL	ALT			15

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig
K5623A	RHR PMP RM VENT FAN A	AUTO	ON	OFF		00:08:00		5
K5623A	RHR PMP RM VENT FAN A	OFF	OFF	ON		00:08:00		5
K5623A	RHR PMP RM VENT FAN A	ON	OFF	OFF		00:08:00		5
K5624A	RHR PMP ROOM VENT FAN B	AUTO	ON	OFF		00:04:00		5
K5624A	RHR PMP ROOM VENT FAN B	OFF	OFF	ON		00:04:00		5
K5624A	RHR PMP ROOM VENT FAN B	ON	OFF	OFF		00:04:00		5
K1507A	AUTO DEPRESS VLV B21-F013C	AUTO	ON	ON				5
K1507A	AUTO DEPRESS VLV B21-F013C	OPEN	OFF	OFF				5
K1511A	AUTO DEPRESS VLV B21-F013A	AUTO	ON	ON				5
K1511A	AUTO DEPRESS VLV B21-F013A	OPEN	OFF	OFF				5
K3C17A	INCREASE	INCREASE	OFF	OFF		00:00:05		14

ANNUCIATOR OVERRIDES

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
1-2	CRD HYD TEMP HIGH	ZA512	ON	ON	OFF			11

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: SHIFT TURNOVER / SWAP RUNNING CONDENSATE PUMPS	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.
	Insert Trigger 12 to Enable 2B Condensate Pump LOCA and Unit Trip Load Shed.
	Insert Trigger 13 to Disable 2C Condensate Pump LOCA and Unit Trip Load Shed.

Simulator Operator Role Play	
	Acknowledge any requests to Radwaste.
	Prestart checks complete on 2C Condensate Pump.
	If asked, 2D Bus clear of personnel.
	If asked to check pump, 2C Condensate Pump running fine.

Evaluator Notes	
Plant Response:	None
Objectives:	Transfer Running Condensate Pumps
Success Path:	Condensate Pumps are swapped.
Event Termination:	Go to Event 2 at the discretion of the Lead Evaluator.

EVENT 1: SHIFT TURNOVER / SWAP RUNNING CONDENSATE PUMPS			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Conduct shift turnover shift briefing.	
	SRO	Direct RO to swap condensate pumps.	
	OATC	Monitors the plant	
	BOP	Swap Condensate Pumps IAW 2OP-32, Section 8.5	
		2OP-32, Section 8.5.	

8.5 Transferring to Standby Condensate Pump

C
Continuous
Use

8.5.1 Initial Conditions

1. At least one condensate pump in operation. ☐

8.5.2 Procedural Steps

1. **DESIGNATE** the on coming and off going condensate pumps below: ☐

   Oncoming Condensate Pump:_____

   Offgoing Condensate Pump:_____

2. **DIRECT** Radwaste Operator to perform the following:

   - **PLACE** an additional CFD in service to prevent override or bypass condition during condensate pump transfer. ☐
   - **PLACE** an additional CDD in service as necessary. ☐
   - **MONITOR** for proper operation of hotwell level control. ☐

3. **ENSURE** proper motor oil level for oncoming condensate pump. ☐

4. **ENSURE** condensate pump motor TBCCW outlet temperature for the oncoming condensate pump being started is less than or equal to 95°F:

   - *COND PMP 2A MOT CCW OUTLET TEMP IND, TCC-TI-770* ☐
   - *COND PMP 2B MOT CCW OUTLET TEMP IND, TCC-TI-771* ☐
   - *COND PMP 2C MOT CCW OUTLET TEMP IND, TCC-TI-772* ☐

8.5.2 **Procedural Steps**

5. **CHECK** status of the following alarms.

   - *GEN-XFMR PRIMARY L/O UNIT TRIP* (UA-13 1-1) ☐
   - *GENERATOR DIFF L/O UNIT TRIP* (UA-13 1-2) ☐
   - *GEN-XFMR BACKUP L/O UNIT TRIP* (UA-13 1-3) ☐

6. **IF** all the alarms listed in Step 8.5.2.5 are clear, **THEN PERFORM** the following:(CR-717090)

   a. **PLACE** the following switches in *ENABLED* for the designated offgoing condensate pump:

      - *UNIT TRIP LOAD SHED SELECTOR SWITCH* ☐
      - *LOCA LOAD SHED SELECTOR SWITCH* ☐

   b. **PLACE** oncoming condensate pump mode selector switch in *MAN*. ☐

      - **CONFIRM** its discharge valve closes. ☐

8.5.2 **Procedural Steps**

CAUTION

When only one reactor feed pump is in service, starting a third condensate pump may cause *OFF GAS A CONDENSERS CONDENSATE SUPPLY LINE RELIEF VALVE, CO-RV-2* or *OFF GAS B CONDENSERS CONDENSATE SUPPLY LINE RELIEF VALVE, CO-RV-3* to lift. This will result in increased leakage to the Equipment Drain System.

CAUTION

Experience has shown that Condensate System dissolved oxygen transients can cause automatic isolation of the condensate oxygen injection system during condensate pump starting evolutions.

c. **START** the oncoming condensate pump. ☐

– **CONFIRM** its discharge valve opens. ☐

d. **WHEN** condensate pump discharge pressure stabilizes, **THEN PERFORM** the following:

(1) **STOP** designated offgoing condensate pump ☐

(2) **IF** *FEEDWATER LINE ISOLATION VALVE, B21-F032A* and *FEEDWATER LINE ISOLATION VALVE, B21-F032B* are open, **THEN PLACE** the stopped condensate pump mode switch in *AUTO*. ☐

e. Place the following switches for the pump started in step 8.5.2.6.c in *DISABLED*:

– *UNIT TRIP LOAD SHED SELECTOR SWITCH* ☐

– *LOCA LOAD SHED SELECTOR SWITCH* ☐

f. GO TO Step 8.5.2.12. ☐

8.5.2 Procedural Steps

7. **PLACE** oncoming condensate pump mode selector switch in *MAN*. ☐

   – **CONFIRM** its discharge valve closes.

CAUTION

When only one reactor feed pump is in service, starting a third condensate pump may cause *OFF GAS A CONDENSERS CONDENSATE SUPPLY LINE RELIEF VALVE, CO-RV-2* or *OFF GAS B CONDENSERS CONDENSATE SUPPLY LINE RELIEF VALVE, CO-RV-3* to lift. This will result in increased leakage to the Equipment Drain System.

CAUTION

Experience has shown that Condensate System dissolved oxygen transients can cause automatic isolation of the condensate oxygen injection system during condensate pump starting evolutions.

8. **PLACE** the following switches in *DISABLED* for the condensate pump to be started:

   – *UNIT TRIP LOAD SHED SELECTOR SWITCH* ☐

   – *LOCA LOAD SHED SELECTOR SWITCH* ☐

9. **START** the selected oncoming condensate pump. ☐

   – **CONFIRM** its discharge valve opens. ☐

10. **WHEN** condensate pump discharge pressure stabilizes, **THEN PERFORM** the following:

    a. **STOP** off going condensate pump ☐

    b. **IF** *FEEDWATER LINE ISOLATION VALVE, B21-F032A* and *FEEDWATER LINE ISOLATION VALVE, B21-F032B* are open, **THEN PLACE** the stopped condensate pump mode switch in *AUTO*. ☐

8.5.2 Procedural Steps

11. **PLACE** the following switches in *ENABLED* for the condensate pump just stopped in Step 8.5.2.10.a.

    - *UNIT TRIP LOAD SHED SELECTOR SWITCH* ☐
    - *LOCA LOAD SHED SELECTOR SWITCH* ☐

12. **DIRECT** Radwaste operator to remove the additional CFD or CDD placed in service in Step 8.5.2.2. ☐

13. **DIRECT** Radwaste operator to monitor CDD effluent conductivity for each demineralizer in service. ☐

14. **COMPLETE** Attachment 8A. ☐

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

Simulator Operator Role Play	
	If contacted as the RE to address thermal limits, request power lowered to 80% via Recirculation flow until thermal limits can be checked. A recovery plan will be developed. 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. (If asked it is 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 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 to insert the control rod in 3 hours and C2 to disarm the control rod 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 3 at the direction of the Lead Evaluator.

EVENT 2: 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 3, page 53 for format of the brief.	
	BOP	Plant monitoring	
		May read APP actions for the OATC to perform.	

EVENT 2: ROD DRIFT			
	OATC	Acknowledge alarms: A-05 (2-2) ROD OUT BLOCK A-05 (3-2) Rod Drift Announce and enter 0AOP-02.0, Control Rod Malfunction/Misposition.	
	OATC	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)	
	OATC	Monitor core parameters, main steam line radiation and off-gas activity.	
	OATC	Perform 2OP-07 Section 6.4.15, Single Rod Scram from RPS Test Panel. CRS will NA appropriate steps.	The examiner will **prompt** the performer that the "Blue Light is on" when step 6.4.15.9 is performed. The examiner will **prompt** the performer that the "Blue light is OFF" when step 6.4.15.10 is performed.

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6.4.15 (Continuous Use) - Single Rod Scram From RPS Test Panel

NOTE

If necessary to scram a single control rod for operability concerns, then 0PT-14.2.1, Single Rod Scram Insertion Times Test, is to be used. ..... ☐

Date/Time Started _____

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

   - It is desired to scram a control rod from the RPS Test Panel. ..... _____
   - Communications established between RPS Test Panel and the Control Room. ..... _____
   - Reactor Engineer recommends performance of this section and has determined Tech Spec Thermal Limits will **NOT** be exceeded by this single rod scram. ..... _____

   _____
   Person Contacted

2. **Obtain** permission from the Unit CRS to perform this section. ..... _____

3. **Document** applicable control rod to be scrammed in the space provided: ..... _____

   Control Rod No.: _____–_____

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

   - Reactor pressure: ..... _____

     _____ psig

   - Applicable accumulator pressure: ..... _____

     _____ psig

BEGIN R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

5. **Select** applicable control rod at P603. ..... _____

   _____
   CV

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6.4.15 (Continuous Use) - Single Rod Scram From RPS Test Panel (continued)

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

7. **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, (Continuous 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

8. **Monitor** control rod position. _____

CAUTION

- The RPS Test Panel will only be operated by a licensed Reactor Operator. ☐
- If the control rod does **NOT** SCRAM after lowering the Scram Test switch, then the Unit CRS is to be immediately notified to determine OPERABILITY of the rod (TS 3.1.3). ☐

9. **Scram** the applicable control rod by lowering the scram test switch on RPS Test Panel P610 to the scram (down) position. _____

   _____
   CV

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6.4.15 (Continuous Use) - Single Rod Scram From RPS Test Panel (continued)

10. **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

11. **Confirm** rod position display indicates "00" for scrammed rod and the green "Full In" light is ON..... _____

END R.M. LEVEL R2/R3 REACTIVITY EVOLUTION

12. **IF** control rod did **NOT** fully insert,
THEN reference Tech Specs for OPERABILITY..... _____

13. Slowly **open** applicable C12-113 (Charging Water Riser Isolation Valve)..... _____

_____
IV

14. **Confirm** associated accumulator pressure is greater than 955 psig..... _____

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

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

_____
Person Contacted

b. **Remove** temporary scram timing cables from P616 and P610..... _____

_____
IV

EVENT 3: POWER REDUCTION	
Simulator Operator Actions	

	Simulator Operator Role Play
	If contacted as the NE for power reduction guidance, inform crew the reactivity plan has power reduced to ~80% (~56 Mlbms) using recirc flow.
	If contacted as the NE to monitor power reduction, inform crew that you will monitor core performance on the computer.
	If contacted as Radwaste operator acknowledge any requests.
	If contacted as the Load Dispatcher, acknowledge report that Brunswick Unit Two will be lowering power.
	As Chemistry acknowledge request for samples due to 15% power change

Evaluator Notes	
Plant Response:	Reactor power will be reduced IAW 0ENP-024.5
Objectives:	SRO - Direct actions power reduction RO – Reduce power as directed by the SRO BOP – Control balance of plant
Success Path:	Reduce power IAW 0ENP-24.5
Event Termination:	Go to Event 4 at the direction of the Lead Evaluator.

EVENT 3: POWER REDUCTION			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Directs power to be reduced to 80% using recirculation flow IAW 0ENP-24.5	
		Contacts chemistry for samples due to 15% power change. May contact Load dispatcher to inform of power decrease. May conduct a brief (See Enclosure 3, page 53 for format of the brief.	
	BOP	Monitors the plant	

EVENT 3: POWER REDUCTION

Time	Pos	EXPECTED Operator Response	Comments
	RO	Reduces power using recirculation flow to ~80% power . May reference 2OP-02 section 6.2.1 **NOTE:** 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 **IF** desired to lower the speed of both Recirc Pumps simultaneously, as directed by the Unit CRS, **THEN depress** Recirc Master Control Lower (Slow Medium Fast) pushbutton, as applicable. 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 Continues lowering Recirc pump speeds until ~80% power.	
	RO	Request peer checker / reactivity team.	
	RO	Verifies operation on the Power to Flow Map	

EVENT 4: HDD CONTROLLER FAILURE	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 2** to fail Heater Drain Controller.
	If directed to place controller in Manual or to swap master controllers, Delete CF039F.

Simulator Operator Role Play	
	If contacted as TBAO to investigate, report LC-91 is in master and is sending a full open signal.
	If asked by I&C to investigate controller failure, acknowledge the request.
	When HDD level is stabilized and if directed to place controller in Manual or to swap master controllers, have Sim Operator delete CF039F and report controller in manual maintaining level

Evaluator Notes	
Plant Response:	Heater Drain Tank Lowers Low level alarm at 32" Both Heater Drain pumps trip at 24" Condensate Booster Pump C auto start if power is not sufficiently reduced
Objectives:	Enter 0AOP-23.0 Reduce power Control level using HD-57
Success Path:	Reduce power Manually control level in Heater Drain Tank using the HD-57
Event Termination:	Go to Event 5 at the discretion of the Lead Evaluator.

EVENT 4: HDD CONTROLLER FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry in 0AOP-23.0, Condensate/Feedwater System Failure	
	SRO	Directs power reduction to stabilize Condensate/Feedwater	
	SRO	Directs manual control with HD-57 to stabilize HD Tank level	
	SRO	Directs I&C to investigate	
	SRO	May contact Shift Manager	
		May conduct a brief (See Enclosure 3, page 53 for format of the brief.	
	OATC	Monitor plant	
	OATC	Announce entry into 0AOP-23.0, Condensate/Feedwater System Failure	
	OATC	Reduce Reactor power IAW 0ENP-24.5 as directed by CRS	May initiate a manual runback using the pushbutton.

EVENT 4: HDD CONTROLLER FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Acknowledge and report alarm: UA-4 2-10 HD DEAERATOR LEVEL HIGH-LOW.	Alarm at 30 inches and lowering. Pump trip at 24 inches and lowering.
		Diagnose HD Pump discharge valves full open	
		Enter and announce 0AOP-23.0, Condensate/Feedwater System Failure	
		Trips one of the operating Heater Drain pump	
		Maintains heater drain deaerator level less than 60 inches indicated on HEATER DRAIN DEAERATOR LEVEL, HD-LI-97	If level reaches 60 inches UA-4, 3-10 may alarm and the HDD Moisture removal valves will open. Move to the next event when level is being controlled with the HD-V57.
		May dispatch TBAO to check HD Pump Air-Operated Discharge Level Control Valves, HD-LV-91-1, 2, & 3.	
		May direct TBAO to place HDD level control in Manual IAW 2OP-35 Section 6.3.8. or swap controller IAW 2OP-35, Section 6.3.8	
		Monitors main condenser vacuum and condensate parameters	
		May have to secure a CBP if one auto started during the evolution.	

EVENT 5: INADVERTENT RCIC INITIATION	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 3** to activate the an inadvertent RCIC Initiation.

Simulator Operator Role Play	
	If RCIC has been running for >5 minutes, and crew has not recognized RCIC running, call control room as AO and ask why RCIC is running.
	If asked as I&C to investigate, acknowledge the request.
	If asked as RE to monitor thermal limits, acknowledge the request.
	If asked as chemistry for Rx Coolant Sample, acknowledge the request.

Evaluator Notes	
Plant Response:	RCIC will inadvertently initiate. The crew should respond per 0AOP-03.0, Positive Reactivity Addition and trip RCIC. RCIC should be declared inoperable per TS 3.5.3.
Objectives:	SRO - Direct actions IAW 0AOP-03.0 RO - Take actions IAW 0AOP-03.0 BOP – Monitors reactor plant parameters
Success Path:	RCIC is shutdown and Tech Spec. 3.5.3 is addressed.
Event Termination:	Go to Event 6 at the discretion of the Lead Evaluator.

EVENT 5: RCIC INADVERTENT INITIATION			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct entry into 2AOP-03.0, Positive Reactivity Addition	
		Direct / concur RCIC operation to be terminated.	
		Enter PCCP when torus temp reaches 95° F.	
		Contact I&C to investigate RCIC logic.	
		Tech Spec 3.5.3 RCIC System Determine Condition A applies Required Action A.1, Immediately verify HPCI is OPERABLE AND Required Action A.2, Restore RCIC to OPERABLE within 14 days.	
		May conduct a brief (See Enclosure 3, page 53 for format of the brief.	
	BOP	Monitor plant parameters	

EVENT 5: RCIC INADVERTENT INITIATION			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	OATC	Recognize and report RCIC injection	
		Enter and announce 2AOP-03.0, Positive Reactivity Addition	
		Verify inadvertent initiation by two independent indications and trip RCIC. Things to look at to verify: HPCI did not auto start on LL2 - RPV Water Level Lo Lo (105 inches) – this should have automatically scrammed prior to this level, No low level alarms, etc	
		Depress TURBINE TRIP, E51-S17, push button to trip the RCIC turbine	
		Monitors reactor power.	
		A-03 3-5, RCIC TURBINE STM LINE DRN POT LEVEL HI will annunciate requiring the operator to perform the following if it has been in for 5 minutes: Close TURBINE TRIP & THROTTLE VLV, E51-V8, motor operator.	

EVENT 6: RPS MG SET A TRIP	
Simulator Operator Actions	
	When directed by the Lead Evaluator, **Initiate Trigger 4** to trip RPS MG Set A
	If directed to isolate RWCU filter demins modify the following Remote Functions: RW_IAFLTFVA and RW_IAFLTFVB, MANUAL (controller mode) and RS_IAFLTFVD, ZERO (valve demand) for Filter A and Filter B
	If asked to place RPS on Alternate power supply, **Insert Trigger 15**.
Simulator Operator Role Play	
	If asked as TBAO to investigate, report tripped breaker on MCC 2CA to RPS MG Set tripped and MG Set A Motor is abnormally hot
	If asked as I&C to investigate, acknowledge the request. If crew is waiting for I/C to determine cause before re-energizing RPS A, report that MG Set A was the cause of the loss of RPS A.
	If asked as SM grant permission to transfer RPS to alternate power supply.
	If requested to report status of MSIV coil lights in back panel report Inboard DC and Outboard AC lights lit, Inboard AC and Outboard DC out (prior to transferring RPS and resetting PCIS), after transfer and reset, all logic lights lit
	If requested as E&RC, report RWCU sample lines in service
	If requested to vent RWCU seal cooling loops, report action complete
Evaluator Notes	
Plant Response:	RBS Bus A will deenergize and the following plant response: Half scram and half MSIV Group 1, Rx Bldg HVAC isolates and SBGT starts, CREV initiates, and Closure of inboard isolation valves for Group 1 (steam line drains and sample valves), Group 2, Group 3, Group 6 (full CAM)
Objectives:	SRO – Direct actions for loss of RPS A RO – Identify and report loss of RPS A and components BOP – Verify plant response for loss of RPS A.
Success Path:	Verify actions for loss of RPS A. Restore power to RPS A and reset the scram.
Event Termination:	Go to Event 7 at the direction of the Lead Evaluator.

EVENT 6: RPS MG SET TRIP

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Diagnose loss of RPS MG Set A	
		Contact I&C to investigate	
		Contact SM for approval of RPS power supply transfer. Direct RPS A transferred to alternate per 2OP-03 (Reactor Protection System Operating Procedure).	
		Technical Specification / TRM • 3.3.1.1 Reactor Protection System (RPS) Instrumentation Condition A1, Place channel in trip condition in 12 hours. • 3.3.2.1 Control Rod Block Instrumentation Condition A1, Restore RBM channel to operable status in 24 hours. Condition B.1, Place one RBM channel in trip in 1 hour • 3.3.3.1 Post Accident Monitoring (PAM) Instrumentation (RWCU Isolation) Condition A1, Restore to operable within 30 days. • 3.3.6.1 PCIS Instrumentation Condition A1, Place channel in trip condition in 12 hours. • 3.3.6.2 Secondary Containment Isolation Instrumentation Condition A1, Place channel in trip condition in 24 hours. • 3.3.7.1 Control Room Emergency Ventilation (CREV) System Instrumentation Condition A1, Place CREV in the Rad/Smoke protection mode of operation within 7 days. • 3.4.5 RCS Leakage Detection Instrumentation Condition B.1, Analyze grab samples every 12 hours Condition B.2, Restore operable in 30 days • 3.6.1.3 PCIS Instrumentation (RWCU Isolation) Condition A1, Isolate flowpath in 8 hours. Condition A2, Verify flowpath isolated once every 31 days • TRM 3.4 Post Accident Monitoring All monitors are available for being manually placed in service and are not required for continuous operation. No actions required. • ODCM 7.3.2 Gaseous Effluent Monitoring A.1, Enter the Condition referenced in Table 7.3.2-1 (Condition I) I.1, Immediately verify Gaseous RW Treatment System not bypassed I.2, Immediately verify Main Stack Effluent Noble Gas monitor is operable I.3, Take grab sample and analyze to verify noble gas gross gamma activity rate is ≤ 243,600 uCi/sec, once per 72 hours, and every 4 hours thereafter I.4, Restore channel to operable in 30 days	

EVENT 6: RPS MG SET TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	May conduct a brief (See Enclosure 3, page 53 for format of the brief.	
	BOP	Dispatch TBAO to investigate	
	RO	Diagnose loss of RPS MG Set A	
		Transfer RPS A to Alternate per 2OP-03, Section 6.3.5, Shifting RPS Bus Alternate Power Supply Sources	

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6.3.5 Shifting RPS Bus Alternate Power Supply Sources

1. **Ensure** all applicable prerequisites in Section 5.0 are met. _____

2. On Panel H12-P610, **confirm** C72B-S1 (RPS Power Source Select Switch) in NORM ..... _____

NOTE

RPS alternate power can be supplied from 120/208V AC Distribution Panel 2E7 (Normal) or 120/208V AC Distribution Panel 2E8 (Alternate) depending on the position of LG3 (Alternate Power Throwover Switch). ..... ☐

CAUTION

If either RPS Bus A or RPS Bus B is supplied by the alternate power supply when transferring from normal to alternate power supplies, RPS trips will occur ..... ☐

3. **Place** C72-EPA6-52 (EPA #6 Alternate Source circuit breaker) in OFF ..... _____

4. **Place** C72-EPA5-52 (EPA #5 Alternate Source circuit breaker) in OFF ..... _____

5. **Perform** one of the following:

   - **IF** the alternate power supply is to be aligned to its Normal Supply (2E7), **THEN place** LG3 (RPS Alternate Power Throwover Switch) in NORMAL (down) ..... ____/____ IV

   - **IF** the alternate power supply is to be aligned to its Alternate Supply (2E8), **THEN place** LG3 (RPS Alternate Power Throwover Switch), in ALTERNATE (up) ..... ____/____ IV

6. **Confirm** C72-EPA5-52 (EPA #5 Alternate Source Circuit Breaker) red Power In light is ON ..... _____

7. **Place** C72-EPA5-52 (EPA #5 Alternate Source Circuit Breaker) in ON ..... ____/____ IV

8. **Confirm** C72-EPA5-52 (EPA #5 Alternate Source Circuit Breaker) red Power Out light is ON. ..... _____

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6.3.5 Shifting RPS Bus Alternate Power Supply Sources (continued)

9. **Confirm** C72-EPA6-52 (EPA #6 Alternate Source Circuit Breaker) red Power In light is ON ..... _____

10. **Place** C72-EPA6-52 (EPA #6 Alternate Source Circuit Breaker) in ON ..... ____/____ IV

11. **Confirm** C72-EPA6-52 (EPA #6 Alternate Source Circuit Breaker) red Power Out light is ON. ..... _____

12. On Panel H12-P610, **confirm** white ALT light located above the C72B-S1 (RPS Power Source Select Switch) is ON ..... _____

Date/Time Completed _____

Performed By (Print)	Initials
_____	_____
_____	_____
_____	_____
_____	_____

Reviewed By: _____
Unit CRS/SRO

EVENT 7: HPCI STEAM LEAK	
Simulator Operator Actions	
	At the discretion of the Lead Evaluator, **Initiate Trigger 5** to a HPCI Steam Leak
	Verify RHR Room Cooler B trips 4 minutes after HPCI Steam leak is activated, and RHR Room Cooler A trips 8 minutes after steam leak.

Simulator Operator Role Play	
	As **Unit 1 RO/SRO** report multiple Unit 2 fire alarms after ARM alarm
	If directed as OSAO to close PIV-33, wait 4 minutes and report PIV closed.
	If directed as Unit 1 to perform AD-EP-ALL-0202, acknowledge request.
	If contacted as Maintenance or I&C, acknowledge request.

Evaluator Notes	
Plant Response:	Rx Bldg temperatures and rad levels rise. Rx Bldg negative pressure is lost. 2A RHR Room Cooler starts at 120°F in the HPCI room and 2B RHR Room Cooler starts at 145°F in the HPCI room. The 2B RHR Room Cooler will stop after 4 minutes, and 2A RHR Room Cooler will stop after 8 minutes..
Objectives:	SRO – Respond IAW 0AOP-5.0 and 0EOP-03-SCCP BOP – Respond to Reactor Building radiation alarms RO – Diagnose and report HPCI steam leak – attempt to isolate
Success Path:	Scram Reactor and Emergency Depressurize to slow leak.

EVENT 7: HPCI STEAM LEAK

Time	Pos	EXPECTED Operator Response	Comments
	SRO	Enter and direct activities of 0AOP-05.0, Radioactive Spills, High Radiation, And Airborne Activity	
		Direct HPCI isolation	
		Direct Rx Bldg evacuation	
		Enter and direct the activities of EOP-03-SCCP	
		Contact TSC/Engineering for EQ envelope evaluations Contact MM and/or I/C for HPCI failure	
		Direct service water alignment to vital header and RHR Room Cooler start	
		Direct manual scram when HPCI exceeds MSOT (HPCI Max Safe = Max Norm of 165°F)	
	SRO	May conduct a brief (See Enclosure 3, page 53 for format of the brief.	

EVENT 7: HPCI STEAM LEAK			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Diagnose HPCI steam line break	
		Acknowledge and report alarms: A-02 5-7 STM LEAK DET AMBIENT TEMP HIGH A-01 4-1 HPCI TURB TRIP SOL ENER A-01 3-5 HPCI ISOL TRIP SIG A INITIATED A-01 4-5 HPCI ISOL TRIP SIG B INITIATED	
		Attempt HPCI isolation and recognize and report failure to isolate	
		Acknowledge and report A-01 5-4 HPCI VALVES MTR OVERLOAD	
	BOP	Acknowledge and report UA-03 2-7 AREA RAD RX BLDG HIGH (This is a SCCP entry)	
		Enter and announce AOP-05.0, Radioactive Spills, High Radiation, And Airborne Activity Direct AO to close PIV-33 Announce Rx Bldg evacuation	
		Acknowledge alarms 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 Align service water to vital header and start RHR Room Coolers	

EVENTS 8 and 9: SCRAM / RHR ROOM COOLERS TRIP	
Simulator Operator Actions	

Simulator Operator Role Play	
	If contacted by I&C to investigate RHR Room Cooler trip, acknowledge request.

Evaluator Notes	
Plant Response:	
Objectives:	SRO – Direct Reactor Scram when HPCI reaches Max. Safe condition Direct action of RSP RO – Perform Scram immediate actions Restore and maintain RPV water level as directed by CRS Stabilize RPV pressure as directed by CRS BOP – Maintain stable condition on Balance of Plant Perform actions as directed by CRS
Success Path:	Scram immediate actions are completed, RPV pressure and level are stabilized and controlled within band.

EVENTS 8 and 9: SCRAM / RHR ROOM COOLERS TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	***Direct a reactor manual scram when HPCI area reaches its Max Safe Operating Value.***	***Critical Task #1***
		Direct actions in RSP and RVCP. Provide pressure band to ROs, 800-1000 psig Direct RPV level be maintained 166-206 inches Monitor Containment parameters Direct verifications of Actuations and Isolations.	
		Continue to direct actions from SCCP Direct cooldown not to exceed 100°F/hr	
	OATC	***Insert Reactor scram as directed by CRS***	***Critical Task #1***
		Perform Scram Immediate Actions (Enclosure 1, page 49)	
		Recognize failure of manual scram – Insert ARI	
		Stabilize pressure as directed by the SRO, 800-1000 psig. Then may establish a cooldown.	
		Restore and maintain RPV water level 166-206 inches	
	BOP	Perform Balance of Plant actions and as directed by CRS	
		May perform verification of actuations and isolations	

EVENTS 10 and 11: EMERGENCY DEPRESSURIZATION / SRVs FAILED TO OPEN	
Simulator Operator Actions	
	When directed by the Lead Evaluator, place the simulator in FREEZE
	Verify that the Bypass Opening Jack fails when used.

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	After room trip, 2 areas will reach Max Safe Temperature and ED will be required. Two ADS valves will fail to open which will require opening 2 additional SRVs.
Objectives:	SRO – Evaluate plant conditions and direct Emergency Depressurization. RO – Perform actions for Emergency Depressurization BOP – Assist with re-flooding as directed by SRO
Success Path:	Reactor is depressurized and water level is in normal band.
Scenario Termination:	***When the Reactor is depressurized and level being restored to normal level band, the scenario may be terminated.***

EVENTS 10 and 11: EMERGENCY DEPRESSURIZATION / SRVs FAILED TO OPEN			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Continue reactor cooldown per RVCP direction.	
		May direct Anticipation of Emergency Depressurization IAW SEP-15.	
		Direct Emergency Depressurization when two plant areas exceed their Max Safe Temperature.	***Critical Task #2.***
		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 Torus Cooling.	
	SRO	May conduct a brief (See Enclosure 3, page 53 for format of the brief.	

EVENTS 10 and 11: EMERGENCY DEPRESSURIZATION / SRVs FAILED TO OPEN			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO/ BOP	Recognize and report failure of RHR Room coolers. (The S RHR will not start. The N RHR will trip 5 min after the leak started.)	
	RO/ BOP	May perform SEP-15 to anticipate ED. While maintaining main steam line flow less than 3x106 lbm/hr, Rapidly depressurize RPV with Main Turbine Bypass valves irrespective of cooldown rate Recognize that the Bypass Opening Jack fails.	
	RO/ BOP	***Open seven ADS valves as directed by SRO.***	***Critical Task #2.***
	RO/ BOP	Recognize failure of 2 ADS valves to OPEN and report to SRO. (SRVs A and C fail to open)	
	RO/ BOP	Open 2 additional SRVs as directed by SRO.	
	RO/ BOP	Maintain reactor water level as directed by SRO. (Should use condensate system via SULCV)	
	RO/ BOP	Place available loops in Torus Cooling IAW hard card. (See Enclosure 2, page 50)	

EVENT TERMINATION	
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	
Scenario Termination:	***When the Reactor is depressurized and level being restored to normal level band, the scenario may be terminated.***

Enclosure 1, SCRAM Actions

Unit 2 Scram Immediate Actions (0EOP-01-UG)

SCRAM IMMEDIATE ACTIONS

1. **Ensure** SCRAM valves OPEN by manual SCRAM or ARI initiation.

2. **WHEN** steam flow less than 3 x 10^6 lb/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.

Enclosure 2, Page 1 of 2

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 SPRAY 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 ☐

1
1

2/1061
S/1062

Enclosure 2, 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** 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 SPRAY 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 3 Page 1 of 1

A Plant Status Brief is performed by the CRS utilizing the following format:

B *BEGIN*:
- Announce "Attention in the Control Room for a Plant Status Brief"
- Ensure all affected personnel are attentive, signified by each raising a hand

R *RECAP:*
- Provide overview of sequence of events and current plant status
- Identify major equipment failures
- Identify procedures that are in effect
- Discuss status of actions performed outside the MCR

I *INPUT*:
Each crew member discusses the following, as applicable:
- Critical parameters, including relevant trends (OAC/BOP)
- Manual control bands (OAC/BOP)
- Continuous action steps/carry over steps (OAC/BOP)
- Mitigation strategy and upcoming procedural transitions (STA)
- Time critical actions (STA)
- Limiting Technical Specification actions (STA/SM)
- Emergency Plan status including protective actions (SM)
- Any questions OR any observations not understood

E *EXPECTATION*:
- Identify anticipated plant conditions
- Identify critical upcoming activities, such as anticipated procedure transitions
- Discuss contingency actions
- Resume normal alarm response protocol (if desired)

F *FINISH*:
- Solicit any closing comments or questions
- Announce "End of brief."

When an Alignment Brief is used, it should contain the following elements:

1) CRS states "Attention in the Control Room for an Alignment Brief"

2) Ensure all affected personnel are attentive, signified by each raising a hand.

3) Discuss information as required for alignment. The discussion may include input/questions from crew members, provided that the discussion remains brief. Crew member input is not required.

4) The CRS announces "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	3
Major Transients	1-2	2
EOPs Used	1-2	2
EOP Contingency	0-2	2
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:	J. Johnson			Workweek Manager:	B. Craig	
Mode:	1	Rx Power:	95%	Gross*/Net MWe*:	934 / 909	
Plant Risk: Current EOOS Risk Assessment is:				Green		
SFP Time to 200 Deg F:	128.7 hrs			Days Online:	142 days	
Turnover:	Feedwater Temperature Reduction will be implemented this weekend.					
Protected Equipment:						
Comments:	APRM 2 is INOP and bypassed. 2C TCC Pump is in service on Unit One. BOP operator to swap Condensate Pumps (Start 2C, Shutdown 2B), for routine maintenance.					

DUKE ENERGY

BRUNSWICK TRAINING SECTION

OPERATIONS TRAINING

INITIAL LICENSED OPERATOR

SIMULATOR EVALUATION GUIDE

2015 NRC SCENARIO 4

LOW POWER SCENARIO, LOOP, LOSS OF HP INJECTION, ED ON LEVEL

REVISION 0

Developer: *Lou Sosler*	**Date:** *9/11/2015*
Technical Review: *John Biggs*	**Date:** *9/23/2015*
Validator: *Thmas Baker*	**Date:** *9/11/2015*
Validator: *Brian Moschet*	**Date:** *9/11/2015*
Facility Representative: *Jerry Pierce*	**Date:** *9/23/2015*

REVISION SUMMARY	
0	Exam scenario for 2015 NRC Exam.

TABLE OF CONTENTS

1.0 SCENARIO OUTLINE

Event	Malf. No.	Type*	Event Description
1	ZA411	C-RO C-SRO	DWEDT Pump fails to auto start
2		N-BOP	Place 2A RFPT level control in automatic
3		R-RO	Raise Power
4	NI018F	C-RO C-SRO	IRM C fails upscale – **Tech Spec**
5	SL_IASLRB	C-SRO	SLC Pump 2B Breaker trip – **Tech Spec**
6		C-BOP C-SRO	CW Pump 2A breaker trip
7	CF035F	C-BOP C-SRO	SULCV fails closed – **AOP-23.0**
8	EE009A	M	LOOP – **AOP-36.1**
9	DG004F	C	Starts DG3 after failing to auto start
10	DG027F	C	DG4 Trips on Differential Overcurrent
11	NB009F	M	Small break LOCA
12	ES020F ES013F	C	Loss of HP Injection
13		M C	ED on level – LP ECCS Auto Start Failures
*(N)ormal, (R)eactivity, (C)omponent or Instrument, (M)ajor			

2.0 SCENARIO DESCRIPTION SUMMARY

Event	Description
1	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
2	Step 6.3.46 of 0GP-02, Approach to Criticality and Pressurizations of the Reactor will be completed starting at Step 6.3.46.
3	The crew will raise power by pulling control rods in preparation for placing the Mode switch to RUN. Rod pulls will commence at Step 166 (10-23 @ 12) of the A2X sequence.
4	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.
5	Circulating Water Pump 2A will trip on motor winding fault, and another Circ Water pump will be started.
6	SLC Pump 2B breaker will trip and Tech Spec 3.1.7 will be entered.
7	Control rods will continue to be withdrawn raising power. The SULCV will fail closed stopping feed flow to the vessel. Reactor water level will drop requiring action to re-establish flow to the vessel.
8, 9, 10	A loss of off-site power will occur and DG3 will not auto start. DG4 will trip on differential overcurrent shortly after starting.
11, 12	A small break LOCA with failure of HP injection systems will require Emergency Depressurization when level reaches LL4.
13	ED will be required when level reaches LL4. Low pressure ECCS systems will fail to auto start.

3.0 CREW CRITICAL TASKS

Critical Task #1
Start DG3 and ensure the output breaker closes to energize E3. (Within 30 minutes from when E7 is de-energized)
Critical Task #2
Perform Emergency Depressurization when RPV level cannot be restored and maintained above LL4. (ED must be directed before reaching LL5)
Critical Task #3
Manually start and open injection valves for at least one LP ECCS Loop to restore and maintain level above TAF. (Before the SRV's close)

4.0 TERMINATION CRITERIA

When the Reactor is depressurized, level is being restored to normal band, and Torus and Drywell Sprays are being placed in service, 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
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
A-07, 2-2	REACTOR WATER LEVEL HIGH/LOW
0AOP-23.0	CONDENSATE/FEEDWATER SYSTEM FAILURES
A-04, 4-5	SQUIB VALVE CONTINUITY LOSS
UA-01, 1-7	CW PUMP A TRIP
0AOP-36.1	LOSS OF ANY 4160 V BUSSES OR 480V E-BUSSES
2EOP-01-RSP	REACTOR SCRAM PROCEDURE
2EOP-01-PCCP	PRIMARY CONTAINMENT CONTROL PROCEDURE
0EOP-01-EDP	EMERGENCY DEPRESSURIZATION PROCEDURE
0EOP-02-PCCP	PRIMARY CONTAINMENT CONTROL 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-06 (Saved in IC-180).
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. **ALIGN** the plant as follows:

Manipulation
Insert control rods until Step 165 of GP-10, Sequence A2X is completed. Change Unit Trip / LOCA Load Shed placard to NOT indicate that 2A CWIP is selected.

11. **LOAD** Scenario File.
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
IRM A (Blue Tag)	Bypassed

14. **INSTALL** Protected Equipment signage and **UPDATE** RTGB placard as follows:
    a. ADHR / FPC/ Demin Transfer Pump

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

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

Required Materials
None

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

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

19. **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]
2	Malfunction	NI018F - [IRM C FAILS HI]
3	Malfunction	CW039F - [CIRC WATER INTAKE PUMP MOTOR WINDING FAULT]
4	Remote Function	SL_IASLRB - [2B SLC PUMP MOTOR BKR]
5	Malfunction	CF035F - [S/U LVL CONT VLV FAILS CLOSED]
6	Malfunction	DG027F - [DG4 DIFFERENTIAL FAULT]
6	Malfunction	EE009F - [LOSS OF OFF-SITE POWER]
7	Malfunction	ES020F - [RCIC TURBINE SPEED CONTROL FAILURE]
7	Malfunction	NB009F - [SMALL RECIRC PMP SUCT LINE RUPTURE]
8	Trigger Command	mfd:dg004f
10	Malfunction	CW039F - [CIRC WATER INTAKE PUMP MOTOR WINDING FAULT]
11	Remote Function	ED_ZIEDH14 - [PNL 2AB-TB PWR (E8=NORM/E7=ALT)]
12	Remote Function	SW_VHSW146L - [CONV SW TO RBCCW HXS V146]
13	Remote Function	EP_IACS993P - [DW CLR A & D OVERIDE - NORMAL/STOP]
13	Remote Function	EP_IACS994P - [DW CLR B & C OVERIDE - NORMAL/STOP]
14	Remote Function	SL_IASLCSRC - [SLC JUMPER HOSE SOURCE (ALT=FP / NORM=DEMIN)]
14	Remote Function	SL_IASLCTST - [SLC SUCT. LINEUP (NORM=SLC TNK / ALT=JUMPER HOSE)]
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]

Trig #	Trigger Text
8	K4F14AB8 - [DIESEL GENERATOR AUTO-MODE START]

MALFUNCTIONS

Malf ID	Mult ID	Description	Current Value	Target Value	Rmp time	Actime	Dactime	Trig
DG004F		DG3 AUTO START FAILURE	True	True				
ES041F		RCIC FAILURE TO AUTO START	True	True				
ES016F		HPCI HYDRAULIC SYSTEM FAILURE	True	True				
ES043F		CORE SPRAY A FAILURE TO AUTO START	True	True				
ES044F		CORE SPRAY B FAILURE TO AUTO START	True	True				
ES045F		RHR A FAILURE TO AUTO START	True	True				
ES046F		RHR B FAILURE TO AUTO START	True	True				
NI018F		IRM C FAILS HI	False	True				2
CW039F	A	CIRC WATER INTAKE PUMP MOTOR WINDING FAULT	False	True				3
CF035F		S/U LVL CONT VLV FAILS CLOSED	False	True				5
DG027F		DG4 DIFFERENTIAL FAULT	False	True		00:02:00		6
EE009F		LOSS OF OFF-SITE POWER	False	True				6
ES020F		RCIC TURBINE SPEED CONTROL FAILURE	False	True		00:02:00		7
NB009F	A	SMALL RECIRC PMP SUCT LINE RUPTURE	0.00	50.00000	00:10:00			7
CW039F	D	CIRC WATER INTAKE PUMP MOTOR WINDING FAULT	False	True				10

REMOTES

Remf Id	Mult Id	Description	Current Value	Target Value	Rmp time	Actime	Trig
SL_IASLRB		2B SLC PUMP MOTOR BKR	CLOSE	OPEN			4

PANEL OVERRIDES

Tag ID	Description	Position / Target	Actual Value	Override Value	Rmp time	Actime	Dactime	Trig

ANNUCIATOR OVERRIDES

Window	Description	Tagname	Override Type	OVal	AVal	Actime	Dactime	Trig
1-1	DRYWELL EQUIP DRAIN SUMP LVL HI	ZA411	ON	ON	OFF			1

8.0 OPERATOR RESPONSE AND INSTRUCTIONAL STRATEGIES

EVENT 1: SHIFT TURNOVER / DWEDT PUMP FAILURE	
Simulator Operator Actions	
	Ensure Monitored Parameters is open and Scenario Based Testing Variables are loaded.
NOTE	If the simulator is left in run the DWED Sump Lvl Hi Alarm will annunciate on its own after approximately 50 minutes. (The malfunctions will still work if it is allowed to annunciate)
	At the direction of the Lead Evaluator, **Initiate Trigger 1** to activate the DWED Sump Lvl Hi Annunciator.
	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 DEWDT.
Event Termination:	Go to Event 2 at the direction of the lead evaluator.

EVENT 1: SHIFT TURNOVER / DWEDT PUMP FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Conduct shift turnover shift briefing.	
		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	

FLOOR AND EQUIPMENT DRAIN SYSTEM OPERATING PROCEDURE	0OP-47
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5.3.5 Manually Pumping Drywell Floor And/Or Equipment Drain Sumps

1. **Ensure** the following:

   a. Drywell floor and/or equipment drain sump needs to be manually pumped to determine in-leakage rates ..... _____

   OR

   b. Drywell floor and/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 2: PLACING 2A RFPT CONTROLLER IN AUTOMATIC	
Simulator Operator Actions	

Simulator Operator Role Play	

Evaluator Notes	
Plant Response:	Place RFPT Master Controller in Automatic IAW 0GP-02, Step 6.3.46
Objectives:	SRO – Direct RO to perform Step 6.3.46 of 0GP-02 RO – Place RFPT Level Controller is placed in Automatic
Success Path:	RFPT Master Level Controller is in Automatic and Reactor water level is controlled in band.
Event Termination:	Go to Event 3 at the direction of the Lead Evaluator.

EVENT 2: 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 3 and 4: RAISE REACTOR POWER, IRM C FAILURE	
Simulator Operator Actions	
	While withdrawing control rods, at the direction of the Lead Evaluator, **Initiate Trigger 2**, to fail IRM C upscale.

Simulator Operator Role Play	
	If asked as the RE, continuous rod withdrawal is allowed.
	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 Ops Center 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. Rods pulls will commence at Step 166 (10-23 @ 12) of the A2X sequence. While withdrawing control rods, IRM C will fail upscale causing a rod block and half scram.
Objectives:	SRO - Directs and monitor reactor power ascension with control rods Determine Technical Specification application. RO - Withdraw control rods to raise reactor power. Perform actions for IRM C failure
Success Path:	Declare IRM A operable by channel check and bypass IRM C with tracking LCO for IRM C.
Event Termination:	Go to Event 4 at the Direction of the Lead Evaluator.

EVENTS 3 and 4: RAISE REACTOR POWER, IRM C FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Ensures no other distracting evolutions are in progress while reactivity controls are being manipulated.	
		Directs RO to raise reactor power by withdrawing control rods IAW 0GP-10 Item 10 Step 166. (Continuous withdrawal allowed).	
		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 Required Action A.1 is required within 12 hours, or A.2 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 4 on page 45 for format)	
		NOTE: WCC provides cue that IRM A can be declared operable after channel check is SAT. Evaluates IRM A operability following satisfactory channel check . 2OP-09, Attachment 4, 2.3.4 (Operability Guidance).	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 Definitions provide guidance as to how.
		Directs IRM A channel check be performed.	Channel Check definition in the RO DSR.

EVENTS 3 and 4: RAISE REACTOR POWER, IRM C FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Determines IRM A is operable after the channel check is SAT After IRM A is declared operable TS 3.3.1.1 would only be a tracking LCO	
		Directs removing IRM A from Bypass	
		Directs bypassing IRM C	
		Directs resetting half scram	
	BOP	Monitors the plant	

EVENTS 3 and 4: RAISE REACTOR POWER, IRM C FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Commence rod withdrawal at step 166 of GP-10 per guidance of OI-01.02	
		2OP-07 Continuous Rod Withdraw 1. ENSURE ROD SELECT POWER control switch is in ON. 2. SELECT desired control rod by depressing its CONTROL ROD SELECT push button. 3. ENSURE the backlighted CONTROL ROD SELECT push button is brightly illuminated AND the white indicating light on the full core display is also illuminated. 4. ENSURE ROD WITHDRAWAL PERMISSIVE indication has illuminated. 5. CONTINUOUSLY WITHDRAW control rod to position designated on GP pull sheets by holding EMERGENCY ROD IN NOTCH OVERRIDE switch to OVERRIDE, while simultaneously holding ROD MOVEMENT switch to NOTCH OUT. 6. MONITOR control rod position AND nuclear instrumentation while withdrawing the control rod. 7. PERFORM the following for control rods to be fully withdrawn: a. WHEN control rod reaches position 48, THEN PERFORM either of the following: - MAINTAIN the continuous withdraw signal for the desired time - APPLY a separate notch withdraw signal. b. ENSURE control rod does NOT retract beyond position 48. (ref. 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 AND rod settle light extinguishes. e. ENSURE control rod reed switch position indicators agree with FULL OUT indication on full core display.	
		Stops withdrawing control rods when IRM C fails upscale. *ROD OUT BLOCK*	

EVENTS 3 and 4: RAISE REACTOR POWER, IRM C FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	RO	Determines IRM C failed upscale.	
		Responds and reports applicable alarms for IRM C failing upscale. *A-5* *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.	

EVENT 5: CIRC WATER PUMP 2A TRIP	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 3**, to initiate CW Pump A trip
	Note: At this low a power level, Condenser vacuum will not change. If crew does not start an idle CW pump, **Trigger 10** will trip an additional CW Pump.

Simulator Operator Role Play	
	If asked as Outside AO, acknowledge request to check pump. After 2-3 minutes, call back and report that shear pin on the traveling screens for CW Pump A broke.
	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. At this power level, Condenser vacuum should not be effected.
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 5: CIRC WATER PUMP 2A TRIP			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of APP-UA-01, 1-7, CIRC WATER PUMP A TRIP	
		May conduct a brief (see Enclosure 4 on page 45 for format)	
	RO	Monitor plant parameters	
	BOP	Take actions IAW APP-UA-01, 1-7, CIRC WATER PUMP A TRIP	
		Direct AOs to investigate pump and pump breaker to determine cause of pump trip.	
		IAW APP: If reactor power is less than 90% OR a CWIP pump can be started within 5 minutes, THEN START an available CWIP Start a Circ Water pump ○ Place SC ISOL VALVES MODE SELECTOR switch to D position ○ Start CWIP 2C ○ Place switch to C position May start the circulating water pump using 2OP-29, Section 8.13, Shifting Circulating Water Intake Pumps.	

EVENT 6: SLC PUMP 2B BREAKER TRIP	
Simulator Operator Actions	
	When directed by the lead evaluator, **Initiate Trigger 4** to fail SLC Pump B.

Simulator Operator Role Play	
	If asked as I&C to investigate, acknowledge the request.
	If asked as RBAO report acrid smell in the area of 2XH and the breaker is tripped for 2B SLC Pump (no fire/smoke in the area).

Evaluator Notes	
Plant Response:	SLC Pump Breaker will trip. TS 3.1.7, Condition A With one SLC subsystem inoperable restore the SLC subsystem to OPERABLE status in 7 days.
Objectives:	SRO – Determine Technical Specifications applications RO – Respond to a trip of SLC Pump Breaker BOP – Monitor plant parameters
Success Path:	Determines TS 3.1.7, Condition A applies.
Event Termination:	Go to Event 7 at the direction of the lead evaluator.

EVENT 6: SLC PUMP 2B BREAKER FAILURE			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions of APPs	
		Direct I&C to investigate	
		Evaluate Tech Spec 3.1.7, SLC. Condition A, With one SLC subsystem inoperable restore the SLC subsystem to OPERABLE status in 7 days Determine no mode change can occur –OR- Have WCC perform a risk assessment (3.0.4b) to determine if a Mode change can be performed.	
		May conduct a brief (see Enclosure 4 on page 45 for format)	
	BOP	Plant Monitoring	
	RO	Refer to the appropriate APPs.	
		Diagnose failure of SLC Pump B breaker.	
		Dispatch AO to RB MCC 2XH.	
		May place a blue cap on 2B SLC Pump to identify it is unavailable.	

EVENT 7: SULCV FAILS CLOSED	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 5** to activate the SULCV failing closed.
	If crew does not respond properly to this event, the Reactor may scram on low water level. If this happens continue to next event. Discuss with Lead Evaluator.

Simulator Operator Role Play	
	If contacted as TBAO to investigate SULCV, acknowledge request.
	If contacted as I&C to investigate failure, acknowledge request.

Evaluator Notes
Plant Response: SULCV fails closed and Reactor water level lowers.
Objectives: SRO - Direct actions for failed SULCV and lowering reactor water level RO - Monitors reactor plant parameters BOP - Take action to respond to a failed SULCV and lowering reactor water level
Success Path: Level restored to normal band by establishing flow through an alternate path
Event Termination: Go to Event 8 at the direction of the Lead Evaluator.

EVENT 7: SULCV FAILS CLOSED			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions in response to lowering reactor water level. *A-07 2-2, REACTOR WATER LEVEL HIGH/LOW* *A-05 3-3, SRM PERIOD*	
		Direct entry into 0AOP-23, Condensate / Feedwater System Failure	
		Direct injection to the vessel be established by manually opening one of the following valves: • FW-V120 • FW-V118 • FW-V119	
		Direct manual scram if level control not established and level continues to lower.	
		Contact I/C for troubleshooting.	
		May conduct a brief (see Enclosure 4 on page 45 for format)	
	OATC	Monitor Critical Plant Parameters	
	OATC	If direct by SRO, insert manual scram	
		Announce and enter 0AOP-23, Condensate / Feedwater System Failure	
	BOP	Recognize and respond to lowering reactor water level (may notice before alarm) APP-A-07 2-2, REACTOR WATER LEVEL HIGH/LOW	
		Diagnose SULCV has failed closed and attempt to OPEN	
		Attempt to establish flow to the vessel by manually opening one of the following valves: • FW-V120 • FW-V118 • FW-V119	

EVENT 8, 9: LOSS OF OFF-SITE POWER / SCRAM / DG3 FAILS TO START / DG4 TRIPS	
Simulator Operator Actions	
	At the discretion of the Lead Evaluator, **Initiate Trigger 6** to initiate a loss of off-site power.
	Trigger 11: 2AB-TB to ALT (ED_ZIEDH14
	Trigger 12: RCC on CSW, Open SW-V146 (SW_VHSW146L)
	If requested to cross-tie of service air, wait 3 minutes and modify Remote Function AI_VHAIV07L, OPEN
Simulator Operator Role Play	
	If asked as load dispatcher, transmission line crews are investigating cause and no current estimates of restoration
	If asked as OAO to investigate E4/DG4, report device 86DP tripped @ E4 switchgear
	If asked as I&C to investigate DG3, DG4 and/or HPCI, acknowledge the request
	If requested to monitor DGs, acknowledge alarms using DG Local Alarm Panel(Instructor Aids), report alarms if requested
	If asked to swap Panel 2AB-TB to alternate, notify Sim Operator to activate **Trigger 11** (2 min).
	If requested to align RBCCW to CSW cooling, **Trigger 12** (5 min.)
Evaluator Notes	
Plant Response:	LOOP on Unit 2 (Unit 1 maintains off-site power), Reactor scram, MSIV closure, DG4 auto starts, then trips on differential overcurrent. DG3 fails to start but will start in CR Auto and energize E3. HPCI FIC power failure 2 minutes after LOOP.
Objectives:	SRO - Enter and direct the activities of EOP-01-RSP Direct RPV level and pressure bands Direct entry into AOP-36.1 RO – Perform Scram immediate actions Restore and maintain RPV water level as directed by SRO Stabilize RPV pressure as directed by SRO BOP – Recognize and report loss of 230 kV buses Verify auto start of DGs Recognize and report failure of DG3 to auto start, manually start DGs Recognize and report failure of DG4 due to overcurrent Perform AOP-36.1 actions
Success Path:	Scram immediate actions are completed, RPV pressure and level are stabilized and controlled within band, and plant electrical needs are met via DGs.

EVENT 8, 9: LOSS OF OFF-SITE POWER / SCRAM / DG3 FAILS TO START / DG4 TRIPS			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions Reactor Scram Procedure Direct RPV pressure 800-1000 psig. Direct RPV level 166-206 inches. Monitor Containment parameters	
		Direct entry into 0AOP-36.1, Loss Of Any 4160V Buses Or 480V E-Buses	
		Direct start of DG3.	***Critical Step #1***
		Contact I&C/Maintenance for DG and HPCI failures	
		May conduct a brief (see Enclosure 4 on page 45 for format)	
	OATC	Perform Scram Immediate Actions	
		Stabilize pressure as directed by the CRS	
		Restore and maintain RPV water level 166-206 inches	

EVENT 8, 9: LOSS OF OFF-SITE POWER / SCRAM / DG3 FAILS TO START / DG3 TRIPS			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	BOP	Recognize and report loss of 230 kV busses	
		Verify start of DGs	
		Recognize & report failure of DG3 to auto start, auto starts DG3.	***Critical Step #1***
		Recognize and report failure of DG4 due to overcurrent trip	
		Dispatch OAO to investigate DG4 and monitor the other DG's	
		Announce and execute 0AOP-36.1, Loss Of Any 4160V Buses Or 480V E-Buses	
		Start Battery Room HVAC	
		Start Control Building HVAC	
		Start available SW pumps	
		Direct RCC cooling water swapped to CSW header (open SW-V146)	
		Direct 2AB-TB panel swapped to alternate power supply	
		May start CRD per OP-08	
		Restore RPS	

EVENT 10, 11, 12: SMALL BREAK LOCA / LOSS OF HP INJECTION / ED	
Simulator Operator Actions	
	At the direction of the Lead Evaluator, **Initiate Trigger 7** to initiate a Recirc Pump suction line rupture and failure of the RCIC flow controller.
	Trigger 13: EP_IACS993P, EP_IACS994P (Defeat DW Cooler LOCA Lockout)
	Trigger 14: SL_IASLCTS to ALT, SL-IASLCSRC to ALT (SLC to Demin Water)
	Trigger 15: ED_IARJAX5 - IN, ED_IARKA10 – IN (Rack in E7 to E8 Cross-ties)
Simulator Operator Role Play	
	If requested to defeat drywell cooler LOCA lockout, wait 2 minutes and then initiate **Trigger 13** (EP_IACS993P, EP_IACS994P). Report actions in the back panels are complete.
	If asked as I&C to investigate and RCIC, acknowledge the request
	If asked to investigate HPCI Aux Oil Pump, acknowledge request. (If asked it will NOT reset)
	If requested to transfer SLC suction to demin water, wait two minutes then modify Remote SL_IASLCTS to ALT, SL-IASLCSRC to ALT (**Trigger 14)**
	If requested to rack in E7-E8 crosstie breakers, **initiate Trigger 15**, ED_IARJAX5, IN, ED_IARKA10, IN after 6 minutes
Evaluator Notes	
Plant Response:	RPV level lowers below LL2, HPCI fails to start and is unavailable, RCIC fails to start, but can be started manually. After a couple minutes, RCIC goes into low speed oscillation.
Objectives:	SRO - Enter and direct the activities of EOP-01-RVCP Direct ED when LL4 is reached. RO – Restore and maintain RPV water level as directed by SRO Stabilize RPV pressure as directed by SRO Maximize CRD flow using Hard Card, then SEP-09 Open 7 ADS valves as directed by CRS BOP – Diagnose failure of HPCI Aux Oil Pump Perform Alternate Coolant Injection using SLC IAW LEP-01 Diagnose failure of RCIC speed control Trip RCIC to avoid prolonged low speed operation
Success Path:	Operation of all high pressure injection system is attempted. Reactor is depressurized when LL4 cannot be maintained. Reactor is re-flooded, and Containment parameters are addressed.
Scenario Termination:	***Reactor is depressurized, level is being restored to normal band, Containment and Drywell Sprays are being placed in service.***

EVENT 10, 11, 12: SMALL BREAK LOCA / LOSS OF HP INJECTION / ED			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	SRO	Direct actions RVCP Pressure Leg: Defeat Group 10 Isolation Level Leg: Verify Group Isolations and Actuations Maximize CRD Injection using SEP-09 Alternate Coolant Inject using LEP-01 Inhibit ADS	
		Contact I/C for troubleshooting HPCI and RCIC failures	
		May conduct a brief (see Enclosure 4 on page 45 for format)	
		Direct ED when LL4 is reached.	***Critical Task #2***
		Direct LP ECCS pumps started / injection valves opened as required.	***Critical Task #3***
		Enters and Directs actions of PCCP: Direct Spraying Torus Direct Spraying Drywell	
		Direct Cross-Tie actions IAW 0AOP-36.1 Approval from Unit 1 is obtained to crosstie.	
	OATC	Direct AO to perform actions to lineup SLC to Demin Water. (LEP-01) Initiate SLC for Alternate Coolant Injection	
		Perform SEP-09 hard card. (Enclosure 3, page 44)	
		Recognize failure of RCIC and report to CRS Recognize failure of HPCI and report to CRS.	
		Ensure LL3 actuations have occurred.	
		When directed by SRO, Open 7 ADS valves (No valve indications with the loss of E8, will have to use tailpipe temps, on computer, to verify valves open)	***Critical Task #2***

EVENT 10, 11, 12: SMALL BREAK LOCA / LOSS OF HP INJECTION / ED			
Time	**Pos**	**EXPECTED Operator Response**	**Comments**
	OATC	Identify that LP ECCS Systems (RHR/CS) fail to auto start – manually start pumps and open discharge valves inject to the reactor vessel.	***Critical Task #3***
	BOP	Monitor plant parameters	
		Override Group 10 Isolation	
		Identify that LP ECCS Systems (RHR/CS) fail to auto start – manually start pumps and open discharge valves.	***Critical Task #3***
		Place Suppression Pool Sprays in service IAW SEP-03 (Enclosure 1, page 36)	
		Place Drywell Sprays in service IAW SEP-02. (Enclosure 2, page 38)	
		Perform actions to cross-tie busses E7 and E8 IAW 0AOP-36.1. Direct AO to rack in crosstie breakers. Place **Breaker AZ5** (Sub E8 480V Main Breaker) 480V main breaker control switch for the 480V de-energized bus to TRIP, AND ensure the breaker OPENS. Place **Breaker AK7** (Bus E4 To Sub E8) 4160V supply breaker control switch for the 480V de-energized bus to TRIP, AND ensure the breaker OPENS. Place AND hold **Breaker AX5 and A10** (Bus E7 Tie To Bus E8) bus cross-tie control switch to CLOSE until both cross-tie breakers indicate CLOSED. Ensure the battery chargers have energized and are supplying DC loads. Start 2B-SF-CB and 2B-EF-CB (Battery Room 2B Vent Fans)	

Enclosure 1 **Page 1 of 2**

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:

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

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

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

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

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

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

Enclosure 1 **Page 2 of 2**

2.1.3 Torus Spray Actions (continued)

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

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

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

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

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

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

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

4. **WHEN** torus pressure drops to 2.5 psig **OR** directed to terminate sprays,
THEN ensure CLOSED:

   - E11-F027A (Torus Spray Isol Vlv) ☐ RO
   - E11-F027B (Torus Spray Isol Vlv) ☐ RO

5. **IF** re-initiation of sprays required,
THEN return to Section 2.1.3 Step 1. ☐ RO

6. **WHEN** sprays **NO** longer required,
THEN go to Section 2.2 ☐ RO

Enclosure 2 **Page 1 of 6**

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

Enclosure 2 **Page 2 of 6**

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

Enclosure 2 **Page 3 of 6**

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

Enclosure 2 **Page 4 of 6**

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

Enclosure 2 **Page 5 of 6**

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

Enclosure 2 **Page 6 of 6**

2.1.3 Drywell Spray Actions (continued)

l. **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

11. **WHEN** drywell pressure drops to 2.5 psig **OR** directed to terminate drywell spray,
THEN ensure CLOSED:

a. E11-F016A (Drywell Spray Otbd Isol Vlv) ..... ☐ RO

b. E11-F021A(Drywell Spray Inbd Isol Vlv). ..... ☐ RO

c. E11-F016B (Drywell Spray Otbd Isol Vlv) ..... ☐ RO

d. E11-F021B (Drywell Spray Inbd Isol Vlv). ..... ☐ RO

12. **Ensure** either:

- RHR operated in LPCI mode ..... ☐ RO
- RHR operated in Torus Cooling. ..... ☐ RO
- RHR pumps are secured ..... ☐ RO

13. **IF** re-initiation of drywell spray required,
THEN return to Section 2.1.3 Step 9. ..... ☐ RO

Enclosure 3 **Page 1 of 1**

Increasing Unit 2 CRD Flow From RTGB (0EOP-01-SEP-09)

NOTE

Attachment 2 is **NOT** referred to in this procedure, but is included since EOP-01-SEP-09 is the controlling procedure for this Instructional Aid. ☐

1. **IF** a reactor scram sealed in,
   THEN ensure only one CRD pump operating. ☐

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

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

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

   b. **Start** one CRD pump ☐

4. **Throttle** to maintain charging water header pressure greater than or equal to 1000 psig but as low as possible.

   - In-service C12-F002A(F002B) (Flow Control Vlv). ☐
   - C12-PCV-F003 (Drive Pressure Vlv). ☐

5. **IF** the CRD pump trips on low suction pressure,
   THEN:

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

   b. **Start** a CRD pump. ☐

   c. **Throttle open** the in-service C12-F002A(F002B) (Flow Control Vlv) to maintain charging water header pressure above the pressure at which the CRD pump tripped, but as low as possible. ☐

6. **Refer to** 0EOP-01-SEP-09 for additional actions. ☐

ENCLOSURE 4 Page 1 of 1

A Plant Status Brief is performed by the CRS utilizing the following format:

B *BEGIN*:
- Announce "Attention in the Control Room for a Plant Status Brief"
- Ensure all affected personnel are attentive, signified by each raising a hand

R *RECAP:*
- Provide overview of sequence of events and current plant status
- Identify major equipment failures
- Identify procedures that are in effect
- Discuss status of actions performed outside the MCR

I *INPUT*:
Each crew member discusses the following, as applicable:
- Critical parameters, including relevant trends (OAC/BOP)
- Manual control bands (OAC/BOP)
- Continuous action steps/carry over steps (OAC/BOP)
- Mitigation strategy and upcoming procedural transitions (STA)
- Time critical actions (STA)
- Limiting Technical Specification actions (STA/SM)
- Emergency Plan status including protective actions (SM)
- Any questions OR any observations not understood

E *EXPECTATION*:
- Identify anticipated plant conditions
- Identify critical upcoming activities, such as anticipated procedure transitions
- Discuss contingency actions
- Resume normal alarm response protocol (if desired)

F *FINISH*:
- Solicit any closing comments or questions
- Announce "End of brief."

When an Alignment Brief is used, it should contain the following elements:

1) CRS states "Attention in the Control Room for an Alignment Brief"

2) Ensure all affected personnel are attentive, signified by each raising a hand.

3) Discuss information as required for alignment. The discussion may include input/questions from crew members, provided that the discussion remains brief. Crew member input is not required.

4) The CRS announces "End of brief".

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	3
Major Transients	1-2	2
EOPs Used	1-2	2
EOP Contingency	0-2	2
Run Time	60-90 min	90
Crew Critical Tasks	2-3	2
Tech Specs	2	2
Instrument / Component Failures before Major	2 – RO 2 - BOP	4
Instrument / Component Failures after Major	2	2
Normal Operations	1	1
Reactivity manipulation	1	1

ATTACHMENT 5
Page 1 of 1

R
Reference
Use

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

5. Ensure all required observations to support operability are appropriately documented.

6. Has a WO or AR been initiated? If yes, list number(s): 00345765	☒ Yes	☐ No
7. Has a log entry been made?	☒ Yes	☐ No
8. Is there any welding occurring in the plant?	☒ Yes	☐ No
9. Are there any personnel under-vessel?	☐ Yes	☒ No
10. Are there any plant evolutions in progress?	☒ Yes	☐ No
11. Is there any electrical switching occurring?	☐ Yes	☒ No
12. Are any control rods being moved or selected?	☒ Yes	☐ No
13. Has there been a recent change in the mode switch?	☐ Yes	☒ No
14. Is there any major equipment being started?	☒ Yes	☐ No
15. Has there been any observed relay chatter?	☐ Yes	☒ No
16. Is there any refuel bridge movement?	☐ Yes	☒ No
17. Are the rod interlocks being affected?	☒ Yes	☐ No
18. Completed copy of this attachment sent to engineer	☒ Yes	☐ No

Please 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:	J. Johnson			Workweek Manager:	B. Craig
Mode:	2	Rx Power:	2%	Gross*/Net MWe*:	NA
Plant Risk: Current EOOS Risk Assessment is:				Green	
SFP Time to 200 Deg F:	65 hrs			Days Online:	0 days
Turnover:	The BOP operator is to complete Step 6.3.46 of 0GP-02, Approach to Criticality and Pressurization of the Reactor. The OATC is to raise power to 6-10%. A2X sequence at step 166. Permission for continuous withdrawal has been granted for the rods going from 12-48.				
Protected Equipment:	ADHR / FPC Loop A / Demin Transfer Pump				
Comments:	IRM A was bypassed due to spiking and the paperwork is being evaluated by the WCC SRO for its return to service.				

U.S. Nuclear Regulatory Commission

Site-Specific SRO Written Examination

Applicant Information	
Name:	
Date: 12/15/15	Facility/Unit: Brunswick / Units 1 & 2
Region: I ☐ II ☑ III ☐ IV ☐	Reactor Type: W ☐ CE ☐ BW ☐ GE ☑
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination you must achieve a final grade of at least 80.00 percent overall, with 70.00 percent or better on the SRO-only items if given in conjunction with the RO exam; SRO-only exams given alone require a final grade of 80.00 percent to pass. You have 8 hours to complete the combined examination, and 3 hours if you are only taking the SRO portion.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results		
RO/SRO-Only/Total Examination Values	75 / 25 / 100	Points
Applicant's Scores	____ / ____ / ____	Points
Applicant's Grade	____ / ____ / ____	Percent

Brunswick 2015 NRC SRO Exam Answer Key

#	ID	Answers 0
1	201001 1	C
2	201002 1	~~D~~ C
3	201003 1	B
4	203000 1	A
5	204000 1	B
6	205000 1	D
7	205000 2	C
8	206000 1	C
9	209001 1	D
10	211000 1	C
11	212000 1	D
12	215002 1	A
13	215003 1	A
14	215004 1	A
15	215005 1	C
16	217000 1	B
17	218000 1	A
18	218000 2	B
19	219000 1	B
20	223002 1	C
21	223002 2	A
22	233000 1	D
23	239002 1	A
24	241000 1	A
25	256000 1	D
26	259002 1	A
27	261000 1	B
28	262001 1	B
29	262002 1	A
30	262002 2	B
31	263000 1	A
32	264000 1	B
33	264000 2	D
34	271000 1	C
35	290002 1	D
36	290003 1	D
37	295001 1	C
38	295003 1	B
39	295004 1	A
40	295005 1	C
41	295006 1	B
42	295007 1	A
43	295008 1	D
44	295010 1	A
45	295014 1	D
46	295016 1	B
47	295017 1	C
48	295018 1	B
49	295019 1	C

BVC 1-7-16

#	ID	Answers 0
50	295020 1	D
51	295021 1	B
52	295023 1	D
53	295024 1	C
54	295025 2	B
55	295026 1	B
56	295028 1	C
57	295030 1	C
58	295031 1	C
59	295037 1	C
60	295038 1	C
61	300000 1	C
62	400000 1	B
63	500000 1	A
64	600000 1	C
65	700000 1	B
66	CONDUCT OF OPERATION 1	A
67	CONDUCT OF OPERATION 2	C
68	EMERGENCY PROCEDURE 1	A
69	EMERGENCY PROCEDURE 2	C
70	EQUIPMENT CONTROL 1	D
71	EQUIPMENT CONTROL 2	D
72	EQUIPMENT CONTROL 3	C
73	RADIATION CONTROL 1	A
74	RADIATION CONTROL 2	B
~~75~~	~~RADIATION CONTROL 4~~	~~D~~ Deleted | BJC 1-7-16
76	S203000 1	A
77	S209001 1	D
78	S212000 1	D
79	S215001 1	A
80	S217000 1	C
81	S219000 1	A
82	S261000 1	B
83	S290002 1	D
84	S295003 1	B
85	S295015 1	B
86	S295016 1	B
87	S295018 1	C
88	S295021 1	~~D~~ C | BJC 1-7-16
89	S295022 1	C
90	S295023 1	D
91	S295031 1	A
92	S295034 1	B
93	S295037 1	A
94	SG2.1.26 1	C
95	SG2.1.42 1	D
96	SG2.2.17 1	B
97	SG2.2.22 1	D
98	SG2.3.6 1	C

		Answers
#	ID	0
99	SG2.4.37 1	C
100	SG2.4.46 1	D

1. Which one of the following completes the statement below?

With Unit One operating at rated power, on a loss of air to 1-C11-F002A(B), CRD Flow Control Valve, the valve will fail __(1)__, causing __(2)__ cooling water to the CRD Mechanism.

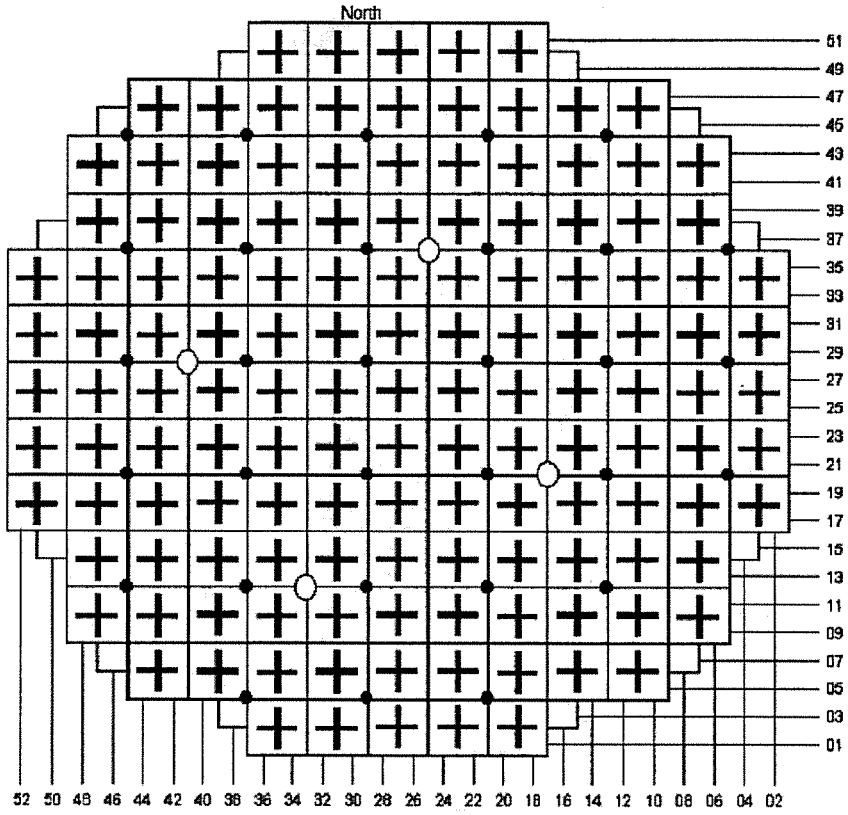
A. (1) open
   (2) minimum

B. (1) open
   (2) maximum

C. (1) closed
   (2) minimum

D. (1) closed
   (2) maximum

2. During a startup on Unit Two, control rod 30-39 is desired to be moved continuously from 12 to 48.



Which one of the following completes both statements below?

The minimum number of RMCS control switches needed to accomplish this control rod movement is __(1)__.

During this control rod movement the largest power change will be seen on SRM __(2)__.

A. (1) one
   (2) B

B. (1) one
   (2) C

C. (1) two
   (2) B

D. (1) two
   (2) C

3. During a reactor startup on Unit Two, a control rod at position 24 is difficult to move.

   Which one of the following completes both statements below?

   IAW 2OP-07, Reactor Manual Control System Operating Procedure, Drive Header DP is required to be adjusted by throttling __(2)__ C12-PCV-F003, Drive Pressure Valve.

   If the control rod cannot be moved from postion 24, LCO 3.1.1, Shutdown Margin (SDM) __(1)__ met.

   A. (1) open
      (2) is

   B. (1) closed
      (2) is

   C. (1) open
      (2) is NOT

   D. (1) closed
      (2) is NOT

4. RHR has auto initiated and is no longer needed for Reactor water level control.

   Which one of the following identifies the required sequence for resetting a Core Spray initiation signal IAW 1OP-17, Residual Heat Removal System Operating Procedure, Section 7.1, Shutdown-Auto or Manual LPCI Mode?

   A. Reset both Divisions of Core Spray logic, then reset both Divisions of LPCI logic within 10 seconds.

   B. Reset both Divisions of LPCI logic, then reset both Divisions of Core Spray logic within 10 seconds.

   C. Reset Division I Core Spray Logic then Division I LPCI Logic within 10 seconds, and then reset Division II Core Spray Logic then Division II LPCI Logic within 10 seconds.

   D. Reset Division I LPCI Logic then Division I Core Spray Logic within 10 seconds, and then reset Division II LPCI Logic then Division II Core Spray Logic within 10 seconds.

5. Following a reactor scram on Unit One, a reject flow path to the condenser has been established to control reactor water level.

   Subsequently, the following conditions exist:

Reactor water level	198 inches
RWCU Diff flow	35 gpm
RWCU System discharge pressure	130 psig
RWCU room temperature	125°F
RWCU Pump flow	80 gpm
RWCU Filter Inlet Temperature	139°F

   Based on these conditions, which one of the following completes both statements below?

   The RWCU Pump(s) will __(1)__.

   The 1-G31-F001, RWCU Inlet Inboard Isolation Valve, will __(2)__.

   A. (1) trip
      (2) close

   B. (1) trip
      (2) remain open

   C. (1) continue to run
      (2) close

   D. (1) continue to run
      (2) remain open

6. Unit Two is in MODE 4. Both loops of RHR are in Shutdown Cooling mode when an inadvertent Group 8 isolation signal is received.

   IAW 0AOP-15.0, Loss of Shutdown Cooling, which one of the following completes both statements below?

   The minimum required reactor water level, unless otherwise directed by the CRS, is __(1)__.

   Recirc loop suction temperatures __(2)__ be used for vessel coolant temperature monitoring for indications of boiling.

   A. (1) 192 inches
      (2) can

   B. (1) 192 inches
      (2) can NOT

   C. (1) 200 inches
      (2) can

   D. (1) 200 inches
      (2) can NOT

7. Unit Two is in MODE 3 with RHR Loop A in Shutdown Cooling IAW 2OP-17, Section 5.7, Placing First RHR Loop in Shutdown Cooling Mode. RHR Pump 2A is running and RHR Pump 2C is in standby. A small leak results in the following conditions:

RPV water level	176 inches
RPV pressure	40 psig
Drywell pressure	1.9 psig

Which one of the following predicts how RHR Loop A will respond?

A. Group 8 isolation; RHR Pump 2A trips.

B. RHR Pump 2C auto starts; RHR Loop A cooldown rate rises.

C. RHR Pump 2C auto starts; RHR Loop A decay heat removal is lost.

D. RHR Pump 2A remains running; RHR Pump 2C remains off.

8. Unit Two HPCI is operating in pressure control mode. Reactor pressure band is 800-1000 psig. Current plant conditions are as follows:

Reactor pressure	990 psig, rising
HPCI flow controller	Auto
HPCI flow	3500 gpm
HPCI turbine speed	3700 RPM
HPCI controller output	80%

Which one of the following identifies two methods available to maintain Reactor pressure in band?

Throttle HPCI Bypass to the CST, E41-F008, in the __(1)__ direction, or __(2)__ the HPCI flow controller auto setpoint.

A. (1) open
   (2) raise

B. (1) open
   (2) lower

C. (1) closed
   (2) raise

D. (1) closed
   (2) lower

9. With Unit One in Mode 3, a steam line rupture occurs in the Drywell. Plant conditions are:

Drywell pressure	18 psig
Reactor water level	60 inches
Reactor pressure	350 psig

Which one of the following completes both statements below?

The Core Spray System injection valves are __(1)__.

The shutoff head of the Core Spray pumps is approximately __(2)__ psig.

A. (1) closed
(2) 200

B. (1) closed
(2) 300

C. (1) open
(2) 200

D. (1) open
(2) 300

10. An ATWS has occurred on Unit Two. Terminate and prevent actions have been completed.

Which one of the following completes both statements below IAW 0OI-37.5, ATWS Procedure Basis Document?

With SLC Tank level at 30%, __(1)__ Shutdown Boron Weight has been injected into the Reactor.

At this time, raising reactor water level __(2)__ required to ensure the reactor will remain shut down.

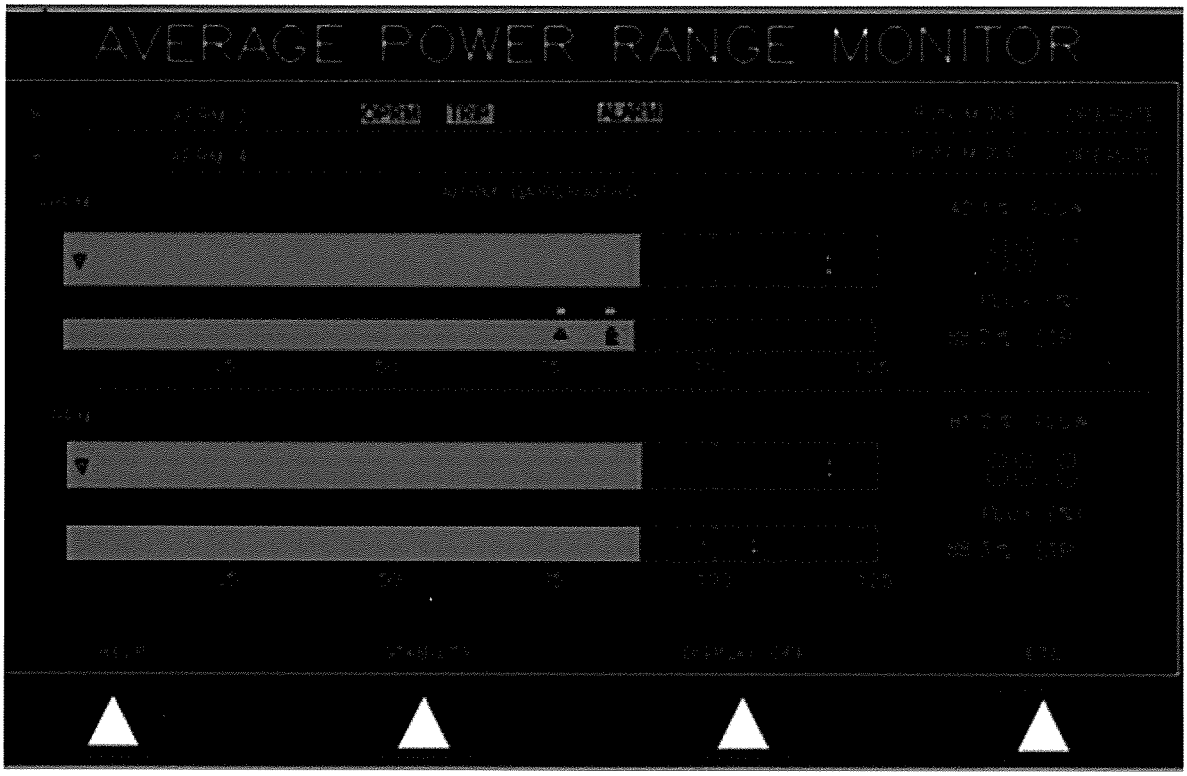
A. (1) Cold
   (2) is

B. (1) Cold
   (2) is NOT

C. (1) Hot
   (2) is

D. (1) Hot
   (2) is NOT

11. A Unit Two APRM ODA shows the following indications:



Which one of the following completes both statements below?

The cause of the indications for APRM 2 is a __(1)__.

As a result of this condition, Voter input status lights will show an APRM UPSC/INOP trip on __(2)__.

A. (1) Recirculation pump trip
   (2) Voter 2 **ONLY**

B. (1) Recirculation pump trip
   (2) all 4 Voters

C. (1) Recirculation flow unit failed downscale
   (2) Voter 2 **ONLY**

D. (1) Recirculation flow unit failed downscale
   (2) all 4 Voters

12. Which one of the following is the power supply to APRM Channel 4 NUMAC on P608?

A. 120 VAC RPS

B. 120 VAC UPS

C. 24/48 VDC Div I

D. 24/48 VDC Div II

13. Which one of the following distribution systems identifies the power supply to the Intermediate Range Monitor (IRM) channels?

A. 24/48 VDC

B. 125/250 VDC

C. 120 VAC UPS

D. 120 VAC RPS

Note: This question is asking about the IRM circuitry. It is NOT referring to drive mechanism or recorders

BLC
12-15-15

14. A plant startup is in progress. A control rod block has occurred. The following nuclear instrument indications are noted:

SRM	Counts	Position	IRM	Counts	Range
A	$3x10^5$	Full In	A	25/125	3
B	$5x10^4$	Partially Withdrawn	B	65/125	2
C	$6x10^4$	Full In	C	35/125	3
D	$5x10^4$	Partially Withdrawn	D	15/125	3
			E	50/125	2
			F	55/125	2
			G	30/125	3
			H	25/125	3

Which one of the following is the <u>minimum</u> required action(s) that will clear the control rod block?

A. Withdrawing SRM A ONLY.

B. Withdrawing SRM A and C.

C. Ranging IRM E to range 3.

D. Inserting SRM B and D.

15. A reactor startup is being performed on Unit Two. Reactor power is currently 18%. APRM Channels 1 and 2 have the following number of operable LPRM inputs:

Level	A	B	C	D
APRM 1	5	3	4	4
APRM 2	6	4	2	5

Which one of the following identifies the effect on the Reactor Manual Control System (RMCS), if any?

A. Rod Block. APRM 1 **ONLY** is INOPERABLE.

B. Rod Block. APRM 2 **ONLY** is INOPERABLE.

C. Rod Block. **BOTH** APRM 1 **AND** 2 are INOPERABLE.

D. No Rod Block. **BOTH** APRM 1 **AND** 2 are OPERABLE.

16. Which one of the following identifies two RCIC functions that remain available following a loss of 125 VDC Panel 4A on Unit Two?

A. automatic initiation and inboard isolation logic

B. automatic initiation and outboard isolation logic

C. automatic shutdown on high RPV water level and inboard isolation logic

D. automatic shutdown on high RPV water level and outboard Isolation logic

17. An automatic ADS actuation has occurred.

Which one of the following completes both statements concerning A-03 (1-10) *Safety / Relief Valve Open?*

This alarm is activated by __(1)__ .

After the reactor is automatically depressurized, the amber light for all the affected SRVs __(2)__ be illuminated on the apron section of RTGB Panel P601.

A. (1) a SRV sonic detector
   (2) will

B. (1) a SRV sonic detector
   (2) will NOT

C. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will

D. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will NOT

18. Which one of the following completes both statements below concerning the 125 VDC power supply to the Unit One ADS logic?

The normal power supply is from Distribution Panel __(1)__,

The backup power supply is from Distribution Panel __(2)__.

A. (1) 3A
   (2) 3B

B. (1) 3B
   (2) 3A

C. (1) 3A
   (2) 4A

D. (1) 3B
   (2) 4B

19. Unit Two is operating at rated power.

In preparation for a HPCI surveillance, RHR Loop 2B has been placed in Torus Cooling IAW 2OP-17, Section 5.9, Suppression Pool Cooling Mode, with all pumps running and cooling maximized.

A subsequent transient occurs with the following plant conditions:

Drywell Pressure	18.1 psig
Torus Pressure	13.7 psig
Reactor Pressure	20 psig
Reactor water level	100 inches

Which one of the following completes both statements below?

Procedurally, total RHR Loop B Torus Cooling flow is limited to __(1)__ .

Immediately after the transient, Torus Cooling __(2)__ remain in service.

A. (1) 11,500 gpm
(2) will

B. (1) 11,500 gpm
(2) will NOT

C. (1) 17,000 gpm
(2) will

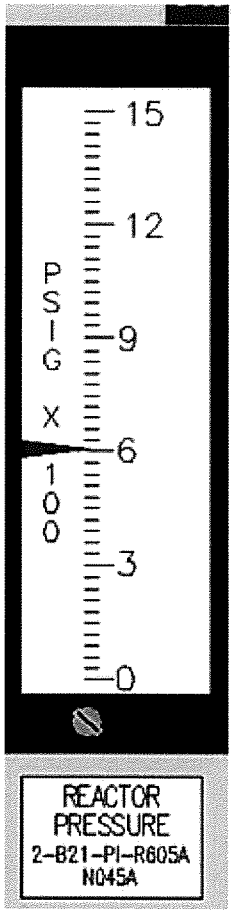
D. (1) 17,000 gpm
(2) will NOT

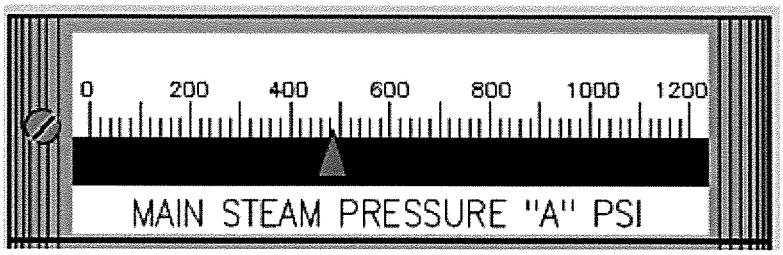
20. Unit Two Mode Switch is in Startup with reactor pressure at 600 psig.

Which one of the following completes both statements below?

High steam flow sensed in a minimum of __(1)__ steam lines will cause **ALL** the Group 1 Isolation valves to close.

If a Group 1 isolation occurs, the MSIVs __(2)__ be opened for a rapid recovery of the Main Condenser, IAW 2OP-25, Reopening the MSIVs Following a Scram, given the following indications:





A. (1) 2
   (2) may

B. (1) 2
   (2) may NOT

C. (1) 4
   (2) may

D. (1) 4
   (2) may NOT

21. Reactor Recirc pumps have auto tripped due to low Reactor water level.

At time = 0, the following indications are available:
G31-F001, RWCU Inboard Isol Vlv, is Closed
G31-F004, RWCU Outboard Isol Vlv, is Open

Which one of the following identifies what the GROUP 3 ISOL CMND status box on ERFIS will display at time = five minutes?

A. A green GROUP ISOL

B. A red NO GROUP ISOL

C. A yellow GROUP ISOL CMND

D. A green NO GROUP ISOL CMND

22. 2OP-17, Section 8.11, Fuel Pool Cooling Assist Mode with Fuel Pool Gates Removed, is being performed on Unit Two.

Which one of the following identifies the power supplies required for the RHR pumps that are utilized in this procedure section?

A. E1 and E2

B. E3 and E4

C. E1 and E3

D. E2 and E4

23. Which one of the following completes both statements below?

The SRVs discharge at approximately __(1)__ in the torus.

The __(2)__ provides even heat distribution in the suppression pool.

A. (1) -8 feet
   (2) T-Quencher

B. (1) -8 feet
   (2) Ring Vent Header Deflector

C. (1) -6.5 feet
   (2) T-Quencher

D. (1) -6.5 feet
   (2) Ring Vent Header Deflector

24. Unit Two is operating at 20% power during a plant startup.
2 Bypass Valves are open with the Main Turbine being rolled (currently at 500 RPM).

A complete loss of Uninterruptible Power Supply occurs.

Which one of the following identifies the plant response?

A. Reactor scram on high reactor pressure signal.

B. Reactor scram on turbine valve closure signal.

C. No reactor scram. Turbine valves close.

D. No reactor scram. Turbine roll continues with EHC transferred to the PMG power supply.

25. Unit Two is operating at 45% power when UA-04 (1-9) *FW Heater Level High Extr Trip* alarms for the 5A Feedwater Heater.

Which one of the following completes both statements below?

2-EX-V23, Non-Return Valve to Feedwater Heater 5A, will __(1)__.

2-HD-LV-83-2, FW Heater 5A Emergency Drain Valve, will route water to the __(2)__.

A. (1) open
(2) condenser

B. (1) open
(2) deaerator

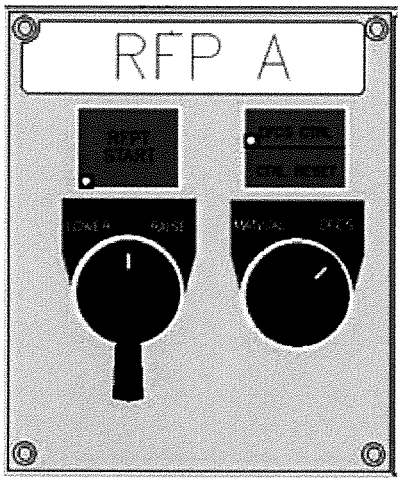
C. (1) close
(2) condenser

D. (1) close
(2) deaerator

26. Unit Two is operating at 40% power. Reactor Feed Pump (RFP) 2A is operating in automatic DFCS control when the following alarm is received:

UA-13 (6-5) *RFP A Control Trouble*

The RO observes the following indications for RFPT 2A on XU-1:



(all light indications are extinguished)

Which one of the following identifies how RFP 2A will respond and what actions are required to control RFP 2A under this condition?

RFP 2A will __(1)__.

The RO can manually control RFP 2A, IAW 0AOP-23, Condensate/Feedwater System Failure, by using the LOWER/RAISE __(2)__.

A. (1) remain at the current speed
   (2) Speed Control Switch on XU-1.

B. (1) remain at the current speed
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

C. (1) automatically lower to 1000 RPM
   (2) Speed Control Switch on XU-1.

D. (1) automatically lower to 1000 RPM
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

27. Unit Two is operating at rated power when a Group 1 Isolation occurs. The following plant conditions currently exist:

Reactor pressure	850 psig
Reactor water level	110 inches, HPCI/RCIC auto injecting
Drywell pressure	1 psig
Torus pressure	1.1 psig

Which one of the following predicts how the plant is affected if both SBGTs subsequently trip?

A. HPCI/RICI unavailable for injection.

B. High airborne activity on the -17' elevation.

C. Torus-to Drywell Vacuum breaker operation will occur.

D. Rx Bldg-to-Torus Vacuum breaker operation will occur.

28. Unit Two is shutdown with all switchyard PCBs closed except for generator PCBs 29A and 29B, which are open. A fault occurs on Line 31 (Whiteville) with a failure of PCB 31B to open.

Which one of the following is the expected status of 230 KV Bus 2B and the SAT?

A. 230 KV Bus 2B is energized; SAT is energized.

B. 230 KV Bus 2B is de-energized; SAT is energized.

C. 230 KV Bus 2B is energized; SAT is de-energized.

D. 230 KV Bus 2B is de-energized; SAT is de-energized.

29. During a Station Blackout with DG3 ONLY available, 4KV Emergency Buses cannot be cross-tied. On Unit One, DC voltage is 210 VDC and slowly lowering due to loss of battery chargers.

Which one of the following completes both statements below?

The Unit One Primary UPS inverter DC input breaker, CB 101, __(1)__ tripped.

IAW 1EOP-01-SBO, Station Blackout, MCC-1CA can be energized using __(2)__.

A. (1) is
(2) SAMA DG2

B. (1) is
(2) Cross-Tie E7 to E5

C. (1) is NOT
(2) SAMA DG2

D. (1) is NOT
(2) Cross-Tie E7 to E5

30. The indications and status of the Unit Two UPS system at the primary and standby inverters are as follows:

	Primary Inverter	Standby Inverter
Load on UPS light	Off	Off
Load on Inverter light	Off	On
Load on Alternate light	On	Off
Alt Source Failure light	Off	Off
Manual Bypass switch	Norm	Bypass Test

Which one of the following identifies the current status of UPS system loads?

A. Energized from MCC 2CA

B. Energized from MCC 2CB

C. Energized from 2E7

D. Energized from 2E8

31. Which one of the following completes both statements below regarding 125/250 VDC Station Distribution?

During a float charge, the charger output voltage to the battery will be at a __(1)__ voltage than when in the equalize mode.

Each division of the 125/250 VDC Station batteries are capable of supplying 150 amps for __(2)__ hours.

A. (1) lower
(2) 8

B. (1) lower
(2) 10

C. (1) higher
(2) 8

D. (1) higher
(2) 10

32. A dual unit Loss of Offsite Power has occurred and DG4 has tripped on differential overcurrent.

Which one of the following loads will lose power as the result of the trip of DG4?

A. RHR Pump 2D

B. RWCU Pump 2B

C. Fuel Pool Cooling Pump 2A

D. Conventional Service Water Pump 2C

33. DG1 was running in Control Room Manual for the performance of 0PT-12.2A, No. 1 Diesel Generator Monthly Load Test, and loaded to 2100 KW.

Subsequently off-site power was lost.

Which one of the following completes the statements below after the system has stabilized?

The DG1 governor is currently in __(1)__ mode of operation.

DG1 frequency is slightly __(2)__ 60 Hz.

A. (1) droop
   (2) less than

B. (1) droop
   (2) greater than

C. (1) isochronous
   (2) less than

D. (1) isochronous
   (2) greater than

34. The crew is placing the AOG System in service IAW 2OP-33, Section 6.1.1, AOG Charcoal Adsorber System Startup.
HCV-102, AOG System Bypass Valve, control switch on XU-80 is placed in AUTO, with the local control switch in the CLOSED position.
AOG-CS-3161, AOG Sys Vlv Cont Sel Sw, is in CENT position.

Subsequently, UA-45 (2-2) *Discharge H2 Conc High* alarms.

Which one of the following completes the statement below.

The HCV-102, AOG System Bypass Valve, __(1)__, and the XCV-142, AOG Guard Bed Isolation Valve __(2)__.

A. (1) auto opens
(2) auto closes

B. (1) auto opens
(2) remains open

C. (1) remains closed
(2) auto closes

D. (1) remains closed
(2) remains open

35. A second Recirc Pump startup is being performed on Unit One IAW 1OP-02, Section 6.1.2, Reactor Recirculation Pump Startup.

Which one of the following completes the statements below concerning the bottom head coolant temperature and the reactor pressure vessel (RPV) coolant temperature?

The maximum temperature difference is limited to __(1)__ .

These temperature limitations are required to be determined within no more than __(2)__ prior to startup of an idle recirculation loop, IAW 2OP-02, Reactor Recirculation System.

A. (1) $\leq$ 50°F
   (2) 15 minutes

B. (1) $\leq$ 50°F
   (2) 30 minutes

C. (1) $\leq$ 145°F
   (2) 15 minutes

D. (1) $\leq$ 145°F
   (2) 30 minutes

36. Which one of the following Unit One time-critical actions is required to be performed within 30 minutes, IAW 1-EOP-01-SBO, Station Blackout Procedure?

A. Load strip the batteries.

B. Cooldown to 150-300 psig.

C. Open Reactor Building roof hatch.

D. Open the Control Room panel doors.

37. Unit One is operating at 94% power with OPRMs Inoperable, when Recirculation Pump 1A trips.

The following conditions exist:

Total Core Flow (P603)	32.2 Mlbm/hr
Total Core Flow (U1CPWTCF)	33.9 Mlbm/hr
APRMs:	44%

Which one of the following completes both statements below?

The OPRM Inoperable, __(1)__ Operation Power to Flow map is required to be used to determine the current operating point.

The current operating point is in the __(2)__ Region.

(Reference provided)

A. (1) Single Loop
   (2) 5% Buffer

B. (1) Single Loop
   (2) Immediate Exit

C. (1) Two Loop
   (2) 5% Buffer

D. (1) Two Loop
   (2) Immediate Exit

38. Unit Two is operating at 84% power.
Reactor Recirculation Pump 2A & 2B speeds are 74%.
VFD 2A power cell failure and automatic cell bypass have occurred.

Subsequently the following alarms/indications are observed:
UA-17 (4-4), *SUB E7 XFMR SEC BKR TRIP*
A-06 (3-2), *RECIRC FLOW A LIMIT*

Which one of the following completes both statements below?

Reactor Recirculation Pump A has runback to Limiter __(1)__.

In order to raise Recirc Pump A speed the __(2)__ must be reset.

A. (1) #1
(2) runback signal ONLY

B. (1) #1
(2) runback and speed hold signals

C. (1) #2
(2) runback signal ONLY

D. (1) #2
(2) runback and speed hold signals

39. UA-23 (3-8) *250 VDC Battery B Ground* alarm is received and sealed in on Unit Two. An AO reports the following readings:

N Bus	1.1 ma
PN Bus	0.4 ma
P Bus	2.7 ma

Which one of the following completes both statements below?

The ground is located on the __(1)__ Bus.

IAW 0AI-115, 125/250 VDC System Ground Correction Guidelines, when ground resistance is between __(2)__, then plant procedures should be entered to locate and correct the ground condition.

A. (1) N
(2) 15 and 25 Kohms

B. (1) N
(2) 26 and 35 Kohms

C. (1) P
(2) 15 and 25 Kohms

D. (1) P
(2) 26 and 35 Kohms

40. Unit One is operating at rated power with DG1 running loaded for a monthly load test. A fault trips the Main Generator Primary Lockout relay.

BOP Bus 1C fails to transfer due to failure of its associated SAT supply breaker to close.

Which one of the following completes both statements below?

E1 is energized from __(1)__.

Entry into 0AOP-36.1, Loss of Any 4160V Buses or 480V E-Buses, __(2)__ required.

A. (1) DG1 ONLY; off-site power is available
   (2) is

B. (1) DG1 ONLY; off-site power is available
   (2) is NOT

C. (1) off-site power with DG1 running unloaded
   (2) is

D. (1) off-site power with DG1 running unloaded
   (2) is NOT

41. Following a loss of the Uninterruptible Power Supply on Unit One, a reactor scram occurs from 100% power.

Which one of the following completes both statements below?

Reactor power __(1)__ be determined to be below 2%.

The reactor __(2)__ be determined to be S/D Without Boron under <u>all</u> conditions.

A. (1) can
   (2) can

B. (1) can
   (2) can NOT

C. (1) can NOT
   (2) can

D. (1) can NOT
   (2) can NOT

42. Unit One was operating at rated power.
MSIV closure results in RPV pressure peaking at 1135 psig.
The reactor failed to scram.
The recirculation pumps are running with reactor power at 5%.

Which one of the following completes both statements below?

__(1)__ Safety Relief Valves have auto opened.

The operator __2__ required to trip the recirculation pumps.

A. (1) 4
(2) is

B. (1) 4
(2) is NOT

C. (1) 8
(2) is

D. (1) 8
(2) is NOT

43. Which one of the following completes both statements below?

IAW the Immediate Operator Actions in 0AOP-23.0, Condensate/Feedwater System Failure, IF reactor vessel level approaches __(1)__, THEN trip one reactor feed pump.

This condition could lead to __(2)__.

A. (1) 200 inches
   (2) jet pump vibration

B. (1) 200 inches
   (2) erosion wear of turbine blades

C. (1) 206 inches
   (2) jet pump vibration

D. (1) 206 inches
   (2) erosion wear of turbine blades

44. Following a line break in the drywell, Unit One conditions are:

Drywell pressure	6 psig
Drywell temperature	225°F
Torus pressure	7 psig
Torus level	-27 inches

Which one of the following completes both statements below?

The Suppression Chamber to Drywell Vacuum relief valves are __(1)__.

PCCP directs initiation of __(2)__ under the given conditions.

A. (1) open
   (2) Torus Spray

B. (1) closed
   (2) Torus Spray

C. (1) open
   (2) Drywell Spray

D. (1) closed
   (2) Drywell Spray

45. Unit Two was at 95% power when a loss of feedwater heating occurred. Following the transient, reactor power is 97%.

Which one of the following completes both statements below?

Thermal limits cannot be verified to be within the limits specified in the COLR when Final Feedwater Temperature is first reduced below __(1)__.

The most limiting thermal limit for loss of feedwater heating is __(2)__.

(Referenced Provided)

A. (1) 418.7°F
   (2) APLHGR

B. (1) 418.7°F
   (2) MCPR

C. (1) 319.3°F
   (2) APLHGR

D. (1) 319.3°F
   (2) MCPR

46. The Shift Manager has determined that Control Room evacuation is required. The RO has inserted a manual scram and placed the Mode Switch to Shutdown.

Which one of the following completes both statements below IAW 0AOP-32.0, Plant Shutdown From Outside Control Room?

The **next** Immediate Operator Action is to __(1)__.

IAW Attachment 17, Study of Manpower Needed and Sound Powered Phone Stations, a minimum of __(2)__ persons are required for a dual unit control room evacuation shutdown.

A. (1) Trip the Main Turbine
(2) 5

B. (1) Trip the Main Turbine
(2) 9

C. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 5

D. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 9

47. An unmonitored release from the Reactor Building is in progress and a hard copy Emergency Notification Form (ENF) is being completed IAW PEP-2.6.21, Emergency Communicator.

The following Met Tower Data is provided by the Process Computer:

Ambient Temp:	80 Deg F.
Upper Wind Direction:	18.00 Deg
Lower Wind Direction:	15.00 Deg
Upper Wind Speed:	8.00 MPH
Lower Wind Speed:	4.00 MPH
Stability Class:	D

Which one of the following completes both statements below?

The Wind Direction provided means that the wind is blowing __(1)__ the degree of direction.

When completing a hard copy ENF, __(2)__ wind speed and direction should be used IAW Attachment 3, Guidance for Completion of ENF.

A. (1) to
   (2) lower

B. (1) to
   (2) upper

C. (1) from
   (2) lower

D. (1) from
   (2) upper

48. Unit Two is operating at rated power when the following alarms and indications are observed:

Time = 0:
UA-03 (2-4) *TBCCW Pump Disch Header Press Low* alarm seals in
TBCCW Pump 2A is running.
TBCCW Pump 2B has tripped (no light indications)
TBCCW Pump 2C is aligned and running on Unit One
TBCCW Discharge Pressure, TCC-PI-566-1 on XU-2, indicates 38 psig

Which one of the following completes the statements below?

At time = 2 minutes, the <u>first</u> action required IAW 0AOP-17.0, Turbine Building Closed Cooling Water System Failure, is to __(1)__.

The 2-TCC-TV-609, TBCCW Heat Exchange Outlet Temperature Control Valve, __(2)__ to provide maximum cooling to TBCCW.

A. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) opens

B. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) closes

C. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) opens

D. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) closes

49. With Unit Two at rated power, the following alarms and indications are noted:

UA-01 (3-2) *Air Compr D Trip*	Alarm sealed in
UA-01 (4-4) *Inst Air Press Low*	Alarm sealed in
Air Compressor 2B	Running
Instrument Air header pressure	101 psig
Service Air header pressure	101 psig

Which one of the following is required IAW 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures?

The operator is required to:

A. close IA-PV-722-1 and IA-PV-722-2, Interruptible Air Isolation Valves.

B. open RNA-SV-5482 and RNA-SV-5481, Div I(II) Backup N2 Rack Isol Valves.

C. close SA-V8 and SA-V10, Inlet Isolation Valves To SA-PV-706-1/2.

D. open SA-PV-5067, Serv Air Dryer 2A Bypass Pressure Control Valve.

50. Unit Two is operating at rated power and the containment is being vented IAW 2OP-10, Section 6.3.2, Venting Containment via SBGT.

routinely (no abnormal rise in drywell pressure)

BHC 12-15-15

Subsequently, the RPS MG Set trips.

Which one of the following completes the following statement?

The reason drywell pressure __(1)__ is because __(2)__.

A. rises; a Group 6 isolation occurred

B. rises; a Group 10 isolation occurred

C. remains the same; venting is unaffected

D. remains the same; drywell cooling is unaffected

51. Unit Two has just entered MODE 4. RHR Loop A is operating in Shutdown Cooling. DG3 is under clearance.

Subsequently, a Loss Of Off-Site Power occurs and a Shutdown Cooling flowpath cannot be reestablished.

Which one of the following completes both statements below?

A Shutdown Cooling flowpath cannot be reestablished due to loss of power to the __(1)__.

An allowable method for feed and bleed operation IAW 0AOP-15.0, Loss of Shutdown Cooling is __(2)__.

A. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with CRD Pump 2B. Bleed by RWCU Reject.

B. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with CRD Pump 2B. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

C. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with Core Spray Loop 2A. Bleed by RWCU Reject.

D. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with Core Spray Loop 2A. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

52. Unit Two is performing refueling operations when the refueling SRO reports that a spent fuel bundle has been dropped in the cattle chute.
The following annunciators are in alarm on Panel 2-UA-3:

(2-3): *Rx Bldg Roof Vent Rad High*
(2-7): *Area Rad Rx Bldg High*
(3-7): *Area Rad Refuel Floor High*
(4-5): *Process Rx Bldg Vent Rad High*

Which one of the following is an Immediate Operator Action IAW 0AOP-5.0, Radioactive Spills, High Radiation, and Airborne Activity?

A. Enter 0EOP-04, RRCP

B. Isolate Reactor Building Ventilation.

C. Place Standby Gas Treatment (SBGT) trains in operation.

D. Ensure Control Room Emergency Ventilation System (CREVS) in operation.

53. Following a loss of feedwater on Unit One, HPCI initiated on low reactor water level then tripped on high reactor water level.

Current plant conditions are:

Reactor water level	150 inches, steady
A-01 (3-1) *HPCI Turb Trip*	alarm sealed in
A-01 (4-1) *HPCI Turb Trip Sol Ener*	alarm sealed in
A-05 (5-5) *Pri Ctmt Hi/Lo Press*	alarm sealed in
A-05 (5-6) *Pri Ctmt Press Hi Trip*	alarm sealed in
HPCI Initiation Signal/Reset white light	LIT
HPCI High Water Level Signal Reset white light	LIT

Which one of the following completes both statements below?

IAW A-1 (3-1), *HPCI Turb Trip,* the required operator action to commence HPCI injection to the reactor at this time is to __(1)__.

PCCP __(2)__ required to be entered.

A. (1) open 1-E41-F006, HPCI Injection Vlv
   (2) is

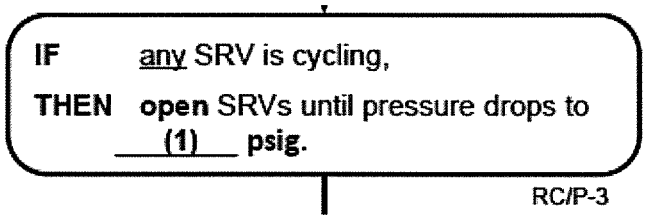
B. (1) open 1-E41-F006, HPCI Injection Vlv
   (2) is NOT

C. (1) depress the High Water Level Signal Reset push button
   (2) is

D. (1) depress the High Water Level Signal Reset push button
   (2) is NOT

54. Following a MSIV closure on Unit One, RVCP is being executed. It is determined that SRVs are cycling.

Which one of the following completes both statements below?



The SRV opening sequence __(2)__ required while executing this step.

A. (1) 950
   (2) is

B. (1) 950
   (2) is NOT

C. (1) 1050
   (2) is

D. (1) 1050
   (2) is NOT

55. Unit One is operating at rated power. A Safety Relief Valve has failed open. Torus temperature is 96°F and rising.

Which one of the following completes the statement below?

IAW 0OI-37.8, Primary Containment Control Procedure Basis Document, __(1)__ torus water temperature reaches 110°F (Step T/T-6), Reactor Scram Required (Step T/T-7), to assure __(2)__.

A. (1) before
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

B. (1) before
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

C. (1) when
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

D. (1) when
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

56. A line break occurs in the Unit One Drywell with the following plant conditions:

RPV water level	180 inches steady on N026A/B, Wide Range Level
RPV water level	155 inches steady on N004A/B/C, Narrow Range Level
RPV water level	190 inches steady on N027A/B, Shutdown Range Level
RPV pressure	50 psig
Drywell ref leg temp	340°F
Drywell average temp	255°F
Reactor Building 50' temp	128°F

Which one of the following RPV water level indications are valid, if any?

(Reference provided)

A. None

B. N026A/B (Wide Range) **ONLY**

C. N026A/B (Wide Range) and N004A/B/C (Narrow Range) **ONLY**

D. N027A/B (Shutdown Range) and N004A/B/C (Narrow Range) **ONLY**

57. Following a LOCA on Unit Two, plant conditions are as follows:

Torus temperature	220°F
Torus pressure	10.5 psig
Torus level	- 43 inches
Core Spray (CS) Pump 2A Disch flow	5,000 gpm
RHR System B flow (2 pumps)	10,000 gpm loop flow (Torus Cooling mode)

BJC 12-15-15

Which one of the following identifies the ECCS pump(s), if any, that is (are) operating outside their associated NPSH limit?

(Reference provided)

A. Both RHR and CS are within NPSH limits.

B. Both RHR and CS are exceeding NPSH limits.

C. RHR is within NPSH limits. CS is exceeding NPSH limits.

D. RHR is exceeding NPSH limits. CS is within NPSH Limits.

58. Which one of the following completes both statements below concerning fuel zone reactor water level instruments (N036/N037)?

Jet pump flow will make fuel zone level instrumentation read __(1)__ than actual level.

Fuel zone level instruments __(2)__ valid with RHR LPCI flow.

A. (1) lower
(2) are

B. (1) lower
(2) are NOT

C. (1) higher
(2) are

D. (1) higher
(2) are NOT

59. While operating a rated power, a loss of Division I 250 VDC Switchboard 2A results in the following indications on Unit Two:

APRM readings:	16%
Control rods:	118 not full in
Blue scram lights:	137 illuminated

Given these conditions, which one of the following identifies a successful method of inserting control rods IAW Scram Immediate Actions or LEP-02, Alternate Control Rod Insertion?

A. Alternate Rod Insertion (ARI)

B. Scram Individual Control Rods

C. Reactor Manual Control System (RMCS)

D. De-energize Scram Solenoids and Vent Scram Air Header

60. A Site Area Emergency has been declared on Unit Two. Until the dose projection team arrives, the Control Room crew is performing 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings. Primary Containment Venting is in progress on Unit Two. The Main Stack flow instrument loop (2-VA-FT-3359) is not operational. The following conditions exist:

Main Stack Rad Recorder (2-D12-RR-4599):	3.8 E-2 µCi/cc
Total Unit 1 flow to Main Stack:	4450 cfm
Total Unit 2 flow to Main Stack	21400 cfm
Common systems discharging to Main Stack	AOG Bldg Exhaust RW Bldg Fan A

Which one of the following is the Source Term release rate estimation from the Main Stack IAW 0PEP-03.6.1?

(Reference attached)

A. 3.8 E-2 µCi/sec

B. 3.8 E+5 µCi/sec

C. 1.2 E+6 µCi/sec

D. 1.5 E+6 µCi/sec

61. Which one of the following is the power supply to Air Compressor 1D?

A. 480 V Substation 1E

B. 480 V Substation 1F

C. 4160 V Bus 1C

D. 4160 V Bus 1D

62. Which one of the following completes the statements below?

The highest CSW system pressure that will auto start the standby CSW pump is __(1)__.

If pressure remains below this setpoint for at least __(2)__ , the SW-V3(V4), SW TO TBCCW HXS OTBD(INBD) ISOL, will reposition to their throttled positions.

A. (1) 40 psig
   (2) 30 seconds

B. (1) 40 psig
   (2) 70 seconds

C. (1) 65 psig
   (2) 30 seconds

D. (1) 65 psig
   (2) 70 seconds

63. Which one of the following completes both statements below?

The hydrogen concentration entry condition setpoint for PCCP is above __(1)__.

If RPS A is de-energized, and CAC-AT-4409, Division I Hydrogen/Oxygen Monitor, is required to be placed in service, then it __(2)__ be unisolated using CAC-CS-2986 (CAM Div I Isol Ovrd).

A. (1) 1.5%
   (2) can

B. (1) 1.5%
   (2) can NOT

C. (1) 3.9%
   (2) can

D. (1) 3.9%
   (2) can NOT

64. Unit Two is operating at rated power.
The control room receives the following fire alarms/reports:

0900 HP reports an acrid smell in reactor building
0901 RX (-)17 FT SD NCS NE CORNER
0902 RBAO reports fire in NCS -17 foot
0903 RO makes PA announcement for the fire and initiates fire alarm
0905 RX (-)17 FT SD NCS ABV LANDING

Which one of the following completes both statements below?

The Electric Fire Pump will auto start when system pressure first drops below __(1)__.

IAW 0PFP-013, General Fire Plan, a PA announcement stating the location of the command post __(2)__ required.

A. (1) 90 psig
(2) is

B. (1) 90 psig
(2) is NOT

C. (1) 105 psig
(2) is

D. (1) 105 psig
(2) is NOT

65. Unit Two is operating at 30% power when the following sequence of events occurs:

Time	Generator Frequency
1208	59.8 Hz
1212	59.2 Hz
1216	58.8 Hz
1218	58.3 Hz

Which one of the following completes the statements below?

Of the times listed above, UA-06 (1-2) *Gen Under Freq Relay,* will first be alarming at __(1)__.

Given the conditions above, at 1220, the operator is required to __(2)__, IAW 0AOP-22.0, Grid Instability,.

A. (1) 1208
   (2) trip the main turbine ONLY

B. (1) 1208
   (2) manually scram the reactor and then trip the main turbine

C. (1) 1216
   (2) trip the main turbine ONLY

D. (1) 1216
   (2) manually scram the reactor and then trip the main turbine

66. IAW AD-OP-ALL-1000, Conduct of Operations, which one of the following identifies the requirements for manipulating a valve that has no label?

The valve can be manipulated ONLY after its identity has been confirmed by a __(1)__; SRO approval __(2)__ required.

A. (1) controlled document
(2) is

B. (1) controlled document
(2) is NOT

C. (1) peer check
(2) is

D. (1) peer check
(2) is NOT

67. Which one of the following identifies when fuel movement must FIRST be suspended IAW FH-11, Refueling?

Suspension of fuel movement and notification of the Reactor Engineer is required if a SRM rises by a factor of _____ relative to the SRM baseline count rate.

A. two

B. four

C. five

D. ten

68. Which one of the following completes the following definition IAW 0EOP-01, Users Guide?

Minimum Number of SRVs Required for Emergency Depressurization: The number of SRVs __(1)__ which corresponds to a minimum steam cooling pressure sufficiently low that __(2)__ .

A. (1) (five)
(2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

B. (1) (five)
(2) the clad temperature will not exceed 1800°F

C. (1) (seven)
(2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

D. (1) (seven)
(2) the clad temperature will not exceed 1800°F

69. IAW 0ERP-Radiological Emergency Response Plan, which one of the following completes the statements below?

The facility that has the primary function to facilitate in-plant repairs is the __(1)__.

The primary location for this facility is the __(2)__.

A. (1) Technical Support Center
(2) O&M Building

B. (1) Technical Support Center
(2) Operations Training Building

C. (1) Operational Support Center
(2) O&M Building

D. (1) Operational Support Center
(2) Operations Training Building

70. Which one of the following identifies the bases for the Minimum Critical Power Ratio (MCPR) Safety Limit IAW Technical Specifications Bases 2.1.1, Reactor Core Safety Limits?

The MCPR Safety Limit ensures that:

A. the calculated changes in core geometry shall be such that the core remains amenable to cooling.

B. plastic strain of the cladding does not exceed 1% during all modes of operation.

C. the calculated total oxidation shall no where exceed 0.17 times the total cladding thickness before oxidation.

D. during normal operation and during Anticipated Operational Occurrences, at least 99.9% of the fuel rods in the core do not experience transition boiling.

71. Given the following excerpt:

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCIC System inoperable.	A.1 Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately

Which one of the following completes both statements below IAW Tech Specs?

The phrase 'by administrative means', requires __(1)__.

When "Immediately" is used as a Completion Time, the required action __(2)__.

A. (1) performing the TS Surveillance
   (2) must be completed within 15 minutes

B. (1) performing the TS Surveillance
   (2) should be pursued without delay and in a controlled manner

C. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) must be completed within 15 minutes

D. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) should be pursued without delay and in a controlled manner

72. Which one of the following identifies the significance of the yellow dot affixed to an annunciator window IAW 0OI-01.01, BNP Conduct of Operations Supplement?

The yellow dot means that the alarm:

A. is a nuisance alarm.

B. has its annunciator card removed.

C. has one or more of its inputs disabled.

D. is lit because its associated equipment is under clearance.

73. Following a large line break in the drywell, H2/O2 monitors have been placed in service. Plant conditions:

Drywell pressure	40 psig
Drywell hydrogen	2.5% (ERFIS)
Drywell oxygen	3.5% (ERFIS)
Torus hydrogen	1.4% (ERFIS)
Torus oxygen	3.5% (ERFIS)
Torus level	-36 inches

Based on the above conditions, which one of the following completes both statements below?

PCCP directs to vent and purge Primary Containment __(1)__.

IAW 0OI-37.8, PCCP Basis Document, venting from the __(2)__ is preferred.

A. (1) ONLY if ODCM release rate limits are not exceeded
   (2) torus

B. (1) ONLY if ODCM release rate limits are not exceeded
   (2) drywell

C. (1) and exceed offsite radioactivity release rates if necessary
   (2) torus

D. (1) and exceed offsite radioactivity release rates if necessary
   (2) drywell

74. Which one of the following completes both statements below?

The Drywell High Range Area Radiation Monitors are designed to measure __(1)__ radiation.

These instruments are used to provide __(2)__.

A. (1) gamma
(2) an entry condition into RRCP, Radioactivity Release Control Procedure

B. (1) gamma
(2) estimates of core damage

C. (1) neutron
(2) an entry condition into RRCP, Radioactivity Release Control Procedure

D. (1) neutron
(2) estimates of core damage

75. In preparation for a valve manipulation in the drywell, the applicable RWP indicates that the highest dose rate in the area is 350 mR/hr.

A flashing red light is encountered at the entry location to the valve in the drywell.

Which one of the following completes both statements below?

The flashing red light indicates the area is a __(1)__.

This RWP __(2)__ be used to perform the valve manipulation.

A. (1) High Radiation Area
   (2) can

B. (1) High Radiation Area
   (2) can NOT

C. (1) Locked High Radiation Area
   (2) can

D. (1) Locked High Radiation Area
   (2) can NOT

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76. During a LOCA with a LOOP, the following plant conditions exist:

2A RHR pump	Injecting and has just exceeded its NPSH Limit
2A CS pump	Injecting and approaching its NPSH Limit
All other ECCS Pumps	Unavailable
Reactor Water Level	-60 inches and steady

Which one of the following completes the statements below?

Continued operation of RHR Pump 2A __(1)__ allowed at this time.

The CRS is required to direct __(2)__ IAW RVCP.

A. (1) is
(2) LEP-01, Alternate Coolant Injection, Section 2.3, RHR Loop B Injection

B. (1) is
(2) 2OP-18, Core Spray System Operating Procedure, Section 8.2, Shifting Suction Source from Suppression Pool to CST

C. (1) is NOT
(2) LEP-01, Alternate Coolant Injection, Section 2.3, RHR Loop B Injection

D. (1) is NOT
(2) 2OP-18, Core Spray System Operating Procedure, Section 8.2, Shifting Suction Source from Suppression Pool to CST

77. Unit Two is operating at rated power. The RB AO reports that the Core Spray A room cooler breaker has tripped on thermal overload.

Which one of the following completes both statements below?

Core Spray Loop A __(1)__.

Based on the conditions above, an immediate one time attempt to reset the Core Spray A room cooler breaker __(2)__ allowed IAW AD-OP-ALL-1000, Conduct of Operations.

A. (1) remains operable
   (2) is

B. (1) remains operable
   (2) is NOT

C. (1) is inoperable
   (2) is

D. (1) is inoperable
   (2) is NOT

78. Unit Two is at rated power. Reactor Water Level Low Trip Unit B21-LTM-N017A-1 is inoperable. All TS actions (RPS & PCIS) have been completed.

2MST-RPS24Q, RPS Reactor Vessel Low Water Level (LL1) Trip Unit Chan Cal, must be performed now for B21-LTM-N017D-1 ONLY.

Which one of the following identifies the required action(s), IAW Tech Specs, to perform the channel calibration on 1-LTM-N017D-1 while B21-LTM-NO17A-1 remains inoperable?

(Reference Provided)

A. ONLY LCO 3.3.1.1, Condition A must be entered immediately.

B. LCO 3.3.1.1, Conditions A and B must be entered immediately.

C. Tech Spec 3.0.3 must be entered.

D. Entry into LCO 3.3.1.1, Conditions A and B must be entered, but only after 6 hours.

79. While Unit Two was performing a TIP trace at rated power, with the TIP detector at the core top limit and its Mode Switch in MANUAL, a small steam line leak in the drywell occurred. Drywell pressure peaked at 2.9 psig.

The required emergency operating procedures were entered and exited, and the crew has entered GP-05, Unit Shutdown; the plant is currently in MODE 3.

The crew noted that the TIP detector is currently in its shield; however, the ball valve is still open and will not close.

Which one of the following identifiies the required action IAW Tech Spec 3.6.1.3, PCIVs?

(Reference provided)

A. Condition A

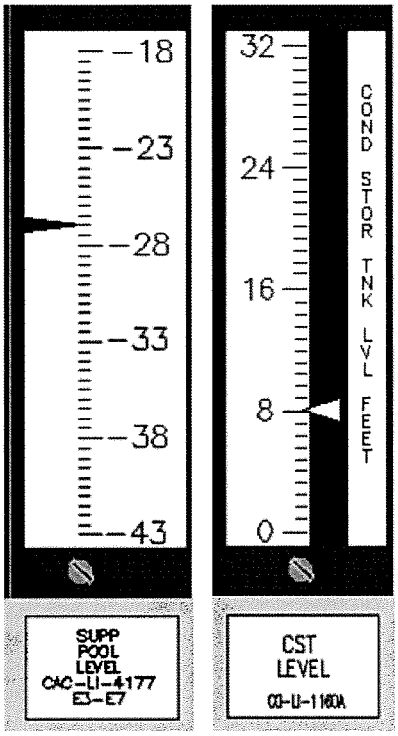
B. Condition B

C. Condition C

D. Condition E

80. Due to an undetected valve misalignment, the CST is draining to the Suppression Pool.

Suppression Pool level is rising at an inch per minute.
CST level is lowering at a foot per minute.



Which one of the following completes both statements below?

The RCIC system suction sources will auto swap in __(1)__ .

When the auto swap occurs, RCIC will __(2)__ IAW Technical Specifications.

A. (1) 2 minutes
   (2) remain operable

B. (1) 2 minutes
   (2) be inoperable

C. (1) 5 minutes
   (2) remain operable

D. (1) 5 minutes
   (2) be inoperable

81. After an ATWS on Unit One occurred, the following plant conditions:

Reactor pressure	1000 psig
Reactor water level	65 inches, slowly rising
Control rods	all inserted
Drywell pressure	3 psig
Torus pressure	2 psig
Torus water temp	150° F
Torus water level	-4 feet
Torus cooling	RHR Loop A in service

Which one of the following identifies the status of the Heat Capacity Temperature Limit (HCTL) and whether 0EOP-01-EDP, Emergency Depressurization, is required based on the given conditions?

(Reference provided)

	HCTL	0EOP-01-EDP
A.	has been exceeded	Required
B.	has been exceeded	NOT Required
C.	has NOT been exceeded	Required
D.	has NOT been exceeded	NOT Required

82. Unit Two is operating at rated power when the following sequence of events occurs:

12/13 @ 0100, 2B SBGT is declared Inoperable for scheduled maintenance
12/15 @ 1230, 2A SBGT is declared Inoperable due to fan failure
12/15 @ 1430, 2B SBGT is declared Operable

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SGT subsystem inoperable in MODE 1, 2 or 3.	A.1 Restore SGT subsystem to OPERABLE status.	7 days

IAW Technical Specifications, which one of the following identifies the applicable completion time to restore 2A SBGT train to operable status?

A. 12/20 @ 0100

B. 12/21 @ 0100

C. 12/22 @ 1230

D. 12/23 @ 1230

83. Unit One is in Mode 3, performing a reactor shutdown IAW GP-05, Unit Shutdown, in preparation for a refueling outage.

Which one of the following completes both statements below?

IAW TS 3.4.9, RCS Pressure and Temperature Limits, the maximum cooldown rate is limited to __(1)__ change in any one hour period.

If the cooldown rate is exceeded, the NRC __(2)__ required to be notified IAW 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors.

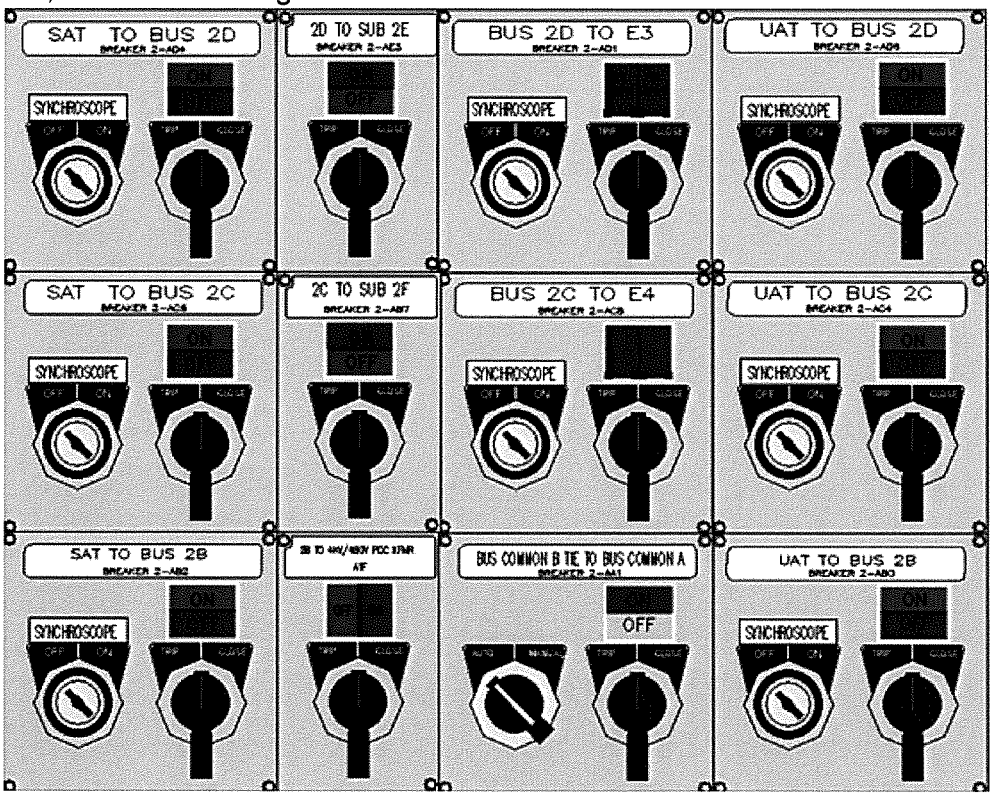
A. (1) 50°F
   (2) is

B. (1) 50°F
   (2) is NOT

C. (1) 100°F
   (2) is

D. (1) 100°F
   (2) is NOT

84. Unit Two was operating at rated power when an electrical fault caused a Reactor scram. During the scram, the crew observed DG3 is running loaded, DG4 is locked out, and the following electrical indications:



Unit Two is in MODE 3. Unit One is operating at rated power.

Which one of the following completes the statements below?

(Reference provided)

Based on this breaker alignment, a __(1)__ lockout occurred.

Entry into Tech Spec 3.8.1 Condition(s) __(2)__ is(are) required.

A. (1) SAT
   (2) D ONLY

B. (1) SAT
   (2) C, D, and F

C. (1) Main Generator
   (2) D ONLY

D. (1) Main Generator
   (2) C, D, and F

85. Unit Two has scrammed with the following current plant conditions:

Reactor water level	Can NOT be determined
Reactor pressure	800 psig
Six control rods	Between 02 and 08

Which one of the following completes both statements below?

The CRS __(1)__ required to exit RSP.

The CRS will perform __(2)__ portion(s) of the ATWS flowchart.

A. (1) is
(2) RC/P, RC/L and RC/Q

B. (1) is
(2) ONLY the RC/Q

C. (1) is NOT
(2) RC/P, RC/L and RC/Q

D. (1) is NOT
(2) ONLY the RC/Q

86. Unit Two was operating at rated power, with RCIC under clearance, when the following occurred:

Time	Event
0800	Fire in the RPS MG Set Room is reported
0803	Main control room evacuation completed
0820	Fire is extinguished but destroyed one row of batteries in the Div I 125/250 VDC battery bank
0825	SEC and RSDP operator arrive at the RSDP
0826	One SRV is manually opened at the RSDP; reactor pressure steady at 1000 psig.

Which one of the following completes the statements below?

(Reference provided)

Decay heat is approximately __(1)__ .

IAW 0PEP-02.1, BNP Initial Emergency Actions, the highest EAL classification that is required for these conditions is __(2)__.

A. (1) 6%
   (2) an Alert

B. (1) 6%
   (2) a Site Area Emergency

C. (1) 9%
   (2) an Alert

D. (1) 9%
   (2) a Site Area Emergency

87. With Unit Two operating at full power, an inadvertent initiation of Core Spray A occurs and cannot be reset.

Which one of the following completes both statement below?

ONLY the __(1)__, RBCCW HXS SW INLET VLV, has shut.

0AOP-16.0, RBCCW System Failure, __(2)__ provide specific steps to realign cooling water valves to RBCCW.

A. (1) SW-V103
(2) does

B. (1) SW-V103
(2) does NOT

C. (1) SW-V106
(2) does

D. (1) SW-V106
(2) does NOT

88. Unit One is performing a shutdown with the following plant conditions:

Reactor mode switch	Shutdown
Reactor water level	195 inches
Shutdown Cooliing	B Loop RHR In Service
RCS	Intact
RHR Hx Inlet Temperature	214°F
RHR Hx Outlet Temperature	210°F

A loss of Off-Site power occurs with all 4 DGs starting and loading.
Thirty minutes later, Shutdown Cooling has been returned to service with the following plant conditions:

Reactor water level	225 inches
RHR Hx Inlet Temperature	244°F
RHR Hx Outlet Temperature	241°F

Which one of the following completes the statements below?

(Reference provided)

A MODE change __(1)__ occurred.

The highest EAL classification for this event is an __(2)__.

A. (1) has
   (2) Unusual Event

B. (1) has
   (2) Alert

C. (1) has NOT
   (2) Unusual Event

D. (1) has NOT
   (2) Alert

89. Unit One is operating at rated power when the 1A CRD Pump trips. The crew started 1B CRD Pump; however, the following annuciator remained in alarm:

A-07 (6-1) *CRD Accum Lo Press/Hi Level*

The cause of the alarm is HCU 12-19, and it has been determined that the accumulator will no longer hold pressure. The CRS has determined that the rod will be declared inoperable.

Which one of the following completes both statements IAW Tech Specs?

(Reference provided)

CRD 12-19 must be disarmed within __(1)__ hours.

CRD 12-19 __(2)__ disarmed to satisfy Tech Specs.

A. (1) 2 hours
   (2) may only be electrically

B. (1) 2 hours
   (2) must be electrically and hydraulically

C. (1) 4 hours
   (2) may only be electrically

D. (1) 4 hours
   (2) must be electrically and hydraulically

90. Both units are operating at rated power.

T=0: During a fuel shuffle in the Unit One Spent Fuel Pool, damage to the fuel pool liner occurred.

T=2 hours: Spent fuel pool level slowly lowered to 23 feet, and is now stable.

Which one of the following completes both statements below?

SCCP entry is required when fuel pool level is below __(1)__.

IAW SCCP, at T=2 hours, SEP-14, Fuel Pool Spray, __(2)__ required.

A. (1) 36 feet, 11.75 inches
(2) is

B. (1) 36 feet, 11.75 inches
(2) is NOT

C. (1) 37 feet, 5 inches
(2) is

D. (1) 37 feet, 5 inches
(2) is NOT

91. An extended LOCA and SBO has occurred on Unit Two and the following conditions currently exist:

Emergency Depressurization completed
All available Table L-1, Preferred Injection Systems, and L-2, Alternate Injection Systems, are injecting to the RPV
Torus pressure is 10 psig
Torus temperature is 216°F

Which one of the following completes the statement below IAW RC/L?

__(1)__ is required to be entered when Core Spray injection flow first lowers below __(2)__ AND RPV level cannot be restored and maintained above LL4.

A. (1) SAMG
(2) 5000 gpm

B. (1) SAMG
(2) 6000 gpm

C. (1) RPV Flooding
(2) 5000 gpm

D. (1) RPV Flooding
(2) 6000 gpm

92. Unit Two is operating a rated power when an automatic scram occurred.

The North Scram Discharge Volume pipe, above the HCUs, ruptured during the scram, and the leak cannot be isolated. The following radiation levels exist in the Reactor Building:

Rx Building North Accross From The TIP Room	2060 mR/hr.
Drywell Entrance	2100 mR/hr.
Rx Bldg NE Air Lock	1250 mR/hr.
N. RHR Room	1370 mR/hr.

Which one of the following completes both statements below IAW SCCP?

(Reference provided)

0EOP-01-SEP-15, Anticipate Emergency Depressurization, __(1)__ allowed at this time.

Emergency Depressurization __(2)__ required.

A. (1) is
   (2) is

B. (1) is
   (2) is NOT

C. (1) is NOT
   (2) is

D. (1) is NOT
   (2) is NOT

93. Unit Two is in an ATWS with the following plant conditions:

Reactor level	70 inches, stable
Reactor pressure	600 psig, slowly lowering
Reactor power	APRM downscale (30 rods NOT full in)
Torus temperature	121°F
Torus level	-48 inches
Torus pressure	19 psig
DW pressure	20 psig
DW temperature	356°F

Which one of the following completes the statement below?

Terminating and preventing injection __(1)__ required before performing __(2)__.

A. (1) is
(2) 0EOP-01-ED, Emergency Depressurization

B. (1) is
(2) 0EOP-01-AEDP, Alternate Emergency Depressuirzation Procedure

C. (1) is NOT
(2) 0EOP-01-ED, Emergency Depressurization

D. (1) is NOT
(2) 0EOP-01-AEDP, Alternate Emergency Depressuirzation Procedure

94. Which one of the following completes both statements concerning drywell entries?

IAW 0E&RC-0261, Drywell Entry, the minimum approval required for entries to the drywell when the reactor is >15% power is __(1)__.

IAW 0OI-01.03, Non-Routine Activities, the Nitrogen Backup System and Pneumatic Nitrogen Systems __(2)__ be left aligned to drywell pneumatic loads during drywell entries.

A. (1) Shift Manager
   (2) can

B. (1) Shift Manager
   (2) shall NOT

C. (1) Plant Manager
   (2) can

D. (1) Plant Manager
   (2) shall NOT

95. Core reload is in progress during a refueling outage.

It is desired to perform single rod withdrawals during the core reload sequence.

Which one of the following completes the statement regarding how a neutronic bridge is established IAW in 0FH-11, refueling?

Four fuel bundles are first loaded around __(1)__, then fuel is loaded in all fuel cells in a line between __(2)__.

A. (1) SRMs A and D ONLY
   (2) SRMs A and D.

B. (1) SRMs B and D ONLY
   (2) SRMs B and D.

C. (1) each of the four SRMs
   (2) SRMs A and D.

D. (1) each of the four SRMs
   (2) SRMs B and D

96. Which one of the following completes both statements below IAW AD-WC-ALL-0200, On-Line Work Management?

The work week schedule is locked/frozen at the __(1)__ Schedule Freeze Meeting.

After the work week is frozen, if FIN team work is required, an On-line/Outage Scope Change Request __(2)__ required.

A. (1) T-3
(2) is

B. (1) T-3
(2) is NOT

C. (1) T-10
(2) is

D. (1) T-10
(2) is NOT

97. During startup of Unit Two from a refueling outage, the following reactor pressures were reached at the indicated times:

At 0400, reactor pressure reaches 150 psig
At 0800, reactor pressure reaches 945 psig

Surveillance requirement 3.5.1.11 is required.

Which one of the following completes the statements below concerning the Technical Specification requirements for completion of Surveillance 3.5.1.11?

(Reference Provided)

The surveillance must be performed by __(1)__ hours.

MODE 1 __(2)__ performed.

A. (1) 1600
(2) cannot be entered until the surveillance is

B. (1) 1600
(2) can be entered without the surveillance being

C. (1) 2000
(2) cannot be entered until the surveillance is

D. (1) 2000
(2) can be entered without the surveillance being

98. The BSEP Radioactive Liquid Release Permit is being approved with the following step filled out on the permit:

9. **Confirm** the following instrumentation is OPERABLE:

a. Liquid Radwaste Radioactivity Monitor, 2-D12-RM-K604 __CRS__

b. Liquid Radwaste Effluent Flow Measurement Device, 2-G16-FIT-N057 __INOP__

Which one of the following completes the statements below?

The minimum required approval to commence ANY liquid release is(are) the __(1)__.

If a Radwaste release is in progress, and swapping of CWIPs (taking less than 2 minutes) is required, the Radwaste release __(2)__ required to be stopped.

A. (1) Unit CRS ONLY
(2) is NOT

B. (1) Unit CRS ONLY
(2) is

C. (1) Unit CRS and Shift Manager
(2) is NOT

D. (1) Unit CRS and Shift Manager
(2) is

99. A General Emergency has been declared. An auxiliary operator is needed to enter the Reactor Building to perform emergency actions to protect valualbe property. It is estimated that the operator will receive 10.5 rem.

Which one of the following completes both statements below IAW PEP-03.7.6, Emergency Exposure Guidelines?

The estimated dose __(1)__ exceed EPA-400 limits.

On Attachment 1, Emergency Exposure Authorization Form, the __(2)__ must sign in the approval blank.

A. (1) will not
   (2) Site Emergency Coordinator (SEC)

B. (1) will not
   (2) Radiation Control Director (RCD)

C. (1) will
   (2) Site Emergency Coordinator (SEC)

D. (1) will
   (2) Radiation Control Director (RCD)

100. Due to a partial loss of drywell cooling on Unit One, Drywell pressure has risen to 1.5 psig.

Which one of the following completes both statements below?

Annunciator A-03 (4-9) *RHR High Drywell Press* __(1)__ alarming.

The CRS will direct venting containment IAW __(2)__.

A. (1) is
(2) 1OP-24, Containment Atmosphere Control System

B. (1) is
(2) 1OP-10, Standby Gas Treatment System Operating Procedure

C. (1) is NOT
(2) 1OP-24, Containment Atmosphere Control System

D. (1) is NOT
(2) 1OP-10, Standby Gas Treatment System Operating Procedure

SRO Written Exam Reference Index

1. 0EOP-01-UG, User's Guide, Attachment 7 – HCTL
2. 0EOP-01-UG, User's Guide, Attachments 8 and 9
3. 0EOP-01-UG, User's Guide, Attachments 19, 20, 22, and 31 (Pages 1 and 2)
4. Secondary Containment Area Radiation Levels
5. 0OI-18, Attachment 3, Page 1 of 2
6. 2OP-32, Attachment 4
7. 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings, Attachments 1 and 6
8. Unit 1 TS 3.1.3, Control Rod Operability
9. Unit 2 TS 3.3.1.1, RPS Instrumentation
10. Unit 2 TS 3.5.1, ECCS and RCIC
11. Unit 2 TS 3.6.1.3, Primary Containment Isolation Valves
12. Unit 2 TS 3.8.1, AC Sources-Operating
13. COLR-U1-CYCLE-20 Power-to-Flow Maps

14. 0PEP-02.1 – Provide large EAL chart