

Draft Submittal

**ST. LUCIE AUGUST 2004  
EXAM NOS. 05000335/2004301  
AND 05000389/2004301**

**AUGUST 9 - 20, 2004**

1. Operating Test Simulator Scenarios *& OUTLINES*

**Y2004  
NRC  
Operating Test  
Sim Scenarios**



**SCENARIO**  

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**ONE (1) THRU  
FOUR (4)**

Set-Up / Validated By:  
J. Charles Couture

Facility: <u>St. Lucie</u> Scenario No.: <u>1</u> Op-Test No.: _____			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 100%, MOC			
Turnover:			
<ul style="list-style-type: none"> <li>• 2 Severe Thunderstorm Warning for St. Lucie and Indian River Counties</li> <li>• 2A HPSI Pump OOS for 6 hrs for E/M PM, not due back this shift</li> <li>• 2A AFW Pump OOS for 12 hrs for bearing replacement, not due back this shift</li> </ul>			
Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP	CEDM Fan HVE-21A fails & 21B does not start. Per RAB Vent ONP must be Off-line in 45 minutes
2		R- RO R-BOP	Rapid Down Power ONP RO - Boron and Rod Control BOP - Turbine Control
3	2	C-RO	Boric Acid FCV fails to open, Per Boron Conc Control ONP to use EB valve, cycle pump
4	3	C -RO	PORV leak, isolate using Pzr Relief/Safety ONP
5	4	C -RO, BOP	2B S/G tube leak Use SGTL ONP
6		M	2B S/G tube rupture, Trip 2-EOP-01
7	5	C -BOP	2A3 Bus lockout, SBCS must be used in Manual
8	6	C - RO	2B MSIV does not close, Use App I to close locally.
9			Termination: Isolate 2B S/G & cooling down RCS to place SDC in service

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: <u>St. Lucie</u> Scenario No.: <u>2</u> Op-Test No.: _____			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 45%, MOC			
Turnover:			
<ul style="list-style-type: none"> <li>• Severe Thunderstorm Warning for St. Lucie and Indian River Counties</li> <li>• 2A HPSI Pump OOS for 6 hrs for E/M PM, not due back this shift</li> <li>• 2A AFW Pump has been OOS for bearing replacement for 70 hours. The LCO will not be met, therefore the unit has to be removed from service. The previous crew used 2-GOP-123 to reduce power. The SM has directed the unit be shutdown using the Rapid Downpower ONP.</li> </ul>			
Event No.	Malf. No.	Event Type*	Event Description
1		R- RO R- BOP	Rapid Downpower ONP RO - Boron and Rod Control BOP - Turbine Control
2	1	I-RO	Pzr Press Ch X Fails Low, Per Pzr Pressure/Level ONP select Ch Y
3	2	C-BOP	2A CCW Pump bearing freeze. Per CCW ONP start 2C Pump on A Hdr
4	3	C-BOP	CCW N-Hdr Rupture when 2C CCW Pump starts
5			Trip Unit per CCW ONP
6	4	C -BOP	2A 6.9KV S/U Xfmr does not swap on trip
7	5	C - RO	2C AFW Pump trip on overspeed on AFAS after entering EOP-09
8	6	M	AFW 2B SE-09-3 failed closed (TLOF)
9	7	C-BOP	2B Main Feed Pump will not start due to Aux Oil Pump failure.
10		C -BOP	Re-energize 2A 6.9KV S/U Xfmr
11			Termination: Start 2A MFP & feed S/G prior to Once thru Cooling

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: <u>St. Lucie</u> Scenario No.: <u>4</u> Op-Test No.: _____			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: 100%, MOC			
Turnover:			
<ul style="list-style-type: none"> <li>• Severe Thunderstorm Warning for St. Lucie and Indian River Counties</li> <li>• 2A HPSI Pump OOS for 6 hrs for E/M PM, not due back this shift</li> <li>• 2A AFW Pump OOS for 12 hrs for bearing replacement, not due back this shift</li> </ul>			
Event No.	Malif. No.	Event Type*	Event Description
1	1	C- BOP	2A ICW Pump bkr trips, Per ICW ONP Start 2C ICW Pump on the A Hdr.
2	2	C-RO	Middle and Lower seals fail on RCP 2B1, Commence shutdown per RCP ONP
3		R-RO R-BOP	Rapid Down Power ONP RO - Boron and Rod Control BOP - Turbine Control
4	3	C-RO	2B3 Pzr Htr Bkr fails open, RO adjust Pzr Spray
5	4	C-BOP	Loss of Instr Air, Trip Rx at 60 psig. Enter 2-EOP-01
6		M	LOCA occurs on Rx Trip, Stop RCPs with No CCW to seals
7	5	I - RO	B SIAS does not auto actuate, Manual SIAS
8	6	C - RO	2B HPSI Pump becomes air bound, exit to EOP-15
9			Termination: Vent 2B HPSI Pump to get flow per Fig 2, cooling down RCS to place SDC in service

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

OR TEST #1 S-T License N.R. Aug 04

Competencies	SRO-Applicant #1 RO/SRO-#/SRO-U				RO-Applicant #2 RO/SRO-#/SRO-U				BOP-Applicant #3 RO/SRO-#/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms												
Interpret / Diagnose Events and Conditions	1,2,3 4,6	3,4 5,6	1,2,3 4,5	1,2,3 6	3,6 3,4	2,3,5 1,6					4	2,3
Understand Plant and System Response												
Comply With and Use Procedures (1)	1,2,3 4,5,6	1,2,4 5,6	1,3,4 5	1,2,3 4,6	2,4 3,5,6	3,6		2,5	1,2	1,4	2,3	
Operate Control Boards (2)					3,5 6	2,3,4 3,6	2,3,5 4,6		1,2,5	1,4	3,5	
Communicate and Interact With the Crew	5,7	3,6	5,6	3,7								
Demonstrate Supervisory Ability (3)	7	6	5,6	3,7								
Comply With and Use Tech. Specs. (3)	4	5	3,3	2								
Notes:												
(1) Includes Technical Specification compliance for an RO.												
(2) Optional for an SRO-U												
(3) Only applicable to SROs												

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author:

*D. J. Roberts* *[Signature]*

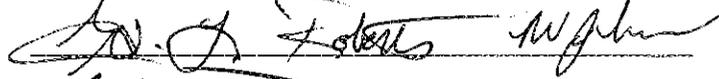
NRC Reviewer:

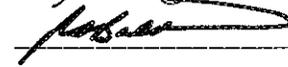
*[Signature]*

OPERATING TEST NO.: 1 St Lucie N.P. Aug 04

Applicant Type	Evolution Type	Minimum Number	Scenario Number								
			1		2		3		4		
			RO	BOP	RO	BOP	RO	BOP	RO	BOP	
RO	Reactivity	1*	5							4	
	Normal	1*			1,2		5				2,4
	Instrument / Component	4*	1,3,4 6		5,6		1,4		1,6		3,5
	Major	1	7		6		6		7		7
As RO	Reactivity	1*					5				
	Normal	0		5							
	Instrument / Component	2*		7,7	3,4,6		2,3				
	Major	1		7	6		6				
SRO-I	Reactivity	0	5		2		5			4	
	Normal	1	5		1,2		5			2,4	
	Instrument / Component	2*	1,2,3 4,6,7		3,4,5 6		1,2,3 4			1,3,5 6	
	Major	1	7		6		6			7	
SRO-U	Reactivity	0									
	Normal	1*									
	Instrument / Component	2*									
	Major	1									

- Instructions:
- (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
  - (2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.45.d) but must be significant per Section C.2.a of Appendix D. \* Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
  - (3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: 

NRC Reviewer: 

(SCENARIO 1)

ES-301

Simulator Scenario Quality Checklist

Form ES-301-4

Facility: <u>St. Lucie</u>		Date of Exam: <u>8-10-04</u>		Scenario Numbers: <u>1 / 1</u>		Operating Test No.: <u>1</u>	
QUALITATIVE ATTRIBUTES			Initials				
			a	b*	c#		
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events. <u>✓OLRM</u>	<u>A</u>	<u>L</u>				
2.	The scenarios consist mostly of related events.	<u>A</u>	<u>L</u>				
3.	Each event description consists of · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable)	<u>A</u>	<u>L</u>				
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	<u>A</u>	<u>L</u>				
5.	The events are valid with regard to physics and thermodynamics.	<u>A</u>	<u>L</u>				
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	<u>A</u>	<u>L</u>				
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	<u>A</u>	<u>L</u>				
8.	The simulator modeling is not altered.	<u>A</u>	<u>L</u>				
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	<u>A</u>	<u>L</u>				
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301.	<u>A</u>	<u>L</u>				
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	<u>A</u>	<u>L</u>				
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	<u>A</u>	<u>L</u>				
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	<u>A</u>	<u>L</u>				
<b>TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4-B5.d)</b>		Actual Attributes		-	-	-	
1.	Total malfunctions (5-8)	7	/ /	<u>A</u>	<u>L</u>		
2.	Malfunctions after EOP entry (1-2)	2	/ /	<u>A</u>	<u>L</u>		
3.	Abnormal events (2-4)	4	/ /	<u>A</u>	<u>L</u>		
4.	Major transients (1-2)	1	/ /	<u>A</u>	<u>L</u>		
5.	EOPs entered/requiring substantive actions (1-2)	1	/ /	<u>A</u>	<u>L</u>		
6.	EOP contingencies requiring substantive actions (0-2)	0	/ /	<u>A</u>	<u>L</u>		
7.	Critical tasks (2-3)	3	/ /	<u>A</u>	<u>L</u>		

(SCENARIO 2)

ES-301

Simulator Scenario Quality Checklist

Form ES-301-4

Facility: <u>St. Lucie</u>		Date of Exam: <u>8-10-04</u>		Scenario Numbers: <u>21 / 1</u>		Operating Test No.: <u>1</u>	
QUALITATIVE ATTRIBUTES			Initials				
			a	b*	c#		
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events. ✓ <u>OLRM</u>	<u>A</u>	<u>L</u>				
2.	The scenarios consist mostly of related events.	<u>A</u>	<u>L</u>				
3.	Each event description consists of · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable)	<u>A</u>	<u>L</u>				
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.	<u>A</u>	<u>L</u>				
5.	The events are valid with regard to physics and thermodynamics.	<u>A</u>	<u>L</u>				
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.	<u>A</u>	<u>L</u>				
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.	<u>A</u>	<u>L</u>				
8.	The simulator modeling is not altered.	<u>A</u>	<u>L</u>				
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.	<u>A</u>	<u>L</u>				
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301.	<u>A</u>	<u>L</u>				
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).	<u>A</u>	<u>L</u>				
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).	<u>A</u>	<u>L</u>				
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.	<u>A</u>	<u>L</u>				
<b>TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4-B5.d)</b>		Actual Attributes			--	--	--
1.	Total malfunctions (5-8)	<u>7</u>	/	/	<u>A</u>	<u>L</u>	
2.	Malfunctions after EOP entry (1-2)	<u>2</u>	/	/	<u>A</u>	<u>L</u>	
3.	Abnormal events (2-4)	<u>3</u>	/	/	<u>A</u>	<u>L</u>	
4.	Major transients (1-2)	<u>2</u>	/	/	<u>A</u>	<u>L</u>	
5.	EOPs entered/requiring substantive actions (1-2)	<u>1</u>	/	/	<u>A</u>	<u>L</u>	
6.	EOP contingencies requiring substantive actions (0-2)	<u>1</u>	/	/	<u>A</u>	<u>L</u>	
7.	Critical tasks (2-3)	<u>2</u>	/	/	<u>A</u>	<u>L</u>	

(SCENARIO 3)

ES-301

Simulator Scenario Quality Checklist

Form ES-301-4

Facility: <i>St. Lucie</i>		Date of Exam: <i>8-10-04</i>		Scenario Numbers: <i>31 /</i>		Operating Test No.: <i>1</i>	
QUALITATIVE ATTRIBUTES			Initials				
			a	b*	c#		
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	<i>✓ OLRM</i>	<i>[Signature]</i>	<i>L</i>			
2.	The scenarios consist mostly of related events.		<i>[Signature]</i>	<i>L</i>			
3.	Each event description consists of · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable)		<i>[Signature]</i>	<i>L</i>			
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.		<i>[Signature]</i>	<i>L</i>			
5.	The events are valid with regard to physics and thermodynamics.		<i>[Signature]</i>	<i>L</i>			
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.		<i>[Signature]</i>	<i>L</i>			
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.		<i>[Signature]</i>	<i>L</i>			
8.	The simulator modeling is not altered.		<i>[Signature]</i>	<i>L</i>			
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.		<i>[Signature]</i>	<i>L</i>			
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301.		<i>[Signature]</i>	<i>L</i>			
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).		<i>[Signature]</i>	<i>L</i>			
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).		<i>[Signature]</i>	<i>L</i>			
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.		<i>[Signature]</i>	<i>L</i>			
<b>TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4-D5, d)</b>			Actual Attributes	-	-	-	
1.	Total malfunctions (5-8)	<i>6 / /</i>	<i>[Signature]</i>	<i>L</i>			
2.	Malfunctions after EOP entry (1-2)	<i>2 / /</i>	<i>[Signature]</i>	<i>L</i>			
3.	Abnormal events (2-4)	<i>4 / /</i>	<i>[Signature]</i>	<i>L</i>			
4.	Major transients (1-2)	<i>1 / /</i>	<i>[Signature]</i>	<i>L</i>			
5.	EOPs entered/requiring substantive actions (1-2)	<i>1 / /</i>	<i>[Signature]</i>	<i>L</i>			
6.	EOP contingencies requiring substantive actions (0-2)	<i>0 / /</i>	<i>[Signature]</i>	<i>L</i>			
7.	Critical tasks (2-3)	<i>3 / /</i>	<i>[Signature]</i>	<i>L</i>			

(SCENARIO 9)

ES-301

Simulator Scenario Quality Checklist

Form ES-301-4

Facility: <u>St. Lucie</u>		Date of Exam: <u>8-10-04</u>		Scenario Numbers: <u>41</u> /		Operating Test No.: <u>1</u>			
QUALITATIVE ATTRIBUTES				Initials					
				a	b*	c#			
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.	<u>✓</u>	<u>OLRM</u>	<u>SL</u>	<u>L</u>				
2.	The scenarios consist mostly of related events.			<u>SL</u>	<u>L</u>				
3.	Each event description consists of · the point in the scenario when it is to be initiated · the malfunction(s) that are entered to initiate the event · the symptoms/cues that will be visible to the crew · the expected operator actions (by shift position) · the event termination point (if applicable)			<u>SL</u>	<u>L</u>				
4.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.			<u>SL</u>	<u>L</u>				
5.	The events are valid with regard to physics and thermodynamics.			<u>SL</u>	<u>L</u>				
6.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.			<u>SL</u>	<u>L</u>				
7.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.			<u>SL</u>	<u>L</u>				
8.	The simulator modeling is not altered.			<u>SL</u>	<u>L</u>				
9.	The scenarios have been validated. Pursuant to 10 CFR 55.46(d), any open simulator performance deficiencies have been evaluated to ensure that functional fidelity is maintained while running the planned scenarios.			<u>SL</u>	<u>L</u>				
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.45 of ES-301.			<u>SL</u>	<u>L</u>				
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).			<u>SL</u>	<u>L</u>				
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).			<u>SL</u>	<u>L</u>				
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.			<u>SL</u>	<u>L</u>				
<b>TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO; SEE SECTION D.4.B5.d)</b>				Actual Attributes			--	--	--
1.	Total malfunctions (5-8)	<u>6</u>	/ /	<u>SL</u>	<u>L</u>				
2.	Malfunctions after EOP entry (1-2)	<u>2</u>	/ /	<u>SL</u>	<u>L</u>				
3.	Abnormal events (2-4)	<u>4</u>	/ /	<u>SL</u>	<u>L</u>				
4.	Major transients (1-2)	<u>1</u>	/ /	<u>SL</u>	<u>L</u>				
5.	EOPs entered/requiring substantive actions (1-2)	<u>1</u>	/ /	<u>SL</u>	<u>L</u>				
6.	EOP contingencies requiring substantive actions (0-2)	<u>0</u>	/ /	<u>SL</u>	<u>L</u>				
7.	Critical tasks (2-3)	<u>3</u>	/ /	<u>SL</u>	<u>L</u>				

OPERATING TEST NO.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number										
			1		2		3		4				
			RO	BOP	RO	BOP	RO	BOP	RO	BOP			
RO	Reactivity	1*			1								
	Normal	1*		1	1			1					
	Instrument / Component	4*		1	2			2					
	Major	1		1	1			1					
As RO FIRST I SRO-I	Reactivity	1*											
	Normal	0				1							
	Instrument / Component	2*				2							
	Major	1				2							
As SRO	Reactivity	0	1					1					
	Normal	1*	1	1				1					
	Instrument / Component	2*	2	1				2	2				
	Major	1	1					1					
SRO-U	Reactivity	0											
	Normal	1*											
	Instrument / Component	2*											
	Major	1											

- Instructions:
- (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
  - (2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.45.d) but must be significant per Section C.2.a of Appendix D. \* Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
  - (3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: J. J. Corwin

NRC Reviewer: \_\_\_\_\_



B set (1 of 2)

OPERATING TEST NO.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number										
			1		2		3		4				
			RO	BOP	RO	BOP	RO	BOP	RO	BOP			
RO RA	Reactivity	1*	1										
	Normal	1*	1			1							
	Instrument / Component	4*	3			2		X					
	Major	1	1			2							
As RO	Reactivity	1*						1					
	Normal	0						1					
	Instrument / Component	2*						2					
	Major	1						1					
SRO-I I <sub>7</sub> As SRO	Reactivity	0	1		1								
	Normal	1*	1	1	1	1							
	Instrument / Component	2*	2	1	1	2							
	Major	1	1		1								
SRO-U	Reactivity	0											
	Normal	1*											
	Instrument / Component	2*											
	Major	1											

- Instructions:
- (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
  - (2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.45.d) but must be significant per Section C.2.a of Appendix D. \* Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
  - (3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: J. Corvax

NRC Reviewer: \_\_\_\_\_





Facility: St. Lucie

Scenario No.: 1

Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a Rapid Power reduction; and execute the EOPs for a Steam Generator Tube Leak and Rupture combined with a Partial Loss of Power and failed equipment.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift.

Preexisting Malfunctions: Acid Valve FCV-2210Y failed closed, 2A3 4Kv bus has an automatic fault on reactor trip, HVE-21B CEDM Fan is failed as-is, and the 2B MSIV is failed as-is.

Event No.	Malf. No.	Event Type*	Event Description
1	PORV	C-RO	PORV leak, Isolate and place standby valve inservice with SRV ONP.
2	CEDM	C-BOP	CEDM Fan HVE-21A fails and HVE-21B does not start. Per RAB ONP, Crew must remove unit from service in 45 minutes.
3		N-RO R-RO N-BOP	Rapid Downpower ONP Borate with CVCS and insert CEAs to control plant downpower. Decrease power using turbine controls.
4		C-RO	Boric Acid Flow Control Valve fails to open, Per Boron Control ONP, use Emergency Borate Valve and cycle Boric Acid Pump to control flow.
5	SGTL B	C-ALL	Steam Generator Tube Leak Appears in the 2B SG requiring use of ONP to isolate paths and continue plant downpower. (TS 3.4.6.2)
6	RUPT B	M-ALL C-BOP	Steam Generator Tube Rupture Occurs on 2B SG requiring manual reactor trip. When transfer occurs, the 2A3 4Kv buss faults causing a sustained loss of power to the 2A3 4Kv buss. Requires use of 2C AFW pump to feed the 2A SG.
7		C-RO	Partial Loss of power causes SBCS to close requiring manual operation to preclude release from the ADVs.
8	NPO MSIV B	C-RO C-SRO	When conducting SG isolation, the 2B MSIV does not close, must diagnose and order EOP App I to close locally.
			Termination: Isolate 2B SG and begin cooldown to place SDC inservice.

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1

Scenario No.: 1

Event No.: 1

Page 2 of 10

Event Description: Pressurizer Relief Valve Leakage.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports decreasing RCS pressure, increase in quench tank parameters indicative of PORV or SRV leak.
		Identifies leaking PORV 1474 leaking by elevated tailpipe temperature.
		Isolates leaking PORV by closing isolation valve V-1476 IAW with ONP.
		Places standby PORV inservice by opening the isolation valve V-1477.
		Recovers pressurizer pressure by energizing backup heaters.
	BOP	Confirms PORV leaking by acoustic flow monitors indicating flow.
	SRO	Directs the gathering of diagnosis information when pressurizer and quench tank anomalies are detected.
		Directs RO to isolate leaking PORV by closing isolation valve using guidance of ONP 2-0120035.
		Directs RO to place standby PORV inservice by opening the isolation valve V-1477 using guidance of ONP 2-0120035.
		Directs analysis and recovery from condition using backup heaters.

Op-Test No.: 1

Scenario No.: 1

Event No.: 2

Page 3 of 10

Event Description: CEDM Fan HVE-21A failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize the loss of the 21A CEDM Fan.
		Diagnose the failure of the standby HVE-21B to auto start.
		Attempts manual start on HVE-21B.
		Directs SNPO to perform breaker check of CEDM Breakers IAW Appendix A of 2-ONP-25.01.
	RO	Checks CEA positions and annunciators to verify no negative affect on CEDMs.
		Notify EM of standby fan failure to start.
		Notify Maintenance Supervisor of standby fan failure to start.
	SRO	Directs the Sequence of diagnosis information when the HVE-21A fan fails.
		Directs the attempted start of HVE-21B.
		Directs the crew to perform a local check of CEDM fan breakers with Appendix A of ONP 2-ONP-25.01.
		Determines that no fans available requires Rapid Downpower IAW 2-22.01 Rapid Downpower ONP
		Note: Crew may attempt to start failed HVE-21A fan.
		Role Play: SNPO reports breakers appear to be aligned normally, fuses are good, and no targets are dropped on relays.

Op-Test No.: 1

Scenario No.: 1

Event No.: 3

Page 4 of 10

Event Description: Plant Shutdown (RCB Vent ONP)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to decrease turbine load
		Note: May adjust SG level set points to compensate for level change.
	RO	Operates Boron Control System to borate the RCS and decrease RCS temperature. (discovers Event 4 Acid Flow Control failure)
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
		Operates Pressurizer Heaters and Spray systems to place the Pressurizer on recirc. (App A of 2-NOP-0030123)
		Starts second Charging Pump and balances Letdown Flow.
	SRO	Performs shift brief prior to power decrease
		Directs actions to prepare for and conduct normal plant shutdown. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease
		Note: crew may additionally address miscellaneous alarms related to the downpower; SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke-Delta-T RPS alarms.

Op-Test No.: 1

Scenario No.: 1

Event No.: 4

Page 5 of 10

Event Description: Boric Acid FCV failure.

(Acid Flow Controller is failed on scenario set-up)

Time	Position	Applicant's Actions or Behavior
	BOP	Communicates with RO as to control turbine power changer rates when turbine power must be decreased or the turbine must be placed on hold.
	RO	Recognizes zero acid flow going to the RCS.
		Diagnoses FCV-2210Y is failed closed, reports to SRO.
		Starts or verifies running a Boric Acid Pump.
		Opens Emergency Borate valve.
		Monitors and controls resultant decrease in RCS temperature and adjusts downpower and/or cycles boric acid pump to control temperature decrease rates.
	SRO	Directs the gathering of diagnosis information when FCV-2210Y acid flow control valve will not open with a down power required.
		Directs power adjustments and compensations necessary when RCS temperature does not respond initially.
		Directs RO to Start Boric Acid pump and open Emergency Borate valve and cycle the Boric Acid Make-Up pump to control gross boric acid flow for down power.

Op-Test No.: 1

Scenario No.: 1

Event No.: 5

Page 6 of 10

Event Description: Steam Generator Tube Leak  
 (Requires examiner cue. Need to activate failure while borating for the downpower early in the scenario right after transfer to Emergency Borate valve control is accomplished.)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes Changing Letdown mismatch, lost RCS inventory.
		Operates CVCS and control rods to decrease reactor power and temperature as directed by SRO
		Starts a third charging pump if required due to RCS leakage
		Operates CVCS and control rods to decrease reactor power and temperature as directed by SRO
	BOP	Recognizes Condenser Air Ejector alarm and detects increasing trends on radiation monitoring.
		Refers to ONP 2-0830030 SG Tube Leak Off-Normal for Plant response guidance for indications of Pri-Sec leakage.
		Orders NPO to ensure vent alignment and isolate priming steam.
		Orders SNPO to perform line-up and checks at the SG Blowdown Treatment Facility.
	SRO	Diagnoses SGTl from changing conditions, TS ref leak >720 GPD.
		Directs BOP and Chemistry to verify CAE alarm validity.
		Directs RO and BOP to continue plant shutdown.
		Directs RO to start a additional charging pumps as leakage increases
		Directs plant organization response and orderly plant shutdown using ONP 2-0830020 Steam Generator Tube leak.
		Orders HP to conduct secondary surveys and possibly evacuate personnel from secondary areas or set up exclusion areas.

Time	Position	Applicant's Actions or Behavior
Op-Test No.: 1      Scenario No.: 1      Event No.: 6      Page 7 of 10		
Event Description:    SG Tube Rupture, Partial Loss of AC Power. (initiate this failure on examiner cue when enough power change has been observed)		
	RO	Manually trips the reactor when pressurizer level can no longer be maintained
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Reports loss of all power to 2A3 4Kv buss due to fault.
	<u>Critical Task</u>	Manually operate SBCS with a loss of power to permissive signals (loss of 2A3 buss) and control SG pressure to prevent continued lifting of SG safeties and release of SG to atmosphere.
	BOP	Confirms SG Blowdown and Steam Line Rad indications.
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Closes Gland Steam Spillover valve to ensure condenser vacuum is maintained.
		Isolates MSR warm-up valves to ensure feedwater heaters do not release steam from the secondary.
	SRO	Directs RO and BOP to manually trip reactor when pressurizer level can no longer be maintained
		Directs RO and BOP in the performance of 2-EOP-1
		Performs shift brief and directs entry into 2-EOP-04, Steam Generator Tube Rupture procedure and outlines goals.

Time	Position	Applicant's Actions or Behavior
Op-Test No.: 1	Scenario No.: 1	Event No.: 7
Page 8 of 10		
Event Description: Steam Generator Tube Rupture Recovery		
	RO	Recognizes SBCS not operating in Automatic due to loss of permissive system power, reports to ANPS.
		Takes Manual control of SBCS and opens valves to commence RCS cooldown as directed by ANPS.
	<u>Critical Task</u>	Transfer SBCS permissive to Manual and operate SBCS to reduce RCS temperature, control RCS subcooling and bring plant to SG isolation temperatures (510 degrees T-hot).
		Operate Pressurizer sprays, aux sprays to reduce RCS subcooling and stay within Figure 1A. Maintain RCS pressure as directed by the SRO.
	BOP	Performs safety function status checks for 2-EOP-4
	<u>Critical Task</u>	Restore CCW to RCPs or Trips all RCPs within 10 mins.
		Key block MSIS signal to maintain SBCS available. <i>415 not yet included</i>
		Verifies SI flow per 2-EOP-99, Figure 2
	SRO	Directs steps in SGTR EOP-04 to commence RCS cooldown and depressurization for ruptured generator isolation.
		Directs SBCS be operated in manual to commence RCS cooldown for SG isolation.
		Direct Block of MSIS signal to ensure continued use of SBCS.
		Operate Pressurizer sprays and heaters to reduce RCS subcooling between 20 and 50 degrees subcooled as directed by the ANPS.
		Orders verification of SI flow per 2-EOP-99, Figure 2

Event Description: SG Tube Rupture Isolation

Time	Position	Applicant's Actions or Behavior
	RO	Continue Cooldown of RCS using SBCS in manual.
		Continue RCS depressurization using Sprays.
	BOP	Performs SFSCs from EOP-04 as directed by ANPS.
		Begins Isolation of 2B SG with Appendix R of EOP-99.
	<u>Critical Task</u>	Discovers 2B MSIV will not close on demand. Directs local closure of HCV-08-1B with Appendix "I" of EOP-99 by the NPO.
	<i>Critical?</i>	Completes isolation of 2B Steam Generator IAW Appendix R guidance of EOP-99.
		Assists RO as directed by SRO
	SRO	Directs plant recovery steps from EOP-04 to cool down the plant and prepare for SG isolation.
		Directs isolation of the 2B SG when isolation criteria are met.
		Orders local closure of HCV-08-1B with Appendix "I" of EOP-99.
		<b>This scenario can be terminated when the 2B SG isolation steps have been completed, and the order has been given to the NPO to complete the AFW local isolation steps of Appendix R.</b>

## Shift Turnover

- The plant is operating at 100% power MOC.
- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.
- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 6 hours ago, not expected back this shift.
- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 12 hours ago, not expected back this shift.
- RE recommends holding ASI to 100% power values.

Facility: St. Lucie

Scenario No.: 2

Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a normal plant power reduction; and execute the EOPs for a Loss of Forced Circulation and with a Partial Loss of Power and followed by a recoverable Total Loss Of Feedwater.

Initial Conditions: Unit 2 is at 45% power MOC, Xenon building in from downpower on hold.

Turnover: 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A AFW Pump has been OOS for bearing replacement for 70 hours. The LCO will not be met; therefore the unit has to be removed from service. The previous crew has reduced power to 45% and is holding power steady. The SM has directed the unit now be shutdown using the Rapid Downpower ONP.

Preexisting Malfunctions: 2A 6.9Kv bus feeder breaker is set up in the failed as is condition and will simulate a blown breaker fuse on the plant trip, CCW system is set with an automatic line break when 2C CCW pump is started.

Event No.	Malf. No.	Event Type*	Event Description
1		N- RO R- RO N-BOP	Rapid Downpower ONP RO - Boron and Rod Control BOP - Turbine Control
2	Press	I-RO	Pzr Press Ch X Fails Low, Per Pzr Pressure/Level ONP select Channel Y
3	2A CCW	C-BOP	2A CCW Pump bearing freeze. (T.S.3.7.3) Per CCW ONP start 2C Pump on A Header
4		C-BOP	CCW N-Header Rupture when 2C CCW Pump starts
5		M-All C-RO	Trip Unit per CCW ONP Stop all four RCPs, Loss of Forced Circulation in the RCS. 2A 6.9KV S/U Transformer does not swap on trip.
6	2C Failure	C - RO	2C AFW Pump trip on overspeed on AFAS after entering EOP-09 (T.S. 3.7.1.2)
7		M-All C-BOP	AFW 2B SE-09-3 failed closed (Total Loss of Feedwater) 2B Main Feed Pump will not start due to Aux Oil Pump failure.
8	2A restore	C -BOP	Re-energize 2A 6.9KV offsite power feed and feed SGs with 2A Main Feedwater Pump.
			Termination: Start 2A MFP & feed S/G or restore flow from the 2C AFW Pump prior to Once thru Cooling.

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1

Scenario No.: 2

Event No.: 1

Page 2 of 10

Event Description: Rapid Plant Down Power (AFW pump Tech Spec)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to decrease turbine load
		Note: May adjust SG level set points to compensate for level change.
	RO	Secures Dilution to the RCS for Xenon.
		Operates Boron Control System to borate the RCS and decrease RCS temperature.
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
	SRO	Performs shift brief prior to power decrease
		Directs actions to prepare for and conduct rapid plant down power. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease
		Note: crew may additionally address miscellaneous alarms related to the downpower; Long Term Steady State CEA limits, SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke-Delta-T RPS alarms.

Op-Test No.: 1

Scenario No.: 2

Event No.: 2

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Event Description: Pressurizer Pressure Channel X

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports Pressurizer Pressure Channel X failing low.
		Verifies channel failure.
		Swaps pressure control to Y Channel control.
		Restores pressure by operating pressurizer heaters.
	BOP	Confirms failed channel, assists with ONP procedures.
	SRO	Directs the gathering of diagnosis information and confirmations of failed channel.
		Implements ONP 2-0120035 Pressurizer Pressure and Level Off Normal procedure to mitigate the failed channel.
		Directs RO to swap to Y channel.

Op-Test No.: 1

Scenario No.: 2

Event No.: 3

Page 4 of 10

Event Description: 2A CCW pump bearing freeze.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize the loss of the 2A CCW pump.
		Stop or verify 2A CCW is stopped.
		Directs SNPO check pump locally.
		Start 2C CCW pump to recover flows to CCW system.
	RO	Notify Maintenance Supervisor of 2A pump failure.
	SRO	Directs the stop of 2A CCW pump with high amperage.
		Verify sufficient flow remains to N-Header for RCPs.
		Implements ONP 2-0310030 CCW Off-Normal procedure to restore CCW flow to the headers.
		Directs the crew to verify lineup on 2C pump.
		Directs the start of the 2C CCW pump and restoration of flow to the headers.
		Role Play: SNPO Reports very hot bearing on 2A CCW pump, and if running reports 2C CCW pump operating normally.

Op-Test No.: 1	Scenario No.: 2	Event No.: 4	Page 5 of 10
Event Description: CCW Rupture.			
(leak comes in automatically on start of 2C pump)			
Time	Position	Applicant's Actions or Behavior	
	BOP	Assist crew diagnosis to link CCW pump start with containment leakage flow.	
		Report CCW Surge tank low level alarms.	
		Report CCW N-Header valves isolate.	
	RO	Recognize and report RCS leakage flow indications rising.	
		Diagnose leakage into containment is not being lost from Reactor Coolant System, no level or pressure loss.	
		Recognize eventual loss of CCW to Reactor Coolant Pumps.	
		Recognize and report loss of letdown system cooling and CVCS Ion Exchanger bypass on high temperature.	
	SRO	Directs the gathering of diagnosis information on apparent leakage when the 2C CCW pump is started. .	

*Yes, include / Acknowledge?*

Op-Test No.: 1

Scenario No.: 2

Event No.: 6

Page 6 of 10

Event Description: Manual Plant Trip for CCW

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes continued operation without CCW flow will result in automatic reactor trip on RCP CCW.
		When directed, Manually Trip the Reactor and carry out SPTAs using EOP-01.
		Stop all four RCPs due to no CCW Flow.
		Verify RCS temperatures for Natural Circulation formation.
	BOP	Carry out SPTAs of EOP-01
		Report loss of 2A 6.9 Kv power supply from offsite.
		Report loss of running Main Feedwater Pump 2A.
	SRO	Direct performance of EOP-01 Standard Post Trip Action with the crew.
		Directs stopping all four RCPs due to no CCW Flow.

Op-Test No.: 1

Scenario No.: 2

Event No.: 5

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Event Description: Loss of Forced Circulation.

Time	Position	Applicant's Actions or Behavior
	RO	Verify parameters confirm Natural Circulation heat removal of the of the RCS.
		Diagnose and report 2B AFW pump is not supplying flow to the 2B SG due to failure of Solenoid AFW isolation valve.
		Commence depressurization to 1800-1850 psia with all RCPs stopped for seal cooling.
	BOP	Perform Safety Function Status Checks of EOP-09 LOFC/LOOP.
		Recognize and report CCW is not available for SG samples and appendix A cannot be completed.
	SRO	Brief the crew on loss of forced circulation and transition to EOP-09 LOFC/LOOP Emergency Procedure.
		Order the performance of EOP-09 LOFC/LOOP Safety Function Status Checks.
		Order the check of Natural Circulation verification with RO.
		Direct RCS depressurized to 1800-1850 for RCP seals.

Op-Test No.: 1

Scenario No.: 2

Event No.: 5

Page 8 of 10

Event Description: Total Loss of Feedwater

(After crew has transitioned to EOP-09 and verified N/C, trigger the loss of the 2C AFW pp)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes loss of feedwater flow.
		Ensure all SG blowdown valves are closed.
	BOP	Recognize loss of 2C Aux feed pump on overspeed.
		Recognize 2B Main Feed pump not available with loss of auxiliary oil pump.
		Perform Safety Function Status Checks of EOP-06 TLOF.
	SRO	Direct reevaluation of conditions, Exit EOP-09 and enter EOP-6 Total Loss of Feedwater.
		Direct an inventory of all potential feedwater sources.
		Direct isolation of all SG blowdown flowpaths.

Event Description: Feedwater Restoration

(Recovery of Feedwater is at examiners discretion. When requested, offsite 2A power can be restored, and/or 2C Aux Feed Pump can be reset to make either available.)

Time	Position	Applicant's Actions or Behavior
	RO	Maintain RCS stable while recovering Feedwater Flow.
	BOP	Performs SFSCs from EOP-06 as directed by ANPS.
	<u>Critical Task</u>	Recovers power to the 2A3 6.9Kv buss by re-powering buss from offsite.
	<u>Critical Task</u>	Starts 2A Main Feedwater pump and restores feed the SGs using the Main Feedwater system.
		(optional step) Resets 2C Auxiliary Feedwater Pump and recovers flow to the SGs.
	SRO	Directs inventory conservations steps from EOP-06.
		Directs power restoration to the 2A3 6.9Kv buss from offsite.
		Directs 2A Main Feedwater pump restart and restoration of feed to the SGs using the Main Feedwater system.
		(optional step) Directs the reset of 2C Auxiliary Feedwater Pump and recovers flow to the SGs.
		NOTE: At the examiners discretion a cue may be given for NPO to restore operability of the 2C pump after EOP-06 entry.
		<b>This scenario can be terminated when feedwater flow has been restored to the SGs.</b>

## Shift Turnover

- The plant is operating at 100% power MOC.
- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.
- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 64 hours ago, not expected back this shift.
- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 70 hours ago, not expected back this shift. The LCO will not be met; the SM has directed that the unit be shutdown and removed from service using the Rapid Downpower ONP.
- RE recommends maintaining ASI between the LPD pre-trip limits during the shutdown.

Facility: St. Lucie

Scenario No.: 3

Op-Test No.: 1

Objectives: To evaluate the candidate's ability to implement the ONOPs for various component failures; perform a rapid plant power reduction; exercise EOP procedure actions for Excess Steam Demand without the aid of forced circulation.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift.

Preexisting Malfunctions: 2A Electric feeds from offsite are set up not to Auto Close on LOOP. 2A Containment Spray pump is set not to start, and the B-side Containment Spray FCV-07-1B is set to not automatically open. Containment N-header is set to remain auto-isolated after closure by SIAS, and the DEH turbine controls are set to auto transfer to manual when needed.

Event No.	Malf. No.	Event Type*	Event Description
1	COOLER	I-RO	RCP Seal Heat Exchanger temperature instrument fails, isolates CCW to RCP seal cooler until reopened.
2	HDP 2A	C-BOP	Heater Drain Pump 2B fails due <sup>to</sup> a bad bearing. Loss of feedwater from the pump requires a Rapid Downpower to ~90% power.
3		N-RO R-RO N-BOP	Rapid Downpower ONP Borate with CVCS and insert CEAs to control plant downpower. Decrease power using turbine controls.
4		C-BOP	Turbine Controls fail to manual when programmed for downpower. Require turbine controls to be operated in manual.
5	Feed Reg	I-RO	2A Steam Generator Controls LT-9011 ramps high. Requires transfer and control of SG level in Manual.
6	ESDE	M-ALL	ESDE leakage occurs on SG 2B directly to containment. Plant trip occurs on high containment pressure. CCW cannot be restored following SIAS due to failure of HCV-14-1 valve, must stop all four RCPS and mitigate ESDE without the aid of forced circulation.
7		C-RO	ESDE Mitigation: 2A Containment Spray pump fails to start on CSAS and must be manually started. 2B SG must be isolated.
8		C-RO	FCV-07-1B containment spray valve fails to open and must be manually opened.
			Termination: Isolate 2B SG and stabilize RCS temperature following dry out conditions in the faulted SG.

cont  
down

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1

Scenario No.: 3

Event No.: 1

Page 2 of 11

Event Description: RCP temperature element.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognize and report loss of RCP 2A1 RCP seal heat exchanger CCW flow due to closed valve.
		Resets and reopens valve to restore flow following hi-temp alarm.
		Verifies RCP seal temperatures normal. Recognizes failed hi-temperature element and places heat exchanger valve in OPEN position to override the closure signal.
	BOP	Assist SRO with procedures.
	SRO	Directs the gathering of diagnosis information RCP seal heat exchanger anomalies are detected.
		Directs RO to open CCW isolation valve.
		Directs RO to reopen the CCW valve after second closure and place the valve in OPEN position to override closure signal and maintain cooling flow.

Op-Test No.: 1

Scenario No.: 3

Event No.: 2

Page 3 of 11

Event Description: 2B Heater Drain Pump Trip.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize the loss of the 2B Heater Drain Pump.
		Notify Maintenance Supervisor of heater drain pump failure.
	RO	Recognize and report inadequate feedwater flow due to loss of Heater Drain Pump.
	SRO	Directs the confirmation of a loss of heater drain pump.
		Directs the confirmation of feed flow lower than steam flow.
		Determines that inadequate feedwater flow requires reduction of steam flow by conducting downpower using Rapid Downpower IAW 2-22.01 Rapid Downpower ONP.
		Note: Crew may attempt one restart of the HDP. Crew may also manually stop the pump if amperage change is noted early.
		Role Play: NPO 2B Heater Drain pump making a lot of noise as it stopped if asked to check.

Op-Test No.: 1

Scenario No.: 3

Event No.: 3

Page 4 of 11

Event Description: Plant Down Power (Feedwater Flow)

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Sets up DEH to decrease turbine load
		Note: May adjust SG level set points to compensate for level change.
	RO	Continues RCS boration to decrease RCS temperature.
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
	SRO	Directs crew to perform a Rapid Shutdown to recover SG levels. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by starting boration to RCS, followed by prompt CEA insertion.
		Directs BOP to decrease turbine power by DEH.
		Note: crew may additionally address miscellaneous alarms related to the downpower; SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke- Delta-T RPS alarms.

Op-Test No.: 1

Scenario No.: 3

Event No.: 4

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Event Description: DEH Failure.

(DEH failure is automatic when GO button is depressed)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes DEH failure and transfer to manual.
		Manually operate DEH controls to remove MW load.
	RO	Operates Boron Control System to borate the RCS and decrease RCS temperature.
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Secures boration and stabilizes RCS temperature at ~90% load.
		NOTE: Crew May Operate Pressurizer Heaters and Spray systems to place the Pressurizer on recirc. They may also start second charging pump and balance letdown flow.
	SRO	Directs crew to perform a Rapid Shutdown to recover SG levels. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to decrease RCS temperature by starting boration to RCS, followed by prompt CEA insertion.
		Directs BOP to decrease turbine power by DEH.
		Directs RO to maintain ASI at 100% value
		Note: Exam team MUST wait until primary-secondary are stable with all SG level alarms OUT before proceeding to next event.

Op-Test No.: 1

Scenario No.: 3

Event No.: 5

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Event Description: Feedwater Level Failure.

(Examiner cue required AFTER downpower to 90% is stabilized)

Time	Position	Applicant's Actions or Behavior
		Note: Exam team MUST wait until primary-secondary are stable with all SG level alarms OUT before proceeding with this event.
	BOP	Observes and ensures secondary stable during manual SG control.
	RO	Recognize & report LIC-9011 output falling while SG level on safety channels also falling.
		Transfer LIC-9011 to manual.
		Raise feedwater flow to SG 2A and restore to normal level.
		Continue to control SG level on 2A.
	SRO	Directs RO to take control of 2A feedwater flow controller and manually restore SG level.

Op-Test No.: 1

Scenario No.: 3

Event No.: 6

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Event Description: Excess Steam Demand (ESDE in Containment)

(Requires examiner cue).

Time	Position	Applicant's Actions or Behavior
	RO	Recognize and report increasing Rx cavity leakage.
		Recognize and report increasing containment pressure, and temperature.
	BOP	Recognizes and reports rising containment delta-P and rising containment temperature.
	SRO	Direct crew to manually trip the reactor as containment pressure approaches LSSS trip setpoint.
		Monitors Reactor Power during ESDE to ensure power remains below limits.

Time	Position	Applicant's Actions or Behavior
Op-Test No.: 1      Scenario No.: 3      Event No.: 7      Page 8 of 11		
Event Description:    ESDE - Steam Break inside containment.		
(ESDE will get larger automatically after reactor trip, CCW valve fails after first closure)		
	RO	Manually trips the reactor when containment pressure approaches trip limit.
		Ensure or initiate Emergency Boration due to RCS cooldown following plant trip.
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
	<u>Critical Task</u>	Recognize and report CCW cannot be regained to RCPs and trip all four RCPs after 10min loss of CCW. <i>(Operator's note)</i>
	BOP	Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Begin CCW restoration to RCPs.
		Recognize and report CCW cannot be regained during restoration using App J of EOP-99 due to failure of HCV-14-1 to reopen.
	SRO	Directs RO to manually trip reactor when containment pressure approaches trip setpoint.
		Directs RO to ensure or initiate Emergency Boration due to RCS cooldown following plant trip.
		Direct restoration of CCW to RCPs following SiAS with App J of EOP-99.
		Recognize CCW cannot be regained, direct RO to secure all running RCPs and establish NC conditions.

Time	Position	Applicant's Actions or Behavior
	RO	Monitor SG conditions for ESDE dry-out approach.
	<u>Critical Task</u>	Operate Atmospheric Dump valves to stabilize RCS temperature following SG dry-out conditions.
		Operate Pressurizer sprays, aux sprays to reduce RCS subcooling and stay within Figure 1A or Figure 1B as appropriate. Maintain RCS pressure and subcooling as directed by the SRO.
	<u>Critical Task</u>	Recognize, report the failure and start the 2A Containment Spray pump.
		Recognize, report the failure of FCV-07-1B Containment Spray flow control valve to open. Manually OPEN FCV-07-1B to restore containment spray flow.
	BOP	Performs safety function status checks for 2-EOP-5
		Verifies SI flow per 2-EOP-99, Figure 2
	SRO	Implements EOP-05, ESDE and orders SFSCs .
		Directs ADVs be operated in manual to Stabilize RCS temperature.
		Direct the start of 2A Containment Spray pump.
		Direct the opening of FCV-07-1B to restore CS flow.

Event Description: ESDE Isolation

Time	Position	Applicant's Actions or Behavior
	RO	Stabilize RCS temperatures using ADVs in manual.
		Continue RCS depressurization using Aux Sprays.
	BOP	Performs SFSCs from EOP-05 as directed by ANPS.
	<u>Critical Task</u>	Isolates 2B SG with Appendix R of EOP-99.
		Assists RO as directed by SRO
	SRO	Directs plant recovery steps from EOP-05 to stabilize RCS temperature and prepare for SG isolation.
	<u>Critical Task</u>	Directs isolation of the 2B SG when isolation criteria are met.
		<b>This scenario can be terminated when the 2B SG isolation steps have been completed, and the order has been given to the NPO to complete the AFW local isolation steps of Appendix R.</b>

## Shift Turnover

- The plant is operating at 100% power MOC.
- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.
- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 6 hours ago, not expected back this shift.
- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 12 hours ago, not expected back this shift.
- RE recommends holding ASI to 100% power values.

Facility: St. Lucie

Scenario No.: 4

Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a rapid plant power reduction; and manually trip the reactor when a loss of Instrument Air occurs. Execute the EOP for a Loss of Reactor Coolant combined with failed equipment and a recover SI flow.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift.

Preexisting Malfunctions: 2B HPSI is air-bound and all SIAS actuation relays are failed as-is.

Event No.	Maif. No.	Event Type*	Event Description
1	2A ICW	C- BOP	2A ICW Pump breaker trips, Per ICW ONP, Start 2C ICW Pump on the A header.
2	RCP SEALS	C-RO	Middle and Lower seals fail on RCP 2A1, Commence shutdown per RCP ONP
3		N- RO R-RO N-BOP	Rapid Down Power ONP RO - Boron and Rod Control BOP - Turbine Control
4	PZR HTR	C-RO	2B3 Pzr Heater Breaker fails open, RO adjust Pzr Spray
5	INST AIR	C-BOP	Loss of Instrument Air, Trip Rx at 60 psig. Enter 2-EOP-01
6		M	LOCA occurs on Rx Trip, Stop RCPs with No CCW to seals
7		I - RO	B SIAS does not auto actuate, Manual SIAS
8	HPSI Restore	C - RO	2B HPSI Pump becomes air bound, exit to EOP-15
			Termination: Vent 2B HPSI Pump to get flow per Fig 2, cooling down RCS to place SDC in service

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1

Scenario No.:4

Event No.: 1

Page 2 of 10

Event Description: 2A ICW Pump Failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports 2A ICW pump amps increasing.
		Stops 2A ICW Pump.
		Directs ANPO to locally prepare 2C ICW Pump for start.
		Start 2C ICW Pump IAW OP 2-0640020.
	RO	Confirms plant stable.
	SRO	Directs the stopping of 2A ICW pump.
		Implements ONP 2-0640030 Intake Cooling Water to recover from pump loss.
		Directs line-up and start of 2C ICW pump.
		Implements OP2-0640020 to start the 2C ICW pump.

Op-Test No.: 1      Scenario No.: 4      Event No.: 2      Page 3 of 10

Event Description:    RCP Seal Failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Assist with RCP diagnosis.
		Notify system engineering for assistance.
	RO	Monitors RCP Seals for degradation.
		Reports two RCP Seals Failed and increased pump bleed off flow.
	SRO	Directs the monitoring of RCP Seals.
		Implements RCP ONP 2-0120034 for seal failures.
		Concludes two failed RCP seals will require removal of unit from service.

Op-Test No.: 1

Scenario No.: 4

Event No.: 3

Page 4 of 10

Event Description: Plant Shutdown (RCP ONP)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to decrease turbine load
		Note: May adjust SG level set points to compensate for level change.
	RO	Operates Boron Control System to borate the RCS and decrease RCS temperature.
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
		NOTE: Crew may operate Pressurizer Heaters and Spray systems to place the Pressurizer on recirc, start second Charging Pump and balance Letdown Flow
	SRO	Performs shift brief prior to power decrease
		Directs actions to prepare for and conduct normal plant shutdown. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease
		Note: crew may additionally address miscellaneous alarms related to the downpower; SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke-Delta-T RPS alarms.

Op-Test No.: 1

Scenario No.: 4

Event No.: 4

Page 5 of 10

Event Description: Pressurizer Heater Failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports 2B3 pressurizer heater buss breaker 2-20403 has failed open. .
		Adjusts sprays and heaters to recover pressure control.
		Reset and restore pressurizer heaters to raise pressure.
	BOP	Assist with pressurizer heater failure procedures.
		Recover pressurizer heater buss breaker.
	SRO	Directs re-closure of pressurizer heater buss breaker.

Op-Test No.: 1

Scenario No.: 4

Event No.:5

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Event Description: Loss of Instrument Air.

(initiate this failure on examiner cue when enough power change has been observed)

Time	Position	Applicant's Actions or Behavior
	BOP	Reports loss of secondary instrument air pressure.
	RO	Reports loss of air casualties in systems as they occur; letdown loss, secondary feedwater heater drains opening.
		Reports Instrument Air Pressure approaching trip setpoint.
	SRO	Directs the gathering of diagnosis on instrument air status.
		Directs crew to manually trip the reactor when instrument air pressure falls to less than 60 psig.
		Implements Instrument Air Off Normal Procedure.

Op-Test No.: 1      Scenario No.: 4      Event No.: 6      Page 7 of 10

Event Description:    Loss of Reactor Coolant.

Time	Position	Applicant's Actions or Behavior
	RO	Manually trips the reactor when directed.
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
	BOP	Perform systematic board walkdown
		Perform Standard Post Trip actions of 2-EOP-1
	<u>Critical Task</u>	Recognize LOCA, loss of subcooling and irrecoverable loss of CCW, stops all four RCPs. <i>u/i 10 minutes of work 2007</i>
	SRO	Directs RO and BOP in the performance of 2-EOP-1
		Directs RCO to stop all four RCPs due to loss of subcooling and irrecoverable loss of CCW, with SIAS on low pressure.

Op-Test No.: 1

Scenario No.: 4

Event No.: 7

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Event Description: Failure of SIAS to actuate

Time	Position	Applicant's Actions or Behavior
	RO	Recognize absence of SIAS signal.
	Critical Task	Manually actuates SIAS signal, verifies equipment start.
	BOP	Performs safety function status checks for 2-EOP-3, LOCA.
		Restore CCW to RCPs or Trips all RCPs within 10 mins. <i>of what?</i>
		Verifies SI flow per 2-EOP-99, Figure 2
	SRO	Directs steps in LOCA EOP-03 (or EOP-15) to isolate LOCA and commence RCS cooldown and depressurization for shutdown cooling entry.
		Directs manual actuation of SIAS.
		Orders verification of SI flow per 2-EOP-99, Figure 2
		Note: SRO and Crew may elect to transition to EOP-15 Functional Recovery with no SIAS and no HPSI pumps available.

*actuation of isolation*

Event Description: 2B HPSI Air Bound Pump

Time	Position	Applicant's Actions or Behavior
	RO	Recognize and report 2B HPSI pump amps swinging, no flow.
		Stop 2B HPSI pump.
	<u>Critical Task</u>	Direct SNPO to check pump locally and direct the venting of the pump to recover SI flow.
	<i>Crew</i>	Starts 2B HPSI to restore flow to the core.
		Manually operate Atmospheric Dump Valves to reduce RCS temperature.
	BOP	Performs SFSCs from EOP-03 (or EOP-15) as directed by US.
	SRO	Directs stopping of 2B HPSI Pump.
		Directs venting to restore the 2B HPSI pump to operable.
		Directs start of vented 2B HPSI to restore flow to the core.
		Note: SRO and Crew may elect to transition to EOP-15 Functional Recovery with no SIAS and no HPSI pumps available.
		<b>This scenario can be terminated when the 2B HPSI pump has been vented and restarted restoring flow to the RCS and an RCS Cooldown is underway.</b>

*2B HPSI  
SIAS  
RCS Cooldown*

## Shift Turnover

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