

Facility: Vermont Yankee Scenario No.: 1 Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_

**Initial Conditions:** Reactor power – 85%, all equipment is operable.

**Turnover:** A reactor downpower is underway, utilizing OP-0105 Phase 5A step 6.b., for a rod pattern exchange. Reactor power is to be reduced to 80% using recirc. Reactor Engineering is to be notified at 80% power and will provide further guidance at that time.

Event No.	Malf. No.	Event Type*	Event Description
1	-	N-SRO R-SRO	Continue power reduction
2	NM05A	I-SRO	APRM fails upscale
3	ED03A	C-SRO R-SRO	Loss of Bus 1 due to bus fault
4	RR01A	M-SRO	Small break LOCA
5	FW08C HP01 RC03	M-SRO C-SRO	Scram, Loss of FW, HPCI failure, RCIC flow controller failure
6	RC01	M-SRO	RCIC trip, RPV-ED on low level

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

**Objectives:** To evaluate the applicants' ability to reduce reactor power in accordance with plant procedures; to respond to an APRM failure with TS implications; to respond to a loss of bus one; to respond to a small break LOCA with a loss of feedwater and HPCI failure controlling water level with RCIC; to implement EOP 1, RPV Control and EOP-3, Containment Control, to RPV-ED following RCIC trip with water level below TAF.

## SIMULATOR OPERATOR INSTRUCTIONS

Simulator Set Up: I.C. No.: 9

Discretionary Distractor Malfunctions/RFs/IOs:

1. Reduce power to 85% using recirc, check recirc lube oil temperatures rfSW\_58
2. Verify Master Recirc controller in operation

No	MF/RF/IO #	Severity	Ramp	REM #	Activation	Description
1	HP01	-	-	PI	-	HPCI Failure
2	NM05A	100	-	1	Following initiation of power reduction	"A" APRM upscale failure
3	ED03A	-	-	2	Following bypass of APRM	Loss of Bus 1 due to bus fault
4	RR01A	0.06	600 s	3	Following exit of buffer and exclusion regions of P-F	Recirc Break
5	FW08C	-	-	4	Immediately following scram	"C" RFP trip
6	RR01A	0.11	120s	4		Recirc Break
7	RC03	0	-	4		RCIC Controller fails downscale
8	RC01	-	-	5	Following DW spray initiation	RCIC trip
9	RR01A	0.6	120s	5		Recirc Break

Additional Instructions:

1. The examination team will determine when each event is to be inserted, and when to FREEZE, and will inform the simulator console operator.
2. When AO is directed to maintain recirc lube oil temperatures, insert rfSW\_58
3. If RE is contacted for additional guidance for downpower, inform control room RE will be available with the rod pattern adjustment.

4. When I&C is contacted to investigate the failed APRM, I&C will initiate troubleshooting efforts. The APRM can be bypassed prior to troubleshooting.
5. When electrical maintenance is contacted to investigate the loss of bus 1, there are indications of a fault on bus 1. Further troubleshooting is required. If requested, bus 6 and 7 cross connect is not recommended. A detailed troubleshooting plan is being developed.
6. When requested to investigate the "C" RFP trip, report an instantaneous overcurrent trip on all three phases on the breaker.
7. When requested to investigate the failure of HPCI to start, report no apparent cause is evident. Further troubleshooting is required.
8. When requested to investigate the failure of the RCIC controller, report no apparent cause is evident. Further troubleshooting is required.
9. When requested to investigate the trip of RCIC, report no apparent cause is evident. Further troubleshooting is required.

## Operator Actions

ES-D-2

Op Test No.:	Scenario No.:	Event No.:	Page 4 of 10
Event Description: Power Reduction			
Time	Position	Applicant's Actions or Behavior	
	SCRO	Brief crew on power reduction	
		Direct continued power reduction IAW OP 0105 Phase 5 Step A.6.b.	
	CRO	Reduce reactor power using recirc at directed rate	
		Direct AOs to monitor recirc lube oil temperatures	
	SCRO	Contact RE at 80% power for additional guidance on power reduction and control rod pattern exchange	

Op Test No.: 1	Scenario No.: 1	Event No.: 2	Page 5 of 10
Event Description: APRM Failure			
Time	Position	Applicant's Actions or Behavior	
	CRO	Recognize and report APRM failure	
		Verifies Alarm Response Procedures (5-M-1), reports to SCRO	
		<ul style="list-style-type: none"> <li>• Verify Tech Spec actions</li> <li>• Contact I&amp;C</li> <li>• If INOP bypass failed APRM</li> </ul>	
		Reports status of other APRM readings and power status	
	SCRO	Verify status of other operable APRMs and their readings	
		Direct CRO/ACRO to contact I&C to investigate	
		Verify Tech Specs (Table 3.1.1-scram and Table 3.2.5-rod block)	
		Log APRM inoperable status in LCO log	
		Direct CRO to bypass failed APRM	
		Direct CRO to reset half scram	
	CRO	Bypass failed APRM	
		Reset half scram and verify half scram reset (standing order tag)	

Op Test No.: 1	Scenario No.: 1	Event No.: 3	Page 6 of 10
Event Description: Loss of Bus 1			
Time	Position	Applicant's Actions or Behavior	
	ACRO	Recognize and report loss of Bus 1	
	SCRO	Enter and direct actions IAW ON 3169, Loss of Bus 1	
		Direct auxiliary oil pump placed in PTL	
		Enter and direct actions in OT3118, Recirc	
		Direct recirc discharge valve RV-53A shut	
		Verify "B" recirc speed <70%	
		Verify power-to-flow status	
		Enter and direct actions in OT 3117,	
		Direct operators to monitor for instabilities	
		Direct rod insertion to exit buffer and exclusion regions	
		Enter and direct actions in ON 3171, Loss of Bus 3	
		Verify "B" D/G status	
	SE	Report entry into exclusion region of power-to-flow map	
		Initiate SOLOMON program to evaluate decay ratios	
		Report exit from buffer and exclusion regions following power reduction	
	CRO	Report RPV water level has recovered on the "C" RFP, "A" and "B" have tripped on loss of power	
		Reports trip of "A" recirc	
		Shuts RV-53A as directed	
		Reports "B" recirc speed	
		Monitors for reactor instability while operating in exclusion region	
		Inserts control rod to exit buffer and exclusion region	
	ACRO	Backup Group III isolation	
		Report power is unavailable to the "A" AOG train	
	SCRO	Direct AOG restored using "B" AOG train	
	ACRO	Restore AOG using "B" AOG train	

Op Test No.: 1	Scenario No.: 1	Event No.: 4	Page 7 of 10
Event Description: Small Break LOCA			
Time	Position	Applicant's Actions or Behavior	
	CRO/ACRO/SE	Recognize and report rising DW pressure	
	SCRO	Enter and direct actions IAW OT 3111, "High Drywell Pressure"	
		Direct power reduction	
		Transfer house loads (bus 2 only)	
		Maximize DW cooling	
		Manual Scram	
		Direct Manual Scram per OT-3100	
	ACRO	Transfer house loads (bus 2 only)	
		Maximize DW cooling	
	CRO	Insert scram	
	SCRO	Enter and direct actions IAW EOP-1	
		Direct verification of Table A initiations and isolations	
		Direct RPV water level control 127-177 using feedwater	
		Direct RPV pressure control 800-1000 psig using TBVs	
		Shift RPV pressure control to SRVs/RCIC (Aux Oil pump unavailable for TBV operation following turbine coastdown)	
		Enter and direct actions IAW EOP-3	
		Direct restart of all available RRUs	
		Direct torus sprays prior to 10 psig torus pressure	
		Spray the DW when torus pressure is greater than 10 psig	
		Verify RRUs off, Recirc secured, Verify DWSIL	
	<b>Crew Critical Task</b>	<p><b>When torus pressure exceeds the suppression chamber spray initiation pressure, initiate drywell containment spray while in the safe region of the drywell spray initiation limit</b></p> <p><b>Standard:</b>  <b>Spray the drywell within 10 minutes of exceeding 10 psig torus pressure and RPV level is not an overriding priority</b></p>	
	CRO	Maintain RPV water level 127-177" using feedwater, perform post scram level control IAW DP-0166	
		Maintain RPV pressure 800-1000 psig using TBVs/SRVs/RCIC	

Op Test No.: 1		Scenario No.: 1	Event No.: 4	Page 8 of 10
Event Description: Small Break LOCA				
Time	Position	Applicant's Actions or Behavior		
	ACRO	Restart DW RRUs		
		Initiate torus sprays		
		Initiate DW sprays		

Op Test No.: 1	Scenario No.: 1	Event No.: 5	Page 9 of 10
Event Description: Loss of High Pressure Injection (HPCI/Feedwater), RCIC controller failure			
Time	Position	Applicant's Actions or Behavior	
	ACRO	Recognize and report the failure of HPCI to automatically initiate on high DW pressure signal	
	CRO	Recognize the loss of FW on "C" RFP trip (A & B RFP powered from Bus 1)	
	SCRO	Direct RPV water level control 127-177 using Table C systems	
		CRD – Maximize flow OP 2111	
		RCIC – OP 2121	
	CRO	Maximize injection using CRD OP 2111	
	ACRO	Inject with RCIC using mini procedure	
		Report RCIC failed to control in automatic control	
	SCRO	Direct ACRO to control RCIC using manual control	
	ACRO	Report RPV water level and trend	
	SCRO	Direct maintenance to investigate the HPCI failure, "C" RFP trip, and RCIC controller failure	

## Operator Actions

ES-D-2

Op Test No.: 1	Scenario No.: 1	Event No.: 6	Page 10 of 10
Event Description: RCIC Trip, RPV-ED			
Time	Position	Applicant's Actions or Behavior	
	ACRO	Recognize and report RCIC trip	
	ACRO/CRO	Report RPV water level and trend	
		Report low-low water level (+82.5")	
		Inhibit ADS as directed	
	SCRO	When RPV water level is < 127" expand RPV water level band to +6 to 177	
		Direct RPV water level control +6 to 177 inches	
		Direct use of alternate systems	
		Maximize CRD flow	
		SBLC injection	
		Direct ADS inhibited	
	CRO/ACRO	Report RPV water level and trend	
		Report RPV water level at TAF (+6")	
	SCRO	Lineup all available systems for injection	
		Verify two systems are available	
		With RPV water level < TAF, Enter EOP-5 RPV-ED	
	<b>Crew Critical Task</b>	<b>With the reactor shutdown and reactor pressure greater than the shutoff head of the low pressure systems, initiate RPV-ED BEFORE RPV level reaches -22 inches</b>	
		<b>Standard:</b>	
		<b>Initiate RPV-ED (begin opening valves) BEFORE RPV level reaches -48 inches.</b>	
		Direct 4 SRV opened	
		Direct RPV water level recovery using low pressure systems to 127-177" band	
	ACRO	Open 4 SRVs	
		Recover RPV water level using low pressure system	
		Report RPV water level and trend	