

Facility: Limerick	Scenario No.: A	Op-Test No.:	_____
Examiners: _____	Operators: _____	_____	_____
Initial Conditions: Unit 1 is at 100% Power, with "1M" SRV leaking. Unit 2 is in OPCON 5 for refueling.			
Turnover: "1M" SRV is leaking. Pilot temperature for the "1M" SRV is 520 deg. F. and stable. RT-6-041-490-1(SUPPRESSION POOL GROSS INPUT LEAK RATE DETERMINATION) actions and monitoring are being performed by other operations and engineering personnel. The crew is directed to place "1A" RHR Loop in Suppression Pool Cooling. RHRSW is in service for the "1A" RHR heat exchanger using the "0A" RHRSW pump per S12.1.A, and the RHR pump and breaker have been verified ready for a start. An Equipment Operator is standing by at the pump. A 90% Reactor Maneuvering Shutdown Instruction has been provided for this shift.			
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (CRS) (PRO)	Place Suppression Pool Cooling in Service
2	MHP451B	I (CRS) (PRO)	HPCI Inadvertent Isolation – Tech Spec
3	MFV046B	I (ALL)	"1B" FW Steam Flow Transmitter Fails Low
4	MFH522A MFH516A	C (ALL)	Loss of Feedwater Heating
4	N/A	R (ALL)	Power Reduction with Rods and Recirc to 85%
5	MAD148B MAD148C	C (ALL)	"1M" SRV fails open and will not close
6	MRP029C MRP407C	M (ALL)	ATWS (Electrical)
6	MSL196D	C (CRS) (PRO)	SLC Failure prevents SLC Injection

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

Op-Test No. \_\_\_\_\_

Scenario No.   A  Event No.:   1  

Event Description: Place "1A" RHR loop in suppression pool cooling

Time	Position	Applicant's Actions or Behavior
	CRS	Direct the PRO to place the "1A" RHR loop in suppression pool cooling per S51.8.A
	PRO	Start "1A" RHR pump
	PRO	Establish 8000 to 8500 gpm flow through HV51-1F024A

Op-Test No. _____	Scenario No. <u>  A  </u>	Event No.: <u>  2  </u>
Event Description: HPCI Inadvertent Isolation		
Time	Position	Applicant's Actions or Behavior
	PRO	Recognize HPCI isolation
	PRO	Reference ARC for HPCI OUT OF SERVICE alarm, and inform CRS to reference Technical Specification 3.5.1.
	CREW	Recognize no actual HPCI isolation signals exist
	RO/PRO	Request WWM / I&C / Floor Supervisor investigate inadvertent HPCI isolation
	CRS	Determine HPCI inoperable, and Unit 1 is in a 14 day action statement per T.S. 3.5.1 action C.1.

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Scenario No.   A  Event No.:   3  

Event Description: "1B" FWLC Steam Flow Transmitter Fails Low

Time	Position	Applicant's Actions or Behavior
	RO	Recognize lowering RPV level
	PRO	Reduce power using recirc per OT-100 immediate operator actions
	CRS	Enter OT-100, Reactor Low Level
	RO	Recognize "1B" FWLC Steam Flow Transmitter failed downscale
	RO	Reference ARC for alarm H-2 on 107 REACTOR (REACTOR HI/LO LEVEL)
	CRS	Direct RO swap FWLC to single element per S06.0.E
	RO	Swap FWLC to single element per S06.0.E

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Scenario No.   A  Event No.:   4  

Event Description: High FW Heater Level, LP FW Heater String Isolation

Time	Position	Applicant's Actions or Behavior
	RO/PRO	Reference ARCs for high level alarms for "2A" and "3A" FW heaters
	RO/PRO	Recognize "2A" FW heater drain and dump valves are both closed
	PRO	Request Equipment Operator check FW heater levels locally
	RO/PRO	Reference ARC for "FW HTRS 1&2 HI-HI LEVEL LP HTR STRING ISOLATION" alarm
	RO/PRO	Recognize isolation of "A" LP FW heater string
	RO	Recognize power increase due to loss of feedwater heating
	PRO	Reduce reactor recirculation flow to reduce power below initial pre-transient power level per OT-104 immediate operator actions
	CRS	Enter OT-104, UNEXPECTED/UNEXPLAINED POSITIVE OR NEGATIVE REACTIVITY ADDITION.
	CRS	Direct power reduction to 85% or below
	PRO	Reduce power using recirc flow to 90% power
	RO	Reduce power using control rods to 85% power or less

Op-Test No. \_\_\_\_\_

Scenario No.   A  Event No.:   5  

Event Description: "1M" SRV Fails Open

Time	Position	Applicant's Actions or Behavior
	RO/PRO	Recognize "1M" SRV open
	RO/PRO	Reference ARC for "SAFETY RELIEF VALVE OPEN" alarm
	CRS	Enter OT-114, INADVERTENT OPENING OF A RELIEF VALVE
	PRO	Place the "1B" loop of suppression pool cooling in service
	CRS	Direct the RO to reduce turbine inlet pressure to 900 psig
	RO	Reduce turbine inlet pressure to 900 psig
	CRS	Direct pulling of fuses for "1M" SRV per OT-114
	CRS	Recognize "1M" SRV still open after turbine inlet pressure reduced to 900 psig
	CRS	Direct rapid plant shutdown per GP-4, RAPID PLANT SHUTDOWN TO HOT SHUTDOWN
	PRO	Transfer house loads to startup buses per S91.6.B
	PRO	Runback both reactor recirc pumps to minimum speed
	RO	Manually scram the reactor at 50% core flow

Op-Test No. \_\_\_\_\_

Scenario No.   A  Event No.:   6  

Event Description: ATWS (Scram Failure)

Time	Position	Applicant's Actions or Behavior
	RO	Recognize no control rod motion, and report to the CRS
	CRS	Enter T-101, RPV CONTROL due to scram condition with power above 4%
	RO	Place reactor mode switch in "SHUTDOWN"
	RO	Insert SRMs/IRMs
	CRS	Direct RRCS initiation
	RO	Manually initiate RRCS
	CRS	Direct trip of both recirc pumps
	PRO	Trip both recirc pumps
	CRS	Direct the RO to manually insert control rods
	RO	Insert control rods manually
	CRS	Direct performance of T-214, ARI Initiation from AER
	CRS	Direct performance of T-215, Scram Fuse Removal
CT	CRS	Direct performance of T-216, Vent Scram Air Header
	PRO	Recognize SLC is not injecting to the RPV
	CRS	Direct performance of T-212 to inject SLC
	CRS	Enter T-117, LEVEL/POWER CONTROL
	CRS	Direct auto ADS inhibited
	PRO	Inhibit auto ADS
	CRS	Direct performance of T-221 to maintain MSIVs open
	CRS	Direct performance of T-270 to terminate and prevent injection to reduce RPV level to below -50 inches
	PRO	Perform T-270 to terminate and prevent HPCI, RHR, and Core Spray injection
	RO	Perform T-270 to terminate and prevent condensate/feedwater injection
	CRS	Provide direction to the RO to reinject as necessary to maintain RPV level in a band that is above -129 and at or below -50 inches

Op-Test No. \_\_\_\_\_

Scenario No.   A  Event No.:   6  

Event Description: ATWS (Scram Failure)

Time	Position	Applicant's Actions or Behavior
	RO	Reinject with condensate/feedwater to maintain RPV level in band as directed by CRS
	PRO	Recognize suppression pool temperature at or above 110 deg. F.
	CRS	Direct performance of T-270 to terminate and prevent injection
CT	PRO/RO	Perform T-270 to terminate and prevent HPCI, RHR, Core Spray injection (PRO) and Condensate/Feedwater (RO)
	CRS	Direct RO to reinject when RPV level is below -161, or SRV is closed and DW pressure is <1.68 psig, or power is <4%, or SP temperature is less than 110 deg F.
CT	RO	Reinject with condensate/feedwater to maintain RPV level in band as directed by the CRS
	CREW	Recognize "1M" SRV is closed
	RO	Recognize control rods inserted following performance of T-216
	CRS	Exit T-117, LEVEL/POWER CONTROL
	CRS	Re-enter T-101, RPV CONTROL, RC/L leg
	CRS	Give RO a level band above the top of active fuel (>-161 inches)
	RO	Restore RPV level above -161 inches

**Termination Point:**

The scenario will be terminated when the following criteria are met:

1. All control rods are fully inserted
2. RPV level is being maintained above the top of active fuel

Facility: Limerick      Scenario No.: B      Op-Test No.: \_\_\_\_\_

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

Initial Conditions: Unit 1 is at 90% power, with N2 makeup in progress to the Unit 1 drywell. Unit 2 is in OPCON 5 for refueling.

Turnover: Secure from drywell N2 makeup. After N2 makeup is secured, raise power to 100% per GP-5, Attachment 1. An 85% Reactor Maneuvering Shutdown Instruction has been provided for this shift.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (CRS) (PRO)	Secure from N2 Makeup
2	MFLCPR = 1.003	C (CRS) (RO)	Power Ascension / Thermal Limit Violation – Tech Spec
2	N/A	R (ALL)	Power Reduction to correct thermal limit violation
3	MCW483C	I (CRS) (PRO)	"1A" RECW pump trips, "1B" RECW fails to start
4	MRR433A MRR434A	C (ALL)	Both "1A" RRP Seals Fail
4	HS43-F031A	C (CRS) (PRO)	"1A" RRP Discharge Valve Fails Open
5	MRR440A	M (ALL)	Reactor Coolant Leak
5	MRH528C	C (CRS) (PRO)	"1A" Drywell Spray Valve Fails to Open
5	MRH171B	I (CRS) (PRO)	"1B" RHR Pump Fails to Start

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

Op-Test No. \_\_\_\_\_

Scenario No.  B Event No.:  1 

Event Description: Secure N2 makeup flow to the drywell

Time	Position	Applicant's Actions or Behavior
	CRS	Direct the PRO to secure N2 flow per S57.3.B
	PRO	Secure N2 flow per S57.3.B
	PRO	Request an Equipment Operator to open 57-1088 valve locally

Op-Test No. \_\_\_\_\_

Scenario No.   B  Event No.:   2  

Event Description: Power increase, Thermal Limit violation

Time	Position	Applicant's Actions or Behavior
	CRS	Direct PRO to increase power using recirc flow per GP-5, Attachment 1
	CRS	Direct RO/PRO to generate a P-1 edit
	RO/PRO	Recognize MFLCPR is greater than 1.000, and MCPR is less than the limit (1.350) and notify CRS
	CRS	Enter GP-14, Resolution of Thermal Limit Violations
	CRS	Notify Reactor Engineering of thermal limit violation
	CRS	Reference Tech Spec 3.2.3 for MCPR limit, recognize corrective action must be initiated within 15 minutes, and MCPR must be restored to greater than the MCPR limit within 2 hours.
	CRS	Within 15 minutes direct power reduction until all thermal limits are less than 1.000
	PRO	Reduce power with recirc. per RMSI to 85% power
	RO	Reduce power with control rods per RMSI until MFLCPR is less than 1.000

Op-Test No. \_\_\_\_\_

Scenario No.  B Event No.:  3 

Event Description: "1A" RECW pump trip and "1B" RECW pump fails to auto start

Time	Position	Applicant's Actions or Behavior
	PRO	Recognize trip of "1A" RECW pump and failure of "1B" pump to start
	PRO	Reference ARC for annunciator 118 SERVICES, window H-1
	CRS	Enter ON-113, Loss of RECW
	RO	Request EO/Floor supervisor investigate the trip of the "1A" RECW pump and the failure of the "1B" RECW pump to auto start
	PRO	Reference ARCs for 111 RECIRC window A-3, 112 CLEANUP window A-3, and 111 RECIRC window G-3
	CRS	Direct the Equipment Operator to attempt to start the "1B" RECW pump from the breaker
	PRO	Recognize "1B" RECW pump is running

Op-Test No. \_\_\_\_\_

Scenario No.   B  Event No.:   4  

Event Description: Failure of both seals on "1A" Reactor Recirculation pump/Reactor Coolant System Leak

Time	Position	Applicant's Actions or Behavior
	RO/PRO	Reference ARCs for 111 RECIRC window A-1
	RO/PRO	Recognize failure of the #1 seal on the "1A" RRP, and notify CRS
	RO/PRO	Reference ARC for 111 RECIRC window A-2
	RO/PRO	Recognize failure of the #2 seal on the "1A" RRP, and notify CRS
	RO	Recognize drywell pressure is rising
	CRS	Enter OT-101, High Drywell Pressure
	CRS	Direct PRO to maximize drywell cooling
	PRO	Ensure drywell cooling is maximized
	CRS	Direct PRO to perform section 3.4 of OT-101
	PRO	Trip "1A" RRP
	PRO	Close "1A" RRP discharge, seal purge, and suction valves
	PRO	Recognize "1A" RRP discharge valve has failed to close
	RO/PRO	Request EO/Floor Supervisor investigate failure of "1A" RRP discharge valve

Op-Test No. \_\_\_\_\_

Scenario No.   B  Event No.:   5  

Event Description: Failure of both seals on "1A" Reactor Recirculation pump/Reactor Coolant System Leak

	CRS	Before drywell pressure reaches 1.68 psig, order rapid plant shutdown per GP-4, Rapid Plant Shutdown to Hot Shutdown
	PRO	Transfer house loads to startup buses per S91.6.B
	PRO	Runback "1B" recirc pump to minimum speed
	RO	Manually scram the reactor at 50% core flow
	CRS	Enter T-101, RPV CONTROL, on low RPV level
	RO	Report all control rods fully inserted
	RO	Place reactor mode switch in SHUTDOWN
	RO	Insert SRMs/IRMs
	CRS	Direct trip of the main turbine
	PRO	Trip the main turbine
	CRS	Direct the RO to maintain RPV level 12.5 to 54 inches using feedwater
	RO	Align feedwater for startup level control per S06.1.D, POST SCRAM LEVEL CONTROL, and maintain 12.5 to 54 inches
	CREW	Recognize drywell pressure greater than 1.68 psig
	CRS	Enter T-102, PRIMARY CONTAINMENT CONTROL, and re-enter T-101
	PRO	Recognize HPCI start and notify CRS
	CRS	Direct PRO to minimize HPCI injection
	PRO	Place HPCI controller to MANUAL, and reduce HPCI speed to terminate HPCI injection
	CRS	Direct PRO place one loop of suppression pool spray in service
	PRO	Place one loop of RHR in suppression pool spray per T-225, STARTUP AND SHUTDOWN OF SUPPRESSION POOL AND DRYWELL SPRAY OPERATION
	CRS	When drywell temperature is above 145 deg. F., direct the PRO to maximize drywell cooling, bypassing isolations per GP-8 as necessary

Op-Test No. \_\_\_\_\_

Scenario No.  B Event No.:  5 

Event Description: Failure of both seals on "1A" Reactor Recirculation pump/Reactor Coolant System Leak

	CRS	Evaluate Drywell Spray Initiation Limit Curve on T-102
	CRS	Evaluate Pressure Suppression Pressure Limit Curve on T-102
CT	CRS	When plant conditions cannot be maintained on the safe side of the Pressure Suppression Pressure Curve, then enter T-112, EMERGENCY BLOWDOWN
	CRS	Direct 5 ADS/SRVs opened
	PRO	Open 5 ADS/SRVs
	CREW	Recognize LOCA signal imminent
	CREW	Perform SE-10, LOCA following LOCA signal
	PRO	Control ECCS injection to prevent flooding Main Steam Lines (maintain RPV level below +118 inches)
	CRS	Direct H2/O2 analyzers bypassed and restored per GP-8.5
	PRO	Bypass and restore H2/O2 analyzers per GP-8.5
	CRS	Recognize conditions on SAFE side of Drywell Spray Initiation Limit Curve
	CRS	Direct drywell sprays per T-225
	PRO	Recognize HV51-1F021A valve will not open
	RO/PRO	Request EO/Floor Supervisor investigate failure of HV51-1F021A
	PRO	Recognize "1B" RHR pump will not start
	RO/PRO	Request EO/Floor Supervisor investigate failure of the "1B" RHR pump to start
	CRS	Direct drywell spray using RHRSW or Fire Water
CT	PRO/RO	Spray drywell per T-225 using RHRSW or Fire Water

**Termination Point:**

The scenario will be terminated when the following criteria are met:

1. Drywell spray has been initiated with RHRSW or Fire Water per T-225