Facility: **PALISADES** Scenario No.: **TWO** Op-Test No.: **1**

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: 25% power.

Turnover: The plant is at approximately 25% power. The Turbine Drain Valves are closed per SOP-8. A Chemistry hold has just been lifted with S/G chemistry within specifications. GCL-5.1, Power Escalation in Mode 1, has been completed through Step 2.12f. Shift orders are to place DEH Speed Loop to OUT and commence a power escalation to full power at 8%/hour.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	BOP (N)	Place DEH Speed Loop to OUT
2	N/A	SRO (N) RO (R) BOP (N)	Power escalation
3	RP11D	SRO (I) BOP (I)	Power Range NI-08 fails
4	SW04B	SRO (C) RO (C)	P-7B, Service Water Pump, trips, STANDBY SW pump does not start
5	RC03	SRO (C) RO (C) BOP (C)	PSC leak ramps to 50 gpm (requires a plant trip)
6	FW06B	BOP(I)	CV-0703, 'B' S/G FRV fails to close
7	SG01B	ALL (M)	Steam Generator Tube Rupture on 'B' S/G (initiates at time of trip)

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

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **1** Page 1 of 1

Event Description: ***Place DEH Speed Loop to Out***

Time	Position	Applicant's Actions or Behavior
	BOP	Change status of Speed Feedback Loop: ▪ ENSURE DEH is in 'HOLD' ▪ PRESS Feedback Loops on Display keypad ▪ MOVE cursor to 'SPEED' feedback loop field ▪ PRESS 'SELECT' on numeric keypad ▪ PRESS 'STOP/START' on Control Keypad Speed Feedback Loop on DEH should indicate 'OUT'

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **2** Page 1 of 1

Event Description: ***Raise Power Following a Chemistry Hold at 25% Power***

Time	Position	Applicant's Actions or Behavior
	BOP	Operates turbine generator on the DEH panel for power escalation @ 8% per hour: May 'Set Limiter": ▪ DEPRESS Set Limiter to access Set Limiter Screen ▪ PRESSES SELECT ▪ PRESS LIMIT RAISE on the keypad ▪ ENTERS setter value ▪ SELECTS rate of 8% per hour ▪ PUSHES "GO " pushbutton and observes white light illuminate ▪ Informs CRS/RO that turbine is in "GO"
	RO	Performs periodic dilutions and/or control rod manipulations to maintain T_{AVE} within 3°F of T_{REF} For Dilution: ▪ SET quantity and batch flow limit on FIC-0210A, PMW flow controller ▪ OPEN CV-2155, Make Up Stop Valve ▪ PUSH start pushbutton on FIC-0210A ▪ VERIFIES FIC-0210A output signal at zero when dilution complete ▪ CLOSES CV-2155 ▪ MONITORS reactor power and T_{AVE} For Control Rod manipulations: ▪ WITHDRAWS Group 4 Regulating Rods in increments specified by CRS ▪ MONITORS reactor power and T_{AVE}
	RO	May divert CVCS letdown to Clean Waste as VCT level rises: ▪ PLACES CV-2056, Letdown to VCT or Radwaste, in the "TO CLEAN WASTE RCVR TANKS" position ▪ When desired VCT level is achieved, PLACES CV-2056 to the "AUTO" or "TO VOL CNTRL TANK" position (then "AUTO")

After power has been raised 1%-2% *OR* at the discretion of the Lead Examiner, INSERT TRIGGER #1.

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **3** Page 1 of 2

Event Description: ***Power Range NI-08 Fails***

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose failure of Power Range NI-08: Indications: NI-08 Lower and Upper power meters read 0%; HI voltage meter reads 0 volts; Rod Drop tell-tale light illuminated Major Alarms: EK-0948, Dropped Rod; EK-06 Rack C Window 3, Channel Deviation Level 1 5%; EK-06 Rack C Window 4, Channel Deviation Level 2 10%; EK-06 Rack C Window 7, Dropped Rod; EK-06 Rack C Window 8, NI Channel Trouble; EK-06 Rack D Window 4, Nuclear ΔT Power Deviation
	BOP	May go to 'HOLD' on the turbine
	BOP	Performs Operator Actions of EK-06 Rack 'C' Windows 3 and 4; If Reactor Power less than 25%: ▪ CHECK Rod positions normal Follow Up Actions: ▪ REMOVE faulty Power Range Nuclear Instrument from service per SOP-35
	BOP	Performs Operator Actions of EK-06 Rack 'C' Windows 8: ▪ CHECK detector voltage for NI-08 greater than 650 VDC Follow Up Actions: ▪ NI detector voltage less than 650 VDC, REMOVE from service per SOP-35
	SRO	▪ May reference or enter ONP-5.1, Dropped Rod. ONP-5.1 does not apply ▪ Directs removal of NI-08 from service ▪ declares Channel 'D' Flux-Delta T Comparator and ASI alarm function of TMM 'D' Channel inoperable ▪ Directs monitoring and logging the "Power Density" status of the remaining operable TMMs hourly ▪ Calls Reactor Engineer to assist in Quadrant Power Tilt and Linear Heat Rate with an NI out of service using Incore Detectors

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **3** Page 2 of 2

Event Description: ***Power Range NI-08 Fails***

Time	Position	Applicant's Actions or Behavior
	BOP	Removes NI-08 from service per SOP-35, Section 7.2.2: For 'D' Channel RPS, Place in BYPASS the following the following Trip Units per SOP-36: Variable High Power Key # 289 High Power Rate Key # 290 TM/LP Key # 297 Loss of Load Key # 298 ▪ **INSERT** bypass key above affected RPS Trip Unit ▪ **TURN** key 90° clockwise ▪ **VERIFY** the yellow light above the bypass keyswitch is ON
	BOP	May RESET Rod Drop 'Telltale" and alarm on Panel C-06: PUSHES Rod Drop "Telltale" pushbutton
	BOP	May check the "Power Density" status (OK) of the remaining operable TMMs (not in tripped)
	SRO	The following T.S. LCOs apply: (THESE ARE MOST IMPORTANT) ▪ 3.3.1, Action: A.1, VHP and TM/LP, 7 days ▪ 3.3.1, Action: B.1, High SUR, Prior to entering MODE 2 from MODE 3 ▪ 3.3.1, Action: C.1, Loss of Load, Prior to increasing power ≥ 17% from MODE 3 (THESE ARE OF LESSOR IMPORTANTANCE) The following ORM, Operating Requirements Manual, items apply: ▪ 3.17.6, Item: 12.1, Flux-Delta T Comparator, Prior to next MODE 1 entry from MODE 2 ▪ 3.17.6, Item: 15, Excore deviation alarm, Once per 12 hours ▪ 3.17.6, Item: 16, ASI alarm, Prior to next MODE 4 entry from MODE 5 ▪ ORM 3.11.2, Excores unable to monitor Linear Heat Rate

After BOP bypasses RPS trip units on 'D' Channel RPS *OR* CRS has briefed loss of NI-08 *OR* at the discretion of the Lead Examiner, INSERT TRIGGER #2.

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **4** Page 1 of 1

Event Description: ***P-7B, Service Water Pump, trips (Standby pps do not start)***

Time	Position	Applicant's Actions or Behavior
	RO	Diagnose failure of P-7B: Indications: P-7B tripped (green light for pump breaker); P-7B amps read 0 amps; SW Critical header pressures read approximately 32# Major Alarms: EK-1137, Service Water Pump P-7B Overload/Trip; EK-1163, Critical Serv Water Header "B" LO Pressure; EK-1164, Critical Serv Water Header "A" LO Pressure; EK-1165, Non-Critical Serv Water LO Press; EK-0551, Diesel Gen No 1-1 Trouble; EK-0557, Diesel Gen No 1-2 Trouble
	SRO	Enters ONP-6.1, Loss of Service Water Directs start of available SW Pump, P-7C
	RO	STARTS P-7C
	RO	No Operator actions for alarms EK-1137, EK-1163, EK-1164, EK-1165 (refer to ONP-6.1)
	BOP	Performs Operator Actions of EK-0551 and EK-0557 ▪ Directs AO to CLEAR D/G alarms locally (due to low Raw Water Pressure)
Simulator Operator – When contacted by Control Room to clear local D/G alarms (low raw water pressure), INSERT ED27 (PIDED08), D/G 1-1 Trouble alarm, value = 0, and INSERT ED28 (PID ED08), D/G 1-2 Trouble alarm, value = 0.		
	SRO/BOP	May direct AO to check pump and breaker
Simulator Operator – When contacted by Control Room as AO to check pump and/or breaker status, wait 5 minutes and REPORT: the pump is hot to the touch and the breaker is tripped, time over current relay.		
	SRO	Exits ONP-6.1
	SRO	The following T.S. LCO applies: ▪ 3.7.8, Action: A.1, SW train (P-7B), 72 hours
After CRS has briefed loss of P-7B *OR* at the discretion of the Lead Examiner, INSERT TRIGGER #4.		

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **5** Page 1 of 1

Event Description: ***PCS Leak requiring a Plant trip***

Time	Position	Applicant's Actions or Behavior
	RO/BOP/SRO	Diagnose PCS leak: Indications from PPC: Containment Sump level rising; Containment Sump fill rate rising; Charging line flow rising; P-55B Charging Pump Start (may occur) Major alarms: EK-0734, Charging PP Seal Cooling LO Press (may occur)
	SRO	Enters ONP-23.1, Primary Coolant Leak: ▪ Directs actions of ONP-23.1 ▪ Reviews reactor trip criteria
	SRO	Directs PCS Leak Rate calculation by ONP-23.1 or DWO-1
	RO/BOP	PERFORMS PCS Leak Rate calculation
	SRO	May direct closing: ▪ CV-1064 and CV-1065, CWRT Vent Valves ▪ CV-1910 and CV-1911, PCS Sample Valves
	SRO	Directs reactor trip (unidentified PCS leakage > 10 gpm) (CRITICAL TASK PL-343 223 05 01)
	SRO	The following T.S. LCO applies: ▪ 3.4.13, Action: A.1, PCS leakage > 1 gpm unidentified, 4 hours
SRO: Emergency Classification Level: Unusual Event, SU5.1, Unidentified PCS Leakage > 10 gpm		
	RO	PUSHES reactor trip pushbutton on Panel C-02

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 1 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	BOP	Informs SRO that Main Feeds Pumps are being tripped due to stuck open FRV, CV-0703 for 'B' S/G, CONTINGENCY ACTION: ▪ Main FRV and B/Ps CLOSED, except for CV-0703 ▪ PUSHES trip pushbutton for running MFW Pump (CRITICAL TASK PL-000 007 05 01)
	SRO	EOP-1.0 verbal verifications
	RO	Reactivity Control: **YES** ▪ Reactor power lowering ▪ negative SUR ▪ maximum of one control rod not inserted
	BOP	Main Turbine Generator criteria: **YES** ▪ Main Turbine tripped ▪ Generator disconnected from grid
	BOP	Feedwater criteria: **NO**: ▪ PLACES Main FWP Controllers to 'MANUAL' RAMPS to minimum speed ▪ CV-0703 could not be closed, ALL Main Feed Pumps TRIPPED
	BOP	Vital Auxiliaries-Electric: **YES** ▪ Buses 1C and 1D energized ▪ Bus 1E energized ▪ Y-01 energized ▪ Six DC Buses energized ▪ 3 of 4 Preferred AC Buses energized
	RO	PSC Inventory Control: **YES** ▪ PZR level 20% - 80% ▪ PZR level trending 42% - 57% ▪ PCS 25°F subcooled

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 2 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	RO	PCS Pressure Control: **YES** ▪ PZR pressure 1650 – 2185 psia ▪ PZR pressure trending toward 2010 – 2100 psia
	RO	Core Heat Removal: **YES** ▪ at least one PCP operating ▪ Verify Loop ΔT less than 10°F ▪ Verify PCS at least 25°F subcooled
	BOP	PCS Heat Removal: **YES** ▪ Verify at least one S/G has; level 5% - 70%; Feedwater available ▪ Verify T_{AVE} 525°F - 540°F ▪ Verify BOTH S/G pressures 800 psia – 970 psia
	RO	Containment Isolation: **YES** ▪ Verify Containment pressure < 0.85 psig
	BOP	Containment Isolation: **YES** ▪ Verify Containment Area Monitor alarms clear ▪ Verify Condenser Off Gas Monitor alarm clear ▪ Verify Main Steam Line Monitor alarms clear This may be a **NO** answer for Condenser Off Gas and Main Steam Line Monitor depending upon the amount of time required to get this far in procedure
	RO	Containment Atmosphere: **YES** ▪ Verify Containment temperature < 125°F ▪ Verify Containment Pressure < 0.85 psig
	RO	Vital Auxiliaries – Water: **YES** ▪ Verify at least two SW Pumps operating ▪ Verify BOTH Critical SW Headers in operation with pressure > 42 psig ▪ Verify at least one CCW Pump operating

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 3 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	RO	Vital Auxiliaries – Air: **YES** ▪ Instrument Air Pressure > 85 psig
	BOP	PLACES left train CRHVAC in emergency mode: ▪ STARTS V-26A Air Filter Unit Fan ▪ ENSURES OFF: V-94, Purge Fan; V-47, Switchgear Exhaust Fan
	BOP	Verify BOTH of the following: **YES** ▪ At least one Condensate Pump operating ▪ At least one Cooling Tower Pump operating
	SRO	▪ Performs Event Diagnostic Flow Chart per EOP-1.0, Attachment 1: (IF CONDENSER OFF GAS MONITOR IS IN ALARM, MAY GO TO EOP-9) ▪ Diagnoses EOP-4.0, Loss of Coolant Accident Recovery ▪ Performs EOP-4.0 strategy brief ▪ Establishes PCS pressure and temperature bands with RO ▪ Directs SE to perform Safety Function Status checks for EOP-4.0
	SRO	May direct Chemistry to sample S/Gs for lithium
	SRO	May direct closing CV-2001 and CV-2009 Letdown Isolation Valves
	RO	CLOSES CV-2001 and CV-2009
	SRO	May direct closing CV-1910 and CV-1911, PCS Sample Vales
	BOP	CLOSES CV-1910 and CV-1911

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 4 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Diagnoses change in PCS parameters, 'B' SGTR ▪ PZR pressure lowering ▪ Second and Third Charging Pumps operating due to lowering PZR level ▪ Condenser Off Gas Monitor counts rising with eventual high alarm ▪ 'B' S/G level rising, 'A' S/G level lowering ▪ Plant Stack Gas Monitor counts rising
	SRO	▪ Re-performs Event Diagnostic Flow Chart per EOP-1.0, Attachment 1 ▪ Diagnoses EOP-9.0, Functional Recovery Procedure
	SRO	May direct Emergency Boration
	RO/BOP	PERFORMS Emergency Boration per SOP-2A, Attachment 14, Emergency Manual Boration: ▪ START P-56A or P-56B, BA Pump ▪OPEN MO-2140, BA Pump Feed Isolation **AND/OR** ▪ OPEN BA Gravity Feed Valves: MO-2169 and MO-2170 ▪ CLOSE MO-2087, VCT Outlet Valve ▪ ENSURE CLOSED MO-2160, SIRW Tank to Charging Pumps Isolation
	SRO	May direct starting Auxiliary Feedwater
	SRO	May direct AFW isolation to 'B' S/G based on EOP-1 criteria
	RO	Isolates AFW to 'B' S/G: ▪ SELECTS 'MANUAL' on FIC-0727, P-8A/B flow to S/G 'B' ▪ SELECTS 'MANUAL' on FIC-0736A, P-8C flow to S/G 'B' ▪ Ensuring/raising flow output to 100% on each controller ('RED' signal indicator to the full right position)

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 5 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	SRO	Directs closing CV-1064 and CV-1065, CWRT vent valves
	BOP	CLOSES CV-1064 and CV-1065
	SRO	Directs performance of EOP Supplement 5, Checklist for Safeguards Equipment Following SIAS
	BOP	Completes EOP Supplement 5
	SRO	Directs placing a Hydrogen Monitor in service
	BOP	Places left train H_2 monitor in service on back of Panel C-11A: ▪ PLACES HS-2417 to OPEN and RELEASES ▪ PLACES HS-2413A, HS-2413B, HS-2415A, and HS-2415B, to OPEN ▪ Energizes H_2 Recorder, AR-2401, by: PLACING to 'ON' Power Switch and PLACES to 'ON Chart Drive Switch ▪ PLACES HS-2427L to "ANALIZE' position
	SRO	Determines success paths for each safety function: **<u>WITH NO SIAS</u>** ▪ Reactivity: RC-1 OR RC-2 (If Emergency Boration in progress) ▪ Maintenance of Vital Auxiliaries-Electric: DC-1, AC-1 ▪ PCS Inventory: IC-1 ▪ PCS Pressure: PC-1 ▪ PCS/Core Heat Removal: HR-1 ▪ Containment Isolation: CI-1 ▪ Containment Atmosphere: CA-1 ▪ Maintenance of Vital Auxiliaries-Air: MVAW-1, MVAA-1 Determines Containment Isolation (CI-1) is jeopardized due to SGTR not isolated

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 6 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	SRO	Determines success paths for each safety function: **WITH SIAS** ▪ Reactivity: RC-3 ▪ Maintenance of Vital Auxiliaries-Electric: DC-1, AC-1 ▪ PCS Inventory: IC-2 ▪ PCS Pressure: PC-3 ▪ PCS/Core Heat Removal: HR-2 ▪ Containment Isolation: CI-1 ▪ Containment Atmosphere: CA-1 ▪ Maintenance of Vital Auxiliaries-Air: MVAW-1, MVAA-1 Determines Containment Isolation (CI-1) is jeopardized due to SGTR not isolated
	SRO	Directs cooldown of PCS to < 524°F T_{HOT}
	RO	Begins PCS cooldown of PCS using the Turbine Bypass Valve: ▪ PIC-0511, CV-0511 Turbine Bypass Valve Controller, PLACED in 'MANAUAL' ▪ Manual Signal Lever used to OPEN CV-0511 for PCS cooldown
	SRO	Directs PCS depressurization per HR-2
	RO	Begins PCS de-pressurization using PIC-0101B, PCS Pressure Controller: ▪ MANUAL pushbutton PUSHED ▪ Manual Signal Lever used to OPEN CV-1057 and CV-1059 PZR Spray Valves

Op-Test No.: **1** Scenario No.: **TWO** Event No.: **6/7** Page 7 of 7

Event Description: ***CV-0703 'B' S/G FRV fails to close/'B' S/G tube rupture***

Time	Position	Applicant's Actions or Behavior
	RO	SECURES 'A' and 'D' PCPs at 1300 psia
	SRO	Directs isolation on 'B' S/G per EOP Supplement 13, 'B' S/G SGTR Isolation Checklist
	BOP	Isolates 'B' S/G per Supplement 13: Isolation from inside the Control Room: ▪ ENSURE OPEN MO-0510, 'A' S/G MSIV Bypass Valve ▪ CLOSE CV-0703, 'B' S/G Main Feed Reg Valve (valve stuck partially open) ▪ CLOSE CV-0744, 'B' S/G Main Feed Block Valve ▪ CLOSE S/G E-50B Blowdown Valves: CV-0768, CV-0770, and CV-0738 (CRITICAL TASK PL-000 216 05 01)
Simulator Operator: When instructed by BOP to isolate 'B' S/G outside the Control Room per Supplement 13, *INSERT TRIGGER #* 8, isolating air and manual isolation valves to CV-0779 and CV-0780, 'B' S/G Atmospheric Steam Dump Valves.		
SRO: Emergency Classification Level: After the PCS leak reaches 10 gpm before the reactor trip, the conditions are met for SU5.1, PCS leakage greater than 10 gpm. After the trip, the classification will change to an Alert, FA1, Loss or Potential Loss of PCS Barrier (SG Tube Rupture that results in SIAS)		
TERMINATE Scenario when 'B' S/G has been isolated per EOP Supplement 13 *OR* at the discretion of the Lead Examiner.		