

Facility: **PALISADES** Scenario No.: **ONE** Op-Test No.: **___1___**
 Examiners: _____ Operators: _____

Initial Conditions: 87% power. P-66B HPSI Pp. is out of service for seal cooler inspection.

Turnover: Turbine Valve Testing was completed successfully. Shift orders are to reduce Main Generator VAR loading to 50 megavars OUT, and then commence a power ascension to full power at 2% per hour.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	SRO (N) BOP (N)	Adjust MVAR loading on Main Generator.
2	N/A	SRO (R) RO (R) BOP (N)	Commence power escalation at 2% per hour.
3	CV06	SRO (I) RO (I)	Letdown pressure control fails LOW.
4	RX14A	SRO (I) BOP (I)	FT-0701 (Main Feed flow) fails higher than current value. 'A' S/G level lowers.
5	N/A	SRO (C)	Low lube oil temperature on EDG 1-1.
6	MS06B	ALL (C)	Main Steam Code Safety partial lifting. Requires de-rate; severity is then raise to require plant trip.
7	RP19/20	RO (I) BOP (I)	Reactor fails to auto trip. Will not manually trip from C-02 or C-06. Requires operation of CRD clutch toggle switches.
8	RC04	ALL (M)	LOCA (350 gpm) inside containment (initiates at time of trip).
9	SI09A	RO (C)	P-66A HPSI Pump fails to auto start.

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

Scenario 1 - Simulator Operator Instructions

- Reset to IC-16 (or similar) 87% power MOL IC.
- P-66B is OOS for seal cooler inspection. (Place caution tag on hand switch).
 - Insert REM SI24 (PIDSI02) to RACKOUT
 - Insert OR P-66B-W to OFF
 - Insert OR P-66B-G to OFF
- INSERT MF RP19 (PIDRPNI3) Reactor fails to auto trip.
- INSERT MF RP20 (PIDRPNI3) Reactor fails to manual trip.
- INSERT SI09A (PIDSI02) P-66A fails to auto start.
- ADJUST PCS Activity on PPC to 2.85 E-1 μ ci/ml.
- RAISE Main Generator MVARs to ~120 MVARs OUT using AC Adjuster switch 390 AC/CS.

Remote	Type	Instructions
1	MF	CV06 (PIDCV03) Loss of Letdown Press. Control LOW NOTE: DO NOT ENTER WHILE DILUTION IS IN PROGRESS
2	MF	RX14A (PIDRX02) Severity = 90%. FT-0701 fails (feed flow).
3	MF	MS06B (PIDMS01) Severity = 100, no ramp. Code Safety RV-0711 leak.
4	MF	MS15B (PIDMS01) Severity = 3, no ramp. Code Safety going full open.
N/A	MF	RC04 (PIDRC01) Severity = 35, ramp = 5 minutes. 350 gpm LOCA setup event trigger 5: event - rdsr(1).lt.100.0, action – imf RC04
6	MF	ANN-K-05-51 ON – D/G 1-1 Trouble Alarm

Special instructions:

- Start with $T_{AVE} \approx T_{REF}$. For a power escalation we need to have $T_{AVE} \approx$ or slightly higher than T_{REF} before initiating go on the turbine.
- Provide a marked up copy of GOP-5 completed up to and including step 4.5.
- VCT Level should be @ 70%
- Provide a partially completed GOP-5 checklist to crew for power ascension.

Scenario 1 - Turnover Information

The plant is at 87% power, following successful completion of Main Turbine Valve Testing. P-66B HPSI Pp. is out of service for seal cooler inspection (tagged out). Boron is 721 ppm. Total PCS Gas Activity is 2.85×10^{-1} micro-curies per ml. Off Gas flow is 3.1 CFM. MECS has ordered Main Generator VAR loading reduced to 50 megavars OUT. Shift orders are to commence power ascension to full power at 2% per hour.

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Event Description: **Loss of Letdown Pressure Control - Low**

Time	Position	Applicant's Actions or Behavior
	RO	Diagnose failure of Letdown Pressure controller (PIC-0202): <ul style="list-style-type: none"> Selected Letdown Pressure Control valve fails CLOSED. EK-0704, Letdown Ht Ex Tube Inlet Hi-Lo Press, alarms. EK-0702, Relief Valve 2006 Disch Hi Temp, alarms
	SRO/RO	Enter and perform actions per the above alarm response procedures
	RO	Determine charging and letdown flows are NOT matched.
	RO	Determine PIC-0202 NOT controlling at 460 psig.
	BOP	May go to HOLD on turbine generator controls
	RO	Select MANUAL on PIC-0202 and manually adjust selected backpressure CV to control letdown pressure at ~460 psig.
	SRO	Gives control band of ~ 400 – 470 psig for intermediate letdown pressure control.
	SRO	If RV-2006 does not reseal, refers to ONP-23.1 for PCS Leak due to RV-2006. Initiate troubleshooting and repair. May quantify amount of water added to quench tank.
	SRO	May refer to EI-Plan, UE for SU5
	SRO/RO	Diagnose RV-2006 reseals. (TIA-0202 on C-02 lowering and Quench Tank parameters stable)
	SRO	May direct performance of a PCS leak rate calculation
	SRO	Refer to Tech. Spec. 3.4.13 for PCS Leakage. <ul style="list-style-type: none"> Determine a 4 hour completion time for reducing leakage to within limits.

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Event Description: **Main Feedwater Flow Failure - High**

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose high failure of Feedwater Flow Transmitter FT-0701 <ul style="list-style-type: none"> • LIC-0701 demand goes low • Recorder FI-0701 feed flow goes high • SG 'A' level lowers • EK-0962, STEAM GEN E-50A LO LEVEL, alarm may annunciate
	SRO	Enters and directs the actions of ARP-5 and ONP-3.0. Reviews reactor trip criteria < 30% S/G level.
	BOP	Takes manual control of FRV-0701 using LIC-0701, immediate action of ONP-3.
	BOP	Slowly raise S/G level using manual control of FRV-0701 to restore level.
	BOP	May go to HOLD on turbine if not already in HOLD from previous event.
	SRO	Contact maintenance to initiate troubleshooting and repairs.
		May need to let plant stabilize before entering next MF due to HB_PWR concerns at examiner discretion.

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Event Description: Low lube oil temperature on EDG 1-1.

Time	Position	Applicant's Actions or Behavior
	BOP	Receives alarm EK-0551 "Diesel Generator 1-1 Trouble" <ul style="list-style-type: none"> • Reviews ARP-3 actions • Dispatches AO to investigate cause of alarm
Sim Op: When asked to investigate, report that alarm is "Low Lube Oil Temperature" reading 84°F and "Pre-lube Pump Failure" for D/G 1-1. Pre-lube pump is not running.		
Sim Op: When AO answers alarm at local alarm panel for D/G 1-1, delete malfunction #6		
	BOP	Reports to CRS that D/G 1-1 lube oil temperature is 84°F.
	CRS	Declares D/G 1-1 inoperable per SOP-22 step 4.2.a Enters TS 3.8.1.B for one D/G inoperable. 1 hour action

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Event Description: **Main Steam Line Code Safety Lift**

Time	Position	Applicant's Actions or Behavior
	SRO BOP RO	Diagnose Main Steam safety lift: <ul style="list-style-type: none"> • Rising steam flow • Lowering Tave • Rising Power • Containment parameters (i.e., <u>not</u> affected) • Diagnoses < 1% power rise
	SRO	Enters and directs the actions of ONP-9, Excessive Load
	SRO	Directs a power reduction at $\leq 30\%$ per hour
	BOP	Sets up turbine generator controls for power reduction. Selects GO on turbine when directed.
	SRO/BOP	Directs Auxiliary Operator to inspect steam dump area. Auxiliary Operator reports that it appears steam is leaking from a code safety but <u>cannot</u> tell which S/G.
		As soon as turbine is in GO, raise steam leak severity by inserting next malfunction (MS15B). This will simulate the code safety fully opening.
	SRO BOP RO	Diagnoses > 1% power rise
	SRO	Directs reactor trip and performance of EOP-1.0, Standard Post Trip Actions

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Event Description: **Reactor Fails to Auto Trip and from Panel C-02/C-06 and P-66A fails to start**

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses failure of RX trip on C-02 panel
	BOP	Attempts to trip RX from C-06, diagnoses failure of reactor trip on C-06
	RO	De-energizes individual CRD clutches using toggle switches (may use breaker 42-1 and 42-2)
	BOP	Trips turbine when pressurize pressure starts to lower (at SRO discretion)
	RO	Answers YES to the following for EOP-1.0 verbal verifications of immediate actions: <ul style="list-style-type: none"> • Reactivity control • Core heat removal • Containment isolation (may not be later in scenario) • Containment atmosphere (may not be later in scenario) • Main. Vital Auxiliaries – Water • Main. Vital Auxiliaries - Air
	RO	Answers NO to the following for EOP-1.0 verbal verifications of immediate actions: <ul style="list-style-type: none"> • PCS Inventory Control – PZR level is off-scale low <ul style="list-style-type: none"> ○ contingency - verifies CVCS operating to restore PZR level, i.e., charging pumps running and orifice stop valves closed • PCS Pressure control – PZR pressure < 1650 psia <ul style="list-style-type: none"> ○ contingency – manually operates PZR heaters and spray, heaters will be off due to low PZR level, spray valves closed ○ contingency – when PCS pressure is < 1605 psia, verify safety injection initiated: <ul style="list-style-type: none"> ▪ Verify EK-1342 in alarm ▪ Verify all available HPSI and LPSI pumps in service ▪ Diagnoses P-66A is not running, informs SRO and starts P-66A ▪ If PCS pressure is < 1300 psia, stop 'A' and 'D' PCPs. If PCS pressure is < minimum for pump operation, secure all PCPs

	BOP	<p>Answers YES to the following for EOP-1.0 verbal verifications of immediate actions:</p> <ul style="list-style-type: none"> • Main Turbine Generator acceptance criteria • Both MFPs in manual at minimum speed with both feed regulating and bypass valves closed • Containment Isolation
	BOP	<p>Answers NO to the following for EOP-1.0 verbal verifications of immediate actions</p> <ul style="list-style-type: none"> • Vital Auxiliaries – Electric – 1E bus is de-energized due to Safety Injection actuation (depending on timing of SIS) <ul style="list-style-type: none"> ○ No contingency • PCS Heat Removal – Tave < 525°F and S/G pressures < 800# <ul style="list-style-type: none"> ○ Contingency Tave – Verify feed flow not excessive, Turbine bypass valve and Atmospheric steam dump valves closed ○ Contingency S/G pressure – Ensure TBV and ADVs are closed, close both MSIVs (S/Gs < 800 psia)

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Event Description: **LOCA**

Time	Position	Applicant's Actions or Behavior
	SRO	Performs Event Diagnostic Flow Chart Diagnoses EOP-9.0 entry Performs EOP-9.0 strategy brief Establishes PCS pressure and temperature bands with RO
	BOP/RO	Closes CV-1064 and CV-1065 Places CRHVAC in emergency mode Performs EOP supplement 5, safety injection checklist (1 exception – P-66B, otherwise, SAT) Places left train H ₂ monitor in service
	BOP	Recommends and secures AFW flow to 'B' S/G (affected) Performs EOP Supplement 17 to isolate 'B' S/G inside control room Direct AO to perform EOP Supplement 18 to isolate 'B' S/G from outside control room Reviews SI throttling criteria
SIM Operator Instructions: MS18/MS19, SG10/SG12		
	RO	Establishes PCS pressure and temperature bands with SRO
	SRO	Determines EOP-9.0 success paths: <ul style="list-style-type: none"> • RC-3 • MVAE-DC-1 • HR-2 • MVAE-AC-1 • IC-2 • PC-3 • CI-1 • CA-2 • MVAW-1 • MVAA-1 Determines that HR-2 is jeopardized due to LOCA

	SRO	Directs 'A' S/G steamed to within 50 psi of 'B' S/G using ADVs
	SRO RO	Verifies natural circulation
	SRO BOP	Performs EOP supplement 4 to verify HPSI flow within specifications
Emergency Classification Level – Alert (FA1)		
Terminate scenario when SI throttling criteria are met or at examiner discretion		

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

Initial Conditions: 25% power. P-67B LPSI Pp. is out of service for bearing inspection.

Turnover: A power escalation was on hold for Chemistry. Shift orders are to continue a power escalation at 8% per hour.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	SRO (R) RO (R) BOP (N)	Continue power escalation at 8% per hour.
2	V-6A-1	SRO (C) RO (C)	Main Exhaust Fan V-6A trips.
3	ED08C	SRO (I) RO (I) BOP (C)	Loss of Preferred AC Bus Y-30.
4	SG01B	SRO (C) RO (C) BOP (C)	'B' Steam Gen. Tube Leak at 0.25 gpm (requires controlled shutdown). Leak then rises to require reactor trip. (≥ 0.4 gpm requires reactor trip.)
5	ED56	SRO (C) BOP (C)	Safety bus 1D de-energizes. EDG 1-2 auto starts but requires manual breaker closure.
6	SG01B	ALL (M)	SGTR on 'B' S/G
7	RC16B	SRO (C) RO (C)	P-50B PCP high vibration requires pump trip.

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

Scenario 2 - Simulator Operator Instructions

- Reset to a 25% IC (IC-14)
- Ensure V-6A is in service and V-6B is not in standby
- INSERT SI27 to RACKOUT to remove LPSI Pump P-67B from service
- INSERT ED11B (PIDED08) to prevent auto closure of D/G 1-2 output breaker.

REMOTE	Type	Instructions
1	OR	V-6A-1 OPEN Trips V-6A breaker
2	MF	ED08C on PIDED02 Causes a loss of Preferred AC Bus Y-30
3	MF	SG01B on PIDSG01 Severity 0.025. Causes a S/G Tube Leak on 'B' S/G.
4	MF	Setup Event Trigger: 4 Event: 0 Action: imf sg01b 0.15 This raises the severity of the tube leak to 1.5 gpm
N/A	OR	TIA-0136B with a 5:00 minute ramp, severity 0.9 Setup Event Trigger: 5 Event: rdsr(1).lt.100.0 Action: none (leave empty)
N/A	MF	RC16B Setup Event Trigger: 6 Event: rdsr(1).lt.100.0 Action: none (leave empty)
N/A	MF	Setup Event Trigger: 7 Event: rdsr(1).lt.100.0 Action: imf sg01b 24.0 This raises severity of tube leak to 240 gpm
N/A	REM	ED56 with 1 minute time delay Setup Event Trigger: 8 Event: rdsr(1).lt.100.0 Action: none (leave empty)
N/A	---	Setup Event Trigger: 9 Event: zdi5p(960) Action: dmf ED11B

Special Instructions:

- Provide marked up GOP-5 completed up to and including Att. 1, Step 3.1.

Scenario 2 - Turnover Information

A power escalation was on hold for chemistry reasons. Chemistry has now authorized exceeding 30% power. The plant is at 25% power. PCS boron is 1007 ppm. Total PCS Gas Activity is 1.32×10^{-1} micro-curies per ml. Off Gas flow is 5.9 CFM. Core burnup is 7000 MWD.

P-67B LPSI Pp. is out of service for bearing inspection.

Shift orders are to continue a power escalation at 8% per hour. AOs have been briefed on P-1B startup. P-1A is in service. P-10A Heater Drain Pp. is ready warming.

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Event Description: **Loss of Preferred AC Bus Y-30**

Time	Position	Applicant's Actions or Behavior
	ALL	Note multiple alarms. Enter transient alarm response.
	BOP	May go to HOLD on Main Turbine.
	SRO	Enters and directs the actions of ONP-24.3, Loss of Y-30. Reviews with crew equipment affected.
	BOP	Dispatch AO to check Y-30 inverter input/output breakers, and local alarms. Electricians to check for fault on bus.
	SRO/BOP	Bypass RPS Channel 'C' reactor trips, per Tech. Spec. 3.3.1 and ARP.
	SRO	Determines that multiple Tech. Specs. apply: <ul style="list-style-type: none"> * Tech. Spec. 3.8.7, 3.8.9 <ul style="list-style-type: none"> - 8 hr. LCO on Y-30 - 24 hr. action on the associated inverter * Tech. Spec. 3.8.1 <ul style="list-style-type: none"> - D/G 1-1 is inoperable due to associated sequencer. 1 hr. action. * Tech. Spec. 3.8.9 <ul style="list-style-type: none"> - 8 hr. action for one Preferred AC Bus inoperable (will exit when placed on the bypass regulator).
	SRO	Receives the following report from AO on Y-30 Inverter #3 local indications: <ul style="list-style-type: none"> * AC Output Brkr. is CLOSED. * DC Input Brkr. is OPEN. * It appears that a worker slipped and inadvertently caused the DC Input Breaker to open.
	SRO/BOP	Determines that AO/electricians report is indicative of NO fault on Y-30. Determines from discussions with AO/electricians that it is acceptable to re-energize Inverter #3.

	SRO	Directs placing Y-30 on the Bypass Regulator.
	BOP	Refers to SOP-30, 7.6.2. c through h for re-energizing from the Bypass Regulator.
Sim Op Instructions: ED48 on ED02 to CLOSE dmf ED08C		
	SRO/BOP	May also dispatch AO to reset 42-1 and AFAS.
Sim Op Instructions: On PIDRPN13, RP35 to RESET.		

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Event Description: **'B' Steam Generator Tube Leak/Rupture/Plant Trip**

Time	Position	Applicant's Actions or Behavior
	SRO BOP RO	Diagnoses Steam Generator Tube Leak on 'B' S/G: <ul style="list-style-type: none"> • EK-1364, GASEOUS WASTE MONITORING HI RADIATION alarms • Monitors PZR level, pressure • Monitors VCT level Charging-Letdown mismatch
	SRO RO BOP	Notes trends on any of the following: <ul style="list-style-type: none"> • RIA-0631, Condenser Off-Gas Monitor • RIA-2323, Main Steam Gamma Monitor ('B' S/G) • RIA-2324, Main Steam Gamma Monitor ('B' S/G) • RIA-0707, Steam Generator Blowdown Monitor • RIA-2325/2326, Stack Gas Effluent Monitors • RIA-2327, High Range Noble Gas Monitor
	SRO RO	Uses ONP-23.2, Att.1 and/or Att.2 or PPC Page 540 to determine leak rate. Determines leak rate is ~ 0.25 gpm. May also use DWO-1 method (15 min).
	SRO	'B' S/G tube leak is identified and quantified, determines that plant shutdown must occur (Mode 3 within 6 hours). Action level 3
	SRO	Determines that Tech. Spec. 3.4.13 applies - 4 hrs. (> 150 gpd).
	SRO	Have Chemistry determine dose rates on C-42 cation columns. Have HP perform surveys per EOP Supplement 14.
	SRO BOP	May raise RIA-0631 setpoint
	BOP	Setup turbine controls for de-rate.
Sim OP: Once plant de-rate commences, raise severity of leak to 1.5 gpm using remote 4		

	ALL	Diagnose that leak rate has risen to above 0.4 gpm. Requires reactor trip.
	SRO	Direct Reactor Trip
Plant Trip		
		Verbal Verifications that are NO: * PZR level. * PZR press * Off-Gas Monitor (RIA-0631) in alarm.
	ALL	Identifies 'B' S/G as the affected S/G.
	BOP	Isolates AFW to 'B' S/G
	ALL	Commence cooldown using ADVs
	SRO	Directs Letdown orifice isolation valves closed
	BOP	Places left train CRHVAC in emergency
	SRO	Direct chemistry to sample S/G for lithium and activity
	SRO	Direct EOP supplement 4, HPSI flow verification, completed
	RO	Trips P-50D, PCP, when PCS pressure < 1300 psia. Trip P-50A and P-50C if PCS pressure < minimum for pump ops
	SRO	When lowest hot leg temperature is < 524 °F, orders 'B' S/G isolated per EOP supplement 13
Sim Op: Use MS18/MS19 and SG10/SG12 to isolate 'B' S/G		
EI Classification – FA1 Alert		
Terminate Scenario when S/G is isolated or at examiner discretion		

