INITIAL SUBMISSION OF THE SCENARIOS

FOR THE PALISADES EXAMINATION - DECEMBER 2001

Facility: **PALISADES** Scenario No.: **Spare** Op-Test No.: _____

Examiners: _____ Operators: _____

_____ _____

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Initial Conditions: IC-19; Approximately 100% power EOL; Equipment OOS is Charging Pump P-55A with Caution Tag hung on handswitch; Charging System is aligned for Option 1 operation with P-55B in MANUAL and P-55C in AUTO.

Turnover: Power is 100% at EOL. Charging Pump P-55A is out of service for repairs with the Charging System aligned for Option 1 operations and CV-2004 closed. PCS Boron concentration is 50 ppm; ASI is +0.02; S/G B/D @ 20K ea.; Off-gas is ~2 scfm; equilibrium Xenon.

Shift orders are to lower power to 60% load at 20% per hour to allow taking Main Feedwater Pump P-1B out-of-service due to elevated seal leakage conditions.

Event No.	Malf. No.	Event Type*	Event Description
1	RX07B	RO (I) SRO (I)	Pressurizer Level Control Channel B Upscale Demand
2	RX12C		Pressurizer Heater Groups Fail OFF (Backup Gp. 1&2) (IPE)
3	N/A	RO (R) TURB (N) SRO (N)	Downpower Ramp
4	RX14A	TURB (I) SRO (I)	Feedwater Flow Transmitter FT-0701 Fail HIGH
5	TC04C	TURB (C) SRO (C)	Turbine Governor Valve GV 3 Fails Shut
6	RP19	RO (C) SRO (C)	Failure of the Reactor to Automatically Trip
7	MS03A	RO (M) TURB (M) SRO (M)	Main Steamline Rupture Inside of the Containment
8	CH05A/B	RO (C) TURB (C) SRO (C)	Initiation Failure of Containment Isolation, Safety Injection, and Containment Spray

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

Simulator Operator Instructions for Scenario: SPARE

Event Number	Simulator Operator Actions
INITIAL CONDITIONS	IC-19; Approximately 100% power EOL Equipment OOS is Charging Pump P-55A with Caution Tag hung on hand switch; Charging System is aligned for Option 1 operation with P-55B in MANUAL and P-55C in AUTO. • P-55B Control Select to Manual • P-55C Control Select to Auto • Start P-55B with Control Switch • Stop P-55A with Control Switch • Place CV-2004 in Close • Remote CV32, P-55A, Rackout Malfunction for Event 6 ACTIVE AT SETUP • MALF RP19 • OVRD DI REACTOR_TRIP to OFF Malfunction for Event 8 ACTIVE AT SETUP. • MALF CHO5A and CHO5B
1**	MALF RX07B ***Activate Event #1 and Event #2 simultaneously***
2**	MALF RX12C ***Activate Event #1 and Event #2 simultaneously*** ***OVERRIDE GREEN lights OFF for Heater Groups #1 and #2***
3	NONE
4	MALF RX14A, Severity = 100%
5	MALF TC04C
6	Malfunction for Event 6 ACTIVE AT SETUP • MALF RP19 • OVRD DI REACTOR_TRIP to OFF
7	MALF MS03A, Severity = 15%, Ramp = 10 minutes
8	Malfunction for Event 8 ACTIVE AT SETUP. • MALF CHO5A and CHO5B

** ***Events #1 and #2 should be activated at the same time.***

SHIFT TURNOVER - SCENARIO: SPARE

Power is 100% at EOL.

Charging Pump P-55A is out of service for repairs with the Charging System aligned for Option 1 operations and CV-2004 closed.

PCS Boron concentration is 50 ppm; ASI is +0.02; S/G B/D @ 20K ea.; Off-gas is ~2 scfm; equilibrium Xenon.

Shift orders are to lower power to 60% load at 20% per hour to allow taking Main Feedwater Pump P-1B out-of-service due to elevated seal leakage conditions

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

Event Description: ***Pressurizer Level Control Channel B Upscale Demand***

Time	Position	Applicant's Actions or Behavior
	RO	Diagnose low failure of Pressurizer Level Transmitter LT-0101B • Pressurizer Level Control 'B' output demand high • Pressurizer Level Indication LI-0101B failed low • EK-07-61, PRESSURIZER LEVEL HI-LO, alarm • EK-07-63, PRESSURIZER LEVEL CH "A" LO-LO, alarm • Various other alarms • Letdown Orifice Stop Valves closed • Pressurizer Heaters off • Actual Pressurizer level rising
	SRO	Enters and directs the actions of ARP-4 (EK-07)
	RO	Takes manual control of Pressurizer Level controller OR selects Channel 'A' as controlling channel ***CRITICAL TASK to obtain control of pressurizer level prior to vct low-low level causing a charging pump suction swapover to the SIRW tank.***
	RO	Restores Pressurizer level to program value and regains heater control by selecting 'Channel A' on LIC-0101, Heater Control Select
	SRO	Contact maintenance to initiate troubleshooting and repairs.

Op-Test No.:	Scenario No.: **SPARE**	Event No.: **2**	Page of
Event Description:	***Pressurizer Backup Heater Groups #1 and #2 Fail OFF (IPE)***		

Time	Position	Applicant's Actions or Behavior
		NOTE: This malfunction should be activated at the same time that EVENT 1 is activated.
	RO	Diagnoses tripped supply breaker for Backup heater Group #1 and #2 • Indication on Group #1 and #2 heaters • Lower than normal current on heater current indication • Slower pressure recovery following depressurization on previous event
	SRO	Consults Tech Spec 3.4.9 to determine required current = 91 amps (375 KW) and determines a 72 hour completion time.
	SRO	Initiates troubleshooting and repair.

Op-Test No.: Scenario No.: **SPARE** Event No.: **3** Page of

Event Description: ***Downpower Ramp***

Time	Position	Applicant's Actions or Behavior
	SRO	Enters and directs the actions of GOP-8.
	SRO	Reviews Precautions and Limitations with crew.
	SRO	Notifies Area Power Control and Chemistry of impending shutdown.
	SRO	Evaluate PCS leak rate surveillance interval.
	SRO	Establish "Power Operation Degas Lineup" (SOP-2A, Section 7.13, "Degas Of PCS") ***NOTE: Not required since plant is not being taken off line.***

Op-Test No.:	Scenario No.: **SPARE**	Event No.: **3**	Page of
Event Description:	***Downpower Ramp***		

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluate ASI guidelines (EM-04-17, "Axial Shape Index (ASI) Control") • For an unplanned rapid power reduction, the operator need not worry about maintaining ASI within Target ASI ± 0.05 during the power reduction • Initiate trending of ASI • Power reduction should be initiated by boration
	RO	Commence boration of PCS (SOP-2A, Section 7.5.1, "Boration") • Determine required amount of boron • Establish boration flow • Maintain boron concentration to ensure regulating rods above the PPDIL
	SRO	If Reactor power changes by 15% or more in one hour or less, then notify Chemistry to perform an isotopic analysis for iodine
	BOP	Commence load reduction at 15%/hour (SOP-8, Section 7.1, "Turbine Generator K-1") • Lower turbine load at 15%/hour • Adjust Valve Position Limiter to maintain Limiter just above valve control signal
		NOTE: Next event should be entered once power has been lowered by approximately 3-5%.

Op-Test No.:	Scenario No.: **SPARE**	Event No.: **4**	Page of
Event Description:	***Feedwater Flow Transmitter FT-0701 Failure High***		

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose high failure of Feedwater Flow Transmitter FT-0701 • LIC-0701 demand goes low • Recorder FI-0701 feed flow goes high • SG 'A' level lowers • EK-09-62, STEAM GEN E-50A LO LEVEL, alarm
	SRO	Enters and directs the actions of ARP-5 (EK-00) and ONP-3.0.
	BOP	Takes manual control of FRV-0701 using LIC-0701 ***CRITICAL TASK to take manual control of FRV and gain control of SG level before low SG level reactor trip.***
	BOP	Slowly raise S/G level using manual control of FRV-0701 to restore level.
	SRO	Contact maintenance to initiate troubleshooting and repairs.

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Event Description: ***Turbine Governor Valve GV 3 Fails Shut***

Time	Position	Applicant's Actions or Behavior
	TURB	Diagnoses turbine control valve GV-3 failing shut • EK-0318, TURBINE PANEL TROUBLE, alarms • Indication on DEH panel • Load lowering • Steam pressure rising • PCS temperature rising • Reactor power lowering
	SRO	If time permits, enter and direct the actions of ONP-1, Loss of Load.
	RO	Insert control rods to match Tave to Tref as time permits (Immediate Action of ONP-1).
	TURB	Ensures Turbine Controls in MANUAL
	TURB	Ensures at least one EHC pump running.
	SRO	Orders reactor trip due to being above 15% power ***CRITICAL TASK to order reactor tripped per procedure and to prevent PCS overpressure.***

Op-Test No.: | Scenario No.: **SPARE** | Event No.: **5** | Page of

Event Description: ***Turbine Governor Valve GV 3 Fails Shut***

Time	Position	Applicant's Actions or Behavior
	RO	Trips the reactor as directed.
	SRO	Enters and directs the actions of EOP-1.0.
	RO	Determines that Reactivity Control acceptance criteria are met.
	BOP	Control the Feedwater System • Places ALL operating MFPs to manual and ramp one to minimum speed • As Tave lowers toward 525°F ramps second MFP to minimum speed • Closes ALL MFRVs and Bypass FRVs ***CRITICAL TASK to prevent PCS overcooling.***
	BOP	Determines that Vital Auxiliaries - Electric acceptance criteria are met.
	RO	Determines that PCS Inventory Control acceptance criteria are met.
	RO	Determines that PCS Pressure Control acceptance criteria are met.

Op-Test No.:	Scenario No.: **Spare**	Event No.: **5**	Page of
Event Description:	***Turbine Governor Valve GV 3 Fails Shut***		

Time	Position	Applicant's Actions or Behavior
	RO	Determines that Core Heat Removal acceptance criteria are met.
	BOP	Determines that PCS Heat Removal acceptance criteria are met.
	RO	Determines that Containment Isolation acceptance criteria are met.
	RO	Determines that Containment Atmosphere acceptance criteria are met.
	RO	Determines that Vital Auxiliaries - Water acceptance criteria are met.
	RO	Determines that Vital Auxiliaries - Air acceptance criteria are met.

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

Event Description: ***Turbine Governor Valve GV 3 Fails Shut***

Time	Position	Applicant's Actions or Behavior
	BOP	Verify at least one Condensat Pump and at least one Cooling Tower Pump operating.
	BOP	Commence Emergency Shutdown Checklist (GOP-10)
	SRO	Refers to Attachment 1, "Event Diagnostic Flow Chart" and diagnoses the event.
	SRO	Transition to EOP-2.0, "Reactor Trip Recovery" due to all safety function acceptance criteria met, and Control Room is habitable.
	SRO	Directs the actions of EOP-2.0
	SRO	Verify acceptance criteria met at intervals of approximately every 15 minutes.
	RO	Verify all PCPs operating
	RO	Verify Pressurizer level within limits: • Level between 20% and 85% • Level trending to between 42% and 57%

Op-Test No.: | Scenario No.: **Spare** | Event No.: **5** | Page of

Event Description: ***Turbine Governor Valve GV 3 Fails Shut***

Time	Position	Applicant's Actions or Behavior
	RO	Verify Pressurizer pressure within limits: • Pressure between 1650 and 2185 psia • Pressure trending to between 2010 and 2100 psia
		SIMULATOR OPERATOR: ***Initiate next event once Pressurizer level and pressure bands have been given by SRO to the RO.***

Op-Test No.:	Scenario No.: **Spare**	Event No.: **6**	Page of
Event Description:	***Failure of the Reactor to Automatically Trip, including from C-02***		

Time	Position	Applicant's Actions or Behavior
		NOTE: This malfunction may not apply if the crew elects to manually trip the reactor prior to conditions warranting an automatic trip.
	RO	Determines that the Reactor has failed to trip automatically and when Reactor Trip pushbutton depressed on panel C-02. ***NOTE: This is actually performed as part of Event 5.***
	RO BOP	Trip Reactor from panel C-06. ***CRITICAL TASK to cause reactor trip following ATWS condition.***
	RO	Informs SRO of failure of reactor to trip from panel C-02.

Op-Test No.:	Scenario No.: **Spare**	Event No.: **7**	Page of
Event Description:	***Main Steam Line Rupture Inside of the Containment***		

Time	Position	Applicant's Actions or Behavior
	SRO RO BOP	Diagnose Main Steam line rupture inside containment: • Excessive steam flow from 'A' S/G • S/G isolation actuation • S/G pressures and PCS temperatures and pressures lowering • Containment humidity, temperature, and pressure rising • PCS subcooling rising • Numerous Control Room alarms (CAC DRY PAN Hi-LEVEL
	SRO	Enters and directs the actions of EOP-6.0. ***NOTE: May return to EOP-1.0, but acceptable to enter EOP-6.0 directly. If EOP-1.0 is re-entered, it will be to perform re-diagnosis or to re-assess Safety Functions.***
	RO BOP	Determine that Containment Isolation acceptance criteria NOT met.
	RO BOP	Determine Containment Isolation did NOT occur: • EK-1126, "CIS INITIATED", NOT in alarm. • Containment isolation valves NOT properly aligned

Op-Test No.: | Scenario No.: **Spare** | Event No.: **7** | Page of

Event Description: ***Main Steam Line Rupture Inside of the Containment***

Time	Position	Applicant's Actions or Behavior
	RO BOP	Initiates CHR signal to isolate containment • Depresses CHRL-CS, HIGH RADIATION INITIATE, and/or • Depresses CHRR-CS, HIGH RADIATION INITIATE ***CRITICAL TASK to ensure containment is isolated when required.***
	SRO RO BOP	***Note: Crew may opt to secure PCPs at this time due to no CCW to containment. Depending on timing of crew, conditions will probably NOT be met to restore CCW to containment.***
	BOP	Perform EOP Supplement 6, "Checklist for Containment Isolation"
	RO BOP	Close both MSIVs and CCW Containment Isolation Valves ***CRITICAL TASK to close MSIVs since they are required to be closed on CHP***
	RO BOP	Manually initiates SIAS. ***CRITICAL TASK to initiate Safety Injection on Containment High Pressure.***
	SRO	Verify Attachment 1, "Safety Function Status Check Sheet", acceptance criteria are satisfied at intervals of approximately every fifteen minutes.

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Event Description: ***Main Steam Line Rupture Inside of the Containment***

Time	Position	Applicant's Actions or Behavior
	RO	Verifies EK-1342, "SAFETY INJ INITIATED" is alarmed due to PZR pressure less than or equal to 1605 psia OR containment pressure greater than or equal to 4.0 psig.
	BOP	Ensure MISVs and MSIV Bypass Valves are closed
	RO	Stop one PCP in each loop in pressure drops below 1300 psia ***NOTE: May have already stopped PCPs due to lack of CCW flow to containment.*** ***CRITICAL TASK to secure PCPs when determined that CCW flow cannot be restored to containment.***
	RO	Commence emergency boration to establish PCS boron concentration greater than or equal to boron needed for Tave >525°F as verfied by sample or hand calculation per EOP Supplement 35.
	RO	Verify PCP operating limits are satisfied per EOP Supplement 1. ***Note: May have already stopped PCPs due to lack of CCW flow to containment.***

Op-Test No.: Scenario No.: **Spare** Event No.: **7** Page of

Event Description: ***Main Steam Line Rupture Inside of the Containment***

Time	Position	Applicant's Actions or Behavior
	BOP	Place LTOP in service.
	SRO BOP	Ensure at least one train of CR HVAC in Emergency Mode within 20 minutes of the time of the Reactor trip per SOP-24.
	SRO RO BOP	Determine the most affected S/G by considering ALL of the following: • High steam flow from S/G • Lowering S/G pressure • Lowering S/G level • Lowering Loop Tc temperature
	BOP	Isolate 'A' S/G per EOP Supplement 17
	RO BOP	Stabilize PCS temperature by maintaining 'B' S/G level between 60% and 70%.
	RO	Verify SI pump throttling criteria are satisifed.
		Terminate scenario when 'A' S/G has been isolated, PCS temperature has been stabilized, and SI Pump throttling criteria are satisfied.

Op-Test No.:	Scenario No.: **Spare**	Event No.: 8	Page of
Event Description:	***Initiation Failure of Containment Isolation, Safety Injection, and Containment Spray***		

Time	Position	Applicant's Actions or Behavior
	RO BOP	Determines Containment Isolation did NOT occur • EK-1126, CIS INITIATED, NOT in alarm • Valve NOT properly aligned ***Note: This is actually performed as part of EVENT 7.***
	RO BOP	Initiates CHR signal to isolate containment and determines CIS does NOT occur • Depresses CHRL-CS, HIGH RADIATION INITIATE, and/or • Depresses CHRR-CS, HIGH RADIATION INITIATE
	BOP	Manually aligns for Containment Isolation per EOP Supplement 6 ***CRITICAL TASK to ensure containment isolated when required.***
	RO BOP	Manually closes both MSIVs • CV-0510 ('A' S/G) • CV-0501 ('B' S/G) ***CRITICAL TASK to close MSIVs since they are required to be closed on CHP***

Op-Test No.:	Scenario No.: **Spare**	Event No.: **8**	Page of
Event Description:	***Initiation Failure of Containment Isolation, Safety Injection, and Containment Spray***		

Time	Position	Applicant's Actions or Behavior
	RO BOP	Manually closes CCW Containment Isolation Valves • CV-0910, (KEY # 337) • CV-0911, (KEY # 338) • CV-0940, (KEY # 336) ***Note: SRO may direct leaving CCW valves open to maintain cooling to PCPs (as long as Containment pressure remains less than 35 psia).***
	RO BOP	Initiates SIAS • Depresses PB-1, INJECTION INITIATE • Depresses PB-2, INJECTION INITIATE ***CRITICAL TASK to initiate Safety Injection when required.***
	RO	Manually aligns for Containment Spray • Opens both Containment Spray Valves (CV-3001, CV-3002) • Starts ALL Containment Spray Pumps (P-54A, B, C) ***CRITICAL TASK to ensure Containment Spray actuated when required.***

Facility: **PALISADES** Scenario No.: **2** Op-Test No.: _____

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: IC-19. Approx. 100% power EOL. Equipment OOS is Charging Pump P-55C with Caution Tag on handswitch.

Turnover: Power is at 100%. Charging Pump P-55C is ouot of service for maintenance and will not be available for approximately 12 hours. Boron concentration is 50 ppm. ASI is +0.02. Equilibrium Xenon. Off-gas flow is 2 scfm. S/G Blowdowns are at 20K each.

Shift orders are to reduce power at 12% per hour for the Refueling Outage.

Event No.	Malf No.	Event Type*	Event Description
1	NA	SRO (N) RO (R) BOP (N)	Power Reduction
2	TC20	SRO (C) BOP (C)	Loss of Panel L21
3	CV05	SRO (I) RO (I)	Loss of Letdown Pressure Control High
4	RX11A	SRO (I) BOP (I)	Erratic Feedwater Regulating Valve Operation
5	RD12-15	SRO (C) RO (C)	Dropped Rod #15
6	SG01A	SRO (M) RO (M) BOP (M)	'A' Steam Generator Tube Rupture at 700 gpm
7	RP19 RP20	SRO (C) RO (C)	Failure of Automatic AND Manual Reactor Trip

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

SIMULATOR OPERATOR INSTRUCTIONS

Event No.	Simulator Operator Instructions
	Reset to IC-19. Approx. 100% power EOL. Equipment OOS is Charging Pump P-55C with Caution Tag on handswitch.
1	Power Reduction - no setup required
2	TC20 - Insert malfunction a couple of minutes after crew starts power reduction. ***When dispatched as an AO to investigate the problem, report:*** ***"There appears to be a problem internal to the UPS. I recommend that the UPS be placed on BYPASS."***
3	CV05
4	RX11A - FRV should cycle ± 10% of current position
5	RD12-15
6	SG01A - Ramp time = 3 minutes; Severity = 700 gpm
7	RP19, RP20 - ***Insert MALFs at beginning of scenario.***

SHIFT TURNOVER - SCENARIO: SPARE

Power is at 100%. Charging Pump P-55C is ouot of service for maintenance and will not be available for approximately 12 hours. Boron concentration is 50 ppm. ASI is +0.02. Equilibrium Xenon. Off-gas flow is 2 scfm. S/G Blowdowns are at 20K each.

Shift orders are to reduce power at 12% per hour for the Refueling Outage.

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

Event Description: ***Power Reduction***

Time	Position	Applicant's Actions or Behavior
	SRO	Reviews Precautions and Limitations of GOP-8.
	RO	Reviews Precautions and Limitations of applicable SOPs.
	BOP	Selects DEH de-escalation rates for Main Turbine.
	RO	Borates to commence downpower
	BOP	Initiates turbine de-rate.

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

Event Description: ***Loss of Panel L-21***

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose loss of panel L-21 • EK-0318, TURBINE PANEL TROUBLE • DEH Screen Alarm, UPS ON BAT ***Note: BOP may go to HOLD on Main Turbine, but NOT required.***
	SRO BOP	Refer to EK-0318 and EK-03, Attachment 1 ***Note: Can also be monitored on SYS STATUS SCREEN***
	SRO BOP	Directs AO to determine if DPU 52 and DPU 53 have Primary AC Power available ***Note: AO reports there appears to be an internal problem. Recommends bypassing.***
	SRO	Within 20 minutes of loss of Panel L-21, directs AO to restore Primary AC Power or restores UPS to NORMAL or BYPASS.
	SRO	Notifies I&C to troubleshoot.

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

Event Description: ***Loss of Letdown Pressure Control High***

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses failure of the intermediate letdown pressure controller * Selected intermediate letdown pressure control valve opens. * Flashing in the Letdown Heat Exchanger, resulting in pressure and flow oscillations on the letdown line. * EK-0704, LETDOWN HT EX TUBE INLET HI-LO PRESS, alarms.
	SRO	Enters and directs the actions of EK-0704.
	RO	Determines charging and letdown flows NOT matched.
	RO	Determines Letdown Pressure Controller PIC-0202 NOT controlling at approximately 460 psig.
	RO	Selects manual on the pressure controller.
	RO	Manually respositions selected valve to control pressure at approximately 460 psig.
	SRO	Initiates troubleshooting and repairs.

Op-Test No.:	Scenario No.: 2	Event No.: 4	Page of
Event Description:	***Dropped Control Rod #15***		

Time	Position	Applicant's Actions or Behavior
	SRO RO BOP	Diagnose Dropped Rod. • EK-0911, ROD POSITION 4 INCHES DEVIATION • EK-0912, ROD POSITION 8 INCHES DEVIATION • EK-0948, DROPPED ROD Note the following plant responses: • Tave lowers • PZR pressure lowers • PZR level lowers
	SRO	Enters and directs the actions of ONP-5.1.
	RO	Identifies affected rod as Rod 15.
	BOP	Adjusts Main Turbine load to maintain Tave within 3°F of Tref.
	SRO	Tech Spec involvement may include any of the following sections: • 3.1.5.a • 3.1.4.c • 3.1.4.e • 3.4.2 • 3.2.3 • 3.2.2
	SRO	Notify Reactor Engineering.

Op-Test No.: | Scenario No.: **2** | Event No.: **5** | Page of

Event Description: ***Erratic Feedwater Regulating Valve Operation***

Time	Position	Applicant's Actions or Behavior
	SRO BOP	Diagnoses erratic operation of FRV CV-0701 • Feed flow to 'A' S/G rising and falling • 'A' S/G level rising and falling ***Note: May get Main Turbine Hi Vibration alarm (EK-0105)***
	SRO	Enters and directs the actions of ONP-10, Excessive Feedwater Increase
	BOP	Takes manual control of FRV CV-0701 to restore S/G feed flow and actual level. ***CRITICAL TASK to take manual control and restore level prior to trip.***
	SRO	Initiates troubleshooting/repair.

Op-Test No.: | Scenario No.: 2 | Event No.: 6 | Page of

Event Description: *'A' Steam Generator Tube Rupture at 700 gpm*

Time	Position	Applicant's Actions or Behavior
	SRO RO BOP	Diagnoses Steam Generator Tube Leak/Rupture on 'A' S/G • Rising radiation levels on secondary plant • Lowering PZR level • Lowering PCS pressure • Rising level in 'A' S/G • Lowering feed flow for 'A' S/G • EK-1364, GASEOUS WASTE MONITORING HI RADIATION alarms
	SRO	Directs a Reactor trip and enters and enters EOP-1.0. Based on rising S/G leakage confirmed AND CVCS charging rate rising to maintain PZR level. ***Note: Tube rupture ramps in over 3 minutes to 700 gpm. (May first enter ONP-23.2 for SG tube leakage, but not likely due to severity of tube rupture.)***
	RO	Trips the Reactor ***Note: See Event 7 for details on how reactor is tripped.*** ***CRITICAL TASK to trip reactor when required.***
	BOP	Manually trips Main Turbine when the majority of Rod Matrix lights have turned from RED to GREEN. ***Note: This potential delay may cause SIAS actuation.*** ***CRITICAL TASK to trip turbine when reactor has tripped.***

Op-Test No.:	Scenario No.: 2	Event No.: 6	Page of
Event Description:	***'A' Steam Generator Tube Rupture at 700 gpm***		

Time	Position	Applicants's Actions or Behaviors
	RO	Determines that Reactivity Control acceptance criteria is met.
	BOP	Control the Feedwater System • Places ALL operating MFPs to manual and ramp one to minimum speed • As Tave lowers toward 525°F ramps second MFP to minimum speed • Closes ALL MFRVs and Bypass FRVs ***CRITICAL TASK to prevent PCS overcooling.***
	BOP	Determines that Vital Auxiliaries - Electric acceptance criteria are met.
	RO	Determines that PCS Inventory Control acceptance criteria are NOT met due to lowering PZR level.
	RO	Determines that PCS Pressure Control acceptance criteria are NOT met due to lowering PZR pressure.
	RO	Verify EK-1342, SAFETY INJ INITIATED, alarms if PZR pressure is less than 1605 psia
	RO	Stop PCPs, as required: • If pressure less than 1300 psia, stop two PCPs (one in each loop) • If PCP operating limits not met, stop ALL PCPs. ***CRITICAL TASK to minimize inventory loss and to protect PCPs.***

Op-Test No.: Scenario No.: **2** Event No.: **6** Page of

Event Description: ***'A' Steam Generator Tube Rupture at 700 gpm***

Time	Position	Applicants's Actions or Behaviors
	RO	Determines that Core Heat Removal acceptance criteria are NOT met. • Possibly NO PCPs operating • Possible loss of subcooling
	BOP	Determines that PCS Heat Removal acceptance criteria are met.
	BOP	Determines that Containment Isolation acceptance criteria are NOT met, due to Condenser Off-Gas Monitor RIA-0631 alarm NOT clear.
	RO	Determines that Containment Atmosphere acceptance criteria are met.
	RO	Determines that Vital Auxiliaries - Water acceptance criteria are met.
	RO	Determines that Vital Auxiliaries - Air acceptance criteria are met.
	BOP	Verify at least one Condensate Pump and Cooling Tower Pump operating
	SRO	Assigns performance of SIAS Checklist, EOP Supplement 5

Op-Test No.:	Scenario No.: 2	Event No.: 6	Page of
Event Description:	***'A' Steam Generator Tube Rupture at 700 gpm***		

Time	Position	Applicants's Actions or Behaviors
	BOP	Commence Emergency Shutdown Checklist (GOP-10)
	SRO	Refers to EOP-1.0, Attachment 1, "Event Diagnostic Flow Chart" and diagnoses the event.
	SRO	Transitions to and directs the actions of EOP-5.0, "Steam Generator Tube Rupture" ***NOTE: Even though all PCPs may be off concurrent with the SGTR, entry should NOT be made to EOP-9.0 based on no PCPs with a SGTR. See note on Event Diagnostic Flow Chart.***

Op-Test No.:	Scenario No.: 2	Event No.: 6	Page of
Event Description:	***'A' Steam Generator Tube Rupture at 700 gpm***		

Time	Position	Applicant's Actions or Behavior
	SRO	Verifies acceptance criteria met at intervals of approximately every 15 minutes. ***Note: SRO can assign the STA/SE surrogate to perform this function.***
	SRO	Notify Health Physics to perform preliminary radiation surveys per EOP Supplement 14
	BOP/RO	Verify at least minimum SI flow per EOP Supplement 4
	RO	Commence emergency boration to establish PCS boron concentration greater than or equal to boron needed for Tave > 525°F
	BOP	Ensure at least one train of CR HVAC in Emergency Mode, per SOP-24. ***Note: Must be performed within 20 minutes of reactor trip.***
	BOP	Ensure S/G blowdown control valves are closed
	RO BOP	Cooldown the PCS to highest narrow range Thot less than 524°F (preferably 500°F to 515°F) using the Turbine Bypass Valve
	RO	Records each occurrence of PZR Spray operation with a ΔT (PZR vapor phase temp minus spray temp) greater than 200°F in the Reactor Logbook

Op-Test No.:	Scenario No.: 2	Event No.: 6	Page of
Event Description:	*'A' Steam Generator Tube Rupture at 700 gpm*		

Time	Position	Applicant's Actions or Behavior
	RO BOP	If less than BOTH Cooling Tower Pumps AND less than BOTH Condensate Pumps NOT operating, close BOTH MSIVs and Bypasses. ***Note: One or more Condensate Pumps may have been manually tripped due to a loss of cooling water upon SIAS actuation.***
	SRO RO BOP	Verify SI Pump throttling criteria are satisfied: • Based on the Average of Qualified CETs, PCS subcooling at least 25°F subcooled • Corrected PZR level is greater than 20% and controlled, per EOP Supplements 9 and 10. • At least one S/G available for PCS heat removal with corrected level being maintained or being restored to between 60% and 70% per EOP Supplement 11. • Operable RVLMS channel indicates greater than 102 inches above the bottom of fuel alignment plate.
	RO BOP	Depressurize the PCS • Maintain PZR pressure within ALL of the following criteria: ■ Less than 940 psia ■ Within the limits of EOP Supplement 1 ■ Preferably within 50 psid of the isolated S/G pressure • Operate Main or Auxiliary Spray valves • If SI pump throttling criteria are met, throttle HPSI flow or control charging and letdown flow
		TERMINATE SCENARIO WHEN THE CREW HAS DEPRESSURIZED THE PCS BELOW 940 PSIA AND WITHIN 50 PSID OF 'A' S/G

Op-Test No.:	Scenario No.: 2	Event No.: 7	Page of
Event Description:	***Failure of Automatic and Manual Reactor Trip***		

Time	Position	Applicant's Actions or Behavior
	RO	Determines that the Reactor has failed to trip from pushbuttons on panels C-02 and C-06.
	RO	Opens CRD Clutch Power Feeder Breakers 42-1RPS and 42-2RPS OR Places ALL CRD clutch power toggle switches to CLUTCH OFF. ***NOTE: Either of the above methods will result in a reactor trip and is acceptable.*** ***This is actuallly performed as part of Event 6.***

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

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: Approx. 60% power MOL; equipment OOS is AFW Pump P-8C with Caution Tag hung on handswitch; two MFW pumps in operation.

Turnover: Approx. 60% power MOL; AFW Pp. P-8C is out of service. Main Feedwater System is in operation with both MFW Pps in service. Boron concentration is 842 ppm. ASI is -0.01. Shift orders are to continue a power escalation at 4% per hour to full power. All GOP-5 steps up to and including GOP-5, Section 3.5 have been completed.

Event No.	Malf No.	Event Type*	Event Description
1	NA	SRO (N) RO (R) BOP (N)	Power Escalation
2	EG04	SRO (I) BOP (I)	Main Generator Automatic Voltage Regulator Failure
3	CC02A	SRO (C) RO (C)	CCW Pp. Trip (Standby Fails to Start)
4	CV04	SRO (C) RO (C)	Charging Pump P-55A Fluid Drive Failure High (IPE)
5	RX15B	SRO (I) BOP (I)	Main Steam Flow Transmitter FT-0704 Failure on "B" S/G (lower than current - use value = 26. No trip)
6	RC03	SRO (C) RO (C) BOP (C)	Primary Coolant System Leak into Containment at approx. 5 gpm. (IPE) (Use value = 5.0)
7	RC04	SRO (M) RO (M) BOP (M)	Primary Coolant System Leak into Containment at 200 gpm (Use value = 20.0)
8	RD10	SRO (C) RO (C)	Three Stuck Control Rods (Rods, 12, 17, and 18)

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

SIMULATOR OPERATOR INSTRUCTIONS

Event No.	Simulator Operator Instructions
	Reset to IC-15 Approx. 60% power MOL; equipment OOS is AFW Pump P-8C with Caution Tag hung on handswitch; two MFW pumps in operation. Ensure CCW Pumps P-52B AND P-52C are running.
1	Power Escalation - No setup required.
2	EG04 - After insertion, change grid voltage/frequency once or twice to require manual operation of Voltage Regulator to maintain generator terminal voltage.
3	CC02A
4	CV04
5	RX15B - Severity = lower than current (use value of 26)
6	RC03 - Severity = use value of 5.0 (5 gpm)
7	RC04 - Severity = use value of 20.0 (200 gpm)
8	RD10-12, RD10-17, RD10-18 ***INSERT at beginning of scenario.***

Special Notes:

1. Ensure EOOS indicates that P-8C is OOS.

2. P-8C-4 - OFF, Insert RED, GREEN light OFF.

3. Insert RD10-12, RD10-17, RD10-18 malfunctions for three stuck control rods.

4. CC13C must be inserted at begin of scenario (prevents standby CCW pump from starting)

5. OVERRIDE Amber Standby light for P-52A ON. Cycle handswitch to OFF and then neutral to make it appear that P-52A is in Standby.

6. If sent as the AO to check CCW Hx dp PRIOR to manually starting the second CCW Pp, report as 10.1, 10.2.

5. If sent as the AO to check CCW Hx dp AFTER manually starting the second CCW Pp, report as 13.1, 13.2

SHIFT TURNOVER - SCENARIO: ONE

Approx. 60% power MOL; AFW Pp. P-8C is out of service. Main Feedwater System is in operation with both MFW Pps in service. Boron concentration is 842 ppm. ASI is -0.01. Shift orders are to continue a power escalation at 4% per hour to full power. All GOP-5 steps up to and including GOP-5, Section 3.5 have been completed.

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

Event Description: ***Power Escalation***

Time	Position	Applicant's Actions or Behavior
	SRO	Enters and directs the actions of GOP-5.
	SRO	Reviews GOP-5 Precaution and Limitations with crew.
	SRO	May discuss ASI control strategy.
	TURB RO	Continue power escalation as directed by CRS.

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

Event Description: ***Voltage Regulator Failure***

Time	Position	Applicant's Actions or Behavior
	SRO BOP	Diagnoses Main Generator Automatic Voltage Regulator failure • EK-0310, GENERATOR VOLTAGE REG TRIP alarms • Voltage regulator auto transfers to Manual
	BOP	May go to Hold on Main Turbine (not required)
	BOP	Any adjustments to voltage must be done with the Direct Control (DC) Adjuster
	SRO	Initiates troubleshooting and repair.

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

Event Description: ***CCW Pump Trip (Standby Fail to Start)***

Time	Position	Applicant's Actions or Behavior
	SRO RO	Diagnose trip of CCW Pump P-52A • P-52A breaker indicates OPEN • EK-1167, COMPONENT CLG PUMPS P-52A/B/C TRIP alarms • EK-1168, COMPONENT CLG PUMPS STANDBY PUMP RUNNING does NOT alarm. • Standby CCW Pump FAILS to start
	SRO	Enters and directs the actions of ARP-7 and ONP-6.2. Makes PA announcement of entering ONP-6.2.
	RO	Starts available CCW Pump P-52C.
	RO	Monitors CRDM and PCP parameters, as appropriate.
	SRO	Refers to Tech Spec 3.7.7. A.1 is required action. Determines one train inoperable and must restore within 72 hours.
	SRO	Initiates troubleshooting and repair. May also write a Condition Report.

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

Event Description: ***Charging Pump P-55A Fluid Drive Failure High***

Time	Position	Applicant's Actions or Behavior
	SRO RO	Diagnoses high failure of Charging Pump P-55A speed • Charging/letdown mismatch • Pressurizer level rising • VCT level lowering • May also get EK-0704, Letdown Ht Ex Tube Inlet Hi-Lo Pressure alarm
	SRO	Enters and directs the actions of EK-0704, as appropriate. NOTE: Actions directed by EK-0704 do NOT address this condition.
	SRO	Directs RO to take manual control of P-55A speed or place Charging Pump P-55B or P-55C in service and secure Charging Pump P-55A per SOP-2A
	RO	Takes manual control of P-55A speed to restore charging flow to normal (33-44 gpm) NOTE: Remainder of this event applies ONLY if crew takes actions to place P-55B or P-55C in manual and secures P-55A. It is acceptable for either set of actions to be taken.
	RO	If directed, place in MANUAL either P-55B (preferred) or P-55C Charging Pumps Control Select Switch

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

Event Description: ***Charging Pump P-55A Fluid Drive Failure High***

Time	Position	Applicant's Actions or Behavior
	RO	May direct AO to ensure throttled OPEN P-55B Seal Coolant Flow Control Vlv.
	RO	Ensure in AUTO charging pump control select switch for the second fixed capacity charging pump
	RO	Start pump selected for manual operation.
	SRO RO	Refer to Attachment 2 and check that the charging pump selected for AUTO (P-55C preferred), and possibly additional Letdown Orifice Stop Valves cycle according to controller output to maintain PZR level setpoint
	RO	IF desired to minimize Letdown Orifice Valve cycling, THEN CLOSE CV-2004, Orifice Stop Valve
	RO	When charging flow increases, stop P-55A.
	SRO	Initiate troubleshooting and repair of P-55A drive

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

Event Description: ***Main Steam Flow Transmitter (FT-0704) Fail to Lower than Normal***

Time	Position	Applicant's Actions or Behavior
	TURB	Diagnoses failure of steam flow transmitter FT-0704 on 'B' S/G • Steam flow lower than feed flow • CV-0703 closing to lower feed flow • Feed pump speed lowering • SG 'B' level lowering • SG 'A' level lowering, then restoring to normal as CV-0701 opens
	SRO	Enters and directs the actions of ONP-3, Loss of Feedwater
	TURB	Takes manual control of CV-0703 and feed pumps, if needed, to maintain SG levels at program ***CRITICAL TASK to prevent reactor trip on low SG level (immediate action).***
	SRO	Initiates troubleshooting and repairs

Op-Test No.: | Scenario No.: **1** | Event No.: **6** | Page 1 of 2

Event Description: ***PCS Leak Inside Containment (5 gpm)***

Time	Position	Applicant's Actions or Behavior
	RO BOP SRO	Diagnoses leakage from PCS into containment • Containment humidity rising • Pressurizer level lowering until recovered by PLCS • Pressurizer pressure lowering until recovered by PPCS • Charging requirements rising • Charging/letdown mismatch greater than normal • VCT level lowering • Containment sump level rising • EK-1364, GASEOUS WASTE, alarms due to Containment Air alarm
	SRO	Refers to and directs the actions of ONP-23.1
	RO	Ensures additional Charging Pumps start (if needed)
	RO	Ensure that the increase in average makeup rate has not been caused by a large generator load change or by a change in Tave
	RO SRO	At SRO discretion, close CV-2001 and CV-2009 to isolate letdown NOTE: May elect to NOT isolate letdown. This is acceptable.

Op-Test No.: | Scenario No.: **1** | Event No.: **6** | Page 2 of 2

Event Description: ***PCS Leak Inside Containment (5 gpm)***

Time	Position	Applicant's Actions or Behavior
	RO BOP SRO	Determine PCS leakrate NOTE: Full leak rate calculation is not expected to be performed. Leak rate determination may be somewhat masked by previous events which may still have PCS temperature changing slightly
	RO BOP	Attempt to locate the leak • Containment Sump level recorders • Containment humidity indicators • Area radiation monitors
	SRO	Refers to and enters Tech Spec 3.4.13 for PCS Leakage limits
	SRO	Enters GOP-8 to perform an orderly shutdown. ***NOTE: Crew may elect to trip the Reactor. This is acceptable.***
		.
		NOTE: Initiate next event when SRO has addressed plant conditions and Tech Specs

Op-Test No.:	Scenario No.: 1	Event No.: 7	Page 1 of 5
Event Description:	***PCS Leak Inside Containment Raises to 200 gpm***		

Time	Position	Applicant's Actions or Behavior
	RO BOP SRO	Diagnoses large break LOCA • SIAS actuated • PCS pressure lowering rapidly • Containment pressure rising rapidly • Containment humidity and temperature rising • EK-1363, CONT HI RAD and numerous alarms annunciating
	SRO	Orders reactor trip and enters and directs actions of EOP-1.0
	RO	Determines Reactivity Control NOT met due to three stuck rods and commences Emergency Boration ***CRITICAL TASK for reactivity control.***
	BOP	Control the Feedwater System • Places ALL operating MFPs to manual and ramp one to minimum speed • As Tave lowers toward 525°F ramps second MFP to minimum speed • Closes ALL MFRVs and Bypass FRVs ***CRITICAL TASK to prevent PCS overcooling.***
	BOP	Determines Vital Auxiliaries - Electric acceptance criteria met

Op-Test No.: | Scenario No.: 1 | Event No.: 7 | Page 2 of 5

Event Description: ***PCS Leak Inside Containment Raises to 200 gpm***

Time	Position	Applicant's Actions or Behavior
	RO	Determine that PCS Inventory Control acceptance criteria are NOT met due to low Pressurizer level
	RO	Determines PCS Pressure Control acceptance criteria NOT met (SIAS has actuated)
	RO	Determines Core Heat Removal accpetance criteria are met
	RO BOP	Determines that PCS Heat Removal acceptance criteria are met • Ensure Turbine Bypass Valve closed • Ensure Atmospheric Steam Dump Valves closed • Ensure both MSIVs closed • Ensure Main Feed Reg Valves and Bypass Feed Reg Valves closed
	RO BOP	Determine that Containment Isolation acceptance criteria are met
	RO BOP	Determine that Containment Atmosphere acceptance criteria are NOT met
	RO	Ensure all CAC high capacity outlet valves are open, as SWS conditions permit

Op-Test No.: Scenario No.: 1 Event No.: 7 Page 3 of 5

Event Description: ***PCS Leak Inside Containment Raises to 200 gpm***

Time	Position	Applicant's Actions or Behavior
	RO	Determine Vital Auxiliaries - Water acceptance criteria are met
	RO	Determine Vital Auxiliaries - Air acceptance criteria are met
	BOP	Perform EOP Supplement 5, "Checklist for Safeguards Equipment Following SIAS"
	BOP	Perform EOP Supplement 6, "Checklist for Containment Isolation"
	BOP	Commence Emergency Shutdown Checklist (GOP-10)
	SRO	Refers to Attachment 1, "Event Diagnostic Flow Chart" and diagnoses the event.
	SRO	Transitions to EOP-9.0 due to indications of a PCS LOCA, concurrent with MORE THAN one full length control rod stuck out. ***CRITICAL TASK to ensure entry into Functional Recovery Procedure.***

Op-Test No.: | Scenario No.: 1 | Event No.: 7 | Page 4 of 5

Event Description: ***PCS Leak Inside Containment Raises to 200 gpm***

Time	Position	Applicant's Actions or Behavior
	RO	Stop PCPs, as required. • If pressure less than 1300 psia, stop one PCP in each loop • If subcooling less than 25°F, stop remaining 2 PCPs. ***CRITICAL TASK to minimize inventory loss and to protect PCPs.***
	SRO	Direct that all PCPs be stopped if PCP operating limits of EOP Supplement 1 are NOT satisfied.
	SRO	Ensure emergency boration in progress. (already in progress due to three stuck control rods)
	SRO	Direct BOP to place one train of CR HVAC in Emergency Mode within 20 minutes of reactor trip.
	SRO	Direct BOP to place a Hydrogen Monitor in service.

Op-Test No.: | Scenario No.: **1** | Event No.: **7** | Page 5 of 5

Event Description: ***PCS Leak Inside Containment Raises to 200 gpm***

Time	Position	Applicant's Actions or Behavior
	SRO	Select appropriate success paths per Resource Assessment Trees A thru I. • RC - 2/3 • MVAE DC - 1 • MVAE AC - 1 • IC - 2 • PC - 1 • HR - 2 • CI - 1 • CA - 2 • MVAW - 1 • MVAA - 1
	SRO	Direct SE to perform Safety Function Status Checks every 15 minutes.
	RO	Verify "SAFETY INJ INITIATED" (EK-1342) is alarmed.
	SRO/RO	When proper boron is verified for cooldown, commence a controlled PCS cooldown.
		Terminate scenario when PCS cooldown commenced.