

Facility: PALISADES		Scenario No.: 1		Op-Test No.: __1__	
Examiners:		Operators:			
Initial Conditions: Approx. 25% power, MOL, D/G 1-1 tagged out for inspection.					
Turnover: Power escalation in progress. One Main Feed Pp. in service. Shift orders are to swap from Startup Power to Station Power and continue the power escalation at 6% per hour to full power.					

Event No.	Malf. No.	Event Type*	Event Description
1	NA	SRO (N) BOP (N)	Alternate from Startup to Station Power
2	NA	SRO (N) BOP (N) RO (R)	Continue power escalation
3	RP22B	SRO (I) BOP (I)	Hot Leg #1 RTD fails low
4	SW11A	SRO (C) RO (C)	P-7A Service Water Pp. Basket Strainer high dP
5	RX15A	SRO (I) BOP (I)	Main Steam Flow Transmitter FT-0702 fail to lower than normal
6	FW10	SRO (M) BOP (M) RO (M)	Feedwater line rupture outside containment (ramp in)
7	RC17	SRO (C) RO (C)	Stuck open PZR spray valve (CV-1057)
8	FW02	SRO (C) BOP (C) RO (C)	Condensate Storage Tank ruptures

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

Scenario 1 - Simulator Operator Instructions

- Reset to IC 14 (25% - MOL).
- Tagout D/G 1-1. Caution Tag Start Switch and Output Breaker switch.
- One MFW Pp. I/S
- Ensure 4160V buses are S/U power.
- Ensure P-7A SWS Pump is operating.
- May have to OVRD EK-1316 to prevent T-82A Hi-Lo Press alarm from coming in when resetting to IC-14.

Event No.	Simulator Operator Instruction
3	REMOTE 1 INSERT RP-22B (Hot Leg RTD) to fail LOW (Value = 0.0%)
4	REMOTE 2 INSERT OVRD for EK-1132, P-7A Basket Strainer Hi dP. IF REQUESTED to locally check basket strainer dP, report gauge reads ~9 psid. P-7B dP at 1 psid. DELETE this OVRD when P-7C starts.
5	REMOTE 3 INSERT MF RX15A (Main Steam FT-0702) to active at 0.65. NOTE: DO NOT ENTER WHILE DILUTION IS IN PROGRESS.
6	REMOTE 4 INSERT FW10 (FW Line 2 Break Outside Cont.) to RAMP in 10 minutes from 0-50%. EK-0171, "CONDENSATE PUMP ROOM FLOODING" should alarm ~30 seconds after Turb. Bldg sump alarm. May need Event Trigger. INSERT this MF when S/G level is being restored from Event 5 conditions and is at ~50%.)
7	REMOTE 5 INSERT RC17 (PZR Spray Vlv.) @100% at time of Reactor trip When operator manually closes CV-1057, RC17 will be deleted via the following Event Trigger: Event: .NOT.ZDI2P(160) (CV-1057 to CLOSE) Action: DMF RC17
8	REMOTE 6 INSERT FW02 (T-2 Leak) Ramp = 10 minutes from 0-100%. (Insert when EOP-2.0 SFSCs are assigned.) Will need to lineup Service Water to P-8C or P-8A when directed. (Use RM FW38).

SPECIAL NOTES:

1. When AO is dispatched to investigate Turbine Building Sump level alarm, wait 1 minute and report: ***"There's some kind of steam/water leak on the East side of the Turbine Building in the vicinity of the E-5s and E-6s. I can't get close enough to see exactly what it is."***
Info only for Simulator Operator: the FW line leak is downstream of the E-6s.
2. If dispatched to investigate T-2 low level, report that a fork lift has punctured the tank.

3. DELETE OVRD EK-1132 when P-7C starts.

Scenario 1 - Shift Turnover

Approx. 25% power, MOL, D/G 1-1 tagged out for inspection. It is day two of the LCO. Boron is 1088 ppm. Offgas flow is 2 cfm. Steam Generator blowdowns are ~20K each.

Power escalation in progress. One Main Feed Pp. in service. Shift orders are to swap from Startup Power to Station Power and continue the power escalation at 6% per hour to full power.

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Event Description: ***Alternate from Startup to Station Power.***

Time	Position	Applicant's Actions or Behavior
	SRO BOP	Enters SOP-30, 7.1.1
	BOP	Checks control power lights LIT for Bus 1A, 1B.
	BOP	Ensures Startup Transformer UV relays reset. * 227X-5 * 227X-6
	BOP	Checks for proper voltages on Station Power Transformers.
	BOP	Inserts synch switch and turns ON for associated breakers, as needed (may check synch scope energized).
	BOP	Scopes and closes the following breakers: <ul style="list-style-type: none"> • Bus 1A 252-101 • Bus 1B 252-201 • Bus 1F 252-301 • Bus 1G 252-401

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Event Description: ***Alternate from Startup to Station Power.***

Time	Position	Applicant's Actions or Behavior
	BOP	Verifies the following breakers open: (as corresponding Station Power breaker is closed) <ul style="list-style-type: none"> • Bus 1A 252-102 • Bus 1B 252-202 • Bus 1F 252-302 • Bus 1G 252-402
	BOP	Acknowledges associated breaker trip alarm after each transfer. (Bus 1F and 1G only.)
	BOP	As each breaker swap is made, ensures charging motor lamp for Station Power breakers lights within 10 seconds.
	BOP	Matches breaker control switch targets by placing switch for Startup Power breakers (just opened) to TRIP.

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Event Description: ***Continue Power Escalation***

Time	Position	Applicant's Actions or Behavior
	SRO	Enters/continues and directs the actions of GOP-5.
	SRO	Reviews GOP-5 Precautions and Limitations with crew.
	SRO	May discuss ASI control strategy. Determines target ASI = -0.02. CUE: Reactor Engineering says it is acceptable to be outside of the ASI band. (Limit is ± 0.05).
	BOP RO	Continue power escalation as directed by CRS.
		Note to Examiner: Various techniques may be used for the power ascension (e.g., start with a 50 gal. dilution, follow with a 100 gal. dilution, etc.)
	BOP	Selects DEH rate at 6% per hour.
	RO BOP	Monitor Tave and Tref.
	BOP	Initiates GO on DEH control for Main Turbine load increase.

Op-Test No.: Scenario No.: **1** Event No.: **3** Page **_1_** of **_1_**Event Description: **Hot Leg #1 RTD fails low**

Time	Position	Applicant's Actions or Behavior
	SRO BOP RO	Diagnoses low failure of Hot Leg #1 RTD <ul style="list-style-type: none"> - EK-0604, (ARP-21) Rack D, NUCLEAR - DELTA T POWER DEVIATION, T-INLET OFF NORMAL/CALCULATOR TROUBLE - Thermal Margin Monitor Channel B indicates "0". - TI-0112HB failed LOW.
	SRO	Enters and directs the actions of various ARP-21.
	BOP	Bypass the Variable High Power Trip (Trip #1) and the TM/LP trip (Trip #9) for B Channel of RPS, per SOP-36. <ol style="list-style-type: none"> 1. Insert bypass key above affected RPS Trip Unit. 2. Turn key 90° clockwise. 3. Verify lit YELLOW light above bypass keyswitch. 4. Log evolution.
	SRO	Notify I&C to troubleshoot.
	SRO	Refers to various Technical Specifications: <ul style="list-style-type: none"> • T.S. 3.3.1 • T.S. 3.1.6 (does not apply because Thot B channel does not feed PDIL calculator. • T.S. 3.3.7 requirements are met • T.S. 3.3.8 does not apply • T.S. 3.4.12 does not apply. • ORM 3.17.6, item 12 does apply.

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Event Description: ***P-7A SW pump Basket Strainer Hi dP***

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses P-7A Basket Strainer Hi dP: <ul style="list-style-type: none"> • EK-1132, SERVICE WATER PUMP P7A BASKET STR HI dP • May check running amps for P-7A
	SRO RO	Implement actions of EK-1132: <ul style="list-style-type: none"> • Start Standby Service Water Pump, per SOP-15. • Then stop P-7A. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • May locally check basket strainer dP. <p>(If local check of basket strainer is requested, Simulator Operator will report a high reading.) After local report of high reading, above actions will be implemented.</p>
	SRO	May refer to ONP-6.1, Loss of Service Water, but this is not required.
	SRO	Refers to Tech. Spec. 3.7.8. Service Water Pump is NOT inoperable.
	SRO	Initiates troubleshooting/repair.
		Note to Examiner: Cue the SRO to have the RO respond.

Op-Test No.: Scenario No.: **1** Event No.: **5** Page **_1_** of **_1_**Event Description: **Main Steam Flow Transmitter FT-0702 fails low**

Time	Position	Applicant's Actions or Behavior
	SRO RO BOP	Diagnoses failure of steam flow transmitter FT-0702 on 'A' S/G <ul style="list-style-type: none"> • Steam flow lower than feed flow • CV-0701 closing to lower feed flow • Feed pump speed lowering • SG 'A' level lowering • SG 'B' level lowering, then restoring to normal as CV-0703 opens
	SRO	Enter and direct the actions of ONP-3, "Loss of Main Feedwater"
	BOP	<ul style="list-style-type: none"> • Take manual control of CV-0701 and feed pumps, if needed, to maintain S/G levels at program. <p>CRITICAL STEP to establish steam generator level control prior to Reactor Trip. Note: Reactor automatically trips @ 26.9%.</p>
	BOP	Monitor feed/steam flow.
	SRO	Initiates troubleshooting and repair.

Op-Test No.: Scenario No.: **1** Event No.: **6** Page **_1_** of **_3_**Event Description: ***Feedwater Line Rupture (outside Containment)***

Time	Position	Applicant's Actions or Behavior
	SRO BOP RO	Diagnose feedwater line rupture: <ul style="list-style-type: none"> • S/G levels lowering (possible low level alarms) • EK-1354, TURBINE FLR SUMP HI LEVEL • EK-0171, CONDENSATE PUMP ROOM FLOODING • EK-0967, LOOP 1 LOOP 2 TAVE DEVIATION
	SRO BOP	May dispatch AO to Turbine Bldg. sump to check level.
	SRO	Enter ONP-3, Loss of Main Feedwater as a precaution, but no actions directly apply.
	SRO BOP RO	Diagnose that, based on Condensate Pump Room Flooding alarm, a manual reactor trip is required.
	SRO	Orders a manual Reactor trip, tripping of both Condensate Pumps, and enters and directs the actions of EOP-1.0.
		NOTE: Next malfunction (stuck open PZR spray) entered at trip.
	RO	Determines Reactivity Control is MET.
	BOP	Control the Feedwater System: <ul style="list-style-type: none"> • 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.

Op-Test No.: Scenario No.: **1** Event No.: **6** Page **_2_** of **_3_**Event Description: ***Feedwater Line Rupture (outside Containment) (including Event 7, Stuck Open PZR Spray Valve)***

Time	Position	Applicant's Actions or Behavior
	BOP	Determines Vital Auxiliaries - Electric acceptance criteria all MET.
	RO	Determines that PCS Inventory Control acceptance criteria are MET.
	RO	Diagnoses stuck open PZR spray valve (CV-1057) and closes valve, and reports condition to CRS. PCS Pressure Control acceptance criteria are met. Note: Safety Injection occurs at 1605 psia.
	RO	Determines Core Heat Removal acceptance criteria are met.
	RO BOP	Determine that PCS Heat Removal acceptance criteria are met.
	RO BOP	Determine that Containment Isolation acceptance criteria.
	RO BOP	Determine 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 RO	BOP turns panels over to RO and reports to CRS.

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Event Description: ***Feedwater Line Rupture (outside Containment)***

Time	Position	Applicant's Actions or Behavior
	SRO BOP	Align Control Room HVAC to Emergency Mode within 20 minutes of reactor trip.
	SRO	Directs closing of both MSIVs (due to no Condensate Pumps operating), and ensure both Main Feedwater Pumps are tripped.
	SRO BOP	Assigns/performs Emergency Shutdown Checklist per GOP-10.
	SRO	Refers to EOP-1.0, Attachment 1, "Event Diagnostic Flow Chart" and diagnoses the event.
	SRO	Transitions to EOP-2.0, "Reactor Trip Recovery" due to all acceptance criteria being met.
	SRO	Assigns performance of EOP-2.0 Safety Function Status Checks to STA individual.
		Note: Condensate Storage Tank malfunction entered here.

Op-Test No.: Scenario No.: **1** Event No.: **8** Page **_1_** of **_2_**Event Description: **Condensate Storage Tank Ruptures**

Time	Position	Applicant's Actions or Behavior
	SRO BOP RO	Diagnoses Condensate Storage Tank rupture: <ul style="list-style-type: none"> EK-1108, CONDENSATE STORAGE TANK T-2 HI-LO LEVEL
		Note: Crew may dispatch an AO to investigate.
	SRO	Re-enters EOP-1.0 Diagnostic Flow Chart and diagnoses a Loss of All Feedwater, EOP-7.0.
	SRO	Assigns EOP-7.0 Safety Function Status Checks to STA.
	SRO RO	Stops all Primary Coolant Pumps. CRITICAL TASK
	RO	Commence emergency boration.
	SRO BOP	Conserve S/G inventory by closing ALL S/G blowdown valves: <div style="display: flex; justify-content: space-between;"> <div> 'A' S/G ' CV-0767 CV-0771 CV-0739 </div> <div> B' S/G CV-0768 CV-0770 CV-0738 </div> </div>
	RO	Since Primary Coolant Pumps are off, may need to use Auxiliary Spray to control Pressurizer pressure (requires a key).

Op-Test No.: Scenario No.: **1** Event No.: **8** Page **2** of **2**Event Description: **Condensate Storage Tank Ruptures**

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluates feedwater options and determines Aux. FW from Service Water via P-8C (or P-8A) should be used. <i>NOTE: Cannot use Main FW option because of no steam available to operate steam driven FW pp. (MSIVs are closed.)</i>
	SRO	Direct performance of EOP Supplement 31 for supplying AFW P-8C from Service Water.
	RO	Place P-8C Start Select Switch to Manual.
	SRO BOP	Direct AO to perform SW lineup to P-8C.
	RO	When lineup is complete, reset Low Suction Pressure Trip, if required (take P-8C handswitch to TRIP).
	SRO RO	Monitor S/G levels. When @ ~ -75%, start P-8C to feed both S/Gs to restore levels to 60-70%.
		END SCENARIO WHEN FEED FLOW IS ESTABLISHED.

Facility: PALISADES	Scenario No.: 2	Op-Test No.: _____
Examiners:	Operators:	
Initial Conditions:	Approx. 87% power, MOL; P-66B HPSI Pump tagged out. Aux. Spray CV-2117 is tagged out.	
Turnover:	Approx. 87% power, MOL. P-66B HPSI pump is out of service for pump alignment and should be restored to service in 3 hours. Aux. Spray CV-2117 is also inoperable due to a wiring problem with the handswitch.	
Boron concentration is 810 ppm. A Power Control request to adjust reactive loading on the Main Generator has been approved and Shift Orders are to first raise VARs OUT by 30 MVARs. Then continue raising power at 4% per hour.		

Event No.	Malf. No.	Event Type*	Event Description
1	NA	SRO (N) BOP (N)	Adjust reactive loading on Main Generator
2	NA	SRO (N) RO (R) BOP (N)	Raise power
3	CV05	SRO (C) RO (C)	Loss of Letdown Pressure Control high
4	RP11D	SRO (I) BOP (I)	Power Range Safety Channel (8) Power Failure
5	RX05B	SRO (I) RO (I)	PZR Pressure Control Fail High (Channel B) (DELETED)
6	TU01	SRO (C) BOP (C)	Main Turbine High Vibration (requires trip)
7	OVRD ED12B SW10A SW10C	SRO (C) RO (C)	De-energization of Bus 1D / D/G 1-2 AUTO start and sequences all loads <u>except</u> P-7A, P-7C SW pumps.
8	MS06A	SRO (M) BOP (M) RO (M)	Steam Generator A Code Safety fail open (1)
9	SG01B	SRO (M) BOP (M) RO (M)	Steam Generator B Tube Leak / Rupture

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

Scenario 2 - Simulator Operator Instructions

- Reset to IC-16 - 86.9% MOL (Turbine Valve Testing).
 - Tagout Aux Spray CV-2117
 - Aux Spray is OOS, with a caution tag hung on the hand switch
 - OVRD DI CV-2117 H/S OFF
 - OVRD LO CV-2117-G, CV-2117 GREEN light OFF
 - OVRD LO CV-2117-R, CV-2117 RED light OFF
 - ENSURE IMP PRESS LOOP is OUT.
 - HPSI Pump P-66B is OOS, with a caution tag hung on the hand switch
 - REMOTE SI24 RACKOUT
 - **INSERT SW10A, SW10C** to ACTIVE (to prevent SW pps. auto start)
- Prepare copy of GOP-5 with all steps up to and including 4.4 complete and signed off.
Provide copy of ASI graph.

Info Only: During validation the following turbine vibration readings were noted just prior to the crew manually tripping the plant:

#3 bearing = 7.1 mils #4 = 12.8 mils #5 = off-scale hi #6 = 11.3

During NRC validation, it was postulated that the scenario IC could be improved if setup included starting out with Tave matched with Tref. A method suggested was to maybe add Xenon build in (turnover that a power maneuver was in progress.)

Event No.	Simulator Operator Instruction
3	REMOTE 1 INSERT CV05 (LD Press. Fail High) to ACTIVE
4	REMOTE 2 INSERT RP-11D (PWR Range NI Power Supp. Failure) to ACTIVE
5	REMOTE 3 INSERT RX05B (PPCS fail Hi) to ACTIVE SPECIAL NOTE: THIS EVENT WAS DELETED. DO NOT USE.
6	REMOTE 4 INSERT TU01 (Main Turb Hi Vibe) Severity = 100% Ramp = 5 min If asked as AO to report readings from Bentley-Nevada panel, access information at instructor station to report actual readings.
Turbine Trip / Reactor Trip	
7	REMOTE 5 INSERT OVRD 152-203-1 (S/P Incoming) to ON (trips Bus 1D)
8	REMOTE 6 INSERT MS06A (S/G Code Safety leak) Severity = 100% No ramp. (right after Bus 1D restored)
9	REMOTE 7 INSERT SG01B (SGTR) @70% Ramp = 5 minutes (insert after transition to EOP-6.0)
10	SW10A and SW10C (ACTIVE AT SETUP) Bus 1D powered Service Water Pps. do not sequence back on after restoration of Bus 1D.

In this scenario there was an overload trip alarm in for P-7A. Per the C+E Manual this should not occur. May need to OVRD the alarm off.

Scenario 2 - Shift Turnover

Approx. 87% power, MOL. P-66B HPSI pump is out of service for pump alignment and should be restored to service in 3 hours. Aux. Spray CV-2117 is also inoperable due to a wiring problem with the handswitch.

Boron concentration is 810 ppm. Offgas flow is 2 cfm. Target ASI is +0.016. A System Control request to adjust reactive loading on the Main Generator has been approved and Shift Orders are to first raise VARs OUT by 30 MVARs. Then continue raising power at 4% per hour.

Op-Test No.: Scenario No.: **2** Event No.: **2** Page **_1_** of **_1_**Event Description: **Raise Power**

Time	Position	Applicant's Actions or Behavior
	SRO	Enters and directs the actions of GOP-5.
	SRO	Reviews GOP-5 Precautions and Limitations with crew.
	SRO	May discuss ASI control strategy.
		Note: Various techniques may be used for the power ascension, (e.g., start with a 50 gal. dilution and follow with a 100 gal. dilution).
	BOP	Selects DEH rate at 4% per hour.
	BOP RO	Continue power escalation as directed by SRO.
	BOP RO	Monitor Tave and Tref
	BOP	Initiates GO on DEH control for Main Turbine.

Op-Test No.: Scenario No.: 2 Event No.: 3 Page _1_ of _1_		
Event Description: <i>Loss of Letdown Pressure Control HIGH</i>		
Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses failure of the intermediate letdown pressure controller <ul style="list-style-type: none"> • 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 repositions selected valve to control pressure at approximately 460 psig.
	SRO	Initiates troubleshooting and repairs.

Op-Test No.: Scenario No.: 2 Event No.: 4 Page _1_ of _2_		
Event Description: Power Range Safety Channel (8) Power Failure		
Time	Position	Applicant's Actions or Behavior
	ALL	Diagnose failure of NI-08: <ul style="list-style-type: none"> • NI-008 detector voltage indicates 0 VDC • Alarms: <ul style="list-style-type: none"> - EK-0948, DROPPED ROD - EK-06 C03, CHANNEL DEVIATION LEVEL 1 5% C04, CHANNEL DEVIATION LEVEL 2 10% C07, DROPPED ROD C08, NI CHANNEL TROUBLE D02, NUCLEAR DELTAT POWER DEVIATION T-INLET OFF-NORMAL/CALCULATOR TROUBLE CHANNEL C D08, NUCLEAR DELTAT POWER DEVIATION T-INLET OFF-NORMAL/CALCULATOR TROUBLE CHANNEL D - TMM Channel D NI indicates 0 - NI-008 Upper and Lower indicate 0% power
	SRO	Note: Refers to ONP-6.1, Control Rod Drop
	SRO	Enter and direct the actions of various ARPs
	SRO	Refer to SOP-35 for removing a Power Range NI from service.

Op-Test No.: Scenario No.: 2 Event No.: 4 Page _2_ of _2_		
Event Description: Power Range Safety Channel (8) Power Failure		
Time	Position	Applicant's Actions or Behavior
	SRO	Refer to EM-04-02 to monitor Quadrant Power Tilt (or call Rx Engineer).
	SRO	Verify Incore Monitoring System operable for monitoring LHR (or call Rx Engineer).
	BOP	Bypass the Variable High Power Trip (Trip #1), the TM/LP Trip (Trip #9), the High Power Rate Trip (Trip #2), and Loss of Load Trips (Trip #10) per SOP-36 <ol style="list-style-type: none"> 1. Insert bypass key above affected RPS Trip Unit. 2. Turn key 90° clockwise. 3. Verify lit yellow light above bypass keyswitch. 4. Log evolution in the Reactor Logbook
	SRO	Declare inoperable the following: <ul style="list-style-type: none"> • Channel D Flux - delta T Power Comparator • ASI alarm function of Thermal Margin Monitor D Channel
	RO BOP	Monitor and log the "Power Density" status of the remaining operable TMM channels hourly.
	SRO	Initiate troubleshooting and repairs
	SRO	Refers to various Tech. Specs: <ul style="list-style-type: none"> • T.S. 3.2.1 for LHR - No action as long as Incore System is operable. • T.S. 3.3.1 - Actions A.1, B.1, C.1 apply • ORM 3.17.6, Action 12.1.a applies. • ORM 3.17.6, Action 16 applies. (item 15 also for reference only) May also refer to ORM 3.11.1, 3.11.2.

Op-Test No.: _____ Scenario No.: 2 Event No.: 5 Page 1 of 1		
Event Description: <i>PZR Pressure Control Fail High (Channel B) (DELETED)</i>		
Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses high failure of pressurizer pressure controlling channel • EK-0753, PRESSURIZER PRESSURE OFF NORMAL HI-LO, alarms • Spray valves open • Proportional heaters off • Pressurizer pressure lowers • PIA-0101B indicating high
	SRO	Enters and directs the actions of ARP-4 and ONP-18
	RO	Takes manual control of PPCS controller 'A' or alternates Pressurizer pressure controllers per SOP-4
	SRO	Initiates troubleshooting and repairs

Op-Test No.: Scenario No.: 2 Event No.: 6 Page _1_ of _2_		
Event Description: Main Turbine High Vibration		
Time	Position	Applicant's Actions or Behavior
	SRO BOP	Diagnose high vibration on turbine <ul style="list-style-type: none"> • EK-0105, TURBINE HIGH VIBRATION • Indications on Control Room vibration recorders
		<i>NOTE: If AO is sent to verify vibration, report that Control Board vibration readings are correct.</i>
	SRO	Enter and direct the action of EK-0105
	BOP	Checks normal indications on: <ul style="list-style-type: none"> - Bearing oil temperature - Eccentricity - Differential expansion - Generator frequency - Feedwater heater levels
	SRO	Determine plant trip required due to vibration level and orders reactor trip NOTE: May first determine that level is between 10-14 mils and commence a plant shutdown per GOP-8. This is acceptable if a trip is directed when vibration exceeds 14 mils with reactor power above 15%.
	RO BOP	Trips the reactor as directed
		INSERT Bus 1D de-energizes at time of Reactor trip.

Op-Test No.: Scenario No.: 2 Event No.: 6 Page _2_ of _2_		
Event Description: Main Turbine High Vibration		
Time	Position	Applicant's Actions or Behavior
	SRO	Enters and directs the actions of EOP-1.0
	RO	Determine that Reactivity Control acceptance criteria are MET.
	BOP	Control the Feedwater System: <ul style="list-style-type: none"> • 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	(EVENT 7) Determine Vital Auxiliaries - Electric acceptance criteria are MET: <ul style="list-style-type: none"> • Bus 1D is energized from D/G 1-2.
	BOP	Take prescribed contingency action for Vital Auxiliaries - Electric: <ul style="list-style-type: none"> • Verify auto start of D/G 1-2. • Ensure D/G breaker 152-213 is closed. (Note: D/G breaker will close and loads will sequence on EXCEPT for Service Water Pumps P-7A and P-7C.)
		EVENT 8 - ENTER "A" S/G Code Safety Fails Open HERE.

Op-Test No.: Scenario No.: 2 Event No.: 8 Page _1_ of _4_		
Event Description: Steam Generator "A" Code Safety (1) Fail Open		
Time	Position	Applicant's Actions or Behavior
	RO	Determine PCS Inventory Control acceptance criteria are MET.
	RO	Verifies status of PCS Pressure Control acceptance criteria. <ul style="list-style-type: none"> • If SIAS has occurred due to effects of "A" S/G code safety open, verifies SIAS. • Acceptance criteria are NOT met.
	RO	Determines Core Heat Removal acceptance criteria are MET.
	RO	Verifies status of PCS Heat Removal acceptance criteria: <ul style="list-style-type: none"> • May see effects of "A" S/G code safety open (audible noise, Tave lowering, S/G level, PZR pressure, etc. • If these effects are not noticeable yet, RO will note acceptance criteria as being MET.
	BOP	If either S/G pressure is less than 800 psia: <ul style="list-style-type: none"> • Ensure Turbine Bypass Valve closed. • Ensure ADVs are closed. • Close both MSIVs. • Recommend isolating AFW to "A" S/G.
	RO BOP	Determine that Containment Isolation acceptance criteria are MET.
	RO	Determine that Containment Atmosphere acceptance criteria are MET.

Op-Test No.: Scenario No.: 2 Event No.: 8 Page _2_ of _4_		
Event Description: Steam Generator "A" Code Safety (1) Fail Open		
Time	Position	Applicant's Actions or Behavior
	RO	Determine Vital Auxiliaries - Water acceptance criteria are NOT met.
	RO	Take prescribed contingency action for Vital Auxiliaries - Water: <ul style="list-style-type: none"> Manually start SW pumps P-7A and P-7B.
	RO	Determine that Vital Auxiliaries - Air acceptance criteria are MET.
	BOP RO	BOP turns panels over to RO and reports to SRO.
	SRO BOP	Align Control Room HVAC to Emergency Mode within 20 minutes of Reactor trip.
	SRO	Verifies at least ONE Condensate Pump and ONE Cooling Tower Pump operating.
	SRO BOP	If SIAS has initiated, assign/perform EOP Supplement 5 for SIAS Checklist.
	SRO BOP	Assign/perform Emergency Shutdown Checklist per GOP-10.

Op-Test No.: Scenario No.: 2 Event No.: 8 Page _3_ of _4_		
Event Description: Steam Generator "A" Code Safety (1) Fail Open		
Time	Position	Applicant's Actions or Behavior
	RO	If both MSIVs are closed, trip BOTH Main Feed Pps.
	SRO	Refers to EOP-1.0, Attachment 1, "Event Diagnostic Flow Chart" and diagnoses the event.
	SRO	Transitions to EOP-6.0, Excess Steam Demand Event".
	SRO	Assigns performance of EOP-6.0 Safety Function Status Checks to STA.
	SRO RO	If Letdown Orifice Stop Valves are closed, place: <ul style="list-style-type: none"> • HS-2003 • HS-2004 • HS-2005 to CLOSE.
	RO	If PZR pressure lowers to less than 1300 psia, trip ONE PCP in each loop.
	RO	If PCS subcooling less than 25°F, trip ALL PCPs.
	RO	Commence / verify emergency boration. (Note: Should already have auto initiated due to SIAS.)
		ENTER EVENT 9 ("B" S/G Tube Rupture) after first round of SFSCs are completed SAT.

Op-Test No.: Scenario No.: 2 Event No.: 8 Page _4_ of _4_		
Event Description: Steam Generator "A" Code Safety (1) Fail Open		
Time	Position	Applicant's Actions or Behavior
	SRO	<p>Determines affected S/G as "A" and initiates EOP Supplement 17 for S/G isolation.</p> <ul style="list-style-type: none">• Actions Outside Control Room <p>___ Close MV-MS103, MV-MS101 (preferred)</p> <p>___ Close MV-CA781, MV-CA782 (alternate)</p> <ul style="list-style-type: none">• Actions Inside Control Room <p>___ Ensure both MSIVs closed.</p> <p>___ Ensure MV-0510 closed (MSIV bypass)</p> <p>___ Close CV-0701, Main Feed Reg</p> <p>___ Close CV-0742 Main Feed Reg Block (keyswitch)</p> <p>___ Close CV-0735, Bypass Feed Reg</p> <p>___ "A" S/G Blowdown Valves: CV-0767, CV-0771, CV-0739</p> <p>___ "A" S/G AFW FCVs: CV-0737, CV-0737A, CV-0749</p> <p>___ Close CV-0522B (P-8B AFW Pp. steam supply)</p>

Op-Test No.: Scenario No.: 2 Event No.: 9 Page _1_ of _2_		
Event Description: Steam Generator "B" Tube Rupture		
Time	Position	Applicant's Actions or Behavior
	ALL	Diagnose Steam Generator "B" Tube Leak/Rupture: <ul style="list-style-type: none"> • "B" S/G level rising. • PZR pressure and level respond accordingly
	SRO	Transitions to EOP-9.0, "Functional Recovery Procedure" due to more than one faulted S/G.
	SRO	Direct performance of Section 4.0, Operator Actions.
	BOP RO	Close CWRT Vent Valves: CV-1064, CV-1065.
	BOP	Place one Hydrogen Monitor in operation, with key switch in "ACCI", per SOP-38.

[illegible]

Facility: PALISADES	Scenario No.: 3	Op-Test No.: _____
Examiners:	Operators:	
Initial Conditions: 100% power, EOL, P-66B HPSI tagged out for bearing inspection.		
Turnover: Shift orders are to commence a power reduction at 20% per hour for refueling outage. GOP-8 has been completed up to Att.1, Step 2.0. Crew begins there for the power reduction.		

Event No.	Malf. No.	Event Type*	Event Description
1	NA	SRO (N) BOP (N)	Setup Main Turbine DEH controls
2	NA	SRO (N) RO (R) BOP (N)	Power reduction
3	IA04C	SRO (C) RO (C)	Plant Air Compressor C-2C trips (requires realignment)
4	CV06	SRO (I) RO (I)	Letdown pressure demand fails low
5	OVRD	SRO (C) BOP (C)	Turbine bypass valve fails partial open (isolatable) DELETED
6	RX10C	SRO (I) BOP (I)	S/G Level Transmitter LT-0703 fails high DELETED
7	RC21	SRO (M) BOP (M) RO (M)	PZR PRV fails open (~1%), then full open (100%)
8	TC02	SRO (C) BOP (C)	Main Turbine fails to auto or manually trip
9	SI09A	SRO (C) RO (C)	P-66A HPSI fails to auto start

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

Scenario 3 - Simulator Operator Instructions

- 100% EOL
- ENSURE C-2A and C-2C in service.
- **INSERT OVRD** C-2B handswitch (hand position to OFF) to prevent manual start.
- **INSERT IA17** C-2B Failure to Auto Start.
- ENSURE HPSI Pump P-66B is OOS, with a caution tag hung on the hand switch
 - REMOTE SI24 RACKOUT
- **INSERT TC02** to ACTIVE (turb fails to auto trip)
- **INSERT SI09A** to ACTIVE (P-66A HPSI fails to auto start)

Event No.	Simulator Operator Instruction
3	REMOTE 1 INSERT IA04C (C-2C trips) INSERT IA01 (Value at 10%).
4	REMOTE 2 INSERT CV06 (LD Press. Fail Low)
5	REMOTE 3 Setup for TBV Fails Open: DELETED 1. CV-0511 Man PB: * PIC-0511 MAN to ON * PIC-0511 M light to OFF * PIC-0511-A Auto lamp to ON * PIC-0511 MNC-2 to ON * PIC-0511-MAN [ZDI3P(717)] 2. Trigger #6 Go to Event * type in ZDI3P(717) * Action is dor pic 0511-MNC-2 3. Trigger #7 * zdi 3p(717) * dor pic 0511-m 4. Trigger #8 * zdi 3p(717) * dor pic 0511-a
6	REMOTE 4 INSERT RX10C (SG-LT-0703) Value = 70%. No ramp. DELETED
7	REMOTE 5 INSERT RC21 (RV-1040 leak) Value = 1%. Ramp = 10 minutes. (PRV Temperature alarms @ ~1%)
7	REMOTE 9 After crew diagnoses PORV weeping, CHANGE value of RC21 to 100%.
Crew Trips the Reactor	
8	TC02 (Main Turb Fail to Auto Trip) (ACTIVE AT SETUP)
9	SI09A (HPSI Fail to Auto Start) (ACTIVE SETUP)

1. If dispatched to check PZR Shed Fans, report ALL 3 fans running. (V-61A/B/C.)

Scenario 3 - Shift Turnover

100% power, EOL, P-66B HPSI tagged out for bearing inspection. Boron is 15 ppm. Shift orders are to commence a power reduction at 20% per hour for refueling outage. T-53B BAST had been placed on long recirc on the previous shift, per SOP-2A, 7.4.2.a.2, and boric acid sample results do match the placard on Panel C-12.

You are to start the power reduction at Step 2.0 of GOP-8, Attachment 1. All steps up to Step 2.0 have been completed.

Special Note to Sim Operator: Provide copy of GOP-8, Att. 1 up to 2.0 initialed as completed.

Op-Test No.: Scenario No.: 3 Event No.: 1 Page <u>1</u> of <u>1</u>		
Event Description: Setup Main Turbine DEH Controls		
Time	Position	Applicant's Actions or Behavior
	BOP	Ensure DEH is in Operator Auto: <ul style="list-style-type: none">• Observe GREEN "Operator Auto" message on CRT screen.
	BOP	Sets LOAD and RATE values: <ul style="list-style-type: none">___ Press CONTROL SETPOINT on DISPLAYS keypad.___ ENTER Setter value (as desired).___ Press SELECT.___ Press TAB to move cursor to "RATE" field.___ Enter RATE as 20% per hour.___ Press SELECT.

Op-Test No.: Scenario No.: 3 Event No.: 2 Page _1_ of _1_		
Event Description: Power Reduction		
Time	Position	Applicant's Actions or Behavior
	SRO	Review Precautions and Limitations of GOP-8 with crew.
		(Note: This may already have been performed at pre-job brief.)
	RO	Commence boration / rod insertion (as determined in pre-job brief).
	BOP	Press GO on Main Turbine DEH control.
	BOP RO	Monitor Tave and Tref as power lowers.

Op-Test No.: Scenario No.: 3 Event No.: 3 Page _1_ of _1_		
Event Description: <i>Air Compressor C-2C Trips, includes a small air system leak.</i>		
Time	Position	Applicant's Actions or Behavior
	SRO RO	Diagnose C-2C trip: <ul style="list-style-type: none"> • EK-1104, AIR COMPRESSORS C2A, C2B, C2C TRIP, alarms. • EK-1102, INSTRUMENT AIR LO PRESS, may alarm. • EK-1101, CONTAINMENT INSTR AIR LO PRESS • EK-1103, SERVICE AIR LO PRESS Note: EK-11XX = ARP-7
	RO	Attempt manual start of Standby air compressor (C-2B). Inform SRO it will NOT start.
	SRO	Enter and direct actions of ONP-7.1, "Loss of Instrument Air".
	SRO RO	Crosstie to FWP Air System: <ul style="list-style-type: none"> • Open Air from Feedwater Purity CV-1221.
	RO	Diagnose that Instrument Air System pressure is restoring.
	SRO BOP	May dispatch an AO to monitor C-903A/B FWP air compressors.
	SRO	Complete and exit ONP-7.1
		Note: There are no Tech. Specs. for air compressors.

Op-Test No.: Scenario No.: 3 Event No.: 4 Page _1_ of _1_		
Event Description: Letdown Pressure Controller Demand Fails 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.
	RO	Select MANUAL on PIC-0202 and manually adjust selected backpressure CV to control letdown pressure at ~460 psig.
	SRO	Refers to ONP-23.1 for PCS Leak due to RV-2006. Initiate troubleshooting and repair.
	SRO RO	Diagnose RV-2006 reseats.
	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.

Op-Test No.: _____ Scenario No.: 3 Event No.: 5 Page 1 of 1		
Event Description: Turbine Bypass Valve Fails Partially Open DELETED		
Time	Position	Applicant's Actions or Behavior
	ALL	Diagnose Turbine Bypass Valve has failed open: Various alarms, including: ● EK-0603, Nuclear Power / delta T
	BOP	Manually close the TBV.
		Note: Candidate is allowed to perform prior to ONP entry, but is not required to.
	SRO	Enter and direct the actions of ONP 9.0, "Excessive Load Increase".
	SRO BOP	Reduce turbine load to restore reactor power to pre-event power level or less. Note: Not required if TBV has been manually closed.

Op-Test No.: _____ Scenario No.: 3 Event No.: 6 Page 1 of 1		
Event Description: S/G Level Transmitter LT-0703 Fails High DELETED		
Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose failure of feed flow transmitter LT-0703 on "B" S/G: <ul style="list-style-type: none"> • Feed flow lower than steam flow. • "B" S/G level lowering. • Heat Balance power lowering.
	SRO	Enter and direct actions of ONP 3, "Loss of Main Feedwater".
	BOP	Take manual control of CV-0703 and Main FW pumps, as needed, to stabilize/restore S/G level.
	SRO	Initiate troubleshooting and repair.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page _1_ of _6_		
Event Description: PZR PRV-1040 Fails Open (~1%), then FULL Open		
Time	Position	Applicant's Actions or Behavior
	ALL	Diagnose a leaking/weeping PRV: <ul style="list-style-type: none"> • EK-0745, Pressurizer Safety Valve RV-1040 Disch Hi Temp, alarms. • Check Quench Tank parameters for indication of PRV discharge.
	SRO	Enter and direct actions of ONP-23.1, "Primary Coolant Leak".
	RO	Close CWRT Vent Valves, CV-1064 and CV-1065.
		NOTE: Once crew has diagnosed that RV-1040 is leaking, RAISE leak severity to 100%.
	ALL	Determine leak rate is significantly HIGHER: <ul style="list-style-type: none"> • Exceeds 20 gpm (Reactor trip criteria).
	RO	Manually trip reactor.
	ALL	Enter EOP-1.0, "Standard Post Trip Actions" and carry out Immediate Actions.

Op-Test No.: Scenario No.: 3 Event No.: 8 Page _1_ of _1_		
Event Description: Main Turbine Fails to Auto Trip		
Time	Position	Applicant's Actions or Behavior
	SRO BOP	Diagnose failure of Main Turbine to auto trip: <ul style="list-style-type: none">• Governor valve position indicators.• Steam Generator pressure lowering.• PCS cooldown and depressurization.
	BOP	Trip the Main Turbine using MSIV closure.
		Continue with Event 7, page 2 on next page.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page 2 of 6		
Event Description: PZR PRV-1040 Fails Open (~1%), then FULL Open		
Time	Position	Applicant's Actions or Behavior
	RO	Determine that Reactivity Control is MET.
	BOP	Control the Feedwater System: <ul style="list-style-type: none"> 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	Determine that Vital Auxiliaries - Electrical acceptance criteria are MET.
	RO	Determine that PCS Inventory Control acceptance criteria are MET. (may not be met, depending on progress of event).
	RO	Determine that PCS Pressure Control acceptance criteria are NOT met. <ul style="list-style-type: none"> If PZR pressure is less than 1605 psia: <ul style="list-style-type: none"> ___ Verify SIAS initiated per EK-1342. ___ Ensure all available HPSI and LPSI pumps operating with loop valves OPEN.

Op-Test No.: Scenario No.: 3 Event No.: 9 Page _1_ of _1_		
Event Description: <i>P-66A HPSI Fails to Auto Start</i>		
Time	Position	Applicant's Actions or Behavior
	RO	Observe that P-66A HPSI pump has NOT started.
	RO	Inform SRO and manually start P-66A HPSI pump.
		Continue with Event 7, page 3 on next page.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page _3_ of _6_		
Event Description: PZR PRV-1040 Fails Open (~1%), then FULL Open		
Time	Position	Applicant's Actions or Behavior
	RO	If PZR pressure is less than 1300 psia, STOP PCPs to have one in each loop operating.
	RO	Determine that Core Heat Removal acceptance criteria are MET. <i>(may not be, depending on progress of event).</i>
	BOP RO	Determine that PCS Heat Removal acceptance criteria are MET.
	BOP RO	Determine that Containment Isolation acceptance criteria are NOT met. <i>(due to Containment pressure > 0.85 psig)</i>
	RO	Determine that Containment Atmosphere acceptance criteria are NOT met. <i>(due to Containment pressure > 0.85 psig)</i>
	RO	Take prescribed Contingency Actions for Containment Atmosphere: <ul style="list-style-type: none"> • If SIAS not present, check ALL Containment Air Cooler fans operating. • Open CAC hi cap outlet valves as Service Water capacity permits.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page _4_ of _6_		
Event Description: <i>PZR PRV Fails Open (~1%), then FULL Open</i>		
Time	Position	Applicant's Actions or Behavior
	RO	Determine that Vital Auxiliaries - Water acceptance criteria are MET.
	RO	Determine that Vital Auxiliaries - Air acceptance criteria are NOT met.
	BOP RO	BOP turns panels over to RO and reports to SRO.
	SRO BOP	Align Control Room HVAC to Emergency Mode within 20 minutes of reactor trip.
	SRO RO	Verify at least ONE Condensate Pump and ONE Cooling Tower Pump operating.
	SRO BOP	Perform EOP Supplement 5 for SIAS Checklist.
	SRO BOP	If CHP/CHR has initiated, perform EOP Supplement 6 for Containment Isolation Checklist.
	SRO BOP	Perform Emergency Shutdown Checklist per GOP-10.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page _5_ of _6_		
Event Description: <i>PZR PRV Fails Open (~1%), then FULL Open</i>		
Time	Position	Applicant's Actions or Behavior
	BOP or RO	Trip both Main Feed Pumps (since MSIVs have been closed).
	SRO	Refer to EOP-1.0, Attachment 1, "Event Diagnostic Flow Chart" and diagnose the event.
	SRO	Transition to EOP-4.0, "Loss of Coolant Accident Recovery".
	SRO	Assign performance of EOP-4.0 Safety Function Status Checks to STA.
	SRO BOP	Verify at least minimum SI flow per EOP Supplement 4.
	SRO RO	If Letdown Orifice Stop Valves are closed, place: <ul style="list-style-type: none"> • HS-2003 • HS-2004 • HS-2005 to CLOSE.
	RO	If PCS is less than 25°F subcooled, stop ALL PCPs.

Op-Test No.: Scenario No.: 3 Event No.: 7 Page _6_ of _6_		
Event Description: <i>PZR PRV Fails Open (~1%), then FULL Open</i>		
Time	Position	Applicant's Actions or Behavior
	ALL	Attempt to isolate LOCA: <ul style="list-style-type: none"> • Verify PORVs closed. • Letdown Stop Valves closed (CV-2001, CV-2009) • Ensure closed PCS Sample Valves, CV-1910, CV-1911. • Ensure closed Reactor vessel and PZR vent valves.
	SRO BOP	Place one Hydrogen Monitor in operation with keyswitch in "ACCI", per SOP-38.
	SRO BOP	If Containment pressure is ≥ 4.0 psig: <ul style="list-style-type: none"> ___ Verify CIS initiated (EK-1126 alarmed). ___ Perform EOP Supplement 6 (if not previously performed). ___ Verify adequate Containment Spray flow. ___ Ensure at least one CAC accident fan operating ("A" fan).
	SRO RO	Verify emergency boration in progress. <i>(Should be, since SIAS has initiated.)</i>
	SRO BOP	Commence a controlled PCS cooldown.
	SRO RO	Determine PCS existing cooldown rate, per EOP Supplement 33.
	SRO RO	When PCS cooldown rate is within limits, start a controlled cooldown using Turbine Bypass Valve. (May use ADVs). CRITICAL TASK

		END OF SCENARIO
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