

Facility: Comance Peak (CPSES)		Scenario No.: 1		Op-Test No.: 2001	
Examiners:			Operators: _____ _____ _____		
<p>NOTE: SRO Admin A.4, Emerg Class. is to be done in conjunction with this Scenario          PRELOAD - MET Tower Data → wind 105          Initial Conditions: 870 - 880 MWE and steady. EDG 1-01 is out of service for preventive maintenance (12 hours into LCO). Severe thunderstorm warning and high winds issued and ABN-907, Section 5 completed.          Turnover: The previous shift just completed turbine valve testing and the shift has been directed to return to 100% (8%/hr &lt; rate of increase &lt; 10%/hr).  <b>Time (T) = 0 at end of power increase → as directed by Chief Examiner</b></p>					
Event No.	Malf. No.	Event Type*	Event Description		
**1 T= 0		N (SRO) R (RO) N (BOP)	Increase reactor power back to 100%		
2 T= E1+0	RX04C	I (SRO) I (RO)	S/G 3 Level Transmitter LT-553 fails low <b>(If RO or BOP goes to place bistables in trip, start Event 3)</b>		
3 T= E1+7	TC05A	C (SRO) C (BOP)	#1 Main turbine control valve fails closed		
4 T= E1+15	ED06G	C (All)	Loss of 1D3 bus		
5 T= E1+18  E1+20	RC03D	C (RO) C (SRO)	<p>RCP 4 vibration - initial severity @ 9 mils and ramp severity to 25 mils over 30 min. High vib. alarm on RCP 4 (shaft) alarms at 15 mils &amp; increasing @ approx 0.5 mils/min.</p> <p>Manual Rx Scram due to high RCP 1-04 vibrations, no SI. Enter EOP-0.0A and then transition to EOS-0.1A.</p>		
6 T= E19+10	ED01	M (All)	Lighting strike in switchyard - loss of offsite power. EDG 1-02 starts and loads (E19 triggers automatically when the reactor is tripped)		
7 T= E19+16	EG07B	C (All)	EDG 1-02 trips (overspeed) - loss of all power. Transition to ECA-0.0A and possibly ABN-601.		
T= E19+26			EDG 1-02 is restarted after S/G depressurization has started per ECA-0.0A.		

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

\*\* Trigger E1 after sufficient power increase has been seen - per Chief Examiner



Scenario Number: 1	Event Number: 2	Facility: CPSES
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Brief Description: S/G 3 Level Transmitter LT-553 fails low

Expected Operator/Plant Response	RO	BOP	US
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Time = E1+0

Annunciators:

SG 3 1 of 4 LO-LO (8A-3.14)

1) Direct and Implement the actions of ABN-710			
! Verifies controlling level channel failed	_____		_____
! Manually controls feedwater to S/G 1-03, using 1-FK-530	_____	_____	
! Select alternate 1-LS-539C for S/G 3	_____	_____	
! Check stable level, and feed/steam flow matched, then place controller in auto and check for proper response.	_____	_____	
2) Refers to: T/S 3.3.1, 3.3.2 -> within 6 hrs place channel in trip T/S 3.3.3-1 -> no action			_____
3) Contacts Prompt Team and Ops Management			_____
<b>Critical task - Rx does not trip on low S/G level</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 3	Facility: CPSES
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Brief Description: #1 Main Turbine control valve fails closed

Expected Operator/Plant Response	RO	BOP	US
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Time = E1+7 min

Annunciators:

None

**Note for simulator operator - If asked, as PEO, report no apparent reason for #1 CV closure**

1)	Determines turbine/reactor power change - informs US	_____	_____	
2)	Ensure rod control and steam dumps maintain RCS temperature	_____		
3)	Determines turbine control valve closed		_____	
4)	Directs and Implements ABN-401			_____
	! Verifies S/G level control, PRZR level control, and PRZR pressure control working correctly	_____		
	! Verify turbine load stable and match LOAD REFERENCE indication with existing load		_____	
	! Reduce turbine load until all operable HP control valves indicate <100% open		_____	
	! Check status of ALL main turbine stop and control valves		_____	
5)	Notify PSO, plant management, and prompt team			_____

Comments:

**Bold Denotes Critical Task**

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Scenario Number: 1	Event Number: 4	Facility: CPSES
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Brief Description: Loss of 1D3 Bus

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1+15 min

Annunciators:

BATT CHRG BC1D3-1/BC1D3-2 SWITCH PNL 1D3 TRBL  
(2.19)

1) Performs actions of ALM-0102		_____	
! After performing a board walkdown, observes that 1D3 voltage is pegged low (1-CB-11) and announces loss of 1D3 bus (this can be difficult to identify - will require some good analysis)		_____	
! Send PEO to equipment to check	_____	_____	_____
! Determines that RCPs can not be tripped from control room	_____	_____	
2) Refers to T/S 3.3.1			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 5	Facility: CPSES
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Brief Description: High Vibration on RCP 1-04 (shaft)

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E1+18 min

Annunciators:

RCP 4 VIBR HI

(5B-4.5)

\_\_\_\_\_

1) Directs and Implements ABN-101

**!** **Trip the reactor due to high rate of RCP vibration increase.** Make plant announcement

\_\_\_\_\_

**!** Go to EOP-0.0A

\_\_\_\_\_

**!** Stop RCP 1-04 - locally (call to have AO open breaker)

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Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 5 (cont)	Facility: CPSES
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Brief Description: RX Scram

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1+20 min

Annunciators:

LOTS

1) Directs and Implements EOP-0.0A			_____
! Verifies Rx trip and bypass breakers open and neutron flux decreasing	_____		
! All rod bottom lights on	_____		
! Verifies turbine trip		_____	
! Verify power to AC safeguards busses		_____	
! Determines SI not required and transitions to EOS-0.1A	_____	_____	_____
2) Directs and Implements EOS-0.1A			_____
! Checks RCS Tave stable or trending to 557°F	_____		
! Check: FW status, PRZR level and PRZR pressure control	_____	_____	
! Maintain plant conditions stable: PRZR pressure → 2220 - 2250 psig PRZR level → 23% - 31% SG narrow range level → 5% - 50% RCS Tave → 555°F - 559°F	_____	_____	
3) Contact plant management (maintain hot standby)			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 6	Facility: CPSES
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Brief Description: Switchyard lighting strike - loss of offsite pwr (EDG 1-02 starts and loads)

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E19+10 min

Note to Examiners - Crews may not implement ABN-601 due to still completing EOS-0.1A (with only a 3 man crew may be limited). May lose EDG 1-02 and then Crew would go to ECA-0.0A

Annunciators:

Numerous Annunciators Located on CB 14 panel

1) Direct and Implement ABN-601 Section 5

- ! Check 6.9 KV safeguard buses energized (Train B)
- ! Check 6.9 KV non-safeguard buses energized
- ! Check Blackout Sequencer
- ! Check switchyard buses - will be de-energized
- 1) Perform Attachment 20
- ! Refer to EPP-201 -> classify as NOUE
- ! Verify numerous transformer/switchyard status
- ! Re-energize various buses (next event before this can be completed)

2) Shift briefing, various announcements, contact distribution, and contact Prompt team

Note to Simulator Operator: Call RO and report lighting strike in switchyard and high winds. Load Met Tower with wind speed of 105 mph (sustained)

Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 7	Facility: CPSES
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Brief Description: EDG 1-02 trips on overspeed → Loss of all power

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E19+16 minutes

Annunciators:

Numerous annunciators

1) Direct and Implement ECA-0.0A			
! Verify Rx trip			
! Verify turbine trip			
! Check RCS isolated			
! Verify AFW flow > 460 gpm			
! Power can not be restored to AC safeguards bus - go to ABN-601, Step 6			
! Initiate DC bus load shedding - Control Room calls and has someone begin to load shed - local actions			
! <b>Depressurize intact SGs to 270 psig</b>			
! Send PEO to check on EDG trip (trip on overspeed)			
2) Direct and Implement ABN-601			
! Start the DG per Attachment 1- EDG restarted AFTER SG depressurization started			
! Transition back to ECA-0.0A			
! After SG pressures have been stabilized - end of scenario (based on Chief Examiner)			

Comments: Bold Denotes Critical Task

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**Critical Task Descriptions**

Event 2:

**Rx does not trip on low S/G level** —> on S/G level transmitter failure, with proper actions, the operators should be able to control S/G water level in manual without causing a low S/G water level RX trip. Per NUREG 1021, App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

Event 4:

**Trip the reactor due to high RCP vibration** - preventing a challenge to plant safety and a degradation of any barrier to fission product release (App D, Step D.1.a)

Event 7:

**Depressurize intact SGs** —> Reduce temp and press of RCS to reduce RCP seal leakage and minimize RCS inventory loss (no way to makeup). (preventing a challenge to plant safety (App D, Step D.1.a))

Facility: Comanche Peak (CPSES)		Scenario No.: 2		Op-Test No.: 2001	
Examiners:			Operators: _____ _____ _____		
Initial Conditions: 100% power and steady.					
Turnover: No equipment is out of service. Train A equipment is in service. Maintain turbine/reactor power at 100%.					
Time = 0 when crew assumes the watch.					
Event No.	Malf. No.	Event Type*	Event Description		
1 T= E1+1	RX05B	I (SRO) I (RO)	PRZR Level Instrument LT-460 fails low ( <b>Start Event 2 prior to RO/BOP tripping bistables</b> ) Note to sim. oper. -> T=0 insert SW03A - SSW Train A, PIS-4251 failure (prevents CCWP 1-02 auto-start when SSWP 1-01 trips)		
2 T= E1+11	SG01B **	C (All)	RCS leak 2 gpm (SG 1-02 tube leak -> ABN-106). Also put in applicable alarms based on leak rate (condenser off-gas, S/G blowdown, etc.)		
3 T= E1+11		N (SRO) N (BOP) R (RO)	Commence plant shutdown -> RCS leak rate (IPO-003A)		
4 T= E2+0	ED07B ***	C (All)	Loss of Protection Inverter IV1PC2 (ABN-603) - <b>Trigger as determined by Chief Examiner based on downpwr</b>		
5 T= E2+10	SW01A	C (All)	Station Service Water Pump 1-01 shaft seized and CCW 1-02 does not auto start (ABN-501)		
6 T= E2+17	EN01 (100%)  MS01B (5E6 lbm/hr)	M (All)	Seismic event (>SSE) causes S/G 1-02 tube rupture  Faults S/G 1-02 (S/G 1-02 pressure goes <300 psig)		

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

\*\* SG01B increase to 500 gpm when seismic event occurs

\*\*\*E2 trigger should be actuated after sufficient downpower as determined by Chief Examiner

Scenario Number: 2	Event Number: 1	Facility: CPSES
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Brief Description: PRZR Level Instrument LT-460 fails low

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 1 min

Annunciators:

PRZR LVL LO (5B-3.6)  
PRZR LVL DEV LO (5C-1.2)

1) Directs and Implements the actions of ABN-706			_____
! Manually controls LK-459 "PRZR LVL CTRL" or FK-121, "CCP CHRG FLO CTRL"	_____		
! Transfer LS-459D, "PRZR LVL CTRL CHAN SELECT" to an alternate channel	_____		
! Ensure LS-459E, LR-459 "PRSR LVL SELECT" selected to a valid channel	_____		
! Place controller in AUTO	_____		
! Establishes letdown per Attachment 6	_____		
2) Refers to T/S 3.3.1 - place channel in trip within 6 hrs T/S 3.3.3 - no action	_____		_____
3) Contacts Prompt Team and Ops Management			_____
<b>RX does NOT trip on high PRZR level</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 2	Facility: CPSES
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Brief Description: RCS Leak S/G 1-02 tube leak, approx 2 gpm (ramps up and stabilizes)

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 11 min

Annunciators:

PC-11 annunciators - main steam line 2 rad monitor MSL179, condenser off-gas, and S/G blowdown and sampling

1) Directs and Implements Procedure ABN-106			
! Verifies main steamline rad alarms - if MSL179 rad alarm in, reduce power to $\leq 50\%$ in 1 hr			
! Initiate required shutdown per IPO-003A			
! Adjust affected SGARV controller setpoint to 1160 psig			
! Check PC-11 for increases in rad levels discharging to LVW and stop or divert flow			
! Request Chemistry to sample SGs			
2) Directs and Implements Procedure ABN-103			
! Verify at least one charging pump operating			
! Ensure PRZR level at or trending to prog. level			
! Check PRZR status - safeties closed, PORVs closed, spray valves closed, and PRT level and temp no significant increase			
! Check S/G status - normal levels, no significant feedwater/stm mismatch, and no increased radiation trend on PC-11.			

Note: Operators may use ABN-103 along with ABN-106. They may NEVER go to ABN-103, not required.

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 3	Facility: CPSES
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Brief Description: Plant shutdown per IPO-003A

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 11min

Annunciators:

None

1) Direct and Implement the power reduction per IPO-3A			
! Contact Chemistry to place demins in service	_____		_____
! Calculate the amount of boration needed to reduce power to approx 575MW (operators will probably initial boration - 100gallons?)	_____		_____
! Initiate RCS boration and inward rod motion	_____		
! Set in the desire unloading rate on the LOAD GRADIENT device		_____	
! Lower the LOAD REFERENCE device to 575 MW		_____	
! Verify proper rod bank insertion, overlap, and sequencing	_____		
! When turbine power is approx 50%, stop one main feedwater pump	_____	_____	

Comments:

Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 4	Facility: CPSES
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Brief Description: Loss of Protection Inverter IV1PC2

Expected Operator/Plant Response	RO	BOP	US
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Time = E2 + 0

Annunciators:

118V CHAN 2 INV TRBL (10B-2.16)

Note: IV1PC2 - acrid odor present and hotter than normal

1) Directs and Implements the actions of ABN-603			_____
! Verify loss did NOT cause a Rx trip	_____		
! Place control rods in manual	_____		
! Verify PRZR level and pressure and take manual control if necessary	_____		
! Manually control feed flow to S/G2 & S/G3 (feed flow increases)		_____	
! Reenergize IV1PC2 to alternate pwer supply		_____	_____
2) Refer to T/S 3.8.7 and 3.8.9			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 5	Facility: CPSES
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Brief Description: Station Service Water Pump 1-01 shaft seizure and CCW Pump 1-02 does not auto start. CCW Pump 1-02 does not auto start due to failure of SSW hdr press switch.

Expected Operator/Plant Response	RO	BOP	US
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Time = E2 + 10 min

Annunciators:

CCP 1 L\O CLR SSW RET FLO LO (1-1.11)

SIP 1 L\O CLR SSW RET FLO LO (1-1.12)

DG ½ SSW RET FLO LO (1-3.11)

1) Directs and Implements Procedure ABN-501	_____	_____	_____
! Verify SSW Pump 1-02 running		_____	
! Manually start CCW Pump 1-02		_____	
! Shutdown Train A equipment (CCP, DG, SI Pump, CS Pumps - pull out) and start required Train B equipment	_____	_____	_____
! Verify proper operation of Train B equipment	_____	_____	
2) Refer to T/S and makes notifications to Ops management			_____
3) Conduct crew brief			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 6	Facility: CPSES
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Brief Description: Seismic event (>SSE) causes S/G 1-02 tube rupture (500 gpm?) and faulted S/G (S/G 1-02 pressure <300 psig) ADVERSE CONTAINMENT

Expected Operator/Plant Response	RO	BOP	US
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Time = E2 + 17 min (Rx trip/SI)

Annunciators: LOTS

1) Directs and Implements Procedure EOP-0.0A			_____
! Verifies Rx trip/bypass bkrs open and flux dec.	_____		
! All rod bottoms lights on	_____		
! Verifies turbine trip		_____	
! Verifies power to AC safeguards buses		_____	
! Verifies both Trains SI actuated	_____		
! Verifies Containment Spray required and Phase B isolation	_____	_____	
! Verifies CCW and RHR pumps running	_____	_____	
! Verifies FW isolation complete	_____		
! <b>Stops RCPs (criteria should be satisfied)</b>	_____	_____	_____
! Transition to FRZ-0.1A for high containment press (due to Orange Path on Containment Status Tree)	_____	_____	_____
2) Directs and Implements Procedure FRZ-0.1A	_____	_____	_____
! Verifies containment Phase A and containment ventilation isolation	_____	_____	

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 6 (Continued)	Facility: CPSES
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Brief Description: Seismic event (>SSE) causes S/G 1-02 tube rupture (500 gpm) and faulted S/G (S/G 1-02 pressure <300 psig)

Expected Operator/Plant Response	RO	BOP	US
2) Directs and Implements Procedure FRZ-0.1A (cont)	_____	_____	_____
! Checks containment spray required and spray flow	_____	_____	
! Verifies all RCPs stopped	_____	_____	
! Verifies Containment Phase B isolation	_____	_____	
! Verifies MSIV and MSIBV closed	_____	_____	
! Check feed flow isolated to SG 1-02	_____	_____	
! Return to EOP-0.0A and step in effect			_____
3) EOP 0.0 A → Determines faulted S/G and transitions to EOP-2.0A, "Faulted S/G Isolation"			_____
4) Directs and Implements Procedure EOP-2.0A			_____
! Checks MSIVs and bypass valves shut	_____	_____	
! Identifies faulted S/G - pressure decreasing in an uncontrolled manner or completely depress	_____	_____	
! <b>Isolates faulted S/G</b>	_____	_____	_____
! Check secondary radiation - should be high	_____	_____	
! Transition to EOP-3.0A, "S/G Tube Rupture" END OF SCENARIO			

Comments:

Bold Denotes Critical Task

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## Critical Task Descriptions

### Event 1:

**RX does NOT trip on high PRZR level** —> with proper actions, the operators should be able to control PRZR water level in manual without causing a high PRZR water level RX trip. Per NUREG 1021, App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

### Event 6:

**Stops RCPs if criteria satisfied** —> depending on the conditions of the accident, for a SBLOCA, the RCPs should be tripped when specified parameters are met. The RCPs should be tripped to avoid more serious impacts. If the criteria is not satisfied, the pumps should continue to be operated because they can provide core heat removal without ECCS in operation.

**Isolates faulted S/G** —> minimizes RCS cooldown and mass and energy release to the containment (reduces challenge to containment). App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

Facility: Comanche Peak (CPSES)		Scenario No.: 3	Op-Test No.: 2001
Examinerory		Operators: _____ _____ _____	
Initial Conditions: 100% power and steady.			
Turnover: EDG 1-02 and CCP 1-02 are out-of-service for preventive maintenance. Train A equipment is in service. The shift has been ordered to remove MFP 1-01 from service for maintenance → 15%/hr			
Time = 0 when Chief Examiner determines enough power reduction has been seen See next page for preload information!!!!!!			
Event No.	Malf. No.	Event Type*	Event Description
1		N (SRO) R (RO) N (BOP)	Downpower to remove MFP 1-01 from service - 15%/hr
2 T= E1+0	CV15	C (SRO) C (RO)	PCV-131, "Letdown Pressure Control Valve" fails closed. <b>As determined by Chief Examiner - based on downpwr</b>
3 T= E1+8	TP01	C (SRO) C (BOP)	200 gpm TPCW leak
4 T= E1+18	RP06A	I (SRO) I (RO)	Loop 1 N16 fails high <b>(Start Event 5 prior to RO/BOP placing bistables in trip)</b>
5 T= E1+24	IA01A	C (All)	Instrument air leak - IA Receiver 1-01 relief valve lifting (Severity = 1500 scfm leak)
6 T= E1+30	RC19A	M (All)	RCS Loop A - 1000 gpm leak - ramp in over 5 minutes RCS Cold Leg 1 Leak (flow scaling)
7 T= ??		C (All)	Rx will not trip in manual or automatic. Go to FRS-0.1A, "Response to Nuclear Power Generation/ATWT"
8 T= E19+2	SI04B	C(RO)	Train B SI Pump failure

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

## Preload Information

T=0:

- ! RP01 Auto Rx trip failure
- ! RP15E Rx trip breakers jammed closed
- ! Override CS-T1B3, xfmr Breaker T1B3 closed
- ! Override CS-1B3-1, incoming Breaker 1B3-1 closed
- ! Dg 1-02 bkr to local, CCP 1-02 breaker racked out

Scenario Number: 3	Event Number: 1	Facility: CPSES
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Brief Description: Power reduction to remove MFP 1-01 from service (15%/hr)

Expected Operator/Plant Response	RO	BOP	CRS
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Time = 0 when downpower ends per Chief Examiner

Annunciators:

None

6)	Direct and Implement the power reduction per IPO-3A			
!	Contact Chemistry to place demins in service	_____		_____
!	Calculate the amount of boration needed to reduce power to 575MW (Rx engineering)	_____		_____
!	Initiate RCS boration and inward rod motion	_____		
!	Set in the desire unloading rate on the LOAD GRADIENT device		_____	
!	Lower the LOAD REFERENCE device to approximately 575MW (Rx power = 50%)		_____	
!	Verify proper rod bank insertion, overlap, and sequencing	_____		
!	When turbine power is approx 50%, stop Main Feedwater Pump 1-01	_____	_____	

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 2	Facility: CPSES
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Brief Description: PCV-131, "LTDN Press Ctrl Valve," fails closed

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 0

Annunciators:

LTDN HX OUT PRESS/FLO HI (6A-3.3)

LTDN RLF VLV OUT TEMP HI (6A-4.3)

1) Refer to ALM-0061A

! Letdown press > 310 psig, isolates letdown → closes 1/1-8149A, 1/1-8149B, and 1/1-8149C and transitions to ABN-105

2) Directs and Implements Procedure ABN-105, Section 5.0

! Establishes excess letdown

1) Simultaneously lower 1-FK-121 to 32 gpm and adjust 1-HC-182 to 6 to 13 gpm

2) Align excess letdown per SOP-103A

3) Contacts the Prompt Team to repair PCV-131 and notifies Ops Management

Note to Sim Oper: When called as PEO to open LCS-8409-RO, "U1 Ltdn Hx Out Press Ctrl Vlv Byp Remote Oper," report that the valve is stuck shut and CANNOT be opened

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 3	Facility: CPSES
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Brief Description: 200 gpm TPCW leak

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 8 min

Annunciators:

TPCW HEAD TK LVL LO (9A-2.10)

1) Determines TPCW tank level has decreased		_____	_____
2) Directs and Implements Procedure ABN-306			_____
! Verifies TPCW head tank level		_____	
! Checks main generator for water inleakage -> sends PEO to check local indicators and annunciator GEN GAS MOISTURE HI (10A-1.10)		_____	
! Ensures makeup aligned to TPCW head tank		_____	
! Has PEO/FSS inspect TPCW for leaks (leak will be discovered on TPCW Pump 1-01 discharge.) Swaps pumps to isolate leak - shut suction and discharge valve.		_____	_____
! Contacts Prompt Team and notifies Ops Management			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 4	Facility: CPSES
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Brief Description: Loop 1 N16 fails high

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 18 min

Annunciators: (I think)

ANY N16DEV HI/LO	(5C-1.5)		
1 of 4 OT N16 HI	(5C-2.5)		
1 of 4 OP N16 HI	(5C-2.6)		
1 of 4 OP N16 ROD STOP & TURB RUNBACK	(6D2.13)		
1 of 4 OT N16 ROD STOP & TURB RUNBACK	(6D-3.14)	_____	

1) Directs and Implements Procedure ABN-704

- ! Place control rods in manual and ensure  $T_{ave}$  is within 1°F of  $T_{ref}$  \_\_\_\_\_
- ! Select the failed channel on 1/1-JS-411E, CHAN DEFEAT \_\_\_\_\_
- ! Within 6 hours have I&C place bistable test switches for failed channel in the CLOSED position \_\_\_\_\_
- ! Refer to T/S 3.3.1 \_\_\_\_\_
- ! Contacts Prompt Team and Ops Management \_\_\_\_\_

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 5	Facility: CPSES
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Brief Description: Instrument Air leak due to IA Receiver 1-01 relief valve lifting

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 24 min

Annunciators:

INSTR AIR HDR PRESS LO (1-3.3)

1) Determines IA system has a leak by acknowledging alarm and observing plant parameters	_____	_____	
2) Directs and Implements Procedure ABN-301			_____
! Verifies both IA compressors are running		_____	
! Determines IA press < 85psig		_____	
! Starts and aligns a common IA compressor		_____	
! Stops unnecessary use of IA		_____	
! Sends PEO to determine cause of low IA press (PEO finds IA Receiver 1-01 relief valve lifting - able to reset the valve)		_____	
! Checks equipment on main control board for proper operation	_____	_____	
! Contacts Prompt Team and informs Ops Management			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 7	Facility: CPSES
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Brief Description: Reactor will not trip in manual or automatic

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 30?

Annunciators: LOTS

1) <b>Recognize that Rx will not trip</b> - may try opening Bkrs CS-T1B3 and CS-1B3-1 on CB - won't open	_____	_____	_____
2) Exits EOP-0.0A and transitions to FRS-0.1A	_____	_____	_____
3) Directs and Implements Procedure FRS-0.1A			_____
! Verify control rods inserting >48 step/min or manually insert control rods	_____	_____	_____
! Initiate emergency boration and verify charging flow >30 gpm	_____	_____	_____
! Dispatch an operator to locally trip the reactor			
<b>Sim Oper: After being dispatched as PEO, trip Rx 1 min later</b>	_____		
! Maintain AFW >860 gpm until narrow >26% (maintain level 26%-50%)		_____	
! Verify Rx subcritical and return to EOP-0.0A	_____		_____
4) Directs and Implements EOP-0.0A			_____
! Verify all rod bottom lights on & turbine tripped	_____		
! Verify power to AC safeguard busses	_____	_____	
! Verify both SI trains actuated, Train B pump trips ( <b>see Event 8</b> )	_____	_____	
! Check status of cont. spray	_____	_____	
! <b>Stop RCPs if criteria satisfied</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 7 (continued)	Facility: CPSES
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Brief Description: Reactor will not trip in manual or automatic (continued)

Expected Operator/Plant Response	RO	BOP	CRS
4) Directs and Implements EOP-0.0A (continued)			
! <b>Determines RCS in NOT intact and transitions to Procedure EOP-1.0A</b>	_____	_____	_____
5) Directs and Implements EOP-1.0A			_____
! <b>Stop RCPs if criteria satisfied</b>	_____	_____	
!     Check if any S/G faulted - none	_____	_____	
!     Check S/G levels >26% and maintain 26-50%	_____	_____	
!     Check secondary radiation normal	_____	_____	
!     Check if ECCS flow should be reduced (pressure should be stabilized/increasing)	_____	_____	
TERMINATE Scenario at completion of Step 6 of EOP 1.0 - this is determination of whether to terminate SI or continue in EOP-1.0 depending on plant conditions at time. US may go to EOS 1.1A or stay in EOP-1.0A			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 8	Facility: CPSES
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Brief Description: Train B SI Pump Starts and Coupling Breaks

Expected Operator/Plant Response	RO	BOP	CRS
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Time: E19 + 2 min

Annunciators:

- |    |   |       |  |       |
|----|---|-------|--|-------|
| 1) | Recognizes that SI pump is not working (amperage is low and essentially zero flow)                                      | _____ |  |       |
|    | ! Dispatch AO to visually inspect the pump  | _____ |  | _____ |
|    | ! When AO reports coupling broke (approximately 7 minutes after recognition of problem), secure the pump - pull to lock |       |  |       |

Note: Crew may attempt to manually restart tripped SI pump ONE time only!!!

Comments: Bold Denotes Critical Task

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## Critical Task Descriptions

### Event 7:

**Both together as one critical task → Recognize that Rx will not trip and Initiate emergency boration and verify charging flow >30 gpm** → reactor will not trip in automatic or manual. Requires driving rods (automatic) and emergency boration. (Failure of an ESF system)

**Stop RCPs if criteria satisfied** → depending on the conditions of the accident, for a SBLOCA, the RCPs should be tripped when specified parameters are met. The RCPs should be tripped to avoid more serious impacts. If the criteria is not satisfied, the pumps should continue to be operated because they can provide core heat removal without ECCS in operation.

**Determines RCS in NOT intact and transitions to Procedure EOP-1.0A** → abnormal containment radiation, pressure, or recirculation sump level is an indication of a line break inside containment. Since the S/Gs were determined to be non-faulted, leak must be in RCS. (Degradation of any barrier to fission product release)

Facility: Comanche Peak (CPSES)		Scenario No.: 4 (SPARE)		Op-Test No.: 2001	
Examiners:			Operators: _____ _____ _____		
Initial Conditions: 50% power and steady (RP01). Auto RX tips failed.					
Turnover: No equipment is out of service. Train A equipment is in service. FWP repairs have been completed by the previous shift. You have been directed to return to 100% power @8%/hr not to exceed 10%/hr.					
Event No.	Malf. No.	Event Type*	Event Description		
1		N(SRO) N(BOP) R(RO)	Increase Reactor power back to 100%		
2** E1+0	MS13A	I(RO) I(SRO)	MSL 1 Press Instrument PI-2325 fails high (100%)		
3 E1+7	FW16	C(RO) C(BOP) C(SRO)	Lowering vacuum on main condenser due to loss of vacuum breaker water seal (6% severity)		
4 E1+17	Rx15A	C(RO) C(SRO)	Pzr spray flow control valve failure (PCV-455B) @ 60% severity. RXR96 is PCV-455B CTRL driver card - remove then delete malfunction		
5 E1+30	TC06C MS07A  MS10A1 @100%	M(ALL)	Main turbine spurious trip and MSIV #1 closes causing SG1 Safety MS-021 to fail open		

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

\*\* Note - Initiate after Chief Examiner determines power increase is sufficient

PRELOAD INFORMATION

T=0 → RP01 Auto Rx Trip Failure

Scenario Number: 4	Event Number: 1	Facility: CPSES
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Brief Description: Increase Rx Power - approx 8%/hr

Expected Operator/Plant Response	RO	BOP	CRS
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Time = 0 min

Annunciators:

None

1) Increase reactor power per IPO-003A			_____
! Provide shift briefing			
! Calc amount of dilution needed to raise power to 1145 Mwe (Rx Eng data)	_____		_____
! Initiate dilution and outward rod motion	_____		
! Set desired loading rate on the LOAD GRADIENT device	_____		
! Raise the LIMIT LOAD device to >1180 MW	_____	_____	
! Raise the LOAD REFERENCE device to increase turbine load	_____	_____	
! Verify proper rod bank insertion, overlap, and sequencing	_____		

Comments:

Bold Denotes Critical Task

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Scenario Number: 4	Event Number: 2	Facility: CPSES
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Brief Description: MSL #1 Press Instrument (PI-2325) Fails High

Expected Operator/Plant Response	RO	BOP	CRS
Time = 0 Start when Chief Examiner determines enough power increase			
<u>Annunciators:</u> AVE Tave - Tref DEV (6D-1.10)	_____		
1) Refers to ALM-0064A and diagnosis ARV open by control board indications	_____	_____	
2) Directs and Implements ABN-709, Section 2.0			_____
! Determines PI-2325 failed high and ZL-2325 indicates valve open	_____	_____	
! Ensures SG 1 press <1125 psig and manually closes ARV	_____	_____	
! Notifies Chemistry to determine if release permit is required			_____
! Contacts Prompt Team and initiates repairs			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 4	Event Number: 3	Facility: CPSES
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Brief Description: Main Condenser Air In-leakage

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 7 minutes

Annunciators:

AVE Tave-Tref DEV (6D-1.10)  
 CNDSR VAC LO (9B-4.5)

1) Determines Condenser Vacuum Lowering			
2) Directs Actions of ABN-304, Section 3.0			
! Starts all available condenser vacuum pumps			
! Notifies Shift Manager and Load Dispatcher of imminent load reduction			
! Reduces turbine load as necessary per IPO-3A			
! Notifies Chemistry of excessive air in-leakage			
! Dispatches personnel to check for leaks			

Note to Simulator Operator: 2 minutes after being dispatched as PEO to check for leakage paths, remove Malf FW16 and report back that main condenser vacuum breaker loop seal was empty and has been refilled

! Stop unnecessary CEVs per SOP-309			
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**Critical Task - Turbine/Rx trip does not occur on low condenser vacuum.**

Comments: Bold Denotes Critical Task

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Scenario Number: 4	Event Number: 4	Facility: CPSES
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Brief Description: PZR Spray Valve PCV-455 fails to 60% open

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 17 minutes

Annunciators:

PRZR PRESS LO BACKUP HTRS ON (5C-3.3)

PRZR LO PRESS PORV 456 BLK (5B-1.6)

PRZR LO PRESS PORV 455A BLK (5B-2.6)

1) Determines PRZR Spray Valve RC Loop 1 is open

2) Directs Actions of ABN-705, Section 3

! Attempts to close Spray Valve PK-455B

! Initiate load reduction to 40% per IPO-3A

! Ensures all PRZR heaters are on

! Directs I&C to de-energize Spray Valve PCV-455B by removing 1-PCY-0455B Driver Card

Note to Simulator Operator: After 1 minute, using remote function RXR96, remove/pull PCV-455B Ctrl Drive Card and remove malfunction RX15A. Report back to control room that card has been removed.

! Check PRZR pressure trending to normal

! Contact Plant Management and initiate repairs

**Critical Task → Rx does not trip on low press**

Comments:

Bold Denotes Critical Task

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Scenario Number: 4	Event Number: 5	Facility: CPSES
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Brief Description: Turbine Spurious trip, MSIV #1 closure, Stm Line Safety Valve 1MS-0021 fails open

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 30 minutes

Annunciators:

TURB ELEC TRIP (9B-3.8)  
 MSIV 1 NOT OPEN (7A-1.12)

Various Others

1) Determines #1 MSIV closed and Rx power >10%	_____	_____	_____
! <b>Trips the reactor</b>	_____		
2) Directs and implements EOP-0.0			_____
! Verifies Rx trip and bypass brks open, all rod bottom lights on, neutron flux decreasing, and turbine tripped	_____	_____	
! Verifies power to AC SFGD buses		_____	
! Verifies SI actuated or is required	_____	_____	
! Determines SG1 is FAULTED and transitions to EOP-2.0			_____
3) Directs and Implements EOP-2.0			_____
! Closes all MSIV's and checks bypasses closed	_____	_____	
! Isolates #1 S/G including #1 MSL supply to TDAFWP	_____	_____	
! Checks for SGTR by verifying Secondary Rad levels -- normal			_____
! Transitions to EOP-1.0			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 4	Event Number: 5 (continued)	Facility: CPSES
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Brief Description: Turbine Spurious trip, MSIV #1 closure, Stm Line Safety Valve 1MS-0021 fails open

Expected Operator/Plant Response	RO	BOP	CRS
4) Directs and Implements EOP-1.0			_____
Check if RCPs should be stopped	_____		
! Check for faulted S/Gs	_____	_____	
! Check intact S/G levels and Secondary Rad levels	_____	_____	
! Transition to EOS-1.1			_____

Terminate scenario when Crew transitions to EOS-1.1 or at the discretion of the Chief Examiner

Comments:

Bold Denotes Critical Task

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Facility: Comance Peak (CPSES)		Scenario No.: 1		Op-Test No.: 2001	
Examiners:			Operators: _____ _____ _____		
<p>NOTE: SRO Admin A.4, Emerg Class. is to be done in conjunction with this Scenario          PRELOAD - MET Tower Data → wind 105          Initial Conditions: 870 - 880 MWE and steady. EDG 1-01 is out of service for preventive maintenance (12 hours into LCO). Severe thunderstorm warning and high winds issued and ABN-907, Section 5 completed.          Turnover: The previous shift just completed turbine valve testing and the shift has been directed to return to 100% (8%/hr &lt; rate of increase &lt; 10%/hr).  <b>Time (T) = 0 at end of power increase → as directed by Chief Examiner</b></p>					
Event No.	Malf. No.	Event Type*	Event Description		
**1 T= 0		N (SRO) R (RO) N (BOP)	Increase reactor power back to 100%		
2 T= E1+0	RX04C	I (SRO) I (RO)	S/G 3 Level Transmitter LT-553 fails low <b>(If RO or BOP goes to place bistables in trip, start Event 3)</b>		
3 T= E1+7	TC05A	C (SRO) C (BOP)	#1 Main turbine control valve fails closed		
4 T= E1+15	ED06G	C (All)	Loss of 1D3 bus		
5 T= E1+18  E1+20	RC03D	C (RO) C (SRO)	RCP 4 vibration - initial severity @ 9 mils and ramp severity to 25 mils over 30 min. High vib. alarm on RCP 4 (shaft) alarms at 15 mils & increasing @ approx 0.5 mils/min.  Manual Rx Scram due to high RCP 1-04 vibrations, no SI. Enter EOP-0.0A and then transition to EOS-0.1A.		
6 T= E19+10	ED01	M (All)	Lighting strike in switchyard - loss of offsite power. EDG 1-02 starts and loads (E19 triggers automatically when the reactor is tripped)		
7 T= E19+16	EG07B	C (All)	EDG 1-02 trips (overspeed) - loss of all power. Transition to ECA-0.0A and possibly ABN-601.		
T= E19+26			EDG 1-02 is restarted after S/G depressurization has started per ECA-0.0A.		

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

\*\* Trigger E1 after sufficient power increase has been seen - per Chief Examiner



Scenario Number: 1	Event Number: 2	Facility: CPSES
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Brief Description: S/G 3 Level Transmitter LT-553 fails low

Expected Operator/Plant Response	RO	BOP	US
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Time = E1+0

Annunciators:

SG 3 1 of 4 LO-LO (8A-3.14)

1) Direct and Implement the actions of ABN-710			
! Verifies controlling level channel failed	_____		_____
! Manually controls feedwater to S/G 1-03, using 1-FK-530	_____	_____	
! Select alternate 1-LS-539C for S/G 3	_____	_____	
! Check stable level, and feed/steam flow matched, then place controller in auto and check for proper response.	_____	_____	
2) Refers to: T/S 3.3.1, 3.3.2 -> within 6 hrs place channel in trip T/S 3.3.3-1 -> no action			_____
3) Contacts Prompt Team and Ops Management			_____
<b>Critical task - Rx does not trip on low S/G level</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 3	Facility: CPSES
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Brief Description: #1 Main Turbine control valve fails closed

Expected Operator/Plant Response	RO	BOP	US
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Time = E1+7 min

Annunciators:

None

**Note for simulator operator - If asked, as PEO, report no apparent reason for #1 CV closure**

1) Determines turbine/reactor power change - informs US	_____	_____	
2) Ensure rod control and steam dumps maintain RCS temperature	_____		
3) Determines turbine control valve closed		_____	
4) Directs and Implements ABN-401			_____
! Verifies S/G level control, PRZR level control, and PRZR pressure control working correctly	_____		
! Verify turbine load stable and match LOAD REFERENCE indication with existing load		_____	
! Reduce turbine load until all operable HP control valves indicate <100% open		_____	
! Check status of ALL main turbine stop and control valves		_____	
5) Notify PSO, plant management, and prompt team			_____

Comments:

**Bold Denotes Critical Task**

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Scenario Number: 1	Event Number: 4	Facility: CPSES
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Brief Description: Loss of 1D3 Bus

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1+15 min

Annunciators:

BATT CHRG BC1D3-1/BC1D3-2 SWITCH PNL 1D3 TRBL  
(2.19)

1) Performs actions of ALM-0102		_____	
! After performing a board walkdown, observes that 1D3 voltage is pegged low (1-CB-11) and announces loss of 1D3 bus (this can be difficult to identify - will require some good analysis)		_____	
! Send PEO to equipment to check	_____	_____	_____
! Determines that RCPs can not be tripped from control room	_____	_____	
2) Refers to T/S 3.3.1			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 5	Facility: CPSES
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Brief Description: High Vibration on RCP 1-04 (shaft)

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E1+18 min

Annunciators:

RCP 4 VIBR HI

(5B-4.5)

\_\_\_\_\_

1) Directs and Implements ABN-101

**!** **Trip the reactor due to high rate of RCP vibration increase.** Make plant announcement

\_\_\_\_\_

**!** Go to EOP-0.0A

\_\_\_\_\_

**!** Stop RCP 1-04 - locally (call to have AO open breaker)

\_\_\_\_\_

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Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 5 (cont)	Facility: CPSES
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Brief Description: RX Scram

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1+20 min

Annunciators:

LOTS

1) Directs and Implements EOP-0.0A			_____
! Verifies Rx trip and bypass breakers open and neutron flux decreasing	_____		
! All rod bottom lights on	_____		
! Verifies turbine trip		_____	
! Verify power to AC safeguards busses		_____	
! Determines SI not required and transitions to EOS-0.1A	_____	_____	_____
2) Directs and Implements EOS-0.1A			_____
! Checks RCS Tave stable or trending to 557°F	_____		
! Check: FW status, PRZR level and PRZR pressure control	_____	_____	
! Maintain plant conditions stable: PRZR pressure → 2220 - 2250 psig PRZR level → 23% - 31% SG narrow range level → 5% - 50% RCS Tave → 555°F - 559°F	_____	_____	
3) Contact plant management (maintain hot standby)			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 6	Facility: CPSES
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Brief Description: Switchyard lighting strike - loss of offsite pwr (EDG 1-02 starts and loads)

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E19+10 min

Note to Examiners - Crews may not implement ABN-601 due to still completing EOS-0.1A (with only a 3 man crew may be limited). May lose EDG 1-02 and then Crew would go to ECA-0.0A

Annunciators:

Numerous Annunciators Located on CB 14 panel

1) Direct and Implement ABN-601 Section 5

- ! Check 6.9 KV safeguard buses energized (Train B)
- ! Check 6.9 KV non-safeguard buses energized
- ! Check Blackout Sequencer
- ! Check switchyard buses - will be de-energized
- 1) Perform Attachment 20
- ! Refer to EPP-201 -> classify as NOUE
- ! Verify numerous transformer/switchyard status
- ! Re-energize various buses (next event before this can be completed)

2) Shift briefing, various announcements, contact distribution, and contact Prompt team

Note to Simulator Operator: Call RO and report lighting strike in switchyard and high winds. Load Met Tower with wind speed of 105 mph (sustained)

Comments:

Bold Denotes Critical Task

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Scenario Number: 1	Event Number: 7	Facility: CPSES
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Brief Description: EDG 1-02 trips on overspeed → Loss of all power

Expected Operator/Plant Response	RO	BOP	CRS
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Time= E19+16 minutes

Annunciators:

Numerous annunciators

1) Direct and Implement ECA-0.0A			
! Verify Rx trip			
! Verify turbine trip			
! Check RCS isolated			
! Verify AFW flow > 460 gpm			
! Power can not be restored to AC safeguards bus - go to ABN-601, Step 6			
! Initiate DC bus load shedding - Control Room calls and has someone begin to load shed - local actions			
! <b>Depressurize intact SGs to 270 psig</b>			
! Send PEO to check on EDG trip (trip on overspeed)			
2) Direct and Implement ABN-601			
! Start the DG per Attachment 1- EDG restarted AFTER SG depressurization started			
! Transition back to ECA-0.0A			
! After SG pressures have been stabilized - end of scenario (based on Chief Examiner)			

Comments:

Bold Denotes Critical Task

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**Critical Task Descriptions**

Event 2:

**Rx does not trip on low S/G level** —> on S/G level transmitter failure, with proper actions, the operators should be able to control S/G water level in manual without causing a low S/G water level RX trip. Per NUREG 1021, App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

Event 4:

**Trip the reactor due to high RCP vibration** - preventing a challenge to plant safety and a degradation of any barrier to fission product release (App D, Step D.1.a)

Event 7:

**Depressurize intact SGs** —> Reduce temp and press of RCS to reduce RCP seal leakage and minimize RCS inventory loss (no way to makeup). (preventing a challenge to plant safety (App D, Step D.1.a))

Facility: Comanche Peak (CPSES)		Scenario No.: 2		Op-Test No.: 2001	
Examiners:			Operators: _____ _____ _____		
Initial Conditions: 100% power and steady.					
Turnover: No equipment is out of service. Train A equipment is in service. Maintain turbine/reactor power at 100%.					
Time = 0 when crew assumes the watch.					
Event No.	Malf. No.	Event Type*	Event Description		
1 T= E1+1	RX05B	I (SRO) I (RO)	PRZR Level Instrument LT-460 fails low ( <b>Start Event 2 prior to RO/BOP tripping bistables</b> ) Note to sim. oper. -> T=0 insert SW03A - SSW Train A, PIS-4251 failure (prevents CCWP 1-02 auto-start when SSWP 1-01 trips)		
2 T= E1+11	SG01B **	C (All)	RCS leak 2 gpm (SG 1-02 tube leak -> ABN-106). Also put in applicable alarms based on leak rate (condenser off-gas, S/G blowdown, etc.)		
3 T= E1+11		N (SRO) N (BOP) R (RO)	Commence plant shutdown -> RCS leak rate (IPO-003A)		
4 T= E2+0	ED07B ***	C (All)	Loss of Protection Inverter IV1PC2 (ABN-603) - <b>Trigger as determined by Chief Examiner based on downpwr</b>		
5 T= E2+10	SW01A	C (All)	Station Service Water Pump 1-01 shaft seized and CCW 1-02 does not auto start (ABN-501)		
6 T= E2+17	EN01 (100%)  MS01B (5E6 lbm/hr)	M (All)	Seismic event (>SSE) causes S/G 1-02 tube rupture  Faults S/G 1-02 (S/G 1-02 pressure goes <300 psig)		

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

\*\* SG01B increase to 500 gpm when seismic event occurs

\*\*\*E2 trigger should be actuated after sufficient downpower as determined by Chief Examiner

Scenario Number: 2	Event Number: 1	Facility: CPSES
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Brief Description: PRZR Level Instrument LT-460 fails low

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 1 min

Annunciators:

PRZR LVL LO (5B-3.6)  
PRZR LVL DEV LO (5C-1.2)

1) Directs and Implements the actions of ABN-706			_____
! Manually controls LK-459 "PRZR LVL CTRL" or FK-121, "CCP CHRG FLO CTRL"	_____		
! Transfer LS-459D, "PRZR LVL CTRL CHAN SELECT" to an alternate channel	_____		
! Ensure LS-459E, LR-459 "PRSR LVL SELECT" selected to a valid channel	_____		
! Place controller in AUTO	_____		
! Establishes letdown per Attachment 6	_____		
2) Refers to T/S 3.3.1 - place channel in trip within 6 hrs T/S 3.3.3 - no action	_____		_____
3) Contacts Prompt Team and Ops Management			_____
<b>RX does NOT trip on high PRZR level</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 2	Facility: CPSES
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Brief Description: RCS Leak S/G 1-02 tube leak, approx 2 gpm (ramps up and stabilizes)

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 11 min

Annunciators:

PC-11 annunciators - main steam line 2 rad monitor MSL179, condenser off-gas, and S/G blowdown and sampling

1) Directs and Implements Procedure ABN-106			
! Verifies main steamline rad alarms - if MSL179 rad alarm in, reduce power to $\leq 50\%$ in 1 hr			
! Initiate required shutdown per IPO-003A			
! Adjust affected SGARV controller setpoint to 1160 psig			
! Check PC-11 for increases in rad levels discharging to LVW and stop or divert flow			
! Request Chemistry to sample SGs			
2) Directs and Implements Procedure ABN-103			
! Verify at least one charging pump operating			
! Ensure PRZR level at or trending to prog. level			
! Check PRZR status - safeties closed, PORVs closed, spray valves closed, and PRT level and temp no significant increase			
! Check S/G status - normal levels, no significant feedwater/stm mismatch, and no increased radiation trend on PC-11.			

Note: Operators may use ABN-103 along with ABN-106. They may NEVER go to ABN-103, not required.

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 3	Facility: CPSES
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Brief Description: Plant shutdown per IPO-003A

Expected Operator/Plant Response	RO	BOP	US
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Time = E1 + 11min

Annunciators:

None

1) Direct and Implement the power reduction per IPO-3A			
! Contact Chemistry to place demins in service	_____		_____
! Calculate the amount of boration needed to reduce power to approx 575MW (operators will probably initial boration - 100gallons?)	_____		_____
! Initiate RCS boration and inward rod motion	_____		
! Set in the desire unloading rate on the LOAD GRADIENT device		_____	
! Lower the LOAD REFERENCE device to 575 MW		_____	
! Verify proper rod bank insertion, overlap, and sequencing	_____		
! When turbine power is approx 50%, stop one main feedwater pump	_____	_____	

Comments:

Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 4	Facility: CPSES
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Brief Description: Loss of Protection Inverter IV1PC2

Expected Operator/Plant Response	RO	BOP	US
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Time = E2 + 0

Annunciators:

118V CHAN 2 INV TRBL (10B-2.16)

Note: IV1PC2 - acrid odor present and hotter than normal

1) Directs and Implements the actions of ABN-603			_____
! Verify loss did NOT cause a Rx trip	_____		
! Place control rods in manual	_____		
! Verify PRZR level and pressure and take manual control if necessary	_____		
! Manually control feed flow to S/G2 & S/G3 (feed flow increases)		_____	
! Reenergize IV1PC2 to alternate pwer supply		_____	_____
2) Refer to T/S 3.8.7 and 3.8.9			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 5	Facility: CPSES
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Brief Description: Station Service Water Pump 1-01 shaft seizure and CCW Pump 1-02 does not auto start. CCW Pump 1-02 does not auto start due to failure of SSW hdr press switch.

Expected Operator/Plant Response	RO	BOP	US
----------------------------------	----	-----	----

Time = E2 + 10 min

Annunciators:

CCP 1 L\O CLR SSW RET FLO LO (1-1.11)

SIP 1 L\O CLR SSW RET FLO LO (1-1.12)

DG ½ SSW RET FLO LO (1-3.11)

1) Directs and Implements Procedure ABN-501	_____	_____	_____
! Verify SSW Pump 1-02 running		_____	
! Manually start CCW Pump 1-02		_____	
! Shutdown Train A equipment (CCP, DG, SI Pump, CS Pumps - pull out) and start required Train B equipment	_____	_____	_____
! Verify proper operation of Train B equipment	_____	_____	
2) Refer to T/S and makes notifications to Ops management			_____
3) Conduct crew brief			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 6	Facility: CPSES
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Brief Description: Seismic event (>SSE) causes S/G 1-02 tube rupture (500 gpm?) and faulted S/G (S/G 1-02 pressure <300 psig) ADVERSE CONTAINMENT

Expected Operator/Plant Response	RO	BOP	US
----------------------------------	----	-----	----

Time = E2 + 17 min (Rx trip/SI)

Annunciators: LOTS

1)	Directs and Implements Procedure EOP-0.0A			
!	Verifies Rx trip/bypass bkrs open and flux dec.	_____		
!	All rod bottoms lights on	_____		
!	Verifies turbine trip		_____	
!	Verifies power to AC safeguards buses		_____	
!	Verifies both Trains SI actuated	_____		
!	Verifies Containment Spray required and Phase B isolation	_____	_____	
!	Verifies CCW and RHR pumps running	_____	_____	
!	Verifies FW isolation complete	_____		
!	<b>Stops RCPs (criteria should be satisfied)</b>	_____	_____	_____
!	Transition to FRZ-0.1A for high containment press (due to Orange Path on Containment Status Tree)	_____	_____	_____
2)	Directs and Implements Procedure FRZ-0.1A	_____	_____	_____
!	Verifies containment Phase A and containment ventilation isolation	_____	_____	

Comments: Bold Denotes Critical Task

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Scenario Number: 2	Event Number: 6 (Continued)	Facility: CPSES
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Brief Description: Seismic event (>SSE) causes S/G 1-02 tube rupture (500 gpm) and faulted S/G (S/G 1-02 pressure <300 psig)

Expected Operator/Plant Response	RO	BOP	US
2) Directs and Implements Procedure FRZ-0.1A (cont)	_____	_____	_____
! Checks containment spray required and spray flow	_____	_____	
! Verifies all RCPs stopped	_____	_____	
! Verifies Containment Phase B isolation	_____	_____	
! Verifies MSIV and MSIBV closed	_____	_____	
! Check feed flow isolated to SG 1-02	_____	_____	
! Return to EOP-0.0A and step in effect			_____
3) EOP 0.0 A → Determines faulted S/G and transitions to EOP-2.0A, "Faulted S/G Isolation"			_____
4) Directs and Implements Procedure EOP-2.0A			_____
! Checks MSIVs and bypass valves shut	_____	_____	
! Identifies faulted S/G - pressure decreasing in an uncontrolled manner or completely depress	_____	_____	
! <b>Isolates faulted S/G</b>	_____	_____	_____
! Check secondary radiation - should be high	_____	_____	
! Transition to EOP-3.0A, "S/G Tube Rupture"			
END OF SCENARIO			

Comments:

Bold Denotes Critical Task

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## Critical Task Descriptions

### Event 1:

**RX does NOT trip on high PRZR level** —> with proper actions, the operators should be able to control PRZR water level in manual without causing a high PRZR water level RX trip. Per NUREG 1021, App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

### Event 6:

**Stops RCPs if criteria satisfied** —> depending on the conditions of the accident, for a SBLOCA, the RCPs should be tripped when specified parameters are met. The RCPs should be tripped to avoid more serious impacts. If the criteria is not satisfied, the pumps should continue to be operated because they can provide core heat removal without ECCS in operation.

**Isolates faulted S/G** —> minimizes RCS cooldown and mass and energy release to the containment (reduces challenge to containment). App D, Step D.1a., “prevent inappropriate actions that create a challenge to plant safety (such as an unintentional reactor protection system (RPS) or ESF actuation).”

Facility: Comanche Peak (CPSES)		Scenario No.: 3		Op-Test No.: 2001	
Examinerory			Operators: _____ _____ _____		
Initial Conditions: 100% power and steady.					
Turnover: EDG 1-02 and CCP 1-02 are out-of-service for preventive maintenance. Train A equipment is in service. The shift has been ordered to remove MFP 1-01 from service for maintenance → 15%/hr					
Time = 0 when Chief Examiner determines enough power reduction has been seen See next page for preload information!!!!!!					
Event No.	Malf. No.	Event Type*	Event Description		
1		N (SRO) R (RO) N (BOP)	Downpower to remove MFP 1-01 from service - 15%/hr		
2 T= E1+0	CV15	C (SRO) C (RO)	PCV-131, "Letdown Pressure Control Valve" fails closed. <b>As determined by Chief Examiner - based on downpwr</b>		
3 T= E1+8	TP01	C (SRO) C (BOP)	200 gpm TPCW leak		
4 T= E1+18	RP06A	I (SRO) I (RO)	Loop 1 N16 fails high <b>(Start Event 5 prior to RO/BOP placing bistables in trip)</b>		
5 T= E1+24	IA01A	C (All)	Instrument air leak - IA Receiver 1-01 relief valve lifting (Severity = 1500 scfm leak)		
6 T= E1+30	RC19A	M (All)	RCS Loop A - 1000 gpm leak - ramp in over 5 minutes RCS Cold Leg 1 Leak (flow scaling)		
7 T= ??		C (All)	Rx will not trip in manual or automatic. Go to FRS-0.1A, "Response to Nuclear Power Generation/ATWT"		
8 T= E19+2	SI04B	C(RO)	Train B SI Pump failure		

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

## Preload Information

T=0:

- ! RP01 Auto Rx trip failure
- ! RP15E Rx trip breakers jammed closed
- ! Override CS-T1B3, xfmr Breaker T1B3 closed
- ! Override CS-1B3-1, incoming Breaker 1B3-1 closed
- ! Dg 1-02 bkr to local, CCP 1-02 breaker racked out

Scenario Number: 3	Event Number: 1	Facility: CPSES
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Brief Description: Power reduction to remove MFP 1-01 from service (15%/hr)

Expected Operator/Plant Response	RO	BOP	CRS
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Time = 0 when downpower ends per Chief Examiner

Annunciators:

None

6)	Direct and Implement the power reduction per IPO-3A			
!	Contact Chemistry to place demins in service	_____		_____
!	Calculate the amount of boration needed to reduce power to 575MW (Rx engineering)	_____		_____
!	Initiate RCS boration and inward rod motion	_____		
!	Set in the desire unloading rate on the LOAD GRADIENT device		_____	
!	Lower the LOAD REFERENCE device to approximately 575MW (Rx power = 50%)		_____	
!	Verify proper rod bank insertion, overlap, and sequencing	_____		
!	When turbine power is approx 50%, stop Main Feedwater Pump 1-01	_____	_____	

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 2	Facility: CPSES
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Brief Description: PCV-131, "LTDN Press Ctrl Valve," fails closed

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 0

Annunciators:

LTDN HX OUT PRESS/FLO HI (6A-3.3)

LTDN RLF VLV OUT TEMP HI (6A-4.3)

1) Refer to ALM-0061A

! Letdown press > 310 psig, isolates letdown → closes 1/1-8149A, 1/1-8149B, and 1/1-8149C and transitions to ABN-105

2) Directs and Implements Procedure ABN-105, Section 5.0

! Establishes excess letdown

1) Simultaneously lower 1-FK-121 to 32 gpm and adjust 1-HC-182 to 6 to 13 gpm

2) Align excess letdown per SOP-103A

3) Contacts the Prompt Team to repair PCV-131 and notifies Ops Management

Note to Sim Oper: When called as PEO to open LCS-8409-RO, "U1 Ltdn Hx Out Press Ctrl Vlv Byp Remote Oper," report that the valve is stuck shut and CANNOT be opened

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 3	Facility: CPSES
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Brief Description: 200 gpm TPCW leak

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 8 min

Annunciators:

TPCW HEAD TK LVL LO (9A-2.10)

1) Determines TPCW tank level has decreased		_____	_____
2) Directs and Implements Procedure ABN-306			_____
! Verifies TPCW head tank level		_____	
! Checks main generator for water inleakage -> sends PEO to check local indicators and annunciator GEN GAS MOISTURE HI (10A-1.10)		_____	
! Ensures makeup aligned to TPCW head tank		_____	
! Has PEO/FSS inspect TPCW for leaks (leak will be discovered on TPCW Pump 1-01 discharge.) Swaps pumps to isolate leak - shut suction and discharge valve.		_____	_____
! Contacts Prompt Team and notifies Ops Management			_____

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 4	Facility: CPSES
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Brief Description: Loop 1 N16 fails high

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 18 min

Annunciators: (I think)

ANY N16DEV HI/LO	(5C-1.5)		
1 of 4 OT N16 HI	(5C-2.5)		
1 of 4 OP N16 HI	(5C-2.6)		
1 of 4 OP N16 ROD STOP & TURB RUNBACK	(6D2.13)		
1 of 4 OT N16 ROD STOP & TURB RUNBACK	(6D-3.14)	_____	

1) Directs and Implements Procedure ABN-704

- ! Place control rods in manual and ensure  $T_{ave}$  is within 1°F of  $T_{ref}$  \_\_\_\_\_
- ! Select the failed channel on 1/1-JS-411E, CHAN DEFEAT \_\_\_\_\_
- ! Within 6 hours have I&C place bistable test switches for failed channel in the CLOSED position \_\_\_\_\_
- ! Refer to T/S 3.3.1 \_\_\_\_\_
- ! Contacts Prompt Team and Ops Management \_\_\_\_\_

Comments:

Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 5	Facility: CPSES
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Brief Description: Instrument Air leak due to IA Receiver 1-01 relief valve lifting

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 24 min

Annunciators:

INSTR AIR HDR PRESS LO (1-3.3)

1) Determines IA system has a leak by acknowledging alarm and observing plant parameters	_____	_____	
2) Directs and Implements Procedure ABN-301			_____
! Verifies both IA compressors are running		_____	
! Determines IA press < 85psig		_____	
! Starts and aligns a common IA compressor		_____	
! Stops unnecessary use of IA		_____	
! Sends PEO to determine cause of low IA press (PEO finds IA Receiver 1-01 relief valve lifting - able to reset the valve)		_____	
! Checks equipment on main control board for proper operation	_____	_____	
! Contacts Prompt Team and informs Ops Management			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 7	Facility: CPSES
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Brief Description: Reactor will not trip in manual or automatic

Expected Operator/Plant Response	RO	BOP	CRS
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Time = E1 + 30?

Annunciators: LOTS

1) <b>Recognize that Rx will not trip</b> - may try opening Bkrs CS-T1B3 and CS-1B3-1 on CB - won't open	_____	_____	_____
2) Exits EOP-0.0A and transitions to FRS-0.1A	_____	_____	_____
3) Directs and Implements Procedure FRS-0.1A			_____
! Verify control rods inserting >48 step/min or manually insert control rods	_____	_____	_____
! Initiate emergency boration and verify charging flow >30 gpm	_____	_____	_____
! Dispatch an operator to locally trip the reactor			
<b>Sim Oper: After being dispatched as PEO, trip Rx 1 min later</b>	_____		
! Maintain AFW >860 gpm until narrow >26% (maintain level 26%-50%)		_____	
! Verify Rx subcritical and return to EOP-0.0A	_____		_____
4) Directs and Implements EOP-0.0A			_____
! Verify all rod bottom lights on & turbine tripped	_____		
! Verify power to AC safeguard busses	_____	_____	
! Verify both SI trains actuated, Train B pump trips ( <b>see Event 8</b> )	_____	_____	
! Check status of cont. spray	_____	_____	
! <b>Stop RCPs if criteria satisfied</b>	_____	_____	_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 7 (continued)	Facility: CPSES
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Brief Description: Reactor will not trip in manual or automatic (continued)

Expected Operator/Plant Response	RO	BOP	CRS
4) Directs and Implements EOP-0.0A (continued)			
! <b>Determines RCS in NOT intact and transitions to Procedure EOP-1.0A</b>	_____	_____	_____
5) Directs and Implements EOP-1.0A			_____
! <b>Stop RCPs if criteria satisfied</b>	_____	_____	
! Check if any S/G faulted - none	_____	_____	
! Check S/G levels >26% and maintain 26-50%	_____	_____	
! Check secondary radiation normal	_____	_____	
! Check if ECCS flow should be reduced (pressure should be stabilized/increasing)	_____	_____	
TERMINATE Scenario at completion of Step 6 of EOP 1.0 - this is determination of whether to terminate SI or continue in EOP-1.0 depending on plant conditions at time. US may go to EOS 1.1A or stay in EOP-1.0A			_____

Comments: Bold Denotes Critical Task

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Scenario Number: 3	Event Number: 8	Facility: CPSES
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Brief Description: Train B SI Pump Starts and Coupling Breaks

Expected Operator/Plant Response	RO	BOP	CRS
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Time: E19 + 2 min

Annunciators:

- |    |   |       |  |       |
|----|---|-------|--|-------|
| 1) | Recognizes that SI pump is not working (amperage is low and essentially zero flow)                                      | _____ |  |       |
|    | ! Dispatch AO to visually inspect the pump  | _____ |  | _____ |
|    | ! When AO reports coupling broke (approximately 7 minutes after recognition of problem), secure the pump - pull to lock |       |  |       |

Note: Crew may attempt to manually restart tripped SI pump ONE time only!!!

Comments: Bold Denotes Critical Task

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## Critical Task Descriptions

### Event 7:

**Both together as one critical task → Recognize that Rx will not trip and Initiate emergency boration and verify charging flow >30 gpm** → reactor will not trip in automatic or manual. Requires driving rods (automatic) and emergency boration. (Failure of an ESF system)

**Stop RCPs if criteria satisfied** → depending on the conditions of the accident, for a SBLOCA, the RCPs should be tripped when specified parameters are met. The RCPs should be tripped to avoid more serious impacts. If the criteria is not satisfied, the pumps should continue to be operated because they can provide core heat removal without ECCS in operation.

**Determines RCS in NOT intact and transitions to Procedure EOP-1.0A** → abnormal containment radiation, pressure, or recirculation sump level is an indication of a line break inside containment. Since the S/Gs were determined to be non-faulted, leak must be in RCS. (Degradation of any barrier to fission product release)