Facility: Diablo Canyon (PWR) **Scenario No.:** 1 **Op-Test No.:** L091C-NRC

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions: **100% Reactor power, MOL, RCS Boron at 774 ppm**

Turnover: **CCP 1-3 OOS (MOW); 1-2 S/G tube leak (≈ 82 gpd and steady; OP O-4, action level 2 entered at 0537 this morning)**

Event No	Malf No.	Event Type*	Event Description
T/O	plp aux25	N/A	Turnover includes 1-2 S/G tube leakage (SGTL) of ≈ 82 gpd (OP O-4, Action Level 2; requires unit offline in Mode 3 w/i 24 hrs)
1	pmp asw1/2	C (SRO, BOP)	ASW Pp 1-1 trips on overcurrent; ASW Pp 1-2 will not start in auto or manual; requires crosstie to U-2 ASW system (requires TS 3.0.3 S/D) **(TS)**
2	plp aux25	C, R (ALL)	Leakrate in the 1-2 S/G rises fast enough (to >300 gpd over the next hour) so that Action Level 3A is achieved w/i 30 minutes (> 30 gpd/hr rate); the unit must be ramped to < 50% w/i the next hour, and ramped offline w/i the next 2 hrs **(TS)**
3	ser 0303 vlv pzr3	C (SRO, BOP)	Pzr PORV block valve 8000C fails closed (simulating a motor short/ground), preceded by a Bus 1H 480 vac ground alarm; will require placing it's PORV (PCV-456) in manual-closed **(TS)**; after a few minutes the breaker for the vlv trips and the ground clears (this is also part of setup for ECA-3.3 event)
4	xmt pzr40	I (SRO, ATC)	Pzr level (controlling) channel LT-459 fails high, causing charging flow to drop in Auto; requires taking manual control of charging **(TS)**
5	mal rcs4b mal syd1	M (ALL)	SGTL in the 1-2 S/G increases to a 300 gpm SGTR, requiring an SI; isolation and an RCS cooldown will be performed per EOP E-3 **(CT) ****; a loss of offsite power will also occur at the time of the trip/SI (prevent use of Pzr sprays in EOP E-3)
6	mal ppl3a	C (BOP)	SI train A fails to actuate in auto or manually, requiring manually positioning SI train A equipment
7	vlv pzr1 vlv pzr2 vlv cvc17/27	C (ALL)	During EOP E-3, depressurization is not available due to no PORVs (one isolated, two failed), no Pzr spray capability (no pwr to RCPs), and no Aux spray capability (aux spray vlvs failed closed); this will force transition to ECA-3.3, where SI will be terminated using alternate ECCS term criteria **(CT)**
			Scenario is terminated once SI termination is completed.

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

Rev 0 comments – N/A

** SGTR evaluated against TCOAs # 1, 2, & 3; since there are significant differences between the TCOA bases and this SGTR (size/ramp, SGTR w/o press control, etc), no TCOA time limits are applied to this scenario.

Target Quantitative Attributes (Per Scenario; See Section D.5.d) (from form ES301-4)		Actual Attributes
1.	Total malfunctions (5–8)	7
2.	Malfunctions after EOP entry (1–2)	2
3.	Abnormal events (2–4)	4
4.	Major transients (1–2)	1
5.	EOPs entered/requiring substantive actions (1–2)	2
6.	EOP contingencies requiring substantive actions (0–2)	1
7.	Critical tasks (2–3)	3

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 1 **Page** 1 **of** 18

Event Description: **1-1 ASW Pp OC trip; 1-2 ASW Pp does not start (auto or manual); crosstie to U-2 is required (TS)**

Time	Position	Applicant's Actions or Behavior
		Note: Procedure step numbers are included at the front of each action/comment in parenthesis, where applicable (per NRC request).
	ATC	Observes PK01-03 (ASW Pp OC trip) and PK01-01 (three low press / low ΔP inputs) alarming, and informs the Shift Foreman.
	ATC/BOP	Observes that 1-1 ASW Pp has a blue OC light (VB1, far left), and reports condition to the Shift Foreman.
	BOP	Observes that 1-2 ASW Pp did not start, and attempts to start the pump (will not start) by taking the pump Auto/Manual switch to Manual, and attempting to start the pump. Note that this action may be performed prior to OP AP-10 entry, or may be performed during the procedure.
		Note: It is expected that the Shift Foreman (SFM) will enter OP AP-10, either directly, or after implementing ARP PK01-03, which will direct the crew to OP AP-10; ARP PK01-01 may be entered briefly, but it is not expected.
		(ONLY if ARP PK01-01 is entered; otherwise, section is N/A)
	SRO	• (1.0) Goes to section 2.1 due to multiple low pressure inputs
	SRO	• (2.1.1) Determines that a loss of ASW has occurred, and goes to OP AP-10, Loss of ASW
		(ONLY if ARP PK01-03 is entered; otherwise, section is N/A)
	SRO	• (1.0) Goes to section 2.1, due to OC trip inputs
	SRO/BOP	• (2.1.1) Determines that the standby ASW pump is NOT running with normal current (did not start)
	SRO	• (2.1.2) Determines that a loss of ASW has occurred, and goes to OP AP-10, Loss of ASW
		(OP AP-10, Loss of ASW)
	SRO	Enters OP AP-10, Loss of Auxiliary Salt Water (ASW)
	SRO	• (optional) (1.0 Scope) May read scope, and note that scope 1.1.1, loss of both ASW Pps applies
	SRO	• (optional) (2.0 Symptoms) (Notes that symptoms 2.1.1 and/or 2.1.2 apply, making the procedure applicable
	SRO	• (1) Verifies an ASW Pp running (none running or available), goes to step 1 RNO
	SRO/BOP	• (1 RNO a) Inquires of U-2 if they have an ASW Pp available
		Cue: The 2-2 ASW Pp is available for U-1 use.
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 1 **Page** 2 **of** 18

Event Description: **1-1 ASW Pp OC trip; 1-2 ASW Pp does not start (auto or manual); crosstie to U-2 is required (TS) (con't)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-10) (con't)
	SRO/BOP	• (1 RNO a) Directs U-2 to start their standby ASW Pp
		Cue: The 2-2 ASW Pp is running with normal amps (requires sim console action)
	SRO/BOP	• (1 RNO a) Directs U-2 to close FCV-496 and open FCV-495
		Note: Normally, both FCV-495 and FCV-496 are open on both units. (Only if) the direction is done backwards, then U-2 will provide the cue that the alignment would crosstie their in-service pump for their unit to U-1 as well (they would NOT perform that lineup). This should cause the lineup to be corrected.
		Cue: FCV-495 is open, and FCV-496 has been closed.
	SRO/BOP	• (1 RNO a) Opens FCV-601 to establish U-1 ASW flow (takes switch on VB-1, far left, lower panel, to open); observes rising ΔP on the 1-1 ASW HX
	ATC/SRO	• (1 RNO a) Observes clearing of ΔP and low pressure alarms on the 1-1 ASW HX and reports to the Shift Foreman.
	SRO	• (optional) Directs watchstander to check out ASW Pps
	SRO	• **(TS)** (1 RNO b) Implements TS 3.0.3 for the loss of ASW to U-1; may notify Shift Manager and/or Operations Mgmt (requires the start of a shut down w/i 1 hour)
	SRO	• (optional) Notifies maintenance of ASW Pp problems
	SRO/BOP	• (1 RNO c) Directs stopping of radwaste discharges in progress (call to Aux Board)
	SRO	• (1 RNO d, may not voice) Notes that U-2 ASW pump was successfully crosstied to U-1, so OP AP-11 actions are not required
	SRO	• (1 RNO e) Continues to step 4
	SRO	• (4) Verifies that CCW temperatures are normal or decreasing (they will be normal; just to right of ASW/CCW Pp controls on VB-1)
	SRO	• (5) Verifies Tech Specs for final U-1 configuration; may also remind U-2 to consult Tech Specs for their unit (if not already done in step 1 RNO); TS 3.0.3 is applicable; may exit OP AP-10
		The next event begins automatically during this event, but allows time to complete this event.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 2 **Page** 3 **of** 18

Event Description: **1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS)**

Time	Position	Applicant's Actions or Behavior
		Note: The S/G tube leakage builds up during the first event to a level that will cause entry into OP O-4 Action Level 3A, which will require the plant to be under 50% in the first hour, and shut down in the next two hours. The previous event also requires a shut down (in 6 hrs, after the first hour), but at a slower ramp rate. The ramp guidance for both procedures, therefore, is included in this event. Depending on Shift Foreman discretion, initially the ramp may be started per OP L-4 (for slower ramp) or OP AP-25 (for faster ramp).
	ALL	Observation is made that the S/G tube leak rate is above 30 gpd/hr (action level 3A in OP O-4, if maintained for at least 30 minutes), and that it also rises above the 150 gpd level (to a final level of > 300 gpd); this observation can be made from any PPC screen using the GRPDIS OP_O-4 display, or manually using Appendix A of OP AP-3 (S/G Tube Failure procedure)
		(OP O-4, Pri to Sec S/G Tube Leak Detection)
	SRO	• (6.4.2.b, may have been reviewed during turnover) Determines that the current leak rate is > 30 gpd/hr with a > 75 gpd leak rate, and refers to step 6.5 for Action Level 3A
	SRO	• (6.5, 6.5.1, once level met for 30 min) Shift Foreman determines that Action Level 3A criteria is met, and has been met for the minimum 30 minutes, requiring power reduction to < 50% w/i 1 hour, and Mode 3 w/i the next 2 hours (more limiting than the TS 3.0.3 shutdown from event 1)
		Note: It is possible that the Shift Foreman will start the TS 3.0.3 / TS 3.4.13B shut down prior to OP O-4 Action Level 3A being acted on (action 3a levels take time to build in). The Shift Foreman may ramp at a rate that already meets OP O-4 Action 3A (≈ 10 mw/min to be < 50% in the first hr), but this rate is only required once the action level is reached (for 30 min).
	ALL	• Observes that 150 gpd leak rate has been exceeded
	SRO	• **(TS)** Notes that TS 3.4.13.d, Action B (150 gpd S/G tube leakage) has been exceeded (shut down required here as well; 6 hrs to shut down)
	SRO	• (optional, 6.6, 6.6.1) Notes that Action Level 3B criteria have also been exceeded, but determines that Action Level 3A actions are more limiting, and continues with Action Level 3A actions to shut down
		Note: It is possible to observe the criteria for either action level first; the important point here is that the SFM recognizes and implements the limiting action (3A) when the criteria is met (in concert with the TS 3.0.3 / TS 3.4.13b shut downs).
		Note: The Shift Foreman may chose to enter/implement OP AP-3 (S/G Tube Failure) at this time (although most actions will not be needed until later in scenario (see event 5); actions are listed here if that early entry is made; it is an optional procedure entry at this point)
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 2 **Page** 4 **of** 18

Event Description: **1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS) (con't)**

Time	Position	Applicant's Actions or Behavior
	SRO	(optional, at this point) Implements OP AP-3 (S/G Tube Failure)
		(ONLY IF OP AP-3, S/G Tube Failure early entry made; otherwise, this section is N/A; see event 5 later)
	ATC	• (1) Determines charging flow is maintaining Pzr level stable in auto (CC2 meters, PPC)
	BOP	• (2a) Determines that no S/G levels are rising unexpectedly (VB3 meters, PPC)
	BOP	• (2b) Checks main steamline read monitors (RM-71-74) (not rising at this time) (VB2 recorders, upper left; PPC)
	BOP	• (2c) Verifies S/G blowdown isolation/sample valves open (they are; VB3 lower left)
	SRO	• (2d) Contacts chemistry to continue sampling of S/Gs
	ATC	• (3) Observes that RCS makeup is well within capacity of leak (CC2 meters, PPC) (leak is only a few hundred gpd at this point)
	SRO	• (4) Implements OP O-4 actions (already in progress), and shutdown if required (also in progress)
	ALL	• (optional) May take further actions to minimize secondary contamination in this procedure, but it is not expected (as several other events are going to take priority for the next ≈ 30 min)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 2 Page 5 of 18

Event Description: 1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS) (con't)

Time	Position	Applicant's Actions or Behavior
		Note: IF OP L-4 shut down started prior to ramp due to S/G tube leak; note that OP L-4 or OP AP-25 can be used for the TS 3.0.3 shutdown. If ramp started in OP AP-25, go to next page and skip this section.
		(ONLY IF OP L-4, started/used; otherwise, this section is N/A)
		Note: (6.6.3.a) The crew may verify some prerequisites and precautions prior to the ramp, as well as a tailboard on the ramp. Those particulars will not be included here, as they do not contain any significant actions.
	SRO	• (6.3.3.b/c) Determines degassing will not be needed. Directs chemistry to provide the Aux Bldg Watch (ABW) with AFW chemical injection instructions
	ALL	• (SFM discretion) (6.3.3.d) May direct a second CCP be placed in service • (OP B-1A:V, 6.2.1) Places FCV-128 in manual (CC2, right side) (ATC) • (6.2.2/3) Starts CCP 1-2 (start/stop switch on VB2, lower panel), and verifies proper amps/operation (BOP) • (6.2.4/5) Adjusts seal flows (HCV-142) and charging flow (FCV-128) to ensure level is on reference (should take little adjustment, as it was on program already) (all on CC2) (ATC) • (6.2.6) When on program level, returns FCV-128 to auto (ATC)
	SRO	• (6.3.3, e-h) Makes several notifications about the intent to ramp to shut down the unit
	SRO/ATC	• (6.3.3.i) (now, or during ramp) Reviews the ramp plan (reactivity handbook) with the ATC, now, and/or during the ramp (usually, they would come up with a plan, come to agreement, and implement the plan, using the reactivity handbook)
	SRO/BOP	• (optional) (6.3.3.j) Directs ramp rate restriction sheet completed (BOP)
	SRO	• Determines substeps k & l N/A (for > 5 mw/min ramps, and when cylinder htg steam is in manual

	SRO/BOP	• Starts ramp per OP C-3:III (they will use the procedure, or the lamicoid pegboard next to the Triconex control HMI; they have the same guidance):
		  • MW feedback is placed in service (on Triconex turbine HMI, CC3)
		  • Load target is entered into Triconex HMI (MW for 50% or below, depending on timing of S/G tube leak event)
		  • Sets ramp rate to ≈ ≤ 5 mw/min (can go faster, but would go to OP AP-25, covered on next pages)
		• Pushes GO

		Note: Other OP L-4 steps may be done (optionally), but the crew should be in OP AP-25 by this point in the ramp (need faster ramp due to leak rate increase), to use the guidance on the next pages.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 2 **Page** 6 **of** 18

Event Description: **1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS) (con't)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-25, Rapid Load Reduction)
	SRO	May perform an OP AP-25 procedure brief prior to entry
	SRO	Enters OP AP-25, Rapid Load Reduction • (1a) Determines runback/programmed ramp is not in progress (may not vocalize, since this ramp is initiated by the crew)

	BOP	• Ramp is started (guidance is also on lamicoid pegboard on CC3):
		  • (1b) MW and IMP feedbacks are placed in service (all on Triconex turbine HMI, CC3)
		  • (1c) ≈ 50% load target is entered into Triconex HMI (approx 500-600 MW; could set final target for shutdown at this time, 50-60 MWe)
		  • (1d) Sets ramp rate to ≈ ≥ 10 mw/min (may start lower if OP O-4 action level 3A levels haven't maintained for 30 minutes yet)
		  • (1e) Pushes GO

	SRO/BOP	(OP O-3) May make calls to chemistry if/when 15%/hr shut down rate is exceeded
	ATC	• (2) Verifies that control rods are inserting properly in AUTO (VB2, intermittent green IN light)
	ATC	• (3, 4) Verifies ON all pressurizer backup heaters (CC1, left), and verifies CCP (1-2) running (VB2),

	ATC	• (5) Verifies charging flow adequate to prevent letdown flashing: may take manual control of Pzr level (now, or any time during ramp) to prevent flashing of letdown (under these conditions, approx 60 gpm charging flow is required to keep letdown properly cooled)
		  • Places HC-459D (master level controller) or FCV-128 (charging flow controller) in manual (CC2, right side, for both)
		  • Keeps charging high enough (approx 60-65 gpm, as minimum) to prevent letdown from flashing (VB2, upper panel, letdown temperature, is monitored)

	BOP	• (6) Verifies DFWCS in AUTO and controlling S/G levels (CC3 MFW HMI, VB3, PPC)
		  • Checks MFW control and bypass valves in AUTO
		  • Checks both MFPs and their controller in AUTO
		  • May check level trends, as well as steam flow/feed flow trends (CC3, PPC, and/or big VB3 DFWCS electronic recorders)

		(continued on the next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 2 Page 7 of 18

Event Description: 1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS) (con't)

Time	Position	Applicant's Actions or Behavior
		(OP AP-25, Rapid Load Reduction, con't)
	ATC	• (7) RCS is borated per reactivity handbook for approx 50% load reduction (the following guidance is on the boration checklist in the reactivity handbook) • Presses STOP on M/U Ctrlr HMI (CC2) • Presses BORATE on HMI • Sets target gallons for boration (as decided above, and per the Shift Foreman); verifies batch is reset • Sets boric acid flowrate • Presses START, and monitors boration • Once stopped, either returns to AUTO (presses AUTO, then START), or performs additional boration per the Shift Foreman
	SRO	• The Shift Foreman provides reactivity oversight for the ramp
	BOP	• (8) Checks secondary system status: • (8a) MFP suction is verified adequate (PPC, VB3 meter; will remain > 260 psig) • (8b) Verifies 3rd Condensate/booster Pp set running (VB3, lower, center; all pumps will be running); may have to start 3rd pump at this time
	ATC	• (9) Verifies proper operation of steam dumps, Tave trending to Tref (VB3, dumps shouldn't be open for this ramp rate, but may have group 1 [4 vlvs] throttle open if ramp rate is high enough to arm dumps)
	ATC	• (10) Checks pressurizer pressure and level trending to program (actual will be close to program, but may be in manual control) (CC2, PPC)
	SRO	• (11) (optional later, based on plant conditions) Determines if it desired to shut down the #2 Htr Drip Pp (it is currently running) (the Shift Foreman would not give direction to shut down the pump until power got down to the 30-40% range) (VB3, upper panel, center)
	SRO	• (12) Determine if the unit can remain on line; the Shift Foreman determines that the unit will be taken off-line due to the TS 3.0.3 / 3.4.13B and OP O-4 shutdown requirements (may not vocalize, since this is already known to the whole crew); skips ahead to step 21
	SRO	• (21) Directs or continues power reduction to 15% (take unit offline)
	BOP	• (optional, only if ramp needs to be restarted) Ramp is started (guidance is also on lamicoid pegboard on CC3): • MW and IMP feedbacks are placed in service (all on Triconex turbine HMI, CC3) • ≈ 15% load target (or lower) is entered into Triconex HMI (approx 60-175 MW) • (1d) Sets ramp rate to ≈ ≥ 10 mw/min • (1e) Pushes GO
		(continued on the next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 2 **Page** 8 **of** 18

Event Description: **1-2 S/G Tube Leakage rises, prompting plant ramp to shut down (TS) (con't)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-25, Rapid Load Reduction, con't)
		Note: The following steps involve the continuing ramp to shut down the unit. Depending on the timing of the crew and other events, some steps (any after step 10) may not be reached. Therefore, it is not expected that all of these steps will be performed (and some will become N/A).
	SRO	• (22) Shutdown Secondary Equipment

	BOP	• (22a) (when < ≈ 35% power) Shut down MFP #2
		  • (22.a.1) Observes MFP #2 at stby (it automatically runs itself down to 3000 rpm between 40 and 30% power, decreasing) (it either will already be @ 300 rpm, or will be ramping to that value; no action by the BOP is expected)
		  • (22.a.2) Verifies that MFP #1 has assumed the load in AUTO (CC3; will check S/G levels, ΔP, and other parameters to see that the other MFP has assumed all of the load; the system is functioning normally with MFP #1 in AUTO)
		  • (22.a.3) Observes that FCV-54 is open or throttled open (MFP recirc, VB3 next to MFP controls), and that MFP #2 suction flow is still showing (≈ .5e6 lbm/hr; the system is functioning normally)
		  • (22.a.4) Shut down the MFP #2 (when directed by the Shift Foreman) (the Shift Foreman has discretion here, and can shut down the pump now, or wait until later (ie, keep the pump available))
		  • (OP C-8:III) (it is not expected that the crew will reach the point of shutting down this MFP, but if it does occur, it basically consists of a few local actions, and then the pump is tripped from the control room, once the programmed ramp is disabled on the Triconex panel on CC3)

	BOP	• (22b) (when < ≈ 35% power) Shut down #2 Htr Drip Pp • (22b) Except for the final stopping of the pump and disabling of the programmed ramp (on Triconex panel on CC3), this pump shutdown is mostly local actions

	BOP	• (22c) (when < ≈ 35% power) Align one Condensate/booster Pp for Auto
		  • (22.c.1) CB Pp set is placed in Manual, if needed (VB3, lower center)
		  • (22.c.2) Shuts down all but one CB Pp set (will shut down 2 sets, and leave one in auto), by taking pump switch to STOP, and monitoring condensate/feed system until stable
		  • (22.c.3) Once PK10-06 has alarmed and reset (expected), one of the two CB Pp sets is place back in Auto

		How far the ramp is observed is at the discretion of the lead examiner, before moving on to the next event.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 3 **Page** 9 **of** 18

Event Description: **Pzr PORV 8000C fails closed (TS)**

Time	Position	Applicant's Actions or Behavior
	ATC	Observes 480 vac bus 1H ground alarm (PK16-24)
		Note: A ground alarm will sound on the bus associated with valve 8000C. The valve will stroke closed (simulating a short) a few seconds later. In a few minutes, the valve breaker will trip open (no lights on the valve).
		(PK16-24, 480v Bus 1H Ground))
	SRO	(may) Implement PK16-24, 480 vac Bus 1H Ground
	ALL	• (2.1.1), or just obvious diagnostics) Attempts to locate bus ground (directs board operators to check bus 1H equipment for problems
	N/A	• (2.1.2 & 2.1.3) not applicable, as bus swapping is not applicable in this case (timing/etc)
	ATC/BOP	(may not catch valve movement) Observes that 8000C is stroking, or notes that the valve is closed (required to be open), with control switch still in the open position.
	ATC/BOP	Observes that 8000C valve indications go out
	SRO	• (2.1.4, or by general policy) Notifies maintenance, as time permits
	SRO	• (2.1.5) Implements Tech Spec for closed PORV block valve 8000C • TS 3.4.11.C (1 hr to place associated PORV in CLOSE position, then 72 hr spec)
		The next event may be implemented once Tech Spec actions have been recognized and taken, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 4 **Page** 10 **of** 18

Event Description: **Controlling Pzr level channel LT-459 fails high (TS)**

Time	Position	Applicant's Actions or Behavior
		Note: When the controlling level channel fails high, charging flow will drop (if in auto) and require manual charging flow to control (or continued manual charging control). Note that this action may be taken prior to procedure entry.
	ATC/BOP	Observes one or more of the following indications: • Charging flow dropping (if in Auto) (CC2 right side, and/or PPC) • LT-459 (VB2 upper right side) failing high • PK04-07, Protection channel activated alarm (high level bistable) • PK05-22, Pzr Level Hi/Lo Control (due to failed channel) • All Pzr heaters energized (due to control channel high) (if not energized per OP AP-25)
	SRO	Implements OP AP-5, Malf of Eagle-21 Protection or Control Channel
		(OP AP-5, Malf of Eagle-21 Protection or Control Channel)
	SRO/ATC	**Note: The ramp may temporarily be put on hold (presses HOLD on HMI) during failure; ramp is restarted by pressing GO on HMI) (CC3)**
	SRO/ATC	• (1) Notes that Pzr level is not controlling properly in Auto control (if in AUTO at time of failure)
	ATC	• (1 RNO) Level control is placed in MANUAL (FCV-128 and/or HC-459D, CC2), if not already done. Operator may raise charging to normal (if in auto when chan failed), and maintain normal RCP seal flows (RCP seals @ 8-13 gpm, using HCV-142, CC2)
	ATC/SRO	• (1 RNO) (as time permits, per Shift Foreman discretion) Notes that all heaters are on. May chose to place some heaters in manual OFF (will probably leave on for ramp)
	BOP	• (2) Determines that the failure is not Eagle-21 related (PK06-01 and PK06-03 are OFF)
	ATC	• (3, 3 RNO) Verifies that level controller is in manual, and swaps controlling channels off of LT-459 (460/461 position) (left end of CC1)
	ATC	• (4) Verifies that the channel selected for recording is not LT-459 (next to ctrl selector above)
	BOP	• (5) Verifies steam dumps are not actuated (no armed or open, unless from ramp in progress [not expected] – VB3, center)
	SRO	• (6) Notifies I&C of the LT-459 failure, as time permits
	ATC	• (8, 8a) Places OOS stickers on failed channel indications (VB2 LT-459 meter) (uses Att 4.1)
	SRO	• (9a) Determines Tech Spec actions using Att 4.1: • TS 3.3.1.M (trip bistables w/i 72 hrs)
		The next event may be implemented once the controlling channel is swapped, and Tech Specs have been discussed, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 5 **Page** 11 **of** 18

Event Description: **1-2 S/G Tube leak degrades to 300 gpm SGTR**

Time	Position	Applicant's Actions or Behavior
	ALL	Diagnoses rise in S/G tube leak rate using one or more of the following: • PK11-17, S/G Blowdown Hi Radiation • PK11-18, Main Steamline Hi Radiation • Recorder trends for RM-15/15R, RM-19, and RM-72 rising (VB2 recorder, PPC) • Observes Pzr level dropping below reference level (CC2, PPC) • Observes charging flow rising (if returned to auto) (CC2, PPC)
	SRO	Implements OP AP-3, S/G Tube Failure
		(OP AP-3, S/G Tube Failure) (note: may be continuing procedure from earlier entry)
	ATC	• (1a) Controls (raises) charging flow to try to maintain Pzr level (FCV-128 and/or HCV-459D, CC2 right side)
	SRO/ATC	• (1b) Determines Pzr level is dropping
	BOP	• (1 RNO a) Starts additional charging pump when needed (many do immediately, or delay for a short time) (should start the 2nd pump) (VB2, lower center area)
	BOP	• (1 RNO b) Observes Pzr level continuing to drop, and isolates letdown flow (closes 8149C, and LCV-459 and LCV-460, VB2, lower left side)
		Note: The manual SI may occur at any time during OP AP-3 implementation, based on feedback from the ATC (CO), and the size of the leak. The timing is set up to allow for some of these OP AP-3 actions to be completed prior to the SI.
	SRO/ATC	• (1 RNO b) Observes that Pzr level is still dropping, and initiates a manual Safety Injection (SI) (CC2, right side)
	SRO	Implements EOP E-0, Reactor Trip or Safety Injection
		(EOP E-0, Reactor Trip or Safety Injection)
	ATC	• (1) Verifies reactor trip (trip bkrs open(VB2 upper left), rods on bottom (VB2 upper left DRPI panel), NIs decreasing (CC1 left))
	ATC	• (2) Verifies turbine trip (stop valves closed) (CC3 HMI or VB2 RPS indicator lamps)
	BOP	• (3) Checks vital 4kv busses (VB4, vital busses F/G/H have white lights on mimic busses)
	ATC/BOP	• (4) Checks if SI actuated (PK08-21 ON, also checks VB1 red train lights and/or train equipment to verify both trains actuated); may actuate manual SI (VB1 upper right, or CC2 right) due to various SI failures
		The next event may be implemented once the manual Safety Injection has been actuated (or an automatic SI has occurred), per the lead examiner.
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 5 & 6 **Page** 12 **of** 18

Event Description: **1-2 S/G Tube leak degrades to 300 gpm SGTR (con't), and failure of Train A Safety Injection (SI) Equipment**

Time	Position	Applicant's Actions or Behavior
		(EOP E-0, Reactor Trip or Safety Injection, con't)
	ATC/BOP	Notes and corrects Auto SI failure (may be done following immediate actions, or during App E actions, below) • Actuates manual Phase A containment isolation (optional), and/or manually aligns SI train A pumps and valves (VB1 and VB2; makes white status lights go out on VB1 upper left side under ESF and Phase A areas)
	BOP	App E is implemented: • (App E, 1a) Checks no personnel in Containment (part of turnover; may not voice) • (App E, 1b) Announce trip/SI on PA system (no power to PA; loss 230KV) • (App E, 2) Checks main generator – tripped (PK14-01 ON, output bkrs open, and exciter field bkr open, CC3 right side) • (App E, 3 & 4) Verify Phase A and containment vent isolation complete (VB1, ESF status lights, red lights ON, white lights OFF); **manual Phase A and/or manual alignment of train A components will be required** • (App E, 5) Verify ESF (SI) actuation complete; **manual alignment of train A pumps and valves will be required** • (App E, 6) Verifies Feedwater isolation complete (normal FWI portion is complete, with red light ON, and white lights OFF) (S/G portion: red light is OFF due to train A SI failure; **MFIVs on VB3 must be closed manually**) • (App E, 7 & 8) Checks containment spray, Phase B, and main steam isolation – required (red lights are OFF for ESF for these on VB1, and white lights are OFF) • (App E, 9) Checks AFW status (MDAFPs running, TDAFP may be running, VB3 center area); verifies either min of 435 gpm flow (VB3 center) or S/G level > 15% (VB3 center) • (App E, 10) Verifies ECCS flows (charging injection (VB2 upper panel left), SI, RHR (both on VB1 upper panel); expected is that only CCPs will be delivering flow at this RCS pressure • (App E, 11) Reports ESF and AFW status to the Shift Foreman • (App E, 12 & 13) Checks excess letdown – not in service (8166/8167 closed); turns on aux bldg vent charcoal filter preheater (VB4 lower panel, left side) • (App E, 14) Checks secondary systems (MFPs tripped (VB2, green lights ON), only one CB Pp set running, condenser status (not avail)) • (App E, 15) Verifies proper operation of Aux Bldg and Control Rm vent systems (VB4 vent status light panel white lights); verifies containment iodine fans secured (VB4, lower panel) • (App E, 16 - 21) Verifies DGs running normally (VB4, freq (60), volts (120), speed (900)); verifies vital batteries supplied by chargers (charger and bus volts on VB5, upper panel middle/lower area); verifies MSRs reset (CC3 Triconex HMI); throttles RCP seal injection flows to normal (FCV-128, to 8-13 gpm each, CC2); checks PK11-04 NOT IN (SFP alarm); notifies Shift Foreman of completion
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 5 Page 13 of 18

Event Description: 1-2 S/G Tube leak degrades to 300 gpm SGTR (con't)

Time	Position	Applicant's Actions or Behavior
		(EOP E-0, Reactor Trip or Safety Injection, con't)
	SRO/BOP	• (App E, comment) If the crew chooses to shut down the TDAFP (optional), closing FCV-37 and FCV-38 will be needed (since there is a loss of power to the 12KV busses); FCV-37 may be closed now or later in EOP E-3 (part of SGTR isolation) (VB3, lower center)
	ATC	• (6) Checks RCS temperature – stable (temps will be dropping due to SGTR/ECCS flows; AFW may be throttled back (VB2, upper panel lower area)
	ATC	• (7) Checks Pzr PORVs and Pzr safeties (closed) / PORV block valves (two open, one closed), and no elevated tailpipe temps or sonic flows on safeties/PORVs (VB2 – upper panel, far right); checks Pzr sprays closed (CC2)
	SRO/ATC	• (8) Checks RCP trip criteria (RCPs not running due to loss of power) (VB1 and VB2)
	ALL	Observes that 230KV power (startup power) has been lost (VB4 and VB5 white lights on non-vital busses OUT), and that 4KV vital busses load onto the DGs (VB4) (note: occurs a couple of minutes after the SI)
		Cue: If offsite power status is requested, report that both 230KV and 500KV power have relayed out, and no RTS is known at this time.
	ATC/BOP	• (9) Checks for faulted S/Gs • Faulted – checks all S/G pressures on VB3 (not uncontrolled drop/depressurized)
	ATC/BOP	• (10) Checks for faulted and ruptured S/Gs • Ruptured – checks RE-71/72/73/74 and RE-15/19 recorders on VB2 (and PPC); RE-72 has spike/trend, and PK11-06/17/18 (PK11-06 and PK11-18 alarms are ON)
	SRO/ALL	• (10 RNO) Transitions to EOP E-3; implements CSFSTs
		(EOP E-3, Steam Generator Tube Rupture)
	ATC	• (1) Checks RCP trip criteria again (N/A, no power to 12KV busses) (VB5 lower right)
	BOP	• (2) Identifies S/G 1-2 as the ruptured S/G (unexpected level rise, RM-72 trend) (VB3 upper, meters, PPC; VB2 recorder)
		Note: Although the SGTR is on the 1-2 S/G, it is normal for the adjacent steamline rad monitor (lead 1-1, RM-71) to have a small "spike", and then return to normal. The normal expectation is that the crew would diagnose this spike as "shine" from the other steam line (1-2), and move on. If the Shift Foreman decides to (also) isolate S/G 1-1, this would be a conservative (but not expected) action. Either way, it will not affect the remainder of the scenario.
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 5 Page 14 of 18

Event Description: 1-2 S/G Tube leak degrades to 300 gpm SGTR (con't) (CT)

Time	Position	Applicant's Actions or Behavior
		(EOP E-3, Steam Generator Tube Rupture, con't)

	BOP	• (3) **Isolates S/G 1-2 using App FF (before transition to ECA-3.3 occurs) (WOG CT E-3-A) (critical task, all below that is BOLD) ****
		• (App FF, 1 & 2) **Sets 1-2 S/G 10% steam dump (PCV-20, VB3 upper panel, center) to 1040 psig, 8.67 turns, and checks valve closed (valve may be throttled for pressure control in auto)**
		• (App FF, 3) **Closes 1-2 S/G MSIV (FCV-42, VB2, upper panel, left side)** and verifies bypass valve (FCV-24) (note: MSIV will be closed if main steam isolation occurred earlier)
		• (App FF, 4) **Closes FCV-37** (stm supply to the TDAFP) (VB3, lower center)
		• (App FF, 5) Verifies SGBD OC closed (FCV-154), and sample isolation (FCV-248) closed on 1-2 S/G (sample valve may be open for sampling)
		• (App FF, 6) Verifies S/G 1-2 isolation complete
		• (App FF, 7) Notifies Shift Foreman of S/G isolation completion
		• (App FF, 8) Removes WR Thot input from SCMM on PAM4
		  • Goes to PAM4 panel
		  • Presses "Configuration Summary"
		  • Presses "Failed S/G"
		  • Presses the PB for the Thot to be disabled (2)
		  • Presses "Disable Loop 2"
		• (App FF, 9) Establishes sample lineup for S/G activity samples (or verifies if done earlier)
		  • (9a) Directs chemistry to sample per CAP AP-1
		  • (9b, 9c) Resets (or verifies) SI, Phase A (VB1); opens FCV-584 (air to containment) (VB4)
		  • (9d) Opens SGBD isolation sample valves (or chemistry may open them locally) (VB3 lower left, or chemistry)

	ATC/BOP	• (4) **Isolates AFW flow to 1-2 S/G (once > 15% NR level) (part of above CT) **** • **Closes/verifies closed AFW LCVs for 1-2 S/G (LCV-107 and LCV-111, VB3 lower left)**
	BOP	• (5) Check Ruptured S/G pressure greater than 225 psig (will be ≈ 950-1040 psig at this point).
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 5 Page 15 of 18

Event Description: 1-2 S/G Tube leak degrades to 300 gpm SGTR (con't) (CT)

Time	Position	Applicant's Actions or Behavior
		(EOP E-3, Steam Generator Tube Rupture, con't)
	SRO	• (6) Determines cooldown target temperature (from table in E-3, based on S/G pressure, usually between 497°F and 513°F, depending on exact 1-2 S/G pressure)
	SRO/BOP	• (7) Determines Condenser is NOT available (VB3, Permissive C9 is OFF, located on PK08), and goes to step 10 (use 10%ers to cool down)
	SRO/BOP	• (10) **Performs RCS cooldown at maximum rate; cooldown is done so that MAGENTA PATH avoided on RCS Integrity, and RCS subcooled margin still exists following cooldown (accomplished by reaching target temperature) (WOG CT E-3-B) (critical task) **** Cooldown is performed by: • **Opens (fully) the 10% steam dumps on the (3) intact S/Gs (full open on PCVs 19, 21, 22 on VB3 lower middle panel area)** • **Stops cooldown and stabilizes at target temperature (or slightly below);** closes PCV-19/21/22, and sets up for auto operation (each steam dump "pot" has a new setpoint calculated, corresponding to the current intact S/G pressures, and then the 10% steam dump valve is returned to AUTO)
	BOP	• (11) Maintains AFW flow to intact S/Gs (VB3 AFW controls).
	ATC	• (12) Checks Pzr PORVs closed and block valves open with power. (VB2, upper panel) (two blocks will be available, since one failed closed earlier)
	ATC/BOP	• (13, 14, 15) Resets SI, and Phase A (VB1 upper panel, center area); opens FCV-584 (VB4, lower left) (if not done earlier)
	SRO/ATC	• (16) Observes that both RHR Pps are running, and RCS pressure is well above 300 psig; stops both RHR Pps (VB1, right lower side)
	SRO/BOP	• (17) Verifies RCS cooldown stopped and temp stabilized once target temperature is reached (see above for details)
	BOP	• (18) Checks ruptured S/G pressure (VB3 meter, PPC) stable or increasing (should be ≈950-1040 psig, and stable)
	ATC	• (19) Checks subcooling adequate (> 40°F, which it is, VB2 meter)
		The next event will continue once the crew has completed the RCS cooldown, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 1 **Event No.:** 7 **Page** 16 **of** 18

Event Description: **1-2 SGTR Without Pzr Pressure Control**

Time	Position	Applicant's Actions or Behavior
		(EOP E-3, Steam Generator Tube Rupture, con't)
		Note: Transition to ECA-3-3 is made possible due to one PORV block valve being failed closed, two other Pzr PORVs failing to operate, the aux spray valves (8045/8048) failing to operate, and the loss of offsite power (no Pzr spray due to no RCPs)
	SRO	• (20) Depressurize RCS to minimize break flow and refill the Pzr, using normal spray; observes normal spray is not available, and moves on to step 21
	SRO/ATC	• (21) Depressurize RCS to minimize break flow and refill the Pzr, using Pzr PORVs; attempt to use both available Pzr PORVs (one at a time) to depressurize • Observes that no PORVs operate • Moves on to step 23
	ALL	• (23) Depressurize RCS to minimize break flow and refill the Pzr, using Aux Spray: • Verifies CCPs are aligned to the RWST • Verifies 8105 and 8106 (CCP recircs, VB2 lower center) are open (they are) • Observes that at least one CCP is in service (both are) (VB2, lower center) • Adjusts HCV-142 to 20% (seal backpressure valve, CC2 right side "pot") • Opens 8107 and 8108, charging isolation valves (VB2, lower left) • Attempts to open aux spray valves (8145 and/or 8148); notes that neither valve will open • Goes to step 23 RNO
	SRO	Transitions to ECA-3.3, SGTR Without Pressurizer Pressure Control
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 7 Page 17 of 18

Event Description: 1-2 SGTR Without Pzr Pressure Control (con't)

Time	Position	Applicant's Actions or Behavior
		(EOP ECA-3.3, SGTR Without Pressurizer Pressure Control, con't)
	SRO/BOP	• (1) Checks 1-2 S/G level < 90% NR (it normally will be; if it is greater than that, then the crew will skip straight to the ECCS terminations steps, starting at step 7 below)
	ATC/BOP	• (2) Establishes instrument air to containments (verifies Phase A reset on VB1, and verifies open FCV-584 on VB4; this sequence was done twice thus far in this procedure path, so no action should be required)
		Note: The attempts to establish spray methods may be repeated or just verified (that they have already failed to work), and then going on to the next step. Details for each method are on the previous event. All methods of depressurization are still unavailable.
	ALL	• (3) Attempts to establish normal Pzr spray (as in E-3 previously); noting that the method is unavailable, the crew moves on to the next step
	ALL	• (4) Attempts to establish PORV for depressurization (as in E-3 previously); noting that the method is unavailable, the crew moves on to the next step
	ALL	• (5) Attempts to establish aux Pzr spray (as in E-3 previously); noting that the method is unavailable, the crew moves on to the next step; (Note that this step has an order that is slightly different than E-3); the crew may chose to isolate charging injection while making their attempt for aux spray, but it is of no consequence (flowpath is blocked)
	BOP	• (6) Maintains (continues, same as E-3 step) AFW flow to intact S/Gs to maintain levels (VB3 AFW controls)
	ATC	• (7) Checks Pzr level > 12% (it may be; if not, the crew will loop from the beginning of the procedure to here until that level is reached; the delay will be only a few minutes at most)

	ALL	• (8) Checks ECCS termination criteria
		  • RCS subcooled margin > 20°F (VB2 meter; it is adequate) (ATC)
		  • Checks for adequate heat sink (both levels and/or flows will be available/adequate) (BOP)
		  • Checks RVLIS level > 60% full range (it will be) (BOP)
		  • Checks ruptured S/G level, increasing in uncontrolled manner (it still is) or off-scale high (should be at this point) (BOP)
		  • Continues to ECCS termination steps (SRO)

		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 1 Event No.: 7 Page 18 of 18

Event Description: 1-2 SGTR Without Pzr Pressure Control (con't) (CT)

Time	Position	Applicant's Actions or Behavior
		(EOP ECA-3.3, SGTR Without Pressurizer Pressure Control, con't)
	ALL	• (9) **Terminates SI (terminates SI prior to water release from S/G) (WOG CT ECA-3-3-A) (Critical Task) **** • **Stops both SI Pps (VB1)** (ATC) • Verifies at least one CCP running (VB2 lower center) (ATC) • Verifies 1-3 CCP stopped (cleared at turnover) • **Depresses 4KV vital bus auto transfer relay reset PBs; makes blue lights go out (VB4)** (BOP) • **Stops one CCP (VB2)** (ATC)
	ALL	• (10) **Isolates Charging Injection (CT con't) **** • Verifies 8105 and 8106, CCP recircs) open (VB2, lower center; they are) (ATC) • **Closes 8803A and 8803B** (VB2, lower left) (ATC) (only one set of valves [8801s or 8803s] required for CT) • **Closes 8801A and 8801B** (VB2, lower left) (ATC) (only one set of valves [8801s or 8803s] required for CT)
		The scenario may be terminated once SI termination is completed, per the lead examiner.

** Critical Task

Turnover includes 1-2 S/G tube leakage (SGTL) of ≈ 80 gpd (OP O-4, Action Level 2; requires unit offline in Mode 3 w/i 24 hrs)

1. ASW Pp 1-1 trips on overcurrent; ASW Pp 1-2 will not start in auto or manual; requires crosstie to U-2 ASW system (requires TS 3.0.3 S/D) **(TS)**

2. Leakrate in the 1-2 S/G rises fast enough (to 300 gpd over the next hour) so that Action Level 3A of OP O-4 is achieved w/i 30 minutes (> 30 gpd/hr rate for 30 min); the unit must be ramped to < 50% w/i the next hour, and ramped offline w/i the next 2 hrs **(TS)**

3. Pzr PORV block valve 8000C fails closed (simulating a motor short/ground), preceded by a Bus 1H 480 vac ground alarm. The valve breaker will then trip open a few minutes later. This will require placing it's PORV (PCV-456) in manual-closed **(TS)**; this is also part of setup for ECA-3.3 event

4. Pzr level (controlling) channel LT-459 fails high, causing charging flow to drop in Auto (if in auto); requires taking/maintaining manual control of charging **(TS)**

5. SGTL in the 1-2 S/G increases to a 300 gpm SGTR, requiring a manual SI; isolation and an RCS cooldown will be performed per EOP E-3 **(CT)**; a loss of offsite power will also occur just after the time of the trip/SI (prevent use of Pzr sprays in EOP E-3 or ECA-3.3)

6. SI train A fails to actuate in auto or manually, requiring manually positioning SI train A equipment (must manually position SI Pps and valves, actuate Phase A on train A [or manually position the valves], and also complete the FWI by closing the MFIVs (only get a signal from train A)

7. During EOP E-3, depressurization is not available due to no PORVs (one isolated, two failed), no Pzr spray capability (no pwr to RCPs), and no Aux spray capability (aux spray vlvs failed closed); this will force transition to ECA-3.3, where SI will be terminated using alternate ECCS term criteria **(CT)**

The scenario is terminated once SI termination is completed in ECA-3.3.

ATTACHMENT 1 – SIMULATOR SETUP

TIME LINE	CONSOLE ENTRY	SYMPTOMS/CUES/DESCRIPTION
Setup Simulator per Checklist	Upload IC-32 to the simulator INIT 32 (**do NOT** go to RUN until next action completed)	100% power, Mol, C_B = 774 • Integrators: BA – 00, and PW – 15 • Tags: CCP 1-3
Setup	plp aux25 ACT,54,0,0,d,0	Steady-state ≈ 82 gpd tube leak (1-2 S/G)
Setup	RUN (see note a right)	RUN the sim until the GRPDIS OP_O-4 gpd/hr values decay to close to zero (0-10 min)
Setup	Drill 81	Reset normal engineering values
Setup	Control Boards	• Put **GRPDIS OP_O-4** up at CO station • Ensure Bldgs and Sfgds selected on ABV
Setup	ser 0219 act,0,0,0,d,0 dsc cvc29 act,0,0,0,d,0	Clears CCP 1-3 (CCP 1-2 is in service on IC
Brief	Surrogate briefing	Brief surrogates on scenario **PRIOR** to crew brief in Rm 113 (because it will take 20-30 min)

CONTROL BOARD SETUP

- ☐ Copies of commonly used forms and procedures are available.
- ☐ Any tags are placed/removed as necessary. **CCP 1-3**
- ☐ Primary integrator = 15 gal, Boron = 00 gal.
- ☐ Record PPC MAX (BOL = 100.1, MOL = 100.0, EOL = 100.2) on CC2 lamicoid
- ☐ The plant Abnormal Status Board is updated with last CCP C_B near 774 and current date.
- ☐ Circuit breaker flags are correct.
- ☐ Equipment status lamicoids are correct:

B.A. XFER PP SUPPLYING BLENDER	**- BA Pp 1-2**
SUPPLYING IN-SERVICE SCW HX	**- CWP 1-1**
AUTO RECLOSE FEATURE CUTIN ON THIS CWP	**- CWP 1-1**
SELECTED TO BUS 2F	**- Cont. Rm. Vent Train 1 Bus F**
SELECTED TO BUS 1H	**- Cont. Rm. Vent Train 1 Bus H**

- ☐ The proper Delta-I curve and Reactivity Handbook for the simulator **INIT** are in place
- ☐ The Rod Step Counters indicate correctly.
- ☐ PPC Setup:
  - o Trend TAVG, ALM/MODE-1, Trend CHARGING, Sim Large on big screen
  - o RONCONFIG is updated.
  - o PENs running, and R2BCONFIG blowdown flows at 90 gpm.
  - o Operational mode correct for current conditions.[1]
  - o Delta-I target slope matches Delta-I curve (DELTAICONFIG)
- ☐ SPDS (screens and time updating), A screen "RM", B screen "SPDS".
- ☐ The chart recorders are operating properly, and advanced.
- ☐ Run the clear recorders program to clear digital charts
- ☐ All printer are on, with adequate paper/ink/etc., and are in the "**ON LINE**" status.
- ☐ The Annunciator Horn is on **(BELL ON)**. Sound Effects are on **(SOUND ON).**
- ☐ **The video and audio systems are SECURED.**

[1] Allow about ten minutes for the PPC to automatically update the plant mode. If still not correct, go to APMC. Follow menu to manually override to correct mode.

TIMELINE AND INSTRUCTOR ACTIONS FOR SIMULATION

Timeline The following table shows the simulator computer operations and other instructions the examiners need to know about the scenario to successfully run the exam. ***"X" = Manual entry required!***

	TIME LINE	CONSOLE ENTRY	SYMPTOMS, CUES, AND DESCRIPTION
X	Once crew has taken the watch	DRILL 6915 in AUTO	Scenario malfunctions are inputted once the crew takes the watch
	1 min, as directed by lead examiner	pmp asw2 3,0,0,0,d,0 pmp asw1 6,6,15,60,d,0	ASW Pp 1-1 trips on OC; The stby Pp ASW 1-2 does not start in auto, and cannot be started in manual
X	**Cue: Provide normal sample, maintenance, and field operator reply cues throughout the scenario.**		
X	**Cue: If requested to investigate ASW Pp 1-1 (and/or 1-2); TBW reports back that an inverse-time OC trip signal is present on "B" phase; Intake watch reports that the 1-1 pump is hot to the touch, and that nothing unusual is noted for the 1-2 pump (bring in door alarm as needed)**		
X	**Cue: If requested to attempt to close bkr for ASW Pp 1-2; TBW reports back that break will not close locally.**		
X	**Cue: If U-2 requested to crosstie ASW: Report that ASW 2-2 is the stby/available pump (and start if requested); when directed, report back that FCV-495 is open, and FCV-496 has been closed.**		
X	When requested to start the stby ASW Pp on U-2 (if correct lineup is requested)	loa asw5 act,1,0,0,d,0	Simulates crosstie and start of stby ASW Pp on U-2 **Note: If incorrect lineup is requested (FCV-495/496 backwards), the lead examiner should be notified, as U2 would tell U1 that the valve lineup would not be correct.**
	0 min	mal ppl3a act 3,0,0,d,0	SI Train A will fail; manual alignment will be required
	3 min, during the loss of ASW	plp aux25 act,300,2700, 180,d,0 **WARNING: Do NOT "clear" this action in order to change the timing; it will seriously change the S/G leak rates (by clearing and re-instating them)**	The SGTL in S/G 1-2 ramps up to >300 gpd at a rate that will force the crew to ramp the unit offline per OP O-4, Action Level 3A (ie, > 30 gpd/hr rate for 30 min)
	10 min after start of ramp, per lead examiner	ser 0303 act,1,0,600, c,ggo,300, .not.i521h33 vlv pzr3 2,0,15,610,c,ggo,0 dsc pzr3 act,0,0,720,c,ggo,0	A ground alarm occurs on 480vac bus H; valve 8000C strokes closed (simulates ground/short); the breaker for 8000C trips open after a few minutes
	10 min after PCV-456 is taken to close, per lead examiner	xmt pzr40 3,110,120,600, c,xv2i206c,0	Pzr level controlling channel LT-459 fails high (over 2 min)
	10 min after Pzr level transferred to alt channel, per lead examiner	mal rcs4b act 300,180,600, c,xc1i079b,0	300 gpm SGTR occurs on S/G 1-2 (ramps over 3 min); a manual SI will be needed

(continued on next page)

(con't)

	TIME LINE	CONSOLE ENTRY	SYMPTOMS, CUES, AND DESCRIPTION
	30 sec after the SI actuation	mal syd1 act 2,60,30, c,fnispr.lt.5,0	Loss of offsite power (so no RCPs/spray capability)
X	**Cue: If offsite power status is requested, report that both 230KV and 500KV power have relayed out, and no RTS is known at this time.**		
	When RCS depressurization is attempted	vlv pzr4 2,0,0,300,c,fnispr.lt.5,0 vlv pzr6 2,0,0,300,c,fnispr.lt.5,0 vlv cvc17 1,0,0,0,d,0 vlv cvc27 1,0,0,0,d,0	Remaining Pzr PORVs (PCV-455C and PCV-474), as well as both aux spray valves (8145 and 8148) will not open when operated in EOP E-3

```
* NRC L091C Exam Scenario 01 (6915)
* jfb1  10/17/11
*
*  ASW 1-1 trips; 1-2 cannot be started (601 needed)
* PMP ASW2 AUX SALTWATER PP 12   #ocwasp12
pmp asw2 3,0,0,0,d,0 #ocwasp12
* PMP ASW1 AUX SALTWATER PP 11   #ocwasp11
pmp asw1 6,6,15,60,d,0 #ocwasp11
*
* SGTL ramps to 300 gpd; requires O-4 ramp, action 3a
* plp AUX-25 STEAM GENERATOR 1-2 TUBE LEAKAGE #wrmssglk(2)
plp aux25 act,300,2700,180,d,0 #wrmssglk(2)
*
* bus 1H ground, 8000C ground/short strokes closed,
* breaker trips in a few minutes
* ser ALM318B 0303 480V BUS-1H GRD   #0303
ser 0303 act,1,0,600,c,ggo,.not.i521h33 #alm318b
* VLV PZR3 PRZR PWR REL ISO VALVE #rrc8000c
vlv pzr3 2,0,15,610,c,ggo, #rrc8000c
* dsc PZR3 52-1H-33 8000C PZR PORV BLOCK VALVE #i521h33
dsc pzr3 act,0,0,720,c,ggo, #i521h33
*
*  LT-459 fails high (slowly)
* XMT PZR40 PZR LEVEL  #lqm459
xmt pzr40 3,110,120,600,c,xv2i206c,0 #lqm459
*
*  300 gpm SGTR (1-2)
* mal RCS4B SG 1-2 TUBE RUPTURE AT TOP OF TUBE
mal rcs4b act 300,180,600,c,xc1i079b,0
*
*  SI failure on train A
* mal PPL3A SAFETY INJECTION ACTUATION FAILURE (TRAIN A)
mal ppl3a act 3,0,0,d,0
*
*  Loss of startup and backfeed 2 min after trip/SI
* mal SYD1 LOSS OF ALL OFF SITE POWER
mal syd1 act 2,60,30,c,fnispr.lt.5,0
*
*  No PORVs or aux sprays will operate for E-3
* VLV PZR4 PRZR POWER RELIEF VALVE #rrcp455c
vlv pzr4 2,0,0,300,c,fnispr.lt.5,0 #rrcp455c
* VLV PZR6 PRZR POWER RELIEF VALVE #rrcp474
vlv pzr6 2,0,0,300,c,fnispr.lt.5,0 #rrcp474
* VLV CVC17 RCS PRZR AUX SPRAY BYPASS #rcvh8148
vlv cvc17 1,0,0,0,d,0 #rcvh8148
* VLV CVC27 RCS PRZR AUX SPRAY #rcvh8145
vlv cvc27 1,0,0,0,d,0 #rcvh8145
```

Diablo Canyon Power Plant
Operations Shift Log

Unit 1

Today - Dayshift

Unit 1 Days at Power: 111 Days

Operating Mode: 1 ***Gross Generation: 1192 MWe***

Power Level: 100 % ***Net Generation: 1148 MWe***

Shift Manager Turnover

PRA RISK STATUS NEXT SHIFT:	GREEN
~~GRID STATUS NEXT SHIFT~~:	~~Normal~~
AVERAGE RCS CALCULATED LEAKRATE:	0.01 gpm (≈ 0.06 gpm tube leakage, 1-2 S/G)
CONDENSER INLEAKAGE:	< 0.01 gpd
MAIN GEN H^2 USAGE (475 SCFD Limit):	392 SCF / 391 SCFD 5 day ave

NEW EMERGENT WORK:

- None

SHUTDOWN TECH SPECS / ECGS:

- None

ECG ACTIONS THAT IF COMPLETION TIME NOT MET ECG 0.3 IS ENTERED:

- ECG 8.1, CCP 1-3

TURNOVER ITEMS:

- CCP 1-3 is OOS for MOW; OOS 0245 last shift, and expected RTS is tomorrow morning; hourly fire watch, along with OPERABLE fire detection and suppression have been implemented (actions A.1.2.1, A.1.2.2, and A.1.2.3); pump is due back in 7 days (ECG 8.1)
- SJAE radiation has slowly increased over the last 24 hrs and stabilized during the last couple of hours; S/G samples were drawn, and chemistry has determined that S/G 1-2 has indications of a tube leak of about 82 gpd; increased monitoring has been implemented per OP O-4 for Action Level 2 (see OP O-4 provided):
  - Rate is still currently < 30 gpd/hr, so monitoring continues (GRPDIS-OP_O-4); as a minimum, the CO is assigned to monitor this group display at CC2, and report changes to the Shift Foreman
  - Take unit offline w/i 24 hrs; unless conditions degrade, plans are to commence a plant shutdown in approximately 6 hours.
  - Chemistry and RP are checking for secondary contamination, and this will continue
  - OP AP-3 was tailboarded last shift, and is required for your shift
  - UPGRADE (degrade) CRITERIA (OP O-4):
    - Action Level 3A: > 75gpd leak rate AND > 30 gpd/hr rate increase, seen for at least 30 min
    - Action Level 3B: > 150 gpd leak rate

TURNOVER ITEMS (con't):

- S/G tube leak (con't):
  - RM-15 chemistry data has also been revised as follows (not on daily chemistry sheet yet):
    - 75 gpd count: 3075 (15), 3086 (15R)
    - 150 gpd counts: 6150 (15), 6172 (15R)

PRIORITY ITEMS FOR NEXT SHIFT:

- Maintain 100% power until the Beacon plan is provided by reactor engineering. Start a 3-5 mw/min ramp to take the unit offline approximately 6 hrs from now, per OP O-4, action level 2. Take other actions, as needed, if conditions degrade.

OPERABILITY ITEMS:

- ECG 8.1, CCP 1-3

ANNUNCIATORS IN ALARM:

- PK11-06, SJAE High Radiation, due to the ongoing 1-2 S/G tube leak; PK11-06 was previously performed, and OP AP-3 was entered and exited, with OP O-4 actions and monitoring still in progress.

Shift Foreman Turnover

TURNOVER ITEMS:

- U-1 – maintain 100% - no one in containment
- U-2 is at 100%

REACTIVITY MANAGEMENT:

- Time in core life: MOL.
- Power History: Steady State, previously at 100% for 63 days. Currently power is at 100%.
- Boron concentration is 774 ppm from a sample taken 4 hours ago.
- Control Rod Height: 231 steps on CBD.
- Diluting the RCS approximately 15 gallons every 1 1/2 hrs.
- The last dilution was completed 15 min ago.
- Rod motion: none planned, as needed to maintain ΔI on target. A Beacon plan should arrive within the next 2-3 hrs; a reactivity brief should be performed for the plant shutdown at that time.

CONDITIONAL SURVEILLANCES & INCREASED MONITORING:

- None

OTHER ABNORMAL PLANT STATUS

- See Plant Abnormal Status Board

Facility: Diablo Canyon (PWR) **Scenario No.:** 2 **Op-Test No.:** L091C-NRC

Examiners: _____ **Operators:** _____

_____ _____

_____ _____

Initial Conditions: **76% Reactor power, MOL, RCS Boron at 838 ppm**

Turnover: **CCP 1-3 OOS (MOW); 1-2 DG OOS (starting air leak); will remain @ 76% until engineering done monitoring Htr #2 Drain Pp (vibrations, following alignment/adjustments)**

Event No	Malf No.	Event Type*	Event Description
1	pmp cvc2	C (ALL)	CCP 1-2 overcurrent trip; requires starting CCP 1-1, and returning letdown to service **(TS)**
2	ser 0266 mal gen3	C, R (ALL)	Stator Water cooling low flow alarm is followed by low-low flow and turbine runback (partial, as stby pp is started); power is stabilized (≈ 40%) following the runback
3	mal rod6a	C (SRO, ATC)	During the stator cooling runback, control rods fail in auto (drive in continuously); the failure is diagnosed, and rods are operated in manual to control Tave
4	xmt cvc19	I (SRO, ATC)	One of two VCT level control channels (LT-112) fails low, causing continuous auto makeup; makeup controls are taken to OFF, and the makeup system is operated in manual
5	mal sei1 mal rcs1	M (ALL)	LBLOCA (DBA) occurs, requiring the crew to eventually transfer to cold leg recirculation **(CT) (TCOA) ****; alignment to cold leg recirc must be completed w/i 10 minutes of reaching 33% RWST level
6	pmp rhr1 pmp rhr2	C (ATC)	Both low pressure ECCS (RHR) Pps fail to start in auto; at least one must be started manually **(CT)**
7	bst rhr7 bst rhr8	C (SRO, ATC)	Both RHR Pps fail to trip off automatically at 33% RWST level, and must be stopped manually
			Terminate the scenario once both trains of ECCS are aligned for cold leg recirculation.

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

** This DBA LBLOCA was evaluated against TCOA #8, and is similar to the TCOA bases event, so TCOA time limits will be applied to the scenario (operators have 10 min to align to cold leg recirculation, as timed from the RWST reaching 33% [alarm comes in] and finishing the alignment [8804A open, which is the last significant action in the lineup]).

Rev 0 comments – corrected one error on attribute table (from preliminary D1 submissions)

Target Quantitative Attributes (Per Scenario; See Section D.5.d) (from form ES301-4)	Actual Attributes
8. Total malfunctions (5–8)	7
9. Malfunctions after EOP entry (1–2)	2
10. Abnormal events (2–4)	4
11. Major transients (1–2)	1
12. EOPs entered/requiring substantive actions (1–2)	2
13. EOP contingencies requiring substantive actions (0–2)	0
14. Critical tasks (2–3)	2

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 1 **Page** 1 **of** 14

Event Description: **CCP 1-2 Overcurrent Trip (TS)**

Time	Position	Applicant's Actions or Behavior
		Note: Procedure step numbers are included at the front of each action/comment in parenthesis, where applicable (per NRC request).
	ALL	Diagnoses CCP 1-2 OC trip using one or more of the following indications: • CCP 1-2 blue OC light is lit, and the pump is no longer running (VB2, lower center) • PK04-17, CCP 1-2 alarm (OC trip input) • PKs 05-01 – 05-04, due to RCP seal low flow alarms • Observes low charging flow and/or RCP seal flows (CC2, PPC, VB2 meters)
	BOP/ATC	Observes that letdown has isolated (due to loss of CCP 1-2; may note later)
		Note: The Shift Foreman may enter any of the annunciator response procedures for the low RCP seal flows (not expected); if used, they will eventually start the standby CCP, and go to AP-17 for actions.
	SRO	(**IF entered**; may go directly to OP AP-17, Loss of Charging) Implements PK04-17, CCP 1-2
		(ONLY IF PK04-17, CCP 1-2, is entered; otherwise, this section is N/A)
	ALL	• (2.1.1) Confirms symptoms of pump trip (already done above; may repeat)
	SRO	• (2.1.2) Determines the CCP has been lost, and goes to OP AP-17, Loss of Charging
	SRO	• (2.1.3) (optional) Dispatches operators to check pump, room, breaker
	SRO	Implements OP AP-17, Loss of Charging, Section A, Loss of All Charging
		(OP AP-17, Loss of Charging, Section A, Loss of All Charging)
	ATC/BOP	May check RCP parameters to verify cooling (PPC picture, VB2 meters)
	ATC/BOP	• (1a) VCT level and pressure – normal (VB2, PPC) • (1a) LCV-112B and LCV-112C open (CCP suctions) (VB2, lower center)
	SRO	• (1b) Determines that pump venting not required at this time
	BOP	• (1c) Verifies 8105 and 8106 open (CCP recircs) (VB2, lower center)
	ATC	• (1d) Closes FCV-128 (CC2 right side)
	BOP	• (1e) Starts CCP 1-1 (VB2, lower center)

	ATC	• (1f) Established charging flow to RCP seals only (all CC2, right side)
		  • Throttles FCV-128 open to establish 8-13 gpm each to RCP seals
		  • Throttles HCV-142 to closed or nearly closed

		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 1 Page 2 of 14

Event Description: CCP 1-2 Overcurrent Trip, con't (TS)

Time	Position	Applicant's Actions or Behavior
		(OP AP-17, Loss of Charging, con't)
		Note: In the next step, HC-459D (master level controller) may be in manual or auto; since FCV-128 is still in manual, it is of no consequence. The ATC will control/adjust charging flow until it is back on reference, then return to AUTO (both controllers), as time permits.
	ATC	• (2, 3) Checks if HC-459D is in AUTO (may or may not be) • Adjusts charging in manual to return level to program (it will be fairly close at this point) by throttling FCV-128 for flow, and maintaining RCP seal flows 8-13 gpm using HCV-142
	ATC	• (4a) Checks Pzr level > 17% (it is) (CC2 recorder, PPC, VB2 meter)
	BOP	• (4b) Checks letdown in service (it is NOT) (VB2, lower left)
	SRO	• (4b RNO) Directs letdown be placed in service per App R (OP B-1A:XII could be used as well)
	ALL	• May perform reactivity brief prior to returning letdown to service
	BOP	• (App R, 1a) Checks FCV-355 open (it is) (VB1, lower left)
	BOP	• (App R, 1b) Opens TCV-130 to 40% (letdown temp controller) (VB2, upper center)
	BOP	• (App R, 1c) Verifies 8149A/B/C closed (letdown orifice iso) (all closed) (VB2, lower center)
	BOP	• (App R, 1d) Verifies LCV-459 and LCV-460 open (letdown iso) (both open) (VB2, lower center)
	BOP	• (App R, 1e) Verifies 8152 open (it is) (VB2, lower center)
	BOP	• (App R, 1f) Opens PCV-135 to 60% (letdown backpress controller) (VB2, upper center)
	ATC	• (App R, 1g) Throttles charging flow (FCV-128 and/or HC-459D) to ≈ 87 gpm (CC2, right side)
	BOP	• (App R, 1h) Opens 8149B or C to establish ≈ 75 gpm letdown flow (VB2, lower)
	BOP	• (App R, 1i) Adjusts PCV-135 to ≈ 350 psig, and places in auto (if desired)
	BOP	• (App R, 1j) Adjusts TCV-130 to ≈ 90-110°F, and places in auto (if desired)
	BOP	• (App R, 1k) Checks letdown relief temp normal (not lifted; shouldn't normally lift)
	BOP	• (App R, 1l) Notifies Shift Foreman that letdown is in service
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 1 **Page** 3 **of** 14

Event Description: **CCP 1-2 Overcurrent Trip, con't (TS)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-17, Loss of Charging, con't)
	ATC	• (4c) Adjusts charging in manual to return level to program (it will be fairly close at this point) by throttling FCV-128 for flow, and maintaining RCP seal flows 8-13 gpm using HCV-142

	ATC/BOP	• (5) Checks VCT makeup system in auto (it is)
		  • (5a) Checks VCT level between 14% and 87% (it is) (VB2 meter, CC2 PPC)
		  • (5b) Checks VCT press 15-60 psig (it is) (VB2 meter/recorder, CC2 PPC)
		  • (5c) Makeup system set for current boron (it is; no changes needed) (CC2 M/U HMI)
		  • (5d) Verifies instrument air is available (it is) (VB4 lower left area)

	SRO	• (6) Implements Tech Specs (loss of this CCP; also, CCP 1-3 is OOS)
		  • TS 3.5.2.A (72 hrs & 14 days)
		  • ECG 8.7.A (72 hrs)

	ATC	• (optional) Returns charging to auto (FCV-128 / HC-459D) when Pzr level is on program level
		The next event may be implemented once the standby CCP has been started and letdown is in service, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 2 **Page** 4 **of** 14

Event Description: **Stator Cooling Water Runback (to ≈ 400 MWe)**

Time	Position	Applicant's Actions or Behavior
		Note: The stator cooling runback will be active for about 60 seconds, which will simulate the local actions action of starting the standby pump before the runback has completed. The runback will stop at around 400 MWe or so.
	ATC	Observes stator cooling low flow alarm, PK14-19, and reports to Shift Foreman
	SRO	Directs local operator to check out stator cooling alarm
	SRO	Implements PK14-19, Stator Water Cooling System
		(ONLY IF PK14-19, Stator Water Cooling System, is entered; otherwise, this section is N/A; ie, may enter OP AP-30 directly)
	SRO	• (1, 2.1) Goes to section 2.1 for alarm input 266 (low flow alarm)
	SRO	• (2.1.1) Implements OP AP-30, Section G, Stator Cooling Water Trouble
		(OP AP-30, Main Generator Malf, Section G, Stator Water Cooling System Trouble)
	SRO	• (1) Identifies that section 2 is appropriate for low flow
	ATC/BOP	• (2a) Determines that turbine runback is occurring (is active now or within a very short time) (CC3 Triconex HMI)
	ALL	Diagnoses that a runback is in progress from one or more of the following: • PK12-12 alarm (runback input) • Runback light on the Triconex HMI screen (CC3) • Observes MWe decreasing, with rod movement, steam dump actuation, etc (various)
	SRO	• (2a RNO) Goes to OP AP-25, Rapid Load Reduction (below) while continuing with applicable steps in AP-30 (as time permits)
	ATC/BOP	• (2b) (may not voice) Determines that turbine has not tripped
	SRO/BOP	• (2c) Directs operator to check stator cooling skid and start a pump (if not already done above)
	SRO/BOP	• (2c, etc) (optional) Works with local operator to check local indications normal (they are, except for tripped pump) once the standby pump is started (this will occur sometime during or following the runback)
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 2 **Page** 5 **of** 14

Event Description: **Stator Cooling Water Runback (to ≈ 400 MWe) (con't)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-25, Rapid Load Reduction)
	ATC/BOP	• (1a) Verifies runback (Triconex HMI console on CC3)
	ATC	• (2) Verifies control rods inserting properly in AUTO (clicking heard, green light ON intermittently) (CC1)
	ATC	• (3 & 4) Verifies ON all pressurizer backup heaters (CC1, left), and verifies CCP 1-2 running (VB2)

	ATC	• (5) May take manual control of Pzr level to prevent flashing of letdown (under these conditions, approx 60 gpm charging flow is required to keep letdown properly cooled)
		  • Places HC-459D (master level controller) or FCV-128 (charging flow controller) in manual (CC2, right side, for both)
		  • Keeps charging high enough (approx 60-65 gpm, as a minimum) to prevent letdown from flashing (VB2, upper panel, letdown temperature, is monitored)

	BOP	• (6) Verifies DFWCS controlling S/G levels (levels will be slightly higher than setpoint, and lowering towards program level) • Verifies MFW reg valves, bypass valves, and MFPs in AUTO

	ATC	• (7) Uses reactivity handbook to determine boric acid required, and borates RCS
		  • Presses STOP on M/U Ctrlr HMI (CC2)
		  • Presses BORATE on HMI
		  • Sets target gallons for boration (as decided above, and per the Shift Foreman); verifies batch is reset
		  • Sets boric acid flowrate
		  • Presses START, and monitors boration
		  • Once stopped, either returns to AUTO (presses AUTO, then START), or performs additional boration per the Shift Foreman

	SRO	• Provides oversight during the ramp
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 2 & 3 Page 6 of 14

Event Description: **Stator Cooling Water Runback (to ≈ 400 MWe) (con't), AND Auto Control Rod failure (rods drive in continuously)**

Time	Position	Applicant's Actions or Behavior
	ATC	Diagnosis is made that control rods are driving in, inconsistent with demand, by observing one or more of the following: • Slow inward rod movement (8 spm) NOT consistent with the relatively high Tave / Tref mismatch with the turbine no longer running back (if caught very early during failure) • Rod movement continues past point where Tave is brought back down to Tref (or drives Tave down below Tref)
	ATC	Control Rods are placed in Manual, to try to stop movement (it works) (this may be done prior to use of OP AP-12A entry) (CC1, right side)
	SRO/ATC	Tave is controlled at Tref with control rods in manual (this may be done immediately, or delayed depending on urgency, based on the stability of the plant at the time) (CC1, right side)
	SRO	Implements OP AP-12A (may occur after actions to stabilize the plant; see above)
		(OP AP-12A, Continuous Withdrawal or Insertion of a Control Rod Bank)
	ATC	• (1) Control rods are placed in Manual (CC1, right side)
	ATC	• (2) Verifies that rod motion has stopped (CC1, right side)
	ATC	• (3a) Tave is controlled at Tref with control rods in manual (CC1, right side)
	ALL	• (3b) Adjusts turbine load and boron to control ΔI and rods > RIL, as needed (this will be done during OP AP-25 as well) (CC2 and CC3)
	SRO	• (3c) May notify maintenance of rod control failure
		(OP AP-25, Rapid Load Reduction) (con't) (note: some of these continuing actions may occur before or after the control rod failure, above; also, not all of these actions may be performed prior to the next event)
	BOP	• (8a & 8b) Verifies MFP suction pressure (VB3, PPC), and stby CB Pp set running (VB3, will be greater than 260 psig at this point)
	ATC/BOP	• (9) Verifies proper operation of steam dumps (VB3, many steam dumps throttled open at first, with throttling down to the (4) group 1 steam dumps a few minutes into the transient)
	ATC	• (10) Checks pressurizer pressure and level at or returning to program (pressure and level transient will return to programmed pressure and level, unless being controlled manually)
	SRO	• (11) S/D the #2 Htr Drip Pp (N/A, since still providing flow)
	SRO	• (12) Determines if the plant can remain on-line (yes; it can)
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 2 **Page** 7 **of** 14

Event Description: **Stator Cooling Water Runback (to ≈ 400 MWe) (con't)**

Time	Position	Applicant's Actions or Behavior
		(OP AP-25, Rapid Load Reduction) (con't) (note: not all of these actions may be performed prior to the next event)
	ALL	• (13) Stabilizes the plant once ramp completed (as time permits, these are later AP-25 actions) • T_{ave} within 1.5 F of T_{ref} • Axial flux difference (AFD) in target band (or borating to get it there) • S/Gs are trending towards program level (CC3, VB3, PPC) (they will be stable and close to program level of 65%) • MFP D/Ps are on program (DFWCS HMI on CC3) (D/P will be very close to program, and stable) • Returns turbine to standby status • Takes MW and IMP pressure feedbacks OUT on Triconex turbine control HMI (CC3) • Sets valve position limit (VPL) to 1-2% above current value (same controller) • May perform reactivity brief
	SRO	Notifies maintenance of pump failure (as time permits)
	SRO/BOP	• (14a, 14b) Resets steam dumps (to normal control) • Checks steam dumps closed (they are, CC3 middle status light panel), and UI-500 (demand signal; next to status lights) @ 0%) • Resets C-7A/7B (C-7A may be in) (CC2, right) • (15) Stabilizes secondary: • Places hotwell reject valve HC-3 controller in manual and closed (VB3, lower, right) • Places FCV-31 (part of cold gas temp control scheme) in manual and full open (VB3, lower right; note that this valve/controller is reverse acting, in that 0% on controller is full open demand) • Adjusts TCV-23 and FCV-31 to attain acceptable steam jet air ejector (SJAE) flows and cold gas temps, and then returns controllers to auto, and monitors (all VB3, lower right)
		The next event may be implemented once the runback has stopped, at least one boration is completed, and the rod failure has been addressed, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 4 Page 8 of 14

Event Description: **Failure of VCT level channel (LT-112 low) causes continuous auto makeup**

Time	Position	Applicant's Actions or Behavior
		Note/Caution: Try to ensure that the ATC/CO has placed the makeup system back in AUTO prior to this failure.
	ALL	Diagnosis of makeup control failure is made by one or more of the following: • Automatic makeup is running, but VCT level shows normal (LT-114) (PPC as L0112A, HSDP) • LT-112 shows low level (0%), but VCT pressure shows normal, and CCP operation (suction) is normal (all on VB2) • Yokogawa recorder (LT-112A) (VB2 upper left)
	ATC	• Makeup Control is taken to STOP (on the makeup control HMI, CC2) (may be done before or during OP AP-19 use)
	SRO	Implements OP AP-19, Malfunction of the Reactor Makeup Control System
		(OP AP-19, Malfunction of the Reactor Makeup Control System)
	ATC	• (1) Ensures M/U set to correct mode (either AUTO and running, or AUTO and stopped if action taken above)
	ATC	• (1) Ensures system is selected to start (will probably be selected to STOP [now or later] due to unneeded makeup operation); may select STOP before or during OP AP-19 use
	BOP	• (2) Checks makeup system pumps and valves lineup up, and in AUTO (VB2, lower center; they are all normal)
	ATC/BOP	• (3) Verifies VCT level channels OPERABLE: • Observes discrepancy between LT-112 (0%), and LT-114 (normal level); may use VCT pressure and/or normal CCP operation to diagnose that LT-112 has failed (probably diagnosed prior to procedure entry); note: may use operator information manual (OIM) as a diagnostic tool
	ALL	• (3 RNO) Goes to App A (1.a.1), and determines what effect the failed LT-112 will have on makeup system operation
	ATC ALL	• (App A, 1b) If not already done, places makeup system in STOP • (App A, 1b) (optional) Crew may tailboard how to operate the makeup system; the two most obvious methods would be to do MANUAL makeups from that point, AND/OR just enable AUTO makeup each time makeup is needed (and STOP when done on the HMI)
	ATC/BOP	• (as time permits) (4) Verifies CCP suction parameters are normal (CCP flow/amps/ pressure, VCT level/pressure; VB2 and CC2 meters)
	SRO	• (as time permits) (5) Notifies Tech Maintenance to troubleshoot and repair
		The next event may be implemented once the diagnosis is made, and the makeup system has been placed in STOP, per the lead examiner.

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 5 & 6 **Page** 9 **of** 14

Event Description: **Earthquake, DBA LBLOCA, with Transfer to Cold Leg Recirculation; RHR Pps fail to start on Safety Injection (CT)**

Time	Position	Applicant's Actions or Behavior
		Note: The DBA LBLOCA will occur rapidly, causing an immediate Safety Injection; no actions are expected other than recognition of the earthquake and SI prior to EOP use.
	ALL	Diagnosis is made of the earthquake from obvious shaking/noise, as well as tank level alarms and the seismic alarm PK15-24.
	ALL	Diagnosis is made of an SI, based on rapidly falling RCS parameters, various SI related alarms, etc.
	SRO	Implements EOP E-0, Reactor Trip or Safety Injection
	SRO	(as time permits) May assign earthquake actions (CP M-4) to the U-2 Shift Foreman or the Shift Manager
		(EOP E-0, Reactor Trip or Safety Injection)
	ATC	• (1) Verifies reactor trip (trip bkrs open(VB2 upper left), rods on bottom (VB2 upper left DRPI panel), NIs decreasing (CC1 left))
	ATC	• (2) Verifies turbine trip (stop valves closed) (CC3 HMI or VB2 RPS indicator lamps)
	BOP	• (3) Checks vital 4kv busses (VB4, vital busses F/G/H have white lights on mimic busses)
	ATC/BOP	• (4) Checks if SI actuated (PK08-21 ON, also checks VB1 red train lights and/or train equipment to verify both trains actuated)
	ATC	• (App E, 5) **Notes and corrects failure of RHR Pps to start, by starting each pump (VB1, lower right) (may be done following immediate actions, or during App E actions, below) (WOG CT E-0-H, Manually start at least one low-head ECCS pump before transition out of E-0) (Critical Task) **** **(Note: the surrogate BOP will allow time for the ATC to note and start these pumps, and will only start them if assigned App E, and when called for in App E)**
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 5 & 6 Page 10 of 14

Event Description: **Earthquake, DBA LBLOCA, with Transfer to Cold Leg Recirculation; RHR Pps fail to start on Safety Injection (CT)**

Time	Position	Applicant's Actions or Behavior
		(EOP E-0, Reactor Trip or Safety Injection) (con't)
	BOP/ATC	App E is implemented: • (App E, 1a) Checks no personnel in Containment (part of turnover; may not voice) • (App E, 1b) Announce trip/SI on PA system • (App E, 2) Checks main generator – tripped (PK14-01 ON, output bkrs open, and exciter field bkr open, CC3 right side) • (App E, 3 & 4) Verify Phase A and containment vent isolation complete (VB1, ESF status lights, red lights ON, white lights OFF) • (App E, 5) **Notes and corrects failure of RHR Pps to start, by starting each pump (VB1, lower right) (may be done following immediate actions, or during App E actions, below) (WOG CT E-0-H, Manually start at least one low-head ECCS pump before transition out of E-0) (Critical Task) **** • (App E, 6) Verifies Feedwater isolation complete (FWIs are complete, with red lights ON, and white lights OFF) • (App E, 7 & 8) Checks containment spray, Phase B, and main steam isolation – required (red lights are ON, and white lights are OFF for these on VB1) • (App E, 9) Checks AFW status (MDAFPs running, TDAFP may be running, VB3 center area); verifies either min of 435 gpm flow (VB3 center) or S/G level > 15% (VB3 center) • (App E, 10) Verifies ECCS flows (charging injection (VB2 upper panel left), SI, RHR (both on VB1 upper panel); all ECCS pumps will be injecting at this RCS pressure (once the RHR Pps are started) • (App E, 11) Reports ESF and AFW status to the Shift Foreman • (App E, 12 & 13) Checks excess letdown – not in service (8166/8167 closed); turns on aux bldg vent charcoal filter preheater (VB4 lower panel, left side) • (App E, 14) Checks secondary systems (MFPs tripped (VB2, green lights ON), only one CB Pp set running, condenser status (available), and opens MFP recircs (FCV-53/54)) • (App E, 15) Verifies proper operation of Aux Bldg and Control Rm vent systems (VB4 vent status light panel white lights); verifies containment iodine fans secured (VB4, lower panel) • (App E, 16 - 21) Verifies DGs running normally (VB4, freq (60), volts (120), speed (900)); verifies vital batteries supplied by chargers (charger and bus volts on VB5, upper panel middle/lower area); verifies MSRs reset (CC3 Triconex HMI); throttles RCP seal injection flows to normal (FCV-128, to 8-13 gpm each, CC2); checks PK11-04 NOT IN (SFP alarm); notifies Shift Foreman of completion of App E
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 5 Page 11 of 14

Event Description: Earthquake, DBA LBLOCA, with Transfer to Cold Leg Recirculation (con't)

Time	Position	Applicant's Actions or Behavior
		(EOP E-0, Reactor Trip or Safety Injection) (con't)
	ATC	• (6) Checks RCS temperature – stable (temps will be dropping due to LBLOCA/ECCS flows; AFW may be throttled back, but temps will continue to drop, due to size of LOCA (VB2 meters, upper panel lower area)
	ATC	• (7) Checks Pzr PORVs and Pzr safeties (closed) / PORV block valves (all open), and no elevated tailpipe temps or sonic flows on safeties/PORVs (VB2 – upper panel, far right); checks Pzr sprays closed (CC2)
	SRO/ATC	• (8) Checks RCP trip criteria – observes RCS pressure < 1300 psig, and/or Phase B isolation; stops RCPs (VB1 and VB2)
	ATC/BOP	• (9) Checks for faulted S/Gs • Faulted – checks all S/G pressures on VB3 (not uncontrolled drop/depressurized)
	ATC/BOP	• (10) Checks for faulted and ruptured S/Gs • Ruptured – checks RE-71/72/73/74 and RE-15/19 recorders on VB2 (and PPC); (all normal, unless RM-7x's getting shine), and PK11-06/17/18 (all OFF)

	SRO/ALL	• (11) Checks RCS intact (it is not) (note: only one valid abnormal reading needed to transition from E-0)
		  • (11a) Checks containment pressure normal (it is very elevated) (VB1 meters, PPC)
		  • (11b) Checks containment level normal (may already be elevated) (VB1 meters, PAMS)
		  • (11c) Checks containment radiation normal (elevated) (PK11-21 and PK11-19)
		• (11 RNO) Places 2nd ASW/CCW HX in service (opens FCV-603 and FCV-431, VB1 far left), and transitions to EOP E-1, Loss of Reactor or Secondary Coolant

	SRO	Performs procedure transition brief for E-1, and implements CSFSTs
		Note: Two possible RED or MAGENTA paths on CSFSTs may occur prior to EOP E-1.3 (cold leg recirc) entry; they will be short entries (basically perform a single step and exit) (FR-P.1 on PTS, and/or FR-Z.2 on high containment level); they may occur any time between now and the end of the scenario (these paths will be ignored during the transfer to cold leg recirc, by proc usage rules)
	SRO	Implements FR-P.1, Imminent PTS (if RED or MAGENTA path occurs)
		(ONLY IF FR-P.1, Imminent PTS, is entered; otherwise, this section is N/A)
	SRO/ATC	• (1) Checks RCS pressure (low), and RHR flow (normal); exits to procedure in effect
	SRO	Implements EOP E-1, Loss of Reactor or Secondary Coolant
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC **Scenario No.:** 2 **Event No.:** 5 **Page** 12 **of** 14

Event Description: **Earthquake, DBA LBLOCA, with Transfer to Cold Leg Recirculation (con't)**

Time	Position	Applicant's Actions or Behavior
	SRO	(IF MAGENTA Path occurs) Implements FR-Z.2, Response to Containment Flooding
		(ONLY IF EOP FR-Z.2, Response to Containment Flooding, is entered; otherwise, this section is N/A)
	SRO/ATC	• (1) Observes that containment level is < 95.75'; exits to procedure and step in effect (continues to monitor level (VB1 meter, upper right side)
		(EOP E-1, Loss of Reactor or Secondary Coolant)
		Note: EOP E-1 actions below may be partially or completely done, depending on the transition to EOP E-1.3 which will occur when RWST level reaches 33% (PK03-01 will alarm); no further E-1 actions are required once transition to E-1.3 is made (for this scenario).
	ATC	• (1) Checks RCPs tripped (already done, VB2)
	ATC/BOP	• (2 & 3) Checks for faulted/ruptured S/Gs • Faulted – checks all S/G pressures on VB3 (not uncontrolled drop/depressurized; all are dropping slowly, as the primary is now the heat sink for the secondary) • Ruptured – checks RE-71/72/73/74 and RE-15/19 recorders on VB2 (and PPC; no upward trends or spikes, unless containment "shine" is noted), and PK11-06/17/18 (alarms not in); requests chemistry to sample S/Gs for activity (as follows, if done): • Verifies phase A containment isolation reset (VB1) • Opens FCV-584 (air to containment) (VB4, lower left) • Opens blowdown isolation valves inside containment (FCV-760, 761, 762, 763) • May require blocking low steamline pressure MSI/SI (due to low steamline pressures); two block switches on CC2 taken to block position
	BOP	• (4) Maintains S/G levels 20-65%; Shuts down TDAFP once level is recovered (VB3, AFW controls)
	ATC	• (5) Check Pzr PORVs (closed) / blocks (open/powered) (VB2 – upper panel, far right)
	ATC	• (6) Verifies containment spray in service (PK01-18 ON, containment radiation is high [RM-2, RM-7 on PPC, or alarms PK11-19/21], CS Pps running, VB1)
	ATC/BOP	• (7) Checks ECCS termination criteria (not met, SCM is < 20°F, Pzr level is also below 12 [36]%)
	ATC	• (8) Maintains RHR pumps running, and aligns cooling (may open FCV-364 and 365 now [will open in later step], VB1 far left lower)
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 5 & 7 Page 13 of 14

Event Description: **Earthquake, DBA LBLOCA, with Transfer to Cold Leg Recirculation (con't) (TCOA) (CT); Stops RHR Pps when they fail to stop @ RWST level of 33%**

Time	Position	Applicant's Actions or Behavior
		(EOP E-1, Loss of Reactor or Secondary Coolant) (con't)
	ATC/BOP	• (10) Check if DGs should be stopped (busses are powered from S/U Pwr) (SI is reset on VB1, and DGs are stopped and placed back in AUTO, VB4)
	ATC	• (11a, b) Verifies recirc capability (RHR Pps have power (VB1), checks aux bldg rad levels (RM-04, 06, 10, 13 show no elevated readings) (PPC, back RMS panels), and checks RHR systems alarms (PK02-16 and PK02-17 off) for intersystem LOCA (ISLOCA)
	ATC	• (11c) Checks RHR Pps running, and establishes cooling to the heat exchangers (by opening FCV-364/365, as noted above), if not already open
	ATC/BOP	• (11d) Implements App P (2^{nd}/manual check of ESF status lights; may be a lower priority)
	ALL	• (11e, f, g) Requests RCS samples; monitors turbine status (oil Pps, coastdown, etc), checks SFP status
	ATC/SRO	• (12) Determines that post LOCA cooldown procedure is not appropriate (RCS pressure is < 300 psig [VB2, PPC, CC2], and RHR flow [VB2]) (stays in E-1)
	ALL	• (13) (If step 13 is reached prior to 33% in the RWST) The crew will preview EOP E-1.3
	ATC	• (13) **When RWST level of 33% is reached, RHR Pps are verified STOPPED; will need to stop both pumps (VB2 lower right)** (if this occurs due to FOP kickout to E-1.3, RHR Pps may be stopped as late as E-1.3 steps)
	SRO	Implements EOP E-1.3, Transfer to Cold Leg Recirculation
		At 33% in RWST (PK03-01 will also alarm); this is time 0 for TCOA to complete transition to cold leg recirc in 10 minutes. (all BOLD substeps part of CT), per the following steps (WOG CT ES-1-3-A), to transfer to cold leg recirc prior to an RWST level of 4%; the TCOA is more limiting than this criteria) (Critical Task and TCOA; end point on next pages) ** **Record time: _____**
		(continued on next page)

** Critical Task

Op-Test No.: L091C-NRC Scenario No.: 2 Event No.: 5 Page 14 of 14

Event Description: DBA LBLOCA, with Transfer to Cold Leg Recirculation (con't) (TCOA) (CT)

Time	Position	Applicant's Actions or Behavior
		(EOP E-1.3, Transfer to Cold Leg Recirculation)

	BOP	• (1) App EE assigned/performed:
		  • **(App EE, 1) All (6) series contactor switches are cut in (VB2, upper panel)**
		  • **(App EE, 2, 3) Resets SI and both trains of CI Phase A and Phase B (VB1, upper panel) (probably done earlier)**
		  • **(App EE, 4) Verifies two ASW/CCW HXs in service (already done, VB1, far left)**
		  • **(App EE, 5 & 6) Verifies open CCW cooling valves to RHR HXs (VB1, far left) probably done earlier)**
		  • (App EE, 7 & 8) Verifies CCP 1-3 stopped (VB2); makes PA announcement concerning CL Recirc
		  • (App EE, 9) Dispatches operators to rack in breakers for 8980 and 8976.

	ATC	• **(2, 3) Verifies RHR Pp 1-2 stopped and closes 8700B (VB1, lower right)**
	ATC	• **(4, 5) Verifies RHR Pp 1-1 stopped and closes 8700A (VB1, lower right)**
	ATC	• **(6) Closes RHR crosstie valves 8716 A/B (VB1, lower center)**
	ATC	• **(7) Isolates ECCS Pp recirc paths by closing 8974 A/B, and closing 8105 / 8106 (VB2)**
	ATC	• (8) Verifies recirc sump level > 92 ft (will be close to 94' or more, VB1 upper right side)
	ATC	• **(9a-d) Opens recirc suction valve 8982B, and then starts RHR Pp 1-2 (verifies flows, amps) (both on VB1, lower right)**
	ATC	• **(9e-h) Opens crosstie 8804B (VB1, lower center)**, and verifies SI Pps running and RHR Pp amps w/i limits
	ATC	• **(10) Opens crossties 8807 A/B (VB1, lower center)**, and verifies both ECCS CCPs running
	ATC	• **(11a-d) Opens recirc suction valve 8982A, and then starts RHR Pp 1-1 (VB1, lower right)** (verifies flows, amps)
	ATC	• **(11e-h) Opens crosstie 8804A (VB1, lower center) (TCOA/CT completion time _____)**, and verifies SI Pps running and RHR Pp amps w/i limits **(TCOA total time must be < 10 minutes) (CT) ****
	SRO/ATC	• (12) Observes that both RHR trains are now in cold leg recirc lineup
	ATC	• (13) Closes normal ECCS pump suction valves: 8805 A/B, 8976, and 8980
		Terminate the scenario any time after valve 8804A has been opened (completion of CT and TCOA to be on CL Recirc)

** Critical Task

MAJOR EVENT SUMMARY AND SCENARIO OBJECTIVES

1. CCP 1-2 overcurrent trip; requires starting CCP 1-1, and returning letdown to service **(TS)**

2. Stator Water cooling low flow alarm is followed by low-low flow and turbine runback (partial, as stby pp is started after about a minute of runback); power is stabilized (≈ 40%) following the runback

3. During the stator cooling runback, control rods fail in auto (drive in continuously); the failure is diagnosed, and rods are operated in manual to control Tave

4. One of two VCT level control channels (LT-112) fails low, causing continuous auto makeup; makeup controls are taken to OFF, and the makeup system is operated in manual

5. LBLOCA (DBA) occurs, requiring the crew to eventually transfer to cold leg recirculation **(CT) (TCOA) ****; alignment to cold leg recirc must be completed w/i 10 minutes of reaching 33% RWST level

6. Both low pressure ECCS (RHR) Pps fail to start in auto; at least one must be started manually **(CT)**

7. Both RHR Pps fail to trip off automatically at 33% RWST level, and must be stopped manually from the Control Room

The scenario is terminated once both trains of ECCS are aligned for cold leg recirculation.

ATTACHMENT 1 – SIMULATOR SETUP

TIME LINE	CONSOLE ENTRY	SYMPTOMS/CUES/DESCRIPTION
Setup Simulator per Checklist	INIT 510	100% power, Mol, C_B = 838 • Integrators: BA – 00, and PW – 15 • Tags: CCP 1-3, DG 1-2
Setup	Drill 81	Reset normal engineering values
Setup	Drill 35	Clears DG 1-2
Setup	Control Boards	• Place CCP 1-2 in service and stop 1-3 • Place DG 1-2 in manual • Ensure Bldgs and Sfgds selected on ABV
Setup	ser 0219 act,0,0,0,d,0 dsc cvc29 act,0,0,0,d,0	Removes CCP 1-3 from service
Setup	Drill 79	Limits NI response during initial stages of DBA LOCA

CONTROL BOARD SETUP

- ☐ Copies of commonly used forms and procedures are available.
- ☐ Any tags are placed/removed as necessary. **CCP 1-3, DG 1-2**
- ☐ Primary integrator = 15 gal, Boron = 00 gal.
- ☐ Record PPC MAX (BOL = 100.1, MOL = 100.0, EOL = 100.2) on CC2 lamicoid
- ☐ The plant Abnormal Status Board is updated with last CCP C_B near 838 and current date.
- ☐ Circuit breaker flags are correct.
- ☐ Equipment status lamicoids are correct:

B.A. XFER PP SUPPLYING BLENDER	**- BA Pp 1-2**
SUPPLYING IN-SERVICE SCW HX	**- CWP 1-1**
AUTO RECLOSE FEATURE CUTIN ON THIS CWP	**- CWP 1-1**
SELECTED TO BUS 2F	**- Cont. Rm. Vent Train 1 Bus F**
SELECTED TO BUS 1H	**- Cont. Rm. Vent Train 1 Bus H**

- ☐ The proper Delta-I curve and Reactivity Handbook for the simulator **INIT** are in place
- ☐ The Rod Step Counters indicate correctly.
- ☐ PPC Setup:
  - o Trend TAVG, ALM/MODE-1, Trend CHARGING, Sim Large on big screen
  - o RONCONFIG is updated.
  - o PENs running.
  - o R2BCONFIG blowdown flows at 90 gpm.
- o Operational mode correct for current conditions.[2]
  - o Delta-I target slope matches Delta-I curve (DELTAICONFIG)
- ☐ SPDS (screens and time updating), A screen "RM", B screen "SPDS".
- ☐ The chart recorders are operating properly, and advanced.
- ☐ Run the clear recorders program to clear digital charts
- ☐ All printer are on, with adequate paper/ink/etc., and are in the "**ON LINE**" status.
- ☐ The Annunciator Horn is on **(BELL ON)**. Sound Effects are on **(SOUND ON).**
- ☐ **The video and audio systems are SECURED.**

[2] Allow about ten minutes for the PPC to automatically update the plant mode. If still not correct, go to APMC. Follow menu to manually override to correct mode.

TIMELINE AND INSTRUCTOR ACTIONS FOR SIMULATION

Timeline The following table shows the simulator computer operations and other instructions the examiners need to know about the scenario to successfully run the exam. ***"X" = Manual entry required!***

	TIME LINE	CONSOLE ENTRY	SYMPTOMS, CUES, AND DESCRIPTION
X	Once crew has taken the watch	DRILL 6916 in AUTO	Scenario malfunctions are inputted once the crew takes the watch
X	**Note: During surrogate briefing, tell BOP to give the ATC the first chance at starting RHR Pps on the SI (ie, don't start them as BOP until reached in procedure in App E).**		
X	**Cue: Provide normal sample, maintenance, and field operator reply cues throughout the scenario.**		
	1 min	pmp cvc2 6,6,20,60,d,0	CCP 1-2 trips on OC
X	**Cue: If requested to investigate CCP Pp 1-2; TBW reports back that an inverse-time OC trip signal is present on all phases; ABW watch reports that the 1-2 pump is hot to the touch, and that there is a slight acrid smell in the room.**		
	Once letdown is returned to service, per lead examiner	bst aux1 1,0,0,600, c,xv2i159m,0 ser 0266 act,1,0,10,c, jistbst1,smss.lt.425	Stator cooling water low flow alarm (bring in approx 2 min prior to runback); aux bistable will control both the alarm and runback in proper sequence
	2 min after low flow alarm is actuated	mal gen3 act 1,0,120, c,jistbst1,60	Stator cooling runback (simulates starting stby pp in 1 min from start of runback)
X	**Cue: If requested to investigate, respond back in a couple of minutes that the running pump is tripped and hot, and that the stby pump had to be started manually.**		
	≈ 475 MW load	mal rod6a act 24,0,0, c,smss.lt.475,0	Auto rod motion operates continuously @ 8 spm, at ≈ 475 mw load during the runback. Manual rod control is available.
X	**Note: If possible, ensure that makeup system has been returned to Auto PRIOR to activating next event.**		
	15 min after runback ends, per lead examiner	xmt cvc19 3,0,10,900, c,smss.lt.425,0	LT-112 fails low (continuous auto makeup); can be stopped with controller
	10 min after LT-112 failure, per lead examiner	bst aux2 1,0,0,600, c,bcvc112.lt.5,0 mal sei1 act 0.2,10,0,c, jistbst2,0 mal rcs1 act 3,2,10,c,jistbst2,0	DBA LBLOCA (loop 2) (preceded by earthquake) (note that aux bst2 controls the LOCA and seismic events)
	Failures on SI	pmp rhr1 1,0,0,0,d,0 pmp rhr2 1,0,0,0,d,0	Neither RHR Pp will start automatically when SI occurs (manual start in control room available)
	Failures during LBLOCA	bst rhr7 3,0,0,0,d,0 bst rhr8 3,0,0,0,d,0	Neither RHR Pp will stop automatically when RWST level reaches 33%; pumps must be stopped manually from VB1 (two RWST low level bistables are failed)

(continued on next page)

Timeline (con't)

	TIME LINE	CONSOLE ENTRY	SYMPTOMS, CUES, AND DESCRIPTION
X	When Requested	DRILL 17 in AUTO	If CAP AP-1 sampling requested, opens S/G sample valves locally
X	When Requested	DRILL 55 in AUTO	On E-1 entry, or when requested, places post-LOCA H^2 monitoring in service
X	When Requested	DRILL 2275 in MANUAL (1^{st} two action ONLY)	Removes power from 8976 and 8980

DRILL FILE TEXT

```
* NRC L091C Exam Scenario 02 (6916)
* jfb1  10/17/11
*
*  Put CCP 1-2 in service; (CCP 1-3 and DG 1-2 OOS)
*
*  CCP 1-2 trips on OC at 1 min
* PMP CVC2 CHARGING PP 12 (CENT.)   #ocvp12
pmp cvc2 6,6,20,60,d,0 #ocvp12
*
*  Aux bst sets up stator alarm and runback in right sequence
bst aux1 1,0,0,600,c,xv2i159m,0  #jistbst1  (cond is PCV-135 in man)
*  Stator cooling low flow (do 2 min prior to runback)
ser 0266 act,1,0,10,c,jistbst1,smss.lt.425  #ALM267
*  stator cooling runback (to approx 400 mw)
* mal GEN3 GENERATOR COOLING WATER TROUBLE
mal gen3 act 1,0,120,c,jistbst1,60  #
*
*  Auto rods (continuous) at 475 mw (manual available)
mal rod6a act 24,0,0,c,smss.lt.475,0
*
*  LT-112 fails low (causes auto makeup)
xmt cvc19 3,0,10,900,c,smss.lt.425,0 #bxmtl112
*
*  Both RHR pps fail to start on SI (manual avail)
pmp rhr1 1,0,0,0,d,0 #orhp11
pmp rhr2 1,0,0,0,d,0 #orhp12
*
*  Both RHR Pps fail to trip at 33% RWST (C/R manual avail)
bst rhr7 3,0,0,0,d,0 #jlb920l
bst rhr8 3,0,0,0,d,0 #jlb921l
*
* DBA LOCA (loop 2) (preceded by earthquake)
bst aux2 1,0,0,600,c,bcvc112.lt.5,0  #jistbst2
mal sei1 act 0.2,10,0,c,jistbst2,0
mal rcs1 act 3,2,10,c,jistbst2,0
```

Diablo Canyon Power Plant
Operations Shift Log

Unit 1

Today - Dayshift

Unit 1 Days at Power: 102 Days

Operating Mode: 1 ***Gross Generation: 891 MWe***

Power Level: 76 % ***Net Generation: 843 MWe***

Shift Manager Turnover

PRA RISK STATUS NEXT SHIFT:	GREEN
GRID STATUS NEXT SHIFT:	Normal
AVERAGE RCS CALCULATED LEAKRATE:	0.01 gpm
CONDENSER INLEAKAGE:	< 0.01 gpd
MAIN GEN H^2 USAGE (475 SCFD Limit):	391 SCF / 391 SCFD 5 day ave

NEW EMERGENT WORK:

- DG 1-2 (starting air leak); DG is cleared; maintenance will have an estimated RTS in an hour or two

SHUTDOWN TECH SPECS / ECGS:

- TS 3.8.1.B – entered 0414 this morning; partial STP I-1c was just completed, next one is due in 7.5 hrs; action B.3.1 is complete; due back 0414, 7 days from now

ECG ACTIONS THAT IF COMPLETION TIME NOT MET ECG 0.3 IS ENTERED:

- ECG 8.1, CCP 1-3

TURNOVER ITEMS:

- CCP 1-3 is OOS for MOW; OOS 0245 last shift, and expected RTS is tomorrow morning; hourly fire watch, along with OPERABLE fire detection and suppression have been implemented (actions A.1.2.1, A.1.2.2, and A.1.2.3); pump is due back in 7 days (ECG 8.1)
- Htr #2 Drain Pp continues to be evaluated following vibration problems a week ago; the pump is back in service, but power level was stabilized @ 76%, as vibration levels are still fluctuating; plans are to continue to hold at 76% for several more hours, while engineering continues to evaluate.

PRIORITY ITEMS FOR NEXT SHIFT:

- Maintain 76% power. A ramp to 100% may occur later in the shift; engineering will provide a Beacon plan should this be needed.
- DG 1-2 testing, should it become available during the shift

OPERABILITY ITEMS:

- DG 1-2 (TS 3.8.1.B)

ANNUNCIATORS IN ALARM:

- None, except those associated with DG 1-2 OOS

Shift Foreman Turnover

TURNOVER ITEMS:

- U-1 – maintain 75% - no one in containment
- U-2 is at 100%

REACTIVITY MANAGEMENT:

- Time in core life: MOL.
- Power History: Steady State, previously at 76% for 03 days. Currently power is at 76%.
- Boron concentration is 838 ppm from a sample taken 4 hours ago.
- Control Rod Height: 200 steps on CBD.
- Diluting the RCS approximately 15 gallons every 1 hrs.
- The last dilution was completed 15 min ago.
- Rod motion: none planned, as needed to maintain ΔI on target

CONDITIONAL SURVEILLANCES & INCREASED MONITORING:

- None

OTHER ABNORMAL PLANT STATUS

- See Plant Abnormal Status Board