Final Submittal

(Blue Paper)

1. As Given Simulator Scenario Operator Actions ES-D-2

TURKEY POINT
EXAM 2002-301

50-250, 50-251/2002-301
OCTOBER 7 - 11 & 15, 2002

Scenarios
Final Submittal

Facility: Turkey Point Scenario No.: 1 Op-Test No.: _____

Examiners: Operators:

Initial Conditions: Mode 1, 574°F, 100% RTP (IC-1)

Turnover: Reduce load to less than 60% power to remove 3A SGFP from service (high vibration). Equipment OOS --- 3C Condensate Pump (TPCW piping leak), 3B Boric Acid Pump (shaft seized), Main Generator Automatic Voltage Regulator (failed circuit card).

Event No.	Malf. No.	Event Type*	Event Description
1		R/ALL	A power reduction from 100% down to 60% is commenced per 3-GOP-103.
2**		I/RCO I/SRO	VCT level transmitter LT-3-112 fails high. LCV-3-115A manually repositioned to VCT. (Optional at lead evaluator discretion.**)
3		I/RCO I/SRO N/RCO N/SRO	LT-3-459 fails low causing loss of letdown & PZR heaters. LCV-3-460 fails closed. Excess letdown placed in service.
4		C/RCO C/SRO	PZR PORV PCV-3-455C commences leaking. PORV block MOV closed to isolate leak.
5		I/BOP I/SRO	PT-3-1604 fails low causing CV-3-2011 to open bypassing the LP feedwater heaters. Power reduced to maintain < 100%.
6		C/BOP C/SRO R/ALL***	3A SGFP bearing high temperature alarm (ann. D-5/4). If power > 95%, crew initiates fast load reduction***. Bearing temperature increases requiring a manual trip of 3A SGFP.
7		M/ALL	Feedwater break occurs. All feedwater flow lost and can not be regained. Reactor trip now required if not already tripped.
8		C/RCO C/BOP 2C/SRO	Reactor fails to trip automatically or manually. MOV-3-1405 fails closed and CV-3-6275A fails open with neither responding to attempts at manual operation.
9			Feedwater flow (both AFW and alternate sources) completely lost causing loss of heat sink CSF red path. 3A s/g wide range level drops sufficiently to require bleed & feed.

* – (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
** - Optional if 2nd RCO instrument failure needed.
*** - If power not yet reduced by 5% from the load reduction begun in event 1, a 3-ONOP-100 fast load reduction may be performed for credit as a reactivity event at lead evaluator direction.

Scenario # __1__

Initial Conditions: Mode 1, 574°F, 100% RTP (IC-1)

Turnover: Reduce load to less than 60% power to remove 3A SGFP from service (high vibration). Equipment OOS --- 3C Condensate Pump (TPCW piping leak), 3B Boric Acid Pump (shaft seized), Main Generator Automatic Voltage Regulator (failed circuit card).

Synopsis: Shortly after shift turnover, turbine load reduction from 100% down to 60% for feed pump work begins per 3-GOP-103. After load reduction sufficient to demonstrate plant control with the main generator voltage regulator in manual, LT-3-112 fails high causing letdown to divert to the CVCS holdup tank. The operators respond to the failure per 3-ONOP-046.4 and manually direct the LCV-3-115A divert valve to the VCT. After the plant is stable, LT-3-459 fails low causing letdown isolation and loss of PZR heaters. Operators respond per 3-ONOP-041.6. LCV-3-460 will not reopen requiring the crew to place excess letdown in service per 3-OP-047 to maintain PZR level. Once LT-3-459 is removed from service per 3-ONOP-049.1, PORV-3-455C starts to leak. The crew responds per 3-ONOP-041.5 and the leaking PORV is isolated manually using its block MOV. Once pressure recovers, PT-3-1604 fails low opening LP feedwater heater bypass valve CV-3-2011. This causes a decrease in feedwater temperature and plant efficiency resulting in a small power increase. Power must be reduced as needed to keep < 100% per 3-ARP-097.CR for annunciator D-7/4. Once power is stable < 100%, the 3A steam generator feed pump bearing high temperature alarm is received. The crew responds per 3-ARP-097.CR for annunciator D-5/4. If power is still above 95%, the NPS may direct a fast load reduction (at lead evaluator discretion) based on the upcoming need to trip the 3A steam generator feed pump. Bearing temperature, local noise and motor amps all increase requiring the feed pump to be tripped. With no automatic turbine runback (PT-3-1604 failed), manual generator voltage regulator control and excess letdown in service maneuvering the plant is greatly complicated and the crew may elect to manually trip the reactor.

The 3A SGFP trip induces a main feed header rupture adjacent to the AFW cage. This results in a loss of main feedwater flow to the steam generators, which will cause a reactor trip signal on low steam generator levels. Both automatic and manual reactor trip fail requiring entry into 3-EOP-FR-S.1. The feed line break causes collateral damage including a break in the train 2 AFW pump discharge piping. While train 1 piping is intact, MOV-3-1405 fails closed causing a loss of secondary heat sink (unit 4 is in mode 5 and is unavailable as a source of steam). MOV-3-1405 can not be manually opened from the console. Entry into the NE quadrant of the Turbine Building is blocked by steam arising from the feed break on the 18 ft. elevation. The loss of heat sink red path critical safety function requires operators to enter 3-EOP-FR-H.1 immediately after exiting 3-EOP-FR-S.1. RCPs are stopped and attempts at establishment of alternate feed sources are unsuccessful. 3A steam generator blowdown isolation valve CV-3-6275A fails to close on phase A containment isolation. The valve can not be manually closed from VPB and the steam cloud prevents local isolation. If needed to lower 3A s/g level < 22% wide range, water hammer from the CV-3-6275A failure induces a break in the 3A steam generator blowdown line down stream of the failed valve. The exercise is concluded

step 24 of 3-EOP-FR-H.1 (after RCS bleed & feed is initiated) or earlier at the discretion of the lead evaluator.

Critical Tasks:

Event 8: Insert negative reactivity into the core by one of the following methods prior to completing step 4 of 3/4-EOP-FR-S.1: deenergizing CRDM MG sets, inserting RCCAs, or establishing emergency boration flow to the RCS (FR-S.1 task C)

Event 9: Initiate RCS feed and bleed so that the RCS depressurizes sufficiently for HHSI injection flow to occur (FR-H.1 task F)

Scenario XX NRC 1

Simulator Operating Instructions

Setup

IC-1 (100% MOL)

Load scenario 16.

Delete all conditional triggers and direct triggers as marked on the accompanying copy of the scenario 16 computer printout.

Place simulator in run.

Main Generator Automatic Voltage Regulator in Manual:	Touch SYS MAT → GENERATOR & GRID → GENERATOR EXCITER → NO. 1 ISOL TRANSD → LOSS OF OUTPUT SIGNAL → set TFGFDIT1 = T. Acknowledge alarm, then select Voltage Regulator Control Switch → OFF.
3C Condensate Pump OOS:	Touch ELECTRICAL GENERATION → 3C 4kV BUS → bkr 12 → BREAKER POSITION → set TAF1D6CP = 3
3B Boric Acid Pump OOS:	Touch RCS PRESSURE → CVCS LETDOWN → BORON MKUP & CHARGING → EMER BORATE → BORIC ACID PUMP B → LOCAL CLOSE/TRIP (MECH) → set TCB1BMC = F
CV-3-6275A fails as is (open):	Touch STEAM PRESSURE → STEAM GEN → BLDN PROC ♦ TO BLDN → CV6275A → FAIL AS IS → set TFSW75AA = T
ATWS/AMSAC failure:	Touch SIM CTL → SPECIAL CONTROLS → ATWS - AMSAC FAILS TO ACTUATE

Acknowledge any alarms and place simulator in freeze.

Attach ECO information tags on control switches for 3C Condensate Pump, 3B Boric Acid Pump & Main Generator Voltage Regulator.

Provide turnover package & copy of 3-GOP-103.

Event 1 Power reduction from 100% with manual main generator voltage control.

Initiated by shift turnover (3-GOP-103). No sim IF actions.

Respond as System, NPS, NRC Resident Inspector, Shift Engineer & Chemistry regarding the load reduction.

Respond as SNPO. If asked, report idle charging pump ready for start. If directed to increase NRHX CCW flow, after 2-4 min, touch SYS MAT → COMMON SERVICES → COMPONENT COOLING → 834 → VALVE PORT AREA → set TAKA834 = as

directed (0.6 = 780 gpm).

Event 2 - LT-3-112 fails high

This event is optional if the lead evaluator determines that a 2nd RCO instrument failure is needed.

When boration has commenced, touch SYS MAT → CHEMICAL VOLUME CONTROL SYSTEM → CVCS VOLUME CONTROL TANK → L-112 → TRANSMITTER FAIL HIGH → set TFB1LTHW = T to begin event. Crew responds per 3-ONOP-046.4.

Respond as SNPO if directed to locally check LT-3-112 inidication in the charging pump room. Report back that the local indication reads 100%.

Respond as WCC/maintenance if called regarding LT-3-112 failure.

Event 3 - LT-3-459 fails low & excess letdown placed in service

Upon completion of 3-ONOP-046.4 (if event 2 performed) or when boration has commenced (if event 2 omitted), touch PRESSURIZER LEVEL → L-459 → LT-459 → TRANSMITTER FAIL LOW → set TFH1TV59 = T → RECALL → CVCS LETDOWN ♦ → LCV-460 → FAIL CLOSE → set TFBVC01 = T. Crew should respond per 3-ONOP-041.6. When LCV-3-460 failure identified, crew should align excess letdown per 3-OP-047.

Respond as SNPO to verify excess letdown HX CCW flow (FI-3-624) < 238 gpm. Touch SYS MAT → COMMON SERVICES → COMPONENT COOLING → CCW TO RCP & XS LTDWN HX'S, NCC'S AND CRDM CLRS → report CCW flow as indicated next to XLHX.

Respond as WCC/I&C when notified.

As NPS, direct tripping bistbles if the BOP is an RO license candidate. If the BOP is a surrogate operator, continue to event 4.

If operators trip bistables, 3-ONOP-049.1 Attachment 4 is used for L-3-459.

Event 4 - PORV PCV-3-455C leakage

Once excess letdown placed in service, touch PRESSURIZER LEVEL → PORV455C → LEAK BY → set TVHV455C = 0.05 (≈20 gpm leak slowly reduces PZR pressure < 2200 psig). Operators respond per 3-ONOP-041.5.

Respond as NPO if directed to perform 3-ONOP-041.5 Attachment 1 (not necessary to provide results).

Event 5 - PT-3-1604 fails low

After 3-ONOP-041.5 response complete, actuate parameter controller direct trigger TFS1ML3L. CV-3-2011 will automatically open and bypass all LP feedwater heaters, reducing feedwater temperature & plant efficiency. That will cause a small reactor power increase. Crew should respond per 3-ARP-097.CR for ann. D-7/4.

NOTE: CV-3-2011 switch must be held closed until valve fully closed or it will reopen.

Respond as NPO if asked to locally verify CV-3-1900 closed. Touch STEAM PRESSURE → FEEDWATER → FW MAIN PROC ♦ (upper left corner) → HTR DRAINS PROCESS ♦ → report CV-1900 position (far right side). To check CV-3-2011 position, touch STEAM PRESSURE → FEEDWATER → FW MAIN PROC ♦ (lower left

corner) → report CV-2011 position (lower left quadrant).

Event 6 - 3A SGFP bearing failure

After plant stabilization, actuate 3A SGFP high bearing temperature alarm (ann. D-5/4). Touch STYL INST → A304 → Ann. panel D → OVERRIDE → SGFP A MOTOR BRG HI TEMP → CRY WOLF SGFP A MOTOR BEARING HI TEMP → STATUS → set V8:D32 = T. Operators should consult 3-ARP-097.CR for ann. D-5/4.

Respond as NPO if directed to check out 3A SGFP bearing temperatures. Tell crew outboard motor bearing temperature is 205°F and slowly increasing.

Arm the feedwater break in event 7 by touching STEAM PRESSURE → FEEDWATER → LV20 → VALVE PORT AREA → ARM TVFAHDR2 = 1.0. Shortly thereafter, touch RECALL → FW MAIN PROC (left side ♦) → 3P1A → BEARING WEAR → ramp TVFABP1A = 0.2/180.

If power still > 95% from event 1, as NPS, direct fast load reduction per 3-ONOP-100 due to high motor bearing temperature to prepare for an expected trip of 3A SGFP.

Respond as SNPO if directed to increase CCW → NRHX. See event 1 for directions.

If power < 95%, at lead evaluator direction , report increasing noise level from 3A SGFP outboard motor bearing with temperature of 215°F and slowly increasing. The crew should trip 3A SGFP per 3-ARP-097.CR, but recognize that it will not cause a turbine runback due to PT-3-1604 failure. The crew may attempt to trip the reactor here since excess letdown is in service (limits RCS ability to respond to load change), the main generator voltage regulator is in manual and the turbine must be manually run back.

Respond as system if notified of load reduction.

Event 7 - Feedwater break / Loss of feedwater

If an attempt is made to trip the reactor <u>or</u> at lead evaluator direction during manual runback after the 3A SGFP is tripped, press MAST FAIL and actuate parameter controller composite "AFW LEAK". This creates a break just outside the AFW cage on the 18 ft. elevation of the Turbine Bldg. Break location means SSGFP, condensate pump & SGFP are all unavailable as feed sources. If the reactor hasn't already been tripped, the loss of feed flow will require a manual reactor trip as steam generator levels rapidly drop.

Event 8 - ATWS with loss of AFW

From event 7 the reactor does not trip either manually or automatically. The crew enters 3-EOP-E-0 step 1and transitions to 3-EOP-FR-S.1. No AFW is available since collateral damage from the feed break includes a break in the AFW train 2 discharge pipe (see setup). MOV-3-1405 fails to open taking train 1 AFW OOS.

If directed as NPO/NWE to locally open MOV-3-1405, report that the AFW MOV platform is inaccessible due to steam. Unit 4 is in mode 5 and is therefore not available as a steam source for train 1 AFW.

Respond as NPO if directed to locally open rx trip breakers & MG set input/output breakers. Report lots of steam coming from the unit 3 end of the Turbine Bldg. 18 ft. elevation, so may have trouble getting to 3B MCC room.

Once emergency boration is established, locally trip the reactor by opening the MG

set input breakers from the 480V LC room by touching ELECTRICAL GENERATION → 3A(3D) 480V LC → bkr 30108(30401) → LOCAL CLOSE/NORM/TRIP (ELEC) → set TAE3108L(3401L) = 2.

Event 9 - Loss of heat sink

Upon completion of 3-EOP-FR-S.1, operators should transition to 3-EOP-FR-H.1.
If needed to get one steam generator level < 22% wide range after completion of 3-EOP-FR-S.1 to force initiation of feed & bleed, initiate 3A steam generator blowdown line leak as needed. Touch STEAM PRESSURE → STEAM GEN ♦ (left side) → BLDN PROC ♦ TO BLDN → leak node downstream of CV6275A → VALVE PORT AREA → set TVSDSD1 = as needed to get desired level decrease.
Operators should notice failure of CV-3-6275A to close.
If directed as NPO to locally close it or locally close the associated manual isolation valve (SGB-3-007), report that the area is inaccessible due to steam.
If directed as NPO to establish unit 2 feed flow, report that valve 3-20-510 is closed under clearance (repairs to line from units 1 & 2).
When directed as SNPO to align PAHMS for service, actuate parameter controller composite "PAHM".

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __1__ **Page** __1__ **of** __1__

Event Description:
Shortly after shift turnover, with reactor power initially at 100%, a power reduction for performing feed pump work is commenced per 3-GOP-103. The main generator voltage regulator is in manual control.

Time	Position	Applicant's Actions or Behavior
	ANPS	Conducts pre-job brief for shutdown
	ANPS	Directs shutdown per 3-GOP-103
	BOP	Inhibits MIMS alarms.
	RCO	Initiates boration per 0-OP-046 • Sets BA totalizer to amount of BA directed by ANPS • Sets FCV-3-113A controller to ANPS directed boration rate • Reactor make-up selector switch → BORATE • Reactor make-up control switch → START • FCV-3-113B → OPEN if auto closed on flow deviation • When boration complete, returns reactor makeup selector switch → AUTO & reactor makeup control switch → START
	RCO	Inserts rods as directed by ANPS
	RCO	Energizes PZR backup heaters
	BOP	Reduces turbine load to maintain Tref within 3°F of Tavg. Adjusts voltage regulator to maintain generator voltage 21-23 kV & existing MVAR (100 MVAR out)
	BOP	Uses 3-GOP-103 Enclosure 1 to verify reactor power = turbine load
	RCO	Starts 2nd charging pump per 3-OP-047 • Dispatches SNPO to check charging pump for start • Sets charging pump speed controller to 20-25% demand • Starts charging pump • Adjusts speed controller to match charging & letdown and places controller in AUTO
	RCO	*NOTE: Although not directed by 3-GOP-103, 2nd letdown orifice will likely be placed in service per 3-OP-047* • *Places PC-3-145 → MANUAL & sets controller approx. 40% above current setpoint*

		• *Opens 2nd orifice isolation valve* • *Adjusts PC-3-145 for proper letdown pressure* • *Returns PC-3-145→ AUTO* • *Directs SNPO open CCW→NRHX valve 3-834 to maintain proper letdown temperature*

Op-Test No.: _____ Scenario No.: __1__ Event No.: __2__ Page __1__ of __1__

Event Description:
This event optional if lead evaluator determines that RCO needs a 2nd instrument failure. If not required, proceed directly to event 3.
When load reduced sufficient to demonstrate plant control, VCT level transmitter LT-3-112 fails high. Operators respond using 3-ONOP-046.4. LCV-3-115A diverts letdown to the holdup tank. The crew manually realigns LCV-3-115A to the VCT.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports decreasing VCT level & LCV-3-115A in full divert *NOTE: Auto makeup may initiate and cause VCT level to increase*
	ANPS	Directs response per 3-ONOP-046.4
	RCO	Requests SNPO locally check LI-3-112 (in charging pump room) and/or BOP check ERDADS LI-3-112 indication.
	RCO	Places LC-3-112 → MANUAL and manually adjusts LC-3-112 to return LCV-3-115A to the VCT position.
	ANPS	Ensures WCC / I&C notified of failure
	ANPS	Notifies NPS to evaluate 0-ONOP-046.3 and Technical Specifications. *NOTE: No Technical Specification actions apply.*
	ANPS	Briefs crew on effects of LT-3-112 failure.

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __3__ **Page** __1__ **of** __1__

Event Description:
Upon completion of 3-ONOP-046.4, LT-3-459 fails low causing loss of letdown & PZR heaters. Operators respond per 3-ONOP-041.6 and place excess letdown in service using 3-OP-047. LT-3-459 is removed from service per 3-ONOP-049.1.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports LI-3-459 failed low, letdown isolated & PZR heaters off
	RCO	Takes PZR level control transfer switch → CH 2 & 3
	ANPS	Directs response per 3-ONOP-041.6
	RCO	PZR level recorder selected to either ch 2 or ch 3.
	RCO	Attempts to open LCV-3-460 and reports valve failed closed. *NOTE: Although not a step in 3-ONOP-041.6, RCO will need to secure one of the two running charging pumps.*
	RCO	Places excess letdown in service per 3-OP-047 • Directs SNPO verify < 238 gpm CCW → excess letdown HX • Opens CV-3-387 • Slowly opens HCV-3-137 while monitoring excess letdown HX warmup per TI-3-139
	RCO	Re-energizes PZR heaters.
	RCO	Maintains PZR level on program per 3-ONOP-041.6 Enclosure 1
	ANPS	Directs response per 3-ONOP-049.1
	ANPS	Refers to Technical Specifications *NOTE: TS 3.3.1 Table 3.3-1 action 13 applies - 6hr to trip bistables*
	ANPS	Briefs crew on effects of LT-3-459 & LCV-3-460 failures and bistable trip activity
	BOP	Using 3-ONOP-049.1 Attachment 4 for L-3-459, enters rack 1 and trips BS-3-459A1 & BS-3-459A2
	ANPS	Ensures WCC / I&C notified and PWO initiated

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __4__ **Page** __1__ **of** __1__

Event Description:
Once excess letdown placed in service, PORV PCV-3-455C commences leaking. Operators isolate leaking PORV per 3-ONOP-041.5.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports RCS pressure dropping & RCS leak thru PZR PORV (using acoustic monitor and tailpipe temperature)
	ANPS	Directs response per 3-ONOP-041.5
	RCO	Closes PORV block MOV-3-536 to isolate leaking PORV. If MOV-3-535 closed first, recognizes that leak not isolated, reopens MOV-3-535 and closes MOV-3-536. *NOTE: If RCS pressure decrease not initially identified as due to PORV leakage, may take normal spray valves → MANUAL & CLOSED first. Also may direct NPO to do 3-ONOP-041.6 Attachment 1 to evaluate PZR heater output.*
	ANPS	Refers to Technical Specifications *NOTE: TS 3.2.5 applies if < 2200 psig – 2hr to restore > 2200 psig* *TS 3.4.4 action a requires leaking PORV MOV closure < 1hr* *TS 3.4.6.2.d applies until leaking PORV isolated (4hr to reduce identified leakage < 10 gpm)*
	ANPS	Briefs crew on effects of PORV PCV-3-455C leakage

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

Event Description:
After 3-ONOP-041.5 response complete, PT-3-1604 fails low causing CV-3-2011 to open bypassing the LP feedwater heaters. This causes a decrease in feedwater temperature and plant efficiency resulting in a small power increase. 3-ARP-097.CR is implemented for annunciator D-7/4.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports annunciator D-7/4 alarming and CV-3-2011 open.
	RCO	Reads 3-ARP-097.CR for annunciator D-7/4.
	ANPS	Directs RCO / BOP actions to maintain power < or = 100%.
	RCO	Drives rods as directed to maintain power < or = 100%.
	BOP	Reduces turbine load as directed to maintain power < or = 100%. Adjusts voltage regulator to maintain generator voltage 21-23 kV and existing MVAR loading (initially 100 MVAR).
	BOP	Reports failure of PT-3-1604 as cause of CV-3-2011 opening
	BOP	Closes CV-3-2011 and monitors SGFP suction pressure *NOTE: CV-3-2011 control switch must be held → CLOSE until valve fully closed or valve will stroke open again.*
	BOP	Directs NPO verify CV-3-1900 closed
	ANPS	Briefs crew on effects of PT-3-1604 failure (no SGFP trip automatic runback)

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

Event Description:
After plant stabilization, 3A SGFP bearing high temperature alarm (ann. D-5/4) is received. 3-ARP-097.CR is implemented. If power not yet reduced by 5% from actions initiated in event 1, at lead evaluator discretion, the crew may be directed to perform a fast load reduction per 3-ONOP-100 (see actions annotated with a * below). Bearing temperature increases to require a manual trip of 3A SGFP. Operators can either manually runback the turbine or trip the reactor now due to automatic runback failure, excess letdown in service & main generator voltage control in manual.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports annunciator D-5/4 alarming.
	RCO	Reads 3-ARP-097.CR for annunciator D-5/4.
	BOP	Directs NPO check 3A SGFP bearing temperatures.
	ANPS*	Directs fast load reduction per 3-ONOP-100 • Conducts crew brief • Notifies NPS to make required notifications
	BOP*	Notifies System & makes plant page announcement
	RCO*	Initiates boration • Places reactor makeup selector switch → BORATE • Places RCS makeup control switch → START • Sets FCV-3-113A potentiometer → 8.0 • Sets BA totalizer to directed amount *NOTE: BA requirements are 85 gal / 10% load reduction. To reduce power from 100→60% requires 340 gal BA.*
	BOP*	Reduces turbine load at directed rate to maintain Tavg not more than 5°F above Tref and rods above RIL (ann. B-8/2).
	RCO*	Starts 2nd charging pump and aligns 2nd letdown orifice.
	RCO*	Directs SNPO increase CCW → NRHX using valve 3-834 as needed to maintain < 840 gpm
	RCO*	Places all PZR backup heater banks to ON.

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

Event Description:
After plant stabilization, 3A SGFP bearing high temperature alarm (ann. D-5/4) is received. 3-ARP-097.CR is implemented. If power not yet reduced by 5% from actions initiated in event 1, at lead evaluator discretion, the crew may be directed to perform a fast load reduction per 3-ONOP-100 (see actions annotated with a * below). Bearing temperature increases to require a manual trip of 3A SGFP. Operators can either manually runback the turbine or trip the reactor now due to automatic runback failure, excess letdown in service & main generator voltage control in manual.

Time	Position	Applicant's Actions or Behavior
	BOP	Trips 3A SGFP when NPO reports bearing temperature > 212°F *NOTE: In view of having normal letdown, automatic voltage regulation and automatic runback all out of service, crew may elect to trip reactor rather than manually runback per 3-ONOP-089. This is acceptable. If reactor trip attempt made at this point, go to events 7 & 8.*
	ANPS	Directs manual turbine runback per 3-ONOP-089 to 45% load using 1st stage impulse pressure
	BOP	Manually reduces turbine load and controls voltage regulator to maintain 21-23 kV generator output voltage.
	BOP	Monitors steam dumps & steam generator level control, recommending reactor trip when ODI trip criteria met
	RCO	Monitors rod insertion, PZR level & pressure control. Attempts reactor trip when ODI trip criteria met.
	ANPS	Directs reactor trip when ODI trip criteria met.

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __7__ **Page** __1__ **of** __1__

Event Description:
If an attempt is made to trip the reactor or at lead evaluator direction during manual runback after the 3A SGFP is tripped, a feedwater break occurs. This break is just outside the AFW cage on the 18 ft. elevation of the Turbine Bldg. Break location means SSGFP, condensate pump & SGFP are all unavailable as feed sources. Thus, feedwater flow is lost and can not be regained. If the reactor hasn't already been tripped, the loss of feed flow will require a manual reactor trip as steam generator levels rapidly drop.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports loss of feedwater flow and lowering steam generator levels. Recommends reactor trip when ODI trip criteria met.
	RCO	Attempts reactor trip when steam generator level ODI trip criteria met.
	ANPS	Directs reactor trip when steam generator level ODI trip criteria met.

Op-Test No.: _____ **Scenario No.:** 1 **Event No.:** 8 **Page** 1 **of** 2

Event Description:
From event 7, the reactor fails to trip automatically or manually and actions are taken IAW 3-EOP-FR-S.1. MOV-3-1405 fails closed making train 1unavailable. Due to the feed break on train 2, no source of feed is available. CV-3-6275A fails to close on containment isolation phase A and can not be locally isolated due to steam from the feed break.

Time	Position	Applicant's Actions or Behavior
	ALL	**CRITICAL TASK: Insert negative reactivity into the core by one of the following methods prior to completing step 4 of 3/4-EOP-FR-S.1: deenergizing CRDM MG sets, inserting RCCAs, or establishing emergency boration flow to the RCS.**
	RCO	Attempts reactor trip from console and VPB. Reports failure of reactor to trip. Manually drives rods in.
	BOP	Manually trips turbine and closes MSR steam stop valves.
	ANPS	Directs response per 3-EOP-E-0 step 1 then transitions to and directs response per 3-EOP-FR-S.1.
	BOP	Reports A AFWP not running and attempts to manually open MOV-3-1405. Reports MOV-3-1405 failed closed.
	BOP	Takes over manual rod insertion from RCO.
	RCO	Initiates emergency boration • Resets safety injection (if actuated & not reset) • Starts at least one charging pump in manual • Takes reactor makeup control switch → STOP • Starts 3A boric acid pump • Opens MOV-3-350 • Opens HCV-3-121 • Increases charging flow to obtain > 60 gpm emergency boration flow & > 45 gpm charging flow *NOTE: If safety injection occurs, BOP will be given task of verifying steps 1-16 of 3-EOP-E-0. Subsequent BOP steps would be performed by RCO. CV-3-6275A failure to close should be identified and reported with manual closure attempted by BOP during steps 1-16 of 3-EOP-E-0.*
	BOP	Directs NPO locally open reactor trip, reactor trip bypass, and

		CRDM MG set input / output breakers

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __8__ **Page** __2__ **of** __2__

Event Description:
From event 7, the reactor fails to trip automatically or manually and actions are taken IAW 3-EOP-FR-S.1. MOV-3-1405 fails closed making train 1unavailable. Due to the feed break on train 2, no source of feed is available. CV-3-6275A fails to close on containment isolation phase A and can not be locally isolated due to steam from the feed break.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports no AFW flow. Directs NPO locally open MOV-3-1405. Reports that MOV-3-1405 can not be locally opened. *NOTE: BOP may be given copy of 3-ONOP-075 and told to restore AFW flow. Equipment malfunctions will prevent FW restoration. Subsequent BOP steps will be performed by the RCO.*
	ANPS	Transitions to 3-EOP-FR-H.1 due to loss of heat sink CSF red path
		NOTE: Emergency Plan classification while in 3-EOP-FR-S.1 is an Alert per 0-EPIP-20101 Enclosure 1 Category 5.

Op-Test No.: _____ **Scenario No.:** __1__ **Event No.:** __9__ **Page** __1__ **of** __1__

Event Description:
Upon completion of 3-EOP-FR-S.1, feedwater flow (both AFW and alternate sources) has been completely lost. Plant conditions require entry into 3-EOP-FR-H.1. RCPs are stopped and establishment of alternate feed sources is attempted unsuccessfully. 3A s/g wide range s/g level drops sufficiently to require feed & bleed.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs response per 3-EOP-FR-H.1.
	RCO	Stops all RCPs. *NOTE: If wide range steam generator level is not low enough to require bleed & feed, crew may take steps to establish AFW, main FW, standby FW, other unit FW or condensate flow to steam generators. Equipment damage and steam flow from break make restoration of any feed source impossible.*
	ALL	**CRITICAL TASK: Initiate RCS feed and bleed so that the RCS depressurizes sufficiently for HHSI injection flow to occur.**
	ANPS	When any steam generator wide range level < 22%, directs initiation of bleed and feed.
	RCO	Manually actuates safety injection and phase A containment isolation.
	RCO	Opens MOV-3-536 (closed to isolate leaking PORV) and both PZR PORVs.
	RCO	Resets safety injection
	BOP	Resets phase A containment isolation
	RCO	Stops unit 4 high head safety injection pumps.
	BOP	Verify 3-EOP-E-0 steps 1-16. If not noted earlier, attempts CV-3-6275A manual closure and reports it failed open.
	RCO	Directs SNPO place PAHMs in service per 3-OP-094.
		NOTE: When bleed & feed initiated, emergency plan classification is Site Area Emergency per 0-EPIP-20101 Enclosure 1 Category

		5.

Facility: Turkey Point Scenario No.: 2 Op-Test No.: _____

Examiners: Operators

Initial Conditions: Mode 1, 574°F, 100% RTP (IC-1)

Turnover: Maintain 100% steady state. An approaching tropical depression is expected to generate severe thunderstorms with gusty winds over the next 24 hrs. Restore Power Range NI-41 to service per 3-PMI-059.12 step 6.29.7. Equipment OOS --- 3A Charging Pump (secondary packing leak), B AFW Pump (failed to come up to speed during last IST) & 3B CCW pump (breaker failed to close on last start attempt).

Event No.	Malf. No.	Event Type*	Event Description
1		N/ALL	Power Range NI-41 restored to service.
1a		I/RCO I/SRO	PRNI-41 upper detector fails low.
2		I/BOP I/SRO	3A S/G pressure transmitter PT-3-475 fails low. 3A S/G FCV-3-478 requires manual operation .
3		C/SRO TS call	3A EDG prelube low oil temp alarm due to soak back pump & immersion heater failure. 3A EDG is declared out of service.
4		R/ALL C/RCO C/SRO	3A steam generator 3 gpm tube leak requiring a fast load reduction during which 3A boric acid pump trips. Subsequent tube leak increase to 30 gpm.
5**		I/BOP I/SRO	PT-3-1607 fails high. CV-3-1607 (3B S/G ADV) fails open. (Optional at lead evaluator discretion.**)
6		C/BOP C/SRO	3B SGFP trips on a spurious low lube oil pressure signal (pressure switch failure). Automatic runback fails to occur.
7		M/ALL	3A steam generator tube leak > charging pump capacity.
8		C/ALL	Reactor trip & safety injection. 3B RHRP fails to auto start. Unit 3 startup transformer ground causes a loss of offsite power. 3B EDG automatically starts and loads 3B & 3D 4kV buses.
9			3A 4kV bus repowered from the unit 4 start up transformer.
10			3A steam generator tube rupture response.

* – (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
** - Optional if 2nd BOP instrument failure needed.

Scenario # __2__

Initial Conditions: Mode 1, 574°F, 100% RTP (IC-1)

Turnover: Maintain 100% steady state. An approaching tropical depression is expected to generate severe thunderstorms with gusty winds over the next 24 hrs. Restore Power Range NI-41 to service per 3-PMI-059.12 step 6.29.7. Equipment OOS --- 3A Charging Pump (secondary packing leak), B AFW Pump (failed to come up to speed during last IST) & 3B CCW pump (breaker failed to close on last start attempt).

Synopsis: Shortly after shift turnover, Power Range NI-41 is restored to service per 3-PMI-059.12 step 6.29.7. Once in service, PRN-41 upper detector fails low immediately thereafter and is removed from service per 3-ONOP-059.8. After the actions for PRN-41 failure are complete, PT-3-475 fails low causing FT-3-474 to also fail low. The operator must take manual control of LCV-3-478 before returning it to automatic once the operable steam flow/pressure channels are selected for control and 3A steam generator level returned to program. Bistables are tripped per 3-ONOP-049.1 for PT-3-475 & FT-3-474. Then, 3A EDG trouble annunciator alarms due to pre-lube oil temperature at 98°F. The NPO responds per 3-ARP-097.DG and/or 3-OP-023 and reports failure of the soak back pump and immersion heaters. 3A EDG is declared inpoerable and removed from service. Once Tech Specs are referenced and applicable compensatory actions initiated, a 3 gpm tube leak develops in 3A steam generator (exceeds Tech Spec limits). 3-ONOP-071.2 is entered and a fast load reduction initiated. An Unusual Event is delared per 0-EPIP-20101. With the load reduction and boration in progress, 3A BATP trips. 3-ONOP-046.4 is used to restore boration flow using the 3B BATP. Once boration flow is restored, the tube leak increases to 30 gpm. Following identification of the tube leak rate increase, 3B steam generator ADV (CV-3-1607) fails open due to PT-3-1607 failure high. The operator takes manual control of CV-3-1607 and closes the valve. After plant stabilization, the 3B SGFP trips on low oil pressure due to a pressure switch failure. The automatic runback to < 45% power fails and a manual runback must be performed per 3-ONOP-089. Following plant stabilization, the 3A steam generator tube leak increases until available charging pump capacity is exceeded requiring a manual reactor trip and safety injection. 3-EOP-E-0 is entered. While performing the prompt actions, the 3B RHRP automatic start failure is noted. When an attempt is made to start the pump, a unit 3 startup transformer ground occurs causing a loss of offsite power to unit 3. 3B EDG automatically starts and supplies 3B & 3D 4 kV buses. Since 3A EDG is OOS, 3-ONOP-004.2 is used to reenergize 3A 4kV bus using the emergency tie from the unit 4 startup transformer. This allows restoration of a 2nd CCWP (3A). A Site Area Emergency is declared per 0-EPIP-20101. Transition to 3-EOP-E-3 is made, 3A steam generator isolated and RCS cooldown/ depressurization performed. Due to loss of forced circulation and cold leg SI flow, entry into 3-EOP-FR-P.1 may be required. The exercise is concluded upon completion of 3-EOP-E-3 step 25 or
earlier at the discretion of the lead evaluator.

Critical Tasks:

Event 7: Manually trip the reactor when steam generator tube leak exceeds charging pump capacity and before automatic trip (applied at lead evaluator's discretion).

Event 10:
1. Isolate feedwater flow into and steam flow out of a ruptured steam generator prior to transitioning to 3/4-EOP-ECA-3.1 (E-3 task A).

2. Perform 3/4-EOP-E-3 cooldown and maintain temperature to meet following criteria: temperature is not too high to maintain required subcooling nor causes a severe challenge to subcriticality CSF (E-3 task B).
3. Depressurize RCS to meet SI termination criteria (E-3 task C)

Scenario XX NRC 2
Simulator Operating Instructions

Setup
IC-1 (100% MOL)

Load scenario 43.

Delete all conditional triggers **except** parameter controller composite "S/UTRANS" conditional on M1:R3BIR (3B RHRP red pump running light). Also delete direct triggers using the copy of scenario 43 computer printout attached as guidance.

Place simulator in run. Start 3A CCW pump and stop 3B CCW pump.

Take PRNI-41 OOS per 3-PMI-059.12 steps 6.2.2.7 thru 6.2.2.17.

3A Charging Pump OOS:	Touch ELECTRICAL GENERATION → 3A 480V LC → bkr 30105 → BREAKER POSITION → set TAB1POSL = 3
3B CCW Pump OOS:	Touch 4.16kV BUS 3B → bkr 13 → BREAKER POSITION → set TAK1B13P = 3
B AFW Pump OOS:	Touch STEAM PRESSURE → AUX F/W STEAM PROC → AFSS-001B → VALVE PORT AREA → TAFF01B = 0.0 → LOA → AFW TURB B MECH TRIP → set TCF5MTB = T
3B RHRP auto start failure:	Actuate parameter controller direct trigger TFQ6A2BF = T
Turbine runback failure:	Touch REACTOR POWER → TURBINE RUNBACKS → SGFP RUNBACK INHIBIT → S/G FEED PUMP BREAKER GOVERNOR AND LOAD LIMIT RUNBACK INHIBIT → set TFU1LRRD = T

Enter conditional for 3A EDG trip by touching:
ELECTRICAL GENERATION → 3A 4KV BUS → EMERG DIESEL BKR 3AA20 ♦ → LOCKOUT 186 → SPURIOUS OPERATION → set conditional TFQ5DGAS = T / Q5:DGAKV GE 4.0

Acknowledge any alarms and place simulator in freeze.

Attach ECO information tags on control switches for 3A Charging Pump, 3B CCW Pump & B AFW Pump.

Remove train 2 AFW orange tag above B AFWP tachometer below ann. panel X.

Provide turnover sheets & copy of 3-PMI-059.12 step 6.29.7.

Event 1 - Restore PRNI-41 to service & PRNI-41 failure
Initiated by shift turnover. Operators perform 3-PMI-059.12 step 6.29.7.
Shortly after PRNI-41 is returned to service, touch REACTOR POWER → INCORE / EXCORE DETECTORS → detector 5 (upper left) top half → NEUTRON DETECTOR FAIL LOW → set TFN1P1AL = T. Operators take PRNI-41 OOS using 3-ONOP-059.8.
Respond as WCC, I&C and/or Reactor Engineering if called.

Event 2 – PT-3-475 fails low

When 3-ONOP-059.8 actions complete, touch STEAM PRESSURE → P-475 → TRANSMITTER PT-475 → TRANSMITTER FAIL LOW → set TFS1MBWL = T.
If operators trip bistables, 3-ONOP-049.1 Attachment 4 is used for P-3-475 & F-3-474.
Respond as WCC if requested to prepare a PWO/Clearance and notify I&C.
Respond as I&C if called directly.
Respond as NPO if requested to inspect the main steam platform area around PT-3-475 for trouble. Report that you observe no apparent damage.
Respond as NPO if directed to reset AMSAC (may be in due to 3A s/g level error before feed flow returned to normal). Wait 1-3 min, then actuate parameter controller direct trigger TCL4RST = T. Report when complete.

Event 3 – 3A EDG pre-lube oil temperature low

Once event 2 response complete or at lead evaluator direction, actuate parameter controller direct trigger TVQ5GGAT = 80.0.
Respond as NPO. After 1-3 min., report annunciators RA-1/7, NOT READY TO START and RA-2/2, LO OIL TEMP alarming and oil temp = 98°F. If asked to perform 3-ARP-097.DG, report immersion heater / soak back pump switch is ON but pump not running and a burnt wiring smell exists at the DECP. Shortly thereafter, report 3A MCC breaker 30514 is tripped open. If directed to take the 3A EDG MCSS → OFF, wait 1-3 min. actuate parameter controller direct trigger TAQ5LRSA = 0. Report when complete.
Respond as WCC. If directed to rack out 3AA20 (3A EDG output bkr), wait 8-10 min, then actuate parameter controller direct trigger TAQ5A20P = 3. Report when complete.
If directed to have Electrical investigate, after 10-15 min., report burned wiring inside 3A DECP.

Event 4 – 3A steam generator tube leak & BATP trip

After 3A EDG taken out of service (or earlier at lead evaluator direction), initiate 3 gpm 3A steam generator tube leak by touching STEAM PRESSURE → STEAM GEN ♦ (left side) → S/G A RCS HYD leak node → S/G TUBE RUPTURE 3A → set TVHHSGA = 0.003. The crew will respond per 3-ONOP-071.2.

Respond as Chemistry. Report back in 10-12 min. that counts appear highest on the 3A s/g sample. Report DAM-1 reading background (normal). If called after R-3-19 alarm, wait 1-3 min, then report no cold chem lab s/g sample flow.

Respond as HP. After 5-8 min, report 3A MSL radiation slightly > bkgd w/ SJAE dischg contaminated. Posting turbine deck as a contamination area.

Respond as System.

Respond as NPS.

With load reduction & boration in progress, touch SYS MAT → CHEMICAL VOLUME CONTROL SYSTEM → CVCS MAKEUP → IDA → THRML OVRLD RELAY FOR BA PUMP A → set TFB1AOV = T.

Respond as WCC/I&C if called.

Respond as SNPO if directed to check out 3A BATP. After 2-4 min., report 3A BATP motor very hot and bkr 30725 tripped open.

Once boration flow restored and load reduction resumed, set TVHHSGA = 0.03 (increases 3A steam generator tube leak rate to 30 gpm).

Respond as SNPO. If asked, report idle charging pump ready for start. If directed to increase NRHX CCW flow, after 2-4 min, touch SYS MAT → COMMON SERVICES → COMPONENT COOLING → 834 → VALVE PORT AREA → set TAKA834 = as directed (0.6 = 780 gpm).

Respond as NPO if directed to align aux stm from U4. Remind crew that aux steam is aligned from Unit 4 normally.Then touch STEAM PRESSURE → AUX F/W STEAM PROC → 075 → VALVE PORT AREA → set TAFF075=0.0 → SLWU-3-001 → VALVE PORT AREA → set TAFF02= 1.0 → 007 → VALVE PORT AREA → set TAFF007=0.0. Report when complete.

Respond as NPO/NWE when directed to open bkr 4D01-28 for MOV-3-1403, after 1-3 min, touch STEAM PRESSURE → AUX F/W STEAM PROC → MOV 1403 → BREAKER LOA LOCAL CLOSE / TRIP (MECH) → set TCF5MB28 = F → MOV1403 → VALVE FAIL CLOSE → set TFFXC03 = T. Report when breaker open.

Event 5 – PT-3-1607 fails high / 3B steam generator ADV fails open

This event is optional if the lead evaluator determines that a 2nd BOP instrument failure is needed.

After > 10% load reduction when directed by lead evaluator, touch STEAM PRESSURE → P-1607 → TRANSMITTER PT-1607 → TRANSMITTER FAIL HIGH → set TFS1MRDH = T.

Respond as NPO if called to check out CV-3-1607. After 1-3 min., report that valve is in indicated (demanded) position.

Respond as WCC/I&C if called regarding PT-3-1607 failure high. Inform crew that PWO will be submitted and planner is working up package.

Event 6 – 3B SGFP spurious low lube oil pressure trip

Once CV-3-1607 manually closed, touch STEAM PRESSURE → FEEDWATER → FW MAIN PROC ♦ (left side) → T-MTP1B → SWITCH PS-2050 → ALM #1 RLY FAIL ENERG → set TFF1X8F = T.

Respond as System when called about sudden load change.

Respond as Chemistry if called to do RCS sampling due to the > 15% power change.

Respond as NPO if called to check out 3B SGFP locally, report that the oil sensing line to PS-3-2050 vibrated loose and that there is a small oil spill in the vicinity of the switch. Also report that you have closed valve 3-40-096B which isolated the flow of oil out the sensing line.

Respond as WCC if called to have Mechanical generate a work package to repair the PS-3-2050 sensing line.

Event 7 – 3A steam generator tube leak > charging pump capacity

After plant stabilization and MOV-3-1403 deenergization / closure, ramp TVHHSGA = 0.200/120 (increases leak to 200 gpm on 2 min ramp). Actions described in event 4 may be performed here before the reactor is tripped.

Respond as System if called about impending reactor trip.

Event 8 – Safety injection / Loss of offsite power

Immediately after the reactor trip, set TVHHSGA = 1.0.

Starting 3B RHRP initiates parameter controller composite "S/U TRANS" causing loss of U3 startup transformer & 3B RHRP when red breaker closed light illuminates. If crew did not take 3A EDG MCSS → OFF in event 3, 3A EDG will start and then lockout shortly thereafter (see setup).

Respond as NPO/NWE if called to investigate U3 SUT. Report to crew that a high side bushing apparently arced to ground and is destroyed.

Respond as NPO if called to locally close MOV-3-1408 / 1409. 12-15 min. later, if 3A 4kV bus not yet restored, actuate parameter controller direct triggers TFFVV08C = T & TFFVV09C = T.

Respond as SNPO if called to locally close MOV-3-1426 / 1427. 8-10 min. later, if 3A 4kV bus not yet restored, actuate parameter controller direct triggers, TFSWVM6B = T & TFSWVM7B = T.

Respond as NPO if called to investigate 3B RHRP bkr 3AB15. After 1-3 min., report no apparent problem.

Respond as SNPO if called to investigate 3B RHRP. After 1-3 min., report no apparent problem.

Respond as U4 RCO if asked about U4 status. Report U4 stable at 100% power. If asked to realign U4 HHSIP suction to U3 RWST per 3-EOP-E-0 Att 1. After 5-7 min., actuate parameter controller composite "SIALIGN". Report completion.

Respond as SNPO when directed to align PAHMS. After 10-15 min., actuate parameter controller composite "PAHM". Report completion.

NOTE: Early 3A MSIV closure may cause 3A s/g ADV lifting and associated release to atmosphere. **Respond as HP/Chemistry** if directed to assess release from 3A ADV. Also report HPs surveying turbine deck already started to rope off U3 mn stm platform & turb. deck downwind until extent of contamination determined.

Event 9 – 3A 4kV bus recovery

Initiated based on loss of offsite power in event 8 and 3A EDG OOS from event 5. 3A 4kV bus restoration will allow starting a 2nd CCWP (3A).
Respond as U4 RCO if asked about U4 SUT lockout that it is reset.
Respond as NPO/NWE if directed to rack in bkr 3AA22. After 4-6 min, actuate parameter controller direct trigger TAE2D06P=T. Report completion.
Respond as NPO/NWE if directed to locally check 3A 4kV bus for breaker targets. After 1-3 min, report no breaker targets on 3A 4kV bus.
If not yet done by end of event 9, **report as SNPO** that aux bldg PAHM alignment complete.

Event 10 - 3A steam generator tube rupture response

Continuation of event 8 upon entry into 3-EOP-E-3.
See events 4 & 8 for field response to this event.
Respond as SNPO if asked to check out charging pumps for start. After 1-3 min, report 3B/3C charging pumps ready for start.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 1/1a **Page** 1 **of** 1

Event Description:
Power Range NI-41 is restored to service following calibration per 3-PMI-059.12 step 6.29.7. Immediately following return to service, PRNI-41fails. Actions are carried out IAW 3-ONOP-059.8.

Time	Position	Applicant's Actions or Behavior
	ANPS	Supervises restoration of PRNI N-3-41 per 3-PMI-059.12 step 6.29.7
	RCO/BOP	Restores PRNI N-3-41 to service • Power mismatch bypass switch → OPERATE • Comparator channel defeat switch → NORMAL • Rod stop bypass switch → OPERATE • Detector current comparator lower section switch → NORMAL • Detector current comparator upper section switch → NORMAL • N-41 dropped rod mode switch → NORMAL
	RCO	Reports failure of N-3-41 upper detector
	ANPS	Directs response per 3-ONOP-059.8
	RCO/BOP	Removes PRNI N-3-41 from service • N-41 dropped rod mode switch → BYPASS • Rod stop bypass switch → BYPASS N-41 • Detector current comparator upper section switch → PRN41 • Detector current comparator lower section switch → PRN41 • Power mismatch bypass switch → BYPASS PR N41 • Comparator channel defeat switch → N41 • Pulls instrument power fuses from PRN41 drawer B
	BOP	Enters protection rack 1 and places bistable test switches → TEST for the following bistables: • BS-3-412B1 & B2 • BS-3-412C1 & C2
	ANPS	Ensures WCC / I&C / Rx engineering notified of PRN41 failure
	ANPS	Refers to Technical Specifications *NOTE: TS 3.3.1 Table 3.3-1 action 2 applies – trip bistables in 6 hr & monitor QPTR per TS 4.2.4.2*

	ANPS	Briefs crew on effects of PRN41 failure

Op-Test No.: _____ **Scenario No.:** __2__ **Event No.:** __2__ **Page** __1__ **of** __1__

Event Description:
When 3-ONOP-059.8 actions complete, 3A S/G pressure transmitter PT-3-475 fails low. 3A S/G FCV-3-478 requires manual operation to regain control of level and is returned to automatic level control when stable and on program. Operators respond using 3-ONOP-049.1. PT-3-475 & FT-3-474 are removed from service.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports PT-3-475 / FT-3-474 failed low. Takes manual control of 3A steam generator FRV and restores level to program consistent with 3-ARP-097.CR (ann. C-4/1)
	ANPS	Directs response per 3-ONOP-049.1
	BOP	Selects channel IV steam flow inputs for 3A steam generator level control
	BOP	Returns 3A steam generator FRV → AUTO when steam & feed matched and level on program. *NOTE: If BOP trips bistables in event 1, then at lead evaluator discretion scenario may continue to next event if desired.*
	ANPS	Refers to Technical Specifications. *NOTE: TS 3.3.1 Table 3.3-1 action 6 & TS 3.3.2 Table 3.3-2 action 15 both apply and require tripping bistables in 6 hrs.*
	ANPS	Briefs crew on effects of PT-3-475 & FT-3-474 failures. Conducts pre-brief on tripping bistables per 3-ONOP-049.1 Attachment 4 for F-3-474 & P-3-475.
	BOP	Enters protection racks 16 & 17 and places bistable test switches → TEST for the following bistables: • BS-3-474 • BS-3-475 • BS-3-478B1 & B2 • BS-3-478C
	ANPS	Ensures WCC / I&C notified of failure & PWO initiated

Op-Test No.: _____ **Scenario No.:** __2__ **Event No.:** __3__ **Page** __1__ **of** __1__

Event Description:
Once event 2 response complete, 3A EDG prelube oil temp drifts below the alarm setpoint. Operators direct NPO investigation while consulting 3-ARP-097.CR/DG and/or 3-OP-023. After an NPO report of burnt wiring, the 3A EDG is declared out of service and appropriate Tech Spec required actions taken.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports annunciator F-8/2 alarming and ready to start light not lit
	BOP	Reads 3-ARP-097.CR (ann. F-8/2) and directs NPO to investigate
	BOP	Directs NPO respond per 3-ARP-097.DG and relays reports from field to ANPS.
	ANPS	Declares 3A EDG inoperable.
	BOP	Directs NPO take 3A EDG master control selector switch → OFF. *NOTE 1: 3AA20 may also be racked out if ANPS directs.* *NOTE 2: If 3A EDG MCSS not taken to OFF, EDG will start and lockout later in event 8*
	ANPS	Refers to Technical Specifications *NOTE: TS 3.8.1.1 actions b & d apply. Startup transformer check in 1 hr, train B safeguards equipment check in 2 hr & restore EDG in 14 days*
	ANPS	Briefs crew on effects of 3A EDG soak back pump & immersion heater failures
	ANPS	Directs performance of 0-OSP-023.3 Attachment 9 in 1 hr and Attachment 2 in 2hr. *NOTE 1: BOP may perform these Attachments scenario permitting* *NOTE 2: Since the 3A EDG is OOS due to an inoperable support system, 3-OSP-023.1 EDG operability verification is not required on the remaining operable EDGs.*
	ANPS	Ensures WCC / I&C notified and PWO initiated

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

Event Description:
After 3A EDG taken out of service, 3A steam generator tube leakage occurs initially at 3 gpm (> Tech Spec limits). PRMS R-3-15 & R-3-19 increase and alarm. 3-ONOP-071.2 is entered and a fast load reduction initiated. With load reduction and boration in progress, 3A BATP trips. 3B BATP is started consistent with 3-ONOP-046.4 to restore boration flow. Leakage then increases to 30 gpm requiring additional charging flow to maintain RCS inventory. An unusual event is declared.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports R-3-15 alarm
	ANPS	Directs response per 3-ONOP-071.2
	BOP	Determines R-3-15 alarm valid • Checks R-3-15 reading above alarm setpoint • Presses FAIL/TEST pushbutton and checks 288K indicated
	RCO	Maintains PZR level on program. Starts charging pumps and reduces letdown as necessary.
	BOP	Makes page announcement regarding potential SJAE effluent release and need to stand clear of SJAE & blowdown piping
	BOP	When R-3-19 increases, closes FCV-3-6278A/B/C & LCV-3-6265B
	BOP	When R-3-19 alarms, directs Chemistry / NPO verify no sample flow at cold chemistry lab
	ANPS	Directs Shift Engineer determine tube leak rate
	ANPS	Ensures HP notified to perform appropriate surveys and Chemistry notified to determine leak location & rate as well as monitor DAM-1/ SJAE SPING
	ANPS	Refers to Technical Specifications. Determines leak rate exceeds 1 gpm limit. Directs shutdown to mode 3 in 1 hr per 3-ONOP-071.2 *NOTE 1: TS 3.4.6.2.c action b applies – fix leak in 4hr & mode 3 next 6 hr. 3-ONOP-071.2 more limiting than TS in this case.* *NOTE 2: In the event that the ANPS does not reference TS, ask what TS applies in this case as a follow up question.*
	ANPS	Ensures NPS, System & plant personnel notified of load reduction

	ANPS	Conducts crew brief per 3-ONOP-071.2 foldout page items 1 & 2 *NOTE: Determines Emergency Plan classification of Unusual Event per 0-EPIP-20101 Enclosure 1 Category 2 applies*

Op-Test No.: _____ **Scenario No.:** __2__ **Event No.:** __4__ **Page** __2__ **of** __2__

Event Description:
After 3A EDG taken out of service, 3A steam generator tube leakage occurs initially at 3 gpm (> Tech Spec limits). PRMS R-3-15 & R-3-19 increase and alarm. 3-ONOP-071.2 is entered and a fast load reduction initiated. With load reduction and boration in progress, 3A BATP trips. 3B BATP is started consistent with 3-ONOP-046.4 to restore boration flow. Leakage then increases to 30 gpm requiring additional charging flow to maintain RCS inventory. An unusual event is declared.

Time	Position	Applicant's Actions or Behavior
	RCO	Initiates boration • Reactor makeup selector switch → BORATE • Reactor makeup control switch → START • Sets FCV-3-113A controller at 8.0 • Sets BA totalizer as directed *NOTE: Boric acid requirement 85 gal / 10% for load reduction from 100% to 25% would be approximately 640 gallons.*
	BOP	Reduces turbine load at directed rate. Maintains Tavg less than 5°F above Tref.
	RCO	Reports loss of boration flow and 3A boric acid pump tripped.
	RCO	Restores boric acid flow consistent with 3-ONOP-046.4 by starting 3B boric acid pump and stopping 3A boric acid pump.
	ANPS	Ensures WCC / Electrical notified of 3A boric acid pump failure
	ANPS	Directs NPS evaluate 0-ONOP-046.3 and Technical Specifications *NOTE: No TS apply for the boric acid pump failure*
	RCO	Starts 2nd charging pump *NOTE: May elect not to align 2nd letdown orifice depending on leak size when step is read. If 2nd orifice aligned, then SNPO should be directed to increase NRHX CCW flow accordingly.*
	RCO	Energizes all PZR heaters

	RCO	Transfers unit loads to startup transformer when directed.
	RCO	When leaking steam generator identified • Directs NPO open breaker 4D01-28 (MOV-3-1403) • Closes CV-3-6275A
	RCO	Directs NPO align aux steam from unit 4, open SLWU-3-001 and close 3-10-007.

Op-Test No.: _____ **Scenario No.:** __2__ **Event No.:** __5__ **Page** __1__ **of** __1__

Event Description:
This event optional if lead evaluator determines that BOP needs a 2nd instrument failure. If not required, proceed directly to event 6.
After > 10% load reduction when directed by the lead evaluator CV-3-1607 (3B S/G ADV) fails open in automatic due to failure high of PT-3-1607. The operator recognizes the failure and closes the valve in manual.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports steam noise. *NOTE: NPO may be directed to investigate source of steam noise if crew doesn't see 3B ADV malfunction first.*
	BOP	Recognizes & reports 3B ADV control output and measured variable both failed high.
	ANPS	Determines PT-3-1607 failed high and 3B ADV full open as a result.
	BOP	Takes 3B ADV control to MANUAL and closes valve.
	ANPS	Briefs crew on effects of PT-3-1607 failure (no 3B ADV automatic operation).
	ANPS	Ensures WCC / I&C notified of failure.

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

Event Description:
Once CV-3-1607 manually closed, 3B SGFP trips on a spurious low lube oil pressure signal (pressure switch failure). The automatic runback fails to occur and the operators must manually runback the turbine per 3-ONOP-089.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports 3B SGFP trip on low lube oil pressure (annunciator D-6/5).
	BOP	Recognizes need for automatic turbine runback and failure for it to occur.
	BOP	Manually runs back turbine to 45% load.
	BOP	Monitors steam generator levels and steam dumps. Recommend reactor trip if ODI trip criteria reached.
	RCO	Monitors PZR level / pressure, automatic rod insertion & Tavg/Tref response.
	ANPS	Directs response per 3-ONOP-089 including manual turbine runback to 45% load using 1st stage impulse pressure.
	ANPS	Directs reactor trip if ODI trip criteria reached.
	ANPS	Ensures NPS, System & DCS notified
	ANPS	Ensures chemistry notified to do 15% power change RCS samples.
	BOP	Directs NPO investigate 3B SGFP low oil pressure (consistent with 3-ARP-097.CR for ann. D-6/5)
	ANPS	Ensures WCC / Mechanical maintenance notified of failure.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 7 **Page** 1 **of** 1

Event Description:
After plant stabilization and MOV-3-1403 deenergization / closure, 3A steam generator tube leakage continues to increase > charging pump capacity. Actions are taken to manually trip the reactor and turbine. 3-EOP-E-0 is entered.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports PZR level decreasing (steam generator tube leak rate increasing)
	RCO	Establishes maximum charging flow and isolates letdown
	RCO	Reports PZR level still decreasing
	ALL	**CRITICAL TASK: Manually trip the reactor when steam generator tube leak exceeds charging pump capacity and before automatic trip (applied at lead evaluator's discretion)**
	ANPS	Determines steam generator tube leak rate is greater than charging pump capacity and directs reactor trip
	RCO	Manually trips reactor, initiates safety injection and initiates phase A containment isolation

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 8 **Page** 1 **of** 2

Event Description:
A safety injection occurs. 3-EOP-E-0 prompt actions are verified. 3B RHRP fails to auto start. When the RCO attempts to manually start the pump, a unit 3 startup transformer ground occurs causing a loss of offsite power to the associated unit. 3B EDG automatically starts and loads equipment on 3B & 3D 4kV buses. Since 3A EDG is OOS, 3A 4kV bus restoration is delegated to the BOP while the rest of the crew continues with 3-EOP-E-0.

Time	Position	Applicant's Actions or Behavior
	BOP	Closes MSR steam stop MOVs
	ANPS	Directs response per 3-EOP-E-0
	RCO	Trips RCPs if < 25°F RCS subcooling
	BOP	Isolates feedwater flow to 3A steam generator if level > 6%
	BOP	Places SGFP switches → STOP & feedwater isolation MOVs → CLOSE
	RCO	Reports 3B RHR pump auto start failure. Attempts to manually start 3B RHR pump.
	BOP	Recognizes & reports the following: • Loss of offsite power due to startup transformer lockout • 3B &3D 4kV busses powered from 3B EDG with 3B sequncer loading train B safeguards loads • 3A 4kV bus deenergized due to 3A EDG OOS
	ANPS	Returns to step 3 of 3-EOP-E-0 to address loss of offsite power
	ANPS	Directs BOP to repower 3A 4kV bus using 3-ONOP-004.2 **(event 9)** *NOTE: ANPS may delay 3A 4kVbus restoration. This bus will be needed to repower train A safeguards loads (3A CCW pump in particular). Subsequent steps assume RCO performing BOP duties while BOP performs 3-ONOP-004.2.*
	RCO	Directs NPO/NWE check out unit 3 startup transformer
	RCO	Directs NPO locally close MOV-3-1408 & 1409 (if deenergized before fully closed)

	RCO	Directs SNPO locally close MOV-3-1426 & 1427 (if deenergized before fully closed)
	RCO	Directs NPO locally check breaker 3AB15 and SNPO locally check 3B RHR pump.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 8 **Page** 2 **of** 2

Event Description:
A safety injection occurs. 3-EOP-E-0 prompt actions are verified. 3B RHRP fails to auto start. When the RCO attempts to manually start the pump, a unit 3 startup transformer ground occurs causing a loss of offsite power to the associated unit. 3B EDG automatically starts and loads equipment on 3B & 3D 4kV buses. Since 3A EDG is OOS, 3A 4kV bus restoration is delegated to the BOP while the rest of the crew continues with 3-EOP-E-0.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports only one CCW pump running
	RCO	Manually starts 3B ECC
	RCO	Resets safety injection
	RCO	Stops one unit 4 HHSI pump. Directs unit 4 RCO align unit 4 HHSI pump suction to unit 3 RWST per 3-EOP-E-0 Attachment 1
	RCO	Directs SNPO place PAHMS in service per 3-OP-094
	RCO	Controls AFW > 345 gpm to increase steam generator levels > 6% and then controls AFW as needed to maintain levels 6-50%
	RCO	If annunciator A-1/3 alarming, starts one charging pump at minimum speed and adjusts HCV-3-121 for proper seal injection flow.
	ANPS	Transitions to 3-EOP-E-3
		NOTE: Emergency Plan classification before the loss of offsite power was an Alert due to tube rupture > charging pump capacity per 0-EPIP-20101 Enclosure 1 Category 2 item B. Following the loss of offsite power the classification level upgraded to a Site Area Emergency again per 0-EPIP-20101 Enclosure 1 Category 2.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 9 **Page** 1 **of** 1

Event Description:
In event 8 when the 3B RHR pump manual start is attempted, the unit 3 starup transformer locks out. Since 3A EDG is out of service, 3A 4kV bus is deenergized and remains that way unit the bus is repowered via tie line from the unit 4 start up transformer using 3-ONOP-004.2. This allows start of a 2nd CCWP (3A).

Time	Position	Applicant's Actions or Behavior
	BOP	Implements 3-ONOP-004.2
	BOP	Verifies 3A 4kV bus stripping per 3-ONOP-004.2 Attachment 1.
	BOP	Determines 3A EDG OOS and unit 3 startup transformer locked out.
	BOP	Determines unit 4 startup transformer available (asks unit 4 RCO if unit 4 startup transformer lockout reset
	BOP	Directs NPO/NWE locally unlock and rack in breaker 3AA22.
	BOP	Closes 3AA22 and reports 3A 4kV bus energized.
	BOP	Resets safety injection if not currently reset.
	BOP	Directs NPO/NWE locally verify no breaker targets on 3A 4kV bus breaker.
	BOP	Closes breakers 3AA08 & 3AA14 to reenergize 3A & 3C 480V load centers
	RCO	Starts 3A CCW pump (and 3A RHR pump if not yet directed in EOPs to secure them).
	RCO	Starts 3A HHSI pump and secures the running unit 4 HHSI pump. Directs unit 4 RCO realign unit 4 HHSI pump suction back to unit 4 RWST.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 10 **Page** 1 **of** 2

Event Description:
3A steam generator has experienced a tube rupture. The crew transitions from 3-EOP-E-0 to 3-EOP-E-3. The ruptured steam generator is then verified isolated, the associated ADV adjusted to 1060 psig, and the RCS cooled down and tube leak flow stopped per 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs response per 3-EOP-E-3. *NOTE: Many actions in 3-EOP-E-3 are assumed to have been done earlier in 3-ONOP-071.2 (event 4) or 3-EOP-E-0 (event 8)*
	ANPS/BOP	**CRITICAL TASK: Isolate feedwater flow into and steam flow out of a ruptured steam generator prior to transitioning to 3/4-EOP-ECA-3.1** *NOTE: BOP steps may be performed by RCO if BOP is in the process of repowering 3A 4kV bus.*
	BOP	Adjusts 3A ADV automatic setpoint to 1060 psig.
	BOP	Closes 3A MSIV
	BOP	Maintains intact steam generator levels 6-50%
	RCO	Resets safety injection if not currently reset.
	BOP	Resets phase A containment isolation.
	RCO	Stops 3A RHR pump if running.
	ALL	**CRITICAL TASK: Perform 3/4-EOP-E-3 cooldown and maintain temperature to meet following criteria: temperature is not too high to maintain required subcooling nor causes a severe challenge to subcriticality CSF**
	ANPS	Determines required CET temperature for RCS cooldown.
	BOP	Dumps steam from 3B & 3C ADVs at maximum available rate.
	RCO	Starts one charging pump if none yet running.
	RCO	Takes reactor makeup control selector switch → STOP

	RCO	Starts other available charging pump and establishes maximum charging flow. Adjusts HCV-3-121 for proper seal injection.
	BOP	Closes ADVs when required CET temperature reached.

Op-Test No.: _____ **Scenario No.:** __2__ **Event No.:** __10__ **Page** __2__ **of** __2__

Event Description:
3A steam generator has experienced a tube rupture. The crew transitions from 3-EOP-E-0 to 3-EOP-E-3. The ruptured steam generator is then verified isolated, the associated ADV adjusted to 1060 psig, and the RCS cooled down and tube leak flow stopped per 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	ANPS/RCO	**CRITICAL TASK: Depressurize RCS to meet SI termination criteria**
	RCO	Opens one PORV until one of the following occurs: • RCS pressure < s/g pressure with PZR level > 12% • PZR level > 71% • CET subcooling < 30°F then closes PORV (steam generator tube leak flow stopped or minimized).

Facility: Turkey Point Scenario No.: 3 Op-Test No.: _____

Examiners: Operators

Initial Conditions: Mode 1, 558°F, 50% RTP (IC-7)

Turnover: The plant is at 50% power in the process of shutting down for refueling per 3-GOP-103 up to step 5.12. A TPCW HX ICW Isolation Valves (POV-3-4882 & 4883) stroke time test per 3-OSP-206.2 section 7.3 should be performed after shift turnover before resuming the load reduction. Equipment OOS --- 3C charging pump (motor replacement), 3A EDG (coolant leak) & 4A HHSI pump (motor ground). Maintenance is in progress on OOS equipment.

Event No.	Malf. No.	Event Type*	Event Description
1		N/BOP N/SRO	TPCW HX ICW Isolation Valves POV-3-4882 & 4883 stroke time test
2		I/BOP I/SRO	LT-3-498 fails high requiring manual control of FCV-3-498.
3		C/BOP C/SRO	3C inverter output breaker CB6 trips. 120VAC vital panel 3P06 is lost but restored using the CS inverter.
4		I/RCO I/SRO C/RCO C/SRO	3A charging pump controller fails low upon reenergization. 3B charging pump discharge relief valve fails open. Loss of all charging flow.
5		R/ALL	Fast load reduction due to loss of all charging. Turbine & reactor tripped and RCS depressurized to allow HHSI flow.
6		M/ALL	PZR spray line break causing a PZR steam space LOCA.
7		C/BOP C/SRO	Manual safety injection. 3D 4kV bus feeder bkr 3AD06 trips open. 3D 4kV bus is realigned to 3A 4kV bus.
8		C/RCO C/SRO	Safety injection response. Instrument air bleed line isolation failure (release path) due to CIV11 relay actuation failure and CV-3-2826 failure to close. 3A ICWP auto start failure.
9			PZR steam space LOCA response.

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

Scenario # 3

Initial Conditions: Mode 1, 558°F, 50% RTP (IC-7)

Turnover: The plant is at 50% power in the process of shutting down for refueling per 3-GOP-103 up to step 5.12. A TPCW HX ICW Isolation Valves POV-3-4882 & 4883 stroke time test per 3-OSP-206.2 section 7.3 should be performed after shift turnover before resuming the load reduction. Equipment OOS -- - 3A EDG (coolant leak) & 4A HHSI pump (motor ground). Maintenance is in progress on OOS equipment.

Synopsis: Following shift turnover, a TPCW HX ICW Isolation Valve POV-3-4882 & 4883 stroke time test is performed per 3-OSP-206.2 section 7.3. Once that surveillance is complete, LT-3-498 fails high. Operators respond per 3-ARP-097.CR (ann. C-6/3) and may use 3-ONOP-049.1 for guidance. Failure of this controlling steam generator level channel for 3C steam generator level control means FCV-3-498 must be manually controlled. LT-3-496 is selected for 3C steam generator level control, level returned to program. After FCV-3-498 control returned to automatic, the 3C inverter output breaker CB6 trips deenergizing 120VAC vital power panel 3P06. The crew responds per 3-ONOP-003.6. The CS inverter is placed in service and 3P06 reenergized using 3-ONOP-003.6. When 3P06 breaker 8 is reclosed, the 3A charging pump controller fails to zero taking it out of service. Once normal letdown is restored, excessive 3B charging pump discharge relief valve leak by prevents the pump from producing any charging or seal injection flow. With a loss of all charging, the crew enters 3-ONOP-047.1 and commences a fast load reduction. The turbine and reactor are tripped and when PZR spray is initiated to depressurize the RCS a spray line leak develops. This results in a PZR steam space loss of coolant accident and a safety injection is required. The crew enters the EOP network using 3-EOP-E-0 followed by 3-EOP-E-1. On the safety injection, breaker 3AD06 trips deenergizing the 3D 4kV bus. The bus must be manually realigned per 3-EOP-E-0 step 3 for supply from 3A 4kV bus to allow use of the 3C CCW & 3C ICW pumps. The 3A ICWP automatic start failure requires that 3A or 3C ICWP must be manually started. Additionally, the instrument air bleed line fails to isolate due to train A containment isolation relay CIV11 failure to actuate and CV-3-2826 sticking open due to salt accumulation. Operator action is required to manually close CV-3-2819 from VPB isolating this radioactive release path to the environment. Transition is made from 3-EOP-E-0 to 3-EOP-E-1and then to 3-EOP-ES-1.2 for post-LOCA cooldown and depressurization. The exercise is concluded upon transition to 3-EOP-ES-1.2 or earlier at the discretion of the lead evaluator.

Critical Tasks:

Event 8:

1. Tripping RCPs on a small break LOCA (ATWS excluded) within 5 minutes of reaching RCP trip criteria (E-1 task C).
2. Manually close instrument air bleed lines during a LOCA prior to transition out of 3-EOP-E-0 (E-0 task R).

Scenario XX NRC 3
Simulator Operating Instructions

Setup
IC-7 (50% EOL)

Load scenario 70. Delete the following conditional triggers: TVELQ34Y = 10.0, "PORV455C" & "PORV456". Also delete other direct triggers using the copy of scenario 43 computer printout attached as guidance.

Place simulator in run. Start 3B charging pump and stop 3C charging pump.

Touch CDB OPTIONS on the scenario initiation page to actuate the following:

	3C Charging Pump OOS (TAB1POSN = 3) 3A EDG OOS (TAQ5LRSA = 0 & TAQ5A20P = 3) 4A HHSIP OOS (TAM2D4AS = 3) CV-3-2826 fails open (TFCVOSV6 = T) CIV 11 relay failure (TFL3V11 = T)
3A ICWP auto start failure:	Touch SYS MAT → STANDBY POWER & SYNC → BUS STRIPPING & SEQ → 34/3A7 FALSE → FAIL TO ACTUATE → set TFQ6A7AF = T
3D 4kV bus loss on SI:	Touch ELECTRICAL GENERATION → 3D 4KV BUS → bkr 06 → FAIL OPEN → set conditional TFE2D22T = T / M2:S4BIR (fails open breaker 3AD06 supply to 3D 4kV bus from 3B 4kV bus when 4B HHSIP red running light lit).
MOV-3-626 fails open:	Touch SYS MAT → COMMON SERVICES → COMPONENT COOLING → CCW TO RCP & XS LTDWN HX'S NCC'S AND CRDM CLRS → FCV-626 → FAIL AS IS → set TFKV626A = T

Acknowledge any alarms and place simulator in freeze.

Attach ECO information tags on control switches for 3C Charging Pump, 3A EDG & 4A HHSI Pump.

Provide turnover sheets, copy of 3-GOP-103 completed up to step 5.12, stopwatch & copy of 3-OSP-206.2 sect 7.3 (test acceptance criteria entered) for an 18 month refueling IST with remote position indication verification required.

Event 1 - Perform TPCW HX ICW isolation valve stroke time test
Initiated by shift turnover. Operators perform 3-OSP-206.2 section 7.3 stroke time test for an 18 month refueling IST involving valves POV-3-4882 & 4883 with remote position indication verification required.
Call as NWE. Notify RCO of intent to exercise POV-3-4882 & 4883.
Respond if called as NPS. Grant permission to perform this test.
Request as NWE that RCO close POV-3-4882 and record closing stroke time.
Request as NWE that RCO open POV-3-4882.

Request as NWE that RCO close POV-3-4883 and record closing stroke time.
Request as NWE that RCO open POV-3-4883.
Call as NWE. Report test complete.
Respond if called as NPS to notification of test completion & results (sat).

Event 2 - LT-3-498 fails high

After completion of the TPCW HX CCW isolation valve stroke test, touch STEAM PRESSURE → STEAM GEN ♦ (left side) → L-495 → TRANSMITTER LT498 → TRANSMITTER FAIL HIGH → set TFF1MACH = T. The crew will respond per 3-ARP-097.CR (ann. C-6/3).
Respond as WCC/I&C if called.
Respond as NPO if directed to reset AMSAC (may be in due to 3C s/g level error before feed flow returned to normal). Touch REACTOR POWER → EAGLE 21 / AMSAC → AMSAC ♦ → SYSTEM RESET → set TCL4RST = T. Report when complete.

Event 3 - Loss of 3P06

After FCV-3-498 returned to automatic control, actuate parameter controller direct trigger TCE6DH6C = F (opens 3C inverter output breaker CB6). Crew should respond per 3-ONOP-003.6
Respond as NWE/NPO to investigate loss of 3P06. Report that the 3C inverter output breaker CB6 has tripped open and you smell what may be overheated wiring insulation. If asked, state that CS inverter is available to repower 3P06.
When directed as NWE/NPO to perform 3-ONOP-003.6 Attachment 1, actuate parameter controller direct trigger TCE6214S = T and parameter controller composite "DEEN3P21" (strips 3P06 and 3P21). Report 4P06 on 4C inverter with CS inverter in standby. **When directed as NWE/NPO, repower 3P06 from CS inverter** by closing in 3P06 main breaker by actuating parameter controller trigger composite "3P06-HOT"). Also closes 3P06 breakers 4 & 8 triggering conditionals failing the 3A charging pump controller to zero. These conditionals are in the "3P06-HOT" parameter controller composite. *See event 4 for guidance regarding the charging pump malfunction*. Unless otherwise directed, continue closing in breakers on 3P06 & 3P21 by actuating parameter controller trigger composites "REENP06", "REENP062" & "REEN3P21".
Upon isolation of letdown due to loss of 3P06, crew should align excess letdown.
If asked, respond as SNPO to verify excess letdown HX CCW flow (FI-3-624) < 238 gpm. Touch SYS MAT → COMMON SERVICES → COMPONENT COOLING → CCW TO RCP & XS LTDWN HX'S, NCC'S AND CRDM CLRS → report CCW flow as indicated next to XLHX. To adjust CCW flow, touch 737A → VALVE PORT AREA → set TAKA737A = desired value (0.7 = 150 gpm; 0.8 = 175 gpm).
If directed as NWE/NPO/3rd RCO, remove rack 20 fuses for PC-444C & D, actuate parameter controller direct triggers TFHV55AC = T & TFHV55BC = T (fails PZR spray valves closed on loss of power).
If directed as NWE/NPO/3rd RCO, hold in rack 46 relay LC-460CX by actuating parameter controller direct trigger TCH2460C = T for restoration of letdown and PZR heater manual control.

If called as I&C/Electrical to investigate, reply that crews have been dispatched. Provide feedback after 10-15 minutes that 3C inverter is definitely out of service and request it be placed under clearance for repair.
If directed as NWE/NPO/3rd RCO, reinstall rack 20 fuses for PC-444C&D by actuating parameter controller direct triggers TFHV55AC = F & TFHV55BC = F to restore PZR spray valve control.
When directed as NWE/NPO/3rd RCO, release rack 46 relay LC-460CX by actuating parameter controller direct trigger TCH2460C = F.

Event 4 – Loss of all charging

When normal letdown is restored in event 4, actuate parameter controller direct trigger TVBVLK45 = 1.0 (fails 3B charging pump discharge relief open, recirculating all discharge flow back to the pump suction). With 3C charging pump OOS and 3A charging pump controller failed to zero, a loss of all charging results. The crew responds per 3-ONOP-047.1.
When directed as SNPO to check out the 3B charging pump, reply back after approximately 2 minutes that you can hear flow through the associated discharge relief (RV-3-283B) line.
NOTE: 3P06 loss in event 3 normally closes MOV-3-626. With a loss of all charging, MOV-3-626 would then need to be reopened to prevent damage to RCPs due to sustained loss of seal injection flow. To allow timely initiation of event 5 without causing unintended RCP seal damage, MOV-3-626 is failed open at setup.
If directed as SNPO to check out MOV-3-626, report nothing obviously wrong. If asked to locally operate the valve, report that the valve is mechanically stuck open.

Event 5 – Fast load reduction

Fast load reduction begins per 3-ONOP-047.1 in response to loss of all charging flow.
Respond as NPS to evaluate event per 0-EPIP-20101.
Respond as WCC if called to have Mechanical check out RV-3-283B and/or I&C check out 3A Charging Pump controller problems. Fix nothing before the end of the scenario.
Respond as System when called about sudden load change.
Respond as Chemistry if called to do RCS sampling due to the > 15% power change.

Event 6 – Pressurizer spray line failure

When PZR spray valves are opened for RCS depressurization, actuate parameter controller direct trigger TVHPSPBR = 0.30/30 (inserts PZR spray line break).
When manual SI is inititated, breaker 3AD06 will fail open deenergizing 3D 4kv bus (conditional malfunction entered at setup). The bus is repowered by manual realignment to 3A 4kV bus supply per 3-EOP-E-0 step 3 RNO during event 7.

Event 7 – Reactor trip verification & loss of 3D 4kV bus

The turbine & reactor were tripped earlier per 3-ONOP-047.1. **Degrading containment conditions require manual SI and entry into 3-EOP-E-0** (steps 1-4 in this event). The crew should realign 3D 4kV bus to 3A 4kV bus supply.

Respond as NPO/NWE if directed to check out breaker 3AD06. After 2-4 min., report breaker tripped open, but no obvious cause. Request Electrical maint. support.

Event 8 – Safety injection with containment penetration isolation failure

Continuation of 3-EOP-E-0 with safety injection (step 5 thru transition to 3-EOP-E-1)
When directed as SNPO to investigate why instrument air bleed isolation valve CV-3-2826 failed to close, reply after 5-10 minutes that the valve stem appears to be covered with salt deposits and corrosion. Request Mechanical maintenance assistance.
Respond as Chemistry if directed to perform an offsite dose calculation in response to the release path that existed through the instrument air bleed line to the plant vent stack. State that a Chemistry tech has been dispatched to the TSC for this purpose.
Respond as I&C if called to check out relay CIV 11. After 10-15 minutes, report that the relay shows signs of damage due to overheating and should be replaced.
Respond as NPO if called to check out 3A or 3C ICWP (3C tripped due to loss of 3D 4kV bus & 3A ICWP did not auto start) or associated breakers. Report pump & breakers appear normal. One pump will need to be restarted to get the two required by 3-EOP-E-0.
Respond as WCC/Electrical/I&C if asked to check out why 3A ICWP did not auto start. After 10-15 min, suggest a sequencer relay failure as the likely cause with additional troubleshooting in progress.
Respond as SNPO when directed to place PAHMS in service. Actuate parameter controller composite "PAHM". After 10-15 minutes, report complete.

Event 9 - PZR steam space LOCA response

Continuation of event 8 upon entry into 3-EOP-E-1.
Respond as Chemistry/HP if queried about secondary radiation (take request & report that you will call when ready for sample; call back in 10 minutes to request that secondary sample valves be opened if not already; report any requested DAM-1 or SPING-4 readings). **Respond as NPO** if directed to place EDGs in standby (10 minutes after EDG stops, notify crew that EDGs are in standby per 3-OP-023).
Respond as NPO/SNPO/NWE when directed to close breakers for cold leg recirculation per step 16 of 3-EOP-E-1, this may be done using the safety injection system mimic page and touching the appropriate valves then mechanically closing the associated breaker. Since the scenario terminates at step 19 (transition to 3-EOP-ES-1.2), closing these breakers may not be necessary prior to freezing the simulator.
Respond as SNPO if directed to close spray pump room & charging pump room shield doors. Report complete 1-3 minutes later.
Respond as HP when directed to survey unit 3 pipe & valve room & electrical penetration rooms.
Respond as Chemistry when directed to align PASS for RCS sampling.

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

Event Description:
Shortly after shift turnover, a TPCW HX ICW Isolation Valves POV-3-4882 & 4883 stroke time test is performed per 3-OSP-206.2 section 7.3.

Time	Position	Applicant's Actions or Behavior
	ANPS	Briefs crew and supervises test perfomance per 3-OSP-206.2 section 7.3.
	BOP	Establishes communication with NWE at TPCW HX.
	BOP	When requested by NWE, closes POV-3-4882 and times closure stroke.
	BOP	Compares VPA position indication with NWE observation of actual valve position.
	BOP	When requested by NWE, re-opens POV-3-4882.
	BOP	When requested by NWE, closes POV-3-4883 and times closure stroke.
	BOP	Compares VPA position indication with NWE observation of actual valve position.
	BOP	When requested by NWE, re-opens POV-3-4883.

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 2 **Page** 1 **of** 1

Event Description:
After completion of the TPCW HX CCW isolation valve stroke test, LT-3-498 fails high requiring manual 3C steam generator level control of FCV-3-498. Operators respond using 3-ARP-097.CR and take LT-3-498 out of service.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports low feedwater flow and decreasing steam generator level.
	BOP	Reports LT-3-498 failed high
	BOP	Responds consistent with 3-ARP-097.CR annunciator C-6/3 by taking 3C steam generator FRV to MANUAL and returning level to program.
	ANPS	Refers to 3-ONOP-049.1 for guidance
	BOP	Selects 3C steam generator level control level input to LI-3-496 (this also transfer level recorder input).
	ANPS	Since LT-3-498 is a control channel, determines no Technical Specifications apply and no bistables need be tripped.
	BOP	Directs NPO to reset AMSAC per 3-ARP-097.CR annunciator D-7/6
	ANPS	Ensures WCC / I&C notified of failure & PWO initiated

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 3 **Page** 1 **of** 2

Event Description:
After LCV-3-498 returned to automatic control, 3C inverter output breaker CB6 trips. 120VAC vital panel 3P06 is lost. Operators respond per 3-ONOP-003.6 and restore 3P06 using the CS inverter.

Time	Position	Applicant's Actions or Behavior
	BOP	Reports loss of channel 1 instrumentation due to loss of 3P06. No reactor trip is required.
	ANPS	Directs response per 3-ONOP-003.6
	BOP	Directs NPO/NWE investigate 3P06 and restore power using 3-ONOP-003.6 Attachment 1.
	RCO	Reduces charging to minimum for seal injection using 3B charging pump in MANUAL. 3A charging pump is secured.
	RCO	Selects PZR level control system inputs to channels 2 & 3.
	RCO	Places excess letdown in service: • Directs SNPO close excess letdown HX CCW valve 3-737A • Directs SNPO slowly open excess letdown HX CCW valve 3-737A • Opens CV-3-387 • Slowly opens HCV-3-137 to initiate excess letdown and control PZR level.
	RCO	If needed directs 3rd RCO to perform 3-ONOP-003.6 Attachment 4 to maintain PZR level & pressure. • When notified LC460CX relay being held in, reenergizes PZR heaters and restores normal letdown by opening LCV-3-460 and then opening the desired CV-3-200 orifice isolation valve • If necessary to isolate normal spray flow (and the accompanying PZR pressure decrease), directs removal of rack 20 fuses for PC-444C & D. This fails normal spray valves PCV-3-455A & B closed.
	BOP	Manually controls 3A steam generator level using FRV and 3C steam generator level using blowdown and turbine load *NOTE: If 3A steam generator feedwater flow manually decreased by > 0.665 × 10^6 lbm/hr below steam flow, a reactor trip will occur*

		on steam / feed flow mismatch with low steam generator level due to loss of 3P06.

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

Event Description:
After LCV-3-498 returned to automatic control, 3C inverter output breaker CB6 trips. 120VAC vital panel 3P06 is lost. Operators respond per 3-ONOP-003.6 and restore 3P06 using the CS inverter.

Time	Position	Applicant's Actions or Behavior
	BOP	Maintains steam generator levels stable
	RCO	Maintaing Tavg, power, PZR pressure & PZR level stable
	ANPS	Reviews important Control Room controls & indications lost with 3P06 out of service in 3-ONOP-003.6 Enclosure 1 with crew members
	ANPS	Refers to Technical Specifications *NOTE: TS 3.0.3 applies due to 3B sequencer out of service.*
	RCO/BOP	When 3P06 restored, restores controls to automatic: • Directs release of LC460CX if being manually held in • Directs reinstallation of PC-444C & D fuses • Manually controls 3A & 3C steam generator levels to program, matches steam / feed flows and places FRVs in automatic • Return 3-ONOP-003.6 Attachment 1 controls to automatic as needed *NOTE 1: When repowered, controls go to automatic first then swap to manual. RCO/BOP should not attempt control until after affected controllers swap to manual.* *NOTE 2: MOV-3-626 is failed open to prevent inadvertent RCP seal damage on loss of all charging (and seal injection) in next event. This valve would otherwise automatically close on loss of 3P06. Evaluation scenario pace might preclude recognition of MOV-3-626 closure if it occurred.*

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 4 **Page** 1 **of** 1

Event Description:
3A charging pump trips when its controller fails low upon reenergization from 3P06 breaker 8. This trips the 3A charging pump. After 3P06 is reenergized, 3B charging pump discharge relief valve fails open. With 3C charging pump out of service, this results in a loss of all charging flow.

Time	Position	Applicant's Actions or Behavior
	RCO	Reports 3B charging pump not producing flow. Reports loss of all charging.
	RCO	Reports 3A charging pump controller failed low. If an attempt to start the pump is made, reports that it will not start.
	RCO	Isolates letdown (and/or excess letdown if in service) and closes MOV-3-6386 due to loss of charging
	ANPS	Directs response per 3-ONOP-047.1
		NOTE 1: Technical Specification 3.0.3 now applies since no charging pumps are available. *NOTE 2: Emergency Plan classification per 0-EPIP-20101 Enclosure 1 Category 1 doesn't apply unless RCS leak > 50 gpm*
	ANPS	Directs WCC / I&C / Mechanical maintenance troubleshoot & restore any charging pump

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

Event Description:
Operators respond to loss of all charging per 3-ONOP-047.1. A fast load reduction is performed, the turbine & reactor tripped and RCS depressurized to allow HHSI flow.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs fast load reduction per 3-ONOP-047.1 *NOTE: Although not directed by procedure, ANPS may elect to do a short crew brief to discuss how to conduct the fast load reduction based on a practice required in 3-ONOP-100 & 3-ONOP-071.2.*
	BOP	Notifies NPS & System of load reduction
	RCO	Reduces power by manual control rod insertion
	BOP	Reduces turbine load to maintain Tavg approx. 3°F above Tref.
	BOP	Stops 3A heater drain pump at < 300 MWe.
	BOP	Stops one condensate pump at < 275 MWe.
	RCO	Leaves rod control in MANUAL < 190 MWe.
	BOP	Opens turbine drain valves at < 150 MWe
	BOP	Transfers FRVs from AUTO to MANUAL as needed for steam generator level control. Transfers steam generator level control to FRBVs when FRVs no longer control steam generator level.
	BOP	Closes MSR main steam stop MOVs at < 110 MWe
	BOP	Transfers unit loads to startup transformer at 50-100 MWe.
	BOP	When < P-7 (<10% power), manually trips turbine
	RCO	When power < 5% and Tavg, PZR level & s/g levels stable, records control bank D rod position and manually trips reactor.
	RCO	Begins depressurization of RCS to 1950 psig by manually opening normal spray valves PCV-3-455A & PCV-3-455B.

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 6 **Page** 1 **of** 1

Event Description:
Initiation of spray flow breaks the spray line causing a PZR steam space LOCA requiring a safety injection per 3-ONOP-047.1

Time	Position	Applicant's Actions or Behavior
	RCO	Reports degrading containment conditions as indicated by increasing containment pressure, sump level & radiation (R-3-11 & R-3-12)
	ANPS	In response to degrading containment conditions, directs manual safety injection per 3-ONOP-047.1 and transitions to 3-EOP-E-0
	RCO	Manually initiates safety injection and initiates phase A containment isolation

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

Event Description:
In response to degrading containment conditions, manual SI is required per 3-ONOP-047.1. Operators perform immediate actions of 3-EOP-E-0. 3D 4kV bus feeder bkr 3AD06 trips open on the SI requiring manual realignment to 3A 4kV bus power supply to allow use of 3C ICW & 3C CCW pumps.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs response per 3-EOP-E-0
	BOP	Reports loss of 3D 4kV bus (breaker 3AD06 opens)
	BOP	Reenergizes 3D 4kV bus from 3A 4k V bus. • Stops 3C ICW pump • Opens breaker 3AB19 • Closes breakers 3AD01 and 3AA17 • Reports 3D 4kV bus reenergized from 3A 4kv bus.

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 8 **Page** 1 **of** 1

Event Description:
A safety injection occurs. Operators continue in 3-EOP-E-0 by verifying prompt actions. The instrument air bleed line fails to isolate due to train A containment isolation relay failure to actuate and CV-3-2826 failure to close. Operator action is required to isolate this direct release path. 3A ICWP fails to auto start. 3A or 3C ICWP must be started manually.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs response per 3-EOP-E-0
	ANPS/RCO	**CRITICAL TASK: Tripping RCPs on a small break LOCA (ATWS excluded) within 5 minutes of reaching RCP trip criteria**
	RCO	Trips RCPs if < 25[65]°F RCS subcooling
	BOP	Places SGFP switches → STOP & feedwater isolation MOVs → CLOSE
	ANPS/RCO	**CRITICAL TASK: Manually close instrument air bleed lines during a LOCA prior to transition out of 3-EOP-E-0**
	RCO	Reports CV-3-2819 & CV-3-2826 both open. Manually closes CV-3-2819. Attempts to manually close CV-3-2826 and reports valve is failed open. *NOTE: Since CV-3-2819 is closed, the IA bleed line containment penetration is isolated.*
	BOP	Manually starts a 2nd ICW pump (3A or 3C)
	RCO	Resets safety injection
	RCO	Stops 4B HHSI pump.
	BOP	Directs SNPO place PAHMS in service per 3-OP-094
	BOP	Controls AFW > 345 gpm to increase steam generator levels > 6[32]%, then controls AFW as needed to maintain levels 6[32]-50%
	BOP	If RCPs running, resets phase A containment isolation
	RCO	If RCPs running, opens MOV-3-1417 & 1418 and then resets & starts NCCs.

	ANPS	Conducts crew brief & transitions to 3-EOP-E-1. *NOTE: Emergency Plan classification is Site Area Emergency per 0-EPIP-20101 Enclosure 1 Category 1*

Op-Test No.: _____ **Scenario No.:** 3 **Event No.:** 9 **Page** 1 **of** 1

Event Description:
A small break LOCA has occurred. Transition is made from 3-EOP-E-0 to 3-EOP-E-1 and appropriate actions carried out. Transition is subsequently made to 3-EOP-ES-1.2.

Time	Position	Applicant's Actions or Behavior
	ANPS	Directs response per 3-EOP-E-1.
	BOP	Maintains steam generator levels 6[32]-50%
	BOP	Directs the following: • Chemistry sample steam generators for activity & monitor DAM-1 • HP take radiation readings on main steam lines
	RCO	Resets safety injection if not currently reset.
	BOP	Resets phase A containment isolation if not already reset.
	RCO	Starts one charging pump if none yet running.
	RCO	Takes reactor makeup control selector switch → STOP
	RCO	Starts other available charging pump and establishes maximum charging flow. Adjusts HCV-3-121 for proper seal injection.
	RCO	Stops RHR pumps and places them in standby.
	ANPS	Determines steam generator pressure stable / increasing and RCS pressure stable / decreasing
	BOP	Stops 3B EDG (running loaded)
	BOP	Directs SNPO / NPO locally unlock breakers for cold leg recirculation
	BOP	Directs SNPO verify containment spray pump & charging pump room radiation shield doors closed
	BOP	Directs HP survey pipe & valve room and electrical penetration rooms
	BOP	Completes placing PAHMS in service.
	BOP	Directs Chemistry align PASS for RCS sampling.

	ANPS	Conducts crew brief & transitions to 3-EOP-ES-1.2