Draft Submittal
(Pink Paper)

SIMULATOR SCENARIOS

TURKEY POINT JULY/AUGUST 2005 EXAM

50-250/2005-301 AND 50-251/2005-301

JULY 18 - 22, 2005 & AUGUST 1 - 5, 2005
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2/9/06

2005

Turkey Point

Scenario's

OPERATIONS SHIFT TURNOVER REPORT

UNIT 3	ONCOMING CREW ASSIGNMENTS	UNIT 4
Unit Supervisor:	Shift Manager:	Unit Supervisor:
Reactor Operator:	Watch Engineer	Reactor Operation:
Secondary Operator:	Admin RCO:	Secondary Operator:
	Primary Operator:	

UNIT 3	PLANT STATUS	UNIT 4
Mode 1		Mode 1
Power (%) 100		Power (%) 100
MWe 758		MWe 759
Gross Leakrate: 0.05		Gross Leakrate: 0.08
Boron (ppm): 475		Boron (ppm): 600

Hot Items List and Short Term Equipment Concerns:

3A EDG - Voltage regulator OOS
A AFW pump - Burned wiring in local control panel
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

U3 Current \ Anticipated LCO Actions:

3A EDG - Next 0-OSP-023.3 in 4 hr. 2 days into 14 day action statement (3.8.1.1 action b)
A AFW pump - 4 hr into 30 day action statement (3.7.1.2 action 3). C AFW pump aligned to train 1 & tested in that configuration.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

U4 Current \ Anticipated LCO Actions:

CURRENT: See 3A EDG & A AFW pump above.

ANTICIPATED: See 3A EDG & A AFW pump above

Results of Offgoing Focus Area

See G:\Ops\Common\0900

UNIT 3 IN THE FIELD

PRIMARY OPERATOR:

Equipment Status Problems:

3C RCP lower motor guide bearing temp detector failed high.

Evolutions or Compensatory Actions In Progress:

None applicable

General Info/Remarks:

Maintain 100% power
Thunderstorms in the area.

SECONDARY OPERATOR:

Equipment Status Problems:

3A EDG - Voltage regulator OOS
A AFW pump - Burned wiring in local control panel
3C s/g - 8 gpd tube leak. Leak constant for past week.

Evolutions or Compensatory Actions In Progress:

3A EDG - Next 0-OSP-023.3 in 4 hr. 2 days into 14 day action statement (3.8.1.1 action b)
A AFW pump - 4 hr into 30 day action statement (3.7.1.2 action 3). C AFW pump aligned to train 1 & tested in that configuration.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Info/Remarks:

Maintain 100% power
Thunderstorms in the area

UNIT 3 CONTROL ROOM

Abnormal Annunciators:

F-8/2 EDG A TROUBLE & F-8/5 EDG A MASTER CONTROL SW OFF-NORMAL both due to 3A EDG OOS

Equipment Status/Problems:

3A EDG - Voltage regulator OOS
A AFW pump - Burned wiring in local control panel
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

Changes to Risk Significant Equipment:

OLRM already run run for OOS equipment.

Upcoming Reactivity Management Activities

Dilute to maintain 100% power.

Upcoming Major POD Activities:

3A EDG - voltage regulator repair
A AFW pump - repair wiring in local control panel

Upcoming ECOs to Hang and / or Releases:

HANG none

RELEASE none

Evolutions or Compensatory Actions In Progress:

3A EDG - Next 0-OSP-023.3 in 4 hr. 2 days into 14 day action statement (3.8.1.1 action b)
A AFW pump - 4 hr into 30 day action statement (3.7.1.2 action 3). C AFW pump aligned to train 1 & tested in that configuration.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Information, Remarks, and Operator Work Around Status:

Thunderstorms in the area.

Facility: Turkey Point Scenario No.: 1 Op Test No.: 2005-301

Examiners: _____ Candidates: _____ US

_____ _____ RO

_____ _____ PO

Initial Conditions: Mode 1, 100% Power, MOL, Equilibrium Xenon

Turnover: Equipment OOS: 3A EDG due to voltage regulator problems (OOS 2 days; next performance of 0-OSP-023.3 in 4 hrs); A AFW Pump due to burned wiring (OOS 4 hrs; ETR 24 hrs)

C AFW Pump has been aligned to Train 1 and tested in that configuration.

There are thunderstorms in the area.

Known tube leak in 3C S/G (8 gpd) – unchanged for last week. Chemistry samples are being taken per 3-ONOP-071.2, Attachment 1. The current sample, just completed indicates no significant change in leak rate. MOV-3-1405 remains open at management direction due to small size and stability of tube leak rate.

Event No.		Event Type*	Event Description
1	TFN1P4AH=T	(I) RO (TS,I) SRO	PR Channel N44 Upper Detector fails high.
1a		(N) BOP (N) SRO	Remove PR Channel N44 from service
2	TFS1MWEH=T	(I) BOP (TS,I) SRO	Controlling steam flow channel for 3A S/G, FT-3-474, fails high.
3	TVKALKNR= 0.4 TFKV609A = T	(C) RO (C) SRO	NRHX Tube Leak with RCV-3-609 failure to auto close.
3a	TAKA834 = 0.0 TAKA777 = 0.0	(N) RO (N) SRO	Isolate Letdown and align Excess Letdown in response to the NRHX tube leak.
4	TFKXC203=T	(C) BOP (C) SRO	TPCW Control Valve to main generator hydrogen coolers, CV-3-2203, fails closed. Requires removing reactive load. The crew may also take actions to initiate a fast load reduction.
5	TVHHSGC= 0.002	(R) RO (N) BOP (TS,R) SRO	3C S/G tube leak rate increases to 2 gpm. Crew will perform a fast load reduction per 3-ONOP-071.2.
6	TVHHSGC =0.6 TVSBVL15=0.1 TFL3S1=T TFL3S2=T TFQ6A4AF = T TFFXM03=T	(M) ALL (C) RO (C) BOP (C) SRO	3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.
7		(M) ALL	The s/g fault causes an RCS cool down. The crew performs 3-EOP-FRP-P.1 if RCS cold leg temperature < 320°F for orange path and < 290°F for red path.

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

Turkey Point 2005-301 Scenario #1

Event 1 – PR Channel N44 Upper Detector fails high.

Event 1a - Remove PR Channel N44 from service

Event 2 – Controlling steam flow channel for 3A S/G, FT-3-474, fails high.

Event 3 – NRHX Tube Leak with RCV-3-609 failure to auto close.

Event 3a - Isolate Letdown and align Excess Letdown in response to the NRHX tube leak

Event 4 – TPCW Control Valve to main generator hydrogen coolers, CV-3-2203, fails closed. Requires removing reactive load. The crew may also take actions to initiate a fast load reduction.

Event 5 – 3C S/G tube leak rate increases to 2 gpm. Crew will perform a fast load reduction per 3-ONOP-071.2.

Event 6 – 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Event 7 – The s/g fault causes an RCS cool down. The crew performs 3-EOP-FRP-P.1 if RCS cold leg temperature < 320°F for orange path and < 290°F for red path.

Scenario XXII NRC 1

Simulator Operating Instructions

Setup

IC-1 (100% MOL)

Place simulator in run

Trigger lesson steps:
SETUP - 3A EDG OOS (actuates TAQ5LRSA = 0 & TAQ5A20P = 3)
SETUP - A AFWP OOS (actuates TAFK144 = 0.0, TAFK142 = 0.0, TAFK003 = 0.0, TAFK342 = 1.0, TAFF01C = 0.0, TAFF3086 = 1.0, TAFF3082 = 0.0, TCF5MTA = T, TAFF4082 = 0.0 & TAFF4086 = 1.0)
SETUP - 3C SG 8 GPD LEAK (actuates TVHHSGC = 0.000005)
SETUP - AUTO CNMT SPRAY AND MOV-3-1403 FAILURES (actuates TFL3S2 = T, TFL3S1 = T & TFFXM03 = T)
SETUP – 3C ECC START FAILURE (actuates TFQ6A4AF = T)

Acknowledge any alarms and place simulator in freeze.

Place clearance info tags on 3A EDG normal start switch and 3A AFWP T&T valve control switch.

Remove AFW train 2 orange tag from C AFWP tachometer just below ann. panel X and move AFW train 1 orange tag from A AFWP tachometer to C AFWP tachometer.

Provide shift turnover checklists and 3-ONOP-071.2 Att 1.

Select 3A QSPDS to page 211 (SAT) and 3B QSPDS to page 212 (RVL). Set ERDADS on VPA to Tavg/Tref (TAV) and at the RCO desk to ENVRN (ED3).

Fill in blender & shutdown boron addition placards at console blender station. Data for each IC may be found in the ECC & Shutdown Guidelines Book in the simulator I/F.

Event 1/1a - PRN-44 upper detector fails high

Initiated at lead evaluator direction immediately after shift turnover. Trigger lesson step **EVENT 1 - PRN44 FAILS HIGH** (actuates TFN1P4AH = T). *The crew will perform 3-ONOP-059.8 IOA (or 3-ONOP-028) to stop auto rod motion by taking rod control to manual. This is followed by removal of PRN44 from service per 3-ONOP-059.8.*

Respond when called as OCC/WCC to generate PWO and have I&C troubleshoot & repair PRN44.

Respond as Reactor Engineering if called to calculate QPTR. Reply that an engineer will be called in to perform this calculation.

If called as SM regarding taking PR Channel N44 out of service, direct crew to perform this task.

Event 2 - FT-3-474 fails high

Once PRN44 removed from service, trigger lesson step **EVENT 2 - 3A SG STM FLOW FT-3-474 FAILS HIGH** (actuates TFS1MWEH = T). *The BOP will need to take manual control of 3A SG level control using FCV-3-478. FT-3-474 is removed from service per 3-ONOP-049.1. Once FT-3-475 is selected for steam flow input to 3A SG level control, FCV-3-478 can be returned to automatic.*

Respond when called as OCC/WCC/FS to have I&C troubleshoot & repair FT-3-474.

Event 3/3a - NRHX tube leak / RCV-3-609 auto close failure / Align excess letdown

Upon completion of FT-3-474 crew brief and 3A SG level control returned to automatic, trigger lesson step **EVENT 3 - NRHX TUBE LEAK / RCV-3-609 AUTO CLOSE FAIL** (actuates TVKALKNR = 0.4 on 2 min ramp, TFKV609A = T then = F when IDK1609C). *PRMS R-3-17A/B alarm(s) and takes actions per 3-ONOP-067. The crew will need to manually close RCV-3-609 (CCW surge tank vent). Taking the control switch to close automatically clears the RCV-3-609 failure and the valve strokes closed.*

If the SFP area radiation monitor (ARM) alarms when CCW surge tank full & vent valve open and the crew calls HP to check out the alarm, respond as HP and say that local readings will be taken to verify the ARM.

Respond as Chemistry if asked to sample CCW for activity. After 4-6 min, report detectable activity in CCW with counting in progress to determine the actual level.

If asked as PO, report NRHX CCW return temp (TI-3-619) & flow (FI-3-620), report temperature is 142°F & flow about 270 gpm which are both higher than last log readings. These values are not high enough to require NRHX isolation per 3-ONOP-067. If the crew does not isolate the NRHX on their own, call as AOM and direct them to do so.

Respond as PO if directed to check FI-3-624, excess letdown HX CCW flow. From CCW system mimic, click on SCHEMATICS→COMMON SERVICES→COMPONENT COOLING→ ♦CCW TO RCP & XS LTDWN HX'S → read CCW flow displayed next to excess letdown HX. Report this value to the crew.

Respond as PO if requested to check RCDT level while excess letdown being placed in service. Click on SCHEMATICS→WASTE DISPOSAL→LIQUID WASTE DISPOSAL. Report level displayed next to RCDT.

Respond as PO/FS when directed to isolate & vent the NRHX (close 3-777, 3-780, 3-834 & open 3-777A), wait 2-4 min, then **trigger** lesson step **EVENT 3 - LOCALLY ISOLATE NRHX** (actuates TAKA834 = 0.0 on 30 sec ramp & TAKA777 = 0.0 on 30 sec ramp after 1 min delay). *Note that 3-780 & 3-777A are not modelled and are transparent to the crew.* After 2-4 min, report complete.

Respond as PO if directed to check CCW temperature & flow to the seal water HX, SFP HX & excess letdown HX. Report value displayed on CCW system mimic.

Respond if asked as OCC/WCC/FS to arrange for repair of the NRHX leak.

Event 4 - TPCW to Gen cooler CV-3-2203 fails closed

After excess letdown aligned, trigger lesson step **EVENT 4 - GEN H2 COOLER TPCW CV-3-2203 FAILS CLOSED** (actuates TFKXC203 = T). *This causes a loss of TPCW flow to the main generator H_2 cooler & ann. F-6/4 then F-6/6 to alarm. The crew should respond per 3-ARP-097.CR, remove reactive load from U3 and locally bypass CV-3-2203. If 3-ONOP-090.1 entered and F-6/4 still in, crew may initiate fast load reduction.*

If asked as SO, report no TPCW flow to generator H_2 cooler and CV-3-2203 failed closed. If asked about ICW flow to TPCW HXs, click on SCHEMATICS→ COMMON SERVICES→INTAKE COOLING. Report ICW flow values shown for each TPCW HX.

If directed as SO to locally control CV-3-2203, report that valve does not respond to local control

Respond as System if notified of the need to remove reactive load from unit 3 or reduce unit load per 3-ONOP-100.

Respond as SO/FS if directed to locally bypass CV-3-2203 by opening valve 3-60-212. Wait 2-4 min, then **trigger** lesson step **EVENT 4 - MANUALLY BYPASS CV-3-2203** (actuates TVKXL203 = 0.45 on 1 min ramp). Report to crew that TPCW flow to generator hydrogen coolers is ≈ 4000 gpm.

Respond as SO if asked to report

Respond if asked as OCC/WCC/FS to troubleshoot & repair CV-3-2203.

Event 5 - 3C SG tube leak increases to 2 gpm

After reactive load removed and CV-3-2203 bypassed, trigger lesson step **EVENT 5 - 3C SG 2 GPM LEAK** (actuates TVHHSGC = 0.002). *This will cause ann. H-1/4 to reflash due to R-3-15 alarm.*

Respond as SO if asked about condenser air inleakage. After 1-3 min, report < 5.5 scfm indicated.

Respond as Chemistry when asked to sample SG's for activity. After 8-10 min, report pancake frisk of s/g samples shows detectable activity only on 3C SG and higher than for the last sample drawn at 8 gpd leak rate. Exact leak rate will be determined when sample activity counting complete.

Respond as HP when asked to perform main steam line & blowdown radiation surveys. After 4-6 min, report 3C MSL radiation slightly > background. Other MSL reading < background.

Respond as System & Shift Manager when notified of the fast load reduction.

Respond as SO/Chemistry when asked to verify cold chem lab sample flow stopped following R-3-19 alarm. After 2-4 min, report no U3 SG sample flow.

Respond as SO/FS when directed to open breaker 3D01-27 to deenergize MOV-3-1405. After 1-3 min, **trigger lesson step EVENT 5 - DEENERGIZE/CLOSE MOV-3-1405** (actuates TCF5MA27 = F then TFFXC05 = T 30 sec later). When directed to open AFSS-3-007 & close AFSS-3-006, **trigger** lesson step **EVENT 5 - ALIGN 3B SG TO TRAIN 1 AFSS** (actuates TAFF07 = 1.0 on 30 sec ramp and TAFF06 = 0.0 after 45 sec delay on a 30 sec ramp)

Respond as SO/FS when asked about the source of aux steam. Report aux steam currently supplied from unit 4. When directed to open SLWU-3-001 and close 3-10-007, **trigger lesson step EVENT 5 - ALIGN AUX STEAM FROM U4** (actuates TAFF02 = 1.0 on 30 sec ramp & TAFF007 = 0.0 on 30 sec ramp with 1 min delay).

Events 6 - 3C SG tube rupture & fault inside containment

After reactor power reduced 5-10%, at lead evaluator direction, trigger lesson step EVENT 6 - 3C SG RUPTURE (actuates TVHHSGC = 0.6 on 2 min ramp). *This should cause the crew to manually trip the reactor as SG tube leak exceeds charging flow & then manually SI when PZR level can't be maintained > 12%.*

When the turbine is tripped during E-0 IOAs, trigger lesson step EVENT 6 - 3C SG FAULTED-RUPTURED (actuates TVSBVL15 = 0.1). *This inserts a 3C SG fault inside containment making 3C SG faulted-ruptured.*

Auto containment spray & MOV-3-1403 auto open failures entered at setup.

When MOV-3-1403 is manually opened, this auto triggers lesson step EVENT 6 - MOV-3-1403 OPENS MANUALLY *(actuates TFFXM03 = F when IMF503S).*

When directed as PO to place PAHM in service, wait 10-15 min, then **trigger** lesson step **EVENT 6 - ALIGN PAHM** (actuates TAC2V02A = 1.0, TAC2V02B = 1.0, TAAAV21 = 1.0, TAAAV22 = 1.0 & TACA005 = 0.0). Report when complete.

If not already done, respond as SO/FS when directed to open AFSS-3-007 & close AFSS-3-006. **Trigger** lesson step **EVENT 5 - ALIGN 3B SG TO TRAIN 1 AFSS** (actuates TAFF07 = 1.0 on 30 sec ramp and TAFF06 = 0.0 after 45 sec delay on a 30 sec ramp)

If not already done, respond as SO/FS when directed to open breaker 3D01-27 & close MOV-3-1405. After 1-3 min, **trigger** lesson step **EVENT 5 - DEENERGIZE/CLOSE MOV-3-1405** (actuates TCF5MA27 = F then TFFXC05 = T 30 sec later).

If not already done, respond as SO/FS when directed to align aux steam from unit 4. **Trigger** lesson step **EVENT 5 - ALIGN AUX STEAM FROM U4** (actuates TAFF02 = 1.0 on 30 sec ramp & TAFF007 = 0.0 on 30 sec ramp with 1 min delay).

Respond as PO if asked to check on charging pumps before/after start. Report pumps ready for start / post-start conditions normal.

Event 7 - Pressurized thermal shock

This event entered when lowest Tc drops < 320°F due to effects of faulted-ruptured SG forcing transition to 3-EOP-FR-P.1.

Since containment conditions will likely be adverse, RCS subcooling will be inadequate for SI termination or RCP start.

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Event Description: PR Channel N44 Upper Detector fails high. Remove PR Channel N44 from service.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**After shift turnover, activate the command to fail N-44 upper channel high**
INDICATIONS AVAILABLE: **Ann. B-2/2, POWER RANGE UPPER DET HI FLUX DEV / AUTO DEFEAT** **Ann. B-6/1, POWER RANGE SINGLE CHNL HI RANGE ALERT** **Ann. B-6/3, POWER RANGE OVERPOWER ROD STOP** **Ann. B-6/4, POWER RANGE CHANNEL DEVIATION** **Ann. B-9/2, AXIAL FLUX TILT** **Ann. G-4/1, AXIAL FLUX TS LIMIT EXCEEDED** **Ann. G-4/2, AXIAL FLUX ADMIN LIMIT EXCEEDED**		
		NOTE: *Crew may first respond using 3-ONOP-028, REACTOR CONTROL SYSTEM MALFUNCTION before using 3-ONOP-059.8.* *3-ONOP-028 Section 4.3 immediate action for continuous rod insertion is to place rod control in MANUAL* *Step 5.3.1 is for RO/BOP to restore Tavg=Tref* *Step 5.3.2 thru 5.3.4 are not applicable* *Step 5.3.5 directs the operator to 3-ONOP-059.8*
		3-ONOP-059.8, POWER RANGE NUCLEAR INSTRUMENTATION MALFUNCTION
	RO	**IMMEDIATE ACTION:** 4.1.1 **IF** failed channel is PR 4, **THEN** transfer ROD MOTION CONTROL SELECTOR to MAN position.
		5.1.1 Malfunction of ONE channel:
	BOP	1. Place the DROPPED ROD MODE switch for the failed channel in the BYPASS position.
	BOP	2. Place the applicable ROD STOP BYPASS switch to the failed channel BYPASS position.
		NOTE: *If an **Upper Section Deviation** or **Lower Section Deviation** alarm occurs, or if ANNUNCIATORS B-2/2 or B-2/3 annunciate, the actions of 3-OSP-059.10, Determination of Quadrant Power Tilt Ratio, need to be performed if power is greater than 50 percent.*
	BOP	3. Transfer the UPPER SECTION comparator defeat switch to the failed channel.
	BOP	4. Transfer the LOWER SECTION comparator defeat switch to the failed channel.

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Event Description: PR Channel N44 Upper Detector fails high. Remove PR Channel N44 from service.

Time	Position	Applicant's Actions or Behavior
	BOP	5. Transfer applicable POWER MISMATCH BYPASS switch to BYPASS the failed channel.
	BOP	6. Transfer the COMPARATOR CHANNEL DEFEAT switch to the failed channel.
	US	7. Perform the following within 6 hours of the failure determination:
	BOP	a. Trip the Power Range bistables by removing the INSTRUMENT POWER fuses from drawer B of the failed channel. Causes ann. B-6/5 to alarm when fuses pulled
	US	8. Directs OCC/WCC to notify I&C.
		NOTE: *The first thermocouple QPTR calculation should be performed as soon as possible. Calculation will be done by STA / Reactor Engineering when called.*
	US	9. **IF** greater than 75 percent power, **THEN** calls to STA/Rx Engineering for assistance with monitoring the Quadrant Power Tilt Ratio at least once per 8 hours using 3-OSP-059.10, DETERMINATION OF QUADRANT POWER TILT RATIO.(per Tech Spec 4.2.4.2)
	n/a	10. **IF** a thermocouple QPTR calculation is performed **AND** acceptable results are NOT achieved, **THEN** contact Reactor Engineering.
	US	11. **IF** maintenance is NOT to be performed immediately, **THEN** calls to OCC/WCC to attach a clearance tag to each bistable switch tripped in Substep 5.1.1.7.b, 5.1.1.7.c, **OR** 5.1.1.7.d in the tripped position.
	US	Evaluates TS 3.3.1 – Table 3.3-1 Action 2
		1. 6 hr to trip bistables
		2. QPTR every 12 hr per TS 4.2.4.2

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Event Description: Controlling steam flow channel for 3A S/G, FT-3-474, fails high.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**After power range NI channel N44, activate the command to fail FT-3-474 high.**
INDICATIONS AVAILABLE: **Ann. C-4/1, SG A FEED > STEAM** **Ann. C-5/1, SG A STEAM > FEED** **Ann. C-6/1, SG A LEVEL DEVIATION** **Ann. C-7/1, SG A STMLINE HI FLOW**		
		FT-3-474 fails high
		NOTE: *If the BOP is too slow to take manual control of FCV-3-478, operators are administratively required to trip the reactor when level reaches 75%. An automatic turbine/reactor trip will occur when level reaches 80%.*
	RO	Recognizes/reports FT-3-474 failure.
	BOP	Manually controls FCV-3-478. Lowers 3A S/G level back to program.
	US	Directs response per 3-ONOP-049.1, DEVIATION OF FAILURE OF SAFETY RELATED OR REACTOR PROTECTION CHANNELS.
	BOP	Determines FT-3-475 reading normally When 3A S/G level on program, selects FT-3-475 for steam flow input to FCV-3-478 control and returns FCV to auto. May also select FT-3-476 for feed flow input to FCV-3-478 control.
	US	Refers to TS 3.3.1, Table 3.3-1, item 12, action 6 (b/s trip in 6 hr). Refers to TS 3.3.2 Table 3.3-2, item 1.f, action 15 (b/s trip in 6 hr).
		NOTE: *Steps 5.5 thru 5.8 are not applicable.*
	US	Determines b/s to trip and effect on plant.
	US	Conducts crew brief.
	BOP	Proceeds to protection rack 16 and trips BS-3-474. Then proceeds to protection rack 17 and trips BS-3-478B1/478B2/478C
	RO	Verifies correct annunciators & bistable status lights received in response to BOP tripping bistables.
		NOTE: *Steps 5.10 thru 5.12 are not applicable.*
	US	Directs OCC/WCC to notify I&C and initiate PWO.

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Event Description: NRHX Tube Leak with RCV-3-609 failure to auto close. Isolate Letdown and align Excess Letdown in response to the NRHX tube leak.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**Upon completion of FT-3-474 crew brief and 3A SG level control returned to automatic, activate the command to insert NRHX tube leak and RCV-3-609 auto close failure.**
INDICATIONS AVAILABLE: **Ann. A-2/5, BORIC ACID MAKEUP FLOW DEVIATION** **Ann. A-2/6, PRI WATER MAKEUP FLOW DEVIATION** **Ann. H-1/4, PRMS HI RADIATION (R-3-17A / B high alarms)** **Ann. H-8/6, CCW HEAD TANK HI/LO LEVEL**		
	BOP	1. Recognizes and announces R-17A/B count increase.
	US	Directs RO and BOP to perform actions per 3-ONOP-067, RADIOACTIVE EFFLUENT RELEASE.
	BOP	2. Checks R-17-A(B) validity after alarm comes in by:
	BOP	a. Readout(s) above or at alarm setpoint.
	BOP	b. Checks channel operability as follows:
	BOP	1) Depress and hold FAIL/TEST pushbutton on affected channel.
	BOP	2) Check readout > or = 288K or 289K.
	BOP	3) Release FAIL/TEST pushbutton.
	BOP	c. Checks affected PRMS drawer responds to source check.
	BOP	d. Checks for PRMS Channel Failure:
	BOP	•Checks Fail indicator – OFF •Display **AND** recorder reading – **NOT** FAILED LOW
	BOP	3. Determines R-3-17A(B) HIGH ALARM is in
		NOTE: *Step 3 RNO directs user to step 29 for R-3-17 alarm.*
	BOP	29. Checks CCW System For High Activity:
	BOP	a. Announces alarm & warns personnel on page system.
	RO	b. Determines RCV-3-609, CCW Head Tank Vent Valve – failed to auto close. Manually closes valve.
	BOP	c. Directs Chemistry to sample CCW System.
	RO	**Recognizes CCW tank level increase.**

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Event Description: NRHX Tube Leak with RCV-3-609 failure to auto close. Isolate Letdown and align Excess Letdown in response to the NRHX tube leak.

Time	Position	Applicant's Actions or Behavior
	RO	30. Checks Normal CCW Temperatures and flows out of RCP Thermal Barriers.
	BOP	31. Directs PO check CCW temperature and flow out of NRHX. Receives/relays report that NRHX CCW return temp = 142°F and flow = 270 gpm
	US	Determines CCW Return Temperature from NRHX, TI-3-619 > 140°F. Directs **shift from normal letdown to excess letdown using 3-OP-047, CVCS-CHARGING AND LETDOWN**
	RO/BOP	Isolates letdown per 3-OP-047 section 7.11. 1. Determines steps 7.11.2.1 & .2 not applicable 2. Places PCV-3-145 in MANUAL, adjusts letdown pressure = 300 psig then closes letdown isolation valve 3. Determines steps 7.11.2.3.d thru 7.11.2.8 are not applicable Places excess letdown in service per 3-OP-047 section 7.12 1. Verifies CV-3-739 open 2. Directs PO verify CCW to excess letdown HX 200-238 gpm. Receives report that flow ≈ 220 gpm 3. Verifies CV-3-389 aligned to VCT 4. Slowly opens HCV-3-137 and after > 5 min closes valve 5. Opens CV-3-387. Directs PO observe RCDT level for increase from lifting RV-3-304. Receives report that RCDT level stable. 6. Slowly opens HCV-3-137 to warmup excess letdown HX 7. Ensures excess letdown temp < 195°F 8. If LCV-3-115A in full divert or desired to send excess letdown to RCDT, aligns CV-3-389 to RCDT.
	BOP	Per 3-ONOP-067 step 31 RNO b & c, directs PO to isolate/vent CCW side of NRHX as follows: 1. Close 3-777, 3-780 & 3-834 to isolate CCW to NRHX. 2. Open 3-777A to vent shell side of NRHX. **NOTE:** *Valves operated by simulator operator when requested*

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Event Description: NRHX Tube Leak with RCV-3-609 failure to auto close. Isolate Letdown and align Excess Letdown in response to the NRHX tube leak.

Time	Position	Applicant's Actions or Behavior
	BOP	32. Directs PO checks normal CCW temperature and flow out of Seal Water Heat Exchanger: • CCW Seal Water HX Outlet Temperature , TI-3-617 < 140°F • CCW Seal Water HX Flow , FI-3-618 < 200 GPM
	BOP	33. Directs PO check normal CCW temperature and flow out of Spent Fuel Pit HX: • CCW Return Temperature from SFP HX, TI-3-621 < 140°F • CCW Flow from SFP HX , FI-3-622 < 2500 GPM
	BOP	34. Directs PO check normal CCW temperature and flow out of Excess Letdown HX: • CCW Return Temperature from Excess Letdown HX, TI-3-623 < 140°F • CCW Flow from Excess Letdown HX , FI-3-624 < 238 GPM
	RO	35. Determines 3A RHR Pump **AND** 3A RHR HX secured
		NOTE: *Step 35 RNO directs user to step 37.*
	RO	37. Determines 3B RHR Pump **AND** 3B RHR HX secured.
		NOTE: *Step 37 RNO directs user to step 39.*
	BOP	39. Isolate potential sources of leakage into CCW from sample systems.
	BOP	40. Isolate other potential sources of leakage into CCW.
	US	41. Return to Step 1.

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Event Description: TPCW Control Valve to main generator hydrogen coolers, CV-3-2203, fails closed. Requires removing reactive load. The crew may also take actions to initiate a fast load reduction.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**After excess letdown aligned, activate the command to insert NRHX tube leak and RCV-3-609 auto close failure.**
INDICATIONS AVAILABLE: **Ann. F-6/4, GEN RTD HI TEMP** **Ann. F-6/6, GEN CORE TROUBLE**		
		Performs actions per 3-ARP-097.CR for Ann. F-6/4
	BOP	1. Verifies alarm by checking the following: a. Remote display monitor on ERDADS. b. Possible Generator Core Trouble Annunciator, F-6/6 (VPA). c. Directs SO/FS verify TPCW flow to Main Generator Hydrogen Coolers is in normal range (3000 – 5800 gpm). Receives/relays report of no flow. d. Obtain a computer printout from ERDADS (may be deferred while crew addresses TPCW loss). e. An ERDADS Personal Trend Chart can be used to determine if there is an increasing temperature trend (may be deferred while crew addresses TPCW loss).
		NOTES • *Bypass of CV-2203, TPCW from Generator Hydrogen Coolers, may be required.* • *2nd note not applicable.*
	BOP	2. Corrective Actions: a. Remove reactive load from main generator by taking AC voltage regulator to lower and notify the Operations Supervisor. b. Check for proper ICW Cooling Water Flow to the TPCW Heat Exchangers **AND** adjust as necessary. c. Using 3-OP-008, TURBINE PLANT COOLING WATER, Attachment 1, directs SO to locally adjust TPCW flow through Main Generator Hydergen Coolers using CV-3-2203 bypass valve 3-60-212 to reduce temperature below alarm setpoints **AND** within the normal range. Receives/relays report of TPCW flow restoration to main generator hydrogen coolers. **NOTE:** *CV-3-2203 manual bypass operated by simulator operator upon request. See dwg 5613-M-3008 sheet 4.* d. Refer to 3-ONOP-090.1, GENERATOR GAS (HX) TEMPERATURE MONITORING. e. Notify Electrical Department.

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Event Description: TPCW Control Valve to main generator hydrogen coolers, CV-3-2203, fails closed. Requires removing reactive load. The crew may also take actions to initiate a fast load reduction.

Time	Position	Applicant's Actions or Behavior
		Performs actions per 3-ONOP-090.1, GENERATOR GAS (H2) TEMPERATURE MONITORING
		NOTE: *Shedding reactive load and CV-3-2203 bypass operation per the ARP will make 3-ONOP-090.1 only minimally useful.*
		NOTE: *If this is the first indication that a generator problem exists, initiate the actions listed below unless it can be proven that the alarm is associated with an instrument malfunction. Generator failures can propagate rapidly if this is a valid alarm.*
	BOP	1. Determines GEN RTD HI-HI TEMP, Annun F-6/5 not alarming
		NOTE: *Step 1 RNO directs user to step 3*
	BOP	3. Check GEN RTD HI TEMP, Annun F-6/4 Actuated
	US	4. If F-6/4 still alarming, crew may initiate use of 3-ONOP-100, FAST LOAD REDUCTION
		NOTE: *If all alarms clear (expected following TPCW restoration) Step 3 RNO directs user to step 6. Step 6 RNO directs user to step 18. Step 18 RNO directs user to step 27which leads to termination of load decrease in step 28 and subsequent exit from ONOP.*

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**After reactive load removed and CV-3-2203 bypassed, activate the command to increase 3C s/g tube leak to 2 gpm**
INDICATIONS AVAILABLE: **Ann. H-1/4, PRMS HI RADIATION (R-3-15 high alarm followed later by reflash for R-3-19 high alarm)**		
		3-ONOP-071.2, STEAM GENERATOR TUBE LEAKAGE
	BOP	Checks High Alarm ON for the following PRMS Channels • R-3-15 High Alarm light - ON • R-3-19 High Alarm light – ON **Reports R-3-15/19 increasing and/or alarming.**
	US	**Directs response per 3-ONOP-071.2.**
	BOP	**Makes page announcement**
	BOP	2. Check Affected PRMS Channel Alarm Valid As Follows: a. Check readout on affected channel – GREATER THAN OR EQUAL TO ALARM SETPOINT b. Check channel operability as follows: 1) Depress and hold the FAIL/TEST pushbutton on the affected PRMS Channel. 2) Check readout equal to 288K **OR** 289K 3) Release the FAIL/TEST pushbutton c. Observe CAUTION prior to Step 6 **AND** go to Step 6
		CAUTIONS • Maximum allowed specific activity of secondary coolant is less than or equal to 0.10 µCi/gm DEI-131. (Reference T.S. 3.7.1.4.) • Use of the Steam Dump to Atmospheric valves should be limited to minimize uncontrolled release of radionuclides to the environment. If S/G Steam Dumps to Atmosphere must be used, use only the unaffected S/G dump valves if possible.
	RO RO BOP	6. Monitor Affected Plant Parameters a. Determines PZR level – STABLE **OR** INCREASING b. Maintain PZR level – MAINTAIN STABLE **OR** INCREASING c. Determines R-3-19 HI ALARM – CLEAR

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
	BOP	Per 3-ONOP-071.2 FOP, when R-3-19 alarms, perform the following: 1. Verify S/G Blowdown Flow Control Valves FCV-3-6278A, B, and C – CLOSED. 2. Blowdown Tank to Canal Level Control Valve, LCV-3-6265B – CLOSED 3. Directs SO/Chemistry verify S/G Sample Total Flow Indicator at the Cold Chem Lab Bldg indicate flow has stopped. (Ensures Blowdown Sample Valves, SV-3-2800, 2801, 2802 are CLOSED.) Receives/relays report that flow stopped.
	US	7. Direct The Shift Engineer To Approximate Tube Leakage Using 3-OSP-041.1, RCS LEAK RATE CALCULATION **NOTE:** *SJAE SPING ACTIVITY vs SG TUBE LEAKAGE & R-3-15 ACTIVITY vs SG TUBE LEAKAGE curves in the Plant Curve Book not applicable since leak > 150 gpd*
		NOTES • *Additional Chemistry personnel may be needed for sampling and analysis.* • *SJAE SPING and R-15 are the quickest indications of increasing leak due to radioactive gases being carried over in the steam to the condenser. Air in-leakage greater than 5.5 SCFM will dilute this indication.* • *DAM-1 and R-19 are slower and may take several hours to stabilize for* accurate indication due to the process delay times.
	US	8. Identifies leaking S/G a. Monitor the following for S/G tube leak indications: • Unexplained increase in any S/G level • High radiation detected on a S/G sample • High radiation detected on a main steam line • High radiation detected on AFW steam supply line (if running) • High radiation detected from a S/G Blowdown line • Unexplained difference between steam flow and feed flow • Increasing radiation levels indicated on R-15, R-19, SPING, **AND** DAM-1

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
	BOP BOP	b. Directs Health Physics to perform the following: • Monitor radiation levels on Main Steam Lines • Monitor radiation levels on AFW steam supply line (if running) • Monitor radiation levels on S/G Blowdown lines • Monitor airborne activity at Steam Jet Air Ejectors c. DirectsNuclear Chemistry to perform the following: • Perform 0-NCAP-104, PRIMARY TO SECONDARY LEAK RATE CALCULATION • Increase S/G sampling frequency as determined by Nuclear Chemistry • Monitor DAM-1 and SJAE SPING readings
		NOTES • *Primary to secondary leakage shall be limited to 1 gpm leakage through all Steam Generators and 500 gallons per day through any one Steam Generator. (Tech Spec 3.4.6.2.c)* • *Sampling of Condenser water for activity is required prior to dumping/rejecting water.* • *The following step is to provide guidance for continued unit operation when Primary-to-Secondary leakage has been CONFIRMED. These actions are to ensure that an identified leak is isolated prior to S/G tube failure.* • *Any tube leakage rate-of-change determination should be performed over at least a 30 minute period to eliminate the possibility of inappropriate actions being taken in the case of instrument spikes.*
	US	9. Determine If Operation May Continue a. S/G Tube Leakage – LESS THAN Tech Spec Limits – Determines TS 3.4.6.2.c 1 gpm pri-sec leak limit exceeded making action b. applicable (4 hrs to correct or HSBY next 6 hr & CSD following 30 hr **RNO** a. Go to Step 10 **AND** be in Mode 3 within 1 hour. (more restrictive than applicable TS action statement)

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
	US	10. Perform the Following Prior to Commencing Load Reduction: a. Notify the System Dispatcher that load reduction is commencing b. Brief Control Room personnel using the Foldout Page as guidance c. Notify plant personnel of the load reduction using Page Boost 11. Notify NPS To Review The Following Procedures **AND** Make Any Required Notifications • 0-EPIP-20101, DUTIES OF EMERGENCY COORDINATOR • 0-ADM-115, NOTIFICATION OF PLANT EVENTS • Verify NRC Resident notified of Fast Load Reduction and S/G Tube Leakage **Declares UNUSUAL EVENT per 0-EPIP-20101, Encl 1, Cat 2B**
		CAUTIONS • *For a shutdown at the maximum rate, boration should be initiated PROMPTLY to avoid exceeding rod insertion limits.* • *Shutdown rates greater than 5% full power per minute (~35 Mwe/Min) may place the unit in an uncontrolled condition and should be avoided.* • *Control Rod motion may cause axial flux difference to deviate outside of the Target Band without necessitating corrective actions until the load eduction is terminated.*
	RO	12. Initiate Boration a. Establish the desired boration rate using the normal boration flowpath 1) Place the Reactor Makeup Selector Switch to BORATE 2) Place the RCS Makeup Control Switch to START 3) Set FC-3-113A potentiometer to 8.0 or as directed by the NPS b. Set the Boric Acid Totalizer to the desired amount of Boric Acid to be added as determined using the shutdown boron placards on the console **OR** the following table

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
	US	**Amount of Boric Acid for Desired Power Reduction** **Core Burnup, MWD** — Without Rod Motion / With Rod Motion **BOL 0-3000** — 160 gallons per 10% / 80 gallons per 10% **MOL 3000-9000** — 170 gallons per 10% / 85 gallons per 10% **EOL 9000-End of Cycle** — 230 gallons per 10% / 115 gallons per 10%
		NOTE: *For s/d from 100% MOL, 850 gal boric acid required*
		NOTES: • *A shutdown at maximum rate will require that boration be stopped approximately 10% above target power.* • *If the unit is to be taken off-line, boration should be stopped prior to reducing power below 25%.*
		c. Check boration required for load decrease - COMPLETE
	BOP/RO	13. Reduce plant load at a rate determined by SM as follows: a. Reduce turbine load (BOP) while manually inserting rods (RO) to lower Tavg (Tavg should not exceed Tref by more than 5°F) **NOTE:** *Since auto rods not available, step 13a RNO applies.* b. Monitor Control Rod Position (RO) 1) Rod Position – Remains above ROD BANK LO LIMIT alarm (Annunciator B-8/1) 2) Rod Position – Remains above ROD BANK EXTRA LO LOMIT alarm (Annunciator B-8/2)
		NOTE: *Step 14 not applicable since normal letdown isolated and excess letdown in service*
	RO BOP RO RO	15. Verify The Following: a. Pressurizer backup heater control switches - ON b. Steam Dump to Condenser valves – PROPER OPERATION c. Pressurizer level – ON PROGRAM d. **IF** the unit is to be taken off-line, **THEN** transfer station service from the Auxiliary to the Start-up Transformer prior to reducing load to 50 Mwe

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Event Description: 3C S/G tube leak rate increases to 2 gpm. Crew will perform a load reduction per 3-ONOP-071.2.

Time	Position	Applicant's Actions or Behavior
		Per foldout page, once 3C s/g identified as leaking, AFW steam supply for train 1 must be realigned to 3B s/g and isolated from 3C s/g as follows: 1. Directs SO to open AFSS-3-007 then close AFSS-3-006 2. Directs SO to open breaker 3D01-27 then locally close MOV-3-1405 **NOTE:** *These actions performed by simulator operator when requested*

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
BOOTH INSTRUCTOR:		**After 10% load reduction or at Chief Examiner direction, activate the command to insert 600 gpm 3C s/g tube rupture.**
INDICATIONS AVAILABLE: **Ann. A-9/3, PZR CONTROL HI/LO LEVEL** **Ann. G-1/2, CHARGING PUMP HI SPEED**		
		3-ONOP-071.2, STEAM GENERATOR TUBE LEAKAGE (continued)
	RO	**Recognizes/reports S/G tube leak rate increase.**
		<u>CREW CRITICAL TASK</u>: Manually trip reactor when PZR level decreasing with max charging & letdown isolated.
	US	**Directs performance of FOP with reactor trip and transition to 3-EOP-E-0 when determined that leak > charging flow with letdown isolated**
	RO	**Implements FOP item 1b** a. Determines PZR level decreasing b. Determines both available charging pumps already running. Increases to maximum speed on running charging pumps. c. Isolates excess letdown (normal letdown previously isolated) d. Can not maintain PZR level STABLE **<u>OR</u>** INCREASING e. **Manually trips reactor and goes to 3-EOP-E-0, REACTOR TRIP OR SAFETY INJECTION.**
		3-EOP-E-0, REACTOR TRIP OR SAFETY INJECTION
	US	**Directs RO/BOP perform immediate actions of 3-EOP-E-0**
		NOTES • ***Steps 1 through 4 are IMMEDIATE ACTION steps.*** • *Foldout page is required to be monitored throughout this procedure.*

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	RO	1. Verify Reactor Trip • Rod bottom lights – ON • Reactor trip and bypass breakers – OPEN • Rod position indicators – AT ZERO • Neutron flux - DECREASING
	BOP	2. Verify Turbine Trip a. All turbine stop valves - CLOSED b. Verify Moisture Separator Reheater Steam Valves – CLOSED • MSR Main Steam Supply Stop MOVs • Reheater Timing Valves • MSR Purge Steam Valves c. Mid and East GCBs – OPEN (Normally 30 second delay)
		NOTE: *When turbine is tripped, 3C s/g steam break inside containment will be inserted. 3C s/g is now faulted and ruptured.*
	BOP	3. Verify Power To Emergency 4 KV Buses a. Check the A and B 4 KV buses – BOTH ENERGIZED b. Check the D 4KV bus – ALIGNED TO AN ENERGIZED 4KV Bus c. Check the Load Centers associated with the energized 4KV bus - ENERGIZED • 3A LC • 3B LC • 3C LC • 3D LC • 3H LC

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	RO	4. Check If SI Is Actuated a. Determines SI not yet actuated b. In step 4 RNO identifies PZR level < 12[50]% c. Manually initiates SI and containment isolation phase A
	US	**Directs performance of 3-EOP-E-0.** **Reviews FOP and directs the following**: 1. RCP trip if RCS subcooling <25[65]°F and HHSI flow available 2. **AFW isolation to 3C s/g.** Maintain > 345 gpm total FW flow to intact s/g's until at least one s/g level >6[32]% **NOTE:** *Because 3C s/g is ruptured and faulted, level will be < 6[32]% and will not meet criteria for isolation as a ruptured generator per FOP item 3. 3C s/g AFW is isolated in FOP item 2 as a faulted s/g*
		<u>CREW CRITICAL TASK</u>: Isolate AFW to 3C s/g
	RO	When directed per FOP, trips RCPs if RCS subcooling <25[65]°F and HHSI flow available
	BOP	When directed per FOP, **isolates AFW to 3C s/g** and maintains > 345 gpm total FW flow to intact s/g's until at least one s/g level > 6[32]%
	BOP	5. Verify Feedwater Isolation a. Place main feedwater pump switches in STOP b. Feedwater control valves - CLOSED c. Feedwater bypass valves – CLOSED d. Close feedwater isolation MOVs e. Verify standby feedwater pumps - OFF
	RO	6. Verify Containment Isolation Phase A Valve White Lights On VPB – ALL BRIGHT

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	7. Check AFW Pumps – AT LEAST TWO RUNNING If AFW steam supply realigned in previous event, • identifies train 1 (C AFWP) running with train 2 (B AFWP) idle due to MOV-3-1403 failure. • Manually opens MOV-3-1403. This starts the B AFWP. If AFW steam supply not realigned in previous event, • identifies train 1 (C AFWP) as running at reduced speed or not at all due to loss of 3C s/g as a steam source. Train 2 (B AFWP) will be running using steam from 3B s/g only since MOV-3-1403 failed to auto open **NOTE:** *If AFW steam supply not realigned in previous event, opening MOV-3-1403 in this step will not restore a 2nd AFWP and is therefore not required until step 21. Local AFWSS valve realignment must be performed to get the 2nd AFWP running which is done in 3-EOP-E-2 or 3-EOP-FR-P.1* **NOTE:** *Step 7 RNO substeps b & c are not applicable*
	RO	8. Verify SI Pumps Running a. High-head SI pumps – AT LEAST TWO RUNNING b. RHR pumps – BOTH RUNNING
	BOP	9. Verify Proper CCW System Operation a. CCW Heat Exchangers – THREE IN SERVICE b. CCW pumps – ONLY TWO RUNNING c. CCW headers – TIED TOGETHER d. RCP Thermal Barrier CCW Outlet, NOV-3-626 - OPEN

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	10. Verify Proper ICW System Operation a. Verify intake cooling water pumps – AT LEAST TWO RUNNING b. Verify ICW To TPCW Heat Exchanger - ISOLATED • POV-3-4882 - CLOSED • POV-3-4883 - CLOSED c. Check intake cooling water headers – TIED TOGETHER
	RO	11. Verify Containment Cooling a. Checks emergency containment coolers. Determines only 3A ECC running. Starts 3B or 3C ECC b. Verify emergency containment filter fans – AT LEAST TWO RUNNING
	RO	12. Verify Containment and Control Room Ventilation Isolation a. Unit 3 containment purge exhaust and supply fans - OFF b. Verify Control Room ventilation status panel – PROPER EMERGENCY RECIRCULATION ALIGNMENT
	BOP	13. Check If Main Steamlines Should Be Isolated a. Determines main steamline isolation and bypass valves all closed (*on hi-hi containment pressure*) **NOTE:** *Step 13 a RNO directs user to step 14*

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	RO	14. Monitor Containment Pressure To Verify Containment Spray NOT Required a. Determines containment pressure increased to > 20 psig b. Identifies containment spray **NOT** initiated. Manually initiates containment spray. c. Verifies containment isolation phase B – ACTUATED d. Verifies containment isolation phase B valve white lights on VPB – ALL BRIGHT. e. Stops all RCPs.
	RO	15. Verify SI Valve Amber Lights On VPB – ALL BRIGHT
	BOP	16. Verify All Four EDGs - RUNNING
		CAUTION *If a loss of offsite power occurs or the opposite unit experiences an SI signal after SI has been reset, manual actions may be required to restore safeguards equipment to the required configuration.*
	RO	17. Reset SI
	RO	18. Realign SI System a. Verifies Unit 3 high-head SI pumps – TWO RUNNING b. Stops both Unit 4 high-head SI pumps **AND** place in standby
		NOTE *Hydrogen Monitors should be in service within 30 minutes of a valid SI signal. They should be available in a timely manner to support decision-making related to hydrogen generation in containment.*
	RO	19. Place Hydrogen Monitors In Service Using 3-OP-094, CONTAINMENT POST ACCIDENT MONITORING SYSTEM

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	RO	20. Verify SI Flow a. Determines RCS pressure < 1600 PSIG [2000 PSIG] b. Identifies flow on High-head SI pump flow indicator c. Determines RCS pressure > 250 PSIG [650 PSIG] **NOTE:** *Substep d not applicable*
		CAUTIONS • *This series of cautions is applicable to multiple AFW pump operation throughout the rest of the EOP network.* • *If two AFW pumps are operating on a single train, one of the pumps needs to be shutdown within one hour of the initial start signal.* • *If two AFW trains are operating, continuing to operate a single AFW pump with an average flow of less than 60 gpm for greater than one hour may damage the pump.* • *When either of the above operating conditions exist, a pump(s) should be shutdown using 3-OP-075, AUXILIARY FEEDWATER SYSTEM, Section 6.2, to minimize the potential for damaging the pump(s).*
	BOP	21. Verify AFW Valve Alignment – PROPER EMERGENCY ALIGNMENT. If MOV-3-1403 not yet opened, it should be opened at this time.
	BOP	22. Verify Proper AFW Flow a. Checks narrow range level in at least one S/G – GREATER THAN 6% [32%]. If not, then maintains 345 gpm AFW flow to intact s/g's b. Control feed flow to maintain S/G narrow range levels between 6% [32%] and 50%

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	RO	23. Check RCP Seal Cooling a. Determines RCP thermal barrier alarms A-1/2 & A-1/3 on (due to MOV-3-626 closure on containment isolation phase B) b. Starts one charging pump at minimum speed for seal injection
	RO	24. Maintain RCS Cold Leg Temperature a. Determines Tcold dropping due to effects of faulted-ruptured s/g b. Verifies atmospheric & condenser steam dumps closed. c. Reduces total FW flow to intact s/g's to ≈ 345 gpm until NR level > 6[32]% in at least one s/g d. Identifies MSIVs as previously closed **NOTE:** *RNO substep b not applicable*
	RO	25. Check RCP Cooling a. Determines no RCPs running **NOTE:** *Substep a RNO sends user to step 26*
	RO	26. Check Letdown, PZR PORVS, **AND** Spray Valves a. Excess letdown isolation valves - CLOSED • CV-3-387, Excess Letdown Isolation Valve From Cold Leg To Excess Letdown Heat Exchanger • HCV-3-137, Excess Letdown Flow Controller b. PORVs – CLOSED c. Normal PZR spray valves – CLOSED d. Ausiliary Spray Valve, CV-3-311, - CLOSED

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	27. Check If S/Gs Are **NOT** Faulted - **NO** a. Check pressure in all S/Gs - • NO S/G PRESSURE DECREASING IN AN UNCONTROLLED MANNER - **NO** • NO S/G COMPLETELY DEPRESSURIZED **RNO** a. Perform the following: 1) Monitor Critical Safety Functions using 3-EOP-F-0, CRITICAL SAFETY FUNCTION STATUS TREES. 2) Go to 3-EOP-E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
		NOTE: ***If Tcold < 320°F, transition directly to 3-EOP-FR-P.1 (event 8). This is an orange path condition for the RCS integrity critical safety function. If Tcold < 290°F, then RCS integrity becomes a red path condition.***
	US	Conducts crew transition brief
		Crew Transitions to **3-EOP-E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1**
	US	**Directs performance of 3-EOP-E-2**
		C A U T I O N S • *At least one S/G must be maintained available for RCS cooldown.* • *Any faulted S/G or secondary break is required to be maintained isolated during subsequent recovery actions unless needed for RCS cooldown.*
		NOTE: *RCS hot leg temperature stabilization note not applicable for faulted-ruptured s/g.*
	BOP	1. Verify The Main Steamline Isolation AND Bypass Valves On Faulted S/G(s) - CLOSED

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 6 Page 24 of 32

Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	2. Check If Any S/G Is NOT Faulted a. Check pressures in all S/Gs – identifies 3A & 3B s/g's as STABLE OR INCREASING
	BOP	3. Identifies 3C s/g as faulted
		CAUTION *If the AFW pumps are the only available source of feed flow, a steam supply to the AFW pumps must be maintained from at least one S/G.*
	BOP	4. Isolate Faulted S/G(s) a. Identifies main feedline aleady isolated (FW isolation valve & feed reg bypass valve) b. Identifies AFW flow as already isolated c. Verifies SI-RESET d. Verifies steam supply aligned to both trains of AFW pumps from intact S/G(s). If train 1 AFW steam supply not yet realigned to 3B s/g, directs SO to open AFSS-3-007 and close AFSS-3-006. e. If MOV-3-1405 not already closed & deenergized, directs SO to open breaker 3D01-27 then locally close MOV-3-1405 f. Verifies S/G dump to atmosphere valve - CLOSED g. Verifies S/G blowdown isolation valves - CLOSED h. Verifies S/G sample lines - ISOLATED
		NOTE: Realignment of train 1 AFW steam supply & isolation AFW steam supply from 3C s/g are performed by the simulator operator when requested.
		5. Check CST Level - GREATER THAN 10%

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Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	US	6. Check Secondary Radiation a. Direct Nuclear Chemistry to take periodic activity samples of all S/Gs b. Direct Nuclear Chemistry to check DAM1 monitor reading c. Direct Health Physics to take radiation readings on main steam lines d. Secondary radiation – NORMAL NEAR ROUTINE OPERATION VALUE – **NO** **RNO** d. Go to 3-EOP-E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
		NOTE: *EOP transition brief may be omitted here due to short time since last one conducted for transition from 3-EOP-E-0 to 3-EOP-E-3*
		Crew Transitions to **3-EOP-E-3, STEAM GENERATOR TUBE RUPTURE, Step 1**
	US	**Directs performance of 3-EOP-E-3**
		C A U T I O N *CCW System load requirements of 3-OP-030, COMPONENT COOLING WATER SYSTEM, SHALL NOT be exceeded.*
		NOTE • *Foldout page is required to be monitored throughout this procedure.* • *Personnel will be necessary for sampling during this procedure.*
	RO	1. Monitor Conditions To Determine If RCPs Should Be Stopped a. Determines no RCPs running **NOTE:** *Substep a RNO sends user to step 2*

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 6 Page 26 of 32

Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	SRO	2. Identifies 3C s/g as ruptured **NOTE:** *Actions in this step already taken in 3-ONOP-071.2 & 3-EOP-E-2*
		CAUTION *At least one S/G must be maintained available for RCS cooldown.*
	BOP	3. Control Ruptured S/G(s) Steam Dump To Atmosphere Valve a. Adjust ruptured S/G(s) steam dump to atmosphere controller setpoint to 1060 psig b. Check ruptured S/G(s) steam dump to atmosphere – CLOSED **NOTE:** *This step may have already been done in 3-ONOP-071.2*
		CAUTION *If any ruptured S/G is also faulted and is NOT needed for RCS cooldown, feed flow to that S/G is required to be maintained isolated during subsequent recovery actions.*
	BOP	4. Control Ruptured S/G(s) Level **NOTE**: *This step not applicable per caution*
		CAUTION *If the AFW pumps are the only available source of feedwater flow, the steam supply to the AFW pumps must be maintained from at least one S/G.*
	BOP	5. Isolate Steam From Ruptured S/G(s) To AFW Pumps **NOTE:** *This step previously done in either 3-ONOP-071.2 or 3-EOP-E-2*

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 6 Page 27 of 32

Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	6. Isolate Miscellaneous Flowpaths From Ruptured S/G(s) a. Verify blowdown isolation valve(s) from ruptured S/G(s) - CLOSED b. Directs SO check auxiliary steam source– relay report that aux steam supplied from unit 4 c. Directs SO locally open Main Steamline Warmup Isolation Valve, SLWU-3-10-007 d. Directs SO locally close Main Steam To Aux Steam Header Isolation Valve, 3-10-007 **NOTE:** *Alignment of aux steam valves performed by simulator operator when requested.*
	BOP	7. Identifies Ruptured S/G(s) Main Steamline Isolation **AND** Bypass Valves as closed. This step not applicable.
		C A U T I O N *All steam generator blowdown sample lines must be isolated within the first 30 minutes of a Steam Generator Tube Rupture event to prevent release of contaminated fluid through unmonitored vent paths.*
	BOP	8. Determines S/G Blowdown Sample Stop Valves - CLOSED
		C A U T I O N *If any PRZ PORV opens because of high PRZ pressure, it is required to be verified closed or isolated after pressure decreases to less than the PORV setpoint.*
	RO	9. Check PZR PORVs **AND** Block Valves a. Power to block valves - AVAILABLE b. PORVs - CLOSED c. Block valves – AT LEAST ONE OPEN
	BOP	10. Check If S/Gs Are **NOT** Faulted - **NO** a. Determines 3C s/g faulted, but already isolated per 3-EOP-E-2

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 6 Page 28 of 32

Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	BOP	11. Maintain Intact S/G Levels a. Narrow range level – GREATER THAN 6% [32%] b. Control feel flow to maintain narrow range level between 15% [32%] and 50% c. Narrow range level – LESS THAN 50%
	RO	12. Verify SI - RESET
	BOP	13. Reset Containment Isolation Phase A And Phase B
	BOP	14. Verify Instrument Air To Containment a. Verify Instrument Air Containment Isolation, CV-3-2803, OPEN b. Verify instrument air pressure, PI-3-1444 – GREATER THAN 95 PSIG
		CAUTION *RCS pressure is required to be monitored. If RCS pressure decreases in an uncontrolled manner to less than 250 psig[650 psig], the RHR pumps must be manually restarted to supply water to the RCS.*
	RO	15. Check If RHR Pumps Should Be Stopped a. RCS pressure – GREATER THAN 250 b. Stop RHR pumps **AND** place in standby
	BOP	16. Verify All 4KV Buses (3A, 3B, 3C & 3D) – ENERGIZED BY OFFSITE POWER
	BOP	17. Verify Ruptured S/G(s) – ISOLATED FROM INTACT S/Gs • Ruptured S/G(s) Main Steamline Isolation And Bypass Valves - CLOSED • Ruptured S/G(s) AFW Steam Supply MOV(s) - CLOSED

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 6 Page 29 of 32

Event Description: 3C S/G ruptured (600 gpm, 2 minute ramp) & faulted (inside containment, initiated upon turbine trip). Failure of Containment Spray to auto actuate and failure of 3C ECC to auto start. AFW Steam Supply Valve, MOV-3-1403, fails to auto open. The crew enters 3-EOP-E-0 transitioning to 3-EOP-E-2 and then to 3-EOP-E-3.

Time	Position	Applicant's Actions or Behavior
	SRO	18. Check Ruptured S/G(s) Pressure – GREATER THAN 500 PSIG - **NO** **RNO** Go to 3-EOP-ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED, Step 1.
	US	Conducts EOP transition brief
		SCENARIO IS CONCLUDED ANY TIME AFTER COMPLETION OF 3-EOP-FR-P.1 (EVENT 7) AND BEFORE ENTRY INTO 3-EOP-ECA-3.1 AT LEAD EXAMINER DIRECTION

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 7 Page 30 of 32

Event Description: The s/g fault causes an RCS cool down. The crew performs 3-EOP-FRP-P.1 if RCS cold leg temperature < 320°F for orange path and < 290°F for red path.

Time	Position	Applicant's Actions or Behavior
		3-EOP-FR-P.1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION
		C A U T I O N *If CST level decreases to less than 10%, makeup water sources for the CST will be necessary to maintain secondary heatsink.*
	US	**Directs response per 3-EOP-FR-P.1**
		NOTE: *Containment conditions are adverse. Use adverse containment values.*
	RO	1. Check RCS Pressure – GREATER THAN 250 PSIG [650 PSIG] **NOTE:** *If RCS pressure < [650]psig, RHR flow will be < 1000 gpm so crew will remain in this procedure*
		C A U T I O N S • *Low range flow indication is NOT available when using main feedwater instrumentation and an alternate source of feedwater. Changes in RCS temperature and S/G level may be used to control feedwater flow.* • *If the AFW pumps are the only available source of feed flow, the steam supply to the AFW pumps needs to be maintained from at least one S/G.*
		NOTE *If RCPs are NOT running and Steps 19 through 28 of 3-EOP-E-3, STEAM GENERATOR TUBE RUPTURE, are in effect, this procedure shall not be performed.*
	RO BOP	2. Determines RCS Cold Leg Temperatures not STABLE OR INCREASING. Try to stop RCS cooldown per RNO: a. Verify S/G steam dump to atmosphere valves – CLOSED. b. Verify steam dump to condenser valves – CLOSED c. Substep c not applicable d. Control feed flow to non-faulted S/G(s) to stop RCS cooldown. Maintain total feed flow greater than 345 gpm until narrow range level greater than 6% [32%] in at least on e non-faulted S/G.

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 7 Page 31 of 32

Event Description: The s/g fault causes an RCS cool down. The crew performs 3-EOP-FRP-P.1 if RCS cold leg temperature < 320°F for orange path and < 290°F for red path.

Time	Position	Applicant's Actions or Behavior
		NOTE *A faulted S/G is any S/G that is depressurizing in an uncontrolled manner or is completely depressurized.*
		3. Minimize Cooldown From Faulted S/G(s)
	BOP	a. Determines 3C s/g faulted
	RO	b. Determines RCS cold leg temperatures – DECREASING
	BOP	c. Identifies main steamline isolation and bypass valves closed for 3C S/G
	RO	d. Verify SI - RESET
	US/BOP	e. Verifies steam supply aligned to both trains of AFW pumps from intact S/G(s). If train 1 AFW steam supply not yet realigned to 3B s/g, directs SO to open AFSS-3-007 and close AFSS-3-006.
	US/BOP	f. If MOV-3-1405 not already closed & deenergized, directs SO to open breaker 3D01-27 then locally close MOV-3-1405
	BOP	g. Check all S/Gs – ANY S/G **NOT** FAULTED (3A & 3B s/g's)
		h. Substep h. not applicable
		i. Isolate feedwater to all faulted S/G(s) **NOT** needed for RCS temperature control – done in 3-EOP-E-0
		4. Check PZR PORV Block Valves
	RO	a. Power to block valves – AVAILABLE
		b. Block valves – AT LEAST ONE OPEN
		CAUTION *If any PRZ PORV opens because of high PRZ pressure, step 5 should be repeated after pressure decreases to less than the setpoint.*
		5. Check If PZR PORVs Should Be Closed
	US	a. Determines Overpressure Mitigation System (OMS) not in service. User directed to substep d.
	RO	d. Check PZR pressure – LESS THAN 2335 PSIG
	RO	e. PZR PORVs - CLOSED
	RO	6. Determines both U3 High-Head SI Pumps RUNNING

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 7 Page 32 of 32

Event Description: The s/g fault causes an RCS cool down. The crew performs 3-EOP-FRP-P.1 if RCS cold leg temperature < 320°F for orange path and < 290°F for red path.

Time	Position	Applicant's Actions or Behavior
	US/RO	7. Determines SI should not be terminated • RCS subcooling based on core exit TCs < 80°F [260°F] • User directed by RNO to Step 27.
	US/RO	27. Determines an RCP should not be started • Determines all RCPs STOPPED • RCS subcooling based on core exit TCs < 30°F [210°F] • User directed by RNO to Step 32
	US	32. Determines RCS Temperature Soak is Required a. Cooldown rate in RCS cold legs – GREATER THAN 100°F IN ANY 60-MINUTE PERIOD b. Perform all of the following 1) Record start time of soak: _____ 2) Do **NOT** cool down RCS until temperature has been stable for 1 hour 3) Do **NOT** increase RCS pressure during the 1 hour soak 4 Perform actions of other procedures in effect which do **NOT** cool down **OR** increase RCS pressure until the RCS temperature soak has been completed 5) RCS cooldown is permitted after 1 hour soak has been completed 6) Maintain RCS pressure **AND** cold leg temperatures within the limits of FIGURE 1 7) Maintain cooldown rate in RCS cold legs less than 50°F in any 60-minute period during subsequent recovery actions
	SRO	33. Return To Procedure **AND** Step In Effect
		SCENARIO MAY BE TERMINATED ANY TIME AT LEAD EXAMINER DIRECTION AFTER COMPLETION OF 3-EOP-FR-P.1

OPERATIONS SHIFT TURNOVER REPORT

UNIT 3	ONCOMING CREW ASSIGNMENTS	UNIT 4
Unit Supervisor:	Shift Manager:	Unit Supervisor:
Reactor Operator:	Watch Engineer	Reactor Operation:
Secondary Operator:	Admin RCO:	Secondary Operator:
	Primary Operator:	

UNIT 3	PLANT STATUS	UNIT 4
Mode 1		Mode 1
Power (%) 75		Power (%) 100
MWe 556		MWe 759
Gross Leakrate: 0.05		Gross Leakrate: 0.08
Boron (ppm): 541		Boron (ppm): 600

Hot Items List and Short Term Equipment Concerns:

3C Charging pump - motor ground
3B2 Circ water pump - breaker 3AB18 failed
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

U3 Current \ Anticipated LCO Actions:

3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

U4 Current \ Anticipated LCO Actions:

CURRENT: None

ANTICIPATED: None

Results of Offgoing Focus Area

See G:\Ops\Common\0900

UNIT 3 IN THE FIELD

PRIMARY OPERATOR:

Equipment Status Problems:

3C Charging pump - motor ground
3C RCP lower motor guide bearing temp detector failed high.
RWST level 322k gal.

Evolutions or Compensatory Actions In Progress:

Continue load increase per 3-GOP-301 to 100% power after shift turnover.
Add 5000 gal to RWST after shift turnover.

General Info/Remarks:

Thunderstorms in area.

SECONDARY OPERATOR:

Equipment Status Problems:

3B2 Circ water pump - breaker 3AB18 failed
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.

Evolutions or Compensatory Actions In Progress:

Continue load increase per 3-GOP-301 to 100% power after shift turnover.
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Info/Remarks:

Thunderstorms in area.

UNIT 3 CONTROL ROOM

Abnormal Annunciators:

3-8/3 STEAM DUMP ARMED/ACTUATED - Condenser steam dump control selected to MANUAL.

Equipment Status/Problems:

3C Charging pump - motor ground
3B2 Circ water pump - breaker 3AB18 failed
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high.
RWST level 322k gal. Need to add 5k gal after shift turnover.

Changes to Risk Significant Equipment:

OLRM already run run for OOS equipment.

Upcoming Reactivity Management Activities

Increase turbine / reactor power from 75% to 100%.
5000 gal blend to RWST after shift turnover.

Upcoming Major POD Activities:

Increase turbine / reactor power from 75% to 100%.
Repair 3C charging pump & 3B2 CWP breaker 3AB18
Continue troubleshooting TC-3-408H

Upcoming ECOs to Hang and / or Releases:

HANG none

RELEASE none

Evolutions or Compensatory Actions in Progress:

Continue load increase to 100% power after shift turnover. 3-GOP-301 complete thru step 5.96.
3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control in MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.
Add 5000 gal to RWST after shift turnover.

General Information, Remarks, and Operator Work Around Status:

Thunderstorms in the area.
Returning to power from turbine valve test.

Facility: Turkey Point Scenario No.: 2 Op Test No.: 2005-301

Examiners: _____ Candidates: _____ US

_____ _____ RO

_____ _____ BOP

Initial Conditions: Mode 1, 75% Power, MOL, 3-GOP-301 in use complete through step 5.96 for return to 100% power following a turbine valve test.

Turnover: Equipment OOS: 3C Charging Pump for motor ground; Condenser Steam Dump mode selector switch selected to MANUAL (Steam Pressure) due to a problem with TC-3-408H, (Tave input to Turbine Trip Summator), 3B2 Circ Water Pump is secured to repair breaker 3AB18.

Need to add 5000 gallons of borated water to RWST immediately after shift turnover. Field operators to support this have been briefed and are on station in the Auxiliary Building.

There are thunderstorms in the area.

Known tube leak in 3C S/G (8 gpd) – unchanged for last week. Chemistry samples are being taken per 3-ONOP-071.2, Attachment 1. The current sample, just completed indicates no significant change in leak rate. MOV-3-1405 remains open at management direction due to small size and stability of tube leak rate.

Event No.		Event Type*	Event Description
1	TAMHTMRT = 2650000.0 TABM365B=1.0	(N) RO (N) SRO	Make up 5000 gallons of borated water to RWST. (0-OP-046 section 7.5)
2	TFH1TV60=T	(I) RO (TS,I) SRO	Pressurizer level channel, LT-3-460, fails low.
2a	-	(N) RO (N) SRO	Restore normal letdown and PZR heaters following LT-3-460 failure.
3	V8CI29ON=T TVKKB1=0.34	(C) BOP (C) SRO	Circ water pump 3B1 motor bearing high temperature. (Must lower reactor power to < 60% & secure SJAE suction before securing pump per 3-OP-010)
4	-	(R) RO (N) BOP (R) SRO	Decrease power to 60%.
5	TFE2D10T=T	(TS) SRO	Loss of 3D Load Center (3AB14 opens).
6	TFH1TU44=T TVHV455C= 0.065 TFHV536F=T	(C) RO	PZR pressure control channel PT-3-444, fails high. PORV PCV-3-455C opens. When PORV is manually closed by operator it leaks by. MOV-3-536 block valve will not close if attempted by operator. This results in a very slow, but steady, pressure decrease. Manual reactor trip when determined PZR pressure cannot be maintained > 2000 psig.
7	TVHV455C=1.0 TFL2XASE=T TFL2XBSE=T TFL4AF=T	(M) ALL (C) BOP	SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication). Locally open RTBs after Emergency Boration flow established and field operator dispatched.
7a	TFQ6A4BF=T	(M) ALL (C) RO	Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

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

Turkey Point 2005-301 Scenario #2

Event 1 - Make up 5000 gallons to the RWST. (0-OP-046 section 7.5)

Event 2 - Pressurizer level channel, LT-3-460, fails low.

Event 2a - Restore normal letdown and PZR heaters following LT-3-460 failure.

Event 3 – Circ water pump 3B1 motor bearing high temperature. (Must lower reactor power to < 60% & secure SJAE suction before securing the pump per 3-OP-010)

Event 4 – Decrease power to < 60%.

Event 5 – Loss of 3D Load Center (3AB14 opens).

Event 6 – PZR pressure control channel PT-3-444 fails high. PORV PCV-3-455C opens. When PORV is manually closed by operator it leaks by. MOV-3-536 block valve will not close if attempted by operator. This results in a very slow, but steady, pressure decrease. Manual reactor trip when determined PZR pressure cannot be maintained > 2000 psig.

Event 7 – SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication). Locally open RTBs after Emergency Boration flow established and field operator dispatched.

Event 7a – Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Scenario XXII NRC 2

Simulator Operating Instructions

Setup

IC-16 (75% MOL)

Place simulator in run.

Take Steam Dump to Condenser Mode Selector Switch → MANUAL

Secure 3C Charging Pump and ensure 3A & 3B are running in AUTO.

Stop 3B2 Circulating Water Pump (pump trips when discharge valve closes)

Trigger lesson steps:
SETUP - 3C CHG PP OOS (actuates TAB1POSN = 3)
SETUP - 3B2 CWP OOS (actuates TAK4DP = 3)
SETUP - REDUCE RWST LEVEL 5K GAL (actuates TAMHTMRT = 2650000.0)
SETUP - 3C SG 8 GPD LEAK (actuates TVHHSGC = 0.000005)
SETUP - ATWS WITH AMSAC FAILED (actuates TFL4AF = T, TFL2XBSE = T & TFL2XASE = T)
SETUP - 3A ECC SEQ RELAY FAILURE (actuates TFQ6A4BF = T)

Place simulator in run.

Acknowledge any alarms and place simulator in freeze.

Place caution tag on steam dump mode selector switch and clearance info tags on 3C charging pump & 3B2 circ water pump control switches.

Provide shift turnover checklists, 0-OP-046 Att 5 reactivity worksheet (75→100%), 0-OP-046 section 7.5, 3-ONOP-071.2 Att 1 and 3-GOP-301 signed off through step 5.96.

Select 3A QSPDS to page 211 (SAT) and 3B QSPDS to page 212 (RVL). Set ERDADS on VPA to Tavg/Tref (TAV) and at the RCO desk to ENVRN (ED3).

Fill in blender & shutdown boron addition placards at console blender station. Data for each IC may be found in the ECC & Shutdown Guidelines Book in the simulator I/F.

Event 1 – Make up to RWST (5000 gal)

Initiated by crew per shift turnover *using 0-OP-046 sect 7.5.*

Respond as PO when asked to verify valve 3-356 closed and open valves 3-365A & B. Wait 1-3 min & **trigger** lesson step **EVENT 1 - ALIGN CVCS M/U TO RWST** (actuates TABM365B = 1.0). *Note that only 3-365B is modeled.* Report 3-356 closed and 3-365A & B open when complete.

When make-up complete, respond as PO when asked to close 3-365A & B. Wait 1-3 min & **trigger** lesson step **EVENT 1 - SECURE CVCS M/U TO RWST** (actuates TABM365B = 0.0).

Respond as Chemistry is called regarding RWST sampling by stating that last RWST boron concentration = 2085 ppm.

Event 2/2a – LT-3-460 (channel II PZR level) fails low / letdown & PZR heater restoration

Following establishment of RWST makeup flow, trigger lesson step **EVENT 2 - PZR LEVEL LT-3-460 FAILS LOW** (actuates TFH1TV60 = T).

Crew will need to reinitiate letdown & restore PZR heaters per 3-ONOP-041.6 (trip bistables per 3-ONOP-049.1).

Respond as OCC/WCC/FS if called about LT-3-460 troubleshooting & repair.

Event 3 – 3B1 CWP loss of lube oil / motor bearing failure

After crew brief thrown for LT-3-460 failure and letdown restored, at lead examiner direction, trigger lesson step **EVENT 3 - 3B1 CWP BRNG HOT** (actuates V8CI29ON = T). *This actuates annunciator I-2/4.*

Respond as SO if asked to check out 3B1 CWP. Report that the lower motor bearing oil sight glass is nearly empty and bearing temp is 225°F and slowly increasing (increase from last set of rounds). Recommend shutting down pump as soon as possible.

If crew does not take action to reduce load in a timely fashion, **trigger** lesson step **EVENT 3 - 3B1 CWP BRNG FAIL** (actuates TVKKB1 = 0.34 on 3 min. ramp). This will slowly increase pump amps to bring in 3B1 CWP overload alarm (I-2/1) without tripping pump.

Before pump is shut down per 3-OP-010 sect 6.2, respond as SO to close valves 3-30-003 & 005. Wait 1-3 min & **trigger** lesson step **EVENT 3 - CLOSE SJAE SUCTIONS 3-30-003 / 005** (actuates TAFB003 = 0.0 on 30 sec ramp & TAFB005 = 0.0 on 30 sec ramp after 1 min delay).

During 3B1 CWP shutdown, respond if asked as SO and report satisfactory closure of SV-3-1414 (liquid radwaste dischg).

Respond as SO if directed to open waterbox cathodic protection breakers (no sim IF action).

Respond as SO if directed to secure aux stm & vent priming jets. Wait 1-3 min and **trigger** lesson step **EVENT 3 - SECURE AUX STM AND VENT PRIMING JETS** (actuates TAKKV66 = 0.0 on 20 sec ramp, TAKKV81 = 0.0 on 20 sec ramp after 40 sec delay, TAKKV63 = 1.0 on 20 sec ramp after 80 sec delay & TAKKV78 = 1.0 on 20 sec ramp after 2 min delay).

Respond as OCC/WCC/FS if called about 3B1 CWP troubleshooting & repair.
If directed, respond as SO to rack out breaker 3AB16. Wait 8-12 min, then **trigger** lesson step **EVENT 3 - RACK OUT 3B1 CWP BKR** (actuates TAK4CP = 3).

Event 4 – Power reduction to 60%

Performed per 3-OP-010 sect 6.2 *due to the need to secure 3B1 CWP with 3B2 CWP already tagged out.*

Crew should use 3-ONOP-100 given impending failure of 3B1 CWP from event 3.

Respond as System if called.

Crew may secure makeup to RWST to support RCS boration. See event 1 instructions for directions on securing CVCS m/u to RWST.

Event 5 – Loss of 3D 480V LC

At evaluator direction after 5-10% power reduction, trigger lesson step **EVENT 5 - LOSS OF 3D LC** (actuates TFE2D10T = T). *This opens breaker 3AB14, deenergizes 3D 480V LC, 3K MCC (EDGs), 3M MCC (swgr) & D NV MCC (loss of normal control room lighting) and transfers 3H 480V LC supply to 3C 480V LC.*

Respond as SO if asked about breaker 3AB14 & report breaker tripped without relay actuation visible at 3B 4kV bus. An overcurrent relay is visible on the 3D 480V LC.

Respond as OCC/FS/WCC regarding troubleshooting & repair of 3AB14. Report that the breaker is open but stuck in the racked-in position.

Do not fix this malfunction before the end of the scenario.

Event 6 – PT-3-444 fails high, PORV-3-455C leaks by, MOV-3-536 fails open & PZR steam space leak

After crew brief on 3D 480V LC loss, trigger lesson step EVENT 6 - PT-3-444 FAILS HIGH, PZR STEAM SPACE LEAK (actuates TFHV536F = T, TVHV455C = 0.065 after 2 sec delay & TFH1TU44 = T).

Crew will respond per 3-ONOP-041.5 by closing PORV PCV-3-455C however leakage (20-25 gpm) is still indicated by acoustic monitor and slowly decreasing PZR pressure. The crew tries to close MOV-3-536 but it is failed open. Spray valves PCV-3-455A/B will need to be manually closed but will not completely stop the pressure decrease before an automatic rx trip occurs. PC-3-444J will respond to manual control.

Respond as OCC/WCC/FS for PT-3-444 troubleshooting & repair. Respond if called regarding MOV-3-536, but do not fix this problem during the scenario.

When it becomes evident that PZR pressure can not be maintained >2000 psig, the crew will attempt to manually trip the reactor.

Events 7/7a – ATWS / PZR steam space LOCA / 3B 4kV bus on 3B EDG

*Per 3-ONOP-041.5 in event 7 due to PZR pressure not maintainable > 2000 psig, the crew will unsuccessfully attempt to trip the reactor. At this point, the **ATWS from setup** becomes evident.*

Immediately after discovery of the ATWS, trigger lesson step EVENT 7 – PZR STM SPACE SBLOCA (actuates TVHV455C=1.0). This will fail the leaking PORV completely.

The EOP network is entered at 3-EOP-E-0 with immediate transition to 3-EOP-FR-S.1.

Respond as SO when directed to locally open RTBs & rod drive MG set output breakers (AMSAC fails to respond from setup).

The loss of 3D 480V LC tripped 3B rod drive MG set, but 3A rod drive MG set is still running thus rods do not fall in.

Once emergency boration is established, trigger lesson step EVENT 7 - LOCALLY OPEN RTBs AND MG SET OUTPUT BKRS (actuates TFL2XBSE = F, TFL2XASE = F after 15 sec delay, TCE6DQ7C = F after 30 sec delay & TCE6DQ8C = F after 45 sec delay).

Note that all train B loads are stripped since the loss of 3D 480V LC placed the 3B sequencer in the LOOP/LOCA mode. Only 3A RCP remains running, so 3A S/G ADV & safeties carry the ATWS decay heat removal load since MSIVs are closed (loss of 3D 480V LC caused a loss of all turbine valve position indication preventing turbine trip verification).

When directed as SO, align PAHM per 3-OP-094. Wait 10-15 min **then trigger lesson step EVENT 7 - ALIGN PAHM** (actuates TAC2V02A = 1.0, TAC2V02B = 1.0, TAAAV21 = 1.0, TAAAV22 = 1.0 & TACA005 = 0.0). Report when complete.

Respond as Chemistry/HP regarding S/G sampling & surveys. Report no contamination.

When 3-EOP-E-1 step 14 is reached, insert additional leakage as needed (use any RCS leak node to ensure RCS pressure is stable/decreasing at that point).

Respond as SO/PO/FS when directed to close in cold leg recirc breakers. Wait 1-3 min, then **trigger lesson step EVENT 7 - CLOSE CL RECIRC BKRS** (actuates TCM2D06M = T, TCM1D09M = T after 5 sec delay, TCM2D04M = T after 15 sec delay, TCM1D11M = T after 20 sec delay, TCM1D03M = T after 30 sec delay, TCM1D04M = T after 35 sec delay, TCM1D10M = T after 45 sec delay, TCM2D05M = T after 50 sec delay, TCM1D12M = T after 60 sec delay & TCM2D03M = T after 65 sec delay).

Respond affirmatively as PO when asked to verify containment spray & charging pump room doors closed.

Respond as HP when directed to survey pipe & valve and electrical penetration rooms for radiation.

Respond as Chemistry when directed to align PASS for on-line sampling/analysis of the RCS.

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Event Description: Make-up 5000 gal of borated water to RWST. (0-OP-046, section 7.5)

Time	Position	Applicant's Actions or Behavior
	US	Directs RCO to initiate a borated make-up of 5000 gallons to the RWST per 0-OP-046, section 7.5.
	RO	Obtains copy of 0-OP-046, section 7.5. Performs actions as follows: 1. Verifies initial conditions are met. 2. Determines desired boric acid (BA) and primary water (PW) flows and volumes needed to achieve desire blend concentration. *NOTE: Chemistry, when called, will say RWST boron concentration is 2085 ppm. 50 gpm primary water & 33 gpm boric acid blended flow for 1 hour will yield 5000 gal blend with this boron concentration.* 3. Verifies closed the following valves: FCV-3-113B, FCV-3-114B. Directs PO verify closed manual valve 3-356. 4. Places FCV-3-113B & FCV-3-114B control switches to CLOSE. 5. Verifies MOV-3-350 is closed. 6. Places RCS M/U Control Switch to STOP 7. Directs PO unlock and open manual valve 3-365A and open manual valve 3-365B to M/U to the RWST. 8. Places Rx M/U Selector Switch in BORATE. 9. Adjusts FCV-3-113A controller auto setpoint for desired BA flow. 10. Places controller for FCV-3-114A in MANUAL. Adjusts output controller demand to zero 11. Places control switch for FCV-3-113A in AUTO. 12. Sets BA Totalizer and PW Totalizer to desired volumes. 13. Places a BA Pump in AUTO. 14. Turns RCS M/U control switch to START & verifies red START light energized. 15. Places control switch for FCV-3-114A in OPEN and adjusts associated flow controller to desired PW flow. 16. Verifies proper flow by observing RWST level increase and BAST and PWST tank levels decrease. 17. Adds 5000 gallons to borated water to the RWST.

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Event Description: Make-up 5000 gal of borated water to RWST. (0-OP-046, section 7.5)

Time	Position	Applicant's Actions or Behavior
	RO	After 5000 gallons added to RWST, performs the following actions per 0-ONOP-046 section 7.5: 1. Resets PW Totalizer 2. Opens FCV-3-114A 3. When approx. 100 gal.PW added, close FCV-3-114A 4. Closes FCV-3-114A. 5. Directs PO close and lock manual valve 3-365A and close manual valve 3-365B. 6. Realigns CVCS system for auto M/U per section 5.1. 7. Identifies need to recirc RWST 24 hours and then have Chemistry take a sample to verify boron concentration.
	BOP	Monitors plant parameters. Assists RCO as needed or directed.

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Event Description: Pressurizer level channel, LT-3-460, fails low. Restore normal letdown and PZR heaters following LT-3-460 failure.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports failure of LT-3-460. • Annunciators A-8/4, PZR LO-LO LEVEL ALERT, A-9/4, PZR LO LEVEL / HEATER OFF / LETDOWN SECURED & B-3/1 PZR HEATER CONTROLLER FAN OFF • LI-3-460 fails low • Letdown isolates (LCV-3-460 & CV-3-200's all close) • PZR heaters deenergize • Charging flow increases in AUTO Responds as directed by the US. Performs immediate actions of 3-ONOP-041.6: 1. Compares level to LT-3-459/461 & verifies LT-3-460 off-normal 2. Checks pressurizer level indicators and selects channel I/III for PZR level control. 3. Checks pressurizer level following program per 3-ONOP-041.6, Enclosure 1 or place LC-3-459F/individual charging pump controllers in manual. (May stop one charging pump.)
	US	Directs response per 3-ONOP-041.6
	RO	Performs subsequent actions of 3-ONOP-041.6 as directed by US: 1. Ensures LR-3-459 selected to channel I or III. 2. Restores letdown. a) Throttles PCV-3-145 to approx 50% open b) Manually controls PCV-3-145 to limit pressure spike c) Opens LCV-3-460 d) Opens CV-3-200A/B/C as directed e) Returns PCV-3-145 to AUTO
	BOP	Assists RO with restoration of letdown as directed by US
	RO	Continues performing subsequent actions of 3-ONOP-041.6 as directed by US: *NOTE: Step 5.4 is not applicable*

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Event Description: Pressurizer level channel, LT-3-460, fails low. Restore normal letdown and PZR heaters following LT-3-460 failure.

Time	Position	Applicant's Actions or Behavior
		1. Restores normal pressurizer heater control by turning control group heater control switch to ON (spring returns to AUTO). 2. Maintains pressurizer level on program per 3-ONOP-041.6, Enclosure 1. *NOTE: Step 5.7 directs transition to 3-ONOP-049.1*
	US	Directs compensatory action IAW 3-ONOP-049.1: 1. Verifies RCO determination of PZR LT status. 2. Verifies LT-3-460 selected out and letdown/PZR heaters restored 3. Verifies LT-3-459/461 normal 4. Refers to T.S. 3.3.1, for PZR level, Action 13 applies and that bistables need to be tripped within next 6 hrs. *NOTE: Steps 5.5 thru 5.8 not applicable* 5. Determines which bistables to trip (BS-3-460A1/2 in rack 11) and effects on plant of tripping bistables. Provides crew brief including this info for RCO/BOP guidance. 6. Verifies correct indication received for each bistable tripped. *NOTE: Steps 5.10 thru 5.12 not applicable* 7. Ensures I&C is notified of LT-3-460 failure and PWO initiated.
	BOP	Monitors plant parameters and assists RCO as directed by US. Obtains keys, proceeds to protection rack 11 and trips bistables IAW 3-ONOP-049.1. 1. BS-3-460A-1 2. BS-3-460A-2

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Event Description: Circ water pump 3B1 motor bearing high temperature. (Must lower reactor power to <60% & secure SJAE suction before securing pump per 3-OP-010).

Time	Position	Applicant's Actions or Behavior
	US	Directs BOP to review and perform 3-ARP-097.CR for annunciator I-2/4. Dispatches SO to check pump status
	BOP	Acknowledges alarm I-2/4. Perform actions of 3-ARP-097.CR for annunciator I-2/4. 1. There are no Control Room actions to perform since all indications are local. 2. Calls SO to check out Circ Water Pump 3B1. • Bearing temp TS-3-4113, TS-3-4114, or TS-3-4115 • Bearing oil level. • Pump/motor vibration/noise. 3. Relays report from SO that bearing temps ≥225°F and slowly increasing with bearing oil sight glass nearly empty 4. Notes that if bearing temp >224°F, local monitoring required and if > 248°F then stop CWP 3B1 per 3-OP-010.
	US **CRITICAL**	Reviews and directs actions per 3-OP-010. **Notes need to reduce power to < 60% and secure SJAE (due to CWP 3B2 not available) in order to stop the pump <u>and</u> not lose Main Condenser vacuum.** Directs RCO and BOP to reduce power to < 60%. **(See next event for power change details.)** Directs BOP to have SO secure SJAE isolation valves **<u>after</u>** power is reduced to < 60%. Directs BOP to secure CWP 3B1 **<u>after</u>** power is below 60% AND **<u>after</u>** SJAE isolation valves are shut.
	BOP	If crew does not decrease load in a timely fashion, annunciator I-2/1 CWP B1/B2 MOTOR OVERLOAD ALARM will alarm on high current without automatically tripping the pump. If alarm comes in, BOP reports this alarm and consults 3-ARP-097.CR Prepares for load decrease per US direction. **(See next event for power change details.)**

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Event Description: Circ water pump 3B1 motor bearing high temperature. (Must lower reactor power to <60% & secure SJAE suction before securing pump per 3-OP-010).

Time	Position	Applicant's Actions or Behavior
	RO	Monitors plant parameters. Assists BOP as needed or directed. Prepares for load decrease per US direction. **(See next event power change details.)**
	BOP	Performs actions of 3-OP-010 scetion 6.2 as directed by US: 1. **After** power is < 60%, calls SO to close SJAE isolation valves 3-30-003 & 3-30-005. 2. **After** above valve are closed, directs SO to listen for SV-3-1414 closure at the discharge seal wells *NOTE: Steps 6.2.2.3 & 6.2.2.4 not applicable* 3. Places 3B1 CWP control switch to STOP. 4. Verifies 3B1 CWP stops when discharge MOV approx 5% open. 5. Verifies 3B1 CWP dischg MOV fully closes after pump stops. 6. Directs SO verify 3B1 CWP not rotating backwards 7. Determines main condenser vacuum using PI-3-1612 (console), PI-3-1406 (VPA) & ERDADS. Provides info to US. *NOTE: Steps 6.2.2.10 thru 6.2.2.14 not applicable* 8. Directs SO report SV-3-1414 position 9. Directs SO open Waterbox Cathodic Protection System breakers 10. Directs SO isolate aux steam to aux priming ejector and open vent valves on vacuum tanks B & D
	US	Verifies Main Condenser Vacuum above minimum per 3-ONOP-014 Encl 1 limits using PI-3-1612, PI-3-1406 and ERDADS after 3B1 CWP s/d Directs OCC/WCC arrange for troubleshooting & repair of 3B1 CWP.

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Event Description: Decrease reactor power to < 60%.

Time	Position	Applicant's Actions or Behavior
	US	Ensures load dispatcher notified of load decrease. Conducts crew brief per foldout page. Notifies SM to review 0-EPIP-20101 & 0-ADM-115 and ensure required notifications made Directs power reduction IAW 3-ONOP-100 using boration and/or control rods including boric acid (BA) amount & flow rate
	BOP	Notifies load dispatcher of load reduction when directed by US Makes plant page announcement regarding load reduction
	RO	If RWST M/U still in progress (most likely), then stops M/U and realigns system for boration. (See Event 1 for actions.) Performs fast load reduction by initiating boration per 0-ONOP-100 and/or control rod insertion per US direction. 1. Sets BA Totalizer to amount directed 2. Places Rx M/U Selector Switch to BORATE 3. Places Rx M/U Control Switch to START 4. Sets FC-3-113A consistent with BA flow rate directed 5. When boration complete, places Rx M/U Selector Switch to AUTO & Rx M/U Control Switch to START
	BOP	Reduces turbine load per 3-ONOP-100 at rate directed by US.
	RO	Performs fast load reduction per 3-ONOP-100 as directed by US: 1. Verifies auto rod insertion in response to turbine load reduction. 2. Reports control rod RIL annunciators (B-8/1 & B-8/2) if alarming. a. If B-8/1, reduces rate of power reduction to avoid B-8/2 b. If B-8/2, places rods in MANUAL until rods ~ 10 steps > RIL 3. Starts 2nd charging pump & places 2nd letdown orifice in service if not yet restored from event 2. Verifies PZR level on program. 4. Determines NRHX CCW flow already increased (from setup) 5. Energizes PZR backup heaters.
	RO/BOP	Maintains Tref within 5°F of Tavg.
	RO/BOP	Terminate load reduction at power level specified by US

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Event Description: PZR pressure control channel PT-3-444, fails high. PORV PCV-3-455C opens. When PORV is manually closed by operator, it leaks by. MOV-3-536 block valve will not close if attempted by operator. This results in a very slow, but steady, pressure decrease. Manual reactor trip when determined Rx pressure can not be maintained > 2000 psig.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator F-7/4 (480V XFMR A/B/C/D LO VOLTAGE).
	Crew	Determines based on annunciator received, loss of Control Room lighting, and breaker 3AB14 indication that a loss of 3D Load Center has occurred.
	US	Directs BOP to perform actions of 3-ARP-097.CR for annunciator F-7/4.
	RO	Monitors plant parameters and assists BOP as directed by US.
	BOP	Reviews and performs actions of 3-ARP-097.CR for annunciator F-7/4. 1. Verifies alarm by checking load center voltmeters (VPA). 2. Checks voltmeters on load centers, 4160V bus (console) and 240kV bus (VPA). 3. Identifies breaker 3AB14 tripped open. 4. Sends SO to check out 3AB14. (Open but will not rack out) 5. Determines 3D load center cannot be restored based on SO report. (Overcurrent relay target visible on LC.) 6. Informs US of need to notify Elec. Dept, Load Dispatcher, and Station Area Ops. 7. Informs US to refer to T.S. 3.8.3.1 for additional actions.
	US	Calls OCC/Elec. Dept, Load Dispatcher, and Station Area Ops. re: loss of 3D load center. Evaluates 3D 480V LC loads lost using breaker book

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Event Description: PZR pressure control channel PT-3-444, fails high. PORV PCV-3-455C opens. When PORV is manually closed by operator, it leaks by. MOV-3-536 block valve will not close if attempted by operator. This results in a very slow, but steady, pressure decrease. Manual reactor trip when determined Rx pressure can not be maintained > 2000 psig.

Time	Position	Applicant's Actions or Behavior
	US	Refers to Technical Specifications 3.8.3.1. Loss of 3D 480V LC. Determines Action a. applies. Reenergize LC within 8 hrs or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 30 hrs. 3.8.1.1. 3B EDG inoperable due to loss of 3K MCC. Determines Action b. applies. Restore 3B EDG within 14 days or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 30 hrs. *NOTE: 3B EDG will start & load and run as long as fuel is available in day tank. No capability to refill day tank.* 3.6.2.1 Loss of 3B CSP. Determines action a. applies. Restore 3B CSP within 72 hrs or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 30 hrs. 3.6.2.2 Loss of 3B ECC. Determines action a. applies. Restore 3B ECC within 72 hrs or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 30 hrs. 3.6.3 Loss of 3B ECF. Determines action applies. Restore 3B ECF within 7 days or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 30 hrs. 3.4.3 Loss of group B PZR backup heaters. Determines Action a. applies. Restore group B backup heaters within 72 hrs or be in at least HOT STANDBY within next 6 hrs and in COLD SHUTDOWN within following 6 hrs.

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Event Description: Loss of 3D Load Center (3AB14 opens).

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports RCS and PZR pressure decreasing. • PZR pressure control channel PT-3-444 indicate failed • PORV PCV-3-455C indicates open with no actual high pressure condition • Annunciator A-4/1, PORV/SAFETY VALVE OPEN • Annunciator A-7/2, PZR PORV HI TEMP • Annunciator A-9/2, PZR CONTROL HI/LO PRESS • Annunciator A-9/5, PZR PRESSURE CONTROLLER HI OUTPUT
	US	Directs RO perform 3-ONOP-041.5 immediate actions *NOTE: FOP item 1 implemented during IOAs*
	RO	Responds as directed by the US. Performs immediate actions of 3-ONOP-041.5: 1. Compares PZR pressure PTs. Determines PT-3-444 failed. 2. Identifies PORV PCV-3-455C open and manually closes valve. 3. Manually controls PC-3-444J (to close PZR spray valves) 4. Determines PT-3-445 not failed 5. Determines both PORVs indicate closed 6. Checks PZR spray valves closed. Since PZR pressure < normal: a. Places PCV-3-455A in MANUAL and CLOSE. b. Places PCV-3-455B in MANUAL and CLOSE. c. Verifies CV-3-311 (Aux Spray) is CLOSED.
	US	Directs RO perform 3-ONOP-041.5 subsequent actions & actions of FOP item 3 if PORV leakage diagnosed before step 14. When determined PZR pressure not maintainable > 2000 psig, directs rx trip and enters 3-EOP-E-0 per step 11 or FOP item 2.

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Event Description: Loss of 3D Load Center (3AB14 opens).

Time	Position	Applicant's Actions or Behavior
	RO	1. Determines safety valves closed (tailpipe temperatures normal), but notes one row of PZR acoustic monitors lit (*steps 4 & 15*) 2. Determines/reports PZR pressure < normal & slowly dropping. *NOTE: Step 6 RNO sends user to step 10.* 3. Reports when PZR pressure < 2000 psig 4. Determines PZR control & group A b/u heaters on. PZR group B b/u heaters off due to loss of 3D 480V LC. Cannot maintain pressure with loss of one b/u heater group and leaking PORV. 5. Determines PORV leaking using PORV tailpipe temperature (TI-3-463), slowly increasing PRT parameters & one row of acoustic monitor LEDs lit. *NOTE: PORV isolation may be performed per step 14 or at any time after PORV leakage diagnosis per foldout page item 3.* 6. If directed, closes MOV-3-535. When valve closed, reports continued indication of PORV leakage. Re-opens MOV-3-535. 7. Attempts to close MOV-3-536. Recognizes/reports MOV-3-536 will not close. 8. Recognizes/reports continued drop in PZR pressure. Determines cause to be leaking PORV & not PZR safety *NOTE: Step 18 RNO sends user to step 20. Since PZR pressure continues to drop, step 20 RNO returns user to step 5.*
	US	Directs BOP to call OCC / I&C / Electrical to investigate problem. Informs SM of plant status
	BOP	Monitors plant parameters. Assists RO as directed by US. Calls OCC / I&C / Electrical to investigate problem when directed by US.

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	US	Directs operators in performance of 3-EOP-E-0:
	RO	Manually attempts to trip reactor with console & VPB handswitches. Checks Rx tripped. Identifies Rx is NOT tripped. • rod bottom lights NOT lit. • RTBs and bypass breakers NOT open. • RPIs NOT at zero. • Neutron flux NOT decreasing.
	US	Transitions to and directs performance of 3-EOP-FR-S.1 immediate actions. Ensures Critical Safety Functions monitored using 3-EOP-F-0. Verifies RCO and BOP performance of 3-EOP-FR-S.1 immediate actions.
	RO **CRITICAL**	Performs immediate actions of 3-EOP-FR-S.1. 1. Determines reactor not yet tripped & previous manual trip attempts not successful **2. Manually inserts control rods.**
	BOP **CRITICAL**	Performs immediate actions of 3-EOP-FR-S.1. 1. Verifies Turbine Trip: a. Manually trips turbine b. Determines all turbine stop valves position indication lost (loss of 3D LC) c. **Closes all MSIVs and bypass valves**
	US	Directs performance of 3-EOP-FR-S.1 subsequent actions
	BOP	Performs 3-EOP-FR-S.1 subsequent actions as directed by US: 1. Checks AFW pumps - ALL running. If not yet started, opens AFWSS MOVs 2. Verifies Containment Ventilation - ISOLATED.

Op Test No.: 2005-301 Scenario No.: 2 Event No.: 7/7a Page 13 of 20

Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	RO **CRITICAL**	Performs 3-EOP-FR-S.1 subsequent actions as directed by US: 1. **Initiates Emergency Boration of RCS:** a. Determines no Charging Pumps running b. Identifies need to reset SI (SI was initiated either manually by crew or automatically on Low PZR pressure) c. **Resets SI and starts 3A Charging Pump** d. Places RCS M/U Control Switch in STOP e. **Manually starts Boric Acid Pump 3A or 3B** f. **Opens Emergency Boration Valve, MOV-3-350 and Charging Flow to Regen HX valve, HCV-3-121** g. Verifies Loop A Charging Isolation, CV-3-310A is open h. **Establishes emergency boration flow as indicated by FI-3-110 > 60 gpm and FI-3-122 > 45 gpm** 2. Checks PZR Pressure - < 2335 psig.
	US **CRITICAL**	Because SI actuated, once Rx is subcritical reported by RO, directs BOP to verify SI equipment aligned using Steps 1 - 16 of 3-EOP-E-0. If reactor not yet tripped, **ensures SO directed to locally trip Rx by opening 3A & 3B RTBs and MG set input & output breakers** Continues directing actions per FR-S.1.
	US	Continues directing performance of 3-EOP-R-S.1 subsequent actions

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	RO	Continues performance of 3-EOP-FR-S.1 subsequent actions 1. Determines status of reactor trip. Reports opening of rx trip breakers to US when it occurs. 2. Determines turbine tripped (MSIVs closed earlier) 3. Checks Mid and East GCBs are OPEN 4. Determines s/g NR levels. If <6[32]%, controls AFW flow > 750 gpm until at least one s/g >6[32]%. Subsequently controls feed flow to maintain level between 15[32]% & 50%. 5. Verifies no PW flow on FR-3-113 6. Determines both RCS temperature & s/g pressure not decreasing in an uncontrolled manner *NOTE: Step 10 RNO directs user to step 14. Steps 11-13 are not applicable* *NOTE: Abnormal levels and pressures in 3B & 3C s/g's as compared to 3A s/g due to 3B and 3C RCPs tripping due actions of train B sequencer LOOP/LOCA program upon the loss of 3D LC. 3A S/G ADV & safeties carry the ATWS decay heat removal load since MSIVs are closed* 7. Determines CETs < 1200°F 8. Verifies Rx Subcritical (PRNI < 5% & IRNI SUR< 0) 9. Secures emergency boration when directed by US
	BOP	1. Verifies SI equipment aligned using 3-EOP-E-0 steps 1-16 when directed by US (described under 3-EOP-E-0 actions).
	US **CRITICAL**	Transitions back to 3-EOP-E-0 Step 1 and directs performance of 3-EOP-E-0 immediate actions (steps 1-4) Monitors 3-EOP-E-0 Foldout Page items. **Directs 3A RCP trip if subcooling < 25[65]°F** (other RCPs stripped by sequencer) *NOTE: The BOP should have performed Steps 1 - 16 earlier in the scenario at US direction.*

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	RO **CRITICAL**	Performs 3-EOP-E-0 immediate actions when directed by US: 1. Determines reactor tripped: • All rod bottom lights ON • RTBs and Bypass breakers OPEN • All RPIs indicate zero • Neutron flux decreasing 2. Determines SI actuated/required by low PZR pressure **Trips 3A RCP per 3-EOP-E-0 foldout page when directed by US.**
	BOP	Performs 3-EOP-E-0 immediate actions when directed by US: 1. Determines turbine tripped a. All MSIVs closed b. Mid and East GCBs open 2. Verifies Power to Emergency 4 KV Buses a. Determines 3A, 3B & 3D 4KV buses all energized b. Determines 3A, 3B, 3C & 3H 480V LC all energized. c. Reports 3D 480V LC does not have power available
	US	Directs performance of 3-EOP-E-0 prompt actions (steps 5-16) Determines train B sequencer on LOOP/LOCA program. • Identifies that train B sequencer load stripping occurred (including both 3B & 3C RCPs) • Identifies SI loads have sequenced onto the 3B EDG

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	BOP	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Verifies feed water isolation. a. Takes SGFP switches to STOP b. Manually closes FRVs if still open c. Closes FWIVs d. Determines FRBVs closed & SSGFPs off. 2. Verifies ≥2 AFW pumps running 3. Determines 2 ICWP in service, POV-3-4882/4883 closed and ICW headers tied together 4. Determines MSIV & bypass valves all closed 5. Determines all 4 EDGs running
	RCO	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Determines containment isolation Phase A.actuated 2. Determines ≥2 HHSIPs & both RHRPs running 3. Determines 3 CCWHX & 2 CCWP in service, CCW headers tied together and MOV-3-626 open 4. Determines 1 ECC (3C) & 2 ECFs (3A/3C) running. Starts 3A ECC. (3B ECF & 3B ECC no power due to loss of 3D LC) 5. Determines containment purge secured & control room ventilation in emergency recirc 6. Determines containment pressure < 20 psig (containment spray not required) 7. Determines SI valve amber lights all bright
	US	Directs performance of 3-EOP-E-0 subsequent actions (steps 17-26)

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	RCO	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Resets SI. (should already be reset in 3-EOP-FR-S.1 to allow starting a charging pump for emergency boration) 2. Determines both U3 HHSIPs running, then stops both U4 HHSIPs and places them in standby 3. Observes RCS pressure < 1600[2000] psig and indicated HHSIP cold leg flow. Determines RCS pressure > 250[650]. 4. Checks RCP seal cooling - no thermal barrier alarms. 5. Observes RCS cold leg temperature is stable/trending to 547°F 6. Determines no RCPs running 7. Determines excess letdown isolated 8. Observes/reports one PZR PORV open
	BOP	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Directs PO to place Containment PAHMS in service. After PO actions are complete, completes switch alignment on 3QR81 & 82 per 3-OP-094. 2. Verifies proper AFW valve alignment. 3. Verifies proper AFW flow a. If all s/g NR levels < 6[32]%, controls AFW flow ≥345 gpm b. Controls AFW flow to maintain s/g NR levels 6[32]% - 50% 4. If RCS temperature is decreasing < 547°F: a. Stops dumping steam b. Limits total AFW flow to 345 gpm until any s/g NR level > 6[32]%
	US	Since one PZR PORV failed open and unisolable, conducts crew brief and transitions to 3-EOP-E-1 (E-0 step 26b RNO) Continues to monitor Critical Safety Functions using 3-EOP-F-0
	US	Directs performance of 3-EOP-E-1. Monitors 3-EOP-E-1 Foldout Page items. Determines that RCS subcooling & pressure insufficient for SI

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
		termination
	RCO	Performs 3-EOP-E-1 actions when directed by US: 1. Determines no RCPs running 2. Determines PZR PORV status a. PCV-3-456 closed with power available to block MOV b. PCV-3-455C failed open with block MOV deenergized open 3. Verifies SI reset (*should be reset from 3-EOP-FR-S.1)* 4. Establishes maximum charging (*one charging pump running from 3-EOP-FR-S.1)* a. Places RCS M/U Control Switch in STOP b. Starts 2nd charging pump (3C chg pp OOS) c. Raises running charging pump speeds to maximum d. Opens HCV-3-121 fully e. Verifies charging pump suction auto transfers to RWST 5. Determines RCS subcooling < 30[210]°F & RCS pressure < 1600[2000] psig 6. Observes containment spray pumps not running 7. Stops RHRPs if RCS pressure stable or increasing and >250[650] psig 8. Reports RCS pressure stable or decreasing *NOTE: RCS leakage will be increased as necessary to ensure RCS pressure stable/decreasing.* 9. Verifies cold leg recirc capability available 10. Verifies ECCS components operating properly 11. Reports RCS pressure > 250[650] psig

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	BOP	Performs 3-EOP-E-1 actions when directed by US: 1. Determines that S/Gs are NOT faulted 2. Maintains s/g NR levels > 6[32]% or controls AFW flow > 345 gpm. When at least one s/g NR level > 6[32]%, controls AFW flow to maintain NR level 15[32]% - 50%. 3. Monitors secondary radiation a. Directs Chemistry sample S/Gs for activity & monitor DAM-1 b. Directs HP to take steamline rad readings c. Determines secondary radiation normal 4. Resets containment isolation Phase A (Phase B not actuated) 5. Verifies instrument air to containment (CV-3-2803 open with instrument air pressure >95 psig) 6. Checks power to charging pumps from offsite. a. Identifies only 3A Charging Pump on offsite power b. Reports 3B Charging Pump powered from 3B EDG with capacity sufficient to start pump. 7. Checks if EDGs should be stopped a. Reports 3A 4kV bus on offsite power & 3B 4kV bus on EDG b. Identifies U3 SUT & 3C transformer both on offsite power c. When directed by US, restores offsite power to 3B & 3C 4KV buses using 3-ONOP-004.1 d. Stops unloaded EDG and directs SO place them in standby

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Event Description: SBLOCA (PORV fails completely) with ATWS. (AMSAC failure, must close MSIVs due to no Main Turbine trip indication.) Locally open RTBs after Emergency Boration flow established and field operator dispatched. Loss of 3D Load Center results in initiating LOOP/LOCA response of train B sequencer and equipment (load stripping [including 3B & 3C RCPs], loads 3B EDG, and sequencing of SI loads onto the EDG). 3A ECC fails to auto start.

Time	Position	Applicant's Actions or Behavior
	BOP	*NOTE: Crew may opt to complete 3-ONOP-004.1 <u>before</u> continuing in E-1. If this occurs, Chief Examiner will evaluate whether to restore offsite power and observe ONOP-004.1 actions <u>in lieu of</u> the remainder on E-1.* Continues performing 3-EOP-E-1 actions when directed by US: 8. Directs FS/field operators locally unlock & close breakers for ECCS cold leg recirc valves per 3-EOP-E-1 step 14b & c 9. Directs PO locally verify Radiation Shield doors on containment spray pump & charging pump rooms closed 10. Determines auxiliary building radiation levels normal a. Checks PRM R-14, ARMs & SFP SPINGs b. Directs HP survey pipe & valve and elect. penetration rooms 11. Verifies PAHMS alignment complete 12. Directs Chemistry align PASS for RCS sampling
	US **CRITICAL**	Since RCS pressure > 250[650} at 3-EOP-E-1 step 19, conducts crew brief and **transitions to 3-EOP-ES-1.2.**
	Terminating Cue:	**Once US determines need to transition to 3-EOP-ES-1.2, the scenario may be terminated at Examiner discretion.**

OPERATIONS SHIFT TURNOVER REPORT

UNIT 3	ONCOMING CREW ASSIGNMENTS	UNIT 4
Unit Supervisor:	Shift Manager:	Unit Supervisor:
Reactor Operator:	Watch Engineer	Reactor Operation:
Secondary Operator:	Admin RCO:	Secondary Operator:
	Primary Operator:	

UNIT 3	PLANT STATUS	UNIT 4
Mode 1		Mode 1
Power (%) 75		Power (%) 100
MWe 556		MWe 759
Gross Leakrate: 0.05		Gross Leakrate: 0.08
Boron (ppm): 541		Boron (ppm): 600

Hot Items List and Short Term Equipment Concerns:

PRNI Channel N-41 - upper detector failed
3C Charging pump - motor ground
3D Normal Containment Cooler - breaker 30829 inspection
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

U3 Current \ Anticipated LCO Actions:

PRNI Channel N-41 OOS per 3-ONOP-059.8 - QPTR every 12 hr (TS 3.3.1 action 2 & SR 4.2.4.2)
3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

U4 Current \ Anticipated LCO Actions:

CURRENT: None

ANTICIPATED: None

Results of Offgoing Focus Area

See G:\Ops\Common\0900

UNIT 3 IN THE FIELD

PRIMARY OPERATOR:

Equipment Status Problems:

3C Charging pump - motor ground
3D Normal Containment Cooler - breaker 30829 inspection
3C RCP lower motor guide bearing temp detector failed high

Evolutions or Compensatory Actions In Progress:

3A RHR pump monthly surveillance in progress. 3-OSP-050.2 complete thru step 7.1.6. FS performing procedure. All necessary operators briefed and on station ready to continue.
3-GOP-301 in progress. Complete thru step 5.96. Continue load increase to 100% after 3A RHR pump monthly surveillance done.

General Info/Remarks:

Thunderstorms in area.

SECONDARY OPERATOR:

Equipment Status Problems:

TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.

Evolutions or Compensatory Actions In Progress:

3-GOP-301 in progress. Complete thru step 5.96. Continue load increase to 100% after 3A RHR pump monthly surveillance done.
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Info/Remarks:

Thunderstorms in area.

UNIT 3 CONTROL ROOM

Abnormal Annunciators:

B-3/5, B-3/6, B-5/5, B-8/4, B-9/2, J-7/4 - PRNI Channel N-41 OOS
C-8/3 STEAM DUMP ARMED/ACTUATED - Condenser steam dump control selected to MANUAL.

Equipment Status/Problems:

PRNI Channel N-41 - upper detector failed
3C Charging pump - motor ground
3D Normal Containment Cooler - breaker 30829 inspection
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

Changes to Risk Significant Equipment:

OLRM already run run for OOS equipment.

Upcoming Reactivity Management Activities

Increase turbine / reactor power from 75% to 100%.

Upcoming Major POD Activities:

Increase turbine / reactor power from 75% to 100% after 3A RHRP monthly surveillance complete. 3-GOP-301 complete thru step 5.96.
Repair 3C charging pump & complete 3D NCC breaker 30829 inspection
Continue troubleshooting PRNI N-41 upper detector & TC-3-408H

Upcoming ECOs to Hang and / or Releases:

HANG none

RELEASE none

Evolutions or Compensatory Actions In Progress:

3A RHR monthly surveillance in progress. 3-OSP-050.2 complete thru step 7.1.6. FS has signoff copy and is coordinating test. Field operators briefed and on station ready to continue. Continue load increase when complete.
PRNI Channel N-41 OOS per 3-ONOP-059.8 - QPTR every 12 hr (TS 3.3.1 action 2 & SR 4.2.4.2)
Condenser steam dump control in MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Information, Remarks, and Operator Work Around Status:

Thunderstorms in the area.
Returning to power after turbine valve test.

Facility:	Turkey Point	Scenario No.:	3	Op Test No.:	2005-301
Examiners:	_____	Candidates:	_____		US
	_____		_____		RO
	_____		_____		BOP

Initial Conditions: Mode 1, 75% Power, MOL, 3-GOP-301 in use complete through step 5.96 for return to 100% power following a turbine valve test.

Turnover: Equipment OOS: 3C Charging Pump for motor ground; Condenser Steam Dump mode selector switch selected to the MANUAL (Steam Pressure) mode due to a problem with TC-3-408H, (Tave input to Turbine Trip Summator); 3D Normal Containment Cooler breaker is racked out for inspection; PRN1 Channel N-41 upper detector failed.

The crew will complete the monthly operability test of 3A RHR Pump and then raise power as soon as possible to 100% to meet load demand. 3-OSP-050.2 is complete through step 7.1.6. Field operators to support this have been briefed and are on station in the Auxiliary Building.

There are thunderstorms in the area.

Known tube leak in 3C S/G (8 gpd) – unchanged for last week. Chemistry samples are being taken per 3-ONOP-071.2, Attachment 1. The current sample, just completed indicates no significant change in leak rate. MOV-3-1405 remains open at management direction due to small size and stability of tube leak rate.

Event No.		Event Type*	Event Description
1	TAM1D3AS=3	(N) RO (TS) SRO	Perform RHR pump 3A monthly operability test, 3-OSP-050.2 beginning at step 7.1.7. During the test the pump will be declared inoperable and taken out of service due to high pump vibrations.
2	V8CD33ON=T TFU1LRRD=T	(C) BOP (C) SRO	3B SGFP bearing high temperature occurs (ann. D-6/4). Operators manually trip 3B SGFP and identify automatic turbine runback failure.
2a		(R) RO (N) BOP (R) SRO	Turbine load is manually reduced sufficiently to stabilize the plant in response to 3B SGFP failure.
3	TVCAPLS2 = 0.12 V8CF25ON=T TCC1DMN4=T	(C) BOP (TS) SRO	Respond to 3B MCC 480 volt transformer ground/high temp alarm due to high amps on the 3B Normal Containment Cooler. Crew identifies high amps on 3B NCC (or it trips on motor OL). Action is required to restore 3D NCC and return to 3 NCCs in service.
4	TFH1TU56=T	(I) RO (TS) SRO	PT-3-456 fails high. *(Can not trip certain bistables or OTΔT reactor trip results).*
5	TVHNL1A = 0.00103	(C) RO	3A RCP #1 seal leakage (5.6 gpm) causes crew to perform a fast load reduction. (ONOP-041.1). [Actions for this failure continue thru event 7].
6	-	(R) RO (N) BOP	Reduce power per 3-ONOP-100 due to 3A RCP #1 seal high leak-off (load reduction may be omitted if already observed in event 2a).
7	TFHN12=T	(M) ALL	3A RCP #1 seal complete failure. Reactor trip required.
8	TFHN23=T TFHN34=T TFQ634BF=T TFM1D3BS=T TAM1D3BS=3	(M) ALL (C) BOP (C) RO	SBLOCA/Safety Injection with 3B Sequencer failure (3B RHR Pump breaker fails).
8a	TAM1D3BS=1 TFM1D3BS=F	(M)(C) ALL	Loss of Emergency Coolant Recirculation (install spare 3B RHR Pump breaker at ECA-1.1, step 10, then return to E-1).

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

Turkey Point 2005-301 Scenario #3

Event 1 - Perform RHR pump 3A monthly operability test, 3-OSP-050.2 beginning at step 7.1.7. During the test the pump will be declared inoperable and taken out of service due to high pump vibrations.

Event 2 - 3B SGFP bearing high temperature occurs (ann. D-6/4). Operators manually trip 3B SGFP and identify automatic turbine runback failure.

Event 2a - Turbine load is manually reduced sufficiently to stabilize the plant in response to 3B SGFP failure

Event 3 - Respond to 3B MCC 480 volt transformer ground/high temp alarm due to high amps on the 3B Normal Containment Cooler. Crew identifies high amps on 3B NCC (or it trips on motor OL). Action is required to restore 3D NCC and return to 3 NCCs in service.

Event 4 – PT-3-456 fails high. *(Cannot trip certain bi-stables, or OTΔT reactor trip results).*

Event 5 – 3A RCP #1 seal leakage (5.6 gpm) resulting in a fast load reduction. (ONOP-041.1) [Actions for this failure continue thru event 7].

Event 6 – Reduce power per 3-ONOP-100 due to 3A RCP #1 seal high leakoff (load reduction may be omitted if already observed in event 2a)

Event 7 – 3A RCP #1 seal failure. Reactor trip required.

Event 8 – SBLOCA/Safety Injection with 3B Sequencer failure (3B RHR Pump breaker fails).

Event 8a – Loss of Emergency Coolant Recirculation (install spare 3B RHR Pump breaker at ECA-1.1, step 10, then return to E-1).

Scenario XXII NRC 3

Simulator Operating Instructions

Setup

IC-16 (75% MOL)

Place simulator in run.

Take Steam Dump Control Switch → MANUAL

Secure 3C Charging Pump and ensure 3A & 3B are running in AUTO.

Secure 3D NCC.

Take PRN-41 OOS per 3-ONOP-059.8.

Trigger lesson steps:
SETUP - 3C CHG PP OOS (actuates TAB1POSN = 3)
SETUP - 3D NCC OOS (actuates TCC1DMN4 = F)
SETUP - 3C SG 8 GPD LEAK (actuates TVHHSGC = 0.000005)
SETUP - PRN41 OOS (actuates TFN1P1AL = T)
SETUP - 3B SEQ & 3B RHRP BKR FAIL (actuates TFQ634BF = T & TFM1D3BS = T)

Place simulator in run.

Acknowledge alarming annunciators and freeze simulation.

Place ECO tags on PRN-41 & protection rack 1, caution tag on steam dump mode selector switch and clearance info tags on 3C charging pp & 3D NCC control switches.

Provide shift turnover checklists, 0-OP-046 Att 5 reactivity worksheet (75→100%), 3-OSP-050.2 (sign off copy kept by NWE), 3-ONOP-071.2 Att 1 and 3-GOP-301 signed off through step 5.96.

Select 3A QSPDS to page 211 (SAT) and 3B QSPDS to page 212 (RVL). Set ERDADS on VPA to Tavg/Tref (TAV) and at the RCO desk to ENVRN (ED3).

Fill in blender & shutdown boron addition placards at console blender station. Data for each IC may be found in the ECC & Shutdown Guidelines Book in the simulator I/F.

Event 1 – 3A RHR pump monthly surveillance test

Performed per shift turnover *using 3-OSP-050.2 sect 7.1.*

As FS, report steps 7.1.1 - 7.1.6 already done. Request crew perform step 7.1.7.

As FS report that steps 7.1.8 thru 7.1.11 are n/a & request crew perform step 7.1.12.

As PO, unlock/ close 3-1461 & 3-1463 and unlock/open 3-741A. Wait 1-3 min, then **trigger** lesson step **EVENT 1 - CLOSE 3-1461 AND 3-1464; OPEN 3-741A** (actuates TAMR1V29 = 1.0 on 1 min ramp) and report steps 7.1.13 – 7.1.18 complete.

Request crew record RWST level (7.1.19).

As FS, report steps 7.1.20 – 7.1.22 complete and field operators ready for RHRP start (step 7.1.23).

2-3 minutes after start, as FS report 3A RHR pump very noisy and vibrating badly. Request pump shutdown to prevent further equipment damage.

Back out of OSP. Steps 7.1.24 thru 7.1.31 are skipped. The crew should shut down 3A RHRP per step 7.1.31.2 and verify MOV-3-749A closed (step 7.1.32).

Steps 7.1.33 & 34 are not applicable.

Perform steps 7.1.35 thru 7.1.37. **Trigger** lesson step **EVENT 1 - CLOSE 3-741A; OPEN 3-1461 & 3-1464** (actuates TAMR1V29 =0.0 on 1 min ramp),

Step 7.1.38 is not applicable. Steps 7.1.39 thru 7.1.43 are performed in the field, but no simulator action is required.

As FS report to crew that 3A RHRP test is complete and unsatisfactory (steps 7.1.44 & 46).

Steps 7.1.45 & 47 are not applicable.

Respond as SM if called regarding 3A RHRP unsat surveillance results.

If requested at OCC to remove 3A RHRP from service, rack out breaker, **trigger** lesson step **EVENT 1 - RACK OUT 3A RHRP BKR** (actuates TAM1D3AS = 3).

If breaker not racked out, prevent further 3A RHRP use. **Trigger** lesson step **EVENT 1 - 3A RHRP SHAFT SHEAR** (actuates TFMUM01S = T).

Respond as OCC/FS/WCC regarding troubleshooting & repair of 3A RHRP.

Event 2 – 3B SGFP bearing high temperature & runback failure

After 3-OSP-050.2 exited, trigger lesson step **EVENT 2 - 3B SGFP BEARING HI TEMP - RUNBACK FAIL** **(actuates V8CD33ON = T & TFU1LRRD = T).**

If asked as SO, report 3B SGFP bearing temperature 205°F and slowly increasing. Also report that pump is somewhat noisier than heard during the loast set of operator rounds.

Event 2a – Fast load reduction

Entered by crew in response to 3B SGFP high bearing temperature condition.

Initially, crew should begin 3-ONOP-100 fast load reduction to < 60% power to allow securing 1 SGFP.

Respond as System regarding the fast load reduction.

At 70% power, **trigger** lesson step **EVENT 2 - 3B SGFP BEARING FAILURE** (actuates TVFABP1B = 1.0 on 1 min ramp).

Crew should manually trip 3B SGFP then respond per 3-ONOP-089 by manual turbine runback as needed to reduce steam flow <= available feed flow.

Respond as OCC/WCC/FS for troubleshooting & repair.

If asked as SO/FS to rack out breaker 3AC14, **trigger** lesson step **EVENT 2 - RACK OUT 3B SGFP BKR** (actuates TAF1D1BP = 3).

Event 3 – 480V transformer alarm & 3B NCC failure

After the plant is stabilized at reduced load with feed flow ≥ steam flow, trigger lesson step **EVENT 3 - 3B NCC HI AMPS** (actuates TVCAPLS2 = 0.12 on 1 min ramp & V8CF25ON = T on 90 sec delay).

Respond as SO/FS if directed to investigate 480V LC transformers and report 3B 480V LC transformer temperature is high (205°C). (*Setpoint is 195°C.)*

Crew should find 3B NCC high current indication and trip the 3B NCC.

At evaluator direction, if 3B NCC problem not found, **trigger** lesson step **EVENT 3 - 3B NCC OVERLOAD TRIP** (actuates TVCAPLS2 = 0.3 on 30 sec ramp).

Clear 3B 480V LC transformer hi temp alarm after securing 3B NCC. **Trigger** lesson step **EVENT 3 - 3B 480V XFMR ALARM CLEAR** (actuates V8CF25ON = F).

If asked as OCC/WCC/FS, report that 3D NCC can be returned to service now.

Respond as SO when asked to take 3D NCC breaker to the ON position. After 1-3 min, **trigger** lesson step **EVENT 3 - RETURN 3D NCC TO SERVICE** (actuates TCC1DMN4 = T).

As OCC/WCC, request crew remove ECO tag from 3D NCC VPB control switch.

Respond as SO when directed to rack out 3B NCC breaker. Wait 2-4 min then **trigger** lesson step **EVENT 3 - RACK OUT 3B NCC BKR** (actuates TAC1POS = 3).

Event 4 – PT-3-456 fails high

After 3D NCC placed in service, trigger lesson step **EVENT 4 - PT-3-456 FAILS HIGH** (actuates TFH1TU56 = T).

The crew should respond per 3-ONOP-049.1 except that if the channel II OTΔT bistables are tripped with channel I OTΔT bistables tripped from the preexisting PRN-41 failure a reactor trip will result. T.S. 3.0.3 is entered and preparation made to shutdown. Respond as System if called.

Provide prompt as SM to complete 3-ONOP-049.1 before commencing shutdown. Ensure RO (vice BOP) trips the bistable trip switches.

Respond as OCC/WCC/FS if called for troubleshooting & repair.

Event 5 – 3A RCP #1 high seal leakoff

Anytime after crew brief completed, trigger lesson step **EVENT 5 - 3A RCP #1 SEAL LEAK = 5.6 GPM** (actuates TVHNL1A = 0.00103 on 1 min ramp).

The crew should respond per 3-ONOP-041.1 & then 3-ONOP-100 for fast load reduction.

If asked as PO for local seal injection reading, click on SCHEMATICS→ REACTOR COOLANT SYSTEM→REACTOR COOLANT PUMPS→SEAL FLOW DISPLAY on any RCP mimic page and read seal injection flows.

Event 6 – Fast load reduction (if necessary)

Initiated by crew per 3-ONOP-041.1 & 3-ONOP-100 in response to event 5.

Depending on crew response in event 2a, the load reduction in this event may be omitted at lead examiner direction.

Event 7 – 3A RCP seal package failure

After fast load reduction reduces power 5-10%, at evaluator direction, increase 3A RCP #1 seal leakoff up to complete #1 seal failure. Trigger lesson step **EVENT 7 - 3A RCP #1 SEAL FAILURE** (actuates TFHN12 = T).

At this point the crew should trip the reactor (& 3A RCP).

Respond as System if called.

Event 8/8a – SBLOCA / 3B sequencer failure / loss of emergency coolant recirculation

Immediately after 3A RCP trip in **event 7, trigger** lesson step **EVENT 8 - 3A RCP SEAL PKG FAILURE** (actuates TFHN23 = T & TFHN34 = T).

*The 3A RCP seal pkg failure along with **setup failures (3B sequencer & 3B RHRP)** will cause the crew to respond per 3-EOP-E-0 and manually start all train B ECCS loads.*

The 3B RHRP failure becomes evident when the pump fails to manually start (neither RHRP running since 3A RHRP OOS from event 1).

Respond as OCC/WCC/FS if called for troubleshooting & repair of either RHRP.

As OCC request racking out breaker for 3B RHRP, then respond as SO when requested to take this action. After 5-8 min **trigger** lesson step **EVENT 8 - RACK OUT 3B RHRP BKR** (actuates TAM1D3BS = 3).

If directed as SO to investigate the 3B sequencer failure, click on SCHEMATICS → STANDBY POWER & SYNC → BUS STRIPPING & SEQ → LOCAL SEQUENCER CONTROLS and report indications for 3B sequencer.

When directed as PO, align PAHM per 3-OP-094. After 12-15 min, **trigger** lesson step **EVENT 8 - PLACE PAHM IN SERVICE** (actuates TAC2V02A = 1.0, TAC2V02B = 1.0, TAAAV21 = 1.0, TAAAV22 = 1.0 & TACA005 = 0.0).

Respond as Chemistry/HP regarding S/G sampling & surveys. Report no signs of any contamination.

When 3-EOP-E-1 step 13 is reached, insert additional leakage as needed (click on SCHEMATICS→REACTOR COOLANT SYSTEM→MAIN RCS HYDRAULICS → any RCS COLD LEG BREAK leak node → TVHHCLA(B)(C) COLD LEG LOOP A(B)(C) LEAKAGE → enter selected value = 0.0001 (or more as needed to ensure RCS pressure is stable/ decreasing at that point) then INSERT.

Respond as SO if directed to secure EDGs locally per 3-OP-023.

Since neither RHRP is available, transition is made to 3-EOP-ECA-1.1.

When directed as PO to verify 3-356 closed & open 3-365A/B, wait 1-3 min, then **trigger** lesson step **EVENT 8A - ALIGN M/U TO RWST** (actuates TABM365B = 1.0).

After step 11 of 3-EOP-ECA-1.1, call as OCC and report 3B RHRP breaker (3AB15) replaced.

When directed as SO to rack in breaker 3AB15, after 3-5 min, **trigger** lesson step **EVENT 8A - RACK IN AND FIX 3B RHRP** (actuates TAM1D3BS=1 & TFM1D3BS=F).

If directed as PO to close 3-365A/B, wait 1-3 min, then **trigger** lesson step **EVENT 8A - SECURE M/U TO RWST** (actuates TABM365B = 0.0).

Respond as FS/SO/PO if directed to close in cold leg recirc breakers. After 1-3 min, **trigger** lesson step **EVENT 8A - CLOSE CL RECIRC BKRS** (actuates TCM2D06M = T, TCM1D09M = T after 5 sec delay, TCM2D04M = T after 15 sec delay, TCM1D11M = T after 20 sec delay, TCM1D03M = T after 30 sec delay, TCM1D04M = T after 35 sec delay, TCM1D10M = T after 45 sec delay, TCM2D05M = T after 50 sec delay, TCM1D12M = T after 60 sec delay & TCM2D03M = T after 65 sec delay).

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Event Description: Perform RHR pump 3A monthly operability test, 3-OSP-050.2 beginning at step 7.1.7. During the test the pump will be declared inoperable and taken out of service due to high pump vibrations.

Time	Position	Applicant's Actions or Behavior
	RO	Performs the following steps from 3-OSP-050.2: 1. Verifies the following valves indicate open on VPB: a. RWST Outlet Isolation MOV-3-864A b. RWST Outlet Isolation MOV-3-864B c. RWST RHRP Suction Stop MOV-3-862A d. RWST RHRP Suction Stop MOV-3-862B *NOTE: Steps 7.1.8 thru 7.1.11 are not applicable* 2. Logs 3A RHRP OOS when notified by FS. *NOTE: Steps 7.1.13 thru 7.1.18 are performed in the field. These steps close 3-1461/1464 and open 3-741A.* 3. Records RWST level (Unit 3 Tech Spec value ≥320k gallons). *NOTE: Steps 7.1.20 thru 7.1.22 are performed in the field.* 4. Starts 3A RHR pump and record start of 5 min steady state run time. ***NOTE: Two (2) minutes into the run, the PO calls in that 3A RHR pump is vibrating excessively, extremely noisy and recommends securing the pump. This requires skipping steps 7.1.24 thru 7.1.31.1*** 5. Stops the 3A RHR pump (May place the pump control switch in pull-to-lock position). 6. Verifies MOV-3-749A closed *NOTES: Steps 7.1.33 & 7.1.34 are not applicable.* *Steps 7.1.35 thru 7.1.37 are performed in the field to open 3-1461/ 1464 and close 3-741A.* *Step 7.1.38 is not applicable* *Steps 7.1.39 thru 7.1.43 are performed in the field* 7. Receives notification that 3A RHRP test is complete *NOTE: Steps 7.1.45 & 7.1.47 are not applicable* 8. 3A RHRP test logged unsat and US notified of results
	US	Declares 3A RHRP OOS & notifies SM. Directs RO & OCC/WCC to take actions to disable 3A RHR pump. Determines TS 3.5.2.c Action g. applies (7 days to restore 3A RHRP or be in HSBY within next 6 hr and HSD within following 6 hr) Maintains command and control of the evolution.

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Event Description: Perform RHR pump 3A monthly operability test, 3-OSP-050.2 beginning at step 7.1.7. During the test the pump will be declared inoperable and taken out of service due to high pump vibrations.

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors plant equipment & assists in operability test as directed. Communicates with in-plant and test support personnel as directed.

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Event Description: 3B SGFP bearing high temperature occurs (ann. D-6/4). Operators manually trip the 3B SGFP and identify automatic turbine runback failure. BOP will manually reduce load sufficiently to stabilize the plant.

Time	Position	Applicant's Actions or Behavior
	BOP	Responds to ann. D-6/4, SGFP B MOTOR BEARING HI TEMP.
	RO/ BOP	References 3-ARP-097.CR for ann. D-6/4 if directed.
	BOP	Directs SO to check out 3B SGFP motor bearing temp. *NOTE: SO will report 3B SGFP motor bearing temp is 205°F and increasing slowly. SO will also report that 3B SGFP motor noise has increased somewhat since the last operator rounds.*
	US	Enters 3-ONOP-100 to perform fast load reduction to < 60% power to allow securing 3B SGFP. 1. Ensures load dispatcher notified of load decrease. 2. Conducts crew brief per foldout page. 3. Notifies SM to review 0-EPIP-20101 & 0-ADM-115 and ensure required notifications made 4. Directs power reduction IAW 3-ONOP-100 using boration and/or control rods including boric acid (BA) amount & flow rate
	BOP	Notifies load dispatcher of load reduction when directed by US Makes plant page announcement regarding load reduction
	RCO	Performs fast load reduction by initiating boration per 0-ONOP-100 and/or control rod insertion per US direction. 1. Sets BA Totalizer to amount directed 2. Places Rx M/U Selector Switch to BORATE 3. Places Rx M/U Control Switch to START 4. Sets FC-3-113A consistent with BA flow rate directed 5. When boration complete, places Rx M/U Selector Switch to AUTO & Rx M/U Control Switch to START
	BOP	Reduces turbine load per 3-ONOP-100 at rate directed by US.
	RCO	Performs fast load reduction per 3-ONOP-100 as directed by US: 1. Verifies auto rod insertion in response to turbine load reduction. 2. Reports control rod RIL annunciators (B-8/1 & B-8/2) if alarming. a. If B-8/1, reduces rate of power reduction to avoid B-8/2 b. If B-8/2, places rods in MANUAL until rods ~ 10 steps > RIL

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Event Description: 3B SGFP bearing high temperature occurs (ann. D-6/4). Operators manually trip the 3B SGFP and identify automatic turbine runback failure. BOP will manually reduce load sufficiently to stabilize the plant.

Time	Position	Applicant's Actions or Behavior
		3. Determines 2 charging pumps & 2 letdown orifices already in service. 4. Determines NRHX CCW flow already increased (from setup) 5. Energizes PZR backup heaters. 6. Verifies PZR level on program.
	RO/BOP	Maintains Tref within 5°F of Tavg.
	BOP	*NOTE: At 70%, 3B SGFP bearing failure will begin which will cause indicated amps to increase. This should be recognized by the BOP and prompt direction from the US to trip the 3B SGFP* Recognizes/reports increasing amps on 3B SGFP. Requests permission to trip 3B SGFP.
	US	Directs trip of 3B SGFP
	BOP/ RO	Secures the 3B SGFP. Observes that an automatic runback of the Main Turbine should have occurred and has failed.
	US	Observes that an automatic runback of the Main Turbine should have occurred and has failed. *NOTE: Auto turbine runback should occur @ 200%/min until turbine power < 45% as sensed by ≈240 psig 1st stage impulse pressure.* Determines new power level (45-60%) that is within the capacity of one SGFP, and directs manual turbine runback to this power level. Directs response per 3-ONOP-089.
	BOP CRITICAL	**Manually runs back the Main Turbine to ≤60% per 3-ONOP-089 to reduce steam flow < available FW flow.**
	BOP/ RCO	Manually operates steam dumps if directed to assist with reducing Tavg within 3°F of Tref
	RCO	Maintains Rods in AUTO and ensures sufficient rod insertion to reduce Tavg within 3°F of Tref
	BOP/ RCO	Verifies FW FRVs modulate to maintain s/g levels following SGFP trip

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Event Description: 3B SGFP bearing high temperature occurs (ann. D-6/4). Operators manually trip the 3B SGFP and identify automatic turbine runback failure. BOP will manually reduce load sufficiently to stabilize the plant.

Time	Position	Applicant's Actions or Behavior
	RCO	Verifies PZR level & pressure control acts to maintain program values .
	RCO/ BOP	Stabilizes plant parameters at a new lower power level. • SG levels & pressures • Steam dumps closed • Tavg approx same as Tref • PZR levels & pressures
	RCO	Assists BOP as directed.
	US	Directs OCC/WCC: • Investigate failures of SGFP and auto turbine runback. • Remove 3B SGFP from service
	US	Maintains command and control of the evolution.
	US	Ensures notification of the following regarding the power change: • System • DCS (0-ADM-115 event notification) • SM (0-ADM-011 ERT) • Chemistry (required RCS sampling)

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Event Description: Respond to 3B LC 480 volt transformer ground/high temp alarm due to high amps on the 3B Normal Containment Cooler. Crew identifies high amps on 3B NCC (or it trips on motor OL). Action is required to restore 3D NCC and return to 3 NCCs in service.

Time	Position	Applicant's Actions or Behavior
	BOP	Responds to annunciator F-7/3, 480V XFMR A/B/C/D GROUND/HI TEMP. References 3-ARP-097.CR for ann. F-7/3 Dispatches SO to check local temperatures and ground indications at each 480 volt transformer. *NOTE: SO will report 3B 480V LC transformer temp is 205°C (195°C setpoint for ann. F-7/3)*
	US	Directs securing loads on 3B LC to reduce load & locate ground.
	BOP/ RO	Secures loads as directed on 3B LC Observes 3B NCC has high amp indication. *NOTE: If 3B NCC high amps not observed, 3B NCC overload trip may be inserted to call attention to the problem.*
	US	In response to identification of high amps on 3B NCC, directs shutdown of 3B NCC.
	RO	Stops 3B NCC. *NOTE: Once 3B NCC is secured, ann. F-7/3 will be cleared shortly thereafter as 3B 480V LC transformer temp drops below 195°C.* Checks containment and RCP temperatures are within specification.
	US	Notifies OCC/WCC to have Electrical Maintenance troubleshoot 3B NCC and check status of 3D NCC. *NOTE: 3D NCC will be returned to service if requested by crew.* Directs starting 3D Containment Cooler Fan to restore 3 NCCs to operation and limit containment temperature increase. Identifies TS 3.6.1.5 LCO containment temperature limit of 120°F

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Event Description: Respond to 3B LC 480 volt transformer ground/high temp alarm due to high amps on the 3B Normal Containment Cooler. Crew identifies high amps on 3B NCC (or it trips on motor OL). Action is required to restore 3D NCC and return to 3 NCCs in service.

Time	Position	Applicant's Actions or Behavior
	RO	When directed by US, starts 3D NCC per 3-OP-057 sect. 5.2 1. Verifies MOV-3-1417 & 1418 open *NOTE: Steps 5.2.2.3 thru 5.2.2.5 are not applicable* 2. Places 3D NCC control switch to OFF/RESET 3. Depresses 3D NCC RESET pushbutton 4. Places 3D NCC control switch to ON 5. Verifies 3D NCC damper opens 6. Verifies 3D NCC operating amps 80-110 amps *NOTE: Step 5.2.2.7 is not applicable* 7. Verifies annunciators I-9/5 & I-9/6 clear 8. Monitors containment air temp recorder R-3-1413 (VPB) to check that all points are < 120°F

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Event Description: PT-3-456 fails high. (Can not trip certain bistables or OTΔT reactor trip will result).

Time	Position	Applicant's Actions or Behavior
	RO	Responds to annunciator alarm A-8/1, PZR PROTECTION HI PRESS. Recognizes failure of the protection channel PT-3-456.
	US	Directs response per 3-ONOP-049.1.
	RO	Determines that all other PZR pressure protection/control channels are operable and indicating normally.
	US **CRITICAL**	Directs compensatory action IAW 3-ONOP-049.1: 1. Verifies RCO determination of PZR PT status. 2. Determines no transfer switches apply for this malfunction 3. Verifies PT-3-444/445/455/457 normal 4. Refers to TS and identifies applicable LCOs: • 3.3.1 Table 3.3-1 items 5, 7 & 8 requiring actions 6 & 13 (trip b/s within 6 hr) • 3.3.2 Table 3.3-2 items 1.d & 8.a requiring actions 15 & 19 (trip b/s within 6 hr and verify 2000 psig interlock in req'd state within 1 hr). • 3.0.3 since TS 3.3.1 item 5 minimum required 2 channels of OTΔT can not be met (1 hr to take action placing unit in HSBY next 6 hr, HSD following 6 hr, CSD subsequent 24 hr) *NOTE: Steps 5.5 thru 5.8 not applicable* 5. Determines which bistables to trip and effects on plant of tripping bistables. **Recognizes that BS-3-422C-1 and BS-3-422C-2 can not be tripped without resulting in a reactor trip.** 6. Briefs crew regarding PT-3-456 failure including: • Effects of the failure • Compensatory actions • What bistables to trip (and not trip) & expected indications when tripping bistables

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Event Description: PT-3-456 fails high. (Can not trip certain bistables or OTΔT reactor trip will result).

Time	Position	Applicant's Actions or Behavior
	RO CRITICAL	*NOTE: Tripping bistables is normally done by the BOP. For this scenario, the crew will be prompted to have the RO perform this function.* 1. Obtains key & proceeds to protection rack 12. 2. Trips BS-3-456A/B/C/D **3. Does not trip BS-3-422C-1 & BS-3-422C-2**
	BOP	Verifies proper annunciator response to bistables tripped.
	US	Completes compensatory action per 3-ONOP-049.1: 1. Verifies correct indication received for each bistable tripped. *NOTE: Steps 5.10 thru 5.12 not applicable* 2. Ensures I&C is notified of PT-3-456 failure and PWO initiated. Maintains command and control of the evolution.

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Event Description: 3A RCP #1 seal leakage (5.6 gpm) causes crew to perform a fast load reduction (ONOP-041.1). [Actions for this failure continue thru event 7].

Time	Position	Applicant's Actions or Behavior
	RO	Responds to annunciator alarm A-1/5, RCP SEAL LEAK-OFF HI FLOW & A-6/5, RCP LABYRINTH SEAL LO ΔP. Verifies alarm by checking the following: • Checks seal leak-off greater than 5 GPM as indicated on FR-3-154B. • Checks charging flow / seal injection flow normal. • Checks VCT temperature TE-3-116 normal
	US	Directs response per 3-ONOP-041.1
	RO	Responds as directed per 3-ONOP041.1: 1. Determines seal injection flow proper using thermal barrier ΔP indications & ERDADS seal injection flow rates. Directs PO check seal injection flow rates locally. 2. Determines 3A RCP #1 seal leak-off flow > limits of 3-ONOP-041.1, Enclosure (1) *NOTE: Step 2 RNO directs user to step 16.* 3. Checks CV-3-307 closed. 4. Determines all RCP #1 seal leak-off flows on FR-3-154A < 6 GPM. 5. Determines 3A RCP #1 seal leak-off flows on FR-3-154A > 5.5 GPM.
	US CRITICAL	**Transitions to 3-ONOP-100 to commence fast load reduction in response to report that 3A RCP #1 seal leakoff flow > 5.5 gpm**
	BOP	Assists the RO as directed by the US.

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Event Description: Reduce power per 3-ONOP-100 due to 3A RCP #1 seal high leakoff (load reduction may be omitted if already observed in event 2a).

Time	Position	Applicant's Actions or Behavior
	US	Ensures load dispatcher notified of load decrease. Conducts crew brief per foldout page. Notifies SM to review 0-EPIP-20101 & 0-ADM-115 and ensure required notifications made Directs power reduction IAW 3-ONOP-100 using boration and/or control rods including boric acid (BA) amount & flow rate
	BOP	Notifies load dispatcher of load reduction when directed by US Makes plant page announcement regarding load reduction
		NOTE: At Lead Examiner discretion, if the load reduction observed previously in event 2a is satisfactory for use as a reactivity manipulation, then the rest of this event may be bypassed and event 7 entered.
	RO	Performs fast load reduction by initiating boration per 0-ONOP-100 and/or control rod insertion per US direction. 1. Sets BA Totalizer to amount directed 2. Places Rx M/U Selector Switch to BORATE 3. Places Rx M/U Control Switch to START 4. Sets FC-3-113A consistent with BA flow rate directed 5. When boration complete, places Rx M/U Selector Switch to AUTO & Rx M/U Control Switch to START
	BOP	Reduces turbine load per 3-ONOP-100 at rate directed by US.
	RO	Performs fast load reduction per 3-ONOP-100 as directed by US: 1. Verifies auto rod insertion in response to turbine load reduction. 2. Reports control rod RIL annunciators (B-8/1 & B-8/2) if alarming. a. If B-8/1, reduces rate of power reduction to avoid B-8/2 b. If B-8/2, places rods in MANUAL until rods ~ 10 steps > RIL 3. Determines 2 charging pumps & 2 letdown orifices already in service. 4. Determines NRHX CCW flow already increased (from setup) 5. Energizes PZR backup heaters. 6. Verifies PZR level on program. 7. Transfers station service from aux xfmrs to SU xfmrs.

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Event Description: Reduce power per 3-ONOP-100 due to 3A RCP #1 seal high leakoff (load reduction may be omitted if already observed in event 2a).

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Maintains Tref within 5°F of Tavg.
	RO/BOP	Stops pumps as directed by US.

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Event Description: 3A RCP #1 seal complete failure. Reactor trip required.

Time	Position	Applicant's Actions or Behavior
	RO	Observes that 3A RCP #1 seal leak-off flow on FR-3-154A > 6 gpm and informs the US.
	US **CRITICAL**	1. Determines from 3-ONOP-041.1 foldout page that 3A RCP #1 seal leak-off flow > 6 gpm requires tripping the reactor & 3A RCP and closing CV-3-303A. **2. Directs the RCO to manually trip the reactor, secure 3A RCP and shut CV-3-303A.** 3. Directs the RCO and BOP to perform immediate operator actions of 3-EOP-E-0.
	RCO	Performs immediate operator actions of 3-EOP-E-0. 1. Manually trips the reactor. 2. Verifies reactor tripped • Rod bottom lights on • RTBs open • RPIs @ zero • NIs decreasing 3. Checks if SI is required • PZR pressure < SI setpoint • RCS subcooling < 30[210]°F • PZR level < 12%
	BOP	Performs immediate operator actions of 3-EOP-E-0. 1. Verifies all turbine stop valves closed (manually trips turbine if required) 2. Closes the MSR main steam stop MOVs. 3. Verifies mid & east GCBs open 4. Determines 3A, 3B & 3D 4kV buses energized 5. Determines 3A, 3C, 3D & 3H 480V LCs energized and reports 3B 480V LC deenergized (from event 3)
	RO **CRITICAL**	**1. Manually trips 3A RCP.** **2. Shuts 3A RCP Seal Leakoff Isolation Valve, CV-3-303A.** ***NOTE: When 3A RCP is tripped, a complete seal package failure is inserted resulting in a SBLOCA requiring SI. See event 8.***

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Event Description: 3A RCP #1 seal complete failure. Reactor trip required.

Time	Position	Applicant's Actions or Behavior
	US	Maintains command and control of the evolution.

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Event Description: SBLOCA/Safety Injection with 3B sequencer failure (3B RHR pump breaker fails; request replace with spare breaker).

Time	Position	Applicant's Actions or Behavior
	RCO	1. Observes PZR level drop and increases charging pump speed. 2. Reports PZR level can not be maintained > 12 % 3. Manually initiates SI & containment isolation phase A
	US **CRITICAL**	Directs manual initiation of SI & containment isolation phase A in response to RO report that PZR level can not be maintained < 12% Monitors 3-EOP-E-0 Foldout Page items. • **Directs tripping 3B & 3C RCPs if RCS subcooling <25[65]°F & HHSI flowpath available** Directs performance of 3-EOP-E-0 prompt actions (steps 5-16) Determines train B sequencer failed. Identifies that train B sequencer loads must be manually started
	RO CRITICAL	**Trips 3B & 3C RCPs if RCS subcooling <25[65]°F & HHSI flowpath available**
	BOP	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Verifies feed water isolation. a. Takes 3A SGFP switch to STOP b. Manually closes FRVs if still open c. Closes FWIVs d. Determines FRBVs closed & SSGFPs off. 2. Verifies ≥2 AFW pumps running 3. Determines 1 ICWP in service, POV-3-4882/4883 closed and ICW headers tied together a. Manually starts 3B or 3C ICWP 4. Determines MSIVs open and MSIS not actuated or required 5. Determines all 4 EDGs running
	RCO	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Determines containment isolation Phase A.actuated 2. Determines ≥2 HHSIPs & no RHRP running. a. Attempts to manually start 3B RHRP b. Recognizes & reports 3B RHRP failure

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Event Description: SBLOCA/Safety Injection with 3B sequencer failure (3B RHR pump breaker fails; request replace with spare breaker).

Time	Position	Applicant's Actions or Behavior
		3. Determines 3 CCWHX & 1 CCWP in service, CCW headers tied together and MOV-3-626 open a. Manually starts 3B or 3C CCWP 4. Determines 1 ECC (3C) & 2 ECFs (3B & 3C) running. Starts 3A or 3B ECC. May start 3A ECF. 5. Determines containment purge secured & control room ventilation in emergency recirc 6. Determines containment pressure < 20 psig (containment spray not required) 7. Determines SI valve amber lights indicate presence of an injection path
	US	Directs performance of 3-EOP-E-0 subsequent actions (steps 17-29)
	BOP	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Directs PO to place Containment PAHMS in service. After PO actions are complete, completes switch alignment on 3QR81 & 82 per 3-OP-094. 2. Verifies proper AFW valve alignment. 3. Verifies proper AFW flow a. If all s/g NR levels < 6[32]%, controls AFW flow ≥345 gpm b. Controls AFW flow to maintain s/g NR levels 6[32]% - 50% 4. If RCS temperature is decreasing < 547°F: a. Stops dumping steam b. Limits total AFW flow to 345 gpm until any s/g NR level > 6[32]% 5. If cooling required for running (3B & 3C) RCPs, resets containment isolation phase A
	RCO	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Resets SI. 2. Realigns SI a. Determines only 3A & U4 HHSIPs running b. Starts 3B HHSIP c. Stops both U4 HHSIPs and places them in standby

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Event Description: SBLOCA/Safety Injection with 3B sequencer failure (3B RHR pump breaker fails; request replace with spare breaker).

Time	Position	Applicant's Actions or Behavior
	CRITICAL	3. Checks for HHSIP cold leg flow if RCS pressure < 1600[2000] psig. Determines RCS pressure > 250[650]. 4. Checks RCP seal cooling – abnormal due to 3A RCP seal package failure. Determines CCW flow maintained to RCPs. 5. Observes RCS cold leg temperature. 6. Determines if 3B & 3C RCPs running. a. **If 3B & 3C RCPs running, trips RCPs if RCS subcooling <25[65]°F & HHSI flowpath available** b. Reestablishes RCP cooling if 3B & 3C RCPs left running 1) Verifies SI reset 2) Opens MOV-3-1417 & 1418 3) Resets & starts all available NCCs 7. Determines excess letdown, PZR PORVs & PZR spray isolated
	BOP	Determines S/Gs are NOT faulted by observing pressure in all S/Gs satisfactory Determines S/G tubes are NOT ruptured by: • Observing R-3-15 (SJAE effluent radiation) normal • Observing R-3-19 (SG blowdown radiation) normal • Observing ERDADS DAM-1 monitor normal or directs Chemistry locally check DAM1 monitor • Directing HP take local steamline radiation readings
	RCO	Determines RCS NOT intact by observing elevated: • Containment radiation • Containment pressure • Containment sump level
	US CRITICAL	**With the information that the RCS is NOT intact, transitions to 3-EOP-E-1.** Conducts EOP transition crew brief. Ensures Critical Safety Functions monitored using 3-EOP-F-0. Directs performance of 3-EOP-E-1.

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Event Description: SBLOCA/Safety Injection with 3B sequencer failure (3B RHR pump breaker fails; request replace with spare breaker).

Time	Position	Applicant's Actions or Behavior
		Monitors 3-EOP-E-1 Foldout Page items. Determines that PZR parameters insufficient for SI termination
	RCO **CRITICAL** **CRITICAL**	Performs 3-EOP-E-1 actions when directed by US: 1. Determines status of 3B & 3C RCPs. a. **If 3B & 3C RCPs still running, trips RCPs if RCS subcooling <25[65]°F & HHSI flowpath available** 2. Determines PZR PORV closed & block MOVs available 3. Verifies SI reset 4. Establishes maximum charging a. Starts one charging pump (3C chg pp OOS) b. Places RCS M/U Control Switch in STOP c. Starts a 2nd charging pump(3C chg pp OOS) d. Raises running charging pump speed to maximum e. Opens HCV-3-121 fully f. Verifies charging pump suction auto transfers to RWST 5. Determines SI termination criteria not met (PZR level < 17[50]%) 6. Observes containment spray & RHR pumps not running 7. Reports RCS pressure stable or decreasing *NOTE: RCS leakage will be increased as necessary to achieve RCS pressure stable/decreasing.* 8. **Determines cold leg recirc capability NOT available (no RHRPs)**

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Event Description: SBLOCA/Safety Injection with 3B sequencer failure (3B RHR pump breaker fails; request replace with spare breaker).

Time	Position	Applicant's Actions or Behavior
	BOP	Performs 3-EOP-E-1 actions when directed by US: 1. Determines that S/Gs are NOT faulted 2. Maintains s/g NR levels > 6[32]% or controls AFW flow > 345 gpm. When at least one s/g NR level > 6[32]%, controls AFW flow to maintain NR level 15[32]% - 50%. 3. Monitors secondary radiation a. Directs Chemistry sample S/Gs for activity b. Determines secondary radiation normal 4. Resets containment isolation Phase A (Phase B not actuated) 5. Verifies instrument air to containment (CV-3-2803 open with instrument air pressure >95 psig) 6. Identifies 3A & 3B Charging Pumps available on offsite power (3C OOS) 7. Checks if EDGs should be stopped a. Reports 3A, 3B & 3D 4kV buses on offsite power d. Stops unloaded EDGs (all) and directs SO place them in standby
	US CRITICAL	**With the information that there are NO RHR pumps available, determines transition to 3-EOP-ECA-1.1 required.** Conducts EOP transition crew brief **Transitions to 3-EOP-ECA-1.1**

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Event Description: Loss of Emergency Coolant Recirculation (install spare 3B RHR pump breaker at ECA-1.1 step 11, then go back to E-1).

Time	Position	Applicant's Actions or Behavior
	US **CRITICAL**	Directs the response to loss of emergency coolant recirculation per 3-EOP-ECA-1.1 **Directs OCC/WCC take actions to re-establish emergency coolant recirculation capability – fix either RHRP** Determines no containment spray pumps required (RWST > 155K gal and Containment Pressure < 14psig)
	RCO **CRITICAL**	Performs actions of 3-EOP-ECA-1.1 as directed by US: 1. Determines RWST level > 60k gal 2. Determines cold leg recirculation capability NOT available - NO RHRPs available 3. **Adds makeup to RWST as necessary to extend its time as a suction source:** a. stops the makeup system b. **dispatches PO to** verify 3-356 closed and **open 3-365A & B** c. verifies FCV-3-113A in AUTO d. **places FCV-3-114A in OPEN** e. places FCV-3-113B & FCV-3-114B in CLOSE f. verifies MOV-3-350 CLOSED g. **places auto-manual stations for FCV-3-113A & FCV-3-114A in MANUAL** h. **places reactor makeup selector switch in BORATE** i. **enters maximum amount of boric acid possible boric acid totalizer and starts makeup system** j. adjusts PW and BA flow controllers to achieve a 1.5 to 1 blend (e.g. 60 gpm PW & 40 gpm BA) while providing maximum makeup flow
	RCO	Continues performing actions of 3-EOP-ECA-1.1 as directed by US: 4. Assists BOP with determining additional RCS cooldown not necessary (event cooling down RCS > 100°F/hr) 5. Determines 2 ECCs running 6. Determines 2 HHSIPs running & both RHRPs OOS 7. Verifies SI reset 8. Stops 1 HHSIP ***NOTE: Once 1st HHSIP stopped, breaker 3AB15 will be returned to***

Op Test No.: 2005-301 Scenario No.: 3 Event No.: 8a Page 21 of 21

Event Description: Loss of Emergency Coolant Recirculation (install spare 3B RHR pump breaker at ECA-1.1 step 11, then go back to E-1).

Time	Position	Applicant's Actions or Behavior
		service restoring 3B RHRP availability.
	BOP	Performs actions of 3-EOP-ECA-1.1 as directed by US: 1. Maintains s/g NR levels > 6[32]% or controls AFW flow > 345 gpm. When at least one s/g NR level > 6[32]%, controls AFW flow to maintain NR level 15[32]% - 50%. 2. Determines initiation of additional RCS cooldown using steam dumps not necessary since Tc cooldown rate > 100°F/hr due to effects of SBLOCA. 3. Requests U4 RO verify at least 1 comp rm chiller running
	US/BOP **CRITICAL**	Receives report from the OCC that a spare breaker has been installed in 3AB15 cubicle for 3B RHRP **Directs FS/SO rack in 3AB15 to place 3B RHRP back in service**
	US **CRITICAL**	**When 3AB15 racked in & 3B RHRP available, returns to 3-EOP-E-1,** Step 16 per CAUTION at the beginning of 3-EOP-ECA-1.1.
	Terminating Cue:	**Once US determines need to return to Step and Procedure in effect (3-EOP-E-1, Step 16), the scenario may be terminated at Examiner discretion.**

OPERATIONS SHIFT TURNOVER REPORT

UNIT 3	ONCOMING CREW ASSIGNMENTS	UNIT 4
Unit Supervisor:	Shift Manager:	Unit Supervisor:
Reactor Operator:	Watch Engineer	Reactor Operation:
Secondary Operator:	Admin RCO:	Secondary Operator:
	Primary Operator:	

UNIT 3	PLANT STATUS	UNIT 4
Mode 1		**Mode** 1
Power (%) 60		**Power (%)** 100
MWe 439		**MWe** 759
Gross Leakrate: 0.05		**Gross Leakrate:** 0.08
Boron (ppm): 582		**Boron (ppm):** 600

Hot Items List and Short Term Equipment Concerns:

3C Charging pump - motor ground
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

U3 Current \ Anticipated LCO Actions:

3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

U4 Current \ Anticipated LCO Actions:

CURRENT: None

ANTICIPATED: None

Results of Offgoing Focus Area

See G:\Ops\Common\0900

UNIT 3 IN THE FIELD

PRIMARY OPERATOR:

Equipment Status Problems:

3C Charging pump - motor ground
3C RCP lower motor guide bearing temp detector failed high

Evolutions or Compensatory Actions In Progress:

3-GOP-301 in progress. Complete thru step 5.92. Continue load increase to 100% after shift turnover.

General Info/Remarks:

Thunderstorms in area.

SECONDARY OPERATOR:

Equipment Status Problems:

TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.

Evolutions or Compensatory Actions In Progress:

3-GOP-301 in progress. Complete thru step 5.92. Continue load increase to 100% after shift turnover.
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Info/Remarks:

Thunderstorms in area.

UNIT 3 CONTROL ROOM

Abnormal Annunciators:

-8/3 STEAM DUMP ARMED/ACTUATED - Condenser steam dump control selected to MANUAL.

Equipment Status/Problems:

3C Charging pump - motor ground
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high

Changes to Risk Significant Equipment:

OLRM already run run for OOS equipment.

Upcoming Reactivity Management Activities

Increase turbine / reactor power from 60% to 100%.

Upcoming Major POD Activities:

Increase turbine / reactor power from 60% to 100% after shift turnover. 3-GOP-301 complete thru step 5.92.
Repair 3C charging pump
Continue troubleshooting TC-3-408H

Upcoming ECOs to Hang and / or Releases:

HANG none

RELEASE none

Evolutions or Compensatory Actions in Progress:

Condenser steam dump control in MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Information, Remarks, and Operator Work Around Status:

Thunderstorms in the area.
Returning to full load following 3B SGFP oil leak repair.

Facility: Turkey Point Scenario No.: 4 Op Test No.: 2005-301

Examiners: _____ Candidates: _____ US

_____ _____ RO

_____ _____ BOP

Initial Conditions: Mode 1, 60% Power, MOL, 3-GOP-301 in use complete through step 5.92 for return to 100% power following power reduction for maintenance on the 3B SGFP lube oil system. All testing was completed and 3B SGFP returned to service.

Turnover: Equipment OOS: 3C Charging Pump for motor ground; Condenser Steam Dump mode selector switch selected to the MANUAL (Steam Pressure) mode due to a problem with TC-3-408H, (Tave input to Turbine Trip Summator).

The crew will be performing a load increase as soon as possible after shift turnover to 100% to meet load demand.

There are thunderstorms in the area.

Known tube leak in 3C S/G (8 gpd) – unchanged for last week. Chemistry samples are being taken per 3-ONOP-071.2, Attachment 1. The current sample, just completed indicates no significant change in leak rate. MOV-3-1405 remains open at management direction due to small size and stability of tube leak rate.

Event No.		Event Type*	Event Description
1	TFKCSMB=T	(C) BOP (TS) SRO	3B ICW Pump shaft shears.
2	TVBVLK40=1.0	(C) RO (C) SRO	CVCS relief valve, RV-3-203, fails open requiring Normal Letdown to be manually isolated.
3	-	(N) RO	Place Excess Letdown in service.
4	TFS1MBWL=T	(I) BOP (TS) SRO	PT-3-475 fails low (3A S/G main steam pressure) which feeds FI-3-474 (3A S/G steam flow) and causes a low steam flow signal.
5	TFLISB21=T	(C) RO (R) BOP (TS) SRO	Control rod L11 drops. (Fast load reduction to < 50%)
6	TVFA102=1.0 TVFABP6A=0.38 TFF1D6CM=T	(C) BOP (C) SRO	3A Condensate Pump bearing high temperature requiring manual start of 3C Condensate pump. Discharge check valve on 3A Condensate pump sticks open. 3C Condensate Pump will not auto start if 3A Condensate Pump trips.
7	TVSBVL10=0.03 TFSVVX5C=T TFSVVX6C=T TFSVVX7C=T TFL3SIA1=T TFL3SIA2=T TFLSIM2=T TFMVV01S=T	(M) ALL (C) ALL	Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.
7a		(M) ALL	3-EOP-ECA-2.1 performed until step 17 following transition from 3-EOP-E-2 caused by MSLB with failure of all MSIVs to close.
7b			3-EOP-FR-P.1 performed in response to orange/red path conditions on Integrity critical safety function status tree due to effects of MSLB.

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

Turkey Point 2005-301 Scenario #4

Event 1 – 3B ICW Pump shaft shears.

Event 2 – CVCS relief valve, RV-3-203, fails open requiring Normal Letdown to be manually isolated.

Event 3 – Place Excess Letdown in service.

Event 4 – PT-3-475 fails low (S/G 3A Main Steam Pressure) which feeds FI-3-474 (S/G 3A Steam Flow) and causes a low steam flow signal.

Event 5 – Control rod L11 drops. (Fast load reduction to < 50%)

Event 6 – 3A Condensate Pump bearing high temperature requiring manual start of 3C Condensate pump. Discharge check valve on 3A Condensate pump sticks open. 3C Condensate Pump will not auto start if 3A Condensate Pump trips.

Event 7 – Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Event 7a - 3-EOP-ECA-2.1 performed until step 17 following transition from 3-EOP-E-2 caused by MSLB with failure of all MSIVs to close.

Event 7b - 3-EOP-FR-P.1 performed in response to orange/red path conditions on Integrity critical safety function status tree due to effects of MSLB.

Scenario XXII NRC 4

Simulator Operating Instructions

Setup

IC-24 (60% MOL)

Place simulator in run.

Take Steam Dump Control Switch → MANUAL

Secure 3C Charging Pump and ensure 3A & 3B are running in AUTO.

Trigger lesson steps:
SETUP - 3C CHG PP OOS (actuates TAB1POSN = 3)
SETUP - ALL MSIVs FAIL OPEN (actuates TFSVVX5C = T, TFSVVX6C = T & TFSVVX7C = T)
SETUP - 3C SG 8 GPD LEAK (actuates TVHHSGC = 0.000005)
SETUP - TRAIN A AUTO SI & TRAIN B AUTO.MAN SI FAIL (actuates TFL3SIA1 = T, TFL3SIA2 = T & TFL3SIM2 = T)
SETUP - 3C COND PP AUTO START FAIL (actuates TFF1D6CM = T)
SETUP - MOV-3-843A AUTO OPEN FAIL (actuates TFMVV01S = T, TFMVV01S = F when IMM2S01O)

Acknowledge alarming annunciators and freeze simulation.

Place caution tag on steam dump mode selector switch and clearance info tag on 3C charging pump control switch.

Provide shift turnover checklists, 0-OP-046 Att 5 reactivity worksheet (60→100%), 3-ONOP-071.2 Att 1 and 3-GOP-301 signed off through step 5.91.

Select 3A QSPDS to page 211 (SAT) and 3B QSPDS to page 212 (RVL). Set ERDADS on VPA to Tavg/Tref (TAV) and at the RCO desk to ENVRN (ED3).

Fill in blender & shutdown boron addition placards at console blender station. Data for each IC may be found in the ECC & Shutdown Guidelines Book in the simulator I/F.

Event 1 – 3B ICWP shaft shear

Immediately after shift turnover, trigger lesson step **EVENT 1 - 3B ICWP SHAFT SHEAR** (actuates TFKCSMB = T).

Respond if directed as SO to:

1) locally investigate 3B ICWP. Report back that coupling between motor & pump shaft disconnected (bolts sheared).
2) perform post-start checks for 3A ICWP. Report back that pump is operating normally.
3) locally investigate breaker 3AB17. Report back that the breaker is open, but otherwise normal.

Respond if directed as SO/FS to walk down the ICW system to look for leaks. After 4-6 min, report no ICW system leaks are visible.

Respond as SO if directed to report TPCW HXs ICW flow. Click on SCHEMA → COMMON SERVICES → INTAKE COOLING → report TPCW HX ICW total flow as indicated on ICW system mimic (or use default value of 5800 gpm).

Respond as PO if directed to report CCW HXs ICW flow. From ICW system mimic, report indicated CCW HX ICW total flow (or use default value of 13600 gpm).

Respond as SO if directed to check TPCW supply temperature (TI-3-1432) < 105°F. From ICW system mimic, touch TPCW ♦ & report system temp TE-1472/TI-1432 at top left of TPCW mimic (approx 99°F and stable).

Respond if called as OCC/WCC/FS to troubleshoot & repair 3B ICWP.

Respond if directed as SO to rack out 3B ICWP breaker 3AB17. After 8-12 min, **trigger** lesson step **EVENT 1 - RACK OUT 3B ICWP BKR** (actuates TAK2B17P = 3).

Event 2 – RV-3-203 fails open / normal letdown isolation

At evaluator direction after TS evaluated for 3B ICWP OOS, trigger lesson step **EVENT 2 - RV-3-203 FAILS OPEN** (actuates TVBVLK40=1.0 on 1 min ramp).

Crew responds per 3-ARP-097.CR (A-5/6) and letdown is manually isolated.

Respond as HP and Chemistry when notified that normal letdown is secured and excess letdown has been placed in service.

Event 3 – Place excess letdown in service

In response to event 2, the crew places excess letdown in service *per 3-OP-041.2 (step 5.1.2.8) or 3-OP-047 (sect 7.14).*

Respond as PO to verify CCW → XLHX flow less than or equal to 238 gpm. Click on SCHEMATICS→COMMON SERVICES→COMPONENT COOLING→ ♦CCW TO RCP & XS LTDWN HX'S...→read CCW flow at EXCESS LETDOWN HEAT EXCH. Charging will likely be reduced to one pump at minimum flow for RCP seal injection.

Respond as PO when directed to check for increasing RCDT level (indication of RV-3-304 lifting in excess letdown line). Report RCDT level stable as indicated on Waste Boron Panel.

Event 4 – PT-3-475 (3A S/G pressure) fails low

After excess letdown placed in service, trigger lesson step **EVENT 4 - PT-3-475 FAILS LOW** (actuates TFS1MBWL = T).

This also fails FT-3-474 (3A S/G steam flow) low which is the controlling steam flow input for 3A S/G level control. FCV-3-478 (3A S/G FRV) fails closed requiring manual control to restore 3A S/G level to program Once back on program the other steam flow channel can be selected for level control input and the FRV returned to AUTO.

The crew responds per 3-ONOP-049.1 and trips bistables as appropriate.

Respond as OCC/WCC/FS for troubleshooting & repair.

Event 5 – Control rod L11 drop

After 3A s/g level control returned to auto & TS impact evaluated or at evaluator discretion, trigger lesson step **EVENT 5 - CONTROL ROD L11 DROPS** (actuates TFLISB21 = T). Rod L11 is in shutdown bank B.

The crew responds per 3-ONOP-028.3. A small power reduction to < 50% is required.

Respond if called as Reactor Engineering for shutdown margin calculation, QPTR calculation & rod drop notification.

Respond if called as Chemistry to verify most recent RCS boron concentration by checking label RCS value at the bottom of the ISIS window. Report that value to the crew as current RCS boron concentration.

Respond as OCC/WCC/I&C if directed to reduce trip setpoint. No further action will be necessary due to reactor trip upcoming shortly.

Event 6 – 3A Condensate Pump bearing & discharge check valve failures

After plant stabilization < 50% power (Tavg approx. = Tref), trigger lesson step **EVENT 6 - 3A COND PP BRNG AND DISCHG CK VALVE FAILURES** (actuates TVFA102 = 1.0 & TVFABP6A = 0.38 on 1 min ramp)

This actuates the 3A Condensate Pump (Cond Pp) motor overload alarm (but not overload trip)and fails the associated discharge check valve open. The operator should start 3C Cond Pp and trip 3A Cond Pp. If 3A Cond Pp is tripped first, the failed check valve will reduce condensate flow enough to trip the SGFPs on low suction pressure requiring reactor trip. The auto start of 3C Cond Pp is defeated requiring manual operator action to start the pump. ***When the 3C Cond Pp switch is taken to start, this auto triggers*** *lesson step* ***EVENT 6 - 3C COND PP MANUAL START*** *(actuates TFF1D6CM=F when IMF1P6CS).*

If the BOP fails to trip 3A Cond Pp, **trigger** lesson step **EVENT 6 - 3A COND PP TRIP** (actuates TVFABP6A = 0.40 on 5 sec ramp)

If asked as FS/SO to investigate 3A Cond Pp, state that the lower motor bearing is smoking with paint scorching on the bearing housing. Recommend tripping the Cond Pp before further damage occurs.

If asked as FS/SO to check out the 3A Cond Pp for reverse rotation after it is secured per 3-OP-073 section 6.1, report that the pump shaft is still turning but in the reverse direction from normal. Respond to request to rack out 3AA21 and close the 3A Cond Pp discharge valve. Take no action on either of these requests.

Event 7/7a/7b – Main steam header break & depressurization of all S/Gs

Once crew has taken action to address 3A Condensate Pump stuck check valve OR immediately after a reactor trip in event 6, trigger lesson step **EVENT 7 - MAIN STEAM HEADER BREAK** (actuates TVSBVL10 = 0.03 on 1 min ramp).

If crew does not trip reactor in response to indications of steam break, at lead examiner direction, call as FS and report that there is a steam break on the West side of the main steam platform. The crew may call for this report before tripping the reactor. As FS convey sufficient urgency to get the crew to trip the reactor.

Following the reactor trip, the RCS cooldown will quickly drop PZR level < 12% requiring manual SI per 3-EOP-E-0 step 4 RNO.

Neither train SI will respond to an automatic initiation from setup. The setup also causes train A only to respond to a manual SI signal with no response from MOV-3-843A to that SI. Either MOV-3-843A or B must be manually opened for cold leg HHSI flow. ***If MOV-3-843A control switch is taken to open, this auto triggers the conditional part of*** *lesson step* ***SETUP - MOV-3-843 AUTO OPEN FAIL*** *(actuates TFMVV01S = F when IMM2S01O).*

All MSIVs fail open entered at setup leads to depressurization of all s/g's.

Crew responds per 3-EOP-E-0 transitioning to 3-EOP-E-2 thence to 3-EOP-ECA-2.1.

When directed as PO to align PAHM per 3-OP-094, wait 8-12 min, then **trigger** lesson step **EVENT 7 - PLACE PAHM IN SERVICE** (actuates TAC2V02A = 1.0, TAC2V02B = 1.0, TAAAV21 = 1.0, TAAAV22 = 1.0 & TACA005 = 0.0).

If asked as OCC/WCC/FS to pull MSIV solenoid fuses, wait 5 minutes and report train A fuses (*XXA, XXB, XXC*) pulled (*no effect on valve position indication – lights powered from train B fuses XGJ, XGK, XHJ*).

If asked as FS/SO to align standby feed per 3-ONOP-075 or 0-OP-074.1 sect 5.1, wait 5 minutes and ask crew for feedwater header pressure (PI-3-1616). **If feedwater header pressure < 500 psig, trigger lesson step EVENT 7 - OPEN DWDS-3-012 3 TURNS** (actuates TAFA012 = 0.15 on 30 sec ramp), then request crew to start the A SSGFP. Once A SSGFP is running or **if feedwater header pressure > 500 psig, trigger lesson step EVENT 7 - OPEN DWDS-3-012 FULLY** (actuates TAFA012 = 1.0 on 2 min ramp).

If requested as FS/SO/PO to deenergize/close all unit 3 AFWSS MOVs, **trigger lesson step EVENT 7 - DEENERGIZE & CLOSE ALL AFWSS MOVs** (actuates TCF5MA27 = F, TFFXC05 = T on 5 sec delay, TCF5M527 = F on 30 sec delay, TFFXC04 = T on 35 sec delay, TCF5MB28 = F on 90 sec delay & TFFXC03= T on 95 sec delay).

Respond as Chemistry/HP regarding S/G sampling & surveys. Report no signs of any contamination.

If asked as PO/SO/FS to close breakers for accumulator discharge valves, **trigger lesson step EVENT 7 - CLOSE ACCUMULATOR DISCHG MOV BKRS** (actuates TCM2D50M = T, TCM2D51M = T on 30 sec delay & TCM2D49M = T on 1 min delay).

When asked to reopen those same breakers, **trigger lesson step EVENT 8 - OPEN ACCUMULATOR DISCHG MOV BKRS** (actuates TCM2D49M = T, TCM2D51M = T on 30 sec delay & TCM2D50M = T on 1 min delay).

Op Test No.: 2005-301 Scenario No.: 4 Event No.: 1 Page 1 of 20

Event Description: 3B ICW Pump shaft shears.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes/reports reduced 3B ICWP amps & annunciator I-4/4
	RO	Refers to 3-ARP-097.CR for annunciator I-4/4
	BOP	Performs immediate actions of 3-ONOP-019: 1. Determines traveling screens clean (ann. I-3/3 OFF & $\Delta p < 7.5"H_2O$) 2. Determines all ICWP alarms off (ann. I-4/1, 4/2 & 4/3)
	US	Directs 3-ONOP-019 response. Evaluates plant condition per step 4 RNO 1. Directs start of 3A ICWP (substep a) 2. Determines substeps b & c no longer apply 3. Determines total ICW flow >19000 gpm on one ICWP (substep d) 4. Refers to 3-OP-019 section 7.10. Since single pump operation > 19000 gpm existed for < 20 min, 3C ICWP vibration evaluation not required. Single pump condition cleared by start of 3A ICWP.
	BOP	Performs subsequent actions of 3-ONOP-019: 1. Determines 3B & 3C ICWP both running, but 3B ICWP amps low 2. Starts 3A ICWP; stops 3B ICWP 3. Reports annunciator I-4/4 cleared with ICW pressure >10 psig & < 35 psig 4. If directed has SO report TPCW HXs ICW flows and has PO report CCW HXs ICW flows 5. If directed has SO/FS check 3B ICWP and breaker 3AB17
	RO	Determines SI terminated
	BOP	Continues performing subsequent steps of 3-ONOP-019: 1. Determines POV-3-4882 & 4883 both open 2. Determines ann. I-5/4 (TPCW hi temp/lo press) OFF 3. Directs SO check TPCW supply temperature TI-3-1432 , <105°F and stable/decreasing
	RO	Determines CCW supply temp < 120°F and stable/decreasing with ann. H-8/5 OFF.
	BOP	Repeats check for normal TPCW conditions

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Event Description: 3B ICW Pump shaft shears.

Time	Position	Applicant's Actions or Behavior
	RO	Repeats check for normal CCW conditions
	US	1. Refers to TS 3.7.3.a actions a & b (72 hr until 3B ICWP bkr racked out & 7 day with 3A & 3C ICWP on independent power supplies) 2. Notifies OCC/WCC to initiate PWO & repair 3. Maintains command and control during the event

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Event Description: CVCS relief valve, RV-3-203, fails open requiring Normal Letdown to be manually isolated.

Time	Position	Applicant's Actions or Behavior
	RCO	Recognizes/reports annunciator A 5/6 'CVCS LP LTDN LINE RELIEF HI TEMP' alarming (TI-3-141 > 150°F)
	BOP	Obtains & reads 3-ARP-097.CR for annunciator A-5/6
	RCO	1. Verifies temperature is > 150°F on TI-3-141 & decreased letdown flow 2. Verifies CV-3-204 OPEN 3. Attempts to reseat RV-3-203 as follows: a. Closes all letdown orifices (may secure a Charging Pump) b. Checks PCV-3-145 operates properly c. Checks TI-3-141 NOT increasing d. Opens the required number of orifices while controlling PCV-3-145 (Most likely will open the 45 GPM orifice) 4. Determines that RV-3-203 did NOT reseat by observing TI-3-141 temperature increasing and lower than expected letdown flow 5. Performs the following to isolate the RV-3-203 relief valve: a. Closes all letdown orifices b. Closes LCV-3-460 c. Minimizes charging flow ***NOTE:****Excess letdown established in next event (event 3)*
	BOP	Assists RCO as directed by the US.
	US	1. Notifies engineering of failed relief valve RV-3-203. 2. Maintains command and control of the evolution.

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Event Description: Place Excess Letdown in service.

Time	Position	Applicant's Actions or Behavior
	US	Directs placing excess letdown in service per 3-OP-047 section 7.12 or 3-OP-041.2 step 5.1.2.8
	RO	Places excess letdown in service as follows: 1. Verifies excess letdown HX CCW outlet valve, CV-3-739, is OPEN. 2. Directs PO verify CCW flow to excess letdown HX 200-238 gpm 3. Determines CV-3-387 closed 4. Determines excess letdown divert to WDS valve, CV-3-389, is aligned to the VCT. 5. Slowly opens excess letdown flow controller, HCV-3-137, allowing the excess letdown lines to fill. 6. After > 5 min., closes HCV-3-137 7. Opens excess letdown isolation valve, CV-3-387 8. Directs PO observe RCDT level for indication of RV-3-304 lifting 9. Slowly opens excess letdown flow controller, HCV-3-137, allowing the heat exchanger to warmup. 10. Monitors excess letdown HX outlet temp on TI-3-139. 11. IF LCV-3-115A, reaches 100% divert position (RED light ON, GREEN light OFF), THEN aligns excess letdown divert to WDS, CV-3-389, to the RCDT (switch to DIVERT).
	BOP	When directed, notifies Chemistry & HP that normal letdown is secured and excess letdown now in service Assists the RO as directed.
	US	Maintains command and control of the evolution.

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Event Description: PT-3-475 fails low (3A S/G main steam pressure) which feeds FI-3-474 (3A S/G steam flow) and causes a low steam flow signal.

Time	Position	Applicant's Actions or Behavior
	BOP	1. Recognizes and reports the following annunciator alarms: • C 4/1 ' FEED>STEAM' • C 5/1 'SG A STEAM>FEED' • C 9/3 'MAIN STEAMLINE HI ΔP' 2. Determines that PT-3-475 has failed low causing FI-3-474 to indicate low and reports failure to US. 3. Takes manual control of FCV-3-478 (3A s/g FRV) to control level and returns level to program.
	US	Directs response per 3-ONOP-049.1.
	RO	Determines that all other s/g steam pressure & steam flow protection channels are operable and indicating normally.
	US	Directs compensatory actions IAW 3-ONOP-049.1: 1. Verifies BOP determination of PT-3-475 / FI-3-474 failure 2. Directs BOP select operable channel for steam flow input to 3A s/g level control 3. Directs BOP return 3A s/g level to program & then FCV-3-478 control to AUTO 4. Verifies PT-3-474/476 and FT-3-475 reading normal
	BOP	Performs 3-ONOP-049.1 actions as directed by US: 1. Compares to PT-3-474 / 476 and FI-3-475 & determines no off-normal conditions on other 3A s/g steam pressure & flow indications 2. Selects operable steam flow channel for input to 3A s/g level control 3. When 3A s/g level back on program, returns FCV-3-478 control to AUTO
	US	Continues directing compensatory action IAW 3-ONOP-049.1: 1. Reviews Tech Specs and determines the following apply: • TS 3.3.1 - Table 3.3-1 item 12 action 6 (trip b/s within 6 hr) • TS 3.3.2 - Table 3.3-2 items 1e, 1f & 4d action 15 (trip b/s within 6 hr) *NOTE: Steps 5.5 thru 5.8 not applicable* 2. Determines which bistables to trip and effects on plant

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Event Description: PT-3-475 fails low (3A S/G main steam pressure) which feeds FI-3-474 (3A S/G steam flow) and causes a low steam flow signal.

Time	Position	Applicant's Actions or Behavior
		3. Briefs crew regarding PT-3-475/FI-3-474 failure including: • Effects of the failure • Compensatory actions • What bistables to trip (and not trip) & expected indications when tripping bistables
	BOP	As directed by the US, proceeds to protection racks and trips the following bistables IAW 3-ONOP-049.1: • Rack 16: BS-3-474 • Rack 17: BS-3-475 • Rack 17: BS-3-478B-1, B-2 & C
	US/RO	Observes correct indications received for each bistable placed in trip.
	US	Completes compensatory action per 3-ONOP-049.1: 1. Verifies correct indication received for each bistable tripped. *NOTE: Steps 5.10 thru 5.12 not applicable* 2. Ensures I&C is notified of PT-3-456 failure and PWO initiated. Maintains command and control of the evolution.

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Event Description: Control rod L11 drops. (Fast load reduction to < 50%).

Time	Position	Applicant's Actions or Behavior
	RO	Performs the following immediate action of 3-ONOP-028.3: Determines one shutdown bank B RCC dropped (L11), reactor trip not required and reports this to the US.
	US	1. Verifies one RCC dropped and rx trip not required 2. Directs response per 3-ONOP-028.3
	RO	Performs the following per 3-ONOP-028.3 as directed by the US: 1. Places rod control in MANUAL 2. Does not dilute or increase power 3. Does not use rods until rod drop cause identified 4. Coordinates with the BOP to maintain Tavg within 3°F of Tref by adjusting turbine load control 5. Verifies PZR level and pressure return to program
	BOP	Performs the following per 3-ONOP-028.3 as directed by the US: 1. Coordinates with RCO to maintain Tavg within 3F of Tref by adjusting turbine load 2. Verifies Steam Generator levels return to program
	US	Directs response per 3-ONOP-028.3: 1. Determines AFD within RAOC limits per PCB (TS 3.2.1) 2. Directs hourly QPTR calculation per 3-OSP-059.10 (TS 3.2.4) 3. Declares the dropped rod inoperable (TS 3.1.3.1) 4. Determines only 1 s/d bank rod dropped (TS 3.1.3.1 & .5) 5. Determines ann. B-9/3 alarming (rod deviation monitor). Directs comparison of RPIs to step counters every 4hr (TS 3.1.3.1 & .5) 6. Determines SDM is adequate within 1 hour due to unchanged RCS boron concentration. Directs log entry. (TS 3.1.1.1)
	US	Determines rx power still > 50% and directs fast load reduction per 3-ONOP-100 to reduce power accordingly 1. Ensures load dispatcher notified of load decrease. 2. Conducts crew brief per foldout page. 3. Notifies SM to review 0-EPIP-20101 & 0-ADM-115 and ensure required notifications made 4. Directs power reduction < 50% IAW 3-ONOP-100 using boration only including required boric acid (BA) amount & flow rate (≈100 gal BA to get to 50% power)

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Event Description: Control rod L11 drops. (Fast load reduction to < 50%).

Time	Position	Applicant's Actions or Behavior
	BOP	Notifies load dispatcher of load reduction when directed by US Makes plant page announcement regarding load reduction
	RO	Performs fast load reduction by initiating boration per 0-ONOP-100 and/or control rod insertion per US direction. 1. Sets BA Totalizer to amount directed 2. Places Rx M/U Selector Switch to BORATE 3. Places Rx M/U Control Switch to START 4. Sets FC-3-113A consistent with BA flow rate directed 5. When boration complete, places Rx M/U Selector Switch to AUTO & Rx M/U Control Switch to START
	BOP	Reduces turbine load per 3-ONOP-100 at rate directed by US.
	RO	Performs fast load reduction per 3-ONOP-100 as directed by US: *NOTE: Since control rods remain in MANUAL for this load reduction, verification of auto rod insertion per step 3a & RIL alarm monitoring per step 3b are not applicable* 1. Determines 2 charging pumps & 2 letdown orifices already in service. 2. Determines NRHX CCW flow already increased (from setup) 3. Energizes PZR backup heaters. 4. Verifies PZR level on program.
	RO/BOP	Maintains Tref within 5°F of Tavg. (3-ONOP-100) Stabilizes plant as US direction once reactor power < 50%. (3-ONOP-028.3)
	US	Performs the following per 3-ONOP-028.3 1. Notifies reactor engineering of dropped RCC 2. Directs OCC/WCC to notify I&C of dropped RCC and potential for resetting hi flux trip setpoint 3. Directs shutdown margin calculation
	RO	Per 3-ONOP-028.3, checks NIS/RPI rod drop rod stop annunciator B-7/1 status. If alarming, places dop rod mode switch on affected PRNI drawers to RESET then back to NORMAL
	US	Maintains command and control of the evolution.

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Event Description: 3A Condensate Pump bearing high temperature requiring manual start of 3C Condensate pump. Discharge check valve on 3A Condensate pump sticks open. 3C Condensate Pump will not auto start if 3A Condensate Pump trips.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator D 9/1 'COND PUMP A/B/C MOTOR OVERLOAD'.
	RCO	Reads 3-ARP-097.CR for ann. D-9/1 as directed by US.
	BOP	Starts 3C Condensate Pump (idle pump) and secures 3A Condensate Pump (3-OP-073 section 6.1). ***NOTE:*** *If 3A Cond Pp is tripped first, the failed check valve will reduce condensate flow enough to trip the SGFPs on low suction pressure requiring reactor trip. The auto start of 3C Cond Pp is defeated requiring manual operator action to start the pump.*
	US	Directs local investigation of 3A Condensate Pump including a check for reverse rotation per 3-OP-073 section 6.1.
	BOP	Relays report from FS/SO that 3A Condensate Pump is rotating in the reverse direction.
	US	Based on 3A Condensate Pump reverse rotation report directs corrective action per 3-OP-073 section 6.1 1. Directs OCC/WCC rack out breaker 3AA21 & generate ECO *NOTES: Step 6.1.2.3.b requires 3A Condensate Pump discharge valve closure once the breaker is racked out. Due to the short time involved until the next event, the breaker will not get racked out, thus the discharge valve remains open.* *Steps 6.1.2.4 & 6.1.2.5 are not applicable.* *Stopping an SGFP will increase SGFP suction pressure and lessen the likelihood of SGFP auto trip. Turbine load is low enough to allow operation on one SGFP.* Directs stopping one SGFP consistent with 3-ONOP-100 step 7
	BOP	Stops one SGFP when directed consistent with 3-ONOP-100 step 7: 1. Places SGFP Turbine Runback Defeat switch to DEFEAT 2. Stops one SGFP
	US	Maintains command and control of the evolution.

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes/reports steam noise, increased steam flow & s/g level transient consistent with sudden increase in steam demand.
	US	Directs field operator investigate steam leak *NOTE: Field operator will report steam break on West side of main steam platform. Report will convey sufficient urgency to get crew to trip reactor if they haven't ordered it already. If report not requested, this may be provided as a prompt at lead examiner discretion.* Directs reactor trip & performance of immediate actions per 3-EOP-E-0 in response to indications of steam break
	RO	Performs immediate operator actions of 3-EOP-E-0. 1. Manually trips the reactor. 2. Verifies reactor tripped • Rod bottom lights on with RPIs @ zero • RTBs open • NIs decreasing 3. Determines that SI not actuated but required by PZR level < 12[50]% (due to steam break-induced cooldown) a. Manually initiates SI & containment isolation phase A. b. Notes that only train A SI actuated with train B failed.
	BOP	Performs immediate operator actions of 3-EOP-E-0. 1. Verifies all turbine stop valves closed 2. Closes the MSR main steam stop MOVs. 3. Verifies mid & east GCBs open 4. Determines 3A, 3B & 3D 4kV buses energized 5. Determines 3A, 3C, 3D & 3H 480V LCs energized and reports 3B 480V LC deenergized (from event 3)

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	US **CRITICAL**	In response to report that PZR level < 12[50]%, directs manual SI per 3-EOP-E-0 step 4 RNO Following manual SI actuation, verifies failure of train B SI Monitors 3-EOP-E-0 Foldout Page items. 1. Determines all s/g's faulted so does not isolate AFW to any one particular s/g. 2. Continues to maintain just above 345 gpm until directed otherwise in 3-EOP-ECA-2.1 (event 7a) 3. If RCS subcooling < 25[65]°F, **recognizes both MOV-3-843s still closed. Does not order RCP trip unless first directing opening of either valve.** Once HHSI cold leg flow available, directs tripping RCPs. Directs performance of 3-EOP-E-0 prompt actions (steps 5-16)
	RO **CRITICAL**	**If directed by US per 3-EOP-E-0 foldout page RCP trip criteria, identifies absence of cold leg injection flowpath, opens MOV-3-843A or B** and then trips RCPs.
	BOP	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Verifies feed water isolation. a. Takes SGFP switches to STOP b. Manually closes FRVs if still open c. Closes FWIVs d. Determines FRBVs closed & SSGFPs off. 2. Verifies ≥2 AFW pumps running 3. Determines ≥2 ICWPs in service, POV-3-4882/4883 closed and ICW headers tied together

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	BOP	Continues performance of 3-EOP-E-0 prompt actions: 4. Determines MSIVs open. If hi stm flow / low Tavg MSIS signal: a. Attempts to manually close MSIVs from console b. Attempts to manually close MSIVs from VPB pushbuttons c. Recognizes & reports failure of any MSIV to close. ***NOTE:*** *If the high steam flow / low Tavg MSIS signal actuated, then manual MSIV closure attempt required. Otherwise MSIVs failure may not be seen until later in 3-EOP-E-0.* 5. Determines all 4 EDGs running
	RO **CRITICAL**	Performs 3-EOP-E-0 prompt actions when directed by US: 1. Determines containment isolation Phase A.actuated 2. Determines 3A & U4 HHSIPs and 3A RHRP running. Starts 3B RHRP 3. Determines 3 CCWHX & 2 CCWPs in service, CCW headers tied together and MOV-3-626 open 4. Determines 1 ECC & 2 ECFs running. Starts 3A or 3B ECC. 5. Determines containment purge secured & verifies control room ventilation in emergency recirc 6. Determines containment pressure < 20 psig (containment spray not required) 7. **From SI valve amber lights, if MOV-3-843s have not been manually opened yet, determines no cold leg injection path and manually opens either MOV-3-843A or B.**
	US	Directs performance of 3-EOP-E-0 subsequent actions (steps 17-27)

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	BOP	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Directs PO to place Containment PAHMS in service. After PO actions are complete, completes switch alignment on 3QR81 & 82 per 3-OP-094. 2. Verifies proper AFW valve alignment. 3. Verifies proper AFW flow a. Since all s/g NR levels < 6[32]%, controls AFW flow ≥345 gpm b. Unable to maintain s/g NR levels 6[32]% - 50% due to steam flow from all s/g's 4. Determines RCS temperature is decreasing < 547°F: a. Stops dumping steam b. Limits total AFW flow to 345 gpm until any s/g NR level > 6[32]% c. If MSIVs still open, determines cooldown in progress is due to steam flow and attempts to manually close MSIVs from console switches and VPB pushbuttons. d. If not done so already, recognizes & reports failure of all MSIVs to close either automatically or manually 5. If cooling required for running RCPs, resets containment isolation phase A

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	RO	Performs 3-EOP-E-0 subsequent actions when directed by US: 1. Resets SI. 2. Realigns SI a. Determines 3A & U4 HHSIPs running b. Starts 3B HHSIP b. Stops both U4 HHSIPs and places them in standby 3. Checks for HHSIP cold leg flow if RCS pressure < 1600[2000] psig. Determines RCS pressure > 250[650]. 4. Determines RCP seal cooling normal. 5. Observes/reports RCS cold leg temperature dropping 6. If RCPs running. a. Trips RCPs if RCS subcooling <25[65]°F & HHSI flowpath available b. Reestablishes RCP cooling if RCPs left running 1) Verifies SI reset 2) Opens MOV-3-1417 & 1418 3) Resets & starts all available NCCs 7. Determines excess letdown, PZR PORVs & PZR spray isolated
	BOP	Determines S/Gs are faulted - observes pressure in all S/Gs are decreasing in an uncontrolled manner and informs US.
	US Critical	**With the information that pressure in all S/Gs is decreasing in an uncontrolled manner and that the MSIVs will not shut, transitions to 3-EOP-E-2** Conducts EOP transition crew brief. Ensures Critical Safety Functions monitored using 3-EOP-F-0. Directs performance of 3-EOP-E-2
	US	Directs the response to S/Gs pressure decreasing per E-2

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Event Description: Major steam line break downstream of MSIVs. All MSIVs fail open. Neither train SI responds to autp SI. PZR level requires manual SI. Train B does not respond to manual SI. MOV-3-843A fails to auto open requiring opening of either MOV-3-843 A or B to establish cold leg HHSI flow.

Time	Position	Applicant's Actions or Behavior
	BOP	Performs the following as directed by the US per 3-EOP-E-2: 1. Re-verifies the MSIV and Bypass Valves on the faulted S/Gs are not closed and that manual attempts will not work. 2. Checks if any S/G is not faulted - observes pressure in all S/Gs decreasing in an uncontrolled manner and informs the US

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Event Description: 3-EOP-ECA-2.1 performed until step 17 following transition from 3-EOP-E-2 caused by MSLB with failure of all MSIVs to close.

Time	Position	Applicant's Actions or Behavior
	US CRITICAL	**With the information that pressure in all S/Gs is decreasing in an uncontrolled manner and that the MSIVs will not shut, transitions to 3-EOP-ECA-2.1** Ensures Critical Safety Functions monitored using 3-EOP-F-0. 1. Recognizes that 3-EOP-FR-H.1 entry is not required when total FW flow is procedurally reduced < 345 gpm. **2. When Tcold drops < 320°F, recognizes orange path (or red path if < 290°F) for RCS integrity critical safety function requiring transition to 3-EOP-FR-P.1** (Event 7b) Directs performance of 3-EOP-ECA-2.1: 1. Monitors 3-EOP-ECA-2.1 Fold Out Page Items 2. Directs OCC/WCC assist with local actions to close MSIVs
	BOP	Performs 3-EOP-ECA-2.1 as follows at US direction: 1. Evaluates status of secondary pressure boundary and determines isolated with the exception of all MSIVs a. Attempts to close the MSIVs by pulling/directing fuses pulled for one train of solenoids for each MSIV (behind console) b. Dispatches an operator to locally close MSIVs or block valves one loop at a time 2. Establishes an alternate source of feedwater a. Resets feed isolation *NOTE: FW isolation signal to FRBVs must be reset at VPB in order to establish standby feedwater flow. Each FRBV has its own FW isolation reset pushbutton on VPB.* b. Places the standby S/G feedwater system in service per 0-OP-074.1

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Event Description: 3-EOP-ECA-2.1 performed until step 17 following transition from 3-EOP-E-2 caused by MSLB with failure of all MSIVs to close.

Time	Position	Applicant's Actions or Behavior
	BOP	Continues performing 3-EOP-ECA-2.1 as follows at US direction: 3. Isolates steam supply to AFW pumps by dispatching FS/SO to locally: a. Opens AFW pump steam supply MOV breakers on all S/Gs b. Closes AFW pump steam supply MOVs on all S/Gs 4. Controls feed flow to minimize RCS cooldown <100°F/hr a. Decreases feed flow to 25 gpm to each S/G *NOTE: Reducing total FW flow < 345 gpm will cause a red path on the heat sink critical safety function. This will require entry into 3-EOP-FR-H.1 with immediate return to 3-EOP-ECA-2.1 since reducing total feed flow is procedurally directed and not due to equipment malfunction. See 3-EOP-FR-H.1 step 1 CAUTION 1.* b. Observes RCS hot leg temperatures decreasing 5. Determines CST level above 10%. 6. Checks secondary radiation a. Directs Chemistry to take S/G activity samples & DAM-1 monitor readings b. Directs HP to take RAD readings on steamlines 7. Resets containment isolation phase A (phase B not actuated) 8. Determines instrument air pressure > 95 psig. 9. Determines charging pumps on offsite power
	RO	Performs 3-EOP-ECA-2.1 as follows at US direction: 1. Determines RCPs should be stopped - verifies RCS subcooling > 25°F 2. Checks PZR PORVs closed and block MOVs open. 3. Determines RHRPs running, RCS pressure > 250 psig and SI reset. Stops both RHRPs. 4. Determines no containment spray pumps running. 5. Determines RWST level > 155k gal 6. Determines SI reset 7. Determines instrument air aligned to containment (CV-3-2803 open) 8. If RCS Thot < 340°F isolates accumulators as follows: a. Directs field operators locally unlock & close accumulator isolation MOV breakers

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Event Description: 3-EOP-ECA-2.1 performed until step 17 following transition from 3-EOP-E-2 caused by MSLB with failure of all MSIVs to close.

Time	Position	Applicant's Actions or Behavior
		b. Closes accumulator isolation MOVs c. Directs field operators locally open & lock accumulator isolation MOV breakers 9. Observes no charging pumps running and establishes desired charging flow a. Starts at least one charging pump b. Places RCS Makeup Control Switch in STOP c. Starts 2nd charging pump (3C OOS) d. Adjusts charging pump speed controller(s) for desired flow e. Adjusts charging flow to maintain seal injection flow f. Verifies charging pump suction auto transfers to the RWST
	US	Checks criteria for SI termination per 3-EOP-ECA-2.1 1. High-head SI pumps running 2. RCS subcooling > 30°F 3. RCS pressure >1600 psig and increasing/stable 4. PZR level >12%
	US	Maintains command and control of the evolution.
	Terminating Cue:	**Once the 3-EOP-ECA-2.1 SI Termination criteria listed above is achieved, the scenario may be terminated at Lead Examiner discretion.**

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Event Description: 3-EOP-FR-P.1 performed in response to orange/red path conditions on Integrity critical safety function status tree due to effects of MSLB.

Time	Position	Applicant's Actions or Behavior
	US CRITICAL	**When Tcold drops < 320°F, recognizes orange path (or red path if < 290°F) for RCS integrity critical safety function requiring transition to 3-EOP-FR-P.1** Directs performance of 3-EOP-FR-P.1 *NOTE: This procedure may be entered prior to achieving SI termination criteria per 3-EOP-ECA-2.1. 3-EOP-FR-P.1 will also terminate SI but under less restrictive criteria.*
	RO	Performs the following per 3-EOP-FR-P.1: 1. Determines RCS pressure > 250[650] psig 2. Determines Tcold decreasing 3. Determines SI reset
	BOP	Performs the following per 3-EOP-FR-P.1: 1. Determines efforts to stop c/d have been ineffective (step 2) a. Atmospheric & condenser steam dumps closed b.. Determines RHR not in service *NOTE: Step 2 RNO d. not applicable* 2. Determines efforts to minimize c/d have been ineffective (step 3) a. All s/g's faulted b. MSIVs all failed open c. Steam is not available from intact s/g for AFWSS d. Directs FS/SO to deenergize & close AFWSS MOVs (if not already done in event 7a) e. Controls FW flow to each s/g ≈ 25 gpm NOTE: Step 3g RNO sends user to step 4
	RO	Continues performing the following per 3-EOP-FR-P.1: 4. Determines power to PZR PORV block valves available with both MOVs open 5. Determines OMS not in service *NOTE: Step 5a RNO sends user to step 5d* 6. Determines both PORVs closed 7. Determines 2 HHSIPs running 8. Determines SI termination criteria met (RCS subcooling > 80[260]°F

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Event Description: 3-EOP-FR-P.1 performed in response to orange/red path conditions on Integrity critical safety function status tree due to effects of MSLB.

Time	Position	Applicant's Actions or Behavior
		& RVLMS > 0%) 9. Determines SI reset
	BOP	Continues performing the following per 3-EOP-FR-P.1: 3. Resets containment isolation phase A (if not already reset) 4. Determines IA available to containment (CV-3-2803 open & IA pressure > 95 psig)
	RO	Continues performing the following per 3-EOP-FR-P.1: 10. Observes if any charging pumps running and establishes desired charging flow a. Verifies at least one charging pump running b. Verifies RCS Makeup Control Switch in STOP c. Adjusts charging pump speed controller(s) for 20 gpm charging flow d. Adjusts charging flow to maintain seal injection flow 11. Stops any running HHSIPs & RHRPs
	Terminating Cue:	**Once SI has been Terminated per 3-EOP-FR-P.1, the scenario may be terminated at Examiner discretion.**

OPERATIONS SHIFT TURNOVER REPORT

UNIT 3	ONCOMING CREW ASSIGNMENTS	UNIT 4
Unit Supervisor:	**Shift Manager:**	**Unit Supervisor:**
Reactor Operator:	**Watch Engineer**	**Reactor Operation:**
Secondary Operator:	**Admin RCO:**	**Secondary Operator:**
	Primary Operator:	

UNIT 3	PLANT STATUS	UNIT 4
Mode 1		**Mode** 1
Power (%) 75		**Power (%)** 100
MWe 556		**MWe** 759
Gross Leakrate: 0.05		**Gross Leakrate:** 0.08
Boron (ppm): 541		**Boron (ppm):** 600

Hot Items List and Short Term Equipment Concerns:

3C Charging pump - motor ground
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high
3B accumulator level 6540 gal (low level ann. H-2/4 alarming)

U3 Current \ Anticipated LCO Actions:

3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.
3B accumulator level just above TS 3.5.1 limit (6540 gal vs. 6520 gal limit). Need to fill accumulator.

U4 Current \ Anticipated LCO Actions:

CURRENT: None

ANTICIPATED: None

Results of Offgoing Focus Area

See G:\Ops\Common\0900

UNIT 3 IN THE FIELD

PRIMARY OPERATOR:

Equipment Status Problems:

3C Charging pump - motor ground
3C RCP lower motor guide bearing temp detector failed high.
3B accumulator level 6540 gal (low level ann. H-2/4 alarming)

Evolutions or Compensatory Actions In Progress:

Continue load increase per 3-GOP-301 to 100% power after filling accumulator.
3B accumulator level just above TS 3.5.1 limit (6540 gal vs. 6520 gal limit). Need to fill accumulator after shift turnover.

General Info/Remarks:

Thunderstorms in area.

SECONDARY OPERATOR:

Equipment Status Problems:

3B2 Circ water pump - breaker 3AB18 failed
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.

Evolutions or Compensatory Actions In Progress:

Continue load increase per 3-GOP-301 to 100% power after filling accumulator.
Condenser steam dump control selected to MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.

General Info/Remarks:

Thunderstorms in area.

UNIT 3 CONTROL ROOM

Abnormal Annunciators:

-8/3 STEAM DUMP ARMED/ACTUATED - Condenser steam dump control selected to MANUAL.
H-2/4 ACCUM B HI/LO LEVEL - 3B accumulator level 6540 gal

Equipment Status/Problems:

3C Charging pump - motor ground
TC-3-408H Tavg input to condenser steam dump turbine trip summator - failed
3C s/g - 8 gpd tube leak. Leak constant for past week.
3C RCP lower motor guide bearing temp detector failed high.
3B accumulator level 6540 gal (low level ann. H-2/4 alarming)

Changes to Risk Significant Equipment:

OLRM already run run for OOS equipment.

Upcoming Reactivity Management Activities

Increase turbine / reactor power from 75% to 100%.
Fill 3B accumulator after shift turnover.

Upcoming Major POD Activities:

Increase turbine / reactor power from 75% to 100%.
Repair 3C charging pump
Continue troubleshooting TC-3-408H

Upcoming ECOs to Hang and / or Releases:

HANG none

RELEASE none

Evolutions or Compensatory Actions In Progress:

Continue load increase to 100% power after 3B accumulator fill. 3-GOP-301 complete thru step 5.96.
3C Charging pump - TS 3.1.2.3 n/a
Condenser steam dump control in MANUAL (steam pressure control). Steam pressure controller remains in AUTO.
3C s/g - 3-ONOP-071.2 Attachment 1 in use. Chemistry sampling every 2 hr. MOV-3-1405 remains open at management direction since leak rate small & constant.
Fill 3B accumulator after shift turnover.

General Information, Remarks, and Operator Work Around Status:

Thunderstorms in the area.
Returning to power from turbine valve test.

Facility: Turkey Point Scenario No.: 5 Op Test No.: 2005-301

Examiners: _____ Candidates: _____ US

_____ _____ RO

_____ _____ BOP

Initial Conditions: Mode 1, 75% Power, MOL, 3-GOP-301 in use complete through step 5.96 for return to 100% power following a turbine valve test.

Turnover: Equipment OOS: 3C Charging Pump for motor ground; Condenser Steam Dump mode selector switch selected to the MANUAL (Steam Pressure) mode due to a problem with TC-3-408H, (Tave input to Turbine Trip Summator); The 3B SI Accumulator is slightly low out of the green band following chemistry sampling.

Raise 3B accumulator level back to the middle of the band immediately after shift turnover and then raise power to 100%.

There are thunderstorms in the area.

Known tube leak in 3C S/G (8 gpd) – unchanged for last week. Chemistry samples are being taken per 3-ONOP-071.2, Attachment 1. The current sample, just completed indicates no significant change in leak rate. MOV-3-1405 remains open at management direction due to small size and stability of tube leak rate.

Event No.		Event Type*	Event Description
1	TAMCTMAB=53785.0	(N) RO (TS) SRO	Raise SI Accumulator 3B to middle of normal band (3-OP-064 section 7.1)
2	TFB1LTHV=T	(I) RO (I) SRO	VCT level transmitter LT-3-115 fails high (loss of automatic make-up).
3	TFE2D22T=T	(C) BOP (TS) SRO	Loss of 3D 4KV bus (bkr 3AD06 opens) results in loss of power to 3C ICW Pump. (Requires starting 3A ICW pump and must swap 3D bus to 3A bus)
4	TFBVSHRL=T	(C) RO (TS) SRO	Charging pump 3A fails due to shaft shear. (Must isolate one letdown orifice)
5	TFH2408H=T	(I) RO	Median Tavg fails high. (Must take manual control of rods and PZR level control)
6	TFF1MAAH=T	(I) BOP	Controlling channel, LT-3-478, S/G 3A Narrow Range Level, fails high. (ONOP-049.1, should take manual control as well as switch controlling channels)
7	TVBVLK45=1.0	(R) RO (N) BOP (TS) SRO	3B Charging Pump relief valve RV-3-283B fails open causing loss of all charging flow. (3-ONOP-047.1 and fast load reduction)
8	TFG1D41O=T TFP8SWYD=T TFSVV33C=T TFKVSMA=T	(M) ALL	Generator exciter field breaker trips causing turbine trip. Dual Unit LOOP. MOV-3-1433, 3C MSR Main Steam Stop, fails open and 3C CCW pump shaft shears (both occur on LOOP).
9	TFQ5GBS=T	(C) (M) ALL	Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1._EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

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

Turkey Point 2005-301 Scenario #5

Event 1 – Raise 3B accumulator level to middle of normal band (3-OP-064 section 7.1).

Event 2 – VCT level transmitter LT-3-115 fails high (loss of automatic make-up and no auto swap to RWST on VCT lo-lo level [4%]).

Event 3 – Loss of 4D 4KV bus (bkr 3AD06 opens) which results in loss of power to 3C ICW Pump. (Requires starting 3A ICW pump and must swap 3D bus to 3A bus.)

Event 4 – Charging pump 3A fails due to shaft shear (must isolate one letdown orifice).

Event 5 – Median Tavg fails high (Must take manual control of rods and PZR level control)

Event 6 – Controlling channel, LT-3-478, S/G 3A Narrow Range Level, fails high. (ONOP-049.1, should take manual control as well as switch controlling channels)

Event 7 – 3B Charging Pump relief valve RV-3-283B fails open causing loss of all charging flow. (3-ONOP-047.1 and fast load reduction).

Event 8 – Generator exciter field breaker trips causing turbine trip. Dual Unit LOOP. MOV-3-1433, 3C MSR Main Steam Stop, fails open and 3C CCW pump shaft shears (both occur on LOOP).

Event 9 – Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1._EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Scenario XXII NRC 5

Simulator Operating Instructions

Setup

IC-16 (75% MOL)

Place simulator in run

Take Steam Dump Control Switch → MANUAL

Secure 3C Charging Pump and ensure 3A & 3B are running in AUTO.

Trigger lesson steps:
SETUP - 3C CHG PP OOS (actuates TAB1POSN = 3)
SETUP - 3C SG 8 GPD LEAK (actuates TVHHSGC = 0.000005)
SETUP - 3B ACC LOW LEVEL (actuates TAMCTMAB = 53785.0)
SETUP - 3C MSR MN STM STOP MOV FAILS OPEN (actuates TFSVV33C = T)

Increase 3B cold leg accumulator pressure until hi/lo pressure annunciator clears.

Acknowledge any alarms and place simulator in freeze.

Place caution tag on steam dump mode selector switch and clearance info tag on 3C charging pump control switch.

Provide shift turnover checklists, 0-OP-046 Att 5 reactivity worksheet (75→100%), 3-OP-064, 3-ONOP-071.2 Att 1 and 3-GOP-301 signed off through step 5.96.

Select 3A QSPDS to page 211 (SAT) and 3B QSPDS to page 212 (RVL). Set ERDADS on VPA to Tavg/Tref (TAV) and at the RCO desk to ENVRN (ED3).

Fill in blender & shutdown boron addition placards at console blender station. Data for each IC may be found in the ECC & Shutdown Guidelines Book in the simulator I/F.

Event 1 – Fill 3B cold leg accumulator

Initiated by crew per shift turnover *(3-OP-064 sect 7.1)*

Respond as PO when directed to align a U3 HHSIP for full flow recirc (unlock & open 3-899L and 3-899K or H).After 2-4 min, report complete. No simulator action required.

Respond again as PO when asked to close & lock these same valves. After another 2-4 min. report complete. As before, no simulator action required

Respond as Chemistry when asked to sample the 3B accumulator.

Event 2 – LT-3-115 fails high

At floor evaluator direction following initiation of accumulator fill, trigger lesson step **EVENT 2 - LT-3-115 FAILS HIGH** (actuates TFB1LTHV = T).

Crew responds per 3-ONOP-046.4.

Respond as PO to read LI-3-112 locally in the Charging Pump Room. Read VCT LEVEL indicated in the parameter bar at the bottom of the ISIS screen.

Respond as OCC/WCC/FS if called for troubleshooting & repair.

Event 3 – Loss of 3D 4kV bus

Upon completion of 3-ONOP-046.4, trigger lesson step **EVENT 3 - LOSS OF 3D 4KV BUS - TRIPS OPEN 3AD06** (actuates TFE2D22T = T). *Crew starts 2nd ICWP per 3-ONOP-019 & responds to loss of 3D 4kV bus per 3-ONOP-004.5.*

Respond if directed as SO to:

1) locally investigate 3C ICWP. Report normal conditions for a recently idled pump.
2) perform post-start checks for 3A ICWP. Report back that pump is operating normally.
3) locally investigate breaker 3D05 and/or 3AD06. Report burnt insulation smell near bus & light wisps of smoke from control cubicle immediately above breaker 3AD06. All breakers (including 3AD05) appear open and, with the exception of 3AD06, otherwise normal. Report 3D 4kV bus is deenergized.

Respond if directed as SO/FS to walk down the ICW system to look for leaks. After 4-6 min, report no ICW system leaks are visible.

Respond as SO if directed to report TPCW HXs ICW flow. Click on SCHEMA → COMMON SERVICES → INTAKE COOLING → report TPCW HX ICW total flow as indicated on ICW system mimic (or use default value of 5800 gpm).

Respond as PO if directed to report CCW HXs ICW flow. From ICW system mimic, report indicated CCW HX ICW total flow (or use default value of 13600 gpm).

Respond if called as IST coordinator regarding evaluation of 3C ICWP for flow > 19000 gpm.

Respond as SO if directed to check TPCW supply temperature (TI-3-1432) < 105°F. From ICW system mimic, touch TPCW ♦ & report system temp TE-1472/TI-1432 at top left of TPCW mimic (approx 99°F and stable).

Respond if called as OCC/WCC/FS to troubleshoot & repair breaker 3AD06.

If asked as OCC/WCC/FS about 3D 4kV bus, report that the bus is fine for reenergization, but breaker 3AD06 is OOS and needs to be racked out for repair.

If asked as SO/FS to rack out breaker 3AD06, **trigger** lesson step **EVENT 3 - RACK OUT 3AD06** (actuates TAE2D22P = 3).

Report no targets on 3D 4kV bus after reenergization.

Event 4 – 3A charging pump shaft shear

After restoration of 3A 4kV bus power to 3D 4kV bus, trigger lesson step **EVENT 4 - 3A CHG PP SHAFT SHEAR** (actuates TFBVSHRL = T). *3A charging pump will trip on low oil pressure. Now only 3B charging pump is running.*

If asked as PO, report 3A charging pump motor stopped. State that the motor will need to be tagged out on an ECO to allow further inspection. If directed to check out breaker 30105, report that it is tripped open, but nothing else appears abnormal.

Respond as HP if notified that letdown flow is being reduced down to one orifice. Respond as PO if directed to adjust CCW flow to NRHX in response to reduction of letdown flow to one orifice. To adjust as directed, click on SCHEMATICS→ COMMON SERVICES→COMPONENT COOLING→834→TAKA834 BYP AROUND TCV-144→enter Selected value then INSERT

If asked as OCC/WCC/SO/FS to rack out breaker 30105, **trigger** lesson step **EVENT 4 - RACK OUT 3A CHG PP BKR** (actuates TAB1POSL = 3).

Respond as OCC/WCC if asked to generate PWO, troubleshoot & repair the 3A charging pump.

Event 5 – Median Tavg fails high

After charging & letdown flows stable, trigger lesson step **EVENT 5 - MEDIAN Tavg FAILS HIGH** (actuates TFH2408H = T). *This affects Tavg/Tref TR, rod & PZR level control (SDCS in manual).*

Respond as OCC/WCC/FS if called for troubleshooting & repair.

Event 6 – LT-3-478 (3A S/G level control channel) fails high

After completion of 3-ONOP-041.6 & 3-ONOP-028 with Tavg & PZR level stabilized, trigger lesson step **EVENT 6 - LT-3-478 FAILS HIGH** (actuates TFF1MAAH = T). *This requires manual control of FCV-3-478 (3A S/G FRV) which closes on the failure. The valve must be manually reopened to restore feed flow. When S/G level returned to program, level control is selected to another level channel and FRV returned to AUTO.*

Respond as OCC/WCC/FS if called to troubleshoot & repair LT-3-478.

Event 7 - 3B charging pump dischg relief fails open (loss of all charging)

After 3A S/G level control has been returned to automatic, trigger lesson step **EVENT 7 - 3B CHG PP DISCHG RELIEF FAILS OPEN** (actuates TVBVLK45=1.0 on 30 sec ramp). *This causes a loss of all charging flow requiring operators reduce load per 3-ONOP-047.1.*

If called as PO/FS regarding status of 3B charging pump, report back that there is evidence of flow through the associated discharge relief RV-3-283B.

Respond as OCC/WCC/FS if called to troubleshoot & repair RV-3-283B or ETR for 3A or 3C charging pump. Report that Mechanical Maint will be called regarding RV-3-283B. Also report 3C charging pump motor is off-site and 3A charging pump damage appears to be a shaft shear at the coupling between the motor & pump.

Event 8 – Generator trip / Dual unit LOOP

After reactor power ↓ 5-10%, at lead evaluator direction, trigger lesson steps **EVENT 8 - GEN EXC FLD BKR TRIP, LOSS OF SWYD** (actuates TFG1D41O = T then TFP8SWYD=T on 15 sec delay) **& EVENT 8 - 3A CCWP SHAFT SHEAR** (actuates TFKVSMA=T). *This trips the exciter field breaker which trips the generator, turbine & reactor (in that order). The loss of unit 3 generation causes a grid transient that results in a loss of PTN switchyard. 3A/B/D 4kV buses are subsequently repowered from the EDGs. When 3A CCWP is sequenced on, its shaft shears requiring the RO to recognize abnormally low amps then trip the pump. This avoids MOV-3-626 closure when two CCWPs sequenced on. Starting 2nd CCWP not required by 3-EOP-ES-0.1 MOV-3-1433 fails open from setup requiring MSIV closure thus stabilizing Tavg. Operators respond per 3-EOP-E-0 and transition to 3-EOP-ES-0.1.*

Event 9 – Loss of 3B EDG/3B kV bus

Once 3-EOP-ES-0.1 entered, trigger lesson step **EVENT 9 - 3B EDG TRIP** (actuates TFQ5GBS = T). *This trips 3B EDG, losing 3B 4kV bus. 3-EOP-ES-0.1 step 5 directs response per 3-ONOP-047.1 to the loss of all charging.*

Respond as SO and report 3B EDG lockout relay has tripped. There is nothing else obviously wrong except that the lockout relay will not reset.

Respond as OCC/WCC/FS if asked to investigate.

Eventually, operators depressurize the RCS and use HHSI flow for RCS makeup.

Respond as System and report grid unstable due to loss of PTN unit 3 combined with other unscheduled forced outages. Restoration time unknown.

If directed as SO/FS to locally close MOV-3-1407, wait 2-4 min, then **trigger** lesson step **EVENT 9 - LOCALLY CLOSE MOV-3-1407** (actuates TFFVV07C = T).

If asked as SO/FS to take 3B EDG MCSS to OFF, wait 1-3 min, then **trigger** lesson step **EVENT 9 - 3B EDG MCSS TO OFF** (actuates TAQ5LRSB = 0).

If directed as SO to start the air side seal oil pump, wait 1-3 min, then **trigger** lesson step **EVENT 9 - START AIR SIDE SEAL OIL PUMP** (actuates TCU8AS1 = T)

If directed as SO to stop the DC air side backup seal oil pump, wait 1-3 min, then **trigger** lesson step **EVENT 9 - STOP DC AIR SIDE B/U SEAL OIL PUMP** (actuates TCU8BP0 = T)

If directed as PO to locally reset the group A PZR heater lockout relay, wait 1-3 min, then **trigger** lesson step **EVENT 9 - RESET GROUP A PZR HTR LOCKOUT** (actuates TCH2LRES = T).

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 1 Page 1 of 18

Event Description: Raise SI Accumulator 3B to middle of normal band (3-OP-064 section 7.1).

Time	Position	Applicant's Actions or Behavior
	US	Directs RCO to fill the 3B cold leg accumulator per 3-OP-064, section 7.1. Determines TS 3.5.2.a Action c (30 days to fix) applies when HHSIP aligned for full flow recirc as a part of the accumulator filling process.
	RO	Obtains and reviews copy of 3-OP-064, section 7.1. Performs actions as follows: 1. Verifies initial conditions are met. 2. Records initial level in procedure. 3. Notifies US/SM that HHSIP to be used to fill 3B cold leg accumulator will be aligned for full flow recirc and is inoperable. Directs PO unlock & open manual HHSIP test recirc Isolation valves 3-899L and 3-899K or H (depending on U3 HHSIP used). **NOTE:** *No simulator action required for 3-899 valves* 4. Opens CV-3-851B (3B accumulator makeup valve). 5. Starts one U3 HHSIP as directed. 6. Opens MOV-3-869 (starts makeup flow) 7. When accumulator level 6560-6780 gal., closes MOV-3-869 8. Stops running U3 HHSIP. 9. Closes CV-3-851B. 10. Directs PO close & lock manual HHSIP test recirc Isolation valves unlocked & opened above (3-899L and 3-899K or H depending on U3 HHSIP used). 11. Notifies SM that HHSIP used to fill 3B cold leg accumulator no longer aligned for full flow recirc and is operable. 12. Notifies Chemistry to sample 3B cold leg accumulator 13. Records HHSIP used, 3B accumulator filled & 3B accumulator final level
	BOP	Monitors plant parameters. Assists RCO as needed or directed.

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 2 Page 2 of 18

Event Description: VCT level transmitter LT-3-115 fails high (loss of automatic make-up).

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports failure of LT-3-115 high. • Annunciator A-4/6, VCT HI/LO LEVEL • LI-3-115 fails high • VCT level decreasing < 17% with no auto makeup
	BOP	Reads 3-ARP-097.CR for annunciator A-4/6 if directed by US
	RO	Places LCV-3-115A to VCT position per 3-ARP-097.CR if read by BOP
	US	Directs compensatory actions per 3-ONOP-046.4 before suction lost to charging pumps due to VCT emptying
	RO	Performs actions of 3-ONOP-046.4 as directed by US before suction lost to charging pumps due to VCT emptying 1. Determines BA & PW flow rates normal for plant conditions 2. Determines LT-3-115 failed high by identifying: a. LI-3-115 reading 100% b. Directs monitoring of LI-3-112 by STA or BOP using ERDADS or PO using local indicator in U3 charging pump room and identifies LI-3-112 as dropping (unless LCV-3-115A already repositioned to VCT per ARP) c. LCV-3-115A in full divert to HUT (if not manually repositioned to VCT earlier per ARP) 3. Places LCV-3-115A to VCT position (if not repositioned earlier per ARP)
	US	1. Ensures LT-3-115 failure reported to I&C via OCC/WCC 2. Determines TS boration flowpaths maintained and no LCO apply
	US	Briefs crew regarding failure including: • need for manual makeup per 0-OP-046 on low VCT level, • no auto chg pp suction swap to RWST • need to monitor VCT level using available LI-3-112 indications • TS 3.1.2.1 & 3.1.2.2 do not apply regarding BA flow paths

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 2 Page 3 of 18

Event Description: VCT level transmitter LT-3-115 fails high (loss of automatic make-up).

Time	Position	Applicant's Actions or Behavior
	RO	If manual m/u required (VCT level < 17%), performs 0-OP-046 sect. 5.4: 1. Determine BA & PW flows and volumes needed for desired blend boron concentration from PCB 2. Adjusts FC-3-113A for desired BA flow 3. Places FC-3-114A to MANUAL. Sets output on demand meter at zero 4. Places reactor m/u selector switch to BORATE 5. Verifies FCV-3-113A control switch in AUTO 6. Places FCV-3-114A control switch to OPEN 7. Sets BA totalizer to volume determined earlier 8. Verifies one BATP in AUTO 9. Places RCS m/u control switch in START 10. If flow deviation closes FCV-3-113B, places control switch in OPEN 11. Adjusts FC-3-114A to PW flow rate determined above 12. When PW totalizer reaches amount determined above, return FCV-3-114A control switch to AUTO and verify valve closes 13. When m/u complete: a. Places RCS m/u control switch in STOP b. Verifies FCV-3-113B control switch in AUTO and valve closed c. Places FC-3-114A in AUTO 14. Verifies control switches in AUTO and valves closed for FCV-3-113A, FCV-3-114A & FCV-3-114B
	BOP	Monitors plant parameters and assists RCO as directed by US.

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 3 Page 4 of 18

Event Description: Loss of 3D 4KV bus (bkr 3AD06 opens) results in loss of power to 3C ICW Pump. (Requires starting 3A ICW pump and must swap 3D bus to 3A bus).

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes/reports no 3C ICWP amps & annunciator I-4/4
	RO	Refers to 3-ARP-097.CR for annunciator I-4/4
	BOP	1. Determines traveling screens clean (ann. I-3/3 OFF & $\Delta p < 7.5"H_2O$) 2. Determines all ICWP alarms off (ann. I-4/1, 4/2 & 4/3) 3. Recognizes & reports loss of 3D 4kV bus due to bkr 3AD06 open
	US	Directs 3-ONOP-019 response.
	BOP	1. Determines 3B ICWP running and 3C ICWP zero amps 2. Starts 3A ICWP; stops 3C ICWP 3. Reports annunciator I-4/4 cleared with ICW pressure 10-35 psig 4. If directed has SO report TPCW HXs ICW flows and has PO report CCW HXs ICW flows 5. If directed, has SO/FS do post-start check on 3A ICWP 6. If directed, has SO/FS check 3C ICWP and/or breaker 3AD05
	US	**NOTE:** *In view of rapid restoration of 2nd ICWP, crew does not need to evaluate the 3C ICWP > 19000 gpm condition described below since single pump condition existed < 20 min per 3-OP-019.* 1. May determine total ICW flow > 19000 gpm briefly on 1 pump 2. If so, directs performance of 3-OP-019 section 7.10 for 3C ICWP. Starting 2nd operable ICWP satisfies this procedure intent.
	RO	Determines SI terminated
	BOP	1. Determines POV-3-4882 & 4883 both open 2. Determines ann. I-5/4 (TPCW hi temp/lo press) OFF 3. Directs SO check TPCW supply temperature TI-3-1432 , <105°F and stable/decreasing
	RO	Determines CCW supply temp < 120°F and stable/decreasing with ann. H-8/5 OFF.
	BOP	Repeats check for normal TPCW conditions
	RO	Repeats check for normal CCW conditions

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 3 Page 5 of 18

Event Description: Loss of 3D 4KV bus (bkr 3AD06 opens) results in loss of power to 3C ICW Pump. (Requires starting 3A ICW pump and must swap 3D bus to 3A bus).

Time	Position	Applicant's Actions or Behavior
	US	Directs response to loss of 3D 4kV bus per 3-ONOP-004.5 Declares breaker 3AD06 OOS. Grants permission to rack out 3AD06. Directs reenergization of 3D 4kV bus from 3A 4kV bus
	BOP	Responds as directed by US per 3-ONOP-004.5 1. Determines 3D 4kV bus lockout reset 2. Determines 3A & 3B 4kV buses both energized 3. Verifies load breakers 3AD04 & 3AD05 open 4. Reenergizes 3D 4kV bus from 3A 4kV bus. a. Opens 3AB19 b. Takes 3AD06 control switch to OPEN (bkr tripped open) c. Closes 3AD01 d. Closes 3AB19 5. Directs SO/FS locally verify no breaker targets on 3D 4kV bus breakers.
	US	1. Refers to TS a. 3.7.2.a action a – 30 day with 3A & 3B CCWP on independent power supplies until 3D 4kV bus restored b. 3.7.3.a action a - 7 day with 3A & 3B ICWP on independent power supplies until 3D 4kV bus restored 2. Notifies OCC/WCC to initiate PWO & repair 3. Maintains command and control during the event

Op Test No.: 2005-301 Scenario No.: 1 Event No.: 4 Page 6 of 18

Event Description: Charging pump 3A fails due to shaft shear. (Must isolate one letdown orifice).

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes & reports trip of 3A charging pump. Only one charging pump available & running (3B) **NOTE:** *Shaft shear generates low oil pressure condition which trips charging pump* Recognizes & reports the following alarms if they come in: • A-9/3 PZR CONTROL HI/LO LEVEL • A-5/4 CVCS HP LTDN LINE HI TEMP • G-1/2 CHARGING PUMP HI SPEED
	BOP	Reads 3-ARP-097.CR for annunciators A-5/4, A-9/3 and/or G-1/2 as applicable and directed by US.
	US	Directs local investigation of charging pumps
	BOP	Directs PO locally check out charging pumps Relays report from PO regarding 3A charging pump shaft shear
	US	Upon receipt of report regarding 3A charging pump, directs shutdown of pump. Directs OCC/WCC initiate repair effort, place charging pump under ECO and rack out 3A charging pump breaker 30105.
	RO	Stops 3A charging pump
	US	Determines max available charging < letdown flow and directs isolation of one letdown orifice.
	RO RO/BOP	1. Determines that max available charging flow inadequate for the 2 letdown orifices currently open 2. Determines HCV-3-121 full open & PCV-3-145 operating sat. 3. Reduces letdown flow by closing 1 letdown orifice per 3-OP-047 section 7.11 to prevent flashing at the letdown orifices: a. Notifies HP b. Directs PO adjust CCW flow to NRHX c. Determines steps 7.11.2.1 & .2 not applicable d. Places PCV-3-145 in MANUAL and adjusts to obtain letdown pressure = 300 psig (PI-3-145 on VPA) e. When letdown pressure stable, closes desired orifice isolation

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Event Description: Charging pump 3A fails due to shaft shear. (Must isolate one letdown orifice).

Time	Position	Applicant's Actions or Behavior
		valve (CV-3-200A/B/C) f. Adjusts PCV-3-145 to maintain PI-3-145 > 150 psig g. When desired letdown flow rate achieved, adjusts PCV-3-145 to return PI-3-145 to green band then return PCV-3-145 to AUTO h. Directs PO adjust CCW to NRHX (valve 3-834) as needed to stabilize TI-3-143 (letdown temp) i. Verifies LC-3-459G in AUTO j. Determines step 7.11.2.8 not applicable
	US	Reviews Tech Spec 3.1.2.3 and determines that 72 hr action statement applies since only 1 charging pump now operable Maintains command & control of event
	BOP	Assists RCO as directed by the US.

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Event Description: Median Tavg fails high. (Must take manual control of rods and PZR level control).

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators B-4/4 TAVG/TAVG-TREF DEVIATION & A-9/3 PZR CONTROL HI/LO LEVEL alarming Determine that median Tavg has failed high by instrument checks Takes manual control of rods to prevent continued insertion ***NOTE:*** *This action taken per ARP B-4/4 step 3.a and immediate action of 3-ONOP-028, Reactor Control System Malfunction* Takes manual control of the Master Charging Pump Controller or individual running Charging Pump Controller ***NOTE:*** *This action taken as an immediate action 3-ONOP-041.6, Pressurizer Level Control Malfunction*
	US	Directs performance of 3-ONOP-028
	RO	Performs actions per 3-ONOP-028 as directed by US: 1. Adjusts rods to maintain Tavg equal to Tref 2. Notifies OCC/WCC to have I&C department to investigate failure 3. Verifies rods above rod insertion limits 4. Operates rods in manual until problem is corrected.
	US	Directs WCC generate caution tag for rod control selector switch If rods above rod insertion limits, determines no Tech Spec LCOs exceeded
	US	Directs performance of 3-ONOP-041.6
	RO	Performs actions per 3-ONOP-041.6 as directed by US: **NOTE:** *Steps 5.1 thru 5.5 are not applicable* 1. Manually controls PZR level consistent with programmed level shown in Enclosure 1
	US	Determines 3-ONOP-049.1 does not apply to this malfunction.
	BOP	Assists RCO as directed by the US

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Event Description: Controlling channel, LT-3-478, S/G 3A Narrow Range Level, fails high. (ONOP-049.1, should take manual control as well as switch controlling channels).

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports 3A s/g level dropping and annunciators C-5/1, SG A STEAM > FEED & C-6/1, SGA LEVEL DEVIATION Manually controls 3A S/G Feed Reg Valve FCV-3-478 and returns 3A S/G level to program
	RO	If directed, reads 3-ARP-097.CR for annunciators C-5/1 & C-6/1
	US	Directs performance of applicable 3-ONOP-049.1 steps 1. Determines LT-3-478 failed and LT-3-476 operable. 2. Directs transfer of 3A s/g level control level input to LT-3-476 3. Once 3A s/g level returns to program, directs placing FCV-3-478 back in auto. **NOTE:** *Steps 5.4 thru 5.12 are not applicable*
	BOP	Responds per applicable actions of 3-ONOP-049.1 as directed by the US. 1. Identifies LT-3-478 failed high by comparison to programmed level 2. When directed by US, verifies LT-3-476 operable and selects it for 3A S/G level control 3. When directed by US, verifies 3A S/G level near program & returns 3A S/G Feed Reg Valve to auto
	US	Refers to Tech Specs. Recognizes that LT-3-478 is not covered. Does not direct tripping any bistables. Directs RCO to call OCC / WCC to have I&C generate PWO and investigate problem. Informs SM of plant status
	RO	Monitors plant parameters. Assists BOP as directed by US. Calls OCC / WCC to have I&C investigate problem when directed by US.

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Event Description: 3B Charging Pump relief valve RV-3-283B fails open. (3-ONOP-047.1 and fast load reduction).

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes & reports annunciator A-6/5, RCP LABYRINTH SEAL LO ΔP
	BOP	Reads 3-ARP-097.CR for annunciator A-6/5 if directed by US
	RO	Performs actions of 3-ARP-097.CR annunciator A-6/5 when read: 1. Throttles HCV-3-121 closed 2. Determines MOV-3-626 open Recognizes/reports loss of all charging flow Performs immediate actions of 3-ONOP-047.1: 1. Determines only operable charging pump not delivering flow 2. Isolates letdown by closing the open orifice isolation valve (CV-3-200A) 3. Closes RCP seal return isolation MOV-3-6386 4. Determines HCV-3-137 closed
	US	Directs performance of 3-ONOP-047.1 1. Reviews completion of RCO immediate actions 2. Directs local investigation of 3B charging pump 3. Directs SM refer to 0-EPIP-20101 **NOTE**: *Step 5.3 is not applicable* 4. Determines Tech Spec 3.0.3 applies 5. Consults with OCC/WCC and determines charging flow can not be restored ***NOTE:*** *Should direct 3B charging pump stopped & RCS m/u secured. This is not covered in 3-ONOP-047.1.* 6. Conducts crew brief & directs maximum rate load reduction
	US	Directs OCC/WCC notification about loss of all charging & requests maintenance support to restore a charging pump
	RO	Stops 3B charging pump when directed
	BOP	Performs 3-ONOP-047.1 subsequent actions as directed by the US: 1. Directs PO locally investigate 3B charging pump

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Event Description: 3B Charging Pump relief valve RV-3-283B fails open. (3-ONOP-047.1 and fast load reduction).

Time	Position	Applicant's Actions or Behavior
		2. Relays report from PO regarding 3B charging pump discharge relief valve failure 3. Reduces reactor power by turbine load reduction 4. Coordinates with RCO to maintain Tavg approximately 3°F higher than Tref 5. If turbine load < 450 MWe, stops 1 HDP. 6. If turbine load < 400 MWe, defeats SGFP turbine runback using console switch then stops 1 SGFP.
	RO	Performs 3-ONOP-047.1 subsequent actions as directed by the US: 1. Reduces reactor power by control rod insertion (rods in manual from event 5). ***NOTE:*** *Rod insertion limit not an issue for this event* 2. Coordinates with BOP to maintain Tavg approximately 3°F higher than Tref 3. Closely monitors PZR level recorder to determine extent of leakage thru RCP seals. Uses 3-ONOP-041.6 Enclosure 1 to determine programmed PZR level due to level program failure from event 5.

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Event Description: Generator exciter field breaker trips causing turbine trip. Dual Unit LOOP. MOV-3-1433, 3C MSR Main Steam Stop, fails open and 3C CCW pump shaft shears (both occur on LOOP).

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes & reports auto generator / turbine trip followed by loss of switchyard / loss of offsite power
	RO	Recognizes & reports auto reactor trip (on generator / turbine trip)
	US	Directs operators perform immediate actions of 3-EOP-E-0:
	RO	Performs 3-EOP-E-0 immediate actions when directed by US: 1. Determines reactor tripped: • All rod bottom lights ON • RTBs and Bypass breakers OPEN • All RPIs indicate zero • Neutron flux decreasing 2. Determines SI not actuated nor required
	BOP CRITICAL	Performs 3-EOP-E-0 immediate actions when directed by US: **1. Verifies turbine tripped** a. Determines all turbine stop valves closed **b.** Attempts to manually close MSR main steam stop MOVs, but **determines that MOV-3-1433 failed open** **c. Closes all MSIVs** d. Determines Mid and East GCBs open 2. Verifies Power to Emergency 4 KV Buses a. Determines 3A, 3B & 3D 4KV buses all energized (from EDGs) b. Determines 3A, 3B, 3C, 3D & 3H 480V LC all energized. c. Reports 3D 480V LC does not have power available
	US	Determines SI is not actuated nor required Directs performance of 3-EOP-E-0 step 4 RNO actions
	BOP	Stabilizes plant per 3-EOP-E-0 step 4 RNO actions as directed by US: 1. Maintains Tavg 543°F - 550°F 2. Maintains AFW flow > 345 gpm until s/g levels 6%-50% 3. Monitors steam dumps for proper operation (atmospheric only since MSIVs closed)

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Event Description: Generator exciter field breaker trips causing turbine trip. Dual Unit LOOP. MOV-3-1433, 3C MSR Main Steam Stop, fails open and 3C CCW pump shaft shears (both occur on LOOP).

Time	Position	Applicant's Actions or Behavior
		4. Closes FW isolation MOVs
	RO	Stabilizes plant per 3-EOP-E-0 step 4 RNO actions as directed by US: 1. Maintains Tavg 543°F - 550°F 2. Maintains PZR pressure 2220 - 2250 psig
	US	Conducts EOP transition crew brief Monitors critical safety functions per 3-EOP-F-0
	CRITICAL	**Transitions to 3-EOP-ES-0.1**

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Event Description: Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1. EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes & reports loss of 3B EDG & 3B 4kV bus. Identifies 3A & 3D 4kv buses as still energized from the 3A EDG.
	US	Directs BOP attempt to restore 3B 4kV bus using 3-ONOP-004.3 Directs RCO stabilize plant per 3-EOP-ES-0.1 Monitors 3-EOP-ES-0.1 Foldout Page items. Contacts System to determine cause of loss of switchyard and status of offsite power restoration.
	BOP	Performs 3-ONOP-004.3 once directed by US: 1. Verifies 3B 4kV bus stripped, but not energized **NOTE**: *Step 1b RNO sends user to step 2* 2. Determines 3B 4kV bus not locked out and SI reset 3. Directs SO/FS locally check 3B EDG and attempt lockout reset 4. Relays report that 3B EDG lockout will not reset. **NOTE:** *Simulator operator will place 3B EDG master control selector switch to OFF when requested* **NOTE**: *Step 4 RNO d sends user to step 6* 5. Determines power not available from U3 SUT or 3C 4kV bus **NOTE:** *Step 6a RNO sends user to step 7. Since 3A 4kV bus is energized, user goes to step 7 RNO.* 6. Determines power can not be restored to 3B 4kV bus under current plant conditions **NOTE:** *Step 7 RNO c sends user back to step 1*

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Event Description: Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1. EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Time	Position	Applicant's Actions or Behavior
	RO	Performs actions of 3-EOP-ES-0.1 as directed by US 1. Determines at least two AFWP running 2. Determines Tc > 525°F and stable at post trip value 3. Aligns main FW for shutdown conditions a. Determines Tavg < 554°F b. Stops one SGFP if two SGFPs running c. Determines main FRVs closed. Places each in MAN d. Determines FW isolation valves now closed e. Maintains AFW or main FW (via FRBVs) flow > 345 gpm until s/g levels 6%-50% 4. Determines all control rods fully inserted. 5. Verifies VCT makeup in auto. Determines 3A & 3C charging pumps have EDG power but are OOS, thus can not establish charging flow. No power available to 3B charging pump. **NOTE:** *Step 5 RNO substeps c & d not applicable*
	US CRITICAL	**Directs RO performance of 3-ONOP-047.1 for RCS inventory control beginning at step 5.18** If substantial increase in containment pressure, sump level and/or radiation, directs manual SI and enters 3-EOP-E-0. Directs BOP continue performing 3-EOP-ES-0.1 once efforts to restore power to 3B 4kV bus stopped due to lack of offsite power to switchyard 1. Determines that letdown should remain isolated due to loss of all charging flow regardless of PZR level 2. Does not direct actions that conflict with 3-ONOP-047.1 a. No manual SI actuation with PZR pressure < 1730 psig b. No energizing PZR heaters with PZR pressure < 2235 psig

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Event Description: Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1. EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Time	Position	Applicant's Actions or Behavior
	RO **CRITICAL**	Performs actions of 3-ONOP-047.1 beginning at step 5.18 as directed by US: 1. Verifies atmospheric dump valves operating to maintain 547°F 2. Monitors containment pressure, sump level & radiation. If substantial increase in any of these parameters, reports this to US (requires manual SI and entry into 3-EOP-E-0) 3. Determines normal PZR spray not available 4. Manually initiates containment isolation phase A **5. Opens a PZR PORV, depressurizes RCS to 1950 psig, then closes PZR PORV.** 6. Verifies BLOCK LOW PZR PRESS SI status light ON **7. Blocks low PZR pressure SI** 8. Verifies LOW PZR PRESS SI BLOCKED status light ON **9. Opens MOV-3-843A** 10. Coordinates with BOP (3A EDG loading) and **starts 3A HHSIP** **11. Opens PZR PORV until any of the following observed:** **a. Cold leg HHSI flow indicated (FI-3-943)** **b. Increasing PZR level** c. RCS pressure reached 1350 psig d. RCS CET subcooling < 35°F 12. Closes PZR PORV
	BOP	Performs 3-EOP-ES-0.1 actions as directed by US: 1. If PZR level less than or equal to 15% a. Verifies letdown & excess letdown isolated b. Verifies PZR heaters off c. Determines charging not available to restore PZR level

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Event Description: Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1. EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Time	Position	Applicant's Actions or Behavior
	BOP	Continues performing 3-EOP-ES-0.1 actions as directed by US:
		NOTE: *Steps 7 & 8 are not applicable for loss of all charging flow*
		2. Determines no 4kV buses on offsite power
		a. Directs RCO starts 2nd (3C) ICWP while monitoring 3A EDG loading
	CRITICAL	b. **Determines 3A CCWP shaft sheared. Directs RCO start 3C CCWP** and stops 3A CCWP while monitoring 3A EDG loading
		c. Directs System restore offsite power to switchyard
		d. With 3A EDG running:
		1) Starts turning gear oil pump
		2) Directs SO start air side seal oil pump
		3) Stops emergency bearing oil pump
		4) Directs SO stop DC air side backup seal oil pump
		NOTE: *Seal oil pump operations are performed by simulator operator when requested*
		e. Directs U4 RCO start computer room chiller
		3. Reset PZR heater lockout relays
		a. Determines 3A 4kV bus energized from 3A EDG
		b. Places group A PZR b/u heater control switch to OFF
		c. Directs PO reset group A PZR b/u heater lockout relay
		NOTE: *Group A PZR b/u heater lockout reset is performed by the simulator operator when requested*
		d. Places group B PZR b/u heater control switch to OFF
		NOTE: *Placing group B PZR b/u heater key switch in EMERGENCY unnecessary since power not available*

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Event Description: Transition is made from 3-EOP-E-0 to 3-EOP-ES-0.1. EDG 3B trips after 3-EOP-ES-0.1 entry. 3-ONOP-047.1 is completed to restore RCS inventory control.

Time	Position	Applicant's Actions or Behavior
	BOP	Continues performing 3-EOP-ES-0.1 actions as directed by US: 4. Does not manually SI or energize PZR b/u heaters (conflict with 3-ONOP-047.1) **NOTE:** *Step 11 is not applicable since it conflicts with 3-ONOP-047.1 restoration of RCS inventory control.* 5. Controls feed flow to maintain s/g NR level 15%-50%. Maintains > 346 gpm flow until at least one s/g NR level > 6% 6. Sets atmospheric steam dumps to maintain s/g pressure as directed by US 7. Determines RCPs not available. Verifies natural circulation using Attachment 1 **NOTE:** *Step 15 RNO sends user to step 19 due to lack of offsite power.* 8. Determines SRNIs energized. Transfers console recorders to SRNIs.
	Terminating Cue:	**Once HHSI flow established for RCS inventory control per 3-ONOP-047.1, the scenario may be terminated at Examiner discretion.**