

Final

Facility: <u>V. C. Summer</u>	Scenario No.: <u>1</u>	Op-Test No.: <u>2005-301</u>
Examiners: _____ _____ _____	Operators: _____ _____ _____	CRS RO PO
Initial Conditions: <u>100% IC, AT MOL.</u>		
Turnover: <u>Thunder storms in the area, severe weather check list being implemented.</u> <u>"A1" train maintenance week.</u>		
S/G A Small tube leak, approx. 8 gpd; MAL-RCS002A.		
Motor Driven EFW Pump 'A' Impeller replacement in progress with 48 hours to complete, have done 12 hours so far.		
B S/G rad monitor (RMG-19B) is OOS.		
Event No.	Event Type*	Event Description
1	RO (I)	Turbine Impulse Pressure Transmitter PT-446 Fails Low.
2	BOP (I)	Steam Generator Steam Flow Transmitter Failure, 474 fails LOW.
3	RO (C) SRO (TS) BOP(N)	VCT suction valve 115C fails closed (hot short at motor). This will cause the running Charging pump to cavitate and fail requiring entry into AOP-102.2 and TS evaluation of loss of one CCP.
4	SRO(TS)	The building operator calls the control room and reports that, while on his rounds, he discovered a significant amount of oil on the floor in the TDEFP room and it appears that the governor may have leaked all its oil onto the floor.
5	RO (R) BOP (N)	Reduce power to take the unit off line. In accordance with GOP-4B Power Operation Mode 1 (Descending Power). MDS calls and requests that due to approaching severe thunderstorm he would like to increase the power descension rate to 1%/min.
6	BOP (C)	During the Down power, the \square FRV fails as is, this will cause the operator to have to place the \square FRV in manual and control the A SG in manual during the Shut Down. (AOP-210.1).
7	RO (C) SRO(TS)	SG Tube Leak on the "C" SG, ramping to approximately the output of the existing charging pump(s). Ramp up over a 5 minute period. (AOP-112.2).
8	M (All)	S/G tube rupture on the C SG to full flow of a tube (600 gpm ramped in over 3 min), requires reactor trip. The Reactor will not trip (ATWS) (EOP -13.0, Entry, Response to Abnormal Nuclear Power Generation).
9	BOP (C)	When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

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

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Event Description: Steam Generator Steam Flow Transmitter Failure, 474 fails LOW.

Time	Position	Applicant's Actions or Behavior
		<u>AOP-401.3</u>
	BOP	The BOP operator acknowledges annunciator 624 4-4 in alarm, recognizes the failure of IFT0474 and responds IAW AOP-401.3
	BOP	Depending on response time, annunciator 624 1-5 (SG A LVL DEV) may also alarm.
	BOP	Verify the failed channel is the controlling channel.
	BOP	Select the operable flow channel: Place FW CONTROL CHANNEL SEL Switch to the operable channel. Place STEAM CONTROL CHANNEL SEL Switch to the operable channel.
	BOP	Verify Turbine Load is LESS THAN 950 MWe. Preferred is ½ turn on limiter. Using any method available, reduce Turbine Load by 40 MWe to 50 MWe. (The preferred method is ½ turn on the load limiter) (The crew may decide to borate to avoid RAOC concerns and, if so, would likely turn on BU heaters for improved mixing. This would not be required for such a small load decrease but would be a good practice). Expected plant response = rods step in and Group 1 steam dumps open.
	BOP	Verify only one SG is AFFECTED.
	BOP	Adjust the Feedwater Flow Control Valve as necessary to restore feed flow to the AFFECTED SG.
	BOP	Restore Narrow Range level in all SGs to between 60% and 65%.
	BOP	Check if Feedwater Pump speed control is operating properly: a. Feedwater Header pressure is GREATER THAN Main Steam pressure. b. Feed flow is normal for flow and power level. c. All operating Feedwater Pump speeds and flows are balanced
	BOP	Verify Narrow Range level in all SGs is normal.
	BOP	Restore the AFFECTED SG control systems to normal: Place the Feedwater Flow Control Valve in AUTO. Place the Feedwater Pump Speed Control System in AUTO. REFER TO SOP-210, FEEDWATER SYSTEM.
	SRO	Within six hours, place the failed channel protection bistables in a tripped condition: SRO evaluates Tech Spec Table 3.3-3

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Event Description: VCT suction valve 115C fails closed (hot short at motor). This will cause the running Charging pump to cavitate and fail requiring entry into AOP-102.2 and TS evaluation of loss of one CCP.

Time	Position	Applicant's Actions or Behavior
		<u>AOP-102.2</u>
	RO	Operator acknowledges that annunciators 614 4-2 (CHG PP B/C TRIP), 614 5-1 (CHG LINE FLO HI/LO), 617 2-2, 618 2-2, & 619 2-2 (RCP A, B, C #1 SEAL INJ FLO LO) are all in alarm, recognizes the "B" Charging Pump has tripped, and responds IAW AOP-102.2
	RO	<p>Check if Charging Pump flow is normal: IF Charging Pump has tripped or flow is abnormal, THEN perform the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Ensure the Charging Pump is secured. <input type="checkbox"/> Close all Letdown Isolation Valves: PVT-8149A(B)(C), LTDN ORIFICE A(B)(C) ISOL. PVT-8152, LTDN LINE ISOL. LCV-459, LTDN LINE ISOL. LCV-460, LTDN LINE ISOL. <p>(Expected plant response = RML-1 alarm on Letdown Isolation.)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Close FCV-122, CHG FLOW. <input type="checkbox"/> Verify CCW flow to the RCP Thermal Barriers is GREATER THAN 90 gpm on FI-7273A(B), THERM BARR FLOW GPM. <input type="checkbox"/> Display Dedicated Display ZZRCPBRG on the IPCS to monitor RCP temperatures. <p>(RML-1 expected alarm – letdown isolation.)</p>
	CRS/SE	<input type="checkbox"/> Contact Electrical and Mechanical Maintenance to investigate.
	RO	<p>Verify Charging System valve lineup:</p> <ul style="list-style-type: none"> <input type="checkbox"/> IF Charging Pump suction is aligned to the VCT, THEN ensure both LCV-115C(E), VCT OUTLET ISOL, are open.
	CRS/SE	Send someone to locally open the breaker for valve 115C and then to manually open the valve.
	SRO	SRO evaluates Tech Spec 3.5.2 and determines 72 hr. action statement.
	RO	<ul style="list-style-type: none"> <input type="checkbox"/> Ensure the following valves are open: MVG-8106, CHG PP. MVT-8109A(B)(C), CHG PP A(B)(C). MVG-8130A(B), LP A SUCT TO CHG PP C. MVG-8131A(B), LP B SUCT TO CHG PP C. MVG-8132A(B), CHG PP C TO LP A DISCH. MVG-8133A(B), CHG PP C TO LP B DISCH
	RO	<ul style="list-style-type: none"> <input type="checkbox"/> Check the Charging header valve lineup as follows: Ensure MVG-8107, CHG LINE ISOL, is open. Ensure MVG-8108, CHG LINE ISOL, is open. Ensure FCV-122, CHG FLOW, is in MAN and CLOSE.
	RO	Ensure the following valve is open:

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Event Description: VCT suction valve 115C fails closed (hot short at motor). This will cause the running Charging pump to cavitate and fail requiring entry into AOP-102.2 and TS evaluation of loss of one CCP.

Time	Position	Applicant's Actions or Behavior
		PVT-8147, ALT CHG TO RCS LP A.
	BOP	<input type="checkbox"/> Locally verify Charging Pump suction pressure is between 50 psig and 100 psig as indicated on the following (building operator to report 52 psig): PI-151A, SUCTION PRESS, for Charging Pump A.
	RO	With Shift Supervisor's permission, start a Charging Pump, while monitoring RCP temperatures. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. (SEE SOP 102 section III.B below)
	RO	WHEN a Charging Pump is operating, THEN place Charging and Normal Letdown in service.. REFER SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. (SEE SOP-102 Section IV.M below)
		<u>SOP-102 Section III.B</u>
	SRO	Crew instructs the building operator to perform Attachment VB (Floor instructor to provide copy of Attachment VB if requested by crew) to mechanically and electrically align "C" charging pump to "B" Train. (If the crew chooses, they might start "A" CCW pump and "A" charging pump to get a charging pump back while they are waiting to get "C" charging pump racked up on "B" Train. If so the steps below are nearly identically except for "A" Train component numbers)
	RO	To start XPP-0043C, PUMP C, on miniflow, complete Attachment VB if Charging Pump C is to be aligned to Train B.
	Building	Following the completion of Attachment VA(B), Chilled Water Expansion Tank levels should be monitored for indications of equalization: <ol style="list-style-type: none"> 1) L9004A, CHILLED WATER EXPANSION TNK A LV, or ILI09004-VU, CHILL WATER EXP TK A LEVEL IND (IB-412). 2) L9006A, CHILLED WATER EXPANSION TNK B LV, or ILI09006-VU, CHILL WATER TK B LEVEL IND (IB-412).
	RO	Verify PI-121, CHG PRESS PSIG, is between 2650 psig and 2850 psig. Monitor the following for proper pump operation: <ol style="list-style-type: none"> a. LR-459, PZR % LEVEL & LEVEL SP. b. FI-130A, RCP A INJ FLO GPM. c. FI-127A, RCP B INJ FLO GPM. d. FI-124A, RCP C INJ FLO GPM.
	RO	Ensure the B train of Component Cooling is operating per SOP-118.
	RO	Ensure the B train of Chill Water is operating per SOP-501.
	RO	Ensure XPP-43C-PP1, CHG PP C AUX OIL PP, is running.
	Building	Verify IPI00153A, CHG PUMP C SUCT HDR PRESS IND, indicates

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Event Description: VCT suction valve 115C fails closed (hot short at motor). This will cause the running Charging pump to cavitate and fail requiring entry into AOP-102.2 and TS evaluation of loss of one CCP.

Time	Position	Applicant's Actions or Behavior
		pump suction pressure is greater than 15 psig (AB-388).
	RO	Start XPP-0043C, PUMP C. (PEER <input type="checkbox"/>)
	RO	Verify XPP-43C-PP1, CHG PP C AUX OIL PP, stops automatically when the Charging Pump comes up to full speed.
	Building	Verify IPI00153A, CHG PUMP C SUCT HDR PRESS IND, indicates pump suction pressure is greater than 15 psig (AB-388).
	RO	Monitor the following to verify proper pump operation: <ol style="list-style-type: none"> 1) Charging Pump C running current is between 30 amps and 50 amps. 2) PI-121, CHG PRESS PSIG, is between 2650 psig and 2850 psig. 3) XVG-9684C-CC, CCW TO CHG PP C, is open.
		<u>SOP-102 Section IV.M</u>
	RO	Place FCV-122, CHG FLOW, in MAN and close.
	RO	Place PCV-145, LO PRESS LTDN, in MAN and open to 70%. (PEER <input type="checkbox"/>)
	RO	Place TCV-144, CC TO LTDN HX, in MAN and open to 100%.
	RO	Place TCV-143, LTDN TO VCT OR DEMIN, in VCT.
	RO	Open PVT-8152, LTDN LINE ISOL.
	RO	Open the following: <ol style="list-style-type: none"> a. LCV-459, LTDN LINE ISOL. b. LCV-460, LTDN LINE ISOL.
	RO	Ensure the following Charging Line Isolation Valves are open: <ol style="list-style-type: none"> a. MVG-8107, CHG LINE ISOL. b. MVG-8108, CHG LINE ISOL.
	RO	Slowly open FCV-122, CHG FLOW, to establish 60 gpm flow as indicated on FI-122A, CHG FLOW GPM.
	RO	Open Orifice Isolation Valves to obtain the desired Letdown flow rate (60 gpm to 120 gpm): <ol style="list-style-type: none"> a. PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). b. PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). c. PVT-8149C, LTDN ORIFICE C ISOL (60 gpm).
	RO	Adjust FCV-122, CHG FLOW, as required to maintain TI-140, REGEN HX OUT TEMP °F, between 250°F and 350°F while maintaining Pressurizer level.
	RO	Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig.

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Event Description: SG Tube Leak on the "C" SG, ramping to approximately the output of the existing charging pump(s). Ramp up over a 5 minute period. (AOP-112.2).

Time	Position	Applicant's Actions or Behavior
	RO	RO acknowledges that annunciator 646 2-1 (MN STM LINE RMG-19 HI RAD) is in alarm and pulls the ARP.
	RO	Verify the alarm is valid and identify the Main Steam line affected by observing RM-G19A, B, and C and R/R-8.
	SRO	Request Health Physics perform radiological surveys around the Main Steam lines.
	SRO	Direct Chemistry to sample all Steam Generators for activity.
	Building	Align the condenser exhaust to the Auxiliary Building Charcoal Exhaust as follows: a. Open XVB00110-AR, MN&AUX COND VAC PP CHAR EXH DISCH VALVE (TB-436). b. Close XVB00109-AR, MN&AUX COND VAC PUMP ATMOS DISCH VALVE (TB-436).
	BOP	Reduce all Steam Generator blowdown flows to minimum.
	SRO	If the alarm is valid, refer to AOP-112.2.
		<u>AOP-112.2 (approx 90% power)</u>
	Note	If they have not already done so in previous event, the crew may elect to stop the load reduction and stabilize power at this point (but not required by procedure).
	RO	Check if PZR level can be maintained: a. Open FCV-122, CHG FLOW, as necessary to maintain PZR level this will cause annunciator 614 5-1 (CHG LINE FLO HI/LO) to alarm – expected alarm). b. Verify PZR level is at or trending to program level.
	BOP	The tube leak may eventually cause annunciator 624 3-5 (SG C LVL DEV) to alarm (expected alarm).
	RO	Reduce Letdown to one 45 gpm orifice. a) Set PCV-145, LO PRESS LTDN, to 70%. b) Ensure PVT-8149A, LTDN ORIFICE A ISOL, is open. c) Close both PVT-8149B(C), LTDN ORIFICE B(C) ISOL. d) Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig. e) Place PCV-145, LO PRESS LTDN, in AUTO.
	RO	IF PZR level continues to decrease, THEN perform the following Close PVT-8149A, LTDN ORIFICE A ISOL. RML-1 should alarm due to letdown isolation (expected alarm)
	SRO	Check if SI is required
		At some point near this step Pressurizer Pressure will drop below the

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Event Description: SG Tube Leak on the "C" SG, ramping to approximately the output of the existing charging pump(s). Ramp up over a 5 minute period. (AOP-112.2).

Time	Position	Applicant's Actions or Behavior
		Tech Spec 3.2.5 DNB value of 2206#. The SRO should evaluate and verbalize the 2 hr. LCO
	RO	Verify VCT level is being maintained between 20% and 40%.
	SRO/SE	<p>Estimate the RCS leak rate using IPCS CHGNET.</p> <p>Calculate the RCS leak rate. IAW STP-114.002, OPERATIONAL LEAK TEST.</p> <p>Comply with Tech Spec 3.4.6.2 action statement. Determines that shutdown to mode 3 within 6 hours is required</p>

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Event Description: S/G tube rupture on the C SG to full flow of a tube (600 gpm ramped in over 3 min), requires reactor trip. The Reactor will not trip (ATWS) (EOP -13.0, Entry, *Response to Abnormal Nuclear Power Generation*).

Time	Position	Applicant's Actions or Behavior
		Tube rupture 600 gpm ramp over 3 min after Tech Spec eval.
		Acknowledges annunciator 616 1-5 (PZR LCS DEV HI/LO and responds IAW direction of CRS or if time allows IAW ARP.
	SRO	CRS directs the RO to insert a manual reactor trip and that they will actuate SI when directed by EOP-1.0
		<u>EOP-13.0</u>
	RO	Verify Reactor Trip: Trip the Reactor using both Reactor Trip Switches.
	RO	IF the Reactor will NOT trip OR is NOT subcritical, THEN insert Control Rods at the fastest control rod insertion rate
	CRITICAL SRO	Direction given to trip the reactor locally using Attachment 1
		Follow-up question – may ask SRO to classify this emergency event (Site Area Emergency)
	BOP	Verify Turbine/Generator Trip: Verify all Turbine STM STOP VLVs are closed. Depress Emerg Trip Sys TRIP.
	BOP	Ensure Generator Trip ' (after 30 second delay) 1) Ensure the GEN BKR is open. 2) Ensure the GEN FIELD BKR is open. 3) Ensure the EXC FIELD CNTRL is tripped.
	BOP	Ensure EFW Pumps are running: BOP starts "B" EFW Pump (It has not auto started because SG level is not yet below 35% and SI has probably not yet actuated.)
	RO	Initiate emergency boration of the RCS: Ensure at least one Charging Pump is running. Verify PZR pressure is LESS THAN 2335 psig. Verify SI ACT status light is NOT lit. Verify SI flow on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. GO TO Step 5. Observe the CAUTION prior to Step 5. (Emergency boration is not required if SI has actuated by this point and SI flow is verified)
	Building	Building Operator locally trips the RTBs at this point. Verify all Reactor Trip and 'Bypass Breakers are open. Verify all Rod Bottom Lights are lit. Verify Reactor Power level is decreasing.
	RO	5 Verify Containment Ventilation Isolation Valves closed by verifying the Safety INJECTION monitor lights are dim, (Time permitting, perform EOP-1.0 steps 1 – 8 in conjunction with this

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior
	BOP	BOP operator notes that there is no power on IDB and that the diesel did not start. He notes that there is a lockout on XFMR-XTF31 (by recognizing annunciator 639 4-2 in alarm). BOP operator also notes that annunciator 637 6-1 (DG B ENG START FAIL) is in alarm
	BOP	BOP operator depresses the "B" DG Emergency Start Pushbutton and notes that the diesel does start and the DG breaker does close to energize 1DB.
	RO	Verify the Reactor is subcritical: Power Range channels indicate LESS THAN 5%. Intermediate Range channels indicate a negative startup rate
	SRO	GO TO Step 15. Observe the CAUTION prior to Step 15.
	SRO	RETURN TO the Procedure and Step in effect (EOP-1.0).
		<u>EOP-1.0</u>
	RO	Verify Reactor Trip: Trip the Reactor using either Reactor Trip Switch. Verify all Reactor Trip and ' Bypass Breakers are open. Verify all Rod Bottom Lights are lit. Verify Reactor Power level is decreasing.
	BOP	Verify Turbine/Generator Trip: Verify all Turbine STM STOP VLVs are closed. Ensure Generator Trip (after 30 second delay): Ensure the GEN BKR is open. Ensure the GEN FIELD BKR is open. Ensure the EXC FIELD CNTRL is tripped.
	BOP	Verifies Power on both ESF busses
		At some point after the reactor trip Hi Rad on RMA-09. 645 1-3 CNDSR EXH RM-A9 HI RAD should come in and is an expected alarm with a tube rupture.
	RO	Check if SI is actuated: Check if either SI ACT status light is bright on XCP-6107 1-1 or Any red first-out SI annunciator is lit on XCP-626 top row. Actuate SI using either SI ACTUATION Switch.
	BOP	Complete ATTACHMENT 3, SI EQUIPMENT VERIFICATION. (If not already done, the BOP operator should be throttling EFW flow to zero to the "C" SG because it has been identified as the ruptured SG). OAP-103.4
	SRO	Announce plant conditions over the page system.
	RO	Verify RB pressure has remained LESS THAN 12 psig on PR-951, '

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior
		RB PSIG (P-951), red pen.
	BOP	Check RCS temperature: With any RCP running, RCS Tavg is stable at OR trending to 557°F. WHEN Narrow Range SG level is GREATER THAN 30% [50%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F.
	RO	Check PZR PORVs and Spray Valves: PZR PORVs are closed. PZR Spray Valves are closed. Verify power is available to at least one PZR PORV Block Valve. MVG-8000A, RELIEF 445 A ISOL. MVG-8000B, RELIEF 444 B ISOL. MVG-8000C, RELIEF 445 B ISOL. Verify at least one PZR PORV Block Valve is open
	RO	Check if RCPs should be stopped: RCS pressure is LESS THAN 1400 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. Note: RCS pressure should be about 1800 psig so no RCP trip should be required.
	BOP	Verify no SG is FAULTED: No SG pressure is decreasing in an uncontrolled manner. No SG is completely depressurized.
	RO	Verify Secondary radiation levels indicate SG tubes are NOT RUPTURED: RM-G19A(B)(C), STMLN HI RNG GAMMA. RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR.
	CRITICAL SRO	GO TO EOP-4.0, STEAM GENERATOR TUBE RUPTURE, Step 1.
	RO	Check if RCPs should be stopped: Check if either of the following criteria is met: Annunciator XCP-612 4-2 is lit (PHASE B ISOL). OR RCS pressure is LESS THAN 1400 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. Note: RCS pressure should be about 1800 psig so it should not be necessary to secure any RCPs
	SRO	Identify the RUPTURED SG(s):

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior
		Narrow Range level in any SG increasing in an uncontrolled manner, OR High Radiation on any of RM-G19A(B)(C), STMLN HI RNG GAMMA, OR Local hand held radiation monitor readings taken by Health Physics on the blowdown lines at following penetrations: XRP0326, SG A Blowdown Line (AB-412 West Pen). XRP0224, SG B Blowdown Line (IB-412 East Pen XRP0219, SG C Blowdown Line (IB-412 East Pen), OR As determined by Chemistry ample analysis for abnormal activity using a frisker.
	BOP	Isolate flow from each RUPTURED SG: Place the Steamline PWR RELIEF A(B)(C) SETPT Controller(s) in MAN and closed. Adjust the PWR RELIEF A(B)(C) SETPT Controller(s) to 8.85 (1150 psig). Place the Steamline Power Relief A(B)(C) Mode Switch(s) in PWR RLF. Place the PWR RELIEF A(B)(C) SETPT Controller(s) in AUTO.
	BOP	WHEN RCS Tav _g is LESS THAN P-12 (552°F), THEN place both STM DUMP INTERLOCK Switches to BYP INTLK.
	BOP	Verify the Steamline PORV closed.
	BOP	IF at least one MD EFW Pump is running, THEN isolate the TD EFW Pump by placing PVG-2030, STM SPLY TO TD EFP to CLOSE.
	BOP/Bldg	Open XMC1DB2Y 05EH, EMERG FEEDWATER PUMP MAIN STEAM BLOCK XVG2802B-MS (AB-463). Close XVG02802B-MS, MS HEADER C EF PUMP TURBINE SUPPLY VLV
	BOP	Close the following for each RUPTURED SG: SG Blowdown, PVG-503A(B)(C). MS Drain Isolation, PVT-2843A(B)(C). MS Drain Isolation, PVT-2877B for SG C.
	BOP	Close the following for each RUPTURED SG: MS Isolation Valve, PVM-2801A(B)(C) AND MS Isolation Bypass PVM-2869A(B)(C).
	BOP	Verify Narrow Range level in each RUPTURED SG is GREATER THAN 30% [50%]. a. Stop EFW flow to each RUPTURED SG: 1) Close FCV-3551, MD EFP TO SG C. 2) Close FCV-3556, TD EFP TO SG C. 3) Maintain Narrow Range level in C SG GREATER THAN 40% [50%].
	BOP/SRO	Verify each RUPTURED SG pressure is GREATER THAN 350 psig.
	SRO	Determine the required core exit TC temperature for RCS cooldown.

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior
	SRO/RO	Check if any RCP is running (all running).
	BOP	<p>Dump steam from each INTACT SG: WHEN RCS Tavg is LESS THAN P-12 (552°F), THEN: Place both STM DUMP INTERLOCK Switches to BYP INTLK. Place both STMLN SI TRAIN A(B) Switches to BLOCK.</p> <p>Verify PERMISV C-9 status light is bright on XCP-6114 1-3. Verify the MS Isolation to open. Valves, PVM-2801A & B are open Place the STM DUMP CNTRL Controller in MAN Place the STM DUMP MODE SELECT Switch in STM PRESS. Adjust the STM DUMP CNTRL Controller to fully open the Bank 1 Steam Dump Valves.</p>
	RO	While cooling down, a high vibration on "C" RCP may occur. If so, secure RCP "C" as required by SOP-101
	BOP	Verify Narrow Range level in SGs A & B 30% [50%].
	BOP	Control EFW flow to maintain in SGs between 40% [50%] and 60%.
	RO	Verify power is available to the PZR PORV Block Valves:
	RO	Verify all PZR PORVs are closed.
	RO	Verify at least one PZR PORV Block Valve is open.
	RO	Reset both SI RESET TRAIN A(B) Switches.
	RO	<p>Reset Containment Isolation: RESET PHASE A - TRAIN A(B) CNTMT ISOL. RESET PHASE B - TRAIN A(B) CNTMT ISOL.</p>
	BOP	<p>Place both ESF LOADING SEQ A(B) RESETS to: a. NON-ESF LCKOUTS. b. AUTO-START BLOCKS.</p>
	RO	<p>Establish Instrument Air to the RB: a. Start one Instrument Air Compressor and place the other in Standby. b. Open PVA-2659, INST AIR TO RB AIR SERV. c. Open PVT-2660, AIR SPLY TO RB.</p>
	RO	Stop both RHR pumps
	SRO	Verify core exit TC temperature is LESS THAN the value determined in Steps 8 through 10
	BOP	<p>Stop the RCS cooldown: a. Ensure Step 10 is completed. b. Adjust steam dump setpoints as necessary to maintain desired core exit TC temperature.</p>
	BOP	Verify each RUPTURED SG pressure is stable OR increasing.

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Verify RCS subcooling on TI-499A(B), A(B) TEMP is GREATER THAN 50°F.
	CRITICAL RO	Depressurize the RCS using Normal PZR Spray at the maximum rate: (PCV-444C should not be opened if "C" RCP has been secured in a previous step) Using RCP A: 1) Open PCV-444D, PZR SPRAY. 2) Close PCV-444C, PZR SPRAY, if RCP C is NOT running Using RCPs B AND C: 1) Open PCV-444C, PZR SPRAY. 2) Close PCV-444D, PZR SPRAY, if RCP A is NOT running.
		Use maximum available spray until any one of the following criteria is met: PZR level is GREATER THAN 68% [54%]. OR RCS subcooling on TI-499A(B), A(B) TEMP "F, is LESS THAN 30"F. OR RCS pressure is LESS THAN RUPTURED SG(s) pressure AND PZR level is GREATER THAN 18% [38%].
	RO	Upon meeting one of the above criteria, Stop RCS depressurization: 1) Close both PCV-444C(D), PZR SPRAY. 2) Close PVT-8145, PZR SPRAY FR CVCS.
	RO/BOP	Check if SI flow should be terminated: a. RCS subcooling on TI-499A(B), is GREATER 30"F b. Secondary Heat Sink is adequate: (Total EFW flow available to INTACT SGs is GREATER THAN 450 gpm. OR Narrow Range SG level is GREATER THAN 30% [50%] in at least one INTACT SG.) c. RCS pressure is stable OR increasing. d. PZR level is GREATER THAN 18% [38%].
	RO	Stop all but one Charging Pump and place in Standby.
	RO	Establish Normal Charging: a. Close FCV-122, CHG FLOW. b. Open both MVG-8107 and MVG-8108, CHG LINE ISOL. c. Adjust FCV-122, CHG FLOW, to obtain 60 gpm Charging flow. d. Close both MVG-8801A(B), HI HEAD TO COLD LEG INJ.
	RO	Control FCV-122, CHG FLOW, to maintain PZR level.
	RO	Verify SI flow is NOT required: a. RCS subcooling on TI-499A(B), is GREATER THAN ' 30"F. b. PZR level is GREATER THAN 18% [38%]. This is the endpoint of this JPM or as directed by the NRC.

Op Test No.: 1 Scenario No.: 1 Event No.: 9

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Event Description: When the reactor trips there is a Loss of power on the IDB emergency bus due to the thunderstorm. The Emergency Diesel generator does not start automatically.

Time	Position	Applicant's Actions or Behavior

Final

Facility: <u>V. C. Summer</u>	Scenario No.: <u>2</u>	Op-Test No.: <u>2005-301</u>
Examiners: _____	Operators: _____	CRS
_____	_____	RO
_____	_____	PO
Initial Conditions: At approximately 39% power and increasing.		
Turnover: Thunder storms in the area, severe weather check list being implemented.		
"A1" train maintenance week.		
S/G A Small tube leak, approx. 8 gpd; MAL-RCS002A.		
Motor Driven EFW Pump 'A' Impeller replacement in progress with 48 hours to complete, have done 12 hours so far.		
B S/G rad monitor (RMG-19B) is OOS.		
At the point of the GOP-4 Step 3.11.J when the second feed water pump is going to be placed in service. The crew is to place the B Main Feed Water Pump in service IAW SOP-210, Section III. Step 2.7.k		
Event No.	Event Type*	Event Description
1	BOP (N)	The BOP will place the second feed water pump in service IAW SOP-210.
2	BOP (I) SRO (TS)	Feedwater Flow transmitter (477) Failure, fails HIGH, with a slow ramp at approximately 3 minutes from current position.
3	BOP (C)	Running EH pump trips. (Must manually start other pump)
4	RO (I) SRO (TS)	Pressurizer pressure channel 444 gradual failure high. Control severity to prevent a trip.
5	RO (I,R) SRO (TS)	Power Range Channel N44 failure high with the failure of the rods to move. The rods will not move in any direction in Manual or Automatic.
6	RO (R) BOP (N) SRO (N)	Small steam leak occurs allowing determination of a required reactor shut down. The crew may initiate a Rx Trip since Rods already will not move. When a trip signal is inserted, the reactor will not trip.
7	All (M)	Large Steam Line Break occurs on the C Steam Generator upstream of the MSIVs. "C" MSIV fails to shut automatically. The "C" feed water isolation valve does not isolate automatically.
8	BOP (C)	A Reactor Building Cooling Unit fails to start automatically.
9	RO (C)	'B' Train Containment Spray pump fails to start automatically.
10	RO (I)	Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

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

Op Test No.: 1 Scenario No.: 1 Event No.: 2Page 3 of 21

Event Description: Feedwater Flow transmitter (477) Failure, fails HIGH, with a slow ramp at approximately 3 minutes from current position.

Time	Position	Applicant's Actions or Behavior
		<u>AOP 401.3</u>
		<i>FT-477 STEAM FLOW FAILURE. Enter AOP-401.3. First 7 steps are Immediate Operator Actions. FCV-478 will travel closed.</i>
		<i>Alarm XCP-624, 4-4 SG A FWF>STF MISMATCH</i>
	BOP	1 Verify the failed channel is the controlling channel.
	BOP	2 Select the operable flow channel: <ul style="list-style-type: none"> • Place FW CONTROL CHANNEL SEL Switch to the operable channel. • Place STEAM CONTROL CHANNEL SEL Switch to the operable channel
	CRS/BOP	3 Verify Turbine Load is LESS THAN 950 MWe.
	CRS/BOP	4 Verify only one SG is AFFECTED.
	CRS/BOP	5 Adjust the Feedwater Flow Control Valve as necessary to restore feed flow to the AFFECTED SG.
	CRS/BOP	6 Restore Narrow Range level in all SGs to between 60% and 65%.
	CRS/BOP	7 Check if Feedwater Pump speed control is operating properly: <ul style="list-style-type: none"> • Feedwater Header pressure is GREATER THAN Main Steam Header pressure • Feed flow is normal for steam and flow and power level • All operating Feedwater Pump speeds and flows are balanced
	CRS/BOP	8 Verify Narrow Range level in all SGs is normal.
	CRS/BOP	9 Restore the AFFECTED SG control systems to normal: <ul style="list-style-type: none"> • Place the Feedwater Flow Control Valve in AUTO • Place the Feedwater Pump Speed Control System in AUTO. REFER TO SOP-210, FEEDWATER SYSTEM
	CRS	10 Within six hours, place the failed channel protection bistables in a tripped condition: <ol style="list-style-type: none"> a. Identify the associated bistables for the failed channel. REFER TO Attachment 1. b. Record the following for each associated bistable on SOP-401, REACTOR PROTECTION AND CONTROL SYSTEM, Attachment I: <ul style="list-style-type: none"> • Instrument. • Associated Bistable. • Bistable Location. • STPs. c. Notify the I&C Department to place the identified bistables in trip.

Op Test No.: 1 Scenario No.: 1 Event No.: 2 Page 4 of 21

Event Description: Feedwater Flow transmitter (477) Failure, fails HIGH, with a slow ramp at approximately 3 minutes from current position.

Time	Position	Applicant's Actions or Behavior
		TS 3.3.1, Table 3.3-1, item 14
	CRS/SE	11 Determine and correct the cause of the channel failure. <i>No repair will occur for this event.</i>
		<i>End of FT-477 failure event.</i>

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Event Description: Pressurizer pressure channel 444 gradual failure high. Control severity to prevent a trip.

Time	Position	Applicant's Actions or Behavior
		<u>AOP-401.5</u>
	RO	Receives annunciators XCP 616 2-3 PZR PRESS HI/LO, 616 2-5 PZR CNTRL PRESS HI, 616 4-4 PRT LVL LO/ TEMP/PRESS/LVL/HI Verifies PT-444 is failing high
	CRS	Enters AOP-401.5, Pressurizer Pressure Control Channel Failure. Verifies first 3 steps are completed which are immediate actions.
	RO	1. Verify the PZR PORVs are closed: <ul style="list-style-type: none"> • PCV-445A. PWR RELIEF • PCV-445B. PWR RELIEF (did not close; requires closing block valve) • PCV-444B. PWR RELIEF
	RO	2. Compare the PZR control channel indication to the protection channel indications: <ul style="list-style-type: none"> • PI-455. PRESS PSIG • PI-456. PRESS PSIG • PI-457. PRESS PSIG
	RO	3. Check if PI-444. CNTRL CHAN PRESS PSIG is NORMAL
	CRS/RO	3. IF PT-444 failed, then perform the following: <ol style="list-style-type: none"> a) Ensure the PZR Spray Valves are closed: <ul style="list-style-type: none"> • PCV-444C. PZR SPRAY • PCV-444D, PZR SPRAY
	RO	<ol style="list-style-type: none"> b) Control PZR PRESS MASTER CONTROL in MAN. c) Operate the PZR Heaters and Spray Valves in manual to control RCS pressure between 2220 psig and 2250 psig.
	CRS	Will probably reach the 2206 psig DNB Tech Spec 3.2.5 at which point the CRS should verbalize the 2 hr LCO requirement.
	CRS	<ol style="list-style-type: none"> d) Within one hour; close MVG-8000B. RELIEF 444 B ISOL. <i>Per TS 3.4.4.b, must also remove power from block valve, XVG-8000B because it would not.</i>
	CRS/RO	4. Check If PI-445. CNTRL CHAN PRESS PSIG, indication is NORMAL
	CRS/RO	5. Ensure ROD CNTRL BANK SEL Switch is In AUTO.
	CRS/RO	6. Maintain RCS pressure between 2220 psig and 2250 psig.
	CRS/SE	7. Determine and correct the cause of the channel failure.
	CRS	Reference TS 3.4.4.b. for PORV failure. Must remove power from block valve in this case.

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Event Description: Power Range Channel N44 failure high with the failure of the rods to move. The rods will not move in any direction in Manual or Automatic.

Time	Position	Applicant's Actions or Behavior
		<u>AOP-401.10</u>
		<p><i>Start of N-44 Failure and Rods Fail To Move event. Crew should enter:</i></p> <ul style="list-style-type: none"> • AOP-401.10 for N-44 Failure (steps 1&2 are immediate actions). • AOP-403.4 for Stuck Control Rods (steps 1&2 are immediate actions). <p><i>RO should notice rods did not move when N-44 failed.</i></p>
	RO	<p>N-44 starts failing hi, the following alarms are received: XCP 620 1-1 PR HI SETPT FLUX HI XCP 620 1-4 PR CHAN DEV XCP 620 1-5 PR UP DET FLUX HI DEV AUTO DEFEAT XCP 620 5-1 ROD CNTRL SYS FAIL URGENT XCP 620 1-6 PR LO DET FLUX HI DEV AUTO DEFEAT</p>
	RO/CRS	<p>1. Verify normal indication on Power Range Channel N-44.</p> <p>IF Power Range Channel N-44 has failed, THEN place the ROD CNTRL BANK SEL Switch in MAN.</p> <p>(Should be a discussion of GOP Appendix A requirement to have rods in AUTO if <u>any</u> PZR PORV is isolated.)</p>
	RO	2. Stabilize any plant transients in progress.
	CRS/RO	3. Maintain stable plant conditions
	CRS/RO	4. Verify no testing .is in progress on the operable Power Range channels.
	CRS/RO	5. Place ROD STOP BYPASS Switch for the failed Power Range channel in BYPASS.
	CRS/RO	<p>6. Verify the appropriate Rod Stop Bypass status light is lit:</p> <ul style="list-style-type: none"> • For N-44, B2 OP ROD STOP BYP (XCP-6111 4-4).
	CRS/RO	7. Adjust Control Rods to maintain Tavg within 1.0°F of Tref.
		<i>The empty fuse holders should NOT be reinstalled as this will allow a small amount of current flow through the blown fuse indicator</i>
	CRS/RO	<p>8. Deenergize the failed Power Range channel:</p> <ul style="list-style-type: none"> • Remove the CONTROL POWER fuses from the POWER RANGE A drawer of N-44. • Remove the INSTR POWER fuses from the POWER RANGE B drawer of N-44.
	CRS/RO	<p>9. Align the Power Range channel comparator circuits:</p> <p>a. Place the following switches to the failed Power Range channel (N-44) position:</p> <ul style="list-style-type: none"> • COMPARATOR CHANNEL DEFEAT Switch (on the COMPARATOR AND RATE drawer) • UPPER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer)

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Event Description: Power Range Channel N44 failure high with the failure of the rods to move. The rods will not move in any direction in Manual or Automatic.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> LOWER SECTION Switch (on the DETECTOR CURRENT COMPARATOR drawer).
	CRS/RO	10. Ensure NR-45 is selected to the appropriate operable channels.
	CRS/SE	11. Within six hours, place the failed channel protection bistables in a tripped condition: <ol style="list-style-type: none"> Identify the associated bistables for the failed channel (N-44). REFER to Attachment 1. Record the following for each associated bistable on SOP-401, REACTOR PROTECTION AND CONTROL SYSTEM, Attachment I: <ul style="list-style-type: none"> Instrument Associated Bistable Bistable Location. STPs. Notify the I&C Department to place the identified bistables in trip.
	CRS/RO	12. Verify Reactor Power is LESS THAN 75%.
	CRS	13. Refer to Tech Spec 3.3.1. (Trip bistables within 6 hours.)
	CRS/SE	14. Determine and correct the cause of the Power Range channel failure.
		<i>Cause of failure will not be determined for this event.</i>
		<u>AOP-403.4</u>
	CRS	<i>Following are the actions for Failure of Control Rods to Move. Steps 1& 2 are immediate actions. This event will be occurring simultaneously with the N44 failure so the crew will be forced to prioritize between the two AOPs.</i>
	RO	1. The ROD CNTRL BANK SEL Switch is already in MAN
	RO	2. Main Turbine load is already stabilized
	CRS/RO	3. Stop any boration or dilution in progress
	CRS/RO	1. Adjust Control Rods to maintain Tav_g within 1.0 degrees of Tref. NOTE – Step 4: If Tav_g has remained within 1.5°F of Tref , Control Rods should be moved one or two steps in or out to verify proper operation. Since Control Rods will NOT move, THEN perform the following: <ul style="list-style-type: none"> Adjust Main Turbine load until Tav_g is within 5°F of Tref Initiate GTP-702, Attachment IV.A, INOPERABLE CONTROL ROD
	CRS	CRS evaluates Tech Specs 3.1.3.1.C which will require a plant

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Event Description: Power Range Channel N44 failure high with the failure of the rods to move. The rods will not move in any direction in Manual or Automatic.

Time	Position	Applicant's Actions or Behavior
		shutdown, then performs the following:
		Building operator (if dispatched) reports that the urgent failure is from power cabinet 2BD
	SE	a. Notify the following plant personnel: <ul style="list-style-type: none"> • Management Duty Supervisor • Reactor Engineering
	BOP	b. Decrease Main Turbine Load to 50 MW at a rate determined by the Shift Supervisor. (Refer to GOP-4B, POWER OPERATION, MODE 1 – DESCENDING, starting with Step 3.3)
	BOP/RO	c. Maintain Tavg within 5 degrees of Tref using the following: <ul style="list-style-type: none"> • Main Turbine Load adjustment • RCS Boration. Refer to SOP-106, REACTOR MAKEUP WATER SYSTEM

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Event Description: Large Steam Line Break occurs on the C Steam Generator upstream of the MSIVs. "C" MSIV fails to shut automatically. The "C" feed water isolation valve does not isolate automatically.

Time	Position	Applicant's Actions or Behavior
		<u>EOP-1.0</u>
	NOTE	<i>Large Steam Break should occur at this time. An AUTO SI may occur prior to MANUAL actuation due to size of steam break.</i>
	RO	1. Verify Reactor Trip: (Reactor did not trip automatically. Isolate EFW flow to "C" S/G) <ul style="list-style-type: none"> • Trip the Reactor using either Reactor Trip Switch • Verify all Reactor Trip and Bypass Breakers are open. • Verify all Rod Bottom Lights are lit. • Verify Reactor Power level is decreasing.
	BOP	2. Verify Turbine/Generator Trip: (Secure RCPs Hi 3) <ol style="list-style-type: none"> a. Verify all Turbine STM STOP VLVs are closed. b. Ensure Generator Trip (after 30 second delay): <ol style="list-style-type: none"> 1) Ensure the GEN BKR is open. 2) Ensure the GEN FIELD BKR is open. 3) Ensure the EXC FIELD CNTRL is tripped.
	BOP	3. Verify both ESF buses are energized.
	ALL	4. Check if SI is actuated: <ol style="list-style-type: none"> a. Check if either: <ul style="list-style-type: none"> • SI ACT status light is bright on XCP-6107 1-1. <li style="text-align: center;">OR • Any red first-out SI annunciator is lit on XCP-626 top row. b. Actuate SI using either SI ACTUATION Switch. GO TO Step 6.
	ALL	5. Check if SI is required: <ol style="list-style-type: none"> a. Check if any of the following conditions exist: <ul style="list-style-type: none"> • PZR pressure LESS THAN 1850 psig. <li style="text-align: center;">OR • RB pressure GREATER THAN 3.6 psig. <li style="text-align: center;">OR • Steamline pressure LESS THAN 675 psig. <li style="text-align: center;">OR • Steamline differential pressure GREATER THAN 97 psid. b. Actuate SI using either SI ACTUATION Switch.
	RO	At some point after the Rx Trip, a High-3 should have occurred and the RO will secure all RCPs
	CRS/BOP	6. Complete ATTACHMENT 3, SI EQUIPMENT VERIFICATION. BOP operator manually closes "C" MSIV and "C" FWIV.

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
	RO	e) Verify RB Spray flow is GREATER THAN 2500 gpm for each operating train on FI-7368, SPR PP A DISCH FLOW GPM. FI-7378, SPR PP B DISCH FLOW GPM. (At this point the RO notes that there is no flow indicated on FI-7368 but that all other indications are normal and diagnoses it as a failed indicator.)
	RO	f) Stop all RCPs (if not already stopped on Phase B).
	CRS/RO	9. Check RCS temperature: <ul style="list-style-type: none"> • With no RCP running, RCS Tcold is stable at OR trending to 557°F. IF RCS temperature is LESS THAN 557°F AND decreasing, THEN: <ol style="list-style-type: none"> a) Place the STM DUMP CNTRL Controller in MAN and closed. b) Place the STM DUMP MODE SELECT Switch in STM PRESS. c) Ensure all Steamline PORVs and Condenser Steam Dumps are closed. d) IF RCS cooldown continues, THEN: (Could get red path on EOP-15.0 if throttle too much) <ol style="list-style-type: none"> (1) IF Narrow Range SG level is LESS THAN 30% [50%] in all SGs, THEN reduce EFW flow as necessary to stop the cooldown, while maintaining total EFW flow GREATER THAN 450 gpm. (2) WHEN Narrow Range SG level is GREATER THAN 30% [50%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F. (3) IF RCS cooldown continues, THEN close: <ul style="list-style-type: none"> • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C).
	BOP	By step 9 in EOP-1.0 the faulted SG should have been diagnosed as "C" and EFW to "C" SG should be secured (FCV closed) (OAP-103.4)
	CRS/RO	10. Check PZR PORVs and Spray Valves: <ol style="list-style-type: none"> a. PZR PORVs are closed. b. PZR Spray Valves are closed. c. Verify power is available to at least one PZR PORV Block Valve: <ul style="list-style-type: none"> • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. d. Verify at least one PZR PORV Block Valve is open. OPEN one Block Valve unless it was closed to isolate an open PZR PORV.
	CRS/RO	11. Check if RCPs should be stopped: <ol style="list-style-type: none"> a. Check if either of the following criteria is met:

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		<p>OR</p> <ul style="list-style-type: none"> • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). • RCS pressure is LESS THAN 1400 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. <p>b. Stop all RCPs (already stopped).</p>
	CRS/BOP	<p>12. Verify no SG is FAULTED:</p> <ul style="list-style-type: none"> • No SG pressure is decreasing in an uncontrolled manner. • No SG is completely depressurized. <p>GO TO EOP-3.0, FAULTED STEAM GENERATOR ISOLATION, Step 1.</p> <p>Crew will leave this procedure and transition to EOP-3.0, step 1.</p>
		<u>EOP-3.0</u>
	CRS/BOP	<p>1. Ensure all the following are closed:</p> <ul style="list-style-type: none"> • MS Isolation Valves, PVM-2801A(B)(G). • MS Isolation Bypass Valves, PW-2869A(B)(C).
	ALL	<p>2. Check if any SG is NON-FAULTED:</p> <ul style="list-style-type: none"> • Pressure in any SG is stable or increasing. • Any SG is not completely depressurized
	ALL	<p>3. Identify any FAULTED SG(s):</p> <ul style="list-style-type: none"> • Any SG pressure decreasing in an uncontrolled manner. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Any SG is NOT completely depressurized
	CRS/BOP	<p>4. Close the following valves for each FAULTED SG:</p> <ul style="list-style-type: none"> • FW Flow Control FCV-498 • FW Isolation, PVG-1611C • SG Blowdown. PVG-503C • FW Flow Control Bypass FCV-3341
	ALL	<p>5. Complete the isolation of each FAULTED SG:</p> <ol style="list-style-type: none"> a. Close SG Chemical Feed Isolation, MVK-1633C b. Close MS Drain Isolation PVT-2843C c. Close MS Drain Isolation, PVT-2877B for SG C. d. Place the Steamline PWR RELIEF C SETPT Controller in MAN and closed. e. Place the Steamline Power Relief C Mode Switch in PWR RLF f. Close FCV-3551 MD EFP TO SG C g. Close FCV-3556 TD EFP TO SG C h. Locally unlock and close XVG01017C-EF SG C MTR DR EF PUMP SUPPLY HEADER VALVE (IB-423). i. Locally unlock and close XVKO1019C-EF SG C MTR DR EF PUMP SUPPLY STOP CHK VLV (IB-423).

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		j. Locally unlock and close XVG01018C-EF SG C TURB DR EF PUMP SUPPLY HDR VALVE (IB-423). k. Locally unlock and close XVK01020C-EF SG C TURB DR EF PUMP SUP STOP CHK VALVE (IB-423) l. Close and locally deenergize the appropriate valve for SG C FAULTED: <ul style="list-style-type: none"> • For SG C: <ol style="list-style-type: none"> 1) Open XMCIDB2Y 05EH. EMERG FEEDWATER PUMP MAIN STEAM BLOCK XVG2802B-MS (AB-463). 2) Close MVG-2802B MS LOOP C TO TD EFP
	CRITICAL BOP	Faulted SG is Isolated
	ALL	6. Check if Secondary radiation levels are normal: <ol style="list-style-type: none"> a. Check radiation levels normal on all unisolated radiation monitors: <ul style="list-style-type: none"> • RM-G19C STMLN HI RNG GAMMA. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-LIO. SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. • RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. b. Notify Chemistry to sample all SG secondary sides and screen samples for abnormal activity using a frisker.
	ALL	7. Check if SI flow should be reduced: <ol style="list-style-type: none"> a. RCS subcooling on TI-499A(B), A(B) TEMP OF is GREATER THAN 30°F. b. Secondary Heat Sink is adequate: <ul style="list-style-type: none"> • Total EFW flow to INTACT SGs is GREATER THAN 450 gpm. OR • Narrow Range level is GREATER THAN 30% [50%] in at least one INTACT SG. c. RCS pressure is stable OR increasing. d. PZR level is GREATER THAN 18% [38%] (IF PZR LEVEL < 18%[38%], THEN transition to EOP-2.0, see attachment of EOP-2.0 steps)
	CRS/RO	8. Reset both SI RESET TRAIN A(B) Switches.
	CRS/RO	9. Reset Containment Isolation: <ul style="list-style-type: none"> • RESET PHASE A TRAIN A(B) CNTMT ISOL. • RESET PHASE B TRAIN A(B) CNTMT ISOL.
	CRS/BOP	10. Place both ESF LOADING SEQ A(B) RESETS to: <ol style="list-style-type: none"> a. NON-ESF LCKOIJTS.

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		b. AUTO-START BLOCKS.
	CRS/RO	11. Establish Instrument Air to the RB: a. Start one Instrument Air Compressor and place the other in Standby. b. Open PVA-2659, INST AIR TO RB AIR SERV. c. Open PVT-2660. AIR SPLY TO RB
	CRS	12. GO TO EOP-1.2, SAFETY INJECTION TERMINATION, Step 1.
		If previously entered EOP-2.0, EOP-2.0 will transition back to EOP-1.2.
		<u>EOP-1.2</u>
	CRS/RO	Stop all but one Charging Pump and place in Standby. (Stop A Chg Pump)
	CRS/RO	Verify RCS pressure is stable OR increasing.
	CRS/RO	Establish Normal Charging: a. Close FCV-122, CHG FLOW. b. Open both MVG-8107 and MVG-8108, CHG LINE ISOL. c. Adjust FCV-122, CHG FLOW, to obtain 60 gpm Charging flow. d. Close both MVG-8801A(B), HI HEAD TO COLD LEG INJ
	CRS/RO	Control FCV-122, CHG FLOW, to maintain PZR level.
	Note	SI terminated and normal charging restored.
	CRS/RO	Stops both RHR pumps
	CRS/RO	6. Verify SI flow is NOT required: a. RCS subcooling on TI-499A(B), is GREATER THAN 30°F c. PZR level is GREATER THAN 18% [38%].
	CRS/RO	7. Check if RB Spray should be stopped: a. Check if any RB Spray Pumps are running. b. Verify RB pressure is LESS THAN pressure is LESS THAN 11 psig. c. Depress both RESET TRAIN A(B) RB SPRAY. d. Verify EOP-14.0, RESPONSE TO INADEQUATE CORE COOLING, has NOT been implemented. e. Stop both RB Spray Pumps and place in Standby. f. Close MVG-3003A(B), SPRAY HDR ISOL LOOP A(B).
	CRS/RO	9. Check if Letdown can be established: a. Verify PZR level is GREATER THAN 30% [50%] b. Establish Normal Letdown: 1) Adjust FCV-122, CHG FLOW, to obtain 60 gpm Charging flow. 2) Set PCV-145, LO PRESS LTDN, to 70%. 3) Open TCV-144, CC TO LTDN HX. 4) Open PVT-8152, LTDN LINE ISOL.

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		5) Open both LCV-459 and LCV-460, LTDN LINE ISOL. 6) Open desired Orifice Isolation Valve(s) to obtain 60 gpm to 120 gpm: <ul style="list-style-type: none"> • PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). • PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). • PVT-8149C, LTDN ORIFICE C ISOL (60 gpm).
		7) Adjust FCV-122, CHG FLOW, to maintain TI-140, REGEN HX OUT TEMP "F, between 250°F and 350°F while maintaining PZR level. 8) Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig. 9) Place PCV-145, LO PRESS LTDN, in AUTO. 10) Place TCV-144, CC TO LTDN HX, in AUTO.
	CRS/RO	9. Check the Reactor Makeup System: <ul style="list-style-type: none"> a. Set FCV-113 A&B, BA FLOW, Controller to 8.6. j. Ensure the Reactor Makeup System is in AUTO.
	CRS/RO	10. Transfer Charging Pump suction to the VCT: <ul style="list-style-type: none"> a. Open both LCV-115C(E), VCT OUTLET ISOL. k. Close both LCV-115B(D), RWST TO CHG PP SUCT.
		Examiners should end scenario at this point as SI is now secured and charging and letdown are restored.
		<u>EOP-2.0 (if necessary)</u>
		The following are applicable steps of EOP-2.0, Loss of Reactor or Secondary Coolant. This would be entered if PZR Level was too low for EOP-1.2 transition.
	ALL	1. Check if RCPs should be stopped: <ul style="list-style-type: none"> a. Check if either of the following criteria is met: <ul style="list-style-type: none"> • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). <li style="text-align: center;">OR • RCS pressure is LESS THAN 1400 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. b. Stop all RCPs.
	CRS/BOP	2. Verify no SG is FAULTED: <ul style="list-style-type: none"> • No SG pressure is decreasing in an uncontrolled manner. • No SG is completely depressurized.
	CRS/BOP	3. Check INTACT SG levels: <ul style="list-style-type: none"> a. Verify Narrow Range level in INTACT SGs is GREATER THAN 30% [50%].

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		e. Control EFW flow to maintain Narrow Range level in each INTACT SG between 40% [50%] and 60%.
	CRS/RO	4. Reset both SI RESET TRAIN A(B) Switches.
	CRS/RO	5. Reset Containment Isolation: <ul style="list-style-type: none"> • RESET PHASE A -TRAIN A(B) CNTMT ISOL. • RESET PHASE B -TRAIN A(B) CNTMT ISOL.
	ALL	6. Check if Secondary radiation levels are normal: <ul style="list-style-type: none"> a. Check radiation levels normal on: <ul style="list-style-type: none"> • RM-G19A(B)(C), STMLN HI RNG GAMMA. • RM-A9, CNDSR EXHAUST GAS ATMOS MONITOR. • RM-L3, STEAM GENERATOR BLOWDOWN LIQUID MONITOR. • RM-L10, SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. b. Place SVX-9398A(B)(C), SG A(B)(C) SMPL ISOL, in AUTO. m. Notify Chemistry to sample all ' SG secondary sides and screen ' samples for abnormal activity using a frisker.
	CRS/RO	7. Check PZR PORVs and Block Valves: <ul style="list-style-type: none"> a. Verify power is available to the PZR PORV Block Valves: <ol style="list-style-type: none"> 1) MVG-8000A, RELIEF 445 A ISOL. 2) MVG-8000B RELIEF 444 B ISOL. 3) MVG-8000C, RELIEF 445 B ISOL. <p>If any PZR PORV opens because of high PZR pressure, Step 7.b should be repeated after pressure decreases to LESS THAN 2300 psig, to ensure the PORV recloses.</p> <ul style="list-style-type: none"> b. Verify all PZR PORVs are closed. c. Verify at least one PZR PORV Block Valve is open.
	CRS/BOP	8. Place both ESF LOADING SEQ A(B) RESETS to: <ul style="list-style-type: none"> a. NON-ESF LCKOUTS. b. AUTO-START BLOCKS.
	CRS/RO	9. Establish Instrument Air to the RB: <ul style="list-style-type: none"> a. Start one Instrument Air Compressor and place the other in Standby.

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Event Description: Flow meter (FI-7368) for A Train of Containment Spray fails low. Actual spray is occurring.

Time	Position	Applicant's Actions or Behavior
		b. Open PVA-2659, INST AIR TO RB AIR SERV. c. Open PVT-2660, AIR SPLY TO RB.
	ALL	10. Check if SI flow should be reduced: <ul style="list-style-type: none"> a. RCS subcooling on TI-499A(B), A(B) TEMP "F, is GREATER THAN 30"F. b. Secondary Heat Sink is adequate: <ul style="list-style-type: none"> • Total EFW flow to INTACT SGs is GREATER THAN 450 gpm. <li style="text-align: center;">OR • Narrow Range level is GREATER THAN 30% [50%] in at least one INTACT SG. c. RCS pressure is stable increasing. NOTE - Step 10.d If PZR level is LESS THAN 18% [38%], the PZR should refill from SI flow after pressure is stabilized. <ul style="list-style-type: none"> n. PZR level is GREATER THAN 18% [38%] (IF PZR still less than 18%[38%], then go to Step 11), if not then continue) GO TO Step 11. <ul style="list-style-type: none"> o. GO TO EOP-1.2, SAFETY INJECTION TERMINATION, Step 1.
	ALL	11. Check if RB Spray should be stopped: <ul style="list-style-type: none"> a. Check if any RB Spray Pumps are running b. Verify RB pressure is LESS THAN 11 psig c. Depress both RESET TRAIN A(B) ' RB SPRAY. NOTE - Step 11.d <ul style="list-style-type: none"> • RB Spray must run for a minimum of two hours. • Anytime RB Spray Pumps are stopped, MVG-3003A(B), SPRAY HDR ISOL LOOP (B), should be closed for containment isolation. d. Consult with TSC personnel concerning RB Spray System operation.
	CRS/RO	12. Check if RHR Pumps should be stopped: <ul style="list-style-type: none"> a. Check RCS pressure: <ul style="list-style-type: none"> 1) RCS pressure is GREATER THAN 250 psig 2) RCS pressure is stable OR increasing. b. Check if any RHR Pump is running with suction aligned to the

Facility:	VC Summer	Scenario No.:	3 (SPARE)	Op-Test No.:	2005-301
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions: The Unit is in Mode 2 with a MOL reactor startup in progress.					
Turnover: The previous crew has initiated the reactor startup per GOP-3. Source range counts are stable and Control bank 'D' is presently at 100 steps. 1/M data now projects criticality at 116 steps on Control bank 'D'. Continue with the reactor startup beginning with step 3.11.q of GOP-3, and stabilize reactor power between 1-3%.					
"A1" maintenance week					
S/G "A," Small tube leak, approx. 8 gpd.					
Event No.	Malf. No. / Position	Event Type*	Event Description		
1	RO	R	Pull control rods to establish critical reactor.		
2	BOP SRO (TS)	C	Train 'A' Service Water Pump A trips and spare "C" pump needs to be aligned and started.		
3	RO	I	Controlling channel Pressurizer Level Transmitter (ILT-459) fails low and L/D isolates. AOP-401.6		
4	BOP	N	Re-establish letdown. (SOP-102)		
5	BOP	I	Steam Generator B PORV Pressure Transmitter (IPT-2010) fails high. BOP operator takes manual control and closes PCV-2010.		
6	BOP / RO SRO (TS)	C	Letdown line break inside Containment. AOP isolates letdown which terminates the leak. Crew places excess letdown in service. AOP-101.1 & SOP-102		
7	RO	C	RCP "A" High Vibration (discussion about PZR spray) and seal failure when secured. (AOP-101.2) (SOP-101)		
8	ALL	M	Small break LOCA (approx 400 gpm). Ramp leak in over a 5 minute period to allow entry into AOP-101.1 again. (vary ramp rate as necessary to give operators time to make "manual" reactor trip decision in AOP-101.1 prior to getting auto trip and time to manual SI in EOP-1.0 prior to auto SI).		
9	BOP or RO	C	Safety injection Train 'A' fails to automatically or manually actuate (troubleshooting this event for the rest of the scenario). and 'B' Charging pump fails to automatically start when safety injection is initiated but will manual start. The reactor fails to automatically trip & fails to trip from RO side MCB switch but will trip from BOP side..		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page _____ of _____		
Event Description: _____ _____ _____		
Time	Position	Applicants Actions or Behavior
		<u>GOP-3.0</u>
		q. Within 15 minutes before achieving criticality, verify Tavg greater than or equal to 551°F.
		r. Announce criticality over the page system.
		s. Verify critical rod position is above the Rod Insertion Limit per Tech Spec 3.1.3.6.
		t. At the AUDIO COUNT RATE CHANNEL drawer, place the following switches in OFF: 1) AUDIO MULTIPLIER. 2) CHANNEL SELECTOR.
		3.11 Increase Reactor Power to 10 ⁻³ % as follows: / a. Establish a stable Startup Rate of less than one decade per minute.
		b. At 7.5x10 ⁻⁶ %, perform the following: 1) Verify P6 Permissive energizes to bright. 2) Verify a minimum of one decade overlap between Source Range Channels and Intermediate Range Channels.
		c. Prior to 10 ⁵ CPS, perform the following: 1) Momentarily place SR TRAIN A Switch in BLOCK. 2) Verify SR A TRIP BLCK Permissive energizes to bright. 3) Momentarily place SR TRAIN B Switch in BLOCK. 4) Verify SR B TRIP BLCK Permissive energizes to bright.
		d. Select one Intermediate Range Channel and one Power Range Channel on NR-45, NIS RECORDER.
		e. Stabilize Reactor Power at 10 ⁻³ %.
		<i>This ends the pull to criticality event.</i>
	RO	A SWP trips. RO responds to various alarms and references the ARP: XCP-604 1-2: SWP A/C TRIP

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Event Description: _____

Time	Position	Applicants Actions or Behavior
		XCP-604 3-3: SW CCW HX A FLO LO/TEMP HI XCP-604 3-4: DG A CLR SW FLO LO TEMP HI
	CRS/RO	ARP is handed to CRS, the IB operator is dispatched to SW PP house to investigate. Electricians may also be notified.
	CRS	Decision should be made to place C SWP on A Train
		CORRECTIVE ACTIONS: I. Place the spare Service Water Pump in service per SOP-117.
	ALL	2.1 Shift from Service Water Pump A to Service Water Pump C in service, as follows: a. With the exception of racking down XSW1EA 04, SERVICE WATER PUMP XPP0039A-SW, complete Attachment V.
	ALL	b. Start XPP-0039C, PUMP C TRAIN A. (PEER <input type="checkbox"/>)
	RO	c. Verify MVB-3116C, SWP C DISCH, automatically opens.
	ALL/Building	d. Ensure sufficient Service Water Pump C cooling water flow, by throttling the following (SW-436): 1) XVT03157C-SW, SW PP C MTR UPPER BRG CLG WTR SUP VALVE, to obtain upper bearing flow between 10 gpm and 12 gpm. 2) XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE, to obtain lower bearing flow between 3 gpm and 4 gpm.
	ALL/Building	e. At XPN-13, C SERVICE WATER SCREEN Control Panel (SW-436), verify proper traveling screen operation, as follows: 1) Place the Screen Selector Switch, in HAND. 2) Verify proper screen operation and screen wash flow. 3) Place the Screen Selector Switch, in AUTO.
	RO	f. Stop XPP-0039A, PUMP A, and place the control switch, in PULL TO LK NON-A.
	RO	g. Verify MVB-3116A, SWP A DISCH, automatically closes.

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Time	Position	Applicants Actions or Behavior
	ALL/Building	h. Re-verify Service Water Pump C cooling water flow and adjust as necessary, by throttling the following (SW-436): 1) XVT03157C-SW, SW PP C MTR UPPER BRG CLG WTR SUP VALVE, to obtain upper bearing flow between 10 gpm and 12 gpm. 2) XVT03158C-SW, SW PP C MTR LOWER BRG CLG WTR SUP VALVE, to obtain lower bearing flow between 3 gpm and 4 gpm.
	ALL/Building	i. Rack down XSW1EA 04, SERVICE WATER PUMP XPP0039A-SW (SW-425).
	ALL/Building	j. At XPN-11, A SERVICE WATER SCREEN, Control Panel (SW-436), place the Screen Selector Switch, in OFF.
	ALL/Building	k. Complete Attachment V.
	ALL	l. Ensure proper Service Water flow through the operable Train A Chiller per SOP-501.
		<i>This ends the A SWP trip event.</i>
		<i>The following event is the LT-459 Failure, PZR Level Controlling channel.</i>
		LT-459 Fails low and Letdown isolates. The following alarms are received: XCP-614 5-1: CHG LINE FLO HI/LO XCP-616 1-3: BLCK HTRS ISOL LTDN PZR LCS LO XCP-616 1-5: PZR LCS DEV HI/LO XCP-616 3-1: PZR HTR CNTRL OR BU GRP 1/2 TRIP XCP-616 4-6: SCR OUTPT LOSS

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page _____ of _____		
Event Description: _____ _____ _____		
Time	Position	Applicants Actions or Behavior
		<i>Crew enters AOP-401.06 PZR Level Control and Protection Channel Failure. Step 1 is an immediate action.</i>
		<u>AOP-401.6</u>
	RO	1 Place PZR LEVEL CNTRL Switch to the position with two operable channels.
	RO	2 Select an operable channel on PZR LEVEL RCDR.
	RO	3 Control the PZR Heaters as necessary to maintain PZR pressure: CNTRL GRP Heaters. BU GRP 1 Heaters. BU GRP 2 Heaters.
	RO	4 Verify Letdown is in service. 4 Re-establish Letdown. REFER TO SOP-102, CHEMICAL AND VOLUME CONTROL SYSTEM. IF Letdown can NOT be established, THEN REFER TO AOP-102.1, LOSS OF LETDOWN, while continuing with this procedure.
	RO	2.1 Place FCV-122, CHG FLOW, in MAN and close.
	RO	2.2 Place PCV-145, LO PRESS LTDN, in MAN and open to 70%. (PEER <input type="checkbox"/>)
	RO	2.3 Place TCV-144, CC TO LTDN HX, in MAN and open to 100%.
	RO	2.4 Place TCV-143, LTDN TO VCT OR DEMIN, in VCT.
	RO	2.5 Open PVT-8152, LTDN LINE ISOL.
	RO	2.6 Open the following: a. LCV-459, LTDN LINE ISOL. b. LCV-460, LTDN LINE ISOL.

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Event Description: _____

Time	Position	Applicants Actions or Behavior
	RO	2.7 Ensure the following Charging Line Isolation Valves are open: a. MVG-8107, CHG LINE ISOL. b. MVG-8108, CHG LINE ISOL.
	RO	2.8 Slowly open FCV-122, CHG FLOW, to establish 60 gpm flow as indicated on FI-122A, CHG FLOW GPM.
	RO	2.9 Open Orifice Isolation Valves to obtain the desired Letdown flow rate (60 gpm to 120 gpm): a. PVT-8149A, LTDN ORIFICE A ISOL (45 gpm). b. PVT-8149B, LTDN ORIFICE B ISOL (60 gpm). c. PVT-8149C, LTDN ORIFICE C ISOL (60 gpm).
	RO	2.10 Adjust FCV-122, CHG FLOW, as required to maintain TI-140, REGEN HX OUT TEMP °F, between 250°F and 350°F while maintaining Pressurizer level.
	RO	2.11 Adjust PCV-145, LO PRESS LTDN, to maintain PI-145, LO PRESS LTDN PRESS PSIG, between 300 psig and 400 psig.
	RO	2.12 Place PCV-145, LO PRESS LTDN, in AUTO.
	RO	2.13 Adjust TCV-144, CC TO LTDN HX, potentiometer as necessary to maintain the desired VCT temperature and place in AUTO. Refer to VCS Curve Book, Figure VII.15.
	RO	2.14 When Pressurizer level matches reference level, place FCV-122, CHG FLOW, in AUTO per Section IV.
	RO	2.15 After the Letdown temperatures have stabilized, place TCV-143, LTDN TO VCT OR DEMIN, in DEMIN/AUTO.
	RO	5 Check if PZR LVL MASTER CONTROLLER is responding appropriately: <ul style="list-style-type: none"> • Verify Charging flow is normal and responding to PZR level error. • Verify PZR level is stable at OR trending to program level.

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Event Description: _____

Time	Position	Applicants Actions or Behavior
	CRS/SE	<p>6 Within six hours, place the failed channel protection bistables in a tripped condition:</p> <p>a. Identify the associated bistables for the failed channel REFER TO Attachment 1.</p> <p>b. Record the following for each associated bistable on SOP-401, REACTOR PROTECTION AND CONTROL SYSTEM, Attachment I:</p> <ul style="list-style-type: none"> • Instrument. • Associated Bistable. • Bistable Location. • STPs. <p>c. Notify the I&C Department to place the identified bistables in trip.</p>
		<p>7 Determine and correct the cause of the channel failure</p>
		<p><i>This concludes the LT-459 failure event.</i></p>
		<p><i>The next event is IPT-2010 slowly failing high which results in SG PORV IPV-2010 (B Loop) slowly going full open. Valve controller can be taken to Manual and closed. No alarms are associated with this event.</i></p>
	ALL	<p>Crew should notice some excess RCS cooling, increased steam flow and finally notice IPV-2010 is going open.</p>
	CRS/BOP	<p>CRS and/or BOP should recommend placing 2010 controller in Manual and attempting to close.</p>
	BOP	<p>IPV-2010 placed in Manual and closed.</p>
	CRS/SE	<p>MWR should be written and work order generated to repair transmitter.</p>
		<p><i>This concludes the 2010 failing open event.</i></p>

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Event Description: _____

Time	Position	Applicants Actions or Behavior
		<i>The Letdown leak inside containment is the next event.</i>
		The following alarms are received as leak progresses: XCP-642 3-3: RB ACC AREA RM-G5 HI RAD XCP-642 3-4: RB ACC AREA RM-G5 TRBL XCP-642 3-5: INCOR INSTR AREA RM-G14 HI RAD XCP-642 3-6: INCOR INSTR AREA RM-G14 TRBL
		<u>AOP-101.1</u>
	RO	1 Verify PZR level is at or trending to program level. IF PZR level is decreasing. THEN perform the following: a) Open FCV-122. CHG FLOW as necessary to maintain PZR level b) IF PZR level continues to decrease, THEN reduce Letdown to one 45 gpm orifice: 1) Set PCV-145, LO PRESS LTDN. To 70% 2) Ensure PVT-8149A. LTDN ORIFICE A ISOL. is open. 3) Close both PVT-8149B(C). LTDN ORIFICE B(C)

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page _____ of _____		
Event Description: _____ _____ _____		
Time	Position	Applicants Actions or Behavior
		ISOL. 4) Adjust PCV-145. LO PRESS LTDN. to maintain PI-145. LO PRESS LTDN PRESS PSIG. between 300 psig and 400 psig. 5) Place PCV-145, LO PRESS LTDN. in AUTO.
	CRS/RO	2 Check if SI is required: a. Check if <u>any</u> of the following criteria are met: <ul style="list-style-type: none"> • PZR level is decreasing with Charging maximized and Letdown minimized. • PZR level is approaching 12%. • PZR pressure is approaching 1870 psig. • VCT level is approaching 5%. <p><i>SI should NOT be required, crew should follow ALTERNATIVE ACTION of step 2 which is to GO TO STEP 3</i></p>
	CRS/SE	3 Determine RCS leak rate: a. Estimate the RCS leak rate. REFER TO IPCS CHGNET. b. Calculate the RCS leak rate. REFER TO STP-114.002. OPERATIONAL LEAK TEST. c. Check if the RCS leak rate is GREATER THAN Tech Spec 3.4.6.2 d. Comply with the applicable Tech Spec 3.4.6.2 action statement.
	RO	4 Verify RCS pressure is GREATER THAN 2210 psig. a) Ensure all PZR Heaters are on. b) the PZR Spray Valves are closed c) Ensure the PZR PORVs are closed. <u>IF any</u> PORV fails to close, <u>THEN</u> close its Block Valve.
	BOP/CRS	5 Verify no SG tubes are leaking: a. Narrow Range level in no SG is increasing with feed flow LESS THAN steam flow. b. Radiation levels on all of the following are normal: <ul style="list-style-type: none"> • RM-G19A(B)(C). STMLN HI RNG GAMMA. • RM-A9. CNDSR EXHAUST GAS ATMOS MONITOR. • RM-L3. STEAM GENERATOR BLOWDOWN

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Event Description: _____

Time	Position	Applicants Actions or Behavior
		<p>LIQUID MONITOR.</p> <ul style="list-style-type: none"> • RM-LIO. SG BLOWDOWN CW DISCHARGE LIQUID MONITOR. <p>c. No steam flow/feed flow mismatch (feed flow low). d. As determined by Chemistry sample analysis of ALL SG secondary sides for activity.</p>
	RO	<p>6 Check the PZR PORVs:</p> <p>a. Check if RCS pressure is LESS THAN 2335 psig. b. Verify all PZR PORVs are closed. c. Check if PRT conditions are normal by verifying PRT LVL LO /TEMP/LVL/PRESS HI (XCP-616 4-4). is not lit. d. Verify at least one PZR PORV Block Valve is open.</p>
	RO	<p>7 Check If Reactor Building conditions are normal:</p> <p>a. RB radiation levels are normal on the following:</p> <ul style="list-style-type: none"> • RM-GS. RB PERSONNEL ACCESS AREA GAMMA. • RM-G6. 17 RB REFUEL BRIDGE AREA GAMMA. • RM-A2. RB SAMPLE LINE PARTICULATE(IODINE)(GAS) ATMOS MONITOR. <p>b. RB Sump levels are normal c. RB pressure is LESS THAN 1.5 psig d. The following annunciators are NOT lit:</p> <ul style="list-style-type: none"> • RBCU IA/2A DRN FL0 HI (XCP-606 2-2). • RBCU IB/2B DRN FL0 HI (XCP-607 2-2). <p><i>Conditions are not normal, so the alternative action of isolating letdown will be performed.</i></p>
	RO	<p>7 Attempt to isolate leakage as follows:</p> <p>a) Close all Letdown Isolation Valves:</p> <ol style="list-style-type: none"> 1) PVT-8149A(B)(G) LTDN ORIFICE A(B)(C) ISOL. 2) LCV-459. LTDN LINE ISOL 3) LCV-460, LTDN LINE ISOL <p>b) Check RCS parameters for indications of leakage.</p> <p><i>Leakage should be isolated by the above actions. Crew should wait and verify no further leakage occurs. Since Normal Letdown will remain isolated, crew should place EXCESS LETDOWN in service.</i></p> <p>REFER TO SOP-102. CHEMICAL AND VOLUME CONTROL SYSTEM</p>

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Event Description: _____ _____ _____

Time	Position	Applicants Actions or Behavior
		<i>The following is from SOP-102:</i>
	RO	2.1 Ensure HCV-137, XS LTDN HX, is closed.
	RO	2.2 Place PVM-8143, XS LTDN TO VCT(PEER <input type="checkbox"/>)
	RO	2.3 If required, reset Phase A Isolation by depressing the following: a. RESET PHASE A - TRAIN A CNTMT ISOL. b. RESET PHASE A - TRAIN B CNTMT ISOL.
	RO	Open the following: a. MVT-8100, SEAL WTR RTN ISOL. b. MVT-8112, SEAL WTR RTN ISOL.
	RO	2.5 Ensure MVG-9583, FROM XS LTDN HX, is open.
	RO	2.6 Open PVT-8153, XS LTDN ISOL.
	RO	2.7 Open PVT-8154, XS LTDN ISOL.
	RO	2.8 Establish Excess Letdown flow as follows: a. Slowly throttle open HCV-137, XS LTDN HX. b. Monitor TI-139, XS LETDOWN HX OUT TEMP °F, to maintain less than 165°F. c. Monitor the following to ensure flow between 0.2 gpm and 5.0 gpm: 1) FR-154A, RCP SL LKOFF HI RANGE. 2) FR-154B, RCP SL LKOFF LO RANGE.
		<i>This concludes establishing Excess Letdown. More steps do remain from AOP-101.1 for determining if leakage is isolated, but can commence the A RCP high vibration event at this time.</i>

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Event Description: _____

Time	Position	Applicants Actions or Behavior
		<p>Crew receives annunciator XCP-617 1-3: RCP A VIBR HI <i>RO should notice frame and shaft vibration levels are escalating. A RCP should be secured based on increasing levels. The following steps would apply from SOP-101 for securing the RCP.</i></p>
	RO	<p>2.1 Place the Pressurizer Spray Valve for the affected Reactor Coolant Pump in MAN and close: a. PCV 444D, PZR SPRAY, for Reactor Coolant Pump A.</p>
	RO	<p>2.2 If the Reactor Coolant System is solid, place PCV-145, LO PRESS LTDN, in MAN.</p>
	RO	<p>2.3 Secure one of the following Reactor Coolant Pumps as required: a. XPP-0030A, PUMP A.</p>
	RO	<p>2.4 If the Reactor Coolant System is solid, return PCV-145, LO PRESS LTDN, to AUTO, if desired.</p>
	RO	<p>2.5 Verify Seal Injection to the secured Reactor Coolant Pump using the applicable following indicator: a. FI-130A, RCP A INJ FLO GPM.</p>
	RO	<p>2.6 Maintain Component Cooling Water to the secured Reactor Coolant Pump thermal barrier until RCS temperature is less than 150°F.</p>
	BOP	<p>2.7 Place the following controllers in MAN, as required for the affected RCS loop and maintain Narrow Range Steam Generator level between 60% and 65%:</p>

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Time	Position	Applicants Actions or Behavior
		a. PVT-478, SG A FWF. b. FCV-3321, LOOP A MAIN FW BYP.
	CRS	2.8 If not already in Hot Standby, proceed to Hot Standby IAW GOP-5, Reactor Shutdown From Startup To Hot Standby (Mode 2 To Mode 3).
		<i>The following steps are from GOP-5, Reactor Shutdown from Mode 2 to Mode 3. These steps will place the Reactor below 7.5x10⁻⁵% power. Prior to commencing shutdown, should go ahead and begin Small Break LOCA Event.</i>
	CRS/SE	3.1 Complete GTP-702 Attachment II.K, Operational Mode Change Plant Shutdown - Entering Mode 3 Or Plant Trip To Mode 3 From Modes 1 Or 2.
	RO	3.2 Select both Intermediate Range Channels on NR-45, NIS RECORDER.
		3.3 Insert Control Rods with a manual Reactor trip as follows:
	CRS	a. Perform a Pre-job brief per OAP-100.3, Human Performance Tools.
	RO	b. Select one Intermediate Range and one Source Range Channel on NR-45, NIS RECORDER
	BOP	c. Ensure both Motor Driven Emergency Feedwater Pumps are running.
	RO	d. (Optional) If desired, commence RCS boration prior to performing a manual Reactor trip: <ol style="list-style-type: none"> 1) Open MVT-8104, EMERG BORATE. 2) Ensure XPP-13A(B), BA XFER PP A(B), is running. 3) Verify greater than 30 gpm flow on FI-110, EMERG BORATE FLOW GPM. 4) Refer to STP-134.001, Shutdown Margin Verification, to determine the required boron concentration needed for the anticipated Plant Mode and temperature: <ul style="list-style-type: none"> Anticipated Mode: Anticipated RCS temperature: °F Required Boron: _____ ppm 5) When boration is no longer desired, perform the following: <ol style="list-style-type: none"> a) Close MVT-8104, EMERG BORATE. b) Verify no flow on FI-110, EMERG BORATE

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Time	Position	Applicants Actions or Behavior
		FLOW GPM.
	RO	<p>e. Place RX TRIP Switch CS-CR01 in TRIP.</p> <p>f. Verify all Reactor Trip and Bypass Breakers are open.</p> <p>g. Verify all Rod Bottom lights are lit.</p> <p>h. If two or more Control Rods are not fully inserted, then emergency borate as follows:</p> <ol style="list-style-type: none"> 1) Open MVT-8104, EMERG BORATE. 2) Verify greater than 30 gpm flow on FI-110, EMERG BORATE FLOW GPM. 3) If required, refer to AOP-106.1, Emergency Boration, to establish greater than 30 gpm flow. 4) Borate 2500 gallons if two Control Rods are not fully inserted. 5) Borate 5800 gallons if greater than two Control Rods are not fully inserted. <p>i. Verify Reactor Power level is decreasing.</p> <p>j. Ensure RCS temperature is being maintained between 555°F and 559°F using the Steam Dump System or Steamline PORVs.</p> <p>k. Place both SOURCE RANGE HIGH FLUX AT SHUTDOWN Switches in BLOCK.</p> <p>l. When Reactor Power decreases below $7.5 \times 10^{-6}\%$, complete the following:</p> <ol style="list-style-type: none"> 1) Verify P6 Permissive de-energizes to dim. 2) When on scale indication is observed, select both Source Range Channels on NR-45, NIS RECORDER.
		<p><i>This concludes the high vibration on A RCP event. The Small Break LOCA event can now commence if not already performed earlier. The following steps would again be the repeat of AOP-101.1 until the size of the leak would require EOP-1.0 entry for TRIP and SI.</i></p>

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Time	Position	Applicants Actions or Behavior
		The following annunciators should come into alarm: XCP 606 2-2: RBCU 1A/2A DRN FLO HI XCP 607 2-2: RBCU 1B/2B DRN FLO HI XCP 616 3-6:PZR PCS LO BU HTRS ON
		<u>AOP-101.1</u>
		<p>1 Verify PZR level is at or trending to program level.</p> <p>1 IF PZR level is decreasing. THEN perform the following:</p> <ol style="list-style-type: none"> a) Open FCV-122. CHG FLOW. as necessary to maintain PZR level b) IF PZR level continues to decrease, THEN reduce Letdown to one 45 gpm orifice: <ol style="list-style-type: none"> 1) Set PVT-145, LO PRESS LTDN. To 70% 2) Ensure PVT-8149A. LTDN ORIFICE A ISOL. is open. 3) Close both PVT-8149B(C). LTDN ORIFICE B(C) ISOL. 4) Adjust PCV-145. LO PRESS LTDN. to maintain PI-145. LO PRESS LTDN PRESS PSIG. Between 300 psig and 400 psig. 5) Place PCV-145, LO PRESS LTDN. in AUTO.
		<p>2 Check if SI is required:</p> <ol style="list-style-type: none"> a. Check if any of the following criteria are met: <ul style="list-style-type: none"> • PZR level is decreasing with Charging maximized and Letdown minimized. • PZR level is approaching 12%. • PZR pressure is approaching 1870 psig. • VCT level is approaching 5% b. Perform the following: <ol style="list-style-type: none"> 1) Trip the Reactor. 2) GO TO EOP-1.0. REACTOR TRIP/SAFETY INJECTION ACTUATION. WHEN EOP-1.0 Immediate Actions are complete, THEN actuate SI.

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Time	Position	Applicants Actions or Behavior
		<i>Crew should transition to EOP-1.0. The first 5 steps are immediate operator actions.</i>
		<i>A Train of SI will fail to actuate in BOTH Manual and Automatic. Individual components can be manually started.</i>
		<i>Reactor will NOT trip in Automatic. Reactor can be tripped manually from the BOP side MCB Switch.</i>
		1 Verify Reactor Trip: <ul style="list-style-type: none"> • Trip the Reactor using either Reactor Trip • Verify all Reactor Trip and Bypass Breakers are open. • Verify all Rod Bottom Lights are lit. • Verify Reactor Power level is decreasing.
		2 Verify Turbine/Generator Trip: <ol style="list-style-type: none"> a. Verify all Turbine STM STOP VLVs are closed. b. Ensure Generator Trip (after 30 second delay): <ol style="list-style-type: none"> 1) Ensure the GEN BKR is open. 2) Ensure the GEN FIELD BKR is open. 3) Ensure the EXC FIELD CNTRL is tripped.
		3 Verify both ESF buses are energized.
		4 Check if SI is actuated: <i>SI may have actuated by this time. Step 5 is the final immediate action.</i> <ol style="list-style-type: none"> a. Check if either: <ul style="list-style-type: none"> • SI ACT status light is bright on XCP-6107 1-1. <li style="text-align: center;">OR • Any red first-out SI annunciator is lit on XCP-626 top row. (If no SI then: GO TO Step 5.) b. Actuate SI using either SI ACTUATION Switch. c. GO TO Step 6.
		6 Initiate ATTACHMENT 3, SI EQUIPMENT VERIFICATION.
		<i>The "B" Charging pump fails to automatically start on SI. The operator is expected to attempt to manually start "B" Charging pump and it will start.</i>

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Time	Position	Applicants Actions or Behavior
		<p>7 Announce plant conditions over the page system.</p>
		<p>8 Verify RB pressure has remained LESS THAN 12 psig on PR-951, RB PSIG (P-951), red pen.</p> <p>8 Perform the following:</p> <p>a) Verify both the following annunciators are lit:</p> <ul style="list-style-type: none"> • XCP-612 3-2 (RB SPR ACT). • XCP-612 4-2 (PHASE B ISOL). <p>IF either annunciator is NOT lit, THEN actuate RB Spray by placing the following switches to ACTUATE:</p> <ul style="list-style-type: none"> • Both CS-SGA1 and CS-SGA2. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Both CS-SGB1 and CS-SGB2. <p>b) Verify Phase B Isolation by ensuring RB SPRAY/PHASE B ISOL monitor lights are bright on XCP-6105.</p> <p>c) Ensure the following are open:</p> <ul style="list-style-type: none"> • MVG-3001A(B), RWST TO SPRAY PUMP A(B) SUCT. • MVG-3002A(B), NAOH TO SPRAY PUMP A(B) SUCT. • MVG-3003A(B), SPRAY HDR ISOL LOOP A(B). <p>d) Ensure both RB Spray Pumps are running.</p> <p>e) Verify RB Spray flow is GREATER THAN 2500 gpm for each operating train on:</p> <ul style="list-style-type: none"> • FI-7368, SPR PP A DISCH FLOW GPM. • FI-7378, SPR PP B DISCH FLOW GPM. <p>f) Stop all RCPs.</p>
		<p>9 Check RCS temperature:</p> <ul style="list-style-type: none"> • With any RCP running, RCS Tavg is stable at OR trending to 557:F.

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Event Description: _____

Time	Position	Applicants Actions or Behavior
		<p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • With no RCP running, RCS Tcold is stable at OR trending to 557°Fc) <p>9 IF RCS temperature is LESS THAN 557°F AND decreasing, THEN:</p> <ol style="list-style-type: none"> a) Place the STM DUMP CNTRL Controller in MAN and Closed b) Place the STM DUMP MODE SELECT Switch in STM PRESS. c) Ensure all Steamline PORVs and Condenser Steam Dumps are closed. d) IF RCS cooldown continues, THEN: <ol style="list-style-type: none"> 1) IF Narrow Range SG level is LESS THAN 30% [50%] in all SGs, THEN reduce EFW flow as necessary to stop the cooldown, while maintaining total EFW flow GREATER THAN 450 gpm. 2) WHEN Narrow Range SG level is GREATER THAN 30% [50%] in at least one SG, THEN control EFW flow as necessary to stabilize RCS temperature at 557°F. e) IF RCS cooldown continues, THEN close: <ul style="list-style-type: none"> • MS Isolation Valves, PVM-2801A(B)(C). • MS Isolation Bypass Valves, PVM-2869A(B)(C). • <p>IF RCS temperature is GREATER THAN 557°F AND increasing, THEN:</p> <ol style="list-style-type: none"> a) Verify PERMISV C-9 status light is bright on XCP-6114 1-3. b) IF the Condenser is available, THEN ensure Condenser Steam Dump Valves are open. c) IF the Condenser is NOT available, THEN open the Steamline PORVs, PCV-2000(2010)(2020): <ol style="list-style-type: none"> 1) Place the PWR RELIEF A(B)(C) SETPT Controllers in MAN and closed.

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Time	Position	Applicants Actions or Behavior
		<p>2) Place the Steamline Power Relief A(B)(C) Mode Switches in PWR RLF.</p> <p>3) Adjust the PWR RELIEF A(B)(C) SETPT Controllers as necessary to reduce RCS temperature.</p>
		<p>10 Check PZR PORVs and Spray Valves:</p> <p>a. PZR PORVs are closed.</p> <p>b. PZR Spray Valves are closed.</p> <p>c. Verify power is available to at least one PZR PORV Block Valve:</p> <ul style="list-style-type: none"> • MVG-8000A, RELIEF 445 A ISOL. • MVG-8000B, RELIEF 444 B ISOL. • MVG-8000C, RELIEF 445 B ISOL. <p>d. Verify at least one PZR PORV Block Valve is open. .</p>
		<p>11 Check if RCPs should be stopped:</p> <p>a. Check if either of the following criteria is met:</p> <ul style="list-style-type: none"> • Annunciator XCP-612 4-2 is lit (PHASE B ISOL). <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • RCS pressure is LESS THAN 1400 psig AND SI flow is indicated on FI-943, CHG LOOP B CLD/HOT LG FLOW GPM. <p>b. Stop all RCPs.</p> <p><i>Conditions are probably not met for securing any RCPs.</i></p> <p>GO TO Step 12.</p>
		<p><i>Examiners may end exam at this point.</i></p>