Byron
June 2000 Examination

NRC-Developed
Scenarios

As-Submitted to Facility

Facility: ____BYRON____ Scenario No.: ___1___ Op-Test No.: _00-301_

Examiners: _____ Operators: _____

_____ _____

_____ _____

Objectives:
In accordance with plant procedures: Decrease reactor power, Respond to a failure of the steamline pressure transmitter for MFW pump, Respond to a failure of the controlling pressurizer level channel, Respond to a failure of the Auctioneering Tave circuit, Respond to a Rod Control Urgent Failure alarm, Respond to a faulted S/G, Respond to an ATWS, Respond to a failure of the emergency boration valve, Respond to a S/G tube rupture.

Initial Conditions:
Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS.

Turnover:
Reactor Power is 100%, Lower Reactor Power to 95% for instrument cross-cals. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours.
The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO)	POWER DECREASE (BORATE)
2		N (BP)	POWER DECREASE (TURBINE)
3		I (BP)	S/G STM PRESSURE FOR FEED PUMP CONTROL FAILS LOW (CONTROL OF FP)
4		I (RO)	CONTROLLING PZR LEVEL CHANNEL FAILS LOW (RESTORE LETDOWN)
5		I (RO)	AUCT TAVE CKT FAILS HIGH FOR ROD CONTROL
6		C (RO)	ROD CONTROL URGENT FAILURE (LOGIC CABINET)
7		M (E)	1A S/G STEAM LEAK S/G SAFETIES STICK OPEN
8		C (RO)	RX TRIP FAILURE ATWAS
9		C (BP)	EMERGENCY BORATE VALVES FAILS
10		M (E)	1/B S/G TUBE RUPTURE

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

Event No.: _1/2_

Event Description: Power Decrease by borating and using the turbine_

Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-4, step F.1: Implement flowpath 1BGP 100-4T1, Power Descension Flowchart Direct intitiation of Reference Reactivity Data as per 1BGP 100-7
	SRO	Direct decrease from 100% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate boration: (BOP CV-6) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to BOR position Set 1FK-110 BA Flow Cont to desired boration rate Fill out Boration/Dilution/Rod Motion Log Verify 1CV110A in AUTO Set 1FY-0110 BA Blender Preset Counter to desired volume Verify 1CV110B in AUTO Verify BA Transfer Pump in START or AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & BA transfer pump(CV110B open, BA pump is running, CV110A throttles open) Verify BA flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load decrease: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load decreases

Event No.: _1/2_

Event Description: Power Decrease by borating and using the turbine_

Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power decrease: Monitor reactor power, Tave Verify rods move in AUTo to maintain Tave within ± 2F of Tref Borating Montior VCT level Verify RCS concentration increasing Monitor B/A Control counter countdown Verify boration auto stops at preset value Return Reactor Makeup System to blended flow for current boron concentration

Event No.: _3_

Event Description: Steamline pressure transmitter PT-MS507 fails LOW causing FW Pump speeds to decrease. Manual control of the FW Pump Master controller is expected. The steam dumps are affected if operated in STM PRESS mode, the dumps will not open in AUTO since measured pressure is ZERO.

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-15-A9/B9/C9/D9 S/G 1 LEVEL DEVIATION HIGH LOW 1-15-A3/B3/C3/D3 S/G 1 FLOW MISMATCH STM FLOW LOW PI-507 INDICATION AT BOTTOM OF SCALE PI-507 COMPUTER INPUT LOW DECREASING S/G LEVELS DUE TO DECREASING FEEDWATER FLOW SINCE FW PUMPS DECREASE SPEED
	BOP	Identify/report PT-507 failed low
	BOP	Response per AR 1-15-A9 and 1-15-A3 Take MAN control of Master FW Pump Speed Controller and raise speed to increase FW flow If required, take MAN control of FW REG VALVES and open to restore level Recover S/G levels and FW flows. Adjusting feed pump speed as necessary Return FW REG VALVES to AUTO if required
	SRO	Inform SM/MAINT of PT-507 failure/status

Event No.: _4_
Event Description: Selected controlling PZR level channel 1LT-459 fails low. The result is isolation of CVCS letdown, rising charging flow, PZR heaters denergize, and rising PZR level.

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciators 1-12-A4 PZR LVL LOW HTRS OFF LETDOWN SECURED 1-12-B4 PZR LEVEL CONT DEV LOW PZR heaters tripped off Letdown Isolation Valve LCV-459 & Orfice Isolation valves 1CV8149A/B/C close Charging flow control CV-121 throttles open to increase flow
	RO	Identify/report failed PZR level channel LT-459
	SRO	Implement 1BOA INST-2 "Operation with a failed instrument channel", attachment C "Pressurizer level channel failure" and direct operator action
	RO	Check PZR Level Verify level normal (56-60%) If not take manual control of either the master level controller LK-459 or 1CV121 (FK-121) valve and adjust charging flow to minimum while maintaining RCP seal injection flow within required limits Select operable channel on LEVEL CHANNEL SELECTOR by placing to 461/460 position Verify channel 460 or461 selected on PZR level recorder
	RO	Reestablish normal letdown per 1BOPO CV-17 Place letdown pressure controller PCV-CV131 in MAN and raise demand Place letdown Hx Out temperature controller TCV-CC130A to MAN and raise demand to 60% Open Letdown Line Isolation valve LCV-CV460 Verify open inservice regen Hx isolation valves CV8324A/B & CV8389A/B Verify Letdown Line CNMT isolation valves CV8160 & 8152 When plant conditions are stable and PZR level at normal (58-60%), place FCV-121 in AUTO Adjust in MAN Cent Chg Pump Flow controller FK-121 to establish 100 gpm charging flow with 8-10 gpm seal injection flow Open the selected letdown orifice isolation valves CV8149 A/B/C to establish desired letdown flow

Event No.: _4_

Event Description: Selected controlling PZR level channel 1LT-459 fails low. The result is isolation of CVCS letdown, rising charging flow, PZR heaters denergize, and rising PZR level.

Time	Position	Applicant's Actions or Behavior
	RO (CONT)	Adjust PCV-CV131 to obtain 360-380 psig on PI-131 and place in AUTO Adjust TCV-CC130A to obtain 90-115F on TK-130 and place in AUTO
	RO	Trip bistables by placing in TEST: LB459A C1-751 BS-1 PZR HI WTR LVL RX TRIP
	RO	Place PZR level control in AUTO Master PZR Level Controller 1CV121 controller
	SRO	Check Technical Specifications: 3.3.1 - Rx Trip Inst Table 3.3.1-1 FU (; Req Channels 3 - Ensure only ONE channel inop; place inop channel in TRIP within 6 hours 3.3.3 - Post Accident Monitoring, Table 3.3.3-1 Function 6; Req Channels 2 - No action 3.3.4 - Remote Shutdown System, Condition A - Restore required Function to Operable within 30 days
	SRO	Inform SM/Maint of PZR level channel LT-459 status
	SRO	Inform SM of unit status/potential GSEP event

Event No.: _5_

Event Description: _Rod Control Auct Tave Ckt fails. Rods move in AUTO._

Time	Position	Applicant's Actions or Behavior
	CUE	Inward Rod Movement
	RO	Identify/report problem with Rod Control Check turbine power stable Place Rod Control in Manual
	SRO	Implement 1BOA ROD-1 'UNCONTROLLED ROD MOTION" and direct operator action
	BOP	Check turbine power stable
	RO	Place Rod Control in Manual (previously performed) Verify rods not moving Check rod control inputs Power range instruments operable RCS Loop Tave instruments operable Turbine first stage pressure operable Tref instrumentation operable
	RO	Check for unexplained reactivity addition: Rx makeup control system set proper boron conc BTRS in off Secondary system status normal Contact Chem Dept to sample RCS Boron RCS temperature stable

Event No.: _5_

Event Description: _Rod Control Auct Tave Ckt fails. Rods move in AUTO._

Time	Position	Applicant's Actions or Behavior
	SRO	Consult with SM for status of Manual Rod Control
	RO	Place Rod Control in Manual Insert rods 7 steps Withdraw rods 7 steps Check Tave-Tref stable and within 1F Restore to within 1F adjust rods, adjust turbine load, or adjust RCS boron concentration
	SRO	Consult with SM for status of AUTO Rod Control
	RO	Check if Rod Control can be placed in AUTO TURBINE LOW POWER C5 NOT LIT Check Tave-Tref stable and within 1F Place Rod Control in AUTO (if desired) **PZR Level will also be affected by this** **Check PZR level normal & stable** **Manually restore PZR to program level**
	SRO	Check Technical Specifications: Section 3.1.4, 3.1.5, 3.1.6 Rod alignments and insertion limits

Event No.: _6_
Event Description: Rod Control Cabinet Urgent Failure due to Logic Cabinet (Only SCDE rod will be able to move in bank select)

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-10-C6 ROD CONT URGENT FAILURE
	RO	Identify/report ROD CONT URGENT FAILURE 1BAR 1-10-C6
	SRO	Implement 1BOA ROD-2 "FAILURE OF RODS TO MOVE" and direct operator actions Inform Nuclear Engineering/Maint to investigate problem. Confirm trip ability of rods Dispatch local operator to investigate
	RO	Stabilize plant Place rod control in manual stop boration or dilution
	BOP	Stop turbine load changes
	RO	Evaluate cause of rods failing to move: Check PWR RNG FLUX HIGH ROD STOP ALARM Not Lit IR HIGH FLUX ROD STOP C-1 ALARM Not Lit TURBINE LOW POWER INTLK C-5 bypass permissive Not LIT BANK D ROD STOP C-11 ALARM Not Lit Check for ROD URGENT failure: ROD CONT URGENT FAILURE ALARM LIT Maintain Tave and Tref within 1F Adjust turbine load and adjust boron concentration
	SRO	Contact SED and/or IMD for guidance and troubleshooting Consult with SED and/or IMD to determine if alarm can be reset **LOGIC Cabinet failure and alarm can not be reset**

Event No.: _6_

Event Description: Rod Control Cabinet Urgent Failure due to Logic Cabinet (Only SCDE rod will be able to move in bank select)

Time	Position	Applicant's Actions or Behavior
	SRO	Check Technical Specifications: 3.1.4 All Shutdown and control rods shall be OPERABLE
	RO/BOP	Maintain Tave and Tref within 1F adjust turbine load, adjust boron concentration
	CREW	Discuss the ability of the rods ONLY SCDE RODS WILL MOVE SAFETY ISSUE

Event No.: _7/8_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	CUE	Increased steam flow on 1A S/G S/G pressure decreasing RCS temp decreasing PZR level and pressure decreasing Rx Power increasing
	RO	Identify/report Rx Power Increasing, Steam Flow increasing from 1A S/G - S/G Safties stick open
	SRO	Direct Operator actions to trip the Rx and implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION."
	RO	Manually trips RX from MCR- **Rx will not trip ATWAS**
	SRO	Implement 1BFR-S.1 "RESPONSE TO NUCLEAR POWER GENERATION/ATWS" and direct operator actions.
	RO	Verify RX Trip: Rod bottom lights -NOT LIT Rx Trip and Bypass breakers closed - RTA,BYA,RTB,BYB Neutron flux NOT decreasing Manually trip RX 1PM05J,6J Manually insert Control Rods - **SCDE RODS will move (CRITICAL TASK)**
	BOP	Manually trip the turbine Check AFW pumps running - Manually start pumps

Event No.: _8/9_
Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Initiate Emergency Boration of RCS: **Failure of Emergency Borate Valve** Check at least 1 CCP running Initiate emergency boration: Open emergency boration valve 1CV8104 - **Valve is broken (CRITICAL TASK)** Align one of the following flowpaths: RWST: Open at least 1 RWST to CCP suction Valve - 1CV112D,E Close at least 1 VCT outlet valve - 1CV112B,C Maximize charging flow Verify letdown is established OR Normal Boration: Open both boration valves - 1CV110A,B Start the boric acid transfer pump Verify charging flow > 30 gpm Check PZR pressure < 2335 psig Verify CNMT Ventilation Isolation: Group 6 CNMT Vent Isol monitor light - LIT Stop VQ fans and close VQ isol valves as necessary
	RO	Verify RX subcrtical - RX is still critical PR > 5%

Event No.: _8_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	BOP	Isolate Steam Dumps: Place steam dump BYPASS INTERLOCK switches (A and B train)
	RO	Rx Trip: Locally perform the following until the RX is tripped Open RX trip and bypass breakers by depressing manual TRIP buttons. Shutdown both MG sets by placing breaker control switches in PULL OUT - Generator and Motor Open both MG set generator side breakers by depressing manual TRIP buttons. Open both MG set motor breakers by depressing manual TRIP buttons.
	BOP	Turbine Tripped Check S/G levels: NR level > 10% Control feed flow to maintain between 10-50% Check S/G blowdown isol valves closed - 1SD002A,B,C,D,E,F,G,H
	RO	Verify all dilution paths isolated: Check Rx M/U dilution valves closed - 1CV111A,B Verfiy BTRS MODE SELECTOR switch in OFF Dispatch operator locally to verify dilution paths ISOLATED

Event No.: _8_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Stop Reactivity insertion from RCS cooldown: Check RCS temp decreasing uncontrolled S/G pressure decreasing uncontrolled
	BOP	Check Main Steamline Isolation All MSIV and MSIV bypass valves closed Identify faulted S/G: Check pressure in all S/G - 1A S/G faulted Pressure decreasing uncontrolled or completely depressurized Isolate faulted S/G: Check FW to faulted S/G isolated: FW ISOLATION MONITOR LIGHTS panel - LIT for 1A S/G If not manually isolate from MCR and locally Close AFW isol vlaves for 1A S/G - 1AF013A,E Check S/G PORV on 1A S/G closed - 1MS018A Verify S/G blowdown isol valves on 1A S/G closed - 1SD002A,B Verify S/G blowdown sample isol valve on 1A S/G closed-1SD005A
	RO	Check Core Exit TC: Average of 10 highest < 1200F Verify Rx subcrtiical - PR < 5%, IR negative SUR
	SRO	Direct Operator actions and go to 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION."

Event No.: _7_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governer valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate **(TRIP RCPS-FOLD OUT PAGE RCS PRESSURE<1425 PSIG AND HIGH HEAD SI FLOW >50GPM)**
	BOP	Verify FWI: FW pumps tripped FW isolation monitor lights LIT FRV's 1FW510,520,530,540 and/or FW shutoff vlaves 1FW006A,B,C,D FW pump discharge valves closed-1FW002A,B,C

Event No.: _7_
Event Description: _1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOI monitor lights-LIT Verify AF system: **1A S/G isolated** AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937< 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: _7_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at leat 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation

Event No.: _7_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Control Room Ventilation aligned for emergency: Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2 Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open Control Room pressure > +0.125" H2O OPDI-VC038 Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed

Event No.: _7_
Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed

Event No.: _7_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	RO	Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456 Maintain RCS temp control: No RCPs running RCS cold leg temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's Check status of RCP: RCP's are off
	BOP	Check S/G pressure boundaries: 1A S/G pressure completely depressurized or uncotrolled
	SRO	Go To 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions.

Event No.: _7_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions. **(Insert 1B S/G tube Rupture Now)**
	BOP	Check Main Steamline Isolation: All MIV and MSIV Bypass valves closed Check if any S/G pressure boundary is intact: S/G pressures stable or increasing Identify faulted S/G: 1A S/G faulted Isolate faulted S/G 1A S/G is isolated (performed in FRS-1) Monitor AFW pump suction pressure: AF PUMP SX SUCT VLV ARMED Alarm - NOT LIT Check Secondary Radiation: Secondary Radiation trends - Normal: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 Request Chem to sample all S/G's fro activity: Open S/G blowdown sample isol valves at CHEM request 1SD005A (1A), 5C (1B), 5D (1C), 5B (1D)
	SRO	Go to 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _10_

Event Description: 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 "LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: RCP's are secured
	BOP	Check S/G's Secondary pressure boundaries: 1A S/G faulted but previously isolated Check intact S/G levels: NR levels > 10% Control feed flow to maintain S/G NR levels 10-50% NR level not increasing uncontrolled: **1B S/G increasing uncontrolled tube rupture**
	SRO	Go to 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions.

Event No.: _10_

Event Description: _ 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-3 "STEAM GENERATOR TUBE RUPTURE" and direct operator actions.
	RO	Check status of RCP's: RCP's are secured
	BOP	Identify ruptured S/G: Unexpected rise in level - 1B S/G ruptured Isolate flow from ruptured S/G: 1B S/G PORV controller in AUTO Check 1B S/G PORV - Closed 1MS018A Verify ruptured S/G blowdown isol valves closed - 1SD002C,D Close ruptured S/G MSIV and MSIV Bypass valve - Closed Check PORV on intact S/G's available for RCS cooldown: 1MS018C for 1C S/G 1MS018D for 1D S/G Check ruptured S/G level: 1B S/G NR level > 10% Verify AFW isol valves on 1B S/G closed - 1AF013B,F Check ruptured S/G pressure: 1B S/G pressure > 320 psig

Event No.: _10_

Event Description: _ 1A S/G Safeties Stick Open , Rx Trip ATWAS, Emergency Borate Valve Fails, 1B S/G Tube Rupture

Time	Position	Applicant's Actions or Behavior
	RO	Initiate RCS cooldown: Determine required core exit temp from table: Lowest ruptured S/G pressure Check PZR pressure < 1930 psig: PZR LOW PRESS SI BLOCK PERMISSIVE P-11 - LIT Block Steamline Isol SI: Place STM LINE SI RESET/BLOCK switches (A and B TRN) BLOCK Dump steam at maximum rate using 1C and 1 D S/G PORVS **(CRITICAL TASK)** (Establish a good cooldown rate and brief)
The scenario can be ended at Chief Examiner's discretion.		

Facility: ____BYRON____ Scenario No.: ____2____ Op-Test No.: __00-301__

Examiners: _____ Operators: _____

Objectives:
In accordance with plant procedures: Respond to a failure of the feed flow transmitter for #1 FRV, Respond to a failure of the power range channel N-41, Increase reactor power, Respond to a failure of the level transmitter for VCT, Respond to a large break LOCA, Respond to a failure of automatic FWI, Respond to a failure of automatic sump swapover.

Initial Conditions:
Reactor power is 45%, MOL, Pressurizer level control is selected to 459/460.
1A D/G is OOS, 1A AFW pump is OOS.

Turnover:
Reactor Power is 45%. STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		I (BP)	FEED FLOW TRANSMITTER FOR #1 FRV FAILS HIGH
2		I (RO)	PR CHANNEL N-41 FAILS HIGH
3		R (RO)	POWER INCREASE (DILUTE 50 GALLONS)
4		N (BP)	POWER INCREASE (TURBINE)
5		I (RO)	LT-185 INDICATING RECORDER FOR VCT FAILS HIGH DIVERT TO HUT NO AUTO SWAPOVER
6		M (E)	LARGE BREAK LOCA
7		C (BP)	FAILURE OF FWI
8		C (RO)	FAILURE FOR AUTO SUMP SWAPOVER

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

Event No.: _1_
Description: _Feed Flow transmitter FT-510 fails High. This channel inputs to the S/G Water Level Controller for S/G 1A Fed Reg Valve, 1FW510. The feed Reg Valve will close due to the steam flow/feed flow mismatch

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-15-A3) S/G 1A FLOW MISMATCH STM FLOW LOW FT-510 indication reading high 1FW510 throttling closed S/G level decreasing below program
	BOP	Identify/report feed flow channel FT-510 failure Take Manual control of 1FW510 and balance Feed and Steam Flow to stabilize S/G level as necessary
	SRO	Implement 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment G "FEEDWATER FLOW CHANNEL FAILURE" and direct operator action
	BOP	Check Affected S/G Level Normal IF Not Place Feed Reg Valve in manual and restore S/G level to stable condition Select operable feed flow channel FT-511 Establish AUTO level control Check HD system, HD pump discharge flow control valve position normal 1HD046A AND 1HD046B
	SRO	Inform Sm/Maint of failure of S/G 1A feed flow channel FT-510

Event No.: _2_
Event Description: Power Range Channel N-41fails high

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-10-A3) PWR RNG HIGH STPT RX TRIP ALERT (1-10-B5) PWR RNG FLUX HIGH ROD STOP (1-10-C3) PWR RNG FLUX RATE RX TRIP ALERT (1-10-C4) PWR RNG CHANNEL DEV N-41 INDICATION AT TOP OF SCALE ROD STOP
	RO	Identify/report failure of Power Range NI Channel N-41
	SRO	Implement 1BOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION", Attachment A "PR CHANNEL FAILURE" and direct operator action.
	RO	Place ROD BANK SELECT switch in MANUAL Check for ROD STOP (1-10-B5) NOT LIT Place Rod Stop Bypass Switch to bypass for N-41 Check Tave-Tref within 1F and restore Tave by: Control Rods, Turbine Load, Boron Concentration
	BOP	Check S/G levels normal and stable
	BOP	Bypass/Defeat channel N-41 Place Detector Current Comparator Upper Section Defeat to N-41 Place Detector Current Comparator Lower Section Defeat to N-41 Place power Mismatch Bypass to N-41 Place Rod Stop Bypass to N-41 (performed earlier) Place Comparator Channel Defeat to N-41 Trip Bistables Remove Control Power Fuses at N-41 "A" Drawer Bistable NC41P tripped LO RX TRIP Bistable NC41R tripped HI RX TRIP

Event No.: _2_

Event Description: Power Range Channel N-41fails high

Time	Position	Applicant's Actions or Behavior
	BOP (CONT)	Locally trip OTΔT bistables on Channel I OTΔT Trip-TB411C OTΔT Runback TB411D
	RO	Select Operable channel Loop ΔT Place Rod Control in automatic C5 permissive NOT LIT Tave-Tref within 1F Place Rod Control in AUTO
	SRO	Check Technical Specifications 3.3.1 Function 2, 3, &6, Required channels operable 4- ACTION Place inop channel in trip within 6 hours 3.3.1 Function 17 Verify interlock is in required state for existing condition within 1 Hour 3.2.4 QPTR
	SRO	Inform SM/Maint of N-41 channel failure/problem
	SRO	Inform SM of unit status/potential GSEP event

Event No.: _3/4_

Event Description: Power Increase by diluting and using the turbine_

Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-3, step F.61:
	SRO	Direct increase from 45% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate dilution: (BOP CV-5) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to DIL or ALT DIL position Set 1FK-111 PW/TOTAL Flow Cont to desired dilution rate Verify 1CV111A in AUTO Set 1FY-0111 Primary Water Control Preset Counter to desired volume Verify 1CV11B & 1CV110B in AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & PW (CV111A &111B open, PW pump is running, CV110B throttles open [if ALT DIL]) Verify PW flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load increase: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load increases

Event No.: _3/4_

Event Description: Power Increase by diluting and using the turbine_

Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power increase: Monitor reactor power, Tave Verify rods move in AUTO to maintain Tave within ± 2F of Tref Diluting Montior VCT level Verify RCS concentration decreasing Monitor Primary Water Control counter countdown Verify dilution auto stops at preset value Return Reactor Makeup System to blended flow for current boron concentration

Event No.: _5_

Event Description: VCT Level LT-185 fail high causing 1LR-185 to indicate high 1CV-112A fails to full divert position (the fault results in the inability for auto swapover to RWST valves 1CV-112D and E will not auto open)

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator: 1-9-A2 VCT LEVEL HIGH LOW 1CV-112A full divert to the HUT
	RO	Identify/report 1LR-185 failed low, 1CV-112A in full divert
	SRO	Direct operator actions
	RO	Place 1CV-112A to VCT position
	SRO	Identify loss of auto swapover capability to RWST from VCT **(CRITICAL TASK)**
	SRO	Inform SM/Maint of LT-185 failure

Event No.: _6/7_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	CUE	PZR Level rapidly decreasing/ LOCA
	RO	Identify/report PZR level and pressure rapidly decreasing
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governer valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate **(TRIP RCPS-FOLD OUT PAGE RCS PRESSURE<1425 PSIG AND HIGH HEAD SI FLOW >50GPM)**
	BOP	Verify FWI: **(FAILURE OF FWI)** FW pumps tripped-Manually trip FW pumps FW isolation monitor lights LIT-Manually close FRV's 1FW510,520,530,540 and/or FW shutoff vlaves 1FW006A,B,C,D FW pump discharge valves closed-1FW002A,B,C **(CRITICAL TASK)**

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOI monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937< 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 > 20 psig Group 6 CS monitor lights - LIT Group 6 Phase B Isolation monitor lights - LIT Stop all RCP's-(previously performed by RO) Check eductor suction flow on running pumps > 15 gpm 1FI-CS013,14

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Check CS eductor additive flow on running pump > 5gpm 1FI-CS015,16 Align SX Cooling Towers: All 8 riser valves Open- 0SX163A thru H All 4 Hot Water Basin Bypass valves Closed-0SX162A,B,C,D All 8 Sx Cooling Tower fans running in Hi speed Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at leat 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Control Room Ventilation aligned for emergency: Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2 Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open Control Room pressure > +0.125" H2O OPDI-VC038 Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	RO	Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456 Maintain RCS temp control: No RCPs running RCS cold leg temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's Check status of RCP: RCP's are off
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check if RCS is intact: Diagnose LOCA CNMT are rad monitors (grid 4) < Alert alarm CNMT pressure **>3.4 psig** CNMT sump level lights **LIT** **RCS is not intact**
	SRO	Go To 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" AND DIRECT OPERATOR ACTIONS. Direct initiation of Critical Safety Function Status Trees.

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
NOTE : WITH COOLDOWN AN ORANGE PATH MAY EXIST FOR INTEGRITY CSFST. IF SO THE PERFORMANCE OF 1BFR-P.1 IS REQUIRED.		
	SRO	Implement 1BFR-P.1 "RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION" and direct operator action
	RO	Check RCS pressure: RCS pressure< 325 psig Check RH flow > 1000 gpm
	SRO	Return to procedure in effect, 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
NOTE : AT SOME TIME CNMT PRESSURE COULD RISE TO AN ORANGE PATH FOR CONTAINMENT CSFST. IF SO THE PERFORMANCE OF 1BFR-Z.1 IS REQUIRED.		
	SRO	Implement 1BFR-Z.1 "RESPONSE TO HIGH CONTAINMENT PRESSURE " and direct operator action
	BOP	Verify CNMT Isol phase: CNMT Isol phase A valves closed Group 3 CNMT Isol Mon lights- LIT Verify CNMT Vent Isol: CNMT Vent Isol valves closed Group 6 CNMT Vent Isol mon lights- LIT Check if CNMT spray is required: CNMT pressure > 20 psig 1PR-937 or 1PI-CS934-937 Verify CS system valves- proper emergency alignment: CS pump suction valves: Train A: RWST suction valve 1CS001A Open Sump suction valve 1CS009A open OR Train B: RWST suction valve 1CS001B Open Sump suction valve 1CS009B open CS pump header isol valves closed- 1CS007A,B CS eductor spray additive valves open-1CS019A,B CS eductor inlet flow control valves open-1CS010A,B Verify both CS pumps running

Event No.: _6_

Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify CNMT Isol Phase B valves closed: Group 6 Phase B Isol monitor lights-LIT Stop all RCP's Check CS flow indications- On Scale: CS pump discharge flow > 200 gpm 1FI-CS011/012 CS eductor suction flow > 15 gpm 1FI-CS013/014 CS eductor additive flow > 5 gpm 1FI-CS015/016 Reset CS signal When Spray additive tank LO-2 level lights LIT then close CS eductor spray additive valves: 1CS019A,B Align SX Cooling Towers: All 8 riser valves Open- 0SX163A thru H All 4 Hot Water Basin Bypass valves Closed-0SX162A,B,C,D All 8 Sx Cooling Tower fans running in Hi speed Verify RCFC's running in accident Mode: Group 2 RCFC Accident Mode status lights - LIT Verify Main Steamline Isolation: All MSIV and MSIV Bypass valves closed Check if feed flow should be isolated to any S/G: Any S/G pressure decreasing in an uncontrolled manner or Any S/G completely depressurized
	SRO	Return to procedure in effect, 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: No RCP's running
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check intact S/G levels: NR level > 31% Control feed flow to maintain NR level- 31-50% NR level not increasing in an uncontrolled manner Check secondary radiation: All secondary rad monitors < Alert setpoint SJAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check PZR PORV's PORV isol valves Eneregized-1RY8000A,B PORV's closed 1RY455A, 456 PORV isol valves open (at least 1)-1RY8000A,B Check if ECCS flow should be reduced: RCS subcooling acceptable-ICONIC Display or ATT A Secondary heat sink-S/G NR level > 31%, AFW flow > 500gpm RCS pressure decreasing PZR level < 38%
	BOP	Check if CS should be stopped: CS pumps running RESET CS Signal When spray additive tank LO-2 is reached then close CS eductor valves-1CS019A,B

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Containment spray termination requirements: CNMT press < 15 psig RX Coolant loss only- 2 hrs operating time and Spray Additive Tank LO-2 level lights lit then secure CS
	RO	Check if RH pumps should be stopped: Reset SI: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light NOT LIT Verify AUTO SI BLOCKED permissive light LIT Check RCS pressure: RCS pressure < 325 PSIG
	BOP	Check RCS and S/G pressures for faulted S/G: S/G pressure stable or increasing RCS pressure stable or increasing Check if D/G should be stopped: 4KV ESF busses energized by offsite power- BUS 141, 142 4KV NON-ESF busses energized by offsite power- BUS 143, 144 Stop any unloaded D/G and place in standby per BOP DG-12
	RO	Verify cold leg recirculation capability: Power to at least 1 RH pump Associated CNMT sump isol valve position light LIT 1SI8811A (A),8811B (B)
	BOP	AUX Bldg radiation trends normal Reset CNMT Isol Phase A Place Hydrogen Monitors in service per BOP PS-9, POST LOCA CONTAINMENT HYDROGEN MONITORING SYSTEM OPERATION

Event No.: _6_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	BOP PS-9, POST LOCA CONTAINMENT HYDROGEN MONITORING SYSTEM OPERATION Verify open or open valves-1PS228A,230A,228B,229A,229B,230B Direct local operator to open valves-1PS232A,233A,232B,233B Direct local operator to verify LOCAL SET/NORMAL switch for alarms on H2 units are set to NORMAL Place ON/OFF switch on H2 panels to ON position After 4 minutes verify H2 and System Status alarms light OFF Verify LO RANGE lights are ON for 1EL-PS343 and 344 Obtain samples by contacting CHEM: RCS activity and Boron Concentration CNMT atmosphere and recirc sump Per SM prepare both Hydrogen Recombiners IAW BOP OG-10. Dispatch the operators Align SX MDCT for long term cooling per BOP SX-T2 Maintain UHS Basin level > 80%-Place SX tower makeup in AUTO Close SXCT B/D to Flume Isol Valve SX161A/B Shutdown unnecessary equipment: ALL HD pumps FW pumps per BOP FW-2A, FW-8 All unnecessary CD/CB pumps per BOP CD/CB-2 Align NDCT for temp and level control: Verify CW intake bay level within band Locally verify NDCT's basin water levels acceptable Align NDCT per BOP CW-25A Shutdown all unnecessary CW pumps per 1BOP CW-2 Shut down chiller on non-operating VC train: Momentarily place control switch in TRIP

Event No.: _6/8_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	RO	Check RCS pressure: RCS pressure< 325 psig Check RH flow > 1000 gpm Check if transfer to cold leg recirculation is required: ECCS in Injection Mode RWST level < 46%
	SRO	Go to procedure 1BEP-1 ES-1.3 " TRANSFER TO COLD LEG RECIRCULATION" and direct operator actions
	BOP	Establish CC flow to RH heat Exchangers: Open CC to RH HX Isol valves-1CC9412A,B Check CC to RH HX flows > 5000 gpm 1FI-0689/0688
	RO SRO	Check CNMT sump level Bottom 4 lights LIT CNMT SUMP 1A, 1B Level Align RH pumps suction to CNMT Sumps: Both RH pumps running CNMT sump ISOL Valves both closed-1SI8811A,B **go to Att A Failure of AUTO Sump Swapover (CRITICAL TASK)** Attachment A: Check If RH pump 1A needs to be aligned to CNMT sump TRN A CNMT sump isol valve closed-1SI8811A Check TRN A Recirc flowpath from CNMT sump avail : RH pump 1A running TRN A CNMT sump isol valve energized-1SI8811A

Event No.: _8_
Event Description: Large break LOCA, Failure of FWI, Failure for Auto Sump Swapover

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Manually align RH pump 1A suction to CNMT sump: Place RH pump 1A in PULL OUT Close RH pump 1A suction from RWST isol valve-1SI8812A Place CS pump 1A in PULL OUT Close CS pump 1A RWST suction valve-1CS001A Open RH pump 1A CNMT sump isol valve -1SI8811A Restart RH pump 1A Reopen CS pump 1A RWST suction valve-1CS001A Restart CS pump 1A Check If RH pump 1B needs to be aligned to CNMT sump TRN A CNMT sump isol valve closed-1SI8811B Check TRN B Recirc flowpath from CNMT sump avail : RH pump 1B running TRN B CNMT sump isol valve energized-1SI8811B Manually align RH pump 1B suction to CNMT sump: Place RH pump 1B in PULL OUT Close RH pump 1B suction from RWST isol valve-1SI8812B Place CS pump 1B in PULL OUT Close CS pump 1B RWST suction valve-1CS001B Open RH pump 1B CNMT sump isol valve -1SI8811B Restart RH pump 1B Reopen CS pump 1B RWST suction valve-1CS001B Restart CS pump 1B Check at least one CNMT sump recirc flowpath established: TRN A-RH pump 1A running, 1SI8811A open TRN B-RH pump 1A running, 1SI8811B open
	SRO	Return to main Body step 3C
The scenario can be ended at Chief Examiner's discretion.		

Facility: ____BYRON____ Scenario No.: ____3____ Op-Test No.: __00-301__

Examiners: _____ Operators: _____

Objectives:
In accordance with plant procedures: Respond to a failure of the charging valve controller, Decrease reactor power for instrument cross cals, Respond to a failure of the steam dumps, Respond to a failure of the reactor protection system, Respond to a steam line rupture in containment, Respond to a failure of the MSIV's, Respond to a failure of containment spray pumps.

Initial Conditions:
Reactor power is 100%, MOL, Pressurizer level control is selected to 459/460, 1A D/G is OOS, 1A AFW pump is OOS, Steam Dumps in pressure mode due to testing.

Turnover:
Reactor Power is 100%, Lower Reactor Power to 95% for instrument cross-cals. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours.
The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. Steam Dumps in pressure mode due to testing. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		I (RO)	CHARGING VALVE CONTROLLER FAILS FULL OPEN
2		R (RO)	POWER DECREASE (BORATE)
3		N (BP)	POWER DECREASE (TURBINE)
4		I (BP)	STEAM DUMPS FAIL OPEN
5		C (RO)	INADVERTENT SI
6		M (E)	MAJOR STEAM LINE BREAK IN CONTAINMENT
7		C (BP)	FAILURE OF ALL MSIV'S TO CLOSE (UNCONTROLLED DEPRESSURIZATION ALL S/G'S)
8		C (BP)	FAILURE OF CONTAINMENT SPRAY PUMPS IN AUTO

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

Event No.: _1_

Event Description: Charging valve controller fails full open

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-9-D3) CHG LINE FLOW HIGH LOW PZR Level Increasing 1CV121 Full Open, FI-121 flow increasing
	RO	BAR 1-9-D3 CHG LINE FLOW HIGH LOW Identify/report increased charging flow FI-121 flow controller failure
	SRO	Implement BAR 1-9-D3 CHG LINE FLOW HIGH LOW and direct operator actions..
	RO	Place Flow Controller for 1CV121 to manual. Restore PZR level to normal.
	SRO	Inform SM/Maint of Flow Controller for 1CV121 failure

Event No.: _2/3_

Event Description: Power Decrease by borating and using the turbine_

Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-4, step F.1: Implement flowpath 1BGP 100-4T1, Power Descension Flowchart Direct intitiation of Reference Reactivity Data as per 1BGP 100-7
	SRO	Direct decrease from 100% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate boration: (BOP CV-6) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to BOR position Set 1FK-110 BA Flow Cont to desired boration rate Fill out Boration/Dilution/Rod Motion Log Verify 1CV110A in AUTO Set 1FY-0110 BA Blender Preset Counter to desired volume Verify 1CV110B in AUTO Verify BA Transfer Pump in START or AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & BA transfer pump(CV110B open, BA pump is running, CV110A throttles open) Verify BA flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load decrease: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load decreases

Event No.: _2/3_

Event Description: Power Decrease by borating and using the turbine_

Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power decrease: Monitor reactor power, Tave Verify rods move in AUTo to maintain Tave within ± 2F of Tref Borating Montior VCT level Verify RCS concentration increasing Monitor B/A Control counter countdown Verify boration auto stops at preset value Return Reactor Makeup System to blended flow for current boron concentration

Event No.: _4_

Event Description: Steam Dumps valves Fails Open due to Steam Pressure Controller

Time	Position	Applicant's Actions or Behavior
	CUE	Steam Dump valve indicate throttled open
	BOP	Identify/report Steam Dump valves open (Steam flow increasing, Steam pressure decreasing)
	RO	Identify/report Rx power increasing, Tave decreasing
	SRO	Direct operator actions
	BOP	Manual control of Steam Dumps and shut valves
	SRO	Inform SM/Maint of Steam Dump Failure
	I&C/ENG	Informs US that the Steam Pressure Controller is failing recommend transferring to Tave Mode
	SRO	Implement 1BGP 100-3 and direct operator actions
	BOP	Transfer Steam Dumps to Tave Mode Place the MS Hdr Press Cont in manual and adjust to 0% demand Place the Steam Dump Mode Select Switch in the reset position and then to Tave position. Ensure C-7 permissive is OFF. Ensure Steam Dump Vales remain closed Place the Pressure Mode Controller in AUTO.
	SRO	Inform SM of Steam Dump status

Event No.: _5_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	CUE	Inadvertent SI
	RO	Identify/report SI
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: All turbine throttle valves-closed All turbine governer valves-closed Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate
	BOP	Verify FWI: FW pumps tripped FW isolation monitor lights LIT FW pump discharge valves closed-1FW002A,B,C

Event No.: _5_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOl monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation NOT required: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937< 8.2 psig Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: _5_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure < 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at leat 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation

Event No.: _5_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Control Room Ventilation aligned for emergency: Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2 Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open Control Room pressure > +0.125" H2O OPDI-VC038 Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed

Event No.: _5_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed

Event No.: _5_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO	Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456 Maintain RCS temp control: RCPs running RCS Tave temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's Check status of RCP: RCP's are running Parameters are normal to keep them running RCS pressure > 1425 psig
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check if RCS is intact: CNMT is Normal, RCS is intact Rad < setpoint, Pressure < 3.4 psig, Sump lights NOT LIT Check if ECCS should be terminated: RCS subcooling fine - ICONIC Display or ATT A Secondary Heat Sink - FW flow > 500 gpm and NR level > 10% RCS pressure is stable PZR level > 4%
	SRO	Go to 1BEP ES-1.1 "SI TERMINATION" and direct operator actions.

Event No.: _5_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP ES-1.1 "SI TERMINATION" and direct operator actions. **T. S. 3.3.1-16, 3.3.2-1.b FOR INADVERTENT SI**
	RO	Reset SI if necessary: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light - NOT LIT Verify AUTO SI BLOCKED permissive light - LIT
	BOP	Reset CNMT Isolation: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 ATT E Reset CNMT Isol Phase B - IAW 1BOA PRI-5 ATT E Reset CNMT Vent Isol Check SACs running Open INST AIR CNMT Isol Valves - 1IA065,66
	RO	Realign CCPs: Stop all but 1 CCP and place in Standby Check RCS pressure stable or increasing Terminate High Head ECCS: Check CCP suction aligned to RWST Reset SI recirc sump isol valves 1SI8811A/1CV8110 and 1SI8811B/1CV8111 Reset CCP miniflow isol valves - 1CV8114, 8116 Verify CCP miniflow valves open - 1CV8110,8111,8114,8116 Close CCP to cold leg isol valves - 1SI8801A,B

Event No.: _5/6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Establish charging flow: Place 1CV182 controller at 0% demand Open charging line CNMT isol valves - 1CV8105,8106 Throttle 1CV182 to maintain RCP seal injection flow 8-13 gpm Control charging flow to maintain PZR level: Throttle 1CV121 to maintain PZR level > 4% Check if SI pumps should be stopped: RCS pressure stable or increasing and > 1625 psig Stop SI pumps and place in standby Check if RH pumps can be stopped: Check RH pump suction aligned to RWST Stop RH pumps and place in standby Verfiy ECCS flow not required: RCS subcooling acceptable - ICONIC display or ATT A PZR level > 4% **(Start Main Steam Line Rupture)** **1D S/G major steam line break in CNMT (MSIV's fail to shut)** **Pressure in all S/G's decreasing in an uncontrolled manner.**
	SRO	Per fold out page go To 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions.

Event No.: _6/7_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions.
	BOP	Check Main Steamline Isolation: MSIV and MSIV Bypass valves open Manually actuate Main Steamline Isolation and verify valves closed **(CRITICAL TASK)** **MSIV valves can not be closed due to failure** **T.S. 3.7.2 FOR MSIV** Check if any S/G pressure boundary is intact: ALL S/G pressures decreasing uncontrolled:
	SRO	Go to 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL S/G'S" and direct operator actions.

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL S/G'S" and direct operator actions.
	BOP	Check secondary pressure boundary: Check MSIV's closed - 1MS001A,B,C,D Manually actuate Main Steamline Isolation If still not closed then manually close valves Check MSIV bypass valves closed - 1MS101A,B,C,D Check S/G PORVs closed - 1MS018A,B,C,D Check Main FW valves closed: FW isol valves - 1FW009A,B,C,D FW tempering flow control valves - 1FW034A,B,C,D FW tempering isol valves - 1FW035A,B,C,D Low flow FW isol valves - 1FW039A,B,C,D FW reg valves - 1FW510,520,530,540 FW reg bypass valves - 1FW510A,520A,530A,540A Check S/G blowdown isol valves closed: 1A 1SD002A,B 1B 1SD002E,F IC 1SD002G,H 1D 1SD002C,D Check S/G blowdown sample isol valves closed: 1A 1SD005A 1B 1SD005C 1C 1SD005D 1D 1SD005B **(A Minimum feed flow of 25 gpm must be maintained to each S/G with a NR level < 10%)**

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP	Control feed flow to minimize RCS cooldown: Check cooldown rate in RCS cold legs < 100F in any 1 hr period Check NR level in all S/G < 50% Check RCS hot leg temps stable or decreasing
	RO	Check status of RCP's: RCP's running - TRIP RCP's due to CNMT pressure fold out page
	BOP	Monitor AFW pump suction pressure: AF PUMP SX SUCT VLVS ARMED alarm - NOT LIT
	RO	Check PZR PORV's and Isolation Valves: PORV isol valves energized - 1RY8000A,B PORV's closed - 1RY455A,456 PORV isol vlaves at least 1 open - 1RY8000A,B
	BOP	Check Secondary Radiation: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 Request Chem to sample S/G's for activity Check secondary radiation trends - normal SJAE/Gland exhaust, S/G blowdown, Main Steamline **(1B MSIV closed locally 1B S/G pressure increasing)** **Transition to 1BEP-2 per fold out page**
	SRO	Go To 1BEP-2 " FAULTED S/G ISOLATION" and direct operator actions.

The scenario can be ended at Chief Examiner's discretion.
Technical Specifications on SI, CS pumps, and MSIV's needs to be addressed
NOTE: ENSURE THAT THE CS PUMP FAILURE HAS BEEN HANDLED BY CREW

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
NOTE : WITH COOLDOWN AN ORANGE PATH MAY EXIST FOR INTEGRITY CSFST. IF SO THE PERFORMANCE OF 1BFR-P.1 IS REQUIRED.		
	SRO	Implement 1BFR-P.1 "RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITION" and direct operator action
	RO	Check RCS pressure: RCS pressure > 325 psig Check RCS cold leg temperature: RCS cold leg temperature decreasing
	BOP	Try to stop RCS cooldown Verify S/G PORV's closed, Steam Dumps closed Control feed flow to non-faulted SG Minimize cooldown from faulted S/G: Verify MSIV and MSIV Bypass valves shut ALL S/G faulted then Control feed flow at 25 gpm to each S/G
	RO	Check PZR PORV Isolation valves: PORV isol valves energized - 1RY8000A,B PORV isol valves at least one open - 1RY8000A,B Check if PZR PORVs should be closed: PZR pressure < 2315 psig or if COPS in service < setpoint PZR PORVs closed - 1RY455A,456

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Check if ECCS flow is in service: SI pumps running or CCP to cold legs injection isol valve open - 1SI8801A,B Check if ECCS flow can be terminated: RCS subcooling acceptable - Per ATT A and Figure 1BFR P.1-3 AND RVLIS plenum region $\geq$ 15% If subcooling is acceptable and no RCP is running then start one RCP IAW 1BOP RC-1 "STARTUP OF A RCP." Reset SI if necessary: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light - NOT LIT Verify AUTO SI BLOCKED permissive light - LIT
	BOP	Reset CNMT Isolation: Reset CNMT Isol Phase A - IAW 1BOA PRI-5 ATT E Reset CNMT Isol Phase B - IAW 1BOA PRI-5 ATT E Reset CNMT Vent Isol Check SAC running Open INST Air CNMT Isol valves - 1IA065, 066
	RO	Stop ECCS pumps and place in standby: Si pumps All but 1 CCP Check RH pump suction aligned to RWST Stop RH pumps and place in standby

Event No.: _6_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Terminate High- Head ECCS: Check CCP suction aligned to RWST Reset SI recirc sump isol valves : 1SI8811A/1CV8110 1SI8811B/1CV8111 Reset CCP miniflow isol valves - 1CV8114, 8116 Verify CCP miniflow isol valves open - 1CV8110,8111,8114,8116 Close CCP cold leg injection isol valves - 1SI8801A,B Establish charging flow: Place 1CV182 controller at 0% demand Open charging line CNMT isol valves - 1CV8105, 8106 Throttle 1CV182 to maitain seal injection flow 8-13 gpm per pump Control charging flow to maintain RCS inventory as necessary Verify ECCS flow not required: RCS subcooling acceptable - ICONIC Display or ATT A AND RVLIS plenum region $\geq$ 15% Check RCS hot leg temps: RCS hot leg temps stable If temp increasing control feed ans steam flow to stabilize If temp decreasing reevaluate cooldown isolation Isolate all SI accumulators: Check RCS pressure < 1930 psig Check the following: RCS subcooling acceptable ICONIC Display or ATT A and Figure 1BFR P.1-1 and RVLIS Plenum region $\geq$ 15% Energize SI Accumulator discharge isol valves - 1SI8808A,B,C,D Close SI Accumulator discharge isol valves - 1SI8808A,B,C,D

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Depressurize RCS to decrease RCS subcooling: Check for all of the following: RCS subcooling acceptable -ATT A and Figure 1BFR P.1-2 PZR level < 76% (62% adverse) RCS pressure > 125 psig Depressurize RCS using normal PZR spray - 1RY455B,C If not availalbe use 1 PZR PORV - 1RY455A, 456 OR PZR AUX spray: close normal spray valves - 1RY455B,C Open aux spray valve - 1CV8145 Close charging to RC loop isol 1CV8146,7 Maintain RCS subcooling acceptable: ICONIC Display or ATT A and Figure 1BFR P.1-1 Manually start and align ECCS pumps to maintain RCS subcooling acceptable as necessary Depressurize RCS until **ANY** of the following is satisfied: RCS subcooling between) and 10F per Figure 1BFR P.1-5/6 OR PZR level > 76% (62% adverse) OR RCS pressure < 125 psig Stop RCS depressurization Check PZR level > 21% (50 % adverse) Check Rx M/U control system: Makeup control set > RCS Boron Conc M/U set for AUTO - MODE SELECT switch in AUTO MAKEUP CONT switch start Establish Letdown per 1BOP CV-17 OR Excess Letdown per 1BOP CV-15

Event No.: _6_

Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Check CCP suction aligned to VCT Check PZR level < 76% (62% adverse) Control/Maintain PZR pressure stable Verify adequate RCS depressurization: RCS subcooling 0-10F per Figure 1BFR P.1-5,6 OR RCS pressure < 125 psig Determine if RCS Temp Soak is required: Cooldown rate in RCS cold legs > 100F in any 60 minute period Perform all of the following: Do not cool down RCS until temp stable for 1 hour Do not increase RCS pressure during that time Perform actions of other procedures in effect which do not cool down or increase RCS pressure until RCS temp soak complete **(1BEP-2 or 1BCA-2.1 or 1BFR-Z.1)** RCS cooldown is permitted after 1 hour Maintain RCS pressure and cold leg temp within limits of Figure 1BFR P.1-4 Maintain cooldown rate in RCS < 50F in any 1 hour period
	SRO	Return to procedure in effect, 1BEP-2 or 1BCA-2.1 or 1BFR-Z.1 and direct operator actions.

Event No.: _6/8_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
NOTE : AT SOME TIME CNMT PRESSURE COULD RISE TO AN ORANGE PATH FOR CONTAINMENT CSFST. IF SO THE PERFORMANCE OF 1BFR-Z.1 IS REQUIRED.		
	SRO	Implement 1BFR-Z.1 "RESPONSE TO HIGH CONTAINMENT PRESSURE " and direct operator action
	BOP	Verify CNMT Isol phase: CNMT Isol phase A valves closed Group 3 CNMT Isol Mon lights- LIT Verify CNMT Vent Isol: CNMT Vent Isol valves closed Group 6 CNMT Vent Isol mon lights- LIT Check if CNMT spray is required: CNMT pressure > 20 psig 1PR-937 or 1PI-CS934-937 Verify CS system valves- proper emergency alignment: CS pump suction valves: Train A: RWST suction valve 1CS001A Open Sump suction valve 1CS009A open OR Train B: RWST suction valve 1CS001B Open Sump suction valve 1CS009B open CS pump header isol valves closed- 1CS007A,B CS eductor spray additive valves open-1CS019A,B CS eductor inlet flow control valves open-1CS010A,B Verify both CS pumps running: **NO PUMPS RUNNING Failure** Manually actuate CS and Phase B Isolation Locally start 1 CS pump per 1BOA ELEC-5 **(CRITICAL TASK)** **T.S. 3.3.2.2.a, 3.3.2.2.b FOR CS PUMPS**

Event No.: _6_
Event Description: Inadvertent SI, Major Steam Line Break in CNMT, Failure of MSIV's to close, Failure of CNMT spray pumps in Auto

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify CNMT Isol Phase B valves closed: Group 6 Phase B Isol monitor lights-LIT Stop all RCP's Check CS flow indications- On Scale: CS pump discharge flow > 200 gpm 1FI-CS011/012 CS eductor suction flow > 15 gpm 1FI-CS013/014 CS eductor additive flow > 5 gpm 1FI-CS015/016 Reset CS signal When Spray additive tank LO-2 level lights LIT then close CS eductor spray additive valves: 1CS019A,B Align SX Cooling Towers: All 8 riser valves Open- 0SX163A thru H All 4 Hot Water Basin Bypass valves Closed-0SX162A,B,C,D All 8 Sx Cooling Tower fans running in Hi speed Verify RCFC's running in accident Mode: Group 2 RCFC Accident Mode status lights - LIT Verify Main Steamline Isolation: All MSIV and MSIV Bypass valves closed Check if feed flow should be isolated to any S/G: Any S/G pressure decreasing in an uncontrolled manner Any S/G completely depressurized Isolate faulted S/G
	SRO	Return to procedure in effect 1BEP-2 or 1BCA-2.1 or 1BFR-P.1 and direct operator actions.

Facility: ____BYRON____ Scenario No.: ___4___ Op-Test No.: __00-301__

Examiners: _____ Operators: _____

Objectives:
In accordance with plant procedures: Increase reactor power, Respond to a failure of the #1 FRV controller, Respond to a failure of power range channel N-42, Respond to a failure of #1 THot channel, Respond to a LOCA outside containment, Respond to a failure of the RWST valves, Respond to a failure of the Turbine.

Initial Conditions:
Reactor power is 45%, MOL, Pressurizer level control is selected to 459/460.
1A D/G is OOS, 1A AFW pump is OOS.

Turnover:
Reactor Power is 45%. STEP 63 OF 1BGP 100-3, POWER INCREASE TO 100%. The 1A D/G is OOS due to scheduled maintenance activities on the control system. It has been OOS for the last 10 hours. The D/G is expected to be returned to service within the next 12 hours. The 1A AFW pump is OOS due to injection pump replacement. It has been OOS for the last 6 hours. The pump is expected to be returned to service within the next 10 hours. A severe thunderstorm warning is in effect for Stephenson, Winnebago, and Ogle counties for the next 6 hours.

Event No.	Malf. No.	Event Type*	Event Description
1		R (RO)	POWER INCREASE (DILUTE 50 GALLONS)
2		N (BP)	POWER INCREASE (TURBINE)
3		I (BP)	#1 FRV DRIFTS SHUT SLOWLY
4		I (RO)	PR CHANNEL N-42 FAILS LOW
5		I (RO)	#1 THOT (TAVE) CKT FAILS HIGH (LCO 3.0.3)
6		M (E)	LOCA OUTSIDE CONTAINMENT
7		C (RO)	FAILURE OF RWST VALVES TO OPEN
8		C (BP)	FAILURE OF TURBINE TO TRIP

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

Event No.: _1/2_

Event Description: Power Increase by diluting and using the turbine_

Time	Position	Applicant's Actions or Behavior
	SRO	Implement actions of 1BGP 100-3, step F.61:
	SRO	Direct increase from 45% power
	CREW	Review applicable precautions, limitations, and actions
	RO	Initiate dilution: (BOP CV-5) Place MU MODE CONT SWITCH to STOP position Set MU MODE SELECT to DIL or ALT DIL position Set 1FK-111 PW/TOTAL Flow Cont to desired dilution rate Verify 1CV111A in AUTO Set 1FY-0111 Primary Water Control Preset Counter to desired volume Verify 1CV11B & 1CV110B in AUTO Place MAKE-UP CONTROL Switch to START Verify proper operation of valves & PW (CV111A &111B open, PW pump is running, CV110B throttles open [if ALT DIL]) Verify PW flow on recorder Verify B/U Heaters ON and spray valves 1RY455B/C modulates open
	BOP	Initiate turbine load increase: DEPRESS the LOAD RATE MW/MIN Pushbutton Verify/Enter the desired load rate Depress the REF Pushbutton Using the number Pushbuttons, SET in MW on the REFERENCE DEMAND window When ready to begin the load decrease, depress GO Verify load increases

Event No.: _1/2_

Event Description: Power Increase by diluting and using the turbine_

Time	Position	Applicant's Actions or Behavior
	CREW	Monitor power increase: Monitor reactor power, Tave Verify rods move in AUTO to maintain Tave within ± 2F of Tref Diluting Montior VCT level Verify RCS concentration decreasing Monitor Primary Water Control counter countdown Verify dilution auto stops at preset value Return Reactor Makeup System to blended flow for current boron concentration

Event No.: _3_

Event Description: S/G 1A FRV slowly drifts closed

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator 1-15-A4 S/G 1A FLOW MISMATCH FW FLOW LOW 1-15-A6 S/G 1A LEVEL LOW
	BOP	Identify/report 1A S/G level lowering, #1 FRV drifting closed
	SRO	Directs operator actions
	BOP	Manual control of #1 FRV match feed flow and steam flow, return 1A S/G level to normal
	SRO	Inform SM/Maint of failed #1 FRV controller

Event No.: _4_
Event Description: Power Range Channel N-42 fails LOW

Time	Position	Applicant's Actions or Behavior
	CUE	Annunciator (1-10-A3) PWR RNG HIGH STPT RX TRIP ALERT (1-10-B5) PWR RNG FLUX HIGH ROD STOP (1-10-C3) PWR RNG FLUX RATE RX TRIP ALERT (1-10-C4) PWR RNG CHANNEL DEV N-42 INDICATION AT BOTTOM OF SCALE ROD STOP
	RO	Identify/report failure of Power Range NI Channel N-42
	SRO	Implement 1BOA INST-1 "NUCLEAR INSTRUMENTATION MALFUNCTION", Attachment A "PR CHANNEL FAILURE" and direct operator action.
	RO	Place ROD BANK SELECT switch in MANUAL Check for ROD STOP (1-10-B5) NOT LIT Place Rod Stop Bypass Switch to bypass for N-42 Check Tave-Tref within 1F and restore Tave by: Control Rods, Turbine Load, Boron Concentration
	BOP	Check S/G levels normal and stable
	BOP	Bypass/Defeat channel N-42 Place Detector Current Comparator Upper Section Defeat to N-42 Place Detector Current Comparator Lower Section Defeat to N-42 Place power Mismatch Bypass to N-42 Place Rod Stop Bypass to N-42 (performed earlier) Place Comparator Channel Defeat to N-42 Trip Bistables Remove Control Power Fuses at N-42 "A" Drawer Bistable NC41P tripped LO RX TRIP Bistable NC41R tripped HI RX TRIP

Event No.: _4_

Event Description: Power Range Channel N-42 fails low

Time	Position	Applicant's Actions or Behavior
	BOP (CONT)	Locally trip OTΔT bistables on Channel II OTΔT Trip-TB421C OTΔT Runback TB421D
	RO	Select Operable channel Loop ΔT Place Rod Control in automatic C5 permissive NOT LIT Tave-Tref within 1F Place Rod Control in AUTO
	SRO	Check Technical Specifications 3.3.1 Function 2, 3, &6, Required channels operable 4- ACTION Place inop channel in trip within 6 hours 3.3.1 Function 17 Verify interlock is in required state for existing condition within 1 Hour 3.2.4 QPTR
	SRO	Inform SM/Maint of N-42 channel failure/problem
	SRO	Inform SM of unit status/potential GSEP event

Event No.: _5_
Event Description: _Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high.

Time	Position	Applicant's Actions or Behavior
	CUE	Tave Loop A increase ΔT Loop A increase Numerous annunciators on Block 14 Inward Rod Movement
	RO	Identify/report problem with Rod Control Check turbine power stable Place Rod Control in Manual
	SRO	Implement 1BOA ROD-1 'UNCONTROLLED ROD MOTION" and direct operator action
	BOP	Check turbine power stable
	RO	Place Rod Control in Manual (previously performed) Verify rods not moving Check ro control inputs Power range instruments operable RCS Loop Tave instruments **inoperable** **Failed 1TI-412 Loop 1A due to failed high Thot on Loop A** Turbine first stage pressure operable Tref instrumentation operable
	SRO	Implement 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL" Attachment A "RCS NARROW RANGE RTD CHANNEL" while continuing with this procedure and direct operator action
	RO	1BOA INST-2 Place Rod Control in Manual (previously performed) Manually defeat failed channel Select 1A position on Tave DEFEAT Switch Select 1A position ΔT DEFEAT Switch

Event No.: _5_
Event Description: _Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high.

Time	Position	Applicant's Actions or Behavior
	RO (CONT)	Select operable channel for ΔT recorder Check if Rod Control can be placed in AUTO TURBINE LOW POWER C5 NOT LIT Check Tave-Tref stable and within 1F Restore to within 1F adjust rods, adjust turbine load, or adjust RCS boron concentration Place Rod Control in AUTO (if desired) Check PZR level normal & stable Manually restore PZR to program level Locally trip bistables for Loop A by placing in TEST OPΔT Trip TB411G OPΔT Runback TB411H OT ΔT Trip TB411C OT ΔT Runback TB411D Low Tave TB412G Lo-Lo- Tave TB412D Check P12 interlock LO-2 TAVE STM DUMP INTLK P12 not lit
	SRO	Check Technical Specifications: 3.3.1-Rx Trip Inst. Table 3.3.1 Function 6 & 7 Required channels 4 place inop channel in TRIP within 6 hours 3.3.2-ESFAS Inst Table 3.3-3 Function 8.c (p12) Required channels 3- with <Required Op, within 1 hour check permissive status correct 3.0.3 (Due to loss of Loop 2 OT ΔT Trip earlier with N-42 failure) be in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours **(CRITICAL TASK)** **CUE: Can't be fixed must shut down**

Event No.: _5_
Event Description: _Loop A Thot fails high resulting in Loop A Tave failing high. Rods move in AUTO. Loop A #1 RTD fails high.

Time	Position	Applicant's Actions or Behavior
	SRO	Inform SM/Maint of Loop 1A Thot RTD failure Inform SM of unit status/potential GSEP event.
	RO	1BOA ROD-1 Check for unexplained reactivity addition: Rx makeup control system set proper boron conc BTRS in off Secondary system status normal Contact Chem Dept to sample RCS Boron RCS temperature stable
	SRO	Consult with SM for status of Manual Rod Control
	RO	Place Rod Control in Manual Insert rods 7 steps Withdraw rods 7 steps Check Tave-Tref stable and within 1F Restore to within 1F adjust rods, adjust turbine load, or adjust RCS boron concentration
	SRO	Consult with SM for status of AUTO Rod Control
	RO	Check if Rod Control can be placed in AUTO TURBINE LOW POWER C5 NOT LIT Check Tave-Tref stable and within 1F Place Rod Control in AUTO (if desired)
	SRO	Check Technical Specifications: Section 3.1.4, 3.1.5, 3.1.6 Rod alignments and insertion limits

Event No.: _6/8_
Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	CUE	PZR Level rapidly decreasing/ LOCA
	RO	Identify/report PZR level and pressure rapidly decreasing
	SRO	Direct operator actions
	SRO	Implement 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" AND DIRECT OPERATOR ACTIONS
	RO	Verify Rx trip: Rod bottom lights-all lit Rx Trip and Bypass BRKRs- open Neutron flux- decreasing
	BOP	Verify turbine trip: **Turbine failed to trip** **Manually trip turbine-Throttle and Governor valves still open** Isolate steam supply: Manually runback turbine at maximum rate press TURBINE MANUAL Press FAST ACTION and GV LOWER simultaneously Manually actuate Main Steamline Isolation and Verify MSIV bypass valves are closed Place EH pumps in PULL OUT **(CRITICAL TASK)** Verify power to 4kv ESF busses: ESF busses-both energized-BUS 141, 142
	RO	Check SI actuated Any SI first out annunciator-Lit SI ACTUATED permissive- Light Lit SI equipment automatically actuated-SI pump running, Cent Chg pump cold leg injection isolation valve open-1SI8801A,B Actuate SI by taking SI Switch to actuate **(TRIP RCPS-FOLD OUT PAGE RCS PRESSURE<1425 PSIG AND HIGH HEAD SI FLOW >50GPM)**

Event No.: _6_
Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	BOP	Verify FWI: FW pump tripped FW isolation monitor lights-LIT FW pump discharge valves closed-1FW002A,B,C
	RO	Verify ECCS pumps running Both CCP Both RH Both SI
	BOP	Verify group 2 RCFC accident mode status lights-Lit Verify CNMT Isolation Phase A: Group 3 CNMT Isol monitor lights-LIT Verify CNMT Ventilation Isolation: Group 6 CNMT VENT ISOl monitor lights-LIT Verify AF system: AF isolation valves open 1AF013A,B,C,D,E,F,G,H AF flow control valves throttled 1AF005A,B,C,D,E,F,G,H Verify both CC pumps running Verify both SX pumps running Check Main Steamline Isolation: All S/G pressures > 640 psig CNMT pressure on 1PR-937 or 1PI-CS934-937< 8.2 psig Verify MSIV and MSIV bypass valves closed Check if CNMT Spray is required: CNMT pressure on 1PR-937 or 1PI-CS934-937 < 20 psig

Event No.: _6/7_
Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify Total AF Flow: AF flow > 500 gpm Control feed flow to maintain NR level between 31-50% NR levels not increasing in an uncontrolled manner
	RO	Verify ECCS valve alignment: **RWST valves did not open** Group 2 cold leg injection monitor lights required for ECCS valve alignment-LIT- **Manually align RWST valves** **(CRITICAL TASK)** Verify ECCS Flow: High Head Si flow > 50gpm 1FI-917 RCS Pressure < 1625 psig 1PI-403A/405 SI pump discharge flow > 100 gpm 1-FI-918/922 RCS Pressure > 325 psig RH pump discharge flow > 1000 gpm 1FI-618/619 Check at leat 1 Pzr PORV relief path available: PORV isol valves energized PORV in AUTO Associated isol valve open
	BOP	Verify generator trip: (Manually open breakers as necessary) Unit 1 main transformer output breakers open OCB 3-4, OCB 4-5 PMG output breaker open

Event No.: _6_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Verify D/G running: Both D/G running D/G SX valve open-1SX169A,B Local check D/G operation Verify Control Room Ventilation aligned for emergency: Radiation < alarm setpoint: Control Room Outside Air intake 0A- OPR31J-32J Grid 2, 0B OPR33J-34J Grid 2 Operating VC train equipment running Train A supply, return, & M/U fan; chilled water pump, MCR chiller Train B supply, return, & M/U fan; chilled water pump, MCR chiller Operating VC train dampers aligned M/U fan outlet damper NOT fully closed OVC24Y TRN A, OVC08Y TRN B VC train M/U filter light - LIT Operating VC train charcoal absorber aligned TRN A OVC43Y bypass damper closed, OVC21Y inlet damper open, OVC22Y outlet damper open OR TRN B OVC44Y bypass damper closed, OVC05Y inlet damper open, OVC06Y outlet damper open Control Room pressure > +0.125" H2O OPDI-VC038 Verify Aux Bldg Ventilation aligned for emergency: Inaccessible filter plenums-2 plenums aligned with charcoal absorbers on-line Plenum A Fan OVA03CA-running Flow cont damper OVA022Y open Bypass Isol damper OVA020Y closed or Fan OVA03CB-running Flow cont damper OVA023Y open Bypass Isol damper OVA436Y closed

Event No.: _6_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	BOP (Cont)	Plenum B Fan OVA03CC-running Flow cont damper OVA024Y open Bypass Isol damper OVA021Y closed or Fan OVA03CD-running Flow cont damper OVA025Y open Bypass Isol damper OVA437Y closed Plenum C Fan OVA03CE-running Flow cont damper OVA067Y open Bypass Isol damper OVA052Y closed or Fan OVA03CF-running Flow cont damper OVA072Y open Bypass Isol damper OVA438Y closed Verify FHB ventilation aligned for emergency operation: FHB charcoal absorbers-1 train aligned Train A Fan OVA04CA-running Inlet Isol damper OVA04CA open Flow cont damper OVA057Y open Bypass Isol damper OVA051Y closed or Train B Fan OVA04CB-running Inlet Isol damper OVA055Y open Flow cont damper OVA062Y open Bypass Isol damper OVA435Y closed

Event No.: _6_
Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	RO	Check PZR spray and PORV's: PZR spray valves closed 1RY455B, 1RY455C PORV's closed 1RY455A, 1RY456 Maintain RCS temp control: No RCPs running RCS cold leg temps -stable at or trending to 557F If lower than 557F; Stop dumping steam and isolate cooldown If higher than 557F Dump steam by steam dumps if available or PORV's Check status of RCP: RCP's are off
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check if S/G tubes intact: All secondary rad monitors < Alert setpoint SJAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check if RCS is intact: Diagnose LOCA CNMT are rad monitors (grid 4) < Alert alarm CNMT pressure < 3.4 psig CNMT sump level lights - NOT LIT Check if ECCS flow should be terminated: RCS subcooling acceptable-ICONIC Display or Att A Secondary heat sink-AFW flow > 500 gpm or S/G NR level > 10% RCS pressure decreasing PZR level < 4%
	SRO	Direct initiation of Critical Safety Function Status Trees.

Event No.: _6_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	BOP	Check S/G levels: S/G NR level > 10% Control feed flow to maintain level 10-50% S/G NR level not increasing uncontrolled
	RO	Reset SI: Depress both SI reset pushbuttons Verify SI ACTUATED permissive light-LIT Verify AUTO SI BLOCKED permissive light-LIT
	BOP	Reset CNMT Isolation: Reset CNMT Isol Phase A Reset CNMT Isol Phase B Reset CNMT Vent Isol Check SACs running Open CNMT air valves-1IA065,066
	RO	Check if RH pumps should be stopped: RCS pressure > 325 psig RCS pressure and stable Stop RH pumps and place in standby
	BOP	Check Secondary Radiation normal: Chem sample S/G's Secondary Radiation trends normal for plant conditions: SJAE/Gland Exhaust, S/G blowdown, Main steamline Check AUX Bldg radiation normal: Rad levels are abnormally high
	SRO	Go To 1BCA-1.2 "LOCA OUTSIDE CONTAINMENT" and direct operator actions

Event No.: _6_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BCA-1.2 "LOCA OUTSIDE CONTAINMENT" and direct operator actions
	RO	Verify proper valve alignment: RCS loop to RH pump suction isol valves closed: 1RH8701A,B ; 1RH8702A,B RH to hot legs isol valve closed: - 1SI8840 SI to hot legs isol valves closed: - 1SI8802A,B CNMT Isol Phase A valves closed: Group 3 CNMT Isol monitor lights-LIT Try to identify and isolate break: Reset SI recirc sump isol valves: "IAW 1BOA PRI-5 ATT E" 1SI8811A/1CV8110 1SI8811B/1CV8111 Reset SI CENT CHG pump miniflow isol valves: "IAW ATT E" 1CV8114, 1CV8116 Verify CENT CHG pump miniflow isol valves open: 1CV8110,8111,8114,8116 Energize following valves: 1SI8835, 1SI8809A, 1SI8809B Sequentially close and open valves while monitoring for an RCS pressure increase:

Event No.: _6_

Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	RO (Cont)	Cycle RH to cold legs 1A and ID isol valve: 1SI8809A, no pressure change Cycle RH to cold legs 1B and 1C isol valve: 1SI8809B, no pressure change Cycle SI pumps to cold legs isol valve: 1SI8835, pressure increase when closed Maintain 1SI8835 closed **Break between 1SI8835 and 1SI8821A,B** Realign or shutdown affected systems as necessary: SI pumps 1A and 1B need to be secured Check if break is isolated: RCS pressure increasing
	SRO	Go to 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.

Event No.: _6_
Event Description: LOCA outside CNMT, Failure of turbine to trip, Failure of RWST valves to open

Time	Position	Applicant's Actions or Behavior
	SRO	Implement 1BEP-1 " LOSS OF REACTOR OR SECONDARY COOLANT" and direct operator actions.
	RO	Check status of RCP's: No RCP's running
	BOP	Check S/G pressure boundaries: All S/G pressure stable Check intact S/G levels: NR level > 31% Control feed flow to maintain NR level- 31-50% NR level not increasing in an uncontrolled manner Check secondary radiation: All secondary rad monitors < Alert setpoint SJAE exhaust gas S/G blowdown liquid Main Steamline
	RO	Check PZR PORV's PORV isol valves Eneregized-1RY8000A,B PORV's closed 1RY455A, 456 PORV isol valves open (at least 1)-1RY8000A,B Check if ECCS flow should be reduced: RCS subcooling acceptable-ICONIC Display or ATT A Secondary heat sink-S/G NR level > 10%, AFW flow > 500gpm RCS pressure increasing PZR level < 4%
	SRO	Go To 1BEP ES-1.1 "SI TERMINATION"

The scenario can be ended at Chief Examiner's discretion.