

| | | | |
|--|--------------|----------------|-----------------------------|
| Simulation Facility | <u>Byron</u> | Scenario No. 1 | Operating Test No. 2003-301 |
| Examiners: | _____ | Applicant: | _____ <u>SRO</u> |
| | _____ | | _____ <u>RO</u> |
| | _____ | | _____ <u>BOP</u> |
| Initial Conditions: IC-21, 100% power, BOL, equilibrium Xenon, steady state | | | |
| Turnover: 100% power. 1A Containment Spray Pump (CS) is OOS for a pump bearing replacement. 1C Heater Drain pump (HD) is OOS for an alignment and vibration problem. Annunciator 1-4-C5 alarmed 5 minutes ago. | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------------------------|---------------------------------|--|
| Preload | RP02A&B CS01A FW35C ED06D | M RO SRO BOP M BOP | Failure of RTB A&B to auto and manually open. (can be opened locally) 1A CS pump OOS Failure of CS to Actuate on Hi-3 Cnmt Press. Train B CS must be manually started from the MCR 1C HD pump OOS 6.9KV Breaker 1591 fails to ABT. |
| Preload | (preload note) | C RO SRO | 1SI8801A will not auto open nor open from the MCB 1SI8801B will not open automatically. Will open manually from MCB |
| Turnover | ED025 open | C SRO | Failure of DC input to Instrument inverter 113 |
| 1 | | N BOP SRO | Ramp down turbine power to 1000 Mwe at directed MW/min |
| 1 | | R RO SRO | Lower reactor power using rods and/or boration. |
| 2 | RX21A 2500 | I RO SRO | 1PT-455 Controlling Pressurizer Pressure channel fails high (over 30 second ramp) |
| 3 | RX03E, 0 | I BOP SRO | Steam Flow Transmitter 1FT-532 (input to controlling channel) fails low over 3 minute ramp |
| 4 | RD09, 8 | C RO SRO | Automatic rod motion fails at 8 step per minute. |
| 5 | ED05D | M BOP RO SRO | SAT feed breaker to bus 159 trips opens, no ABT. Loss of RCS flow (Loop 1D) ATWS |
| 6 | RP02A,B | M RO BOP SRO | Reactor Trip Breakers fail to open / ATWS |
| 7 | TH06 | M RO BOP SRO | LOCA inside containment. Leads to high-3 containment pressure |
| 8 | preload | C BOP RO SRO | Failure of CS to auto actuate. |

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

SCENARIO OVERVIEW

The Unit 1 is at 100% power. 1C HD pump is OOS for alignment and vibration problems. 1A CS Pump is OOS for a pump bearing replacement. Just prior to turnover annunciator 1-4-C5 BUS 113 INVERTER TROUBLE alarmed the SRO is directed to evaluate the alarm and determine Technical Specification 3.8.7 condition A applies. Restore the inverter to operable status within 24 hours. Ramp unit to 1000 MW.

Following clearly observable plant response from the reactivity changes, the controlling Pressurizer pressure channel (1PT-455) will fail high, causing Pressurizer PORV (1RY-455A) and Pressurizer spray valves to open, decreasing actual RCS pressure. The RO will diagnose the pressure malfunction from alarms, meter indications, and decreasing Pressurizer pressure. The RO must close the PORV or PORV block valve to stop the pressure decrease. Manual action will also be required to close the Pressurizer spray valves which will open due to the master pressure controller demand. The SRO will implement and direct actions of 1BOA INST-2, "FAILED INSTRUMENT CHANNEL Attachment B" to select an operable controlling channel and restore automatic pressurizer pressure control, trip required bistables, and identify Technical Specification Action requirements 3.3.1 Reactor Trip System Instrumentation Conditions E and K – trip channel within 6 hrs., 3.3.2 Engineered Safety Feature Actuation System Instrumentation Condition D – trip channel within 6 hrs., 3.3.4 Remote Shutdown System Condition A – Restore within 30 days, 3.4.1 DNB Limits Condition A – Restore DNB within 2 hrs.

Following completion of actions for controlling Pressurizer pressure channel (1PT-455) failing high, the 1C S/G controlling steam flow channel (1FT-532) will fail low, resulting in indications of decreased steam flow and initial closing of 1C S/G Feedwater regulating valve to attempt to match feed flow with steam flow. S/G level will decrease and manual control of the feedwater regulating valve will be required to maintain normal level. The crew will perform the actions of 1BOA INST-2, "FAILED INSTRUMENT CHANNEL-Attachment H".

After the unit is stabilized following the Steam Flow channel malfunction, breaker 1592 trips causing a loss of 6.9KV Bus 159. No ABT to the Unit Auxiliary Transformer (UAT) will occur, resulting in a loss of the 1D RCP. The Reactor Protection System will sense the loss of RCS flow and generate a reactor trip signal. The Reactor will fail to trip (ATWS), requiring manual rod insertion due to auto rod speed failed at 8 steps per minute, and emergency boration. 1BFR S.1, "RESPONSE TO NUCLEAR POWER GENERATION / ATWS" will be entered. After dispatching an operator to locally trip Unit 1 reactor, the reactor trip breakers will be opened only after placing the steam dumps in Off/Reset per step 7 of BFR S.1.

After the Reactor is tripped, a LOCA of 500 gpm occurs. The size of the LOCA will require SI actuation, cold leg injection valves 1SI8801A&B will fail to open. 1SI8801B must be opened manually from the MCB. The LOCA will increase to 400,000 GPM over 2 minutes after 1SI8801B is open.

CS will fail to automatically occur at the high-3 pressure setpoints. Manual action by the crew will be required to actuate train B of CS, either while performing the actions of 1BEP-0 or the SRO may elect to perform 1BFR Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE"

The scenario ends with completion of Step 6 of 1BEP-1 or Step 6 1BEP ES-1.3 Scenario EPlan classification is MS-3

Critical Tasks

1. FR-S.1--C Insert negative reactivity into the core by manually inserting RCCAs before completing step 4 of 1BFR-S.1
2. FR-S.1--A Manually trip the main turbine in 1BFR-S.1
3. EP-0--I Manually initiate high head injection flow via 1SI8801B before exiting 1BEP-0
4. EP-0--E: Manually actuate at least the minimum required compliment of containment cooling equipment before an extreme (red path) challenge develops to the containment CSF

SIMULATOR OPERATOR NOTES:

Simulator Setup:

IC-21, 100% power. Hang YELLOW risk placard.

Ensure Delta I limits and Delta I band are correct for IC.

Ensure Steam Flow Channel 1FT-532 is select as controlling channel on 1C SG

Take 1A CS pump OOS. Control switch to PULL OUT. Hang Tag

Hang Tags on 1CS007A, 1CS019A, 1CS001A, 1CS009A

Take 1C HD pump OOS. Control switch to PULL OUT. Hang Tag.

With the simulator running, in an expert window type cae d:\byron\2003_demos\nrc1a.cae

Ensure the following appear on the summary popup:

| | |
|--------------------|---|
| mf rp02a | Failure of Reactor Trip Breakers to open in Auto and Manual |
| mf rp02b | Failure of Reactor Trip Breakers to open in Auto and Manual |
| mf cs01a | Failure of 1A CS Pump |
| mf fw35c | Failure of 1C HD pump |
| mf ed06d | Breaker 1591 fails to ABT |
| rf ed053i open | Breaker for 1SI8801A When used with the light overrides it appears the Valve is closed and energized. If operators are dispatched to de-energize and open this valve, then use the Overrides to de-energize the valve, but do NOT open 1SI8801A. |
| or zlo1si880101 on | 1SI8801A close light on |
| or zlo1si8801A1 on | 1SI8801A close light on |
| rf rp75 out | 1SI8801B will not auto stroke open on an SI 1CV8105 will not auto close 1B AFW pump LO pump won't auto start will not affect scenario as the AF Pump will still auto start |
| rf ed062a open | Breaker for 1CS007A |
| rf ed053m open | Breaker for 1CS019A |
| rf ed053a open | Breaker for 1CS001A |
| rf ed053b open | Breaker for 1CS009A |
| rf ed071g open | Breaker for 1CS007B |
| rf ed025 open | DC Bus 111 feed to Inverter 113 |
| or zdi1cs001a cls | 1CS001A CS to close |
| or zlo1cs007b1 on | 1CS007B close light on |

Ensure the following triggers are setup:

Trigger 3 cs:7bxb .eq.1 .and. zdi1cs007b(2) .eq.1
command: mrf ed071g close

trigger 4 csv1cs007b .gt.0.1
command dor zlo1cs007b1

This will require the candidate to place the 1B CS pump to PTL, wait 30 seconds and open 1CS007B then restart 1B CS Pump to establish flow to containment.

Trigger 6 siv1si8801b .eq. 1
command mmf th06a 400000 120

Preload Annunciator 1-4-C5 Failure of DC input to inverter 113

Acknowledge on request actions to prepare for placing inverter 113 on CVT.

Event 1 Load Ramp to 1000 Mwe

As SM acknowledge ramp initiation.

As Radiation Protection/Chemistry acknowledge sample requirements for power change > 15% in one hour.

Event 2 Pressurizer Pressure Channel 1PT-455 failure high (2500#) (When RO in position to respond)

IMF RX21A, 2500 over 30 second ramp

Initiate malfunctions after load ramp complete and with concurrence of lead examiner.

Role Play as U-2 assist/extra NSO to accomplish bistable tripping.

Acknowledge all info passed as SM, WEC, and maintenance.

Perform the following to trip Pressurizer channel bistables:

On SDG RX10:

| | | | | |
|--|------|-------|-------|------|
| Open Protection Cabinet Door #1 | | | RX020 | OPEN |
| Pzr Press Hi Trip PB455A C1-153 | BS-1 | RX032 | | TRIP |
| Pzr Press Lo Trip PB455C C1-153 | BS-4 | RX034 | | TRIP |
| Pzr Lo Press SI PB455D C1-153 | BS-3 | RX035 | | TRIP |
| Pzr Press P-11 PB455B C1-153 | BS-2 | RX033 | | TRIP |

On SDG RX4:

| | | | | |
|---|------|-------|--|-------|
| OTDT Trip TB411C C1-124 | BS-3 | RX013 | | TRIP |
| OTDT Runback TB411D C1-124 | BS-4 | RX135 | | TRIP |
| Protection Cab #1 Close Door | | RX020 | | CLOSE |

Event 3 Steam Flow Transmitter 1FT-532 (controlling channel) fails LOW

Insert malfunction to fail 1C SG controlling steam flow channel, 1FT-532 LOW (RX03E, 0 180 second ramp) on SDG RX16 after bistables for Pressurizer channel 1PT-455 are tripped. or at the lead examiners cue.

Event 4 Automatic Rod Motion fails at 8 Step per Minute (RD09, 8)

Insert Rod Speed Failure Malfunction (RD09, 8) immediately prior to inserting the Loss of Bus 159

Event 5 Loss of Bus 159 and ATWS

Initiate Major Accident sequence after the actions are completed for the failed steam flow transmitter, or at the lead examiners cue.

Event 6 Reactor Trip Breakers fail to open (ATWS)

The ATWS malfunction(s) are in Pre-load. If directed as a local operator to open the unit 1 reactor trip breakers prior to steam dumps being placed in OFF/RESET, **wait until after the steam dumps have been placed in OFF/RESET. otherwise wait 1 minute then DELETE malfunctions RP02A and RP02B and modify Remote Functions RP01 & RP02 to TRIP to open the Reactor Trip Breakers**

Acknowledge direction to perform step 10c if 1BFR S.1 as NLO

Acknowledge the call for the STA to monitor Status Trees.

Acknowledge all info passed to the SM, WEC, and maintenance.

Insert LOCA malfunction (TH06C, 500 gpm) at step 15 of BFR S.1

Event 7**LOCA inside Cnmt. Leads to failure of Hi-3 automatic actuations**

Ensure trigger set up to increase LOCA size upon 1SI8801B opening.
If asked for ETR on 1A CS, report 2-4 hours is optimistic.

Acknowledge direction to trip Control Room Vent fans as NLO
Wait 2 minutes and report Control Room Vent fans have been tripped
Acknowledge direction to energize SVAG valves per 1BEP 0 step 16b
After CAEP's have finished running, report the SVAG valves have been energized
USE CAEP bep0step16b2a to energize valves.

INSTRUCTOR NOTE: As STA, do NOT report on any status until AFTER containment pressure has decreased below 20 psig.

Event 8**Failure of CS to automatically actuate**

The failure of CS to auto actuate is in the Pre-load. Operators will manually align the CS system for operation.

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|---|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Turnover. 100% power. 1A Containment Spray Pump (CS) is OOS for a pump bearing replacement. 1C Heater Drain pump (HD) is OOS for an alignment and vibration problem. Ramp Unit to 1000 Mwe @ 5MW/min Annunciator: 1-4-C5 BUS 113 INVERTER TROUBLE |
| | | Note: A portion of the power increase preparations may have been performed in the briefing room |
| | US | Refer to Tech Specs, and determine the following: <ul style="list-style-type: none"> 3.8.7 Electrical Power Systems Inverters-Operating Condition A – Restore inverter in 24 hours. Implement actions of 1BGP 100-4, rev 25, step F.1 (OR per 1BGP 100-4T2) |
| | US | Direct load reduction to 1000 MWe at 5 MW/min <ul style="list-style-type: none"> Initiate load swing instruction sheet, 1BGP 100-4T2 Contact Chemistry and HP for load change >15% in one hour Perform Reactivity Briefing |
| | CREW | Review applicable Prerequisites, Precautions, Limitations and Actions of 1BGP 100-4 |

Comments: _____

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|--|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | <p>Verify rod position and boron concentration</p> <p>Initiate boration, if required. (BOP CV-6)</p> <ul style="list-style-type: none"> • Determine required boric acid volume ◦ Effects of previously performed borations ◦ Boration / Dilution tables <p>IF BATCH addition desired:</p> <ul style="list-style-type: none"> • Determine the desired change in RCS Tave • Determine required gallons of boric acid to change Tave <p>IF Calculated addition desired:</p> <ul style="list-style-type: none"> • Determine required gallons of boric acid to increase RCS boron as desired <p>NOTE: The remaining steps will be performed for either method of boration</p> <ul style="list-style-type: none"> • Determine required boric acid flow rate • Set 1FK-110 BA Flow Control to desired boration rate (may leave at current value if Batch method used) • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to stop position • Set MODE SELECT to bor position • Place MAKE-UP MODE CONT SWITCH to start • Verify proper operation of valves and BA transfer pump (1CV110B open, 1CV110A throttles open, Boric Acid Pump running, Boric Acid flow indicated on recorder.) |
| | BOP | <p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired value for rate (5 MW/min) • Depress ENTER • Depress REF • Enter desired final turbine loading (1000 MW) • Depress ENTER • When ready to begin load decrease, depress GO • Verify load reduction occurring |
| | RO/BOP | <p>Monitor reactor power and load decrease</p> <ul style="list-style-type: none"> • Monitor Nuclear instruments, Tave, ΔI, Pressurizer press/level • Monitor MWe, turbine loading, EHC |

Comments: _____

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|--|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | During Boration: <ul style="list-style-type: none"> • Monitor VCT level and pressure • Monitor Boric Acid blender counter • Verify boration stops at preset value |
| | | NOTE: Following clearly observable plant response from the reactivity changes and with the concurrence of the lead examiner, the next event may be initiated. |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|---|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-12-B2 PZR PORV OR SAF VLV OPEN 1-12-C6 PZR PORV DSCH TEMP HIGH 1-12-D2 PZR PRESS CONT DEV HIGH PORV 1RY455A OPEN Position indicating light lit. 1PI-455 Indicating 2500 psig. Pressurizer pressure decreasing |
| | RO | Diagnose/Announce Pressurizer pressure transmitter failure, 1RY455A and Pressurizer sprays open: <ul style="list-style-type: none"> • Determine Pressurizer pressure is decreasing, identify open PORV and spray valves • Stop the Depressurization <ul style="list-style-type: none"> ◦ Place Master Pressurizer pressure controller in manual and decrease ◦ Close 1RY455A ◦ Close 1RY8000A • Manually: <ul style="list-style-type: none"> ◦ Close spray valves. ◦ Control Master Pressurizer pressure controller |
| | US | Implement and direct actions of 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", ATTACHMENT B, "PZR PRESSURE CHANNEL FAILURE": <ul style="list-style-type: none"> • Identify failed Pressurizer pressure channel 1PT455 <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. • Recognize Technical Specification entry for DNB LCO • Inform SM of plant status, evaluate for E-Plan. <ul style="list-style-type: none"> ◦ Direct WEC to write WR, CR, and get maintenance involved. ◦ Direct holding the ramp and boration |
| | US | ◦ Briefs Unit 1 NSO and Unit 2 assist NSO on bistable tripping. |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|---|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Perform actions of IBOA INST-2 as directed: <ul style="list-style-type: none"> • Determine Pressurizer Pressure not normal <ul style="list-style-type: none"> • Take Manual Control to restore Pressure. • Determine Operable Channel not selected <ul style="list-style-type: none"> • Place the Master Pressurizer Pressure Controller in Manual • Control Pressurizer Pressure • Select an operable channel. • Check Pressurizer PORVs, Spray Valves and Heaters: <ul style="list-style-type: none"> • PORVS Closed. • Pressurizer Spray valves normal. If not, then manually control. • Pressurizer Heaters normal. • Check Pressurizer Pressure Control in automatic: <ul style="list-style-type: none"> • 1RY455A returned to automatic. • 1RY456 in automatic. • Sprays in automatic (after operable channel selected for control). • Master Pressurizer Pressure Controller in automatic. • Select operable channels to Recorders: <ul style="list-style-type: none"> • Pressurizer Pressure. • Loop DeltaT. • Coordinates bistable tripping: <ul style="list-style-type: none"> ◦ Places colored dots on bistable, indications, and annunciators. ◦ Maintains communications with NSO tripping bistables. |
| | RO/BOP | Ensures the following Bistables are tripped: (May wait to trip bistables, have 6 hrs to complete) <ul style="list-style-type: none"> • PB455A • PB455C • PB455D • PB455B • TB411C • TB411D • Checks Pressurizer Pressure > 1930 psig and P-11 permissive is NOT Lit (Bypass Permissive 3.3). |
| | BOP | Perform actions as directed: <ul style="list-style-type: none"> ◦ Assist RO in monitoring panels and parameters. ◦ Investigate BARs. ◦ Make phone calls as directed to WEC and maintenance. ◦ Control load ramp |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|--|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | US | <p>Refer to Tech Specs, and determine the following:</p> <ul style="list-style-type: none"> • 3.3.1 Reactor Trip System Instrumentation Conditions E and K – trip channel within 6 hrs. • 3.3.2 Engineered Safety Feature Actuation System Instrumentation Condition D – trip channel within 6 hrs. • 3.3.4 Remote Shutdown System Condition A – Restore within 30 days • 3.4.1 DNB Limits Condition A – Restore DNB within 2 hrs. <p>NOTE: after completion of all actions and TS determination for the Pressurizer Instrument failure, and with the concurrence of the lead examiner, the next event may be initiated</p> |

Comments: _____

| Scenario No: 03-1 | | Event No. 3 |
|--|----------|---|
| Event Description: Steam Flow Transmitter FT-532 (controlling channel) fails low | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-15-C3 SG 1C FLOW MISMATCH STM FLOW LOW 1-15-C9 SG 1C LEVEL DEVIATION HIGH LOW 1FI-532 indication reading low 1FW530 throttling closed FW flow decreasing SG level decreasing below program |
| | BOP/US | Identify/report steam flow channel 1FT-532 failure <ul style="list-style-type: none"> • Take manual control of 1FW530 and increase feed flow above steam flow to restore level as necessary. • Balance feed flow with steam flow to stabilize level as necessary. ◦ Take manual control of Master FW Pump Speed controller to establish adequate Feedwater pump Delta P |
| | US | Implement and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment H "STEAM FLOW CHANNEL FAILURE": <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. ◦ Inform SM of plant status, evaluate for E-Plan. ◦ Direct WEC to write WR, CR, and get maintenance involved. ◦ Direct holding load decrease |
| | BOP | Perform actions as directed: <ul style="list-style-type: none"> • Check affected SG levels normal. IF NOT: <ul style="list-style-type: none"> • Place FRV in Manual • Verify/establish adequate Feedwater pump Delta P • Restore level to a stable condition. • Select operable Steam flow channel ◦ Establish automatic level control • Verify Steam Pressure channels normal ◦ Verify/restore Feedwater speed control in automatic |
| | RO | Assist BOP as required to identify failed instrument channel and stabilize SG levels Monitor RCS and stabilize changing parameters resulting from feed flow/steam flow imbalance: <ul style="list-style-type: none"> • RCS Tave • Pzr Pressure • Boration ◦ Load decrease |

Comments: _____

| | | |
|--|----------|--|
| Scenario No: 03-1 | | Event No. 3 |
| Event Description: Steam Flow Transmitter FT-532 (controlling channel) fails low | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: Following the actions for the failed Steam flow channel and with the concurrence of the lead examiner, the next event may be initiated. |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|----------|---|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-20-A6 BUS 159 Fd BRKR 1592 TRIP 1-20-D6 BUS 159 VOLT LOW 1-13-A2 RCP BUS UNDERVOLTAGE RX TRIP ALERT 1-13-D3 RCP 1D BRKR OPEN OR LOW FLOW ALERT 1-13-E3 RCP TRIP 1-11-A4 OPDT RX TRIP 1-11-C5 RCP LOW FLOW ABOVE P8 RX TRIP No voltage on Bus 159: Loop 1D RCS flow coasting down Inward rod motion demanded at only 8 steps per minute. |
| | CREW | Diagnoses loss of Bus 159, 1D RCP, and RED First Out dictating need for Reactor Trip, but failure of Automatic Trip to occur. |
| | US | Implement and direct actions of 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" |
| | RO/BOP | Perform immediate operator actions of 1BEP-0 Determine the reactor is not tripped: <ul style="list-style-type: none"> • Rod bottom lights not lit • Reactor trip & bypass breakers not open • Neutron flux not decreasing Manually attempt to trip reactor with both switches at: <ul style="list-style-type: none"> • 1PM05J • 1PM06J |
| | RO | Identify/report that reactor trip breakers did not open. |
| | US | Implement and direct actions of 1BFR-S.1 "RESPONSE TO NUCLEAR POWER GENERATION/ATWS" <ul style="list-style-type: none"> ◦ Contact WEC for STA duties |
| NOTE: Crew may dispatch operator to locally open reactor trip breakers at any time. | | |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|-----------------------------|--|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Perform immediate operator actions of FR-S.1: <ul style="list-style-type: none"> • Verify reactor is not tripped <ul style="list-style-type: none"> • Rod Bottom lights not lit • Reactor trip breakers not open; Bypass breakers open (not racked in) • Neutron flux not decreasing from Post Trip. • Manually attempt to trip reactor with both switches at: <ul style="list-style-type: none"> • 1PM05J • 1PM06J |
| | RO [CT] FR-S.1-C | Insert control rods at 48 spm in Manual. (automatic is failed to 8 spm) |
| | BOP [CT] FR-S.1-A | Verify turbine trip <ul style="list-style-type: none"> • Turbine throttle valves not closed • Turbine governor valves not closed • Manually trip turbine Check AFW Pumps Running <ul style="list-style-type: none"> • AFW Pump run lights not lit • Manually start AFW pumps |
| | RO/BOP | Initiate Emergency Boration of RCS <ul style="list-style-type: none"> • Check at least one centrifugal charging pump running • Open 1CV8104 • Start boric acid transfer pump • Check emergency boration flow – GREATER THAN 30 GPM • Verify charging flow – GREATER THAN 30 GPM |
| | RO | Check Pressurizer pressure – Less than 2335 psig |
| | BOP | Verify Containment Ventilation Isolation <ul style="list-style-type: none"> • Group 6 Containment Vent Isolation monitor lights lit |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|----------|---|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Verify reactor subcritical <ul style="list-style-type: none"> ◦ PR channels < 5% ◦ IR channels SUR < 0 Determine the power is still above 5% and continue with steps of 1BFR-S.1. |
| | BOP | Isolate Steam Dumps <ul style="list-style-type: none"> • Place steam dump BYPASS INTERLOCK switches to OFF/RESET for both trains. |
| | | NOTE: Reactor trip breakers will be locally opened after dumps are in OFF/RESET. |
| | CREW | Check trips have occurred <ul style="list-style-type: none"> • Reactor trip. • Turbine trip |
| | BOP | Check SG levels <ul style="list-style-type: none"> • Level in at least one SG > 10% if not, verify > 900 gpm AFW flow • Control feed flow to maintain SG levels between 10% (31% adverse) and 50% • Check SG blowdown isolation valves closed: 1SD002A-H |
| | RO | Verify all dilution path valves closed <ul style="list-style-type: none"> • Reactor Makeup dilution valves 1CV111A and 1CV111B closed • Verify BTRS Mode Selector in off • Dispatch operator to locally check valves closed per 1BFR S.1 step 10c |
| | CREW | Stop reactivity insertion from RCS cooldown <ul style="list-style-type: none"> • RCS temperature not decreasing in uncontrolled manner • SG pressure, none decreasing in uncontrolled manner |
| | RO | Check CETCs < 1200°F |
| | | NOTE: 500 gpm LOCA will start here |
| | RO | Verify reactor subcritical <ul style="list-style-type: none"> • PR channels < 5% • IR channels SUR < 0 |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH Pressurizer pressure decreasing Pressurizer level decreasing Containment pressure increasing |
| | US | Implement and direct the actions of 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Informs SM of plant status for evaluation of E-Plan |
| | RO | Perform Immediate Actions of 1BEP-0 Verify reactor trip <ul style="list-style-type: none"> ● Rod bottom lights lit ● Reactor trip and bypass breakers open ● Flux decreasing |
| | BOP | Verify Turbine tripped <ul style="list-style-type: none"> ● All throttle valves closed ● All governor valves closed Verify 4KV ESF Busses energized <ul style="list-style-type: none"> ● Bus 141 bus alive light lit ● Bus 142 bus alive light lit |
| | CREW | Determine SI needed/actuated: <ul style="list-style-type: none"> ● SI First Out Annunciator lit (1-11-B/C/D/E1) ● SI ACTUATED lit (1-BP-4.1) ● SI Equipment actuated ● Manually Actuate SI |
| | CREW | (If manual SI not previously performed) Recognize and respond to conditions requiring a Safety Injection in accordance with 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION", Step 4: <ul style="list-style-type: none"> ● Pressurizer pressure cannot be maintained > 1829 psig ● Pressurizer level cannot be maintained > 4% ● Manually initiate SI |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|---|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP/US | Verify Feedwater isolation: <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW discharge valves (1FW002A/B/C) closed |
| | RO/US | NOTE: 1SI8801B may be opened at this point while verifying pump alignments (CT on page 20) Verify ECCS pumps running: <ul style="list-style-type: none"> • CV pumps • SI pumps • RH pumps |
| | BOP/US | Verify Containment Conditions: <ul style="list-style-type: none"> • RCFC Accident Mode lights lit (Group 2) • Phase A lights lit (Group 3) • Containment Ventilation lights lit (Group 6) |
| | BOP/US | Verify the following: <ul style="list-style-type: none"> • AFW Aligned: <ul style="list-style-type: none"> • 1A and 1B AFW pumps running • 1AF013A-H open • 1AF005A-H throttled • 1A and 1B CCW pumps running • 1A and 1B SX pumps running • Main Steam isolation valves and Main Steam isolation bypass valves isolated when Containment pressure >8.2 psig |
| | | NOTE: RCP Trip criteria may be met at this point |
| | RO/BOP | Determine if RCP's meet trip criteria <ul style="list-style-type: none"> • Controlled cooldown not in progress • RCS pressure <1425 psig • High head SI flow indicator (1FI-917) >100 gpm or SI pump discharge flow >200 gpm • Trip RCP's |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|-----------------------|---|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO [CT] EP-0--I | Verify ECCS valve alignment <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit - OPEN 1SI8801B • Align SVAG Valve power switches and dispatch NLO to energize breakers ECCS Operations: <ul style="list-style-type: none"> • High Head SI flow > 100 gpm • RCS pressure < 1700 psig • SI pump flow > 200 gpm • RCS pressure < 325 psig <ul style="list-style-type: none"> ○ RH pump flow > 1000 gpm Pressurizer PORV relief path available: <ul style="list-style-type: none"> • At least one block valve energized • PORV in automatic • Associated block valve open |
| | BOP | Verify Main Generator Trip: <ul style="list-style-type: none"> • Output Breakers open • PMG Breaker open EDGs running <ul style="list-style-type: none"> • 1SX169A and B open • Dispatch operator for local check of EDG operation |
| | | Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps: |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A running • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper not full closed 0VC24Y • VC train M/U filter light lit • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open ◦ Control Room pressure greater than +0.125 inches water on 0PDI-VC038 |
| | BOP | Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed |
| | BOP | Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed |
| | RO/US | Check Pressurizer sprays & PORVs closed <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C • PORVs closed 1RY455A and 1RY456 |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | CREW | Maintain RCS temperature control <ul style="list-style-type: none"> ◦ With any RCP running, RCS Tave stable at or trending to 557 degrees F. ◦ With No RCP running, RCS Cold Leg temperature stable at or trending to 557 degrees F. |
| | CREW | Check status of RCPs <ul style="list-style-type: none"> • Determine if RCPs are running. • Check if RCPs should be stopped: • ECCS flow- high head > 100 gpm; or SI pump > 200 gpm. • RCS pressure < 1425 psig. • Controlled cooldown NOT in progress, nor previously initiated. • Stop All RCPs. |
| | BOP/CREW | Check Secondary Pressure Boundaries are intact <ul style="list-style-type: none"> • No SG pressure decreasing in uncontrolled manner • No SG completely depressurized |
| | BOP/CREW | Check SG tube intact <ul style="list-style-type: none"> • No abnormal secondary radiation |
| | BOP/CREW | Check RCS intact <ul style="list-style-type: none"> • Containment area radiation monitors > alert alarm setpoints • Containment pressure > 3.4 psig • Containment sump level lights lit |
| | US | Implement and direct actions of 1BEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT" <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. • Informs SM of plant status for evaluation of E-Plan |
| | RO | Check RCPs <ul style="list-style-type: none"> • No RCPs running |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Check SG Secondary pressure boundaries intact <ul style="list-style-type: none"> • No SG Pressure decreasing uncontrollably • No SG completely depressurized Check intact SG levels <ul style="list-style-type: none"> • Narrow range levels > 10% (31% Adverse) • Control Intact SG levels to 10% (31% Adverse) to 50% NR level • Narrow range levels NOT increasing in uncontrolled manner Check Secondary Radiation levels normal <ul style="list-style-type: none"> • No abnormal secondary radiation |
| | RO | Check Pressurizer PORVs and isolation valves: <ul style="list-style-type: none"> • PORV Isolation valves open and energized <ul style="list-style-type: none"> • 1RY8000A • 1RY8000B • PORVs closed <ul style="list-style-type: none"> • 1RY455A • 1RY456 |
| | CREW | Check if ECCS flow should be reduced: <ul style="list-style-type: none"> ◦ RCS Subcooling not acceptable ◦ Secondary heat sink acceptable • RCS pressure decreasing • Pzr Level <12% Determine ECCS flow should NOT be reduced. NOTE: Scenario Termination criteria is completion of step 6 of 1BEP-1 or step 6 1BEP ES-1.3 Scenario EPlan classification is MS-3 |
| | US | Implement and direct actions of 1BEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION" when RWST level < 46% (Actions on page 25) |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: At some time Containment pressure may rise to an ORANGE Path condition (without CS pumps running). If so, performance of 1BFR Z.1 "RESPONSE TO HIGH CONTAINMENT PRESSURE" may be required. Actions are covered below. CUE will be provided by the STA after monitoring the BSTs. |
| | US | Implement and direct as advised by the STA the actions of 1BFR-Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE". <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Inform SM of plant status for evaluation of E-Plan |
| | BOP | Verify Containment isolations <ul style="list-style-type: none"> ● Phase A Group 3 lights lit ● Containment Ventilation Group 6 lights lit <p>Check if Containment Pressure has increased to > 20 psig (1PR-937 or 1PI-CS934 thru 937)</p> <ul style="list-style-type: none"> ● Stop all RCPs (previously completed) <p>Verify CS alignment: (previously complete for B Train)</p> |
| | US/BOP | Verify Group 6 Phase B isolation lights lit (previously completed) <p>Verify RCFCs running in accident mode (Group 2 lights lit).</p> <p>Verify Main Steam Isolation</p> <ul style="list-style-type: none"> ● Main Steam isolation valves and Main Steam isolation bypass valves closed. (previously completed) <p>Determine NO SGs are faulted:</p> <ul style="list-style-type: none"> ● No Steam Generator pressure decreasing in an uncontrolled manner ● No Steam Generator completely depressurized <p>Return to step and procedure in effect.</p> |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: ACTIONS FOR 1BEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION" |
| | BOP/RO | <p>Perform actions of 1BEP ES-1.3 as directed:</p> <p>Check CC pumps 2 running</p> <p>Open CC to RH Heat exchanger isolation valves</p> <ul style="list-style-type: none"> • 1CC9412A and 1CC9412B <p>Check CC flows to RH Heat exchanger</p> <ul style="list-style-type: none"> • >5000 gpm <p>Verify adequate Containment sump level</p> <ul style="list-style-type: none"> • Bottom 4 lights lit <p>Align RH pump suctions to Containment sumps:</p> <ul style="list-style-type: none"> • Place control switches for SVAG valves 480 bus feeds in close • Check Both RH pumps running • Check open 1SI8811A and 1SI8811B • Close 1SI8812A and 1SI8812B <p>Check SI and CV pumps in injection mode:</p> <ul style="list-style-type: none"> • SI pumps both running • Cold Leg Injection valves (1SI8801A/B) open <p>Align SI and CV pumps for Cold Leg Recirculation:</p> <ul style="list-style-type: none"> • Dispatch operator to energize 1SI8806 and 1SI8813 • Verify CV pump 1A miniflow isolation valves closed <ul style="list-style-type: none"> • 1CV8111 and 1CV8114 • Close SI pump miniflow isolation valves <ul style="list-style-type: none"> • 1SI8814, 1SI8920, and 1SI8813 when power restored • Close RH Heat exchanger Discharge Cross ties <ul style="list-style-type: none"> • 1RH8716A and B • Open SI and CV pump suction header Cross ties <ul style="list-style-type: none"> • 1SI8807A and B, and 1SI8924 • Check 1A RH pump running • Open 1CV8804A • Check 1B RH pump running • Open 1SI8804B <p>Start ECCS pumps as necessary (NOTE: Scenario may be terminated at this point)</p> |

Comments: _____

| | | | |
|--|--------------|-----------------|-----------------------------|
| Simulation Facility | <u>Byron</u> | Scenario No. 1a | Operating Test No. 2003-301 |
| Examiners: | _____ | Applicant: | _____ <u>SRO</u> |
| | _____ | | _____ <u>RO</u> |
| | _____ | | _____ <u>BOP</u> |
| Initial Conditions: IC-21, 100% power, BOL, equilibrium Xenon, steady state | | | |
| Turnover: 100% power. 1A Containment Spray Pump (CS) is OOS for a pump bearing replacement. 1C Heater Drain pump (HD) is OOS for an alignment and vibration problem. Annunciator 1-4-C5 alarmed 5 minutes ago. | | | |

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|------------------------------------|---------------------------------|--|
| Preload | RP02A&B CS01A FW35C ED06D | M RO SRO BOP M BOP | Failure of RTB A&B to auto and manually open. (can be opened locally) 1A CS pump OOS Failure of CS to Actuate on Hi-3 Cnmt Press. Train B CS must be manually started from the MCR 1C HD pump OOS 6.9KV Breaker 1591 fails to ABT. |
| Preload | (preload note) | C RO SRO | 1SI8801A will not auto open nor open from the MCB 1SI8801B will not open automatically. Will open manually from MCB |
| Turnover | ED025 open | C SRO | Failure of DC input to Instrument inverter 113 |
| 1 | | N BOP SRO | Ramp down turbine power to 1000 Mwe at directed MW/min |
| 1 | | R RO SRO | Lower reactor power using rods and/or boration. |
| 2 | RX21A 2500 | I RO SRO | 1PT-455 Controlling Pressurizer Pressure channel fails high (over 30 second ramp) |
| 3 | RX03E, 0 | I BOP SRO | Steam Flow Transmitter 1FT 532 (input to controlling channel) fails low over 3 minute ramp |
| 4 | RD09, 8 | C RO SRO | Automatic rod motion fails at 8 step per minute. |
| 5 | ED05D | M BOP RO SRO | SAT feed breaker to bus 159 trips opens, no ABT. Loss of RCS flow (Loop 1D) ATWS |
| 6 | RP02A,B | M RO BOP SRO | Reactor Trip Breakers fail to open / ATWS |
| 7 | TH06 | M RO BOP SRO | LOCA inside containment. Leads to high-3 containment pressure |
| 8 | preload | C BOP RO SRO | Failure of CS to auto actuate. |

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

SCENARIO OVERVIEW

The Unit 1 is at 100% power. 1C HD pump is OOS for alignment and vibration problems. 1A CS Pump is OOS for a pump bearing replacement. Just prior to turnover annunciator 1-4-C5 BUS 113 INVERTER TROUBLE alarmed the SRO is directed to evaluate the alarm and determine Technical Specification 3.8.7 condition A applies. Restore the inverter to operable status within 24 hours. Ramp unit to 1000 MW.

Following clearly observable plant response from the reactivity changes, the controlling Pressurizer pressure channel (1PT-455) will fail high, causing Pressurizer PORV (1RY-455A) and Pressurizer spray valves to open, decreasing actual RCS pressure. The RO will diagnose the pressure malfunction from alarms, meter indications, and decreasing Pressurizer pressure. The RO must close the PORV or PORV block valve to stop the pressure decrease. Manual action will also be required to close the Pressurizer spray valves which will open due to the master pressure controller demand. The SRO will implement and direct actions of 1BOA INST-2, "FAILED INSTRUMENT CHANNEL Attachment B" to select an operable controlling channel and restore automatic pressurizer pressure control, trip required bistables, and identify Technical Specification Action requirements 3.3.1 Reactor Trip System Instrumentation Conditions E and K – trip channel within 6 hrs., 3.3.2 Engineered Safety Feature Actuation System Instrumentation Condition D – trip channel within 6 hrs., 3.3.4 Remote Shutdown System Condition A – Restore within 30 days, 3.4.1 DNB Limits Condition A – Restore DNB within 2 hrs.

Following completion of actions for controlling Pressurizer pressure channel (1PT-455) failing high, the 1C S/G controlling steam flow channel (1FT-532) will fail low, resulting in indications of decreased steam flow and initial closing of 1C S/G Feedwater regulating valve to attempt to match feed flow with steam flow. S/G level will decrease and manual control of the feedwater regulating valve will be required to maintain normal level. The crew will perform the actions of 1BOA INST-2, "FAILED INSTRUMENT CHANNEL-Attachment H".

After the unit is stabilized following the Steam Flow channel malfunction, breaker 1592 trips causing a loss of 6.9KV Bus 159. No ABT to the Unit Auxiliary Transformer (UAT) will occur, resulting in a loss of the 1D RCP. The Reactor Protection System will sense the loss of RCS flow and generate a reactor trip signal. The Reactor will fail to trip (ATWS), requiring manual rod insertion due to auto rod speed failed at 8 steps per minute, and emergency boration. 1BFR S.1, "RESPONSE TO NUCLEAR POWER GENERATION / ATWS" will be entered. After dispatching an operator to locally trip Unit 1 reactor, the reactor trip breakers will be opened only after placing the steam dumps in Off/Reset per step 7 of BFR S.1.

After the Reactor is tripped, a LOCA of 500 gpm occurs. The size of the LOCA will require SI actuation, cold leg injection valves 1SI8801A&B will fail to open. 1SI8801B must be opened manually from the MCB. The LOCA will increase to 400,000 GPM over 2 minutes after 1SI8801B is open.

CS will fail to automatically occur at the high-3 pressure setpoints. Manual action by the crew will be required to actuate train B of CS, either while performing the actions of 1BEP-0 or the SRO may elect to perform 1BFR Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE"

The scenario ends with completion of Step 6 of 1BEP-1 or Step 6 1BEP ES-1.3 Scenario EPlan classification is MS-3

Critical Tasks

1. FR-S.1--C Insert negative reactivity into the core by manually inserting RCCAs before completing step 4 of 1BFR-S.1
2. FR-S.1--A Manually trip the main turbine in 1BFR-S.1
3. EP-0--I Manually initiate high head injection flow via 1SI8801B before exiting 1BEP-0
4. EP-0--E: Manually actuate at least the minimum required compliment of containment cooling equipment before an extreme (red path) challenge develops to the containment CSF

SIMULATOR OPERATOR NOTES:

Simulator Setup:

IC-21, 100% power. Hang YELLOW risk placard.

Ensure Delta I limits and Delta I band are correct for IC.

Ensure Steam Flow Channel 1FT-532 is select as controlling channel on 1C SG

Take 1A CS pump OOS. Control switch to PULL OUT. Hang Tag

Hang Tags on 1CS007A, 1CS019A, 1CS001A, 1CS009A

Take 1C HD pump OOS. Control switch to PULL OUT. Hang Tag.

With the simulator running, in an expert window type cae d:\byron\2003_demos\nrc1a.cae

Ensure the following appear on the summary popup:

| | |
|--------------------|---|
| mf rp02a | Failure of Reactor Trip Breakers to open in Auto and Manual |
| mf rp02b | Failure of Reactor Trip Breakers to open in Auto and Manual |
| mf cs01a | Failure of 1A CS Pump |
| mf fw35c | Failure of 1C HD pump |
| mf ed06d | Breaker 1591 fails to ABT |
| rf ed053i open | Breaker for 1SI8801A When used with the light overrides it appears the Valve is closed and energized. If operators are dispatched to de-energize and open this valve, then use the Overrides to de-energize the valve, but do NOT open 1SI8801A. |
| or zlo1si880101 on | 1SI8801A close light on |
| or zlo1si8801A1 on | 1SI8801A close light on |
| rf rp75 out | 1SI8801B will not auto stroke open on an SI 1CV8105 will not auto close 1B AFW pump LO pump won't auto start will not affect scenario as the AF Pump will still auto start |
| rf ed062a open | Breaker for 1CS007A |
| rf ed053m open | Breaker for 1CS019A |
| rf ed053a open | Breaker for 1CS001A |
| rf ed053b open | Breaker for 1CS009A |
| rf ed071g open | Breaker for 1CS007B |
| rf ed025 open | DC Bus 111 feed to Inverter 113 |
| or zdi1cs001a cls | 1CS001A CS to close |
| or zlo1cs007b1 on | 1CS007B close light on |

Ensure the following triggers are setup:

Trigger 3 cs:7bxb .eq.1 .and. zdi1cs007b(2) .eq.1
command: mrf ed071g close

trigger 4 csv1cs007b .gt.0.1
command dor zlo1cs007b1

This will require the candidate to place the 1B CS pump to PTL, wait 30 seconds and open 1CS007B then restart 1B CS Pump to establish flow to containment.

Trigger 6 siv1si8801b .eq. 1
command mmf th06a 400000 120

Preload Annunciator 1-4-C5 Failure of DC input to inverter 113

Acknowledge on request actions to prepare for placing inverter 113 on CVT.

Event 1 Load Ramp to 1000 Mwe

As SM acknowledge ramp initiation.
As Radiation Protection/Chemistry acknowledge sample requirements for power change > 15% in one hour.

Event 2 Pressurizer Pressure Channel 1PT-455 failure high (2500#) (When RO in position to respond)

IMF RX21A, 2500 over 30 second ramp
Initiate malfunctions after load ramp complete and with concurrence of lead examiner.
Role Play as U-2 assist/extra NSO to accomplish bistable tripping.
Acknowledge all info passed as SM, WEC, and maintenance.

Perform the following to trip Pressurizer channel bistables:

On SDG RX10:

| | | | | |
|---------------------------------|---------------|------|-------|------|
| Open Protection Cabinet Door #1 | | | RX020 | OPEN |
| Pzr Press Hi Trip PB455A C1-153 | BS-1 | | RX032 | TRIP |
| Pzr Press Lo Trip PB455C C1-153 | BS-4 | | RX034 | TRIP |
| Pzr Lo Press SI | PB455D C1-153 | BS-3 | RX035 | TRIP |
| Pzr Press P-11 | PB455B C1-153 | BS-2 | RX033 | TRIP |

On SDG RX4:

| | | | | |
|------------------------------|---------------|------|-------|-------|
| OTDT Trip | TB411C C1-124 | BS-3 | RX013 | TRIP |
| OTDT Runback | TB411DC1-124 | BS-4 | RX135 | TRIP |
| Protection Cab #1 Close Door | | | RX020 | CLOSE |

Event 3 Steam Flow Transmitter 1FT-532 (controlling channel) fails LOW

Insert malfunction to fail 1C SG controlling steam flow channel, 1FT-532 LOW (RX03E, 0 180 second ramp) on SDG RX16 after bistables for Pressurizer channel 1PT-455 are tripped. or at the lead examiners cue.

Event 4 Automatic Rod Motion fails at 8 Step per Minute (RD09, 8)

Insert Rod Speed Failure Malfunction (RD09, 8) immediately prior to inserting the Loss of Bus 159

Event 5 Loss of Bus 159 and ATWS

Initiate Major Accident sequence after the actions are completed for the failed steam flow transmitter, or at the lead examiners cue.

Event 6 Reactor Trip Breakers fail to open (ATWS)

The ATWS malfunction(s) are in Pre-load. If directed as a local operator to open the unit 1 reactor trip breakers prior to steam dumps being placed in OFF/RESET, **wait until after the steam dumps have been placed in OFF/RESET. otherwise wait 1 minute then DELETE malfunctions RP02A and RP02B and modify Remote Functions RP01 & RP02 to TRIP to open the Reactor Trip Breakers**

Acknowledge direction to perform step 10c if 1BFR S.1 as NLO
Acknowledge the call for the STA to monitor Status Trees.
Acknowledge all info passed to the SM, WEC, and maintenance.
Insert LOCA malfunction (TH06C, 500 gpm) at step 15 of BFR S.1

Event 7 **LOCA inside Cnmt. Leads to failure of Hi-3 automatic actuations**

Ensure trigger set up to increase LOCA size upon ISI8801B opening.

If asked for ETR on 1A CS, report 2-4 hours is optimistic.

Acknowledge direction to trip Control Room Vent fans as NLO

Wait 2 minutes and report Control Room Vent fans have been tripped

Acknowledge direction to energize SVAG valves per 1BEP 0 step 16b

After CAEP's have finished running, report the SVAG valves have been energized

USE CAEP bep0step16b2a to energize valves.

INSTRUCTOR NOTE: As STA, do NOT report on any status until AFTER containment pressure has decreased below 20 psig.

Event 8 **Failure of CS to automatically actuate**

The failure of CS to auto actuate is in the Pre-load. Operators will manually align the CS system for operation.

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|---|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Turnover. 100% power. 1A Containment Spray Pump (CS) is OOS for a pump bearing replacement. 1C Heater Drain pump (HD) is OOS for an alignment and vibration problem. Ramp Unit to 1000 Mwe @ 5MW/min Annunciator: 1-4-C5 BUS 113 INVERTER TROUBLE |
| | | Note: A portion of the power increase preparations may have been performed in the briefing room |
| | US | Refer to Tech Specs, and determine the following: <ul style="list-style-type: none"> 3.8.7 Electrical Power Systems Inverters-Operating Condition A – Restore inverter in 24 hours. Implement actions of 1BGP 100-4, rev 25, step F.1 (OR per 1BGP 100-4T2) |
| | US | Direct load reduction to 1000 MWe at 5 MW/min <ul style="list-style-type: none"> Initiate load swing instruction sheet, 1BGP 100-4T2 Contact Chemistry and HP for load change >15% in one hour Perform Reactivity Briefing |
| | CREW | Review applicable Prerequisites, Precautions, Limitations and Actions of 1BGP 100-4 |

Comments: _____

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|--|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | <p>Verify rod position and boron concentration</p> <p>Initiate boration, if required. (BOP CV-6)</p> <ul style="list-style-type: none"> • Determine required boric acid volume <ul style="list-style-type: none"> ◦ Effects of previously performed borations ◦ Boration / Dilution tables <p>IF BATCH addition desired:</p> <ul style="list-style-type: none"> • Determine the desired change in RCS Tave • Determine required gallons of boric acid to change Tave <p>IF Calculated addition desired:</p> <ul style="list-style-type: none"> • Determine required gallons of boric acid to increase RCS boron as desired <p>NOTE: The remaining steps will be performed for either method of boration</p> <ul style="list-style-type: none"> • Determine required boric acid flow rate • Set 1FK-110 BA Flow Control to desired boration rate (may leave at current value if Batch method used) • Set 1FY-0110 BA Blender Preset Counter to desired volume. • Place MAKE-UP MODE CONT SWITCH to stop position • Set MODE SELECT to bor position • Place MAKE-UP MODE CONT SWITCH to start • Verify proper operation of valves and BA transfer pump (1CV110B open, 1CV110A throttles open, Boric Acid Pump running, Boric Acid flow indicated on recorder.) |
| | BOP | <p>Initiate turbine load reduction:</p> <ul style="list-style-type: none"> • Depress LOAD RATE MW/MIN • Enter desired value for rate (5 MW/min) • Depress ENTER • Depress REF • Enter desired final turbine loading (1000 MW) • Depress ENTER • When ready to begin load decrease, depress GO • Verify load reduction occurring |

Comments: _____

| Scenario No: 03-1 | | Event No. 1 |
|---|----------|---|
| Event Description: Ramp down turbine and reactor power to 1000 MWe. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO/BOP | Monitor reactor power and load decrease <ul style="list-style-type: none"> • Monitor Nuclear instruments, Tave, ΔI, Pressurizer press/level • Monitor MWe, turbine loading, EHC |
| | RO | During Boration: <ul style="list-style-type: none"> • Monitor VCT level and pressure • Monitor Boric Acid blender counter • Verify boration stops at preset value |
| | | NOTE: Following clearly observable plant response from the reactivity changes and with the concurrence of the lead examiner, the next event may be initiated. |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|---|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-12-B2 PZR PORV OR SAF VLV OPEN 1-12-C6 PZR PORV DSCH TEMP HIGH 1-12-D2 PZR PRESS CONT DEV HIGH PORV 1RY455A OPEN Position indicating light lit. 1PI-455 Indicating 2500 psig. Pressurizer pressure decreasing |
| | RO | Diagnose/Announce Pressurizer pressure transmitter failure, 1RY455A and Pressurizer sprays open: <ul style="list-style-type: none"> • Determine Pressurizer pressure is decreasing, identify open PORV and spray valves • Stop the Depressurization <ul style="list-style-type: none"> ◦ Place Master Pressurizer pressure controller in manual and decrease ◦ Close 1RY455A ◦ Close 1RY8000A • Manually: <ul style="list-style-type: none"> ◦ Close spray valves. ◦ Control Master Pressurizer pressure controller |
| | US | Implement and direct actions of 1BOA INST-2 "OPERATION WITH A FAILED INSTRUMENT CHANNEL", ATTACHMENT B, "PZR PRESSURE CHANNEL FAILURE": <ul style="list-style-type: none"> • Identify failed Pressurizer pressure channel 1PT455 <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. • Recognize Technical Specification entry for DNB LCO • Inform SM of plant status, evaluate for E-Plan. <ul style="list-style-type: none"> ◦ Direct WEC to write WR, CR, and get maintenance involved. ◦ Direct holding the ramp and boration |
| | US | ◦ Briefs Unit 1 NSO and Unit 2 assist NSO on bistable tripping. |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|---|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Perform actions of IBOA INST-2 as directed: <ul style="list-style-type: none"> • Determine Pressurizer Pressure not normal <ul style="list-style-type: none"> • Take Manual Control to restore Pressure. • Determine Operable Channel not selected <ul style="list-style-type: none"> • Place the Master Pressurizer Pressure Controller in Manual • Control Pressurizer Pressure • Select an operable channel. • Check Pressurizer PORVs, Spray Valves and Heaters: <ul style="list-style-type: none"> • PORVS Closed. • Pressurizer Spray valves normal. If not, then manually control. • Pressurizer Heaters normal. • Check Pressurizer Pressure Control in automatic: <ul style="list-style-type: none"> • 1RY455A returned to automatic. • 1RY456 in automatic. • Sprays in automatic (after operable channel selected for control). • Master Pressurizer Pressure Controller in automatic. • Select operable channels to Recorders: <ul style="list-style-type: none"> • Pressurizer Pressure. • Loop DeltaT. • Coordinates bistable tripping: <ul style="list-style-type: none"> ○ Places colored dots on bistable, indications, and annunciators. ○ Maintains communications with NSO tripping bistables. |
| | RO/BOP | Ensures the following Bistables are tripped: (May wait to trip bistables, have 6 hrs to complete) <ul style="list-style-type: none"> • PB455A • PB455C • PB455D • PB455B • TB411C • TB411D • Checks Pressurizer Pressure > 1930 psig and P-11 permissive is NOT Lit (Bypass Permissive 3.3). |

Comments: _____

| Scenario No: 03-1 | | Event No. 2 |
|---|----------|---|
| Event Description: PT-455 Controlling Pressurizer Pressure Channel fails high | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Perform actions as directed: <ul style="list-style-type: none"> ◦ Assist RO in monitoring panels and parameters. ◦ Investigate BARs. ◦ Make phone calls as directed to WEC and maintenance. ◦ Control load ramp |
| | US | Refer to Tech Specs, and determine the following: <ul style="list-style-type: none"> • 3.3.1 Reactor Trip System Instrumentation Conditions E and K – trip channel within 6 hrs. • 3.3.2 Engineered Safety Feature Actuation System Instrumentation Condition D – trip channel within 6 hrs. • 3.3.4 Remote Shutdown System Condition A – Restore within 30 days • 3.4.1 DNB Limits Condition A – Restore DNB within 2 hrs. <p>NOTE: after completion of all actions and TS determination for the Pressurizer Instrument failure, and with the concurrence of the lead examiner, the next event may be initiated</p> |

Comments: _____

| Scenario No: 03-1 | | Event No. 3 |
|--|----------|---|
| Event Description: Steam Flow Transmitter FT-532 (controlling channel) fails low EVENT NOT USED FOR THIS CREW | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-15-C3 SG 1C FLOW MISMATCH STM FLOW LOW 1-15-C9 SG 1C LEVEL DEVIATION HIGH LOW 1FI-532 indication reading low 1FW530 throttling closed FW flow decreasing SG level decreasing below program |
| | BOP/US | Identify/report steam flow channel 1FT-532 failure <ul style="list-style-type: none"> • Take manual control of 1FW530 and increase feed flow above steam flow to restore level as necessary. • Balance feed flow with steam flow to stabilize level as necessary. ◦ Take manual control of Master FW Pump Speed controller to establish adequate Feedwater pump Delta P |
| | US | Implement and direct actions of 1BOA INST-2, "OPERATION WITH A FAILED INSTRUMENT CHANNEL", Attachment H "STEAM FLOW CHANNEL FAILURE": <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. ◦ Inform SM of plant status, evaluate for E-Plan. ◦ Direct WEC to write WR, CR, and get maintenance involved. ◦ Direct holding load decrease |
| | BOP | Perform actions as directed: <ul style="list-style-type: none"> • Check affected SG levels normal. IF NOT: <ul style="list-style-type: none"> • Place FRV in Manual • Verify/establish adequate Feedwater pump Delta P • Restore level to a stable condition. • Select operable Steam flow channel ◦ Establish automatic level control • Verify Steam Pressure channels normal ◦ Verify/restore Feedwater speed control in automatic |
| | RO | Assist BOP as required to identify failed instrument channel and stabilize SG levels Monitor RCS and stabilize changing parameters resulting from feed flow/steam flow imbalance: <ul style="list-style-type: none"> • RCS Tave • Pzr Pressure • Boration ◦ Load decrease |

Comments: _____

| | | |
|--|----------|--|
| Scenario No: 03-1 | | Event No. 3 |
| Event Description: Steam Flow Transmitter FT-532 (controlling channel) fails low EVENT NOT USED FOR THIS CREW | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: Following the actions for the failed Steam flow channel and with the concurrence of the lead examiner, the next event may be initiated. |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|----------|---|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-20-A6 BUS 159 Fd BRKR 1592 TRIP 1-20-D6 BUS 159 VOLT LOW 1-13-A2 RCP BUS UNDERVOLTAGE RX TRIP ALERT 1-13-D3 RCP 1D BRKR OPEN OR LOW FLOW ALERT 1-13-E3 RCP TRIP 1-11-A4 OPDT RX TRIP 1-11-C5 RCP LOW FLOW ABOVE P8 RX TRIP No voltage on Bus 159: Loop 1D RCS flow coasting down Inward rod motion demanded at only 8 steps per minute. |
| | CREW | Diagnoses loss of Bus 159, 1D RCP, and RED First Out dictating need for Reactor Trip, but failure of Automatic Trip to occur. |
| | US | Implement and direct actions of 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" |
| | RO/BOP | Perform immediate operator actions of 1BEP-0 Determine the reactor is not tripped: <ul style="list-style-type: none"> • Rod bottom lights not lit • Reactor trip & bypass breakers not open • Neutron flux not decreasing Manually attempt to trip reactor with both switches at: <ul style="list-style-type: none"> • 1PM05J • 1PM06J |
| | RO | Identify/report that reactor trip breakers did not open. |
| | US | Implement and direct actions of 1BFR-S.1 "RESPONSE TO NUCLEAR POWER GENERATION/ATWS" <ul style="list-style-type: none"> ◦ Contact WEC for STA duties |
| NOTE: Crew may dispatch operator to locally open reactor trip breakers at any time. | | |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|-----------------------------|--|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Perform immediate operator actions of FR-S.1: <ul style="list-style-type: none"> • Verify reactor is not tripped <ul style="list-style-type: none"> • Rod Bottom lights not lit • Reactor trip breakers not open; Bypass breakers open (not racked in) • Neutron flux not decreasing from Post Trip. • Manually attempt to trip reactor with both switches at: <ul style="list-style-type: none"> • 1PM05J • 1PM06J |
| | RO [CT] FR-S.1-C | Insert control rods at 48 spm in Manual. (automatic is failed to 8 spm) |
| | BOP [CT] FR-S.1-A | Verify turbine trip <ul style="list-style-type: none"> • Turbine throttle valves not closed • Turbine governor valves not closed • Manually trip turbine Check AFW Pumps Running <ul style="list-style-type: none"> • AFW Pump run lights not lit • Manually start AFW pumps |
| | RO/BOP | Initiate Emergency Boration of RCS <ul style="list-style-type: none"> • Check at least one centrifugal charging pump running • Open 1CV8104 • Start boric acid transfer pump • Check emergency boration flow – GREATER THAN 30 GPM • Verify charging flow – GREATER THAN 30 GPM |
| | RO | Check Pressurizer pressure – Less than 2335 psig |
| | BOP | Verify Containment Ventilation Isolation <ul style="list-style-type: none"> • Group 6 Containment Vent Isolation monitor lights lit |

Comments: _____

| Scenario No: 03-1 | | Event No. 4,5,6 |
|---|----------|---|
| Event Description: Loss of 6.9 KV Bus 159 no ABT resulting in a partial Loss of Flow ATWS. During ATWS Auto Control rod speed fails to 8 spm. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO | Verify reactor subcritical <ul style="list-style-type: none"> ◦ PR channels < 5% ◦ IR channels SUR < 0 Determine the power is still above 5% and continue with steps of 1BFR-S.1. |
| | BOP | Isolate Steam Dumps <ul style="list-style-type: none"> • Place steam dump BYPASS INTERLOCK switches to OFF/RESET for both trains. |
| | | NOTE: Reactor trip breakers will be locally opened after dumps are in OFF/RESET. |
| | CREW | Check trips have occurred <ul style="list-style-type: none"> • Reactor trip. • Turbine trip |
| | BOP | Check SG levels <ul style="list-style-type: none"> • Level in at least one SG > 10% if not, verify > 900 gpm AFW flow • Control feed flow to maintain SG levels between 10% (31% adverse) and 50% • Check SG blowdown isolation valves closed: 1SD002A-H |
| | RO | Verify all dilution path valves closed <ul style="list-style-type: none"> • Reactor Makeup dilution valves 1CV111A and 1CV111B closed • Verify BTRS Mode Selector in off • Dispatch operator to locally check valves closed per 1BFR S.1 step 10c |
| | CREW | Stop reactivity insertion from RCS cooldown <ul style="list-style-type: none"> • RCS temperature not decreasing in uncontrolled manner • SG pressure, none decreasing in uncontrolled manner |
| | RO | Check CETCs < 1200°F |
| | | NOTE: 500 gpm LOCA will start here |
| | RO | Verify reactor subcritical <ul style="list-style-type: none"> • PR channels < 5% • IR channels SUR < 0 |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH Pressurizer pressure decreasing Pressurizer level decreasing Containment pressure increasing |
| | US | Implement and direct the actions of 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION" <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Informs SM of plant status for evaluation of E-Plan |
| | RO | Perform Immediate Actions of 1BEP-0 Verify reactor trip <ul style="list-style-type: none"> ● Rod bottom lights lit ● Reactor trip and bypass breakers open ● Flux decreasing |
| | BOP | Verify Turbine tripped <ul style="list-style-type: none"> ● All throttle valves closed ● All governor valves closed Verify 4KV ESF Busses energized <ul style="list-style-type: none"> ● Bus 141 bus alive light lit ● Bus 142 bus alive light lit |
| | CREW | Determine SI needed/actuated: <ul style="list-style-type: none"> ● SI First Out Annunciator lit (1-11-B/C/D/E1) ● SI ACTUATED lit (1-BP-4.1) ● SI Equipment actuated ● Manually Actuate SI |
| | CREW | (If manual SI not previously performed) Recognize and respond to conditions requiring a Safety Injection in accordance with 1BEP-0 "REACTOR TRIP OR SAFETY INJECTION", Step 4: <ul style="list-style-type: none"> ● Pressurizer pressure cannot be maintained > 1829 psig ● Pressurizer level cannot be maintained > 4% ● Manually initiate SI |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|---|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP/US | Verify Feedwater isolation: <ul style="list-style-type: none"> • FW pumps tripped • Isolation monitor lights lit • FW discharge valves (1FW002A/B/C) closed |
| | RO/US | NOTE: 1SI8801B may be opened at this point while verifying pump alignments (CT on page 20) Verify ECCS pumps running: <ul style="list-style-type: none"> • CV pumps • SI pumps • RH pumps |
| | BOP/US | Verify Containment Conditions: <ul style="list-style-type: none"> • RCFC Accident Mode lights lit (Group 2) • Phase A lights lit (Group 3) • Containment Ventilation lights lit (Group 6) |
| | BOP/US | Verify the following: <ul style="list-style-type: none"> • AFW Aligned: <ul style="list-style-type: none"> • 1A and 1B AFW pumps running • 1AF013A-H open • 1AF005A-H throttled • 1A and 1B CCW pumps running • 1A and 1B SX pumps running • Main Steam isolation valves and Main Steam isolation bypass valves isolated when Containment pressure >8.2 psig |
| | | NOTE: RCP Trip criteria may be met at this point |
| | RO/BOP | Determine if RCP's meet trip criteria <ul style="list-style-type: none"> • Controlled cooldown not in progress • RCS pressure <1425 psig • High head SI flow indicator (1FI-917) >100 gpm or SI pump discharge flow >200 gpm • Trip RCP's |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|-----------------------|---|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO [CT] EP-0--I | Verify ECCS valve alignment <ul style="list-style-type: none"> • Group 2 Cold Leg Injection monitor lights lit - OPEN 1SI8801B • Align SVAG Valve power switches and dispatch NLO to energize breakers ECCS Operations: <ul style="list-style-type: none"> • High Head SI flow > 100 gpm • RCS pressure < 1700 psig • SI pump flow > 200 gpm • RCS pressure < 325 psig <ul style="list-style-type: none"> ○ RH pump flow > 1000 gpm Pressurizer PORV relief path available: <ul style="list-style-type: none"> • At least one block valve energized • PORV in automatic • Associated block valve open |
| | BOP | Verify Main Generator Trip: <ul style="list-style-type: none"> • Output Breakers open • PMG Breaker open EDGs running <ul style="list-style-type: none"> • 1SX169A and B open • Dispatch operator for local check of EDG operation |
| | | Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps: |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A running • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper not full closed 0VC24Y • VC train M/U filter light lit • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open ◦ Control Room pressure greater than +0.125 inches water on 0PDI-VC038 |
| | BOP | Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed |
| | BOP | Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed |
| | RO/US | Check Pressurizer sprays & PORVs closed <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C • PORVs closed 1RY455A and 1RY456 |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | CREW | Maintain RCS temperature control <ul style="list-style-type: none"> ◦ With any RCP running, RCS Tave stable at or trending to 557 degrees F. ◦ With No RCP running, RCS Cold Leg temperature stable at or trending to 557 degrees F. |
| | CREW | Check status of RCPs <ul style="list-style-type: none"> • Determine if RCPs are running. • Check if RCPs should be stopped: • ECCS flow- high head > 100 gpm; or SI pump > 200 gpm. • RCS pressure < 1425 psig. • Controlled cooldown NOT in progress, nor previously initiated. • Stop All RCPs. |
| | BOP/CREW | Check Secondary Pressure Boundaries are intact <ul style="list-style-type: none"> • No SG pressure decreasing in uncontrolled manner • No SG completely depressurized |
| | BOP/CREW | Check SG tube intact <ul style="list-style-type: none"> • No abnormal secondary radiation |
| | BOP/CREW | Check RCS intact <ul style="list-style-type: none"> • Containment area radiation monitors > alert alarm setpoints • Containment pressure > 3.4 psig • Containment sump level lights lit |
| | US | Implement and direct actions of 1BEP-1, "LOSS OF REACTOR OR SECONDARY COOLANT" <ul style="list-style-type: none"> ◦ Get acknowledgements from RO and BOP. • Informs SM of plant status for evaluation of E-Plan |
| | RO | Check RCPs <ul style="list-style-type: none"> • No RCPs running |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Check SG Secondary pressure boundaries intact <ul style="list-style-type: none"> • No SG Pressure decreasing uncontrollably • No SG completely depressurized Check intact SG levels <ul style="list-style-type: none"> • Narrow range levels > 10% (31% Adverse) • Control Intact SG levels to 10% (31% Adverse) to 50% NR level • Narrow range levels NOT increasing in uncontrolled manner Check Secondary Radiation levels normal <ul style="list-style-type: none"> • No abnormal secondary radiation |
| | RO | Check Pressurizer PORVs and isolation valves: <ul style="list-style-type: none"> • PORV Isolation valves open and energized <ul style="list-style-type: none"> • 1RY8000A • 1RY8000B • PORVs closed <ul style="list-style-type: none"> • 1RY455A • 1RY456 |
| | CREW | Check if ECCS flow should be reduced: <ul style="list-style-type: none"> ◦ RCS Subcooling not acceptable ◦ Secondary heat sink acceptable • RCS pressure decreasing • Pzr Level <12% Determine ECCS flow should NOT be reduced. NOTE: Scenario Termination criteria is completion of step 6 of 1BEP-1 or step 6 1BEP ES-1.3 Scenario EPlan classification is MS-3 |
| | US | Implement and direct actions of 1BEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION" when RWST level < 46% (Actions on page 25) |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: At some time Containment pressure may rise to an ORANGE Path condition (without CS pumps running). If so, performance of 1BFR Z.1 "RESPONSE TO HIGH CONTAINMENT PRESSURE" may be required. Actions are covered below. CUE will be provided by the STA after monitoring the BSTs. |
| | US | Implement and direct as advised by the STA the actions of 1BFR-Z.1, "RESPONSE TO HIGH CONTAINMENT PRESSURE". <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Inform SM of plant status for evaluation of E-Plan |
| | BOP | Verify Containment isolations <ul style="list-style-type: none"> ● Phase A Group 3 lights lit ● Containment Ventilation Group 6 lights lit <p>Check if Containment Pressure has increased to > 20 psig (1PR-937 or 1PI-CS934 thru 937)</p> <ul style="list-style-type: none"> ● Stop all RCPs (previously completed) <p>Verify CS alignment: (previously complete for B Train)</p> |
| | US/BOP | Verify Group 6 Phase B isolation lights lit (previously completed) |
| | | Verify RCFCs running in accident mode (Group 2 lights lit). |
| | | Verify Main Steam Isolation <ul style="list-style-type: none"> ● Main Steam isolation valves and Main Steam isolation bypass valves closed. (previously completed) |
| | | Determine NO SGs are faulted: <ul style="list-style-type: none"> ● No Steam Generator pressure decreasing in an uncontrolled manner ● No Steam Generator completely depressurized |
| | | Return to step and procedure in effect. |

Comments: _____

| Scenario No: 03-1 | | Event No. 7,8 |
|--|----------|--|
| Event Description: LOCA / Failure of CS to actuate | | |
| Time | Position | Applicant's Actions or Behavior |
| | | NOTE: ACTIONS FOR 1BEP ES-1.3, "TRANSFER TO COLD LEG RECIRCULATION" |
| | BOP/RO | <p>Perform actions of 1BEP ES-1.3 as directed:</p> <p>Check CC pumps 2 running</p> <p>Open CC to RH Heat exchanger isolation valves</p> <ul style="list-style-type: none"> • 1CC9412A and 1CC9412B <p>Check CC flows to RH Heat exchanger</p> <ul style="list-style-type: none"> • >5000 gpm <p>Verify adequate Containment sump level</p> <ul style="list-style-type: none"> • Bottom 4 lights lit <p>Align RH pump suctions to Containment sumps:</p> <ul style="list-style-type: none"> • Place control switches for SVAG valves 480 bus feeds in close • Check Both RH pumps running • Check open 1SI8811A and 1SI8811B • Close 1SI8812A and 1SI8812B <p>Check SI and CV pumps in injection mode:</p> <ul style="list-style-type: none"> • SI pumps both running • Cold Leg Injection valves (1SI8801A/B) open <p>Align SI and CV pumps for Cold Leg Recirculation:</p> <ul style="list-style-type: none"> • Dispatch operator to energize 1SI8806 and 1SI8813 • Verify CV pump 1A miniflow isolation valves closed <ul style="list-style-type: none"> • 1CV8111 and 1CV8114 • Close SI pump miniflow isolation valves <ul style="list-style-type: none"> • 1SI8814, 1SI8920, and 1SI8813 when power restored • Close RH Heat exchanger Discharge Cross ties <ul style="list-style-type: none"> • 1RH8716A and B • Open SI and CV pump suction header Cross ties <ul style="list-style-type: none"> • 1SI8807A and B, and 1SI8924 • Check 1A RH pump running • Open 1CV8804A • Check 1B RH pump running • Open 1SI8804B <p>Start ECCS pumps as necessary (NOTE: Scenario may be terminated at this point)</p> |

Comments: _____

| Simulation Facility | <u>Byron</u> | Scenario No. 2 | Operating Test No. 2003-301 |
|--|---|---|---|
| Examiners: | _____ | Applicant: | _____ <u>SRO</u> |
| | _____ | | _____ <u>RO</u> |
| | _____ | | _____ <u>BOP</u> |
| Initial Conditions: IC-18, 75% power, steady state, BOL. | | | |
| Turnover: Ramp to full power requested by Electric Operations. 1A Motor driven FW is out of service due to breaker cubicle work. | | | |
| Event No. | Malf. No. | Event Type* | Event Description |
| Preload | RF RP64 OUT RF RP71 OUT RF RP95 OUT RF RP97 OUT FW43 MS01A 75 MS01B 80 MS01C 60 MS01D 90 FW45E, 100 Override ZDI1AF013E AUTO | C BOP C BOP C RO BOP SRO C BOP C BOP SRO | 1B Auxiliary Feedwater pump fails to auto start, can be manually started. 1A Auxiliary Feedwater pump fails to auto or manually start. All Main Steam isolation valves fail partially open, no closure available. 1AF005E potentiometer fails to 100% demand. 1AF013E stuck open. |
| 1 | | R RO SRO N BOP | Raise Reactor Power using rods and dilution Ramp up turbine power from 75% to full power. |
| 2 | RX29A 65 PN0610 on | C BOP SRO | Steam Generator 1A Feedwater regulating valve Controller card failure resulting in manual control of Feedwater regulating valve |
| 3 3A | RX13A, 0 | I RO SRO N BOP | 1LT-459, Controlling Pressurizer level channel fails low. Restore Letdown |
| 4 | CV09, 50 | C RO SRO | 1TCV-130A modulates closed |
| 5 | MS04D, 100 | C BOP SRO | 1MS018D, 1D SG PORV fails open. |
| 6 | CC03B CC01C CC02A | I BOP SRO | Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of 1A CC pump auto start on low header pressure. |
| 7 | MS07A, 2.0 (Pre-loaded) | M BOP RO SRO | 1A SG Steam line break (2 MLB/HR) inside containment. 4 faulted steam generators. All MSIVs fail to Close. Stuck open |
| 8 | 1A and 1B AFW pumps fail to Start | C BOP SRO | Pre-loaded. 1A Auxiliary Feedwater pump fails to start. 1B Auxiliary Feedwater pump can only be manually started. |

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

SCENARIO OVERVIEW

The scenario begins with the plant at 75% power and a ramp to full power @ 5 MW/Min is requested via the turnover. The turnover includes information that the 1A Motor driven FW pump is out of service for breaker cubicle work.

After the requested reactivity change, 1A Steam Generator Feedwater regulating valve 1FW510 controller will experience a card failure requiring the operator to manually control. The operators will need to monitor 1A feedwater flow during the requested load change and the rest of the scenario. The BOP will diagnose the failure and manually control the 1A S/G feed regulating valve.

Following the failure of 1A SG regulating valve controller failure, a failure of the controlling channel of Pressurizer level will occur causing letdown to isolate. The crew will respond by diagnosing the failure of the level channel and entering and performing the actions of 1BOA INST-2 Attachment C, "OPERATION WITH A FAILED INSTRUMENT – PRESSURIZER LEVEL CHANNEL FAILURE". An alternate controlling level channel will be selected, letdown will be restored, and the crew will take actions to restore pressurizer level to the program value. Bistables will be tripped for the failed channel, and Technical Specifications will be investigated. LCO 3.3.1 condition K will apply. Maintenance will investigate as requested.

Following the restoration of letdown and bistable tripping, the transmitter for 1TI-130 Letdown heat exchanger outlet temperature controller fails low causing actual letdown temperature to increase resulting in a high temperature diversion around the mixed bed demineralizers. Manual control of the temperature controller is available and will be necessary to restore letdown temperature to normal. Annunciator response procedures will be referenced to respond to the failure.

When manual control of the letdown temperature control valve is selected, a 1D S/G PORV controller failure will cause the 1D S/G PORV to open. RCS Tave will decrease possibly causing control rod motion in the outward direction. The crew will investigate and diagnose the inadvertent PORV failure. Emergency closure of the PORV will be available from the control room and the PORV may be locally isolated if directed by the crew. The SRO will determine Technical Specification 3.7.4 applies.

A Component Cooling (CC) Water surge tank level tree leak will result in low level indication causing automatic makeup from demineralized water and automatic trip of the 1B CC pump. The 1A CC pump will fail to automatically start requiring the operators to manually start the pump. The crew should identify the failure and dispatch an operator to locally isolate demineralized water makeup to the surge tank. Local surge tank level indication is available and the crew should instruct local operations to drain the surge tank to normal level and address operability concerns for 1B CC pump. The SRO will determine Technical Specification 3.7.7 applies.

A 1A S/G Steamline break inside of containment will occur requiring a safety injection. 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION" will be entered. Containment pressure will exceed the Containment Spray actuation setpoint. Manual action will be required to start the 1B Auxiliary Feedwater pump. The 1A Auxiliary Feedwater pump will fail to start. A diagnosis of a Faulted S/G will cause transition to 1BEP-2, "FAULTED SG ISOLATION". Further diagnosis will determine 4 faulted S/Gs exist due to failure of all Main Steam isolation valves to close and a transition to 1BCA-2.1, "UNCONTROLLED DEPRESSURIZATION OF ALL S/Gs" will be made. Depending on the timing, a transition to 1BFR Z.1, "RESPONSE TO CONTAINMENT HIGH PRESSURE," may occur after exiting the Reactor Trip/Safety Injection procedure. Manual operator action will be required to throttle AFW flow to a minimum to the SGs. Local operator action will be required to throttle B Train AFW flow to the faulted 1A S/G due to a failure of the potentiometer and a stuck open isolation valve. Containment Spray may be terminated (depending on the amount of secondary water inventory remaining in the SGs and the RCS temperature) before reaching the LO-2 RWST setpoint for automatic swap over to the containment sump and an unnecessary injection of sump water into the RCS. NaOH addition to the CS water could be stopped due to the break being on a secondary system. If the LO-2 RWST level is reached, then the crew will transition to 1BEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION and then back to the procedure and step in effect. The crew will proceed to terminate the safety injection in 1BCA 2.1. Scenario termination is completion of step 8 of 1BCA-2.1 or Entry into 1BEP ES-1.3 Scenario EPlan classification is HU2

Critical Tasks

- E-0—F Establish the minimum required AFW flow rate to the SGs before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped per FR-H.1.
- ECA-2.1---A Control the AFW flow rate to not less than 45 gpm per SG in order to minimize the RCS Cooldown rate before a severe (orange path) challenge develops to the integrity CSF.

SIMULATOR OPERATOR NOTES:

Simulator Setup:

Init IC 18, BOL, Xenon equilibrium, steady state.

Ensure 1B CC pump is running and 1A CC pump in standby

With the simulator running, in an expert window type cae d:\byron\2003_demos\nrc2.cae and verify the following:

Place 1A MFP control switch to Pull Out and hang tag.

RF RP64 OUT 1B AFW pump fails to auto start, can be manually started.

RF RP71 OUT

RF RP95 OUT

RF RP97 OUT

IMF FW43 1A Auxiliary Feedwater pump fails to auto or manually start.

IMF MS01A 75, MS01B 80, MS01C 60, MS01D 90 open, no closure available.

IMF FW45E 100 1AF005E potentiometer fails at 100% demand.

IOR ZD11AF013E AUTO 1AF013E stuck open.

Ensure Trigger 3 is setup as event zao1li676 .lt. 0.15 command IMF CC01C

trgset 4 "yp:mrx29a .eq. 1"

command "imf pn0610 on"

Event 1 Power ramp from 75% up to 100%.

As SM acknowledge ramp initiation.

As Radiation Protection/Chemistry acknowledge sample requirements for power change > 15% in one hour.

Event 2 Steam Generator 1A Feedwater regulating valve Controller card failure resulting in manual control of Feedwater regulating valve.

Acknowledge all info passed to the SM, WEC, and maintenance.

Trigger 4 will activate annunciator 1-4-A3. If dispatched to 1PA05J to investigate the Process I&C Cabinet Power Supply failure alarm report that no obvious problems are present.

Event 3 Controlling Pressurizer level channel fails low (1LT-459).

SDG: RX6

Malf: RX13A, 0 severity, no ramp.

Initiate at lead examiners cue.

Role play as U-2 assist and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX6

Cabinet door #1 Open

Hi Level Trip LB459A C1-751 BS-1 RF RP20 OPEN

Cabinet door #2 Close RF RX029 TRIP

RF RP20 CLOSE

Event 4 On line letdown heat exchanger (1A) Temperature transmitter for 1TI-130 fails low

SDG: CV2 and CC6

Initiate after Letdown temperature controller is placed back in automatic after event 3.

Malf: CV09, 50

Intent is to cause operator to have to take manual control of the TCV-130 controller and restore letdown temperature without having to swap letdown heat exchangers. Manual control via the M/A station is available on this malfunction. Acknowledge all info passed to the SM, WEC, and maintenance. If dispatched as local operator, use first check and report no obvious problems at the valve. Valve appears to operate smoothly from local observation. Use Remote Function CC50 to reset Penetration Cooling alarm if dispatched.

Event 5 1D SG PORV 1MS018D, fails open.

SDG: MS4

Initiate after letdown temperature is stabilized or at lead examiners cue.

Malf: MS04D, 100, no ramp

If dispatched to the controller box in the AEER, report no obvious problems. If dispatched to locally close 1MS019D, wait 5 minutes, use first check, and then use RF: MS54 CLOSE to close the isolation valve. Report 1MS019D closed when completed. Acknowledge all info passed to the SM, WEC, and maintenance. If asked, on-line risk is Yellow.

Event 6 Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of the 1A CC pump to auto start.

SDG: CC2

Malf: CC03B, 0 and CC01C and (CC02A at current value, preload)

Initiate event after actions for the Porv failure are complete or at lead examiners cue.

If dispatched as Aux NLO, report a leak on the level tree and local Surge tank levels indicate high and take actions as directed to isolate Demin water (WM) makeup to CC tank. The leak can be isolated.

If dispatched as Aux NLO, report that 1A CC pump is running normally.

Use Remote Function CC52 to close 1CC185, the manual isolation for demin water makeup to the CC surge tank 1CC183. Acknowledge all info passed to the SM, WEC, and maintenance.

If directed, use first check, and use Remote Function CC15 to drain the surge tank

If directed to isolate the leak report that you have closed 1CC9457A and 1CC9457B, level transmitter 676 isolation valves.

If directed to swap UO CC pump to Bus 142 use remote functions CC42 RO and CC07 RI

Event 7 Steam line break inside containment on 1A steamline.

Initiate events 7 and 8 after tech specs are investigated for the 1D SG PORV, or at the lead examiners cue.

Action:

SDG: MS1

Malf: MS07A, 2.0 Mlb/hr

Acknowledge all info passed to SM, WEC, and others regarding reactor trip and SI and procedure transitions.

Acknowledge direction to trip Control Room Vent fans as NLO and monitoring of DG operations

Wait 2 minutes and report Control Room Vent fans have been tripped

Acknowledge direction to energize SVAG valves per BEP 0 step 16b

After CAEP's have finished running, report the SVAG valves have been energized

USE CAEP bep0step16b2a to energize valves.

Role play as STA when asked and monitor the Status Trees. Pay particular attention to the Containment Status Tree as the intent of the scenario is reach the Hi-3 setpoint. Actions in EP-0 will ensure Containment Spray is going, however if monitoring the Status Trees identifies an Orange path, report it to the US as usage rules apply.

If dispatched as local operators to check/investigate equipment, report as follows for the requested actions:

All running equipment is operating properly.

1A Auxiliary Feedwater Pump Breaker has an over current flag on phase C. Bus 141, cub 8.

Need the floor plugs removed to get to the 1AF013E.

SDG: FW13

Use RF: FW161 to position the hand wheel for 1AF005E as requested. (8.5 will ~ 45 gpm)

Maintenance will attempt to locally close any/all MSIVs (but will be unsuccessful).

| Scenario No: 03-2 | | Event No. 1 |
|--|----------|--|
| Event Description: Raise turbine load and reactor power. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Turnover information includes request from Electric Operations for an increase in Unit 1 MW to full load (1260 MWe) to begin ASAP at 5 MWe/minute. |
| | | Note: A portion of the power increase preparations may have been performed in the briefing room |
| | US | Implement actions of 1BGP 100-3 <ul style="list-style-type: none"> • Initiate load swing instruction sheet (1BGP 100-4T2 Boration Dilution Boundary Calculation). ○ Contact Chemistry and Health Physics for load change > 15% in one hr. • Inform SM of plant Status, and Electric Operations of ramp start. |
| | CREW | Review Applicable Precautions, Limitations and Actions. |
| | RO | Verify rod position and boron concentration. Perform reactivity manipulation calculation to determine amount of RCS dilution and expected rod outward movement to maintain Delta I within the limits of BCB-1 Fig. 19. Determine required dilution volume by: <ul style="list-style-type: none"> ○ Effects of previously performed dilutions. ○ Byron Boration Dilution Tables. Initiate Dilution in accordance with BOP CV5: IF BATCH addition desired: <ul style="list-style-type: none"> • Determine the desired change in RCS Tave • Determine required gallons of primary water to change Tave IF Calculated addition desired: <ul style="list-style-type: none"> • Determine required gallons of primary water to decrease RCS boron as desired NOTE: The remaining steps will be performed for either method of dilution <ul style="list-style-type: none"> • Determine required primary flow rate • Place MAKE-UP MODE CONT SWITCH to stop position • Set MODE SELECT to dil or alt dil position • Set 1FK-111 PW/Total Flow Control to desired flow rate (may leave at current value if Batch method used) • Set 1FY-0111 PW/Total Flow Preset Counter to desired volume. • Place MAKE-UP MODE CONT Switch to start. • Verify proper operation of valves (1CV111A opens, 1CV111B opens, PW flow indicated on recorder). |

Comments: _____

| Scenario No: 03-2 | | Event No. 1 |
|--|----------|---|
| Event Description: Raise turbine load and reactor power. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Verify the DEHC IMP IN, SPEED IN, and MW IN half of the pushbuttons are illuminated. • Depress the LOAD RATE MW/MIN pushbutton. • Enter the desired load rate (<u>5 MW</u>). • Depress the ENTER pushbutton. • Depress the REF pushbutton. • Enter the desired MW on the REFERENCE DEMAND Window using the numbered pushbuttons (1120). • Depress the ENTER pushbutton. • Depress the GO pushbutton when directed by the US/RO. • Verify load begins to increase. ○ Monitor 1A SG Level |
| | RO | <p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor Reactor power, Tave, and Delta I. • Verify control rods automatically move to maintain Tave within ± 1.0 degree F of Tref. <p>If Diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level. • Monitor PW/Total counter. • Verify dilution auto stops at preset value. • Return Reactor Makeup system to blended flow at current boron concentration. |
| <p>Note: Following clearly observable plant response from the reactivity changes and lead examiners concurrence, the next event can be initiated.</p> | | |

Comments: _____

| Scenario No: 03-2 | | Event No. 2 |
|---|----------|---|
| Event Description: Steam Generator 1A Feedwater regulating valve automatic control card failure | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-4-A3 PROCESS I&C CAB PWR SUP FAILURE 1-15-A9 STEAM GENERATOR 1A LEVEL DEVIATION HIGH LOW Increased Feed Flow to 1A SG Increasing 1A SG Level |
| | BOP | Diagnose/Recognize failure of 1A Feedwater regulating valve Auto Controller. <ul style="list-style-type: none"> • Announce placing 1A Feedwater regulating valve Controller in manual. • Manually control 1FW510 to stabilize/restore level. • Dispatch operator to 1PA05J to check for failure lights per BAR 1-4-A3 |
| | US | Diagnose/Acknowledge failure of 1A Feedwater regulating valve Auto Controller. <ul style="list-style-type: none"> • Orders WEC to generate WR, CR, and get maintenance involved for repairs. |
| | RO | Monitors Reactor and Primary parameters for possible effects: <ul style="list-style-type: none"> • Reactor power and Delta I. • Tave and control rod motion. • Reports status to US. Assists BOP as directed by US: <ul style="list-style-type: none"> ○ Reviews BARs. |
| | | Note: Following actions from the failed controller and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 3 |
|---|----------|--|
| Event Description: 1LT-459 Controlling Pressurizer level channel fails LOW. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-12-A4 PZR LVL LOW HTRS OFF LTDWN SECURED 1-12-A5 PZR HTR TRIP 1-12-B4 PZR LEVEL CONT DEV LOW 1-12-C5 PZR PHASE LOSS OR REVERSAL 1-12-D5 PZR HTR SCR CLG FAN FAILURE 1LI-459 indicating 0% |
| | US | Diagnose/Acknowledge failure of 1LT-459, Controlling Pressurizer level channel and loss of letdown. Implement and direct the actions of 1BOA INST-2 Attachment C, "PRESSURIZER LEVEL CHANNEL FAILURE" <ul style="list-style-type: none"> • Identify failed Pressurizer level channel 1LT-459 <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. • Informs SM of plant status for evaluation of E-Plan <ul style="list-style-type: none"> ○ Direct WEC to write WR, CR, and get maintenance involved. ○ Evaluate holding the ramp and dilution ○ Briefs RO and Unit 2 assist NSO on bistable tripping. |
| | RO/US | Diagnose failure of 1LT-459. <ul style="list-style-type: none"> • Announce failure and loss of letdown flow. Perform actions of 1BOA INST-2 Attachment C, "PRESSURIZER LEVEL CHANNEL FAILURE" as directed by US: <ul style="list-style-type: none"> • Check Pressurizer level • If not normal, take manual control (Pressurizer Master Level controller and/ or 1CV121) to restore level. • Select operable channel (461/460, left position) for Pressurizer level control. • Select operable channel to level recorder (ANY but 459, normally on 460). • Verify Pressurizer level > 17%. <p style="text-align: center;"><u>EXAMINER'S NOTE: Tell the SRO to direct the BOP to restore letdown</u></p> <ul style="list-style-type: none"> • Check Letdown established • Re-establishes Letdown IAW BOP CV-17, "ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW" • Restores heaters to normal. • Restores automatic level control (Pressurizer Master Level Controller and/or 1CV121). • Coordinates bistable tripping (expected alarm 1-12-A3). <ul style="list-style-type: none"> •LB459A |

Comments: _____

| Scenario No: 03-2 | | Event No. 3 |
|--|----------|--|
| Event Description: 1LT-459 Controlling Pressurizer level channel fails LOW. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <p>Performs actions as directed by US/RO:</p> <ul style="list-style-type: none"> • Assist RO as directed by US/RO with panel monitoring. • Investigate BARs. <ul style="list-style-type: none"> ○ Hold/control ramp ○ Monitor 1A SG Level |
| | RO/BOP | <p>Re-establishing Letdown per BOP CV-17:</p> <ul style="list-style-type: none"> • Verify close 1CV8149A,B, and C . <ul style="list-style-type: none"> ○ Assumes CC is still aligned properly to Letdown HX. • Place 1CC-130 in manual and raise demand to 20%. • Place 1CV-131 in manual and raise demand to 20%. • Verify open 1CV8401A/B • Verify close 1CV381A • Verify open 1CV381B • Verify open 1CV8160 and 1CV8152 • Verify open 1CV8389A/B. • Verify open 1CV459 and 1CV460. • Verify open 1CV8324A/B and 1CV8389A/B. • Verify open 1CV8149A/B/C as desired. • Ensure 1CC-130 maintains temperature between 105 and 115 degrees F (1TI-130) and place in AUTO • Adjust in manual 1CV121 to match charging with letdown while establishing Pressurizer at program level and place in automatic. |
| | US | <p>Refer to Tech Spec</p> <ul style="list-style-type: none"> • 3.3.1 Reactor Trip System Instrumentation Condition K – trip channel within 6 hrs. • 3.3.4 Remote Shutdown System Condition A – Restore within 30 days • 3.3.3 Post Accident Monitoring Instrumentation Condition B – Restore within 30 days |
| NOTE: Following actions for failed Pressurizer level channel and lead examiners concurrence, the next event may be initiated. | | |

Comments: _____

| Scenario No: 03-2 | | Event No. 4 |
|--|----------|--|
| Event Description: Failure of 1TCV-130A to control temperature / modulates closed. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-9-E2 LTDWN TEMP HIGH 1-2-D7 CNMT PEN CLG FLOW HIGH LOW 1-8-C5 LTDWN HX OUTLET TEMP HIGH Indicated Letdown Heat Exchanger outlet temperature decreasing (1TI-130) Letdown Heat Exchanger outlet temperature controller 1TK-130 demand decreasing or 0% 1TCV-129 Diverts to VCT |
| Note: Crew may enter IBOA PRI-6 due to the high letdown temperature | | |
| | US | Diagnose/Acknowledge failure of 1TI-130. <ul style="list-style-type: none"> ○ Direct use of BARs. ○ Direct manual control of Letdown Heat Exchanger outlet temperature controller 1TK-130 Controller to re-establish proper letdown cooling flow. ○ Direct closing letdown orifice isolation valves <ul style="list-style-type: none"> ○ 1CV8149A ○ 1CV8149B ○ 1CV8149C ● Determine automatic control problem. ○ Dispatch operator to locally check valve and reports status to crew. ○ Contact Chemistry for Demin Effluent sample. ● Informs SM of status. ○ Order WEC to generate WR, CR, and get maintenance involved for repairs |
| | RO | Announce increasing letdown temperature trend and 1CC-130A closed. <ul style="list-style-type: none"> ○ Dispatch operator to locally check valve and reports status to US. ● Verify High Temperature divert valve diverts letdown flow and reports to US. ○ Take manual control of 1CC-130 and restores cooling flow. ○ Reduce flow by closing letdown orifice isolation valves <ul style="list-style-type: none"> ○ 1CV8149A ○ 1CV8149B ○ 1CV8149C ● Verify 1-9-E2 clears. ● Determine automatic control problem and reports to US. ● Restore letdown flow to VCT when directed by US. |

Comments: _____

| Scenario No: 03-2 | | Event No. 4 |
|--|----------|--|
| Event Description: Failure of 1TCV-130A to control temperature / modulates closed. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Review BARs Monitor control board indications. <ul style="list-style-type: none"> ○ Hold/control ramp. ○ Dispatch operator to locally check valve and reports status to US. ○ Dispatch operator to reset containment penetration cooling flow low ○ Monitor 1A SG Level ○ Assist RO as directed by SRO |
| | | NOTE: Following actions for failed temperature instrument and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 5 |
|--|----------|---|
| Event Description: 1MS018D, 1D SG PORV Fails OPEN. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Indications: RCS Tave decreasing Reactor power increasing Reactor power/ turbine power mismatch increasing Red PORV open position indication light lit. LVDT meter indication increasing above 0%. |
| | BOP | Diagnoses 1D SG PORV open <ul style="list-style-type: none"> • Determine SG pressure is below setpoint (1115 psig) • Report failure to US. Perform actions directed by US: <ul style="list-style-type: none"> • Place PORV control switch to close. <ul style="list-style-type: none"> ○ Report/Acknowledge SG 1D PORV TROUBLE annunciator (1-15-D10) as expected alarm. • Report 1D SG PORV closed. <ul style="list-style-type: none"> ○ Dispatch operator to AEER to PORV controller box. ○ Dispatch operator to locally isolate 1MS018D by closing 1MS019D. • Report status to US. |
| | US | Diagnose/Acknowledge failure of 1D SG PORV open and direct actions: <ul style="list-style-type: none"> ○ Determine SG pressure < PORV setpoint. ○ Dispatch operator to isolate PORV by closing 1MS019D. • Inform SM of plant status. ○ Order WEC to generate WR, CR, and get maintenance involved for repairs. |
| | RO | Diagnose/Acknowledge failure of 1D SG PORV OPEN. Monitor Reactor and Primary parameters for effects and expected response: <ul style="list-style-type: none"> ○ Reactor Power ○ Tave, Delta I and rod motion. ○ Assist as directed by US. ○ Investigate BARs. |
| | US | Refer to Tech Spec <ul style="list-style-type: none"> • 3.7.4 Steam Generator PORVs Condition A – Restore within 30 days ○ 3.6.3. Containment Isolation Valves (not applicable, PORV is in its isolation position.) |
| | | NOTE: Following actions for failed PORV and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 6 |
|--|----------|--|
| Event Description: Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with a failure of 1A CC pump to auto start. EVENT NOT USED – NOT NEEDED | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE: | Annunciators: 1-2-A5 CC SURGE TANK LEVEL HIGH/LOW 1-2-E4 CC SURGE TANK AUTO M/U ON 1-2-A4 CC PUMP TRIP 1B CC pump trip indication 1LI-676 indication at 0% |
| | | NOTE: 1BOA PRI-6, "COMPONENT COOLING MALFUNCTION", may be referenced but is not written to address a CC surge tank level tree leak. |
| | BOP/US | Identify/report: <ul style="list-style-type: none"> • CC Surge tank level low • Automatic makeup with CC Surge tank demin water makeup valve 1CC183 open • 1B CC pump trip • 1A CC pump did not automatically start ○ Refer to BARs |
| | CREW | Determine CC Surge tank level tree leak. <ul style="list-style-type: none"> ○ Dispatch operator to investigate • Dispatch operator to locally isolate make-up from Demin Water. • Directs operator to locally drain CC surge tank level to normal range as appropriate. |
| | BOP | Refer to BAR 1-2-E4 and manually control CC Surge tank level. <ul style="list-style-type: none"> • Manually start 1A CC pump • Dispatch operator to check 1A CC pump for proper operation. |
| | US | Refer to Tech Specs <ul style="list-style-type: none"> • 3.7.7 Component Cooling System Condition B – restore in 7 days (for 1B CC pump trip) ○ If the crew decides to conservatively declare the 1A CC pump inoperable until further information is available then LCO 3.0.3 would apply. |
| | | NOTE: Following local isolation of demin makeup, and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH 1-3-D4 CNMT PRESS HIGH 1-11-E1 CNMT PRESS HIGH SI/RX TRIP 1-15-A/B/C/D4 SG 1A/B/C/D LEVEL LOW 1-15-E4 P-4 FW ISOL Indications: Containment pressure increasing RCS temperature decreasing Increased steam flow |
| | US/CREW | Implement and direct the actions of 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION" <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Informs SM of plant status for evaluation of E-Plan ○ Manually trip reactor or respond to Auto Trip ○ Manually SI or respond to Auto SI |
| | RO | Perform actions of 1BEP-0: Verify reactor trip: <ul style="list-style-type: none"> ● Rod bottom lights Lit. ● Reactor trip and bypass breakers open. ● Neutron flux decreasing. |
| | BOP | Verify Turbine tripped <ul style="list-style-type: none"> ● All throttle valves closed ● All governor valves closed Verify 4KV ESF Busses energized <ul style="list-style-type: none"> ● Bus 141 bus alive light lit ● Bus 142 bus alive light lit |
| | RO | Determine SI needed/actuated: <ul style="list-style-type: none"> ● SI First Out Annunciator lit (1-11-B/C/D/E1) ● SI ACTUATED lit (1-BP-4.1) ● SI Equipment actuated ● Manually Actuate SI |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|---------------------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify FW Isolation: <ul style="list-style-type: none"> • FW pumps tripped. • FW Isolation Monitor Lights lit. • FW pumps discharge valves (1FW002A,B, and C) closed. |
| | RO/US | Check ECCS pumps running: <ul style="list-style-type: none"> • Both CV pumps. • Both RH pumps. • Both SI pumps. |
| | BOP/US | Verify Containment Conditions: <ul style="list-style-type: none"> • RCFC Accident Mode lights lit (Group 2) • Phase A lights lit (Group 3) • Containment Ventilation lights lit (Group 6) |
| | BOP CT E-0--F | Verify AFW SYSTEM: <ul style="list-style-type: none"> ○ Report neither AFW pump auto started. ○ Attempt start of Both AFW pumps. • Manually Start 1B AFW pump. ○ Report failure of 1A AFW pump to manually start (after attempt). ○ Report 1B AFW pump was manually started (after attempt). ○ Dispatch operator(s) to check 1A AFW pump and breaker to investigate failure to start. ○ Dispatch operator(s) to check 1B AFW pump to ensure proper operation. • 1AF013E-H open (No running pump on Train A) ○ 1AF005E full open • 1AF005F-H throttled. (No running pump on Train A) |
| | BOP | Verify Pumps Running: <ul style="list-style-type: none"> • 1A CC pump. ○ U0 CC pump • Both SX pumps. |
| | CREW | Determine Steamline Isolation Required: <ul style="list-style-type: none"> • Any SG pressure < 640 psig (or will become < 640 psig). • Containment pressure approaching 8.2 psig or has exceeded 8.2 psig. • Actuate Main Steam isolation (Both switches, and the individual MSIV switches) and verify Main Steam isolation bypasses closed. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | | Note: CS will eventually be required due to 4 SGs blowing down inside containment. When pressure exceeds 20 psig, then following step must be performed. |
| | BOP | Check if Containment Spray required: <ul style="list-style-type: none"> • Containment pressure increased to > 20 psig • Group 6 CS Monitor lights lit. • Group 6 Phase B Isolation Monitor lights lit. • Stop All RCPs. • CS Eductor Suction Flow > 15 gpm (1FI-CS013 or 1FI-CS014). • CS Eductor Additive Flow > 5 gpm (1FI-CS015 or 1FI-CS016). |
| | BOP | Align SX Cooling Towers <ul style="list-style-type: none"> • All eight riser valves open <ul style="list-style-type: none"> • 0SX163A thru 0SX163H • All four Hot Water Basin Bypass valves closed <ul style="list-style-type: none"> • 0SX162A thru 0SX162D • All eight SX Cooling Tower Fans running in high speed Verify total AFW flow: <ul style="list-style-type: none"> • > 500 gpm. • Control feed flow to maintain narrow range SG levels 10% (31% Adverse) to 50%. • Verify no SG level is increasing in an uncontrolled manner. |
| | RO/BOP | Verify ECCS Valve Alignment: <ul style="list-style-type: none"> • Group 2 Cold Leg Injection lights lit. ○ Reports Exceptions (1B CC pump, and 1A AFW pump) • Align SVAG Valve power switches and dispatch NLO to energize breakers |
| | RO | Verify ECCS Flow: <ul style="list-style-type: none"> • High Head SI flow > 100 gpm ○ RCS pressure < 1700 psig ○ SI pump flow > 200 gpm • RCS pressure > 325 psig • RH pump flow < 1000 gpm |
| | RO | Pressurizer PORV relief path available: <ul style="list-style-type: none"> • At least one block valve energized • PORV in automatic Associated block valve open |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify Generator Trip <ul style="list-style-type: none"> • OCB 3-4 open • OCB 4-5 open • PMG output breaker open |
| | BOP | Verify DGs running <ul style="list-style-type: none"> • Both DGs running • 1SX169A open • 1SX169B open |
| | | Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps: |
| | BOP | Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A running • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open ○ Control Room pressure greater than +0.125 inches water on 0PDI-VC038 |
| | BOP | Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed |
| | RO | Check Pressurizer sprays & PORVs closed <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C • PORVs closed 1RY455A and 1RY456 |
| | RO | Maintain RCS Temperature Control: <ul style="list-style-type: none"> o With any RCP running, RCS Tave stable at or trending to 557 degrees F. o With No RCP running, RCS Cold Leg temperature stable at or trending to 557 degrees F. |
| | BOP/RO | If temperature is < 557 and decreasing, then perform the following: <ul style="list-style-type: none"> • Stop dumping steam. • Maintain total feed flow > 500 gpm until at least 1 SG is > 10 % (31% Adverse). • Verify the following valves closed: <ul style="list-style-type: none"> • Steam Dump valves. • MS RHTR Shutoff valves (1MS009A-D). • MS RHTR S/U Purge Control Valves (1MS067A-D). • MFP turbine HP Stop valves. |
| | | Note: Containment pressure may have reached the spray initiation point, and the RCPs could be already stopped. If so, the diagnostic for a faulted SG will be performed and not all of the following steps will be necessary. |
| | RO | CHECK Status of RCPS: <ul style="list-style-type: none"> • Determine if RCPS are running. • Check if RCPS should be stopped: <ul style="list-style-type: none"> • ECCS flow- high head > 100 gpm; or SI pump > 200 gpm. • RCS pressure < 1425 psig. • Controlled cooldown NOT in progress, nor previously initiated. • Stop All RCPS. |
| | CREW | Determine faulted SG(s) exist: <ul style="list-style-type: none"> • ALL SG pressure decreasing uncontrollably. • Any SG completely depressurized. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|---------------------------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CREW/US | Implement and direct the actions of 1BEP-2, FAULTED STEAM GENERATOR ISOLATION: <ul style="list-style-type: none"> • Announce transition to 1BEP-2 ○ Get acknowledgements from RO and BOP. • Inform SM of plant status, evaluate for E-Plan. • Request STA report to control room for Status Tree monitoring. |
| | | Examiner's Note: The STA will monitor Status Trees when requested by the US/Crew. A challenge to Containment could be identified by the STA and he will make the recommendation to transition to and implement 1BFR-Z.1, "Response to Containment High Pressure" if containment pressure exceeds 20 psig, even if spray is already operating. Refer to page 20 for the evaluation of the crew when in 1BFR-Z.1. |
| | BOP/RO | Check Main Steam Isolation: <ul style="list-style-type: none"> • No Main Steam isolation valves closed • Main Steam bypass valves closed • Manually actuate Main Steamline isolation |
| | US | Determine All Steam Generators are Faulted: <ul style="list-style-type: none"> • Check pressures in all SGs, and determine none are stable or increasing. Implement and direct the actions of 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL SG" <ul style="list-style-type: none"> • Announce Transition to 1BCA-2.1 ○ Get acknowledgements from RO and BOP. • Inform SM of plant status, evaluate for E-Plan. |
| | BOP | Check Secondary Pressure boundary: <ul style="list-style-type: none"> ○ Request maintenance assistance to close MSIVs. • Verify Main Steam isolation bypass valves all closed. • Check all SG PORVs Closed • Check FW Isolated to all SGs (FWI Monitor lights lit). • Check SG Blowdown Isolation and Sample valves all closed. |
| | BOP/RO CT CA-2.1—A. | Control Feed Flow to Minimize RCS Cooldown: <ul style="list-style-type: none"> • Determine cooldown rate in all RCS cold legs > 100 degrees F in any one hour. • Decrease feed flow to 45 gpm to each steam generator. • Report no control of feed flow to 1A Steam Generator. ○ Set 1AF005E flow controller to 0%. ○ Attempt to throttle 1AF013E • Dispatch operator to locally close 1AF005E. • Check Hot Leg temperatures stable or decreasing. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO/BOP | Check Status of RCPs <ul style="list-style-type: none"> • NO RCP's running Monitor AFW pump Suction Pressure: <ul style="list-style-type: none"> • 1-3-E7 AF PUMP SX SUCT VLVS ARMED not lit. |
| | RO | Check Pressurizer PORVs and isolation valves: <ul style="list-style-type: none"> • PORV isolation valves 1RY8000A and 1RY8000B energized. • PORV 1RY455A and 1RY456 closed. • PORV isolation valves at least one open. |
| | BOP/US | Check Secondary radiation <ul style="list-style-type: none"> • Reset Phase A Isolation. • Request Chemistry to sample all SGs. • Check Secondary Radiation trends normal for plant conditions: <ul style="list-style-type: none"> • SJAE/GS Exhaust. • SG Blowdown Liquid. • Main Steamline Radiation. |
| | CREW | Determine RH pumps can be stopped: <ul style="list-style-type: none"> • Both RH pumps running with suction aligned to the RWST. • RCS pressure stable or increasing and > 325 psig. • Reset SI, and verify SI Actuated light not lit, and the AUTO SI BLOCKED light lit. • Stop RH pumps and place in standby. |
| | | Note: If CS is stopped in the next step, Containment pressure must be monitored for CS restart conditions (> 20 psig). |
| | BOP/US | Check if CS can be stopped: <ul style="list-style-type: none"> • Both CS pumps are running. • Reset CS signal. • Spray additive tank low 2 lights are not lit • Close 1CS019A and 1CS019B (per Caution prior to step 8, 1BCA-2.1). Check Containment pressure < 15 psig. <ul style="list-style-type: none"> • If Containment pressure < 15 psig, stop both CS pumps. • If CS pumps stopped, Verify/Close 1CS019A and 1CS019B, and 1CS007A and 1CS007B. |
| | | Examiner's Note: Scenario termination is completion of Step 8 of BCA-2.1 or Entry into BEP ES-1.3 Scenario EPlan classification is HU2 |

Comments: _____

| | | |
|--|----------|--|
| Scenario No: 2 | | Event No. 7 |
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | | Note: The following is to be used whenever the crew implements 1BFR-Z.1, "Response to High Containment Pressure". |
| | US | <ul style="list-style-type: none"> • Implement and direct the actions of 1BFR-Z.1: • Announces procedure transition ○ Get acknowledgements from RO/BOP. • Informs SM of plant status and E-Plan evaluation. |
| | RO/BOP | Perform actions of 1BFR-Z.1 as directed: <ul style="list-style-type: none"> • Verify Containment isolation Phase A- Group 3 Containment isolation monitor lights lit. • Verify Containment Ventilation isolation- Group 6 Containment Vent isolation monitor lights lit. • Determines CS is required (Containment pressure has increased to > 20 psig). • Stops all RCPs if NOT previously stopped. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <ul style="list-style-type: none"> ○ Performs actions of 1BFR-Z.1 as directed: • Verifies proper CS system alignment: • CS suction valves open <ul style="list-style-type: none"> • 1CS001A\ 1CS009A, or 1CS001B\ 1CS009B. • CS pump header isolation valves open <ul style="list-style-type: none"> • 1CS007A and 1CS007B. • CS eductor spray additive valves open <ul style="list-style-type: none"> • 1CS019A and 1CS019B. • CS eductor inlet flow control valves open <ul style="list-style-type: none"> • 1CS010A and 1CS010B. • CS pumps running. • Group 6 Phase B lights Lit. • CS pump discharge flow > 200 gpm (1FI-CS011\1FI-CS012) • CS eductor suction flow > 15 gpm (1FI-CS013\ 1FI-CS-014). • CS eductor additive flow > 5 gpm (1FI-CS015\ 1FI-CS016). • Reset CS signal. • Check Spray additive tank LO-2 lights <ul style="list-style-type: none"> • then closes 1CS019A and 1CS019B even if NOT lit per Caution prior to Step 3, 1BFR-Z.1 (Secondary Break only). <p>Align SX Cooling Towers</p> <ul style="list-style-type: none"> • All eight riser valves open <ul style="list-style-type: none"> • 0SX163A thru 0SX163H • All four Hot Water Basin Bypass valves closed <ul style="list-style-type: none"> • 0SX162A thru 0SX162D • All eight SX Cooling Tower Fans running in high speed • Verify RCFCs running in Accident Mode <ul style="list-style-type: none"> • Group 2 RCFC Accident Mode status lights lit. • Determines Main Steamline isolation necessary and manually actuates Main Steamline isolation and verifies Main Steam bypass valves closed. Reports all Main Steam isolation valves still open. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|-------------------------------------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP CT: CA-2.1—A. | <ul style="list-style-type: none"> ○ Determine all SGs are faulted and controls AFW Flow: <ul style="list-style-type: none"> ● Any SG pressure decreasing uncontrollably or completely depressurized. ● Control AFW flow to 1B, 1C, and 1D SG at 45 gpm per SG by throttling 1AF005F, G, and H; or 1AF013F, G, and H. ● Attempt Control of AFW to 1A SG via 1AF005E, and 1AF013E and reports no control available. ○ Set potentiometer for 1AF005E to 0%. <ul style="list-style-type: none"> ● Dispatches operator to locally throttle 1AF005E. ● Checks FW isolated to all SGs <ul style="list-style-type: none"> ● All FW Isolation Monitor lights lit. |
| | US | <ul style="list-style-type: none"> ● Returns to step and procedure in effect: ● Announces procedure transition and gets acknowledgements for RO and BOP. ● Informs SM of Status. |

Comments: _____

Simulation Facility Byron Scenario No. 2a Operating Test No. 2003-301

Examiners: _____ Applicant: _____ SRO
 _____ RO
 _____ BOP

Initial Conditions: IC-18, 75% power, steady state, BOL.

Turnover: Ramp to full power requested by Electric Operations. 1A Motor driven FW is out of service due to breaker cubicle work.

| Event No. | Malf. No. | Event Type* | Event Description |
|-----------|---|---|---|
| Preload | RF RP64 OUT RF RP71 OUT RF RP95 OUT RF RP97 OUT FW43 MS01A 75 MS01B 80 MS01C 60 MS01D 90 FW45E, 100 Override ZDI1AF013E AUTO | C BOP C BOP C RO BOP SRO C BOP C BOP SRO | 1B Auxiliary Feedwater pump fails to auto start, can be manually started. 1A Auxiliary Feedwater pump fails to auto or manually start. All Main Steam isolation valves fail partially open, no closure available. 1AF005E potentiometer fails to 100% demand. 1AF013E stuck open. |
| 1 | | R RO —SRO N BOP | Raise Reactor Power using rods and dilution Ramp up turbine power from 75% to full power. |
| 2 | RX29A 65 PN0610 on | C BOP SRO | Steam Generator 1A Feedwater regulating valve Controller card failure resulting in manual control of Feedwater regulating valve |
| 3 3A | RX13A, 0 | I RO SRO N BOP | 1LT-459, Controlling Pressurizer level channel fails low. Restore Letdown |
| 4 | CV09, 50 | C RO —SRO | 1TCV 130A modulates closed |
| 5 | MS04D, 100 | C BOP SRO | 1MS018D, 1D SG PORV fails open. |
| 6 | CC03B CC01C CC02A | I BOP —SRO | Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of 1A CC pump auto start on low header pressure. |
| 7 | MS07A, 2.0 (Pre-loaded) | M BOP RO SRO | 1A SG Steam line break (2 MLB/HR) inside containment. 4 faulted steam generators. All MSIVs fail to Close. Stuck open |
| 8 | 1A and 1B AFW pumps fail to Start | C BOP SRO | Pre-loaded. 1A Auxiliary Feedwater pump fails to start. 1B Auxiliary Feedwater pump can only be manually started. |

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

SCENARIO OVERVIEW

The scenario begins with the plant at 75% power and a ramp to full power @ 5 MW/Min is requested via the turnover. The turnover includes information that the 1A Motor driven FW pump is out of service for breaker cubicle work.

After the requested reactivity change, 1A Steam Generator Feedwater regulating valve 1FW510 controller will experience a card failure requiring the operator to manually control. The operators will need to monitor 1A feedwater flow during the requested load change and the rest of the scenario. The BOP will diagnose the failure and manually control the 1A S/G feed regulating valve.

Following the failure of 1A SG regulating valve controller failure, a failure of the controlling channel of Pressurizer level will occur causing letdown to isolate. The crew will respond by diagnosing the failure of the level channel and entering and performing the actions of 1BOA INST-2 Attachment C, "OPERATION WITH A FAILED INSTRUMENT – PRESSURIZER LEVEL CHANNEL FAILURE". An alternate controlling level channel will be selected, letdown will be restored, and the crew will take actions to restore pressurizer level to the program value. Bistables will be tripped for the failed channel, and Technical Specifications will be investigated. LCO 3.3.1 condition K will apply. Maintenance will investigate as requested.

Following the restoration of letdown and bistable tripping, the transmitter for 1TI-130 Letdown heat exchanger outlet temperature controller fails low causing actual letdown temperature to increase resulting in a high temperature diversion around the mixed bed demineralizers. Manual control of the temperature controller is available and will be necessary to restore letdown temperature to normal. Annunciator response procedures will be referenced to respond to the failure.

When manual control of the letdown temperature control valve is selected, a 1D S/G PORV controller failure will cause the 1D S/G PORV to open. RCS Tave will decrease possibly causing control rod motion in the outward direction. The crew will investigate and diagnose the inadvertent PORV failure. Emergency closure of the PORV will be available from the control room and the PORV may be locally isolated if directed by the crew. The SRO will determine Technical Specification 3.7.4 applies.

A Component Cooling (CC) Water surge tank level tree leak will result in low level indication causing automatic makeup from demineralized water and automatic trip of the 1B CC pump. The 1A CC pump will fail to automatically start requiring the operators to manually start the pump. The crew should identify the failure and dispatch an operator to locally isolate demineralized water makeup to the surge tank. Local surge tank level indication is available and the crew should instruct local operations to drain the surge tank to normal level and address operability concerns for 1B CC pump. The SRO will determine Technical Specification 3.7.7 applies.

A 1A S/G Steamline break inside of containment will occur requiring a safety injection. 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION" will be entered. Containment pressure will exceed the Containment Spray actuation setpoint. Manual action will be required to start the 1B Auxiliary Feedwater pump. The 1A Auxiliary Feedwater pump will fail to start. A diagnosis of a Faulted S/G will cause transition to 1BEP-2, "FAULTED SG ISOLATION". Further diagnosis will determine 4 faulted S/Gs exist due to failure of all Main Steam isolation valves to close and a transition to 1BCA-2.1, "UNCONTROLLED DEPRESSURIZATION OF ALL S/Gs" will be made. Depending on the timing, a transition to 1BFR Z.1, "RESPONSE TO CONTAINMENT HIGH PRESSURE," may occur after exiting the Reactor Trip/Safety Injection procedure. Manual operator action will be required to throttle AFW flow to a minimum to the SGs. Local operator action will be required to throttle B Train AFW flow to the faulted 1A S/G due to a failure of the potentiometer and a stuck open isolation valve. Containment Spray may be terminated (depending on the amount of secondary water inventory remaining in the SGs and the RCS temperature) before reaching the LO-2 RWST setpoint for automatic swap over to the containment sump and an unnecessary injection of sump water into the RCS. NaOH addition to the CS water could be stopped due to the break being on a secondary system. If the LO-2 RWST level is reached, then the crew will transition to 1BEP ES-1.3, TRANSFER TO COLD LEG RECIRCULATION and then back to the procedure and step in effect. The crew will proceed to terminate the safety injection in 1BCA 2.1. Scenario termination is completion of step 8 of 1BCA-2.1 or Entry into 1BEP ES-1.3 Scenario EPlan classification is HU2

Critical Tasks

- E-0—F Establish the minimum required AFW flow rate to the SGs before transition out of E-0, unless the transition is to FR-H.1, in which case the task must be initiated before RCPs are manually tripped per FR-H.1.
- ECA-2.1---A Control the AFW flow rate to not less than 45 gpm per SG in order to minimize the RCS Cooldown rate before a severe (orange path) challenge develops to the integrity CSF.

SIMULATOR OPERATOR NOTES:

Simulator Setup:

Init IC 18, BOL, Xenon equilibrium, steady state.

Ensure 1B CC pump is running and 1A CC pump in standby

With the simulator running, in an expert window type cae d:\byron\2003_demos\nrc2.cae and verify the following:

Place 1A MFP control switch to Pull Out and hang tag.

RF RP64 OUT 1B AFW pump fails to auto start, can be manually started.

RF RP71 OUT

RF RP95 OUT

RF RP97 OUT

IMF FW43 1A Auxiliary Feedwater pump fails to auto or manually start.

IMF MS01A 75, MS01B 80, MS01C 60, MS01D 90 open, no closure available.

IMF FW45E 100 1AF005E potentiometer fails at 100% demand.

IOR ZD11AF013E AUTO 1AF013E stuck open.

Ensure Trigger 3 is setup as event zao1li676 .lt. 0.15 command IMF CC01C

trgset 4 "yp:mrx29a .eq. 1"

command "imf pn0610 on"

Event 1 Power ramp from 75% up to 100%.

As SM acknowledge ramp initiation.

As Radiation Protection/Chemistry acknowledge sample requirements for power change > 15% in one hour.

Event 2 Steam Generator 1A Feedwater regulating valve Controller card failure resulting in manual control of Feedwater regulating valve.

Acknowledge all info passed to the SM, WEC, and maintenance.

Trigger 4 will activate annunciator 1-4-A3. If dispatched to 1PA05J to investigate the Process I&C Cabinet Power Supply failure alarm report that no obvious problems are present.

Event 3 Controlling Pressurizer level channel fails low (1LT-459).

SDG: RX6

Malf: RX13A, 0 severity, no ramp.

Initiate at lead examiners cue.

Role play as U-2 assist and/or extra NSO to accomplish bistable tripping. Acknowledge all info passed to the SM, WEC, and maintenance.

SDG: RX6

Cabinet door #1 Open

Hi Level Trip LB459A C1-751 BS-1 RF RP20 OPEN

Cabinet door #2 Close RF RX029 TRIP

RF RP20 CLOSE

Event 4 On line letdown heat exchanger (1A) Temperature transmitter for 1TI-130 fails low

SDG: CV2 and CC6

Initiate after Letdown temperature controller is placed back in automatic after event 3.

Malf: CV09, 50

Intent is to cause operator to have to take manual control of the TCV-130 controller and restore letdown temperature without having to swap letdown heat exchangers. Manual control via the M/A station is available on this malfunction. Acknowledge all info passed to the SM, WEC, and maintenance. If dispatched as local operator, use first check and report no obvious problems at the valve. Valve appears to operate smoothly from local observation. Use Remote Function CC50 to reset Penetration Cooling alarm if dispatched.

Event 5 1D SG PORV 1MS018D, fails open.

SDG: MS4

Initiate after letdown temperature is stabilized or at lead examiners cue.

Malf: MS04D, 100, no ramp

If dispatched to the controller box in the AEER, report no obvious problems. If dispatched to locally close 1MS019D, wait 5 minutes, use first check, and then use RF: MS54 CLOSE to close the isolation valve. Report 1MS019D closed when completed. Acknowledge all info passed to the SM, WEC, and maintenance. If asked, on-line risk is Yellow.

Event 6 Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with failure of the 1A CC pump to auto start.

SDG: CC2

Malf: CC03B, 0 and CC01C and (CC02A at current value, preload)

Initiate event after actions for the Porv failure are complete or at lead examiners cue.

If dispatched as Aux NLO, report a leak on the level tree and local Surge tank levels indicate high and take actions as directed to isolate Demin water (WM) makeup to CC tank. The leak can be isolated.

If dispatched as Aux NLO, report that 1A CC pump is running normally.

Use Remote Function CC52 to close 1CC185, the manual isolation for demin water makeup to the CC surge tank 1CC183.

Acknowledge all info passed to the SM, WEC, and maintenance.

If directed, use first check, and use Remote Function CC15 to drain the surge tank

If directed to isolate the leak report that you have closed 1CC9457A and 1CC9457B, level transmitter 676 isolation valves.

If directed to swap UO CC pump to Bus 142 use remote functions CC42 RO and CC07 RI

Event 7 Steam line break inside containment on 1A steamline.

Initiate events 7 and 8 after tech specs are investigated for the 1D SG PORV, or at the lead examiners cue.

Action:

SDG: MS1

Malf: MS07A, 2.0 Mlb/hr

Acknowledge all info passed to SM, WEC, and others regarding reactor trip and SI and procedure transitions.

Acknowledge direction to trip Control Room Vent fans as NLO and monitoring of DG operations

Wait 2 minutes and report Control Room Vent fans have been tripped

Acknowledge direction to energize SVAG valves per BEP 0 step 16b

After CAEP's have finished running, report the SVAG valves have been energized

USE CAEP bep0step16b2a to energize valves.

Role play as STA when asked and monitor the Status Trees. Pay particular attention to the Containment Status Tree as the intent of the scenario is reach the Hi-3 setpoint. Actions in EP-0 will ensure Containment Spray is going, however if monitoring the Status Trees identifies an Orange path, report it to the US as usage rules apply.

If dispatched as local operators to check/investigate equipment, report as follows for the requested actions:

All running equipment is operating properly.

1A Auxiliary Feedwater Pump Breaker has an over current flag on phase C. Bus 141, cub 8.

Need the floor plugs removed to get to the 1AF013E.

SDG: FW13

Use RF: FW161 to position the hand wheel for 1AF005E as requested. (8.5 will ~ 45 gpm)

Maintenance will attempt to locally close any/all MSIVs (but will be unsuccessful).

| Scenario No: 03-2 | | Event No. 1 |
|--|----------|--|
| Event Description: Raise turbine load and reactor power. EVENT NOT USED | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Turnover information includes request from Electric Operations for an increase in Unit 1 MW to full load (1260 MWe) to begin ASAP at 5 MWe/minute. |
| | | Note: A portion of the power increase preparations may have been performed in the briefing room |
| | US | Implement actions of 1BGP 100-3 <ul style="list-style-type: none"> • Initiate load swing instruction sheet (1BGP 100-4T2 Boration Dilution Boundary Calculation). ○ Contact Chemistry and Health Physics for load change > 15% in one hr. • Inform SM of plant Status, and Electric Operations of ramp start. |
| | CREW | Review Applicable Precautions, Limitations and Actions. |
| | RO | Verify rod position and boron concentration. Perform reactivity manipulation calculation to determine amount of RCS dilution and expected rod outward movement to maintain Delta I within the limits of BCB-1 Fig. 19. Determine required dilution volume by: <ul style="list-style-type: none"> ○ Effects of previously performed dilutions. ○ Byron Boration Dilution Tables. Initiate Dilution in accordance with BOP CV5: IF BATCH addition desired: <ul style="list-style-type: none"> • Determine the desired change in RCS Tave • Determine required gallons of primary water to change Tave IF Calculated addition desired: <ul style="list-style-type: none"> • Determine required gallons of primary water to decrease RCS boron as desired NOTE: The remaining steps will be performed for either method of dilution <ul style="list-style-type: none"> • Determine required primary flow rate • Place MAKE-UP MODE CONT SWITCH to stop position • Set MODE SELECT to dil or alt dil position • Set 1FK-111 PW/Total Flow Control to desired flow rate (may leave at current value if Batch method used) • Set 1FY-0111 PW/Total Flow Preset Counter to desired volume. • Place MAKE-UP MODE CONT Switch to start. • Verify proper operation of valves (1CV111A opens, 1CV111B opens, PW flow indicated on recorder). |

Comments: _____

| Scenario No: 03-2 | | Event No. 1 |
|---|----------|---|
| Event Description: Raise turbine load and reactor power. EVENT NOT USED | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <p>Initiate turbine load increase:</p> <ul style="list-style-type: none"> • Verify the DEHC IMP IN, SPEED IN, and MW IN half of the pushbuttons are illuminated. • Depress the LOAD RATE MW/MIN pushbutton. • Enter the desired load rate (<u>5 MW</u>). • Depress the ENTER pushbutton. • Depress the REF pushbutton. • Enter the desired MW on the REFERENCE DEMAND Window using the numbered pushbuttons (1120). • Depress the ENTER pushbutton. • Depress the GO pushbutton when directed by the US/RO. • Verify load begins to increase. ○ Monitor 1A SG Level |
| | RO | <p>Monitor power increase:</p> <ul style="list-style-type: none"> • Monitor Reactor power, Tave, and Delta I. • Verify control rods automatically move to maintain Tave within ± 1.0 degree F of Tref. <p>If Diluting:</p> <ul style="list-style-type: none"> • Monitor VCT level. • Monitor PW/Total counter. • Verify dilution auto stops at preset value. • Return Reactor Makeup system to blended flow at current boron concentration. |
| Note: Following clearly observable plant response from the reactivity changes and lead examiners concurrence, the next event can be initiated. | | |

Comments: _____

| Scenario No: 03-2 | | Event No. 2 |
|---|----------|---|
| Event Description: Steam Generator 1A Feedwater regulating valve automatic control card failure | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-4-A3 PROCESS I&C CAB PWR SUP FAILURE 1-15-A9 STEAM GENERATOR 1A LEVEL DEVIATION HIGH LOW Increased Feed Flow to 1A SG Increasing 1A SG Level |
| | BOP | Diagnose/Recognize failure of 1A Feedwater regulating valve Auto Controller. <ul style="list-style-type: none"> • Announce placing 1A Feedwater regulating valve Controller in manual. • Manually control 1FW510 to stabilize/restore level. • Dispatch operator to 1PA05J to check for failure lights per BAR 1-4-A3 |
| | US | Diagnose/Acknowledge failure of 1A Feedwater regulating valve Auto Controller. <ul style="list-style-type: none"> • Orders WEC to generate WR, CR, and get maintenance involved for repairs. |
| | RO | Monitors Reactor and Primary parameters for possible effects: <ul style="list-style-type: none"> • Reactor power and Delta I. • Tave and control rod motion. • Reports status to US. Assists BOP as directed by US: <ul style="list-style-type: none"> ○ Reviews BARs. |
| | | Note: Following actions from the failed controller and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 3 |
|---|----------|--|
| Event Description: 1LT-459 Controlling Pressurizer level channel fails LOW. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-12-A4 PZR LVL LOW HTRS OFF LTDWN SECURED 1-12-A5 PZR HTR TRIP 1-12-B4 PZR LEVEL CONT DEV LOW 1-12-C5 PZR PHASE LOSS OR REVERSAL 1-12-D5 PZR HTR SCR CLG FAN FAILURE 1LI-459 indicating 0% |
| | US | Diagnose/Acknowledge failure of 1LT-459, Controlling Pressurizer level channel and loss of letdown. Implement and direct the actions of 1BOA INST-2 Attachment C, "PRESSURIZER LEVEL CHANNEL FAILURE" <ul style="list-style-type: none"> • Identify failed Pressurizer level channel 1LT-459 ○ Get acknowledgements from RO and BOP. • Informs SM of plant status for evaluation of E-Plan ○ Direct WEC to write WR, CR, and get maintenance involved. ○ Evaluate holding the ramp and dilution ○ Briefs RO and Unit 2 assist NSO on bistable tripping. |
| | RO/US | Diagnose failure of 1LT-459. <ul style="list-style-type: none"> • Announce failure and loss of letdown flow. Perform actions of 1BOA INST-2 Attachment C, "PRESSURIZER LEVEL CHANNEL FAILURE" as directed by US: <ul style="list-style-type: none"> • Check Pressurizer level • If not normal, take manual control (Pressurizer Master Level controller and/ or 1CV121) to restore level. • Select operable channel (461/460, left position) for Pressurizer level control. • Select operable channel to level recorder (ANY but 459, normally on 460). • Verify Pressurizer level > 17%. <p style="text-align: center;"><u>EXAMINER'S NOTE: Tell the SRO to direct the BOP to restore letdown</u></p> <ul style="list-style-type: none"> • Check Letdown established • Re-establishes Letdown IAW BOP CV-17, "ESTABLISHING AND SECURING NORMAL AND RH LETDOWN FLOW" • Restores heaters to normal. • Restores automatic level control (Pressurizer Master Level Controller and/or 1CV121). • Coordinates bistable tripping (expected alarm 1-12-A3). <ul style="list-style-type: none"> •LB459A |

Comments: _____

| Scenario No: 03-2 | | Event No. 3 |
|--|----------|--|
| Event Description: 1LT-459 Controlling Pressurizer level channel fails LOW. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <p>Performs actions as directed by US/RO:</p> <ul style="list-style-type: none"> • Assist RO as directed by US/RO with panel monitoring. • Investigate BARs. <ul style="list-style-type: none"> ○ Hold/control ramp ○ Monitor 1A SG Level |
| | RO/BOP | <p>Re-establishing Letdown per BOP CV-17:</p> <ul style="list-style-type: none"> • Verify close 1CV8149A,B, and C . <ul style="list-style-type: none"> ○ Assumes CC is still aligned properly to Letdown HX. • Place 1CC-130 in manual and raise demand to 20%. • Place 1CV-131 in manual and raise demand to 20%. • Verify open 1CV8401A/B • Verify close 1CV381A • Verify open 1CV381B • Verify open 1CV8160 and 1CV8152 • Verify open 1CV8389A/B. • Verify open 1CV459 and 1CV460. • Verify open 1CV8324A/B and 1CV8389A/B. • Verify open 1CV8149A/B/C as desired. • Ensure 1CC-130 maintains temperature between 105 and 115 degrees F (1TI-130) and place in AUTO • Adjust in manual 1CV121 to match charging with letdown while establishing Pressurizer at program level and place in automatic. |
| | US | <p>Refer to Tech Spec</p> <ul style="list-style-type: none"> • 3.3.1 Reactor Trip System Instrumentation Condition K – trip channel within 6 hrs. • 3.3.4 Remote Shutdown System Condition A – Restore within 30 days • 3.3.3 Post Accident Monitoring Instrumentation Condition B – Restore within 30 days |
| NOTE: Following actions for failed Pressurizer level channel and lead examiners concurrence, the next event may be initiated. | | |

Comments: _____

| Scenario No: 03-2 | | Event No. 4 |
|--|----------|--|
| Event Description: Failure of 1TCV-130A to control temperature / modulates closed. EVENT NOT USED | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-9-E2 LTDWN TEMP HIGH 1-2-D7 CNMT PEN CLG FLOW HIGH LOW 1-8-C5 LTDWN HX OUTLET TEMP HIGH Indicated Letdown Heat Exchanger outlet temperature decreasing (1TI-130) Letdown Heat Exchanger outlet temperature controller 1TK-130 demand decreasing or 0% 1TCV-129 Diverts to VCT |
| | | Note: Crew may enter IBOA PRI-6 due to the high letdown temperature |
| | US | Diagnose/Acknowledge failure of 1TI-130. <ul style="list-style-type: none"> ○ Direct use of BARs. ○ Direct manual control of Letdown Heat Exchanger outlet temperature controller 1TK-130 Controller to re-establish proper letdown cooling flow. ○ Direct closing letdown orifice isolation valves <ul style="list-style-type: none"> ○ 1CV8149A ○ 1CV8149B ○ 1CV8149C ● Determine automatic control problem. ○ Dispatch operator to locally check valve and reports status to crew. ○ Contact Chemistry for Demin Effluent sample. ● Informs SM of status. ○ Order WEC to generate WR, CR, and get maintenance involved for repairs |
| | RO | Announce increasing letdown temperature trend and 1CC-130A closed. <ul style="list-style-type: none"> ○ Dispatch operator to locally check valve and reports status to US. ● Verify High Temperature divert valve diverts letdown flow and reports to US. ○ Take manual control of 1CC-130 and restores cooling flow. ○ Reduce flow by closing letdown orifice isolation valves <ul style="list-style-type: none"> ○ 1CV8149A ○ 1CV8149B ○ 1CV8149C ● Verify 1-9-E2 clears. ● Determine automatic control problem and reports to US. ● Restore letdown flow to VCT when directed by US. |

Comments: _____

| Scenario No: 03-2 | | Event No. 4 |
|--|----------|--|
| Event Description: Failure of 1TCV-130A to control temperature / modulates closed. EVENT NOT USED | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Review BARs Monitor control board indications. <ul style="list-style-type: none"> ○ Hold/control ramp. ○ Dispatch operator to locally check valve and reports status to US. ○ Dispatch operator to reset containment penetration cooling flow low ○ Monitor 1A SG Level ○ Assist RO as directed by SRO |
| | | NOTE: Following actions for failed temperature instrument and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 5 |
|--|----------|---|
| Event Description: 1MS018D, 1D SG PORV Fails OPEN. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Indications: RCS Tave decreasing Reactor power increasing Reactor power/ turbine power mismatch increasing Red PORV open position indication light lit. LVDT meter indication increasing above 0%. |
| | BOP | Diagnoses 1D SG PORV open <ul style="list-style-type: none"> • Determine SG pressure is below setpoint (1115 psig) • Report failure to US. Perform actions directed by US: <ul style="list-style-type: none"> • Place PORV control switch to close. <ul style="list-style-type: none"> ○ Report/Acknowledge SG 1D PORV TROUBLE annunciator (1-15-D10) as expected alarm. • Report 1D SG PORV closed. <ul style="list-style-type: none"> ○ Dispatch operator to AEER to PORV controller box. ○ Dispatch operator to locally isolate 1MS018D by closing 1MS019D. • Report status to US. |
| | US | Diagnose/Acknowledge failure of 1D SG PORV open and direct actions: <ul style="list-style-type: none"> ○ Determine SG pressure < PORV setpoint. ○ Dispatch operator to isolate PORV by closing 1MS019D. • Inform SM of plant status. ○ Order WEC to generate WR, CR, and get maintenance involved for repairs. |
| | RO | Diagnose/Acknowledge failure of 1D SG PORV OPEN. Monitor Reactor and Primary parameters for effects and expected response: <ul style="list-style-type: none"> ○ Reactor Power ○ Tave, Delta I and rod motion. ○ Assist as directed by US. ○ Investigate BARs. |
| | US | Refer to Tech Spec <ul style="list-style-type: none"> • 3.7.4 Steam Generator PORVs Condition A – Restore within 30 days ○ 3.6.3. Containment Isolation Valves (not applicable, PORV is in its isolation position.) |
| | | NOTE: Following actions for failed PORV and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 03-2 | | Event No. 6 |
|---|----------|--|
| Event Description: Component Cooling (CC) Surge Tank level transmitter level tree leak results in auto makeup and 1B CC pump trip with a failure of 1A CC pump to auto start. EVENT NOT USED | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE: | Annunciators: 1-2-A5 CC SURGE TANK LEVEL HIGH/LOW 1-2-E4 CC SURGE TANK AUTO M/U ON 1-2-A4 CC PUMP TRIP 1B CC pump trip indication 1LI-676 indication at 0% |
| | | NOTE: 1BOA PRI-6, "COMPONENT COOLING MALFUNCTION", may be referenced but is not written to address a CC surge tank level tree leak. |
| | BOP/US | Identify/report: <ul style="list-style-type: none"> • CC Surge tank level low • Automatic makeup with CC Surge tank demin water makeup valve 1CC183 open • 1B CC pump trip • 1A CC pump did not automatically start ○ Refer to BARs |
| | CREW | Determine CC Surge tank level tree leak. <ul style="list-style-type: none"> ○ Dispatch operator to investigate • Dispatch operator to locally isolate make-up from Demin Water. • Directs operator to locally drain CC surge tank level to normal range as appropriate. |
| | BOP | Refer to BAR 1-2-E4 and manually control CC Surge tank level. <ul style="list-style-type: none"> • Manually start 1A CC pump • Dispatch operator to check 1A CC pump for proper operation. |
| | US | Refer to Tech Specs <ul style="list-style-type: none"> • 3.7.7 Component Cooling System Condition B – restore in 7 days (for 1B CC pump trip) ○ If the crew decides to conservatively declare the 1A CC pump inoperable until further information is available then LCO 3.0.3 would apply. |
| | | NOTE: Following local isolation of demin makeup, and lead examiners concurrence, the next event may be initiated. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CUE | Annunciators: 1-1-A2 CNMT DRAIN LEAK DETECT FLOW HIGH 1-3-D4 CNMT PRESS HIGH 1-11-E1 CNMT PRESS HIGH SI/RX TRIP 1-15-A/B/C/D4 SG 1A/B/C/D LEVEL LOW 1-15-E4 P-4 FW ISOL Indications: Containment pressure increasing RCS temperature decreasing Increased steam flow |
| | US/CREW | Implement and direct the actions of 1BEP-0, "REACTOR TRIP OR SAFETY INJECTION" <ul style="list-style-type: none"> ○ Get acknowledgements from RO and BOP. ● Informs SM of plant status for evaluation of E-Plan ○ Manually trip reactor or respond to Auto Trip ○ Manually SI or respond to Auto SI |
| | RO | Perform actions of 1BEP-0: Verify reactor trip: <ul style="list-style-type: none"> ● Rod bottom lights Lit. ● Reactor trip and bypass breakers open. ● Neutron flux decreasing. |
| | BOP | Verify Turbine tripped <ul style="list-style-type: none"> ● All throttle valves closed ● All governor valves closed Verify 4KV ESF Busses energized <ul style="list-style-type: none"> ● Bus 141 bus alive light lit ● Bus 142 bus alive light lit |
| | RO | Determine SI needed/actuated: <ul style="list-style-type: none"> ● SI First Out Annunciator lit (1-11-B/C/D/E1) ● SI ACTUATED lit (1-BP-4.1) ● SI Equipment actuated ● Manually Actuate SI |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|---------------------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify FW Isolation: <ul style="list-style-type: none"> • FW pumps tripped. • FW Isolation Monitor Lights lit. • FW pumps discharge valves (1FW002A,B, and C) closed. |
| | RO/US | Check ECCS pumps running: <ul style="list-style-type: none"> • Both CV pumps. • Both RH pumps. • Both SI pumps. |
| | BOP/US | Verify Containment Conditions: <ul style="list-style-type: none"> • RCFC Accident Mode lights lit (Group 2) • Phase A lights lit (Group 3) • Containment Ventilation lights lit (Group 6) |
| | BOP CT E-0--F | Verify AFW SYSTEM: <ul style="list-style-type: none"> ○ Report neither AFW pump auto started. ○ Attempt start of Both AFW pumps. • Manually Start 1B AFW pump. ○ Report failure of 1A AFW pump to manually start (after attempt). ○ Report 1B AFW pump was manually started (after attempt). ○ Dispatch operator(s) to check 1A AFW pump and breaker to investigate failure to start. ○ Dispatch operator(s) to check 1B AFW pump to ensure proper operation. • 1AF013E-H open (No running pump on Train A) ○ 1AF005E full open • 1AF005F-H throttled. (No running pump on Train A) |
| | BOP | Verify Pumps Running: <ul style="list-style-type: none"> • 1A CC pump. ○ U0 CC pump • Both SX pumps. |
| | CREW | Determine Steamline Isolation Required: <ul style="list-style-type: none"> • Any SG pressure < 640 psig (or will become < 640 psig). • Containment pressure approaching 8.2 psig or has exceeded 8.2 psig. • Actuate Main Steam isolation (Both switches, and the individual MSIV switches) and verify Main Steam isolation bypasses closed. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | | Note: CS will eventually be required due to 4 SGs blowing down inside containment. When pressure exceeds 20 psig, then following step must be performed. |
| | BOP | Check if Containment Spray required: <ul style="list-style-type: none"> • Containment pressure increased to > 20 psig • Group 6 CS Monitor lights lit. • Group 6 Phase B Isolation Monitor lights lit. • Stop All RCPs. • CS Eductor Suction Flow > 15 gpm (1FI-CS013 or 1FI-CS014). • CS Eductor Additive Flow > 5 gpm (1FI-CS015 or 1FI-CS016). |
| | BOP | Align SX Cooling Towers <ul style="list-style-type: none"> • All eight riser valves open <ul style="list-style-type: none"> • 0SX163A thru 0SX163H • All four Hot Water Basin Bypass valves closed <ul style="list-style-type: none"> • 0SX162A thru 0SX162D • All eight SX Cooling Tower Fans running in high speed Verify total AFW flow: <ul style="list-style-type: none"> • > 500 gpm. • Control feed flow to maintain narrow range SG levels 10% (31% Adverse) to 50%. • Verify no SG level is increasing in an uncontrolled manner. |
| | RO/BOP | Verify ECCS Valve Alignment: <ul style="list-style-type: none"> • Group 2 Cold Leg Injection lights lit. ○ Reports Exceptions (1B CC pump, and 1A AFW pump) • Align SVAG Valve power switches and dispatch NLO to energize breakers |
| | RO | Verify ECCS Flow: <ul style="list-style-type: none"> • High Head SI flow > 100 gpm ○ RCS pressure < 1700 psig ○ SI pump flow > 200 gpm • RCS pressure > 325 psig • RH pump flow < 1000 gpm |
| | RO | Pressurizer PORV relief path available: <ul style="list-style-type: none"> • At least one block valve energized • PORV in automatic Associated block valve open |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify Generator Trip <ul style="list-style-type: none"> • OCB 3-4 open • OCB 4-5 open • PMG output breaker open |
| | BOP | Verify DGs running <ul style="list-style-type: none"> • Both DGs running • 1SX169A open • 1SX169B open |
| | | Examiners note: US and RO will likely continue in 1BEP-0 while BOP is performing the next 3 ventilation steps: |
| | BOP | Verify Control Room ventilation aligned for emergency operations: <ul style="list-style-type: none"> • Dispatch NLO to trip VV supply fans • Operating VC train equipment running <ul style="list-style-type: none"> • Supply fan • Return fan • M/U fan • Chilled water pump • MCR chiller 0A running • Operating VC train dampers <ul style="list-style-type: none"> • M/U fan outlet damper NOT full closed 0VC24Y • VC train M/U filter light LIT • Operating VC train Charcoal Adsorber aligned for train A <ul style="list-style-type: none"> • 0VC43Y closed • 0VC21Y open • 0VC22Y open ○ Control Room pressure greater than +0.125 inches water on 0PDI-VC038 |
| | BOP | Verify Auxiliary Building ventilation aligned <ul style="list-style-type: none"> • Two inaccessible filter plenums aligned <ul style="list-style-type: none"> • Plenum A fan 0VA03CB running <ul style="list-style-type: none"> • Damper 0VA023Y open • Damper 0VA436Y closed • Plenum C fan 0VA03CF running <ul style="list-style-type: none"> • Damper 0VA072Y open • Damper 0VA438Y closed |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | Verify FHB ventilation aligned <ul style="list-style-type: none"> • Train B fan 0VA04CB running • 0VA055Y open • 0VA062Y open • 0VA435Y closed |
| | RO | Check Pressurizer sprays & PORVs closed <ul style="list-style-type: none"> • Normal spray valves closed 1RY455B and 1RY455C • PORVs closed 1RY455A and 1RY456 |
| | RO | Maintain RCS Temperature Control: <ul style="list-style-type: none"> o With any RCP running, RCS Tave stable at or trending to 557 degrees F. o With No RCP running, RCS Cold Leg temperature stable at or trending to 557 degrees F. |
| | BOP/RO | If temperature is < 557 and decreasing, then perform the following: <ul style="list-style-type: none"> • Stop dumping steam. • Maintain total feed flow > 500 gpm until at least 1 SG is > 10 % (31% Adverse). • Verify the following valves closed: <ul style="list-style-type: none"> • Steam Dump valves. • MS RHTR Shutoff valves (1MS009A-D). • MS RHTR S/U Purge Control Valves (1MS067A-D). • MFP turbine HP Stop valves. |
| | | Note: Containment pressure may have reached the spray initiation point, and the RCPs could be already stopped. If so, the diagnostic for a faulted SG will be performed and not all of the following steps will be necessary. |
| | RO | CHECK Status of RCPS: <ul style="list-style-type: none"> • Determine if RCPS are running. • Check if RCPS should be stopped: <ul style="list-style-type: none"> • ECCS flow- high head > 100 gpm; or SI pump > 200 gpm. • RCS pressure < 1425 psig. • Controlled cooldown NOT in progress, nor previously initiated. • Stop All RCPS. |
| | CREW | Determine faulted SG(s) exist: <ul style="list-style-type: none"> • ALL SG pressure decreasing uncontrollably. • Any SG completely depressurized. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|---------------------------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | CREW/US | Implement and direct the actions of 1BEP-2, FAULTED STEAM GENERATOR ISOLATION: <ul style="list-style-type: none"> • Announce transition to 1BEP-2 ○ Get acknowledgements from RO and BOP. • Inform SM of plant status, evaluate for E-Plan. • Request STA report to control room for Status Tree monitoring. |
| | | Examiner's Note: The STA will monitor Status Trees when requested by the US/Crew. A challenge to Containment could be identified by the STA and he will make the recommendation to transition to and implement 1BFR-Z.1, "Response to Containment High Pressure" if containment pressure exceeds 20 psig, even if spray is already operating. Refer to page 20 for the evaluation of the crew when in 1BFR-Z.1. |
| | BOP/RO | Check Main Steam Isolation: <ul style="list-style-type: none"> • No Main Steam isolation valves closed • Main Steam bypass valves closed • Manually actuate Main Steamline isolation |
| | US | Determine All Steam Generators are Faulted: <ul style="list-style-type: none"> • Check pressures in all SGs, and determine none are stable or increasing. Implement and direct the actions of 1BCA-2.1 "UNCONTROLLED DEPRESSURIZATION OF ALL SG" <ul style="list-style-type: none"> • Announce Transition to 1BCA-2.1 ○ Get acknowledgements from RO and BOP. • Inform SM of plant status, evaluate for E-Plan. |
| | BOP | Check Secondary Pressure boundary: <ul style="list-style-type: none"> ○ Request maintenance assistance to close MSIVs. • Verify Main Steam isolation bypass valves all closed. • Check all SG PORVs Closed • Check FW Isolated to all SGs (FWI Monitor lights lit). • Check SG Blowdown Isolation and Sample valves all closed. |
| | BOP/RO CT CA-2.1—A. | Control Feed Flow to Minimize RCS Cooldown: <ul style="list-style-type: none"> • Determine cooldown rate in all RCS cold legs > 100 degrees F in any one hour. • Decrease feed flow to 45 gpm to each steam generator. • Report no control of feed flow to 1A Steam Generator. ○ Set 1AF005E flow controller to 0%. ○ Attempt to throttle 1AF013E • Dispatch operator to locally close 1AF005E. • Check Hot Leg temperatures stable or decreasing. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|---|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | RO/BOP | Check Status of RCPs <ul style="list-style-type: none"> • NO RCP's running Monitor AFW pump Suction Pressure: <ul style="list-style-type: none"> • 1-3-E7 AF PUMP SX SUCT VLVS ARMED not lit. |
| | RO | Check Pressurizer PORVs and isolation valves: <ul style="list-style-type: none"> • PORV isolation valves 1RY8000A and 1RY8000B energized. • PORV 1RY455A and 1RY456 closed. • PORV isolation valves at least one open. |
| | BOP/US | Check Secondary radiation <ul style="list-style-type: none"> • Reset Phase A Isolation. • Request Chemistry to sample all SGs. • Check Secondary Radiation trends normal for plant conditions: <ul style="list-style-type: none"> • SJAE/GS Exhaust. • SG Blowdown Liquid. • Main Steamline Radiation. |
| | CREW | Determine RH pumps can be stopped: <ul style="list-style-type: none"> • Both RH pumps running with suction aligned to the RWST. • RCS pressure stable or increasing and > 325 psig. • Reset SI, and verify SI Actuated light not lit, and the AUTO SI BLOCKED light lit. • Stop RH pumps and place in standby. |
| | | Note: If CS is stopped in the next step, Containment pressure must be monitored for CS restart conditions (> 20 psig). |
| | BOP/US | Check if CS can be stopped: <ul style="list-style-type: none"> • Both CS pumps are running. • Reset CS signal. • Spray additive tank low 2 lights are not lit • Close 1CS019A and 1CS019B (per Caution prior to step 8, 1BCA-2.1). Check Containment pressure < 15 psig. <ul style="list-style-type: none"> • If Containment pressure < 15 psig, stop both CS pumps. • If CS pumps stopped, Verify/Close 1CS019A and 1CS019B, and 1CS007A and 1CS007B. |
| | | Examiner's Note: Scenario termination is completion of Step 8 of BCA-2.1 or Entry into BEP ES-1.3 Scenario EPlan classification is HU2 |

Comments: _____

| | | |
|--|----------|--|
| Scenario No: 2 | | Event No. 7 |
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | | Note: The following is to be used whenever the crew implements 1BFR-Z.1, "Response to High Containment Pressure". |
| | US | <ul style="list-style-type: none"> • Implement and direct the actions of 1BFR-Z.1: • Announces procedure transition ○ Get acknowledgements from RO/BOP. • Informs SM of plant status and E-Plan evaluation. |
| | RO/BOP | Perform actions of 1BFR-Z.1 as directed: <ul style="list-style-type: none"> • Verify Containment isolation Phase A- Group 3 Containment isolation monitor lights lit. • Verify Containment Ventilation isolation- Group 6 Containment Vent isolation monitor lights lit. • Determines CS is required (Containment pressure has increased to > 20 psig). • Stops all RCPs if NOT previously stopped. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|----------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP | <ul style="list-style-type: none"> ○ Performs actions of 1BFR-Z.1 as directed: • Verifies proper CS system alignment: • CS suction valves open <ul style="list-style-type: none"> • 1CS001A\ 1CS009A, or 1CS001B\ 1CS009B. • CS pump header isolation valves open <ul style="list-style-type: none"> • 1CS007A and 1CS007B. • CS eductor spray additive valves open <ul style="list-style-type: none"> • 1CS019A and 1CS019B. • CS eductor inlet flow control valves open <ul style="list-style-type: none"> • 1CS010A and 1CS010B. • CS pumps running. • Group 6 Phase B lights Lit. • CS pump discharge flow > 200 gpm (1FI-CS011\1FI-CS012) • CS eductor suction flow > 15 gpm (1FI-CS013\ 1FI-CS-014). • CS eductor additive flow > 5 gpm (1FI-CS015\ 1FI-CS016). • Reset CS signal. • Check Spray additive tank LO-2 lights <ul style="list-style-type: none"> • then closes 1CS019A and 1CS019B even if NOT lit per Caution prior to Step 3, 1BFR-Z.1 (Secondary Break only). <p>Align SX Cooling Towers</p> <ul style="list-style-type: none"> • All eight riser valves open <ul style="list-style-type: none"> • 0SX163A thru 0SX163H • All four Hot Water Basin Bypass valves closed <ul style="list-style-type: none"> • 0SX162A thru 0SX162D • All eight SX Cooling Tower Fans running in high speed • Verify RCFCs running in Accident Mode <ul style="list-style-type: none"> • Group 2 RCFC Accident Mode status lights lit. • Determines Main Steamline isolation necessary and manually actuates Main Steamline isolation and verifies Main Steam bypass valves closed. Reports all Main Steam isolation valves still open. |

Comments: _____

| Scenario No: 2 | | Event No. 7 |
|--|-------------------------------------|--|
| Event Description: 1A SG Steam line break inside containment resulting in a Reactor trip, all MSIVs fail open, 4 faulted SGs. Manual actions required to establish and control AFW flow. | | |
| Time | Position | Applicant's Actions or Behavior |
| | BOP CT: CA-2.1—A. | <ul style="list-style-type: none"> ○ Determine all SGs are faulted and controls AFW Flow: <ul style="list-style-type: none"> ● Any SG pressure decreasing uncontrollably or completely depressurized. ● Control AFW flow to 1B, 1C, and 1D SG at 45 gpm per SG by throttling 1AF005F, G, and H; or 1AF013F, G, and H. ● Attempt Control of AFW to 1A SG via 1AF005E, and 1AF013E and reports no control available. ○ Set potentiometer for 1AF005E to 0%. <ul style="list-style-type: none"> ● Dispatches operator to locally throttle 1AF005E. ● Checks FW isolated to all SGs <ul style="list-style-type: none"> ● All FW Isolation Monitor lights lit. |
| | US | <ul style="list-style-type: none"> ● Returns to step and procedure in effect: ● Announces procedure transition and gets acknowledgements for RO and BOP. ● Informs SM of Status. |

Comments: _____
