Facility: Vogtle Scenario No.: 7 Op-Test No.: 2012-301

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: The plant is at 29% power, BOL, steady state operations, control rods in manual. (Base IC # 36, snapped to IC # 187 for HL17 NRC Exam)

Equipment OOS: Safety Injection Pump "A" is tagged out for motor repair.

Turnover: The plant is at 29% power, Containment mini-purge is in service for a Containment entry on the next shift, raise power at < 8% per hour.

**Preloaded Malfunctions:**

**ES19A – Block CVI Actuation Train A**

**ES19B - Block CVI Actuation Train B**

**ES10 - Train A Main Steam Line Isol Auto Actuation Failure**

**ES11 - Train B Main Steam line Isol Auto Actuation Failure**

**SI08A - RWST Sludge Mixing Valve 10957 Failure**

**SI08B - RWST Sludge Mixing Valve 10958 Failure**

**RD17D - (K-14) @ 36 steps**

**RD17H - (D-4) @ 24 steps**

**RD17L - (G-13) @ 30 steps**

**PR12B PORV 456 Block Valve 8000B Auto Closure Failure**

**Overrides**

**HV-8104 Emergency Borate valve shut.**

**Note to Simbooth:** Place Containment Mini-Purge in service.

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1 | N/A | R-OATC<br>R-SS<br>N-UO | Raises power in accordance with UOP-12004-C. |
| T2 | SG05D<br>@100% | C-UO<br>C-SS | SG # 4 Steam Flow indicator fails high. |

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| T3 | CV04 | I-OATC<br>I-SS | Loss of Cooling to Letdown Heat Exchanger (TE-0130 fails low) |
| T4 | new malf (9) | TS-SS | NSCW Cooling Tower Fan # 1 on Train A trips with ambient wet-bulb temperature > 63°F<br><br>**LCO 3.7.9 Ultimate Heat Sink (UHS) Condition B** |
| T5 | PR02B @100% | I-OATC<br>I-SS<br><br>TS-SS | PRZR PT-456 fails high resulting in PORV 456 failing open and block valve HV-8000B failure to auto close.<br><br>**LCO 3.3.1 Condition A, FU 6 Condition E, LCO 3.3.1 FU 8a Condition M, LCO 3.3.1 FU 8b Condition E**<br>**LCO 3.3.2 Condition A, FU 1d Condition D,**<br>**LCO 3.3.2 FU 8b Condition L, LCO 3.4.1 Condition A** |
| T6 | RF TK02 95-88% 1200 sec ramp | C-UO<br>C-SS<br>TS-SS | RWST sludge mixing line pipe break with auto closure failure.<br><br>**LCO 3.5.4 Condition B and Condition D (1 hour action)**<br>**TR 13.1.7 Condition D (Immediate TR action)** |
| T7 | FW04C | C-OATC | MFRV # 3 fails shut, requiring reactor trip, 3 stuck rods. |
| 10 | Preload | C-OATC<br>C-SS | Emergency borate due to 3 stuck rods with failure of HV-8104 to open. |
| T8 | SG01C @45% | M-ALL | Ruptured Faulted SG IRC with failure of CVI to occur. |
| T9 | FW06C @40% | M-ALL | Ruptured Faulted SG IRC with failure of CVI to occur. |
| 11 | Preload | C-UO<br>C-SS<br>**Critical** | CVI actuation failure requiring manual alignment. |
| 12 | Preload | C-UO<br>C-SS<br>**Critical** | Main Steam Line Auto Actuation Failure |

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

**Event 1:**

Raise reactor power in accordance with UOP-12004-C.

Verifiable Actions:

**OATC** – Adjust RCS boron concentration and use control rods to raise reactor power.

**UO** – Raises turbine load to raise power.

Technical Specifications:

None

**Event 2:**

Steam Generator # 4 controlling steam flow FI-542 will fail low resulting in a reduction in FW flow.

Verifiable Actions:

**UO** – Takes manual control of the SG # 4 feed flow valves and MFP(s) speed to control SG NR levels between 60 and 70%.

**UO** – Selects an unaffected channel for control.

**UO** – Returns MFP(s) speed controls to auto.

**UO** – Return SG feed flow valves to auto.

Technical Specifications:

None

**Event 3:**

The temperature instrument TE-0130 will fail low causing TV-0130 temperature control valve to the Letdown Heat Exchanger to close causing temperature to rise. An automatic divert of CVCS Letdown around the CVCS demins on high temperature will occur (TV-0129). Letdown will be diverted straight to the VCT.

Verifiable Actions:

**OATC** – Verifies TV-0130 is open to control cooling water flow to the Letdown Heat Exchanger.

**OATC** – Realigns TV-0129 through the demins. (if high temperature divert occurred)

Technical Specifications:

None

**Event 4:**

NSCW Train A Cooling Tower Fan # 1 trips with wet bulb temperature > 63°F

Verifiable Actions:

None, Technical Specification call by the SS.

Technical Specifications:

LCO 3.7.9 Ultimate Heat Sink (UHS) Condition B

**Event 5:**

PRZR pressure channel PT-456 fails high resulting in PORV 456 failing open and lowering RCS pressure with failure of the block valve to automatically close.

Verifiable Actions:

**OATC** – Manually closes PORV 456 per IOAs of18001-C, Primary Instrument Malfunction, energizes PRZR heaters, places spray valves to shut.

**OATC** – Selects controlling channel to 455 / 458 on PS-455F PRZR PRESS CNTL SELECT.

**OATC** – Places PRZR heaters and spray in AUTO.

**OATC** – Places PORV in AUTO.

Technical Specifications:

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation Condition A

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 6, Condition E

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 8a, Condition M

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 8b, Condition E

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) Instrumentation Condition A

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) Instrumentation FU1d, Condition D

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) Instrumentation FU8b, Condition L

LCO 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

**Event 6:**

An RWST leak occurs with failure of RWST sludge mixing pump valves to automatically close.

Verifiable Actions:

**UO** – Manually closes RWST Sludge Mixing Isolation Valves (HV-10957 / HV-10958) to isolate the RWST leak to preserve RWST inventory.

Technical Specifications:

LCO 3.5.4 Refueling Water Storage Tank (RWST) Condition B and Condition D (1 hour action)

TR 13.1.7 Borated Water Sources – Operating Condition D (Immediate TR action)

**Event 7, 10:**

Main Feed regulating valve to SG # 3 will fail shut requiring a manual reactor trip by the crew. Following the trip, 3 control rods will be stuck partially out requiring an emergency boration. HV-8104 Emergency Boration valve will not open from the QMCB.

Verifiable Actions:

**OATC** – Initiates an emergency boration of the RCS from the RWST through the Normal Charging flow path by opening 1FV-110A and 1FV-110B and adjusting charging flow to obtain the required boration flow rate of 30 gpm and required charging flow rate of 42 gpm.

**Event 8, 11, 12:**

SGTR on SG # 3 post reactor trip. Steam Generator # 3 will develop a DBA SGTR over time after the emergency boration has been completed by the OATC. This will require an SI by the crew. The diagnosis of the SGTR is complicated by the MFRV # 3 failing closed earlier in the scenario and SG # 3 level will be low relative to the other 3 SGs. The crew will be alerted by the SJAE / SPE rad monitor (RE-12839) and be required to use SG level rise and balancing of AFW flow to diagnose the ruptured SG.

Verifiable Actions:

**UO** – Balances / isolates AFW flows to determine the ruptured SG # 3.

**OATC** – Manually actuates SI due to lowering PRZR level and RCS pressure in order to maintain RCS inventory.

Technical Specifications:

None

**Event 9:**

Main feed water line break IRC on the ruptured SG # 3.

Verifiable Actions:

**UO** – The UO will manually isolate the main steam lines.

**CRITICAL TASKS:**

**1) Manually isolate the Main Steam lines no later than step # 3 of 19020-C to limit blow down due to SG # 3 fault to one SG. This limits the Containment pressure rise and challenge to the Containment barrier.**

**2) Manually closes at least one CVI damper in each flow path to prevent a radiation release flow path from the RCS via SG # 3 to the environment. CVI isolation must be performed no later than the Initial Operator Actions of 19000-C.**

**3) Manually isolate SG # 3 to limit blow down to one SG limiting CNMT pressure rise and Challenge to the Containment. This also limits RCS cool down and possible PTS condition by closing the following valves. These will be done no later than the procedurally directed steps of 19020-C.**

- **MSIVs and Bypasses**
- **MFIVs**
- **BFIVs**
- **HV-5134 SG 3 from MDAFW PMP-B**
- **HV-5127 SG 3 from TDAFW PMP**
- **PV-3020 SG 3 ARV**
- **SGBD sample valves**
- **SGBD valves**

| target ZERO Every day, every job, safely. | **NUCLEAR SAFETY FOCUS**<br>**TARGET ZERO** |
|---|---|

| **Protected Train:** | | **EOOS:** | |
|---|---|---|---|
| ☒ | Alpha | ☒ | Green |
| ☐ | Bravo | ☐ | Yellow |
| | | ☐ | Orange |
| | | ☐ | Red |

| | |
|---|---|
| **Plant Conditions:** | 29 % power BOL. |
| **Major Activities:** | Initiate power ascent UOP 12004-C section 4.1 for Power Ascent at a rate not to exceed 8% per hour. Step 4.1.40 has been performed. Step 4.1.41 is the next procedure plateau. |
| **Active LCOs:** | ☐ LCO 3.5.2 Condition A is in effect due to SIP A tagged out. |
| **OOS/ Degraded CR Instruments:** | ☐ None |
| **Narrative Status:** | ☐ Containment mini-purge is in service for a planned Containment Entry on next shift.<br>☐ SIP A is tagged out for motor repair, expected return to service time is 24 hours with 48 hours left on a shutdown LCO of 72 hours.<br>☐ MFPT B will be placed in service at 55% power per UOP step 4.1.45.<br>☐ The remnants of Hurricane Maya are passing through, severe weather and thunderstorms will be in the area for the next 8 hours. The Severe Weather Checklist is in effect.<br>☐ Power Range high level trip bistables are set at 90%. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 1

**Event Description**: Reactor Power Ascension from 29% RTP and higher, UOP 12004-C, step 4.1.41 is the next plateau.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | Uses 13009-1, "CVCS Reactor Makeup Control System" Section 4.7 "Frequent Dilutions While Controlling Reactor Power", as necessary to maintain Tavg matched with Tref during power ascension. |
| | UO | Increases turbine load in increments of 15 Mwe to 30 Mwe using load increase pushbutton at direction of OATC. Monitors Generator Output. |
| | OATC | **13009-1, Section 4.7:**<br>NOTES<br>• This section can be used during power changes when necessary to frequently dilute the RCS for temperature control. The use of this section shall be authorized by the SS.<br>• Frequent dilutions can raise VCT level to the point where VCT pressure reaches 40 psig. 1-LIC-0185 may be adjusted to allow divert to the RHT at a lower level to limit VCT pressure increase.<br>**4.7 FREQUENT DILUTIONS WHILE CONTROLLING REACTOR POWER**<br>4.7.1 Determine the amount of Reactor Makeup Water necessary to accomplish the power change or accommodate the expected impact of Xenon. (Uses Reactivity Briefing Sheet to Determine # gallons - Dilution)<br>_____ Gals $H_2O$<br>**NOTE: EACH OATC WILL USE NUMBER HE/SHE IS COMFORTABLE WITH. (100 –1000 Gallons)** |
| | OATC | 4.7.2 Verify the Reactor Makeup System is aligned for automatic operation. |
| | OATC | 4.7.3 Start one Reactor Makeup Water Pump:<br>RX MU WTR PMP-1 1-HS-7762<br>RX MU WTR PMP-2 1-HS-7763 |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 1

**Event Description:** Reactor Power Ascension from 29% RTP and higher, UOP 12004-C, step 4.1.41 is the next plateau.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 4.7.4 Place VCT MAKEUP CONTROL 1-HS-40001B in STOP. |
| | OATC | 4.7.5 As directed by the SS, place VCT MAKEUP MODE SELECT 1-HS-40001A in either the ALT DIL or DIL position. |
| | OATC | 4.7.6 As directed by the SS, lower pot setting on 1-LIC-0185, to limit VCT pressure increase.<br>Initial Pot Setting:_____ New Pot Setting:_____ |
| | OATC | 4.7.7 Set TOTAL MAKEUP Integrator 1-FQI-0111 for the desired amount of Reactor M/U Water.<br>_____ Gals $H_2O$ |
| | OATC | NOTE<br>If VCT MAKEUP MODE SELECT 1-HS-40001A was placed in the DIL position in Step 4.7.5, Step 4.7.8 may be marked N/A.<br>4.7.8 If required, close 1-FV-0110B as necessary to raise or maintain RCS hydrogen concentration. ***(N/A)***<br>**Note to examiner:** If ALT DIL selected, FV-110B will be closed. |
| | SS / OATC | 4.7.9 At SS direction, dilution flow may be adjusted to desired flow using 1-FIC-0111. (record in AUTO LOG).<br>Initial Pot Setting: _____ New Pot Setting: _____<br>***NOTE: EXPECTED NOT TO CHANGE DESIRED FLOW:*** |
| | OATC | 4.7.10 Place VCT MAKEUP CONTROL 1-HS-40001B in START and verify flow is indicated on 1-FI-0110B. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 1

**Event Description**: Reactor Power Ascension from 29% RTP and higher, UOP 12004-C, step 4.1.41 is the next plateau.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | | |
| | OATC | 4.7.11 WHEN TOTAL MAKEUP Integrator 1-FQI-0111 reaches its setpoint, verify dilution stops and the following valves close:<br>• 1-FV-0111A RX MU WTR TO BA BLENDER<br>• 1-FV-0111B BLENDER OUTLET TO VCT<br>• 1-FV-0110B BLENDER OUTLET TO CHARGING PUMPS SUCT |
| | OATC | 4.7.12 Operate the Pressurizer Back-up Heaters as necessary to equalize $C_b$ between the RCS and the Pressurizer. |
| | OATC | 4.7.13 Monitor RCS temperature, Control Bank position, or power levels as applicable. |
| | | **CAUTION**<br>If frequent dilutions are to be continued past the end of the shift, step 4.7.14 should be marked N/A and this section completed to include realignment to the normal configuration. The new on coming shift can then initiate the section from the beginning to continue frequent dilution. |
| | OATC | 4.7.14 **Repeat** Steps 4.7.10 through 4.7.13 as necessary to continue power ramp and/or compensate for Xenon.<br>***NOTE:*** ***OATC WILL LEAVE CVCS MAKEUP SYSTEM ALIGNED PER 4.7 FOR FREQUENT DILUTIONS WHILE CONTROLLING REACTOR POWER DURING POWER ASCENSION.*** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 1

**Event Description**: Reactor Power Ascension from 29% RTP and higher, UOP 12004-C, step 4.1.41 is the next plateau.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | ** | **NOTE: EVENT 2 IS INITIATED WHILE OATC AND UO ARE PERFORMING ACTIONS IN EVENT 2 FOR POWER ASCENSION AT EXAMINERS DISCRETION.** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 2

**Event Description:** SG # 4 Steam Flow channel FI-542 fails high.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | Diagnose SG Loop # 4 Flow FI-542 has failed high.<br><br>Symptoms / alarms:<br><br>ALB13-D01 STM GEN 4 FLOW MISMATCH<br><br>Indications:<br><br>• FI-542 reading off scale high.<br>• Steam flow indication on FI-542 reading higher than feed flow. |
| | UO | **IMMEDIATE OPERATOR ACTIONS**<br><br>G1. Check steam and feed flows – MATCHED ON ALL SGs. **(NO)**<br><br>RNO<br><br>G1. Take manual control of the following as necessary to restore NR level between 60% and 70%.<br><br>• Affected SG feed flow valves. (UO throttles closed loop 4 MFRV)<br><br>• MFP(s) speed. (reduces MFPT speed using the Master Controller)<br><br>**Note to examiners:** It is expected the operator will take manual control of MFRV # 4 and the MFPT Master Controller. Steam flow failing high will result in the MFRV # 4 opening and the MFPT Master Controller speeding up the feed pumps. The operator will control SG # 4 levels and MFP speed with these controllers. |
| | SS | Enters AOP 18001-C, SYSTEMS INSTRUMENTATION MALFUNCTION, section G for FAILURE OF STEAM GENERATOR FLOW INSTRUMENTATION. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 2

**Event Description:** SG # 4 Steam Flow channel FI-542 fails high.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **SUBSEQUENT OPERATOR ACTIONS**<br>G2. Select an unaffected control channel.<br>**Note to examiner:** The UO will select F543 on 1FS-542C selector switch. |
| | UO | G3. Return MFP(s) speed controls to AUTO.<br>**Cue to Simbooth:** IF asked, the Shift Manager has given permission to place the MFRV and MFPT speed controllers in auto. |
| | UO | G4. Return SG feed flow valves to AUTO.<br>**Cue to Simbooth:** IF asked, the Shift Manager has given permission to place the MFRV and MFPT speed controllers in auto. |
| | UO<br>OATC | G5. Initiate the Continuous Actions Page. |
| | UO | G6. Check SG level control maintains NR level – AT 65%. |
| | SS | G7. Notify I & C to initiate repairs. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 2

**Event Description:** SG # 4 Steam Flow channel FI-542 fails high.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | SS | G8. Check repairs and surveillances – COMPLETE. **(NO)**<br><br>RNO<br><br>G8. Perform the following:<br><br>a. WHEN repairs and surveillances are complete, THEN perform step G9.<br><br>b. Return to procedure and step in effect.<br><br>**Note to examiner**: There are no Technical Specification actions for this malfunction. |
| | | **END OF EVENT 2, proceed to EVENT 3.** |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 3**

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | Diagnose TE-0130 has failed low.<br><br>Symptoms / alarms:<br><br>ALB07-F04 LTDN HX HI TEMP DEMIN DIVERT<br>ALB07-B04 (VOLUME CONTROL TANK OUTLET TEMP HI (delayed, or may not come in)<br><br>Indications:<br><br>• TE-0130 reading down scale low.<br>• TE-0130 red UP arrow – LIT. (indicates attempting to raise letdown temperature).<br>• Amber light on 1HS-129 LETDOWN TO DEMIN / VCT – LIT. |
| | OATC | **ALB07-F04 response actions:**<br><br>**AUTOMATIC ACTIONS:**<br><br>Letdown flow is diverted away from the Mixed Bed Demineralizers directly to the Reactor Coolant Filter. |
| | OATC | **INITIAL OPERATOR ACTIONS**<br><br>1. Check letdown temperature on 1-TI-0130 on the QMCB. **(failed)**<br><br>2. IF necessary, initiate 18007-C, "Chemical Volume Control System Malfunction". **(not necessary, letdown is not lost)**<br><br>3. Check for ACCW normal operation. **(TV-0130 not normal)** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 3

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **SUBSEQUENT OPERATOR ACTION**<br><br>1. Attempt to balance charging and letdown flow.<br><br>2. WHEN letdown temperature is restored, return 1-TV-0129 to the DEMIN position.<br><br>3. IF instrument or equipment failure has occurred, initiate maintenance as required.<br><br>**COMPENSATORY OPERATOR ACTIONS**<br><br>NONE<br><br>**Note to examiner:** The OATC can control cooling flow to the VCT using TV-0130. For 120 gpm letdown flow, this is normally set to 51% (note dry erase board on SS throne). It is expected the OATC will take manual control of TV-0130 to control cooling flow.<br><br>**End of 17007-F04 actions.** |
| | OATC | **ALB07-B04 actions (LTDN HX HI TEMP DEMIN DIVERT)**<br><br>**PROBABLE CAUSE**<br><br>1. Low Auxiliary Component Cooling Water (ACCW) flow through the Letdown Heat Exchanger.<br><br>2. Low ACCW flow through the Excess Letdown Heat Exchanger or Seal Water Heat Exchanger if aligned to the Volume Control Tank (VCT). |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 3**

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **AUTOMATIC ACTIONS**<br><br>NONE<br><br>**INITIAL OPERATOR ACTIONS**<br><br>Check normal operation of ACCW and, if necessary, initiate 18022-C, "Loss of Auxiliary Component Cooling Water". |
| | OATC | **SUBSEQUENT OPERATOR ACTIONS**<br><br>NOTE<br><br>Seal water injection flow to the Reactor Coolant Pumps (RCPs) should be maintained less than 130°F.<br><br>1. Monitor VCT outlet temperature using 1-TI-0116 on the QMCB.<br><br>2. Check letdown flow using 1-FI-0132 and temperature using 1-TI-0130 on the QMCB.<br><br>3. Adjust the charging or letdown flow if necessary to reduce the letdown temperature.<br><br>4. Return to normal operation as soon as possible per 13006-1, "CVCS Startup and Normal Operation."<br><br>5. IF equipment failure is indicated, initiate maintenance as required.<br><br>**COMPENSATORY OPERATOR ACTIONS**<br><br>NONE – **End of 17007-B04 actions.** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 3

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | SS | **AOP-18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER symptoms and steps.**<br><br>Symptoms / alarms:<br>• High temperature on any heat exchanger serviced by ACCW.<br><br>**Note to examiner**: The SS may look at 18022-C due to the reference from ALB07-B04 if received. |
| | OATC | NOTES<br>• ACCW pumps are removed from the 4.16KV Class 1E buses following simultaneous loss of offsite power and safety injection.<br>• ACCW flow to the Seal Water Heat Exchanger is not required if RCS temperature is less than 150°F and Seal Water Heat Exchanger Return Temperature remains less than 135°F. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 3**

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 1. Check ACCW pumps – AT LEAST ONE RUNNING. (YES)<br>2. Check ACCW SPLY HDR PRESS PI-1977 – GREATER THAN 135 PSIG. (YES)<br>3. Check if ACCW flow exists through the letdown heat exchanger. **(YES)**<br>• TV-0130 OPEN.<br>• ALB07-D03 LTDN HX OUT HI TEMP – EXTINGUISHED. |
| | OATC UO | 4. Initiate the Continuous Actions Page. |
| | OATC | 5. Check ACCW Surge Tank Level (IPC L2700) – GREATER THAN 20% AND STABLE OR RISING. **(YES)** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 3

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 6. Check if RCPs should be stopped:<br>a. Check the following RCP parameters (using plant computer):<br>• Motor bearing (upper or lower radial or thrust) – GREATER THAN 195°F.<br>• Motor stator winding – GREATER THAN 311°F.<br>• Seal water inlet – GREATER THAN 230°F.<br>• Loss of ACCW – GREATER THAN 10 MINUTES.<br>**Note to examiner:** All parameters listed are met, the RCPs do NOT require stopping.<br>a. Perform the following.<br>1) IF any parameter limit is exceeded, THEN perform step 6.b.<br>2) Go to Step 7. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 3**

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 7. Check RCP thermal barrier outlet valves – OPEN. **(YES)**<br>• HV-19051 ACCW RCP-1 THERMAL BARRIER RTN VLV<br>• HV-19053 ACCW RCP-2 THERMAL BARRIER RTN VLV<br>• HV-19055 ACCW RCP-3 THERMAL BARRIER RTN VLV<br>• HV-19057 ACCW RCP-4 THERMAL BARRIER RTN VLV<br>• HV-2041 ACCW RCPS THERMAL BARRIER RTN VLV<br>**Note to examiner**: All the above listed valves are open as required. |
| | OATC | 8. Check ACCW heat exchangers outlet temperature (IPC T2701) - LESS THAN 120°F. **(YES)** |
| | OATC | 9. Check ACCW containment isolation valves – OPEN. **(YES)**<br>• HV-1979 ACCW SPLY HDR ORC ISO VLV<br>• HV-1978 ACCW SPLY HDR IRC ISOL VLV<br>• HV-1974 ACCW RTN HDR IRC ISO VLV<br>• HV-1975 ACCW RTN HDR ORC ISO VLV<br>**Note to examiner**: All the above listed valves are open as required. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 3

**Event Description: TE-0130 fails low, this controls ACCW cooling to the Letdown Heat Exchanger. With TE-0130 failed low, TV-0130 will throttle shut raising the actual Letdown Heat Exchanger temperature. The OATC will have to manually control TV-0130 to control ACCW flow to the Letdown Heat Exchanger.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 10. Check if ACCW is restored to service.<br>a. Components cooled by ACCW – TERMPERATURES RETURNING TO NORMAL. **(YES)**<br>b. Restore charging and letdown using 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. **(N/A)** |
| | SS | c. Return to procedure and step in effect. |
| | | **END OF EVENT 3, proceed to EVENT 4.** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 4

**Event Description: Trip of NSCW Train A Cooling Tower Fan # 1, wet bulb temperature will be > 63°F requiring a Tech Spec LCO entry.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW | Diagnose trip of NSCW Train A Tower Fan # 1.<br><br>Symptoms / alarms:<br><br>ALB36-B02 480V SWGR 1AB15 TROUBLE<br><br>Indications:<br><br>• Green and amber light on NSCW CT Fan # 1 – LIT<br><br>**Note to examiner:** The fan green and amber light will be the only indication in the control room the fan has tripped and is not readily in their peripheral vision area.<br><br>IF, they don't see the light and dispatch someone to AB15 to investigate, the Simbooth Operator will report back after several minutes that **"breaker 1AB15-05 is tripped for NSCW FAN-1".** |
| | UO | **ALB36-B02 actions.**<br><br>**PROBABLE CAUSE**<br><br>3. One of the breakers on Switchgear 1AB15 tripped due to a fault.<br><br>**AUTOMATIC ACTIONS**<br><br>NONE<br><br>**INITIAL OPERATOR ACTIONS**<br><br>NONE |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 4

**Event Description: Trip of NSCW Train A Cooling Tower Fan # 1, wet bulb temperature will be > 63°F requiring a Tech Spec LCO entry.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **ALB36-B02 actions continued.**<br><br>**SUBSEQUENT OPERATOR ACTIONS**<br><br>1. N/A due to not a loss of bus voltage.<br><br>2. Dispatch an operator to Switchgear 1AB15 to check for:<br><br>a. Existing relay targets.<br><br>b. Other abnormal conditions.<br><br>c. Transformer winding high temperatures (refer to 13429-1 to check max temperature indication).<br><br>**Note to examiner**. The Simbooth Operator will report back after several minutes that **"breaker 1AB15-05 is tripped for NSCW FAN-1".**<br><br>**Note to examiner**: Steps 3, 4, 5, and 6 of ARP are N/A for this event. |
| | UO | 7. IF alarm is in due to overcurrent trip of Breakers 1AB15-05, 06, 08, OR 13, (NSCW TRAIN A Cooling Tower Fans), THEN the Breaker TRIP/RESET pushbutton must be depressed and the applicable fan QMCB Handswitch must be placed in STOP THEN released to clear the alarm and amber light on associated fan handswitch.<br><br>**Note to examiner**: If requested, the ABO will report the TRIP/RESET pushbutton does NOT appear to be resetting. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 4**

**Event Description: Trip of NSCW Train A Cooling Tower Fan # 1, wet bulb temperature will be > 63°F requiring a Tech Spec LCO entry.**

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Action or Behavior</th></tr>
<tr><td></td><td>SS</td><td><u>COMPENSATORY OPERATOR ACTIONS</u><br><br>1. Initiate maintenance to correct problem (i.e., restore alarm).<br><br>2. IF after three days the alarm has NOT been restored, intiate a Temporary Modification per 00307-C, "Temporary Modifications" to clear the bad input(s). Record this action required on Figure 5 of 10018-C, "Annunciator Control".</td></tr>
<tr><td></td><td>SS</td><td>Technical Specifications:<br><br>3.7.9 Ultimate Heat Sink (UHS)<br><br>LCO 3.7.9 The UHS shall be OPERABLE. With ambient wet-bulb temperature > 63°F, four fans and four spray cells per train shall be OPERABLE. With ambient wet-bulb temperature ≤ 63°F, three fans and four spray cells per train shall be OPERABLE.<br><br>APPLICABILITY: MODES 1, 2, 3, and 4.<br><br>ACTIONS
<table>
<tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr>
<tr><td>B. One NSCW cooling tower with one or more required fans and/or spray cells inoperable.</td><td>B.1 Restore fan(s) and spray cell(s) to OPERABLE status.</td><td>72 hours</td></tr>
<tr><td>D. Required Action and associated Completion Time not met.<br><br>OR<br><br>UHS inoperable for reasons other then Conditions A, B, or C</td><td>D.1 Be in MODE 3<br><br>AND<br><br>D.2 Be in MODE 5</td><td>6 hours<br><br><br>36 hours.</td></tr>
</table></td></tr>
</table>

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 4

**Event Description: Trip of NSCW Train A Cooling Tower Fan # 1, wet bulb temperature will be > 63°F requiring a Tech Spec LCO entry.**

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Action or Behavior</th></tr>
<tr><td></td><td>SS</td><td>Technical Specification 3.7.9 UHS continued.<br><br>SURVEILLANCE REQUIREMENTS<br><table><tr><th>SURVEILLANCE</th><th>FREQUENCY</th></tr><tr><td>SR 3.7.9.5 Verify ambient wet-bulb temperature ≤ 63°F when one NSCWE town fan is out-of-service and daily high temperature (dry bulb) is forecasted to be > 48°F.</td><td>In accordance with the Surveillance Frequency Control Programl</td></tr></table><br>Note to examiner: IF asked to perform the wet bulb surveillance, the Simbooth Operator will report back after several minutes that ambient wet-bulb temperature is 78°F. This will ensure that LCO entry is required.<br><br>The SS may request someone to perform OSP-14150-C, Wet Bulb Temperature With Psychrometer". This takes ~ 5 – 10 minutes, report back the temperature as stated about (78°F).</td></tr>
<tr><td></td><td></td><td>END OF EVENT 4, proceed to EVENT 5.</td></tr>
</table>

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 5**

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | Diagnose the high failure of PRZR Pressure channel PT-456.<br><br>Symptoms / alarms:<br><br>• ALB11-B03 PRZR HI PRESS<br>• ALB11-C03 PRZR HI PRESS CHANNEL ALERT<br>• ALB12-D03 PRZR PRESS LO PORV BLOCK<br>• ALB12-E01 PRZR RELIEF DISCH HI TEMP<br>• ALB12-F04 PV-0456A OPEN SIGNAL<br><br>Indications:<br><br>• PRZR Pressure channel PT-456 offscale high.<br>• PRZR Pressure channels PT-455, 457, and 458 rapidly lowering.<br>• Both PRZR Sprays fully shut.<br>• All PRZR heaters on. |
| | OATC | **AOP 18001-C, Section C IMMEDIATE ACTIONS**<br><br>C1. Check RCS pressure - STABLE OR RISING. **(NO)**<br><br>RNO:<br><br>C1. Perform the following:<br><br>• Close spray valves.<br>• Close affected PRZR PORV.<br>• Operate PRZR heaters as necessary. |
| | CREW | Enters AOP 18001-C, Section C and verifies immediate operator actions properly completed. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 5**

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | C2. Check controlling channel – OPERATING PROPERLY. **(YES)** |
| | OATC | C3. Initiate the Continuous Actions Page. |
| | OATC | C4. Control PRZR pressure using heaters and sprays – BETWEEN 2220 AND 2250 PSIG. |
| | OATC | C5. Check PIC-455A Pressurizer Master Pressure Controller – IN AUTO WITH OUTPUT SIGNAL APPROXIMATELY 25%. **(NO)**<br><br>RNO:<br><br>C5. Place PIC-455A in manual and adjust controller output to approximately 25%. |
| | OATC | C6. Check affected channel selected on PS-455F PRZR PRESS CNTL SELECT. **(YES)** |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 5**

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | C7. Select unaffected channels on PS-455F:<br><br>Failed Channel — Select<br>P455 — CH457 / 456<br>***P456*** — ***CH455 / 458***<br>P457 — CH455 / 456<br>P458 — CH455 / 456 |
| | OATC | C8. Perform the following:<br><br>a. Check PRZR pressure – STABLE AT APPROXIMATELY 2235 PSIG.<br><br>b. Place PRZR heaters in AUTO.<br><br>c. Place PRZR spray valve controllers in AUTO.<br><br>RNO:<br><br>a. Adjust PRZR pressure to approximately 2235 psig using PRZR heaters and sprays. |
| | OATC | C9. Place PORVs in AUTO and verify proper operation. |
| | OATC | C10. Return PRZR pressure Master Controller to AUTO. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 5

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | C11. Select same channel on PS-455G PRZR PRESS REC SEL as selected on PS-455F.<br><br>***455*** |
| | OATC | C12. Check P-11 status light on BPLB indicates correctly for plant condition within one hour.<br><br>***OFF*** |
| | SS | C13. Notify I&C to initiate repairs.<br><br>SS will call typically call the SSS to perform the following:<br><br>• Notify Operations Duty Manager of the AOP entry<br>• Write a Condition Report<br>• Notify I&C |
| | SS | C14. Bypass the affected instrument channel using 13509 C, BYPASS TEST INSTRUMENTATION (BTI) PANEL OPERATION, if desired.<br><br>**NOTE: SS is NOT expected to bypass failed channel.** |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 5**

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | SS | C15. Trip the affected channel bistables and place the associated MASTER TEST switches in TEST position per TABLE C1 within 72 hours.. (TS 3.3.1 & 3.3.2)<br><br>**NOTE: SS expected to leave bistables untripped during allowed out of service time to facilitate troubleshooting by I&C.** |
| | SS | C16. Initiate the applicable actions of:<br><br>• TS 3.3.1 Reactor Trip<br><br>Function — Condition<br>6 OTΔT — E<br>8a Low PRZR pressure — M<br>8b High PRZR pressure — E<br><br>• TS 3.3.2 ESFAS<br><br>Function — Condition<br>1d SI low PRZR pressure — D<br>8b P-11 Interlock — L **(one hour action)**<br><br>• TS 3.4.1.a DNB<br><br>RCS pressure < 2199 psig B (Momentary)<br><br>**Note to examiner:** The SS may look at Tech Specs for the Block Valve HV-8000B which did not close in automatic. There is no Tech Spec requirement for the Block Valve to work in automatic. Manual operation only is required per Tech Spec Bases of 3.4.11. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 5

**Event Description: PRZR pressure channel PI-456 will fail high with the PORB Block Valve HV-8000B failing to close in automatic on low RCS pressure of 2185 psig. The OATC will be required to manually close PORV 456 or HV-8000B to prevent a Reactor trip.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | SS | C17. Check repairs and surveillances - COMPLETE.<br><br>RNO:<br><br>C17. Perform the following:<br><br>a. WHEN repairs and surveillances are complete, THEN perform step C18.<br><br>b. Return to procedure and step in effect.<br><br>**END OF EVENT 5, proceed to EVENT 6.** |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 6**

**Event Description: The RWST will develop a leak resulting in lowering RWST level below the Tech Spec limit. After receipt of a QMCB annunciators, the UO will find the RWST Sludge Mixing Isolation Valves have failed to automatically close. The UO will close the valves on the QPCP and the leak will be terminated.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | Diagnose RWST level is actually lowering on all channels.<br><br>Symptoms / alarms:<br><br>ALB06-E04 RWST LO LEVEL<br><br>Indications:<br><br>• RWST level lowering on LI-0990, 0991, 0992, and 0993 to less than 95%.. |
| | OATC | **ALB06-E04 actions.**<br><br>**PROBABLE CAUSE**<br><br>1. Filling of Accumulators.<br><br>2. Adding water to the Spent Fuel Pool.<br><br>3. Safety Injection (SI) actuation.<br><br>4. System leakage. |
| | UO | **AUTOMATIC ACTIONS**<br><br>RWST Sludge Mixing Isolation Valves 1-HV-10957 (Train B, 1-LT-0991) an 1-HV-10958 (Train A, 1-LT-0990) close.<br><br>**Note to examiner:** These valves are located on the QPCP and will NOT close for this event. The UO will have to manually close the valves to isolate the leak. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 6

**Event Description: The RWST will develop a leak resulting in lowering RWST level below the Tech Spec limit. After receipt of a QMCB annunciators, the UO will find the RWST Sludge Mixing Isolation Valves have failed to automatically close. The UO will close the valves on the QPCP and the leak will be terminated.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC<br>UO | **ALB06-E04 actions continued.**<br><br>**INTIAL OPERATOR ACTIONS**<br><br>NONE |
| | UO | **SUBSEQUENT OPERATOR ACTIONS**<br><br>1. IF in Modes 1, 2, 3, or 4, and SI is not in progress, stop any operation that could be removing water from the RWST.<br><br>2. IF a system leak is indicated, dispatch personnel to locate and isolate the leak.<br><br>**Note to examiner.** The UO closing either HV-10957 or HV-10958 will isolate the leak for this event.<br><br>3. Restore RWST level to normal per 13701-1, "Boric Acid System".<br><br>4. Refer to Technical Specification LCO 3.5.4 and TR 13.1.7.<br><br>**COMPENSATORY OPERATOR ACTIONS**<br><br>NONE |
| | SS | |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 6

**Event Description: The RWST will develop a leak resulting in lowering RWST level below the Tech Spec limit. After receipt of a QMCB annunciators, the UO will find the RWST Sludge Mixing Isolation Valves have failed to automatically close. The UO will close the valves on the QPCP and the leak will be terminated.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | SS | 3.5.4 Refueling Water Storage Tank (RWST).<br><br>LCO 3.5.4 The RWST shall be OPERABLE.<br><br>APPLICABILITY: MODES 1, 2, 3, and 4. |

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| B. One or more sludge mixing pump isolation valves inoperable. | B.1 Restore the valve(s) to OPERABLE status. | 24 hours |
| D. RWST inoperable for reasons other than Condition A or B. | D.1 Restore RWST to OPERABLE status. | 1 hour |
| E. Required Action and associated Completion Time of Condition A or D not met. | E.1 Be in MODe 3.<br><br>AND<br><br>E.2 Be in MODE 5 | 6 hours<br><br><br>36 hours. |

**Note to examiner**: Closing the RWST sludge mixing isolations HV-10957 and HV-10958 satisfies Condition B.

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 6

**Event Description: The RWST will develop a leak resulting in lowering RWST level below the Tech Spec limit. After receipt of a QMCB annunciators, the UO will find the RWST Sludge Mixing Isolation Valves have failed to automatically close. The UO will close the valves on the QPCP and the leak will be terminated.**

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Action or Behavior</th></tr>
<tr><td></td><td>SS</td><td>TR 13.1.7 Borated Water Sources – Operating.<br><br>TR 13.1.7 The following borated water source(s) shall be OPERABLE as required by TR-13.1.3:<br><br>a. Boric acid storage tank.<br><br>b. The refueling water storage tank (RWST).<br><br>APPLICABILITY: MODES 1, 2, 3, and 4.<br><br>ACTIONS
<table>
<tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr>
<tr><td>D. RWST inoperable.</td><td>D.1 Enter applicable Conditions of RWST Technical Specification 3.5.4.</td><td>Immediately.</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>END OF EVENT 6, proceed to EVENT 7, the main event.</td></tr>
</table>

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | Diagnose MFRV Loop # 3 has failed shut.<br><br>Symptoms / alarms:<br><br>ALB13-C01 STM GEN 3 FLOW MISMATCH<br>ALB13-C06 STM GEN 3 HI/LO LVL DEVIATION (short delay)<br>ALB13-C03 STM GEN 3 LO LEVEL (a little longer delay)<br>ALB13-C05 STM GEN 3 LO-LO LVL ALERT (auto trip set point)<br><br>Indications:<br><br>• Feed flow reading 0 gpm for SG # 3 (1FI-530A / 531A).<br>• Level lowering rapidly on SG # 3 (1LI-538, 539, 537, & 553).<br>• MFRV # 3 green light only lit on ZLB-004.<br>• MFRV # 3 demand at 100% and red up arrow lit on 1FIC-530. |
| | SS | Enters 18016-C CONDENSATE AND FEEDWATER MALFUNCTION section D MAIN FEEDWATER VALVE MALFUNCTION. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 7**

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **IMMEDIATE OPERATOR ACTIONS**<br><br>D1. Check proper operation of BFRVs and MFRVs.<br><br>RNO<br><br>D1. Perform the following:<br><br>• Control SG levels using the following as necessary.<br><br>MFRVs<br>BFRVs<br><br>• IF SG levels cannot be maintained greater than 41%.<br><br>-OR-<br><br>Less than 79%,<br>THEN perform the following:<br><br>1) Trip the reactor.<br><br>2) Go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION.<br><br>**Note to examiner**: At > 29% power, the BFRV will NOT be able to maintain SG levels and the Reactor will be tripped manually by the OATC or will trip automatically on SG # 3 LO-LO LEVEL. |
| | OATC | D1 RNO – Manually trips the Reactor due to impending loss of level in SG # 3. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 7**

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW | Transitions to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |
| | CREW<br><br>SS | Performs Immediate Operator Actions per 19000-C, E-0 Reactor Trip or Safety Injection.<br><br>Makes a page announcement of Reactor Trip. |
| | OATC | 1. Check Reactor Trip: **(YES)**<br>• Rod Bottom Lights – LIT<br>• Reactor Trip and Bypass Breakers – OPEN<br>• Neutron Flux – LOWERING |
| | UO | 2. Check Turbine Trip: **(YES)**<br>• All Turbine Stop Valves – CLOSED |
| | UO | 3. Check Power to AC Emergency Buses. **(YES)**<br>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.<br>• 4160 AC 1E Busses<br>b. AC Emergency Busses – ALL ENERGIZED.<br>• 4160V AC 1E Busses<br>• 480V AC 1E Busses |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 7**

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 4. Check if SI is actuated. **(NO)**<br>• Any SI annunciators – LIT<br>• SI ACTUATED BPLP window – LIT<br>RNO<br>4. Check if SI is required. **(NO)**<br>IF one or more of the following conditions has occurred.<br>• PRZR pressure has less than or equal to 1870 psig.<br>• Steam line pressure less than or equal to 585 psig.<br>• Containment pressure greater than or equal to 3.8 psig.<br>• Automatic alignment of ECCS equipment to injection phase.<br>THEN actuate SI and go to Step 6. |
| | UO<br><br><br><br><br><br><br>SS | 5. Perform the following to limit RCS cooldown:<br>a. Check NR level in at least one SG greater than 10%.<br>RNO<br>a. Maintain AFW flow greater than 570 gpm and go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE.<br>b. Reduce AFW flow.<br>c. Go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW | Transitions to 19001-C, ES-0.1 REACTOR TRIP RESPONSE. |
| | OATC UO | 1. Initiate the following:<br>• Continuous Actions and Foldout Page.<br>• Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCTION STATUS TREE. |
| | CREW | 2. IF SI actuation occurs during this procedure, THEN go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 7**

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 3. Limit RCS cooldown:<br>a. Verify AFW flow to SGs.<br>b. Trip both MFPs.<br>c. Check SGs NR level – AT LEAST ONE GREATER THAN 10%. |
| | OATC | 4. Check RCS temperature stable at or trending to 557°F.<br>With RCP(s) running – RCS AVERAGE TEMPERATURE.<br>-OR-<br>Without RCP(s) running – RCS WR COLD LEG TEMPERATURES. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 5. Check FW status:<br>a. Average RCS temperature – LESS THAN 564°F. **(YES)**<br>**b.** Verify FW isolation valves closed. **(YES)**<br>• MFIVs<br>• BFIVs<br>• MFRVs<br>• BFRVs |
| | UO | 6. Check total feed flow capability to SGs – GREATER THAN 570 GPM AVAILABLE. **(YES)** |
| | OATC | 7. Check all Rods – FULLY INSERTED. **(NO, 3 are stuck out)**<br>RNO<br>7. IF two or more Rods NOT fully inserted,<br>THEN EMERGENCY BORATE 154 ppm for each Rod not fully inserted by initiating 13009, CVCS REACTOR MAKEUP CONTROL SYSTEM.<br>Verify adequate shutdown margin as required by Technical Specification SR 3.1.1.1.<br>**Note to examiner:** Once OATC initiates emergency boration flow, a DBA SGTR will occur on SG # 3. E. Boration steps are on page # 39 of this event. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 8. Check Main Generator Output Breakers – OPEN. **(YES)** |
| | SS | 9. Perform the following:<br>a. Check 18009-C, STEAM GENERATOR TUBE LEAK – IN EFFECT.<br>RNO<br>a. Go to Step 9.d.<br>d. Check other AOPs – IN EFFECT. **(NO)**<br>e. Initiate actions of AOPs in conjunction with remaining actions of this procedure. |
| | UO | 10. Check PRZR level control:<br>a. Instrument Air – AVAILABLE. **(YES)** |
| | | **Note to examiner:** The DBA SGTR will have initiated by now. The crew will actuate SI and go to E-0 on lowering PRZR level and pressure. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 4.9 EMERGENCY BORATION<br><br>NOTE<br><br>Table 1 provides a convenient tool for checking Emergency Boration flow path alternatives.<br><br>**Note to examiner**: The path through HV-8104 is the preferred path. The next preferred path is the next section in the procedure, etc. |
| | OATC | 4.9.1 Emergency Boration Through 1-HV-8104. |
| | OATC | 4.9.1.1 Start one (1) Boric Acid Transfer Pump.<br><br>4.9.1.2 Verify a Charging Pump is running.<br><br>4.9.1.3 Open EMERGENCY BORATE valve 1-HV-8104.<br><br>**Note to examiner:** 1-HV-8104 will NOT open, the candidate should proceed to section 4.9.2 Emergency Boration Through The Normal Charging Flow Path. |
| | OATC | 4.9.2 Emergency Boration Through The Normal Charging Flow Path. |
| | OATC | 4.9.2.1 Start one (1) Boric Acid Transfer Pump. |
| | OATC | 4.9.2.2 Verify a Charging Pump is running. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 4.9.2.3 Open the following valves:<br>• 1-FV-0110A, BA TO BLENDER<br>• 1-FV-0110B, BLENDER OUTLET TO CHARGING PUMPS SUCT |
| | | NOTE<br>The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS. |
| | OATC | 4.9.2.4 Place 1-FIC-0121 in MANUAL. |
| | OATC | 4.9.2.5 Adjust 1-FIC-0121 to maintain flow greater than 42 gpm. |
| | OATC | 4.9.2.6 Verify Emergency Boration flow 1-FI-0110A is greater than 30 gpm. |
| | OATC | 4.9.2.7 IF flow is less than 30 gpm, start the second Boric Acid Transfer Pump. |
| | OATC | 4.9.2.8 Operate the Pressurizer Backup Heaters as necessary to equalize boron concentration between the RCS and the Pressurizer. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 7

**Event Description: Main Feed Regulating Valve for loop # 3 fails shut requiring a Reactor trip. When the Reactor trips, 3 rods will stick out requiring an Emergency Boration by the OATC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 4.9.2.9 Check plant conditions are consistent with RCS boration:<br>RCS Tavg may be dropping.<br>NIS may be dropping. |
| | | **END OF EVENT 7, proceed to EVENT 8, the MAIN EVENT.** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | Actuates SI due to inability to maintain PRZR level > 9% per Foldout Page of 19001-C, ES-0.1 REACTOR TRIP RESPONSE. |
| | CREW | Performs Immediate Operator Actions per 19000-C, E-0 Reactor Trip or Safety Injection. |
| | SS | Makes a page announcement of Reactor Trip and Safety Injection. |
| | OATC | 1. Check Reactor Trip: **(YES)**<br>• Rod Bottom Lights – LIT<br>• Reactor Trip and Bypass Breakers – OPEN<br>• Neutron Flux – LOWERING |
| | UO | 2. Check Turbine Trip: **(YES)**<br>• All Turbine Stop Valves – CLOSED . |
| | UO | 3. Check Power to AC Emergency Buses. **(YES)**<br>a. AC Emergency Busses – AT LEAST ONE ENERGIZED.<br>• 4160 AC 1E Busses<br>b. AC Emergency Busses – ALL ENERGIZED.<br>• 4160V AC 1E Busses<br>• 480V AC 1E Busses |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 4. Check if SI is actuated. **(YES)**<br>• Any SI annunciators – LIT<br>• SI ACTUATED BPLP window – LIT |
| | SS | Go to Step 6. |
| | SS<br>CREW | 6. Initiate the Foldout Page. |
| | SS | 7. Perform the following: |
| | OATC | • OATC Initial Actions Page |
| | UO | • UO Initial Actions Page |
| | | **NOTE:** SS initiates step 8 after OATC/UO Initial Actions completed. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **PERFORMS OATC INITIAL ACTIONS**<br>1. Check both trains of ECCS equipment – ALIGNING FOR INJECTION PHASE: **(YES)**<br>• MLB indication |
| | OATC | 2. Check Containment Isolation Phase A – ACTUATED. **(YES)**<br>• CIA MLB indication |
| | OATC | 3. Check ECCS Pumps and NCP status:<br>a. CCPs RUNNING. **(YES)**<br>b. SI Pumps – RUNNING. **(YES)**<br>**Note to Examiner**: SIP A is tagged out.<br>c. RHR pumps – RUNNING. **(YES)**<br>d. NCP – TRIPPED. **(YES)** |
| | OATC | 4. Verify CCW Pumps – ONLY TWO RUNNING EACH TRAIN. **(YES)** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **PERFORMS OATC INITIAL ACTIONS**<br>5. Verify proper NSCW system operation: **(YES)**<br>a. NSCW Pumps – ONLY TWO RUNNING EACH TRAIN.<br>b. NSCW TOWER RTN HDR BYPASS BASIN hand switches – IN AUTO:<br>• HS-1668A<br>• HS-1669A |
| | OATC UO | 6. Verify Containment Cooling Units:<br>a. ALL RUNNING IN LOW SPEED. **(YES)**<br>• MLB indication<br>b. NSCW Cooler isolation valves – OPEN. **(YES)**<br>• MLB indication |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | | **PERFORMS OATC INITIAL ACTIONS** |
| | OATC | 7. Check Containment Ventilation Isolation. |
| | | a. Dampers and Valves – CLOSED. **(NO)** |
| | | • CVI MLB indication |
| | **Critical** | **a. Perform the following:** |
| | | **1) Close Dampers and Valves.** |
| | | **2) Start Piping Pen Units.** |
| | | **Note to examiner**. CVI dampers on pages 57 and 58. |
| | OATC | 8. Check Containment pressure – REMAINED LESS THAN 21 PSIG. **(YES)** |
| | OATC | 9. Check ECCS flows: |
| | | a. BIT flow. **(YES)** |
| | | b. RCS pressure – LESS THAN 1625 PSIG. **(NO)** |
| | | RNO |
| | | d. Go to Step 10. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **PERFORMS OATC INITIAL ACTIONS**<br><br>10. Check ECCS Valve alignment – PROPER INJECTION LINEUP INDICATED ON MLBs. **(YES)** |
| | OATC | 11. Check ACCW Pumps – AT LEAST ONE RUNNING. **(YES)** |
| | OATC | 12. Adjust Seal Injection flow to all RCPs 8 TO 13 GPM. |
| | OATC | 13. Dispatch Operator to ensure one train of SPENT FUEL POOL COOLING in service per 13719, SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM.<br><br>**END OF OATC INITIAL OPERATOR ACTIONS,**<br>return to E-0 Step 8. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 8**

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **UO INITIAL ACTIONS**<br>1. Check AFW Pumps – RUNNING. **(YES)**<br>• MDAFW Pumps<br>• TDAFW Pump, if required. |
| | UO | 2. Check NR level in at least one SG – GREATER THAN 10%. (32% ADVERSE)<br>RNO<br>2. Establish AFW flow greater than 570 gpm by starting pumps and aligning valves as necessary. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **UO INITIAL ACTIONS**<br>3. Check if main steamlines should be isolated: **(NO)**<br>a. Check for one or more of the following conditions:<br>Any steamline pressure – LESS THAN OR EQUAL TO 585 PSIG.<br>Containment pressure – GREATER THAN 14.5 PSIG.<br>Low Steam Pressure SI/SLI – BLOCKED AND High Steam Pressure Rate – ONE TWO OR MORE CHANNELS OF ANY STEAMLINE.<br>RNO<br>a. Go to Step 4. |
| | UO | 4. Verify FW Isolation Valves closed: **(YES)**<br>• MFIVs<br>• BFIVs<br>• MFRVs<br>• BFRVs |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | **UO INITIAL ACTIONS**<br>5. Verify SG Blowdown isolated. **(YES)**<br>• Place SG Blowdown isolation Valve handswitches HS-7603A, B, C, and D in the CLOSE position.<br>**Note to examiner:** The UO will place the HS-7603A valves in the hard closed position.<br>• SG Sample Isolation Valves – CLOSED. **(YES)** |
| | UO | 6. Verify Diesel Generators – RUNNING. **(YES)** |
| | UO | 7. Throttle total AFW flow as necessary to maintain SG NR levels between 10% (32% ADVERSE) and 65%.<br>**Note to examiner**: IF the UO suspects a SGTR into SG # 3, he may request to isolate AFW flow to SG # 3 to assist in determining which SG is ruptured. |
| | UO | 8. Verify both MFPs – TRIPPED. **(YES)** |
| | UO | 9. Check Main Generator Output Breakers – OPEN. **(YES)**<br>**END OF UO INITIAL ACTIONS, return to step 8 of E-0.** |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 8**

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC<br>UO | **19000-C, E-0 actions beginning with step 8.**<br><br>8. Initiate the Continuous Actions Page. |
| | OATC | 9. Check RCS temperature stable at or trending to 557°F. **(NO)**<br><br>RNO<br><br>9. IF temperature is less than 557°F and lowering, **(it is)** THEN perform the following as necessary:<br><br>a. Stop dumping steam.<br><br>b. Perform the following as appropriate:<br><br>IF at least one SG NR level greater than 10% (32% ADVERSE),<br>THEN lower total feed flow.<br><br>-OR-<br><br>If all SG NR levels less than 10% (32% ADVERSE),<br>THEN lower total feed flow to NOT less than 570 gpm.<br><br>c. If cooldown continues,<br>THEN close MSIVs and BSIVs.<br><br>d. If temperature greater than 557°F and rising,<br>THEN dump steam. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | **CAUTION:** A PRZR PORV Block Valve which was closed to isolate an excessively leaking or open PRZR PORV should not be opened unless used to prevent challenging the PRZR Safeties.<br><br>10. Check PRZR PORVs, Block Valves, and Spray Valves:<br><br>a. PRZR PORVs – CLOSED AND IN AUTO. **(YES)**<br><br>b. Normal PRZR Spray Valves – CLOSED. **(YES)**<br><br>c. Power to at least one Block Valve – AVAILABLE. **(YES)**<br><br>d. PRZR PORV Block Valves – AT LEAST ONE OPEN. **(NO)**<br><br>RNO<br><br>d. Verify open at least one PRZR PORV Block Valve when PRZR pressure is greater than 2185 psig.<br><br>**Note to examiner**: PORV "B" must be manually cycled to control at 2185 psig. |

**Op-Test No.: 2012-301** **Scenario No.: 7**

**Event No.: 8**

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | OATC | 11. Check if RCPs should be stopped.<br>a. ECCS Pumps – AT LEAST ONE RUNNING: **(YES)**<br>• CCP or SI Pump<br>b. RCS pressure – LESS THAN 1375 PSIG. **(NO)**<br>RNO<br>a. Go to Step 12. |
| | UO | 12. Check SGs secondary pressure boundaries:<br>a. SG Pressures:<br>Any lowering in an uncontrolled manner. **(NO)**<br>-OR-<br>Any completely depressurized.<br>RNO<br>a. Go to Step 13. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 13. Check SG Tubes intact:<br><br>a. Direct Chemistry to take periodic activity samples of all SGs one at a time.<br><br>b. Secondary radiation – NORMAL. **(YES, possible to see on a couple of rad monitor trends but none will be in alert)**<br><br>• MAIN STM LINE MONITORS:<br>  • RE-13120 (SG 1)<br>  • RE-13121 (SG 2)<br>  • RE-13122 (SG 3)<br>  • RE-13119 (SG 4)<br><br>• CNDSR AIR EJCTR/STM RAD MONITORS:<br>  • RE-12839C<br>  • RE-12839D (if on scale)<br>  • RE-12839E (if on scale)<br><br>• STEM GEN LIQ PROCESS RAD:<br>  • RE-0019 (Sample)<br>  • RE-0021 (Blowdown)<br><br>• SG sample radiation.<br><br>c. Check SG levels – ANY RISING IN AN UNCONTROLLED MANNER. **(YES)**<br><br>d. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | | **NOTE to Simbooth**: Report back in 20 minutes that SG # 3 shows activity in the samples IF REQUESTED previously. |
| | SS | SS transitions to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE. |
| | | **NOTE to Simbooth**: Once SS has transitioned to E-3, enter the fault on SG # 3. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|

| VALVE # | DESCRIPTION | LOCATION |
|---|---|---|
| HV-12975 | CNMT AIR RAD MON SPLY ISO IRC | QPCP |
| HV-12976 | CNMT AIR RAD MON SPLY ISO ORC | QPCP |
| HV-12977 | CNMT AIR RAD MON RTN ISO ORC | QPCP |
| HV-12978 | CNMT AIR RAD MON RTN ISO IRC | QPCP |
| HV-2626A | CTB NORM PURGE SPLY IRC ISO VLV- MAIN (Normally de-energized shut) | QHVC (C31) |
| HV-2626B | CTB NORM PURGE SPLY IRC ISO VLV-MINI | QHVC ((C32) |
| HV-2627A | CTB NORM PURGE SPLY ORC ISO VLV- MAIN (Normally de-energized shut) | QHVC (D31) |
| HV-2627B | CTB NORM PURGE SPLY ORC ISO VLV-MINI | QHVC (D32) |
| HV-2628A | CTB NORM PURGE EXH IRC ISO VLV- MAIN (Normally de-energized shut) | QHVC (A33) |
| HV-2628B | CTB NORM PURGE EXH IRC ISO VLV-MINI | QHVC ((A34) |
| HV-2629A | CTB NORM PURGE EXH ORC ISO VLV- MAIN (Normally de-energized shut) | QHVC (B33) |
| HV-2629B | CTB MINI PURGE EXH ORC ISO VLV-MINI | QHVC (B34) |
| HV-2624A | CTB POST LOCA PURGE EXH IRC ISO VLV | QHVC (A35) |
| HV-2624B | CTB POST LOCA PURGE EXH IRC ISO VLV | QHVC (B35) |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR on SG # 3 followed by a FW Line Break after transition to 19030-C, E-3 Steam Generator Tube Rupture. Based on the Foldout Page of 19030-C, the crew will transition back to 19020-C to isolate the faulted steam generator, then back to 19030-C and eventually transition to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|

| | | |
|---|---|---|
| HV-12604 | PIPING PEN RM OUTLET ISO DMPR | QHVC (C22) |
| HV-12605 | PIPING PEN RM INLET ISO DMPT | QHVC (B22) |
| HV-12606 | PIPING PEN RM INLET ISO DMPR | QHVC (B23) |
| HV-12607 | PIPING PEN RM OUTLET ISO DMPR | QHVC (C23) |
| HV-12596 | RECYCLE HOLD-UP TK-1 ISO VENT VLV | QHVC (E22) |
| HV-12597 | RECYCLE HOLD-UP TK-1 ISO VENT VLV | QHVC (E23) |
| HS-2548 | PIPING PEN RM FLTR & EXH FAN 1 | QHVC (A22) |
| HV-2549 | PIPING PEN RM FLTR & EXH FAN 2 | QHVC (A23) |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE to be followed by a Feedline Break IRC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW | 1. Initiate the following:<br>• Continuous Actions and Foldout Page.<br>• Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCITON STATUS TREE. |
| | SS | 2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION. |
| | OATC | 3. Maintain Seal Injection flow to all RCPs – 8 to 13 GPM. |
| | OATC | 4. Check if RCPs should be stopped:<br>a. ECCS Pumps – AT LEAST ONE RUNNING: **(YES)**<br>__ CCP or Sip Pump<br>b. RCS pressure – LESS THAN 1375 PSIG. **(NO)**<br>RNO<br>b. IF RCS pressure lowers to less than 1375 psig prior to initiation of RCS cooldown in Step 17.<br>THEN stop all RCPs and return to Step in effect.<br>Go to Step 5. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE to be followed by a Feedline Break IRC.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 5. Identify ruptured SG(s) by any of the following conditions.<br><br>**Unexpected rise in any SG NR level.**<br><br>High radiation from any SG sample.<br><br>High radiation from any SG steamline.<br><br>High radiation from any SG blowdown line.<br><br>**Note to examiner:** SG # 3 level will be rising with AFW flow throttled.<br><br>**Note to examiner**: Once SG # 3 has been identified, the Simbooth Operator will insert a DBA Feedwater line break on SG # 3 that will require a transition back to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION and then back to 19030-C. **IF identified earlier in E-0, the Simbooth operator will initiate the FW line break as soon as E-3 is entered.** |
| | UO<br>OATC | Recognize rising steam flow on SGs 1, 2, and 4 and lowering RCS pressure. |
| | SS | Transitions to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION based on Foldout Page Criteria. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8 (E-2 Actions)

**Event Description:** 19020-C E-2 actions for Faulted Steam Generator.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW<br><br>SS | 1. Initiate critical safety function status trees per 19200-C, F-O CRITICAL SAFETY FUNCTION STATUS TREE.<br><br>2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION.<br><br>**Note to examiner:** The SS will call the Simbooth to have the Shift Manager implement NMP-EP-110. |
| | OATC | **CAUTION**: At least one SG should be available for RCS cooldown. |
| | UO<br><br>**Critical** | 3. Verify Main Steamline Isolation and Bypass Valves – CLOSED. **(NO)**<br><br>**Note to examiner:** Auto actuation of the Main Steamline and Bypasses is defeated. **The UO will have to manually actuate SLI to satisfy the critical step.** |
| | UO | 4. Check SGs secondary pressure boundaries:\<br><br>**a.** Identify intact SG(s): **(# 1, 2, and 4 are intact)**<br><br>• SG pressures – ANY STABLE OR RISING. **(YES)**<br><br>b. Identify faulted SG(s).<br><br>ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. **(YES, SG # 3)**<br><br>-OR-<br><br>ANY SG COMPLETELY DEPRESSURIZED. **(maybe by now, SG # 3)** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8 (E-2 Actions)

**Event Description:** 19020-C E-2 actions for Faulted Steam Generator.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 5. Isolate Main Feedwater to the faulted SG(s):<br>• Close affected MFIVs:<br>HV-5227 (SG 1)<br>HV-5228 (SG 2)<br>HV-5229 (SG 3)<br>HV-5230 (SG 4)<br>• Close affected BFIVs:<br>HV-15196 (SG 1)<br>HV- 15197 (SG 2)<br>HV- 15198 (SG 3)<br>HV- 15199 (SG 4) |
| | UO<br><br><br><br>**Critical**<br><br><br><br>**Critical** | 6. Isolate Auxiliary Feedwater to the faulted SG(s):<br>• Close affected MDAFW Pump Throttle Valves:<br>HV-5139 – SG 1 FROM MDAFW PMP-A<br>HV-5132 – SG 2 FROM MDAFW PMP-B<br>**HV-5134 – SG 3 FROM MDAFW PMP-B**<br>HV-5137 – SG 3 FROM MDAFW PMP-A<br>• Close affected TDAFW Pump Throttle Valves:<br>HV-5122 – SG 1 FROM TDAFW<br>HV-5125 – SG 2 FROM TDAFW<br>**HV-5127 – SG 3 FROM TDAFW**<br>HV-5120 – SG 3 FROM TDAFW<br>**Note to examiner:** The valves bolded above are critical at this time IF not already previously closed. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8 (E-2 Actions)

**Event Description:** 19020-C E-2 actions for Faulted Steam Generator.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 7. Check at least one MDAFW Pump – RUNNING AND CAPABLE OF FEEDING SG(s) NEEDED FOR RCS COOLDOWN. **(YES)** |
| | UO | 8. Close affected TDAFW Pump Steam Supply Valve(s): **(N/A)**<br>HV-3009 (SG 1) LP-1 MS SPLY TO AUX FW TD PMP-1<br>HV-3019 (SG-2) LP-2 MS SPLY TO AUX FW TD PMP-1 |
| | UO | 9. Verify affected SG ARV(s) – CLOSED:<br>PV-3000 (SG 1)<br>PV-3010 (SG 2)<br>PV-3020 (SG 3)<br>PV-3030 (SG 4) |
| | UO | 10. Align SGBD valves:<br>• Place SG Blowdown Isolation Valve handswitches in CLOSE position.<br>• Close sample valves.<br>HV-9451 (SG 1)<br>HV-9452 (SG 2)<br>HV-9453 (SG 3)<br>HV-9454 (SG 4) |
| | UO | 11. Verify faulted SG(s) remains isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sampling. |
| | UO | 12. Check CST level – GREATER THAN 15%. **(YES)** |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8 (E-2 Actions)

**Event Description:** 19020-C E-2 actions for Faulted Steam Generator.

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 13. Initiate checking if SG Tubes intact:<br>a. Direct Chemistry to take periodic activity samples of all SGs one at a time.<br>**b.** Secondary radiation – NORMAL. **(NO)**<br>• MAIN STM LINE MONITORS<br>• RE-13120 (SG 1)<br>• RE-13121 (SG 2)<br>• RE-13122 (SG 3)<br>• RE-13119 (SG 4)<br>• CNDSR AIR EJCTR/STM RAD MONITORS:<br>• RE-12839C<br>• RE-12839D (if on scale)<br>• RE-12839E (if on scale)<br>• STM GEN LIQ PROCESS RAD:<br>• RE-0019 (Sample)<br>• RE-0021 (Blowdown)<br>• SG sample radiation.<br>**c.** Check SG levels – ANY RISING IN AN UNCONTROLLED MANNER. **(YES)** |
| | SS | d. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE. |
| | SS | Transitions back to 19030-C, E-3 STEAM GENERTOR TUBE RUPTURE. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE after return from 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION following feed line break.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | CREW | 1. Initiate the following:<br>• Continuous Actions and Foldout Page.<br>• Critical Safety Function Status Trees per 19200-C, F-O CRITICAL SAFETY FUNCITON STATUS TREE. |
| | SS | 2. Initiate NMP-EP-110, EMERGENCY CLASSIFICATION DETERMINATION AND INITIAL ACTION. |
| | OATC | 3. Maintain Seal Injection flow to all RCPs – 8 to 13 GPM. |
| | OATC | 4. Check if RCPs should be stopped:<br>a. ECCS Pumps – AT LEAST ONE RUNNING: **(YES)**<br>__ CCP or Sip Pump<br>b. RCS pressure – LESS THAN 1375 PSIG. **(YES)**<br>c. Stop all RCPs. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE after return from 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION following feed line break.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | UO | 5. Identify ruptured SG(s) by any of the following conditions.<br>**Unexpected rise in any SG NR level.**<br>High radiation from any SG sample.<br>High radiation from any SG steamline.<br>High radiation from any SG blowdown line.<br>**Note to examiner:** SG # 3 will have been previously identified. |
| | | **CAUTION:** At least one SG should be maintained available for RCS cooldown. |
| | UO | 6. Isolate ruptured SG(s):<br>a. Adjust ruptured SG ARV(s) controller setpoint to 1160 psig (pot setting 7.73)<br>b. Check ruptured SG ARV(s) – CLOSED.<br>__ PV-3000 (SG 1)<br>__ PV-3010 (SG 2)<br>__ PV-3020 (SG 3)<br>__ PV-3030 (SG 4) |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE after return from 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION following feed line break.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | | **CAUTION:** If TDAFW Pump is the only available AFW pump, maintain at least one steam supply OPEN. |
| | UO | 7. Close affected TDAFW Pump Steam supply valve(s): **(N/A)**<br>HV-3009 (SG 1) LP-1 MS SPLY TO AUX FW TD PMP-1.<br>HV-3019 (SG 2) LP-2 MS SPLY TO AUX FW TD PMP-1. |
| | UO | 8. Verify SG Blowdown Isolation Valves – CLOSED WITH HANDSWITCHES IN CLOSE POSTION. |
| | OATC | 9. Isolate flow from the ruptured SG(s) by closing its Main Steamline isolation and Bypass Valves. |

**Op-Test No.:** 2012-301 **Scenario No.:** 7

**Event No.:** 8

**Event Description: DBA SGTR actions from 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE after return from 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION following feed line break.**

| Time | Position | Applicant's Action or Behavior |
|---|---|---|
| | | **CAUTIONS:**<br>• This procedure should be performed in a timely manner to assure that break flow in the ruptured SG(s) is terminated before water enters the SGs main steam piping.<br>• Any ruptured SG that is also faulted, should remain isolated during subsequent recovery actions unless needed for RCS cooldown or SG activity sample. |
| | UO | 10. Check ruptured SG(s) level:<br>a. SG NR level – GREATER THAN 10% (32% ADVERSE). **(NO)**<br>b. Stop feed flow to ruptured SG(s).<br>**Note to examiner**: AFW flow should remain isolated to SG # 3 due to the CAUTIONS above. |
| | UO<br><br><br>SS | 11. Check ruptured SG(s) pressure – GREATER THAN 290 PSIG. **(NO)**<br>RNO<br>11. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT SUBCOOLED RECOVERY DESIRED. |
| | | **END OF EVENT 8, END OF THE SCENARIO.** |