



# SIMULATOR EXERCISE GUIDE

**SEG**

**SITE:** PBNP **Revision #: 0**

**LMS ID:** PBN LOI NRC 22E **LMS Rev. Date:**

**SEG TITLE:** 2021 NRC Exam Scenario 1

**SEG TYPE:**  Training  Evaluation

**PROGRAM:**  LOCT  LOIT  Other:

**DURATION:** 90 minutes

**Developed by:** John Rogers \_\_\_\_\_  
Instructor/Developer Date

**Reviewed by:** Jeff Hinze \_\_\_\_\_  
Instructor (Instructional Review) Date

**Validated by:** John Rogers \_\_\_\_\_  
SME (Technical Review) Date

**Approved by:** Adam Moore \_\_\_\_\_  
Training Supervision Date

**Approved by:** Joe Krear \_\_\_\_\_  
Training Program Owner (Line) Date

Facility: Point Beach Scenario No.: 1 Op-Test No.: 2021

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: Reactor power is 28% for flux mapping. G03, EDG is out of service due to  
to maintenance with G04, EDG aligned. 1LT-426, PZR Level transmitter (Red) removed from  
service.

Turnover: Raise power to 50% at 15% per hour per OP 1C, Startup to Power Operations.

Critical Tasks: CT-24, Energize At Least One Emergency Bus  
CT-25, Manually Start SW Pump For EDG Cooling

| Event No. | Malf. No. | Event Type*                      | Event Description  |
|-----------|-----------|----------------------------------|--|
| 1         |           | R-RO<br>N-BOP<br>N-SRO           | Normal Up Power  |
| 2         |           | R-BOP<br>C-RO<br>C-SRO<br>TS-SRO | Single Dropped Rod<br><br><b>2019 Repeat</b>   |
| 3         |           | C-BOP<br>C-SRO<br>TS-SRO         | 1HC-478, SG B Atmospheric Steam Dump controller fails in auto, valve fully opens, in manual will only close <b>to 10%</b> , requiring local manual isolation valve operation<br><br><b>New</b> |
| 4         |           | M-ALL                            | Loss of All AC Power<br>'A' Train EDG success path   |
| 5         |           | C-BOP<br>C-SRO                   | P-32A/B SW Pumps do not Auto Start after Restoration of 'A' Train EDG<br><br><b>New</b>  |
| 6         |           | C-RO<br>C-SRO                    | Multiple (4) Stuck Rods Post Trip, requires boration<br><br><b>2017 Repeat</b>   |

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

## SIMULATOR EXERCISE GUIDE REQUIREMENTS

**Terminal Objective:** Given the site simulator and specific plant conditions, the students will be able to respond to various plant abnormal and emergency events, in accordance with site procedures and technical Specifications.

**Enabling Objectives:** 1. None.

**Prerequisites:** 1. Simulator available  
2. Students enrolled in Initial License Program

**Training Resources:** 1. Floor Instructor as Shift Manager / Shift Technical Advisor  
2. Simulator Booth Operator  
3. Communicator  
4. NRC Evaluators

**References:** 1. OP 1C, Startup to Power Operation  
2. AOP-1D, CVCS Malfunction  
3. AOP-2A, Secondary Coolant Leak  
4. AOP-6A, Dropped  
5. AOP-24, response to Instrument Malfunction  
6. EOP-0, Reactor Trip or Safety Injection  
7. EOP-0.1, Reactor Trip Response  
8. ECA-0.0, Loss of All AC Power  
9. OM 3.7, AOP And EOP Procedure Usage For Response To Plant Transients  
10. Technical Specifications Manual  
11. Technical Requirements Manual

**Protected Content:** None

**Evaluation Method:** Simulator performance will be evaluated in accordance with NUREG 1021.

**Operating Experience:** None

**Risk Significant Operator Actions:**



**UPDATE LOG:** Indicate in the following table any minor changes or major revisions made to the material after initial approval.

| # | DESCRIPTION OF CHANGE               | REASON FOR CHANGE | AR/TWR# | PREPARER | DATE |
|---|-------------------------------------|-------------------|---------|----------|------|
|   |                                     |                   |         | REVIEWER | DATE |
| 0 | Developed for the 2021 ILT NRC Exam |                   |         |          |      |
|   |                                     |                   |         |          |      |

## OVERVIEW / SEQUENCE OF EVENTS

### OVERVIEW

Initial conditions for the scenario are: reactor power is stable at approximately 28%, Emergency Diesel Generator (EDG) G03 is out of service for maintenance with G04 aligned to 1A-06 and 2A-06, and 1LT-426 Pressurizer Level channel is removed from service.

Examinees will initiate a power ascension per OP-1C. The crew will then be required to respond to a dropped rod and an instrument failure per AOPs. The crew will also respond to a loss of all AC safeguards power, Service Water pump failures, and stuck control rods using emergency procedures.

The scenario will be terminated when the crew completes through Step 6 of EOP-0.1, Reactor Trip Response.

### SEQUENCE OF EVENTS

| Event # | Description  |
|---------|--|
| 1.      | <p><b>OP 1C Power Ascension</b></p> <ul style="list-style-type: none"> <li>) The crew will raise reactor power approximately 3% to 5% utilizing the provided reactivity plan.</li> </ul>   |
| 2.      | <p><b>Dropped Rod – K9</b></p> <ul style="list-style-type: none"> <li>) Rod K9 will drop to the bottom of the core, causing automatic outward rod motion.</li> <li>) The crew will respond per AOP-6A, Dropped Rod, to stop outward rod motion and stabilize the plant.</li> <li>) The SRO will address Technical Specifications</li> </ul>  |
| 3.      | <p><b>1HC-478, Loop B ADV Hand Controller, Fails High</b></p> <ul style="list-style-type: none"> <li>) The S/G B ADV Controller fails high causing the associated atmospheric steam dump valve (ADV) to open.</li> <li>) The crew will respond per AOP-2A, Secondary Leak, and AOP-24, Response to Instrument Malfunction to isolate the 'B' S/G ADV and stabilize the plant.</li> <li>) The SRO will address Technical Specifications.</li> </ul> |
| 4.      | <p><b>Loss of All AC Safeguards Power to Unit 1</b></p> <ul style="list-style-type: none"> <li>) The loss of Station Transformer 1X-04 and the failures of Emergency Diesel Generators to automatically restore safeguards power results in a loss of all AC safeguards power to Unit 1.</li> <li>) The crew will respond per ECA-0.0 to trip Unit 1 reactor and restore power to a safeguards bus.</li> </ul>                                     |

|    |   |
|----|---|
| 5. | <p><b>'A' Train Service Water Pumps Fail to Start</b></p> <ul style="list-style-type: none"><li>) Upon power restoration, 'A' Train Service Water pumps will fail to automatically start.</li><li>) The crew will start Service Water pumps to ensure adequate Service Water cooling flow per ECA-0.0.</li></ul>          |
| 6. | <p><b>Stuck Rods (4)</b></p> <ul style="list-style-type: none"><li>) When the reactor is tripped, rods B6, B8, C5, and E11 will be stuck at their initial fully withdrawn positions.</li><li>) The crew will respond by borating the RCS to ensure adequate shutdown margin per EOP-0.1, Reactor Trip Response.</li></ul> |
|    | <p>Terminate the scenario when crew has completed Step 6 of EOP-0.1, Reactor Trip Response, or per Lead Evaluator.</p>  |

## SIMULATOR SET-UP INSTRUCTIONS

Perform simulator set up per the site specific Simulator Setup Checklist.

| Check | Action  |
|-------|---|
| 1.    | Reset to IC-30  |
| 2.    | Perform Simulator Setup Checklist   |
| 3.    | Open schedule file. <b>Z:\2021 ILT NRC Exam Simulator Files\ILT NRC Scenario 1</b>  |
| 4.    | To record SBT data: <ol style="list-style-type: none"> <li>1. Launch "SBT Report" from Thunderbar</li> <li>2. Open "Scenario Validation Checklist.sbt" (TRex_PB\Lightning)</li> </ol>   |
| 5.    | Take schedule(s) to <b>run</b>  |
| 6.    | Verify required event file(s) open if required  |
| 7.    | Take sim to <b>run</b>  |
| 8.    | Place turnover sheets on <b>RO</b> desk   |
| 9.    | Place reactivity sheets on <b>RO</b> desk   |
| 10.   | Guard the following: <ul style="list-style-type: none"> <li>) G01, G02, G04 EDG's</li> </ul> Place the following OOS: <ul style="list-style-type: none"> <li>) G03 EDG</li> <li>) 1LT-426 Pressurizer Level</li> </ul> Place red dots on the G03 alarm and PZR Level: <ul style="list-style-type: none"> <li>) C02 E 2-1</li> <li>) C02 E 2-2</li> <li>) 1C04 1C 3-3</li> </ul>   |
| 11.   | <ul style="list-style-type: none"> <li>) Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.</li> <li>) Brief the scenario evaluators</li> <li>) Brief surrogates using TR-AA-230-1007-F11, Surrogate Brief Checklist, if necessary</li> </ul>   |
| 12.   | Run Scenario  |
| 13.   | To save SBT Data: <ol style="list-style-type: none"> <li>1. In the SBT Report program click the Generate Report icon (green arrow)</li> <li>2. In Test Title enter a unique test title, to be same as file name</li> <li>3. In report name enter the location the test files are to be saved, use same file name as Test Title</li> <li>4. Click "Generate" (generates and saves two files in the selected folder)</li> <li>5. Verify files saved in the selected folder</li> <li>6. The generated report and SBT Report program may now be closed</li> <li>7. Collect procedure markups for SBT</li> <li>8. Save any InSight, Alarm, Event, Schedule Files to the secure drive that were in use</li> </ol> |
| 14.   | Reset simulator to appropriate IC.  |

**BOOTH OPERATOR BRIEFING:**

Review the scenario sequence, event triggers and expected field communications.

**Z:/2021 ILT NRC Exam Simulator Files/NRC Scenario 1.sch**

| At Time  | On Event | Action  | Description  |
|----------|----------|---|--|
|          |          | <b>Preloads / Initial Conditions</b>                    |  |
| 00:00:00 |          | Insert malfunction MAL1DSG001B                          | DIESEL G03 FAILURE TO START                              |
| 00:00:00 |          | Insert malfunction XMT1RCS007C to -15                   | 1-LT426 PRZR NARROW RANGE LEVEL FIXED BIAS               |
|          |          | <b>Event 2: Dropped Rod</b>                             |  |
|          | 1        | Insert malfunction MAL1CRF002-K9 on event 1             | ROD DROP K9  |
|          |          | <b>Event 3: SG B ADV Controller (HC-478) fails High</b> |  |
|          | 3        | Insert malfunction CNH1PCS013E to 100.00000 on event 3  | 1-HC478 LOOP B ATM SD HAND CONTROLLER FIXED AUTO ONLY    |
|          | 4        | Insert malfunction VLV1SGN009D to 0.10000 on event 4    | 1-MS-2015 SG B ATMOSPHERIC STM DMP CONTROL FAIL POSITION |
|          |          | Insert remote LOA1SGN026 to 0 in 10                     | 1MS-244 SG B ATMOS STM DMP INLET                         |
|          |          | <b>Event 4: Loss of AC</b>                              |  |
|          | 5        | Insert malfunction MAL1EPS002 on event 5                | LOSS OF LOW VOLTAGE STATION AUX TRANSFORMER X04          |
| 00:00:00 |          | Insert malfunction BKR1DSG001 to Failasis               | 1-A5260 DIESEL GEN NO. G01 TO BUS 1-A05                  |
| 00:00:00 |          | Insert malfunction MAL1DSG007A                          | EDG G01 FAILURE TO AUTOSTART                             |
| 00:00:00 |          | Insert malfunction BKR1DSG004 to Failasis               | 1-A5286 G04 TO 1A06 BRK 86                               |
|          |          | <b>Event 5: SW Pumps DO not Auto Start</b>              |  |
| 00:00:00 |          | Insert malfunction BKR1SWS001 to Fail_Auto_CI           | 1-B5210C P-32A SERVICE WATER PUMP CKTBKR                 |
| 00:00:00 |          | Insert malfunction BKR1SWS002 to Fail_Auto_CI           | 1-B5211C P-32B SERVICE WATER PUMP CKTBKR                 |
| 00:00:00 |          | Insert malfunction BKR1SWS006 to Fail_Auto_CI           | 2-B5234B P-32F SERVICE WATER PUMP CKTBKR                 |
|          |          | <b>Event 6: Stuck Rods Post-Trip</b>                    |  |
| 00:00:00 |          | Insert malfunction MAL1CRF001-B6 to Non-Trippable       | STUCK ROD B6   |
| 00:00:00 |          | Insert malfunction MAL1CRF001-B8 to Non-Trippable       | STUCK ROD B8   |
| 00:00:00 |          | Insert malfunction MAL1CRF001-C5 to Non-Trippable       | STUCK ROD C5   |
| 00:00:00 |          | Insert malfunction MAL1CRF001-E11 to Non-Trippable      | STUCK ROD E11  |
|          |          | Insert remote LOA1CVC054 to 1.0000 in 5                 | 1CV-350 BA TO CHG PP SUCT MOV 1-350                      |
| 00:00:00 |          | Event Z:/2021 ILT NRC Exam Simulator Files/NRC 1.evt    |  |

**Event file: Trigger 4 inserts when 1HC-478 is in MANUAL (x13i263m == 1)**



## SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

**Bolded steps are Verifiable Actions taken by the Operators.**

**(IA) actions are those allowed to be taken from memory, before referencing the procedure, as allowed by OM 3.7, Attachment F, AOP Actions Allowed From Memory.**

| Event # 1               | OP 1C Power Ascension  |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
|-------------------------|--|----------------|--------------------|----------------|---|---|--|----|---|--|----|----|--|----|----|--|
| <b>ACTION</b>           | Booth: None  |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
| <b>STUDENT RESPONSE</b> | <p><b>BOP/RO</b><br/> ) Perform actions as directed.</p> <p><b>SRO</b><br/> ) Implements OP 1C starting at Step 5.37.</p> <p><b>Crew</b><br/> 5.37 <u>Commence Load Escalation</u> (Per the crew's reactivity plan.)<br/> 5.37.1 <b>ESTIMATE the amount of dilution/rod motion needed for desired load change</b>, and REFER to PPCS Xenon program for timing estimates. (<b>SRO</b> directs; <b>RO</b> performs)<br/> 5.37.2 IF rate of load escalation is to be greater than or equal to 15% per hour, THEN CONTACT Chemistry for primary sampling requirements. (no actions needed)<br/> 5.37.3 PERFORM the following to begin raising load: (<b>SRO</b> directs, <b>BOP</b> performs)<br/> a. ENSURE EH Control in OPER AUTO, 1<sup>st</sup> Stage IN.<br/> b. ENSURE the Valve Position Limiter (VPL) is set to the desired position.<br/> c. <b>SET Turbine Controls for desired ramp rate per table below:</b></p> <table border="1" data-bbox="479 1245 919 1451"> <thead> <tr> <th>% per Hour</th> <th>Thumbwheel Setting</th> <th>INITIAL or N/A</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>6</td> <td></td> </tr> <tr> <td>12</td> <td>8</td> <td></td> </tr> <tr> <td>15</td> <td>10</td> <td></td> </tr> <tr> <td>30</td> <td>15</td> <td></td> </tr> </tbody> </table> <p><i>(The setting depends on the decision of the crew)</i><br/> d. <b>ADJUST Turbine Setter to desired turbine load AND DEPRESS GO pushbutton.</b> (<b>BOP</b> uses the up/down arrow buttons, in the Reference Control section of Turbine Control, to set the desired end point.)<br/> 5.38 <u>Continuous Action During Power Increase</u><br/> 5.38.1 MAINTAIN controls in AUTO as practicable:<br/> ) Blender controls (<b>RO</b>)<br/> ) Turbine controls (<b>BOP</b>)<br/> 5.38.2 MAINTAIN Control Banks within the insertion, sequence, and overlap limits specified in the COLOR. LCO 3.1.6 (<b>RO</b>)<br/> 5.38.3 MAINTAIN Tavg within 1.5°F of Tref. (<b>RO</b>)<br/> <b>SET desired quantity on 1YIC-11A, Dilution Flow Counter</b><br/> <b>SET desired flow rate on 1HC-111, Reactor Makeup Water Flow Controller</b></p> | % per Hour     | Thumbwheel Setting | INITIAL or N/A | 3 | 6 |  | 12 | 8 |  | 15 | 10 |  | 30 | 15 |  |
| % per Hour              | Thumbwheel Setting   | INITIAL or N/A |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
| 3                       | 6  |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
| 12                      | 8  |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
| 15                      | 10   |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |
| 30                      | 15   |                |                    |                |   |   |  |    |   |  |    |    |  |    |    |  |

|                  |   |
|------------------|---|
|                  | <p><b>PLACE Reactor Makeup Mode Selector Switch in DILUTE</b><br/> <b>ENSURE SHUT CV-110A, BA to Z-1 Blender Flow Control Valve</b><br/> <b>PLACE Reactor Makeup Control Switch to START</b><br/> <b>ENSURE Dilution Flow Counter functions properly upon start</b><br/> <b>MONITOR system for proper response</b></p>  |
| <b>ROLE PLAY</b> | <p><b><u>Booth Communications:</u></b><br/>         ) Respond to reports or direction to field operators as necessary.</p> <p><b><u>SM Communications:</u></b><br/>         ) Brief the crew to maintain rod control in AUTO. Rod control may be taken to MANUAL to make adjustment to Tavg or AFD, but should be returned to AUTO following rod motion.<br/>         ) Direct the crew to proceed with power ascension as briefed.</p> |
| <b>NOTES</b>     | <p><b>Continuation Criteria:</b><br/>         After a power increase of approximately 3% to 5%, or at the discretion of the Lead Examiner, continue with the next event.</p>  |

| Event # 2               | Dropped Rod – K9  |
|-------------------------|---|
| <b>ACTION</b>           | Booth: Insert <b>TRIGGER 1</b> per Lead Evaluator   |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>) Rod Bottom Light control rod K-9, Control Bank A</li> <li>) Control rod K-9 IRPI at approximately 0</li> <li>) POWER RANGE CHANNEL DEVIATION (1C04 1A 3-3)</li> <li>) POWER RANGE ROD DROP (1C04 1A 4-5)</li> <li>) ROD BOTTOM ROD DROP (1C04 1A 1-4)</li> <li>) Power Range NIs drop to between 19% and 24%</li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>) Diagnoses the dropped rod and takes manual control of rods. <b>(RO)</b></li> <li>) Suspends the load ramp if in progress. <b>(BOP)</b></li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>) Implements AOP-6A, Dropped Rod</li> </ul> <p><b>Crew (SRO directs)</b></p> <ol style="list-style-type: none"> <li>1. Check Only One Rod Dropped <b>(RO)</b></li> <li>2. Check Main Turbine – ON LINE <b>(BOP)</b></li> <li>3. <b>(IA) Place Control Rod Bank Selector Switch in – MANUAL (RO)</b></li> <li>4. <b>(IA) Check Tav<sub>g</sub> – TRENDING TO PROGRAM VALUE; RNO: Restore Tav<sub>g</sub> to program value by adjusting turbine load. (BOP)</b><br/> <i>This may be completed by either of b or c (as determined by the SRO):</i> <ol style="list-style-type: none"> <li>a. Determine the amount of load reduction needed.</li> <li>b. Select TURBINE MANUAL and use GV down pushbutton</li> <li>c. In OPER AUTO, set the reference setter to the desired value by using the Reference Control down and up buttons; then press GO.</li> </ol> </li> <li>5. Maintain RCS Tav<sub>g</sub>: (Continuous Action Step [C.A.S.] for <b>RO</b> to monitor throughout the procedure)</li> <li>6. Notify the following personnel: <b>(SRO directs SM to make notifications)</b> <ul style="list-style-type: none"> <li>o Reactor Engineering</li> <li>o I&amp;C Supervisor</li> <li>o Maintenance Supervisor</li> </ul> </li> <li>7. <b>Place Lift Coil Disconnect Switch For Dropped Rod In – DISCONNECT (BOP or RO)</b></li> <li>8. Check Axial Flux Difference – IN OPERATING BAND <b>(RO)</b></li> <li>9. Perform PBF-2513, Shutdown Margin For an Operating Reactor WITHIN 1 HOUR (Shift Manager discuss with <b>SRO</b> to hand off to U2 to perform)</li> <li>10. Check Quadrant Power Tilt – LESS THAN 2%; RNO: Perform AOP-6H, Quadrant Power Tilt, while continuing with this procedure. <b>(RO. AOP-6H may be handed off to Unit 2 to perform, but no actions due to initial power level)</b></li> <li>11. <b>Reset Dropped Rod Alarms on NIS Power Range Cabinets (BOP)</b></li> <li>12. Reduce Reactor Power – TO LESS THAN OR EQUAL TO 75% WITHIN 2 HOURS OF DROPPED ROD (No actions required due initial power level)</li> <li>13. Check Changes in Reactor Power - LESS THAN 15% IN ANY</li> </ol> |

| Event # 2  | Dropped Rod – K9   |                 |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
|--|--|-----------------|-----------------|-----------------|--|--|--|------------------------------|---|--------|--|--|--|--|---|---------|
|  | <p>1 HOUR (RO)<br/>           14. Confirm Dropped Rod (RO)<br/>           15. Check Dropped Rod Confirmed (RO)<br/>           16. Direct Maintenance to Make Necessary Repairs (SRO directs SM to call)</p> <p><b>Note:</b> The temperature transient caused by the dropped rod may result in an automatic letdown isolation. Letdown restoration per AOP-1D, CVCS Malfunction, is not required to meet the objectives of this scenario.</p> <p>) Assess Technical Specifications: (SRO performs)</p> <table border="1" data-bbox="402 688 1419 1159"> <thead> <tr> <th>CONDITION</th> <th>REQUIRED ACTION</th> <th>COMPLETION TIME</th> </tr> </thead> <tbody> <tr> <td colspan="3"><b>TS 3.1.4 Rod Group Alignment Limits</b></td> </tr> <tr> <td>B. One rod not within limits</td> <td>B.1.1 Verify SDM to be within limits provided in COLR</td> <td>1 hour</td> </tr> <tr> <td colspan="3"><b>TS 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits (PZR Press 2205 psig)</b></td> </tr> <tr> <td>A. One or more RCS DNB parameters not within limits.</td> <td>A.1 Restore RCS DNB parameter(s) to within limit.</td> <td>2 hours</td> </tr> </tbody> </table> | CONDITION       | REQUIRED ACTION | COMPLETION TIME | <b>TS 3.1.4 Rod Group Alignment Limits</b> |  |  | B. One rod not within limits | B.1.1 Verify SDM to be within limits provided in COLR | 1 hour | <b>TS 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits (PZR Press 2205 psig)</b> |  |  | A. One or more RCS DNB parameters not within limits. | A.1 Restore RCS DNB parameter(s) to within limit. | 2 hours |
| CONDITION  | REQUIRED ACTION  | COMPLETION TIME |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| <b>TS 3.1.4 Rod Group Alignment Limits</b>   |  |                 |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| B. One rod not within limits   | B.1.1 Verify SDM to be within limits provided in COLR  | 1 hour          |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| <b>TS 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits (PZR Press 2205 psig)</b> |  |                 |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| A. One or more RCS DNB parameters not within limits.   | A.1 Restore RCS DNB parameter(s) to within limit.  | 2 hours         |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| <b>ROLE PLAY</b>   | <p><b><u>Booth Communications:</u></b><br/>           ) Respond to reports or direction to field operators as necessary.</p> <p><b><u>SM Communications:</u></b><br/>           ) Respond to reports from crew members as required.<br/>           ) When SDM calculation called for, discuss with OS to pass it off to Unit 2 so Unit 1 can focus on the event.</p>   |                 |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |
| <b>NOTES</b>   | <p><b>Continuation Criteria:</b><br/>           After the crew has restored Tavgt to program and address Technical Specifications, or at the discretion of the Lead Examiner, continue with the next event.</p>  |                 |                 |                 |  |  |  |                              |   |        |  |  |  |  |   |         |

|                         |  |
|-------------------------|--|
| <b>Event # 3</b>        | <b>1HC-478, Loop B ADV Hand Controller, Fails High</b>   |
| <b>ACTION</b>           | <b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator   |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>) 1MS-2015, B ADV, indicating lights – red on, green off</li> <li>) PPCS alarms</li> <li>) Rising reactor power</li> <li>) Lowering Tavg</li> <li>) Lowering Pzr Level and Pressure</li> </ul> <p><b>BOP</b></p> <ul style="list-style-type: none"> <li>) <b>(IA)</b> Diagnoses controller failure and attempt to shut 1MS-2015, Atmospheric Dump Valve, from the control room.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>) Implements AOP-2A, Secondary Coolant Leak</li> </ul> <p><b>Crew (SRO directs)</b></p> <p><b>AOP-2A, Secondary Coolant Leak</b></p> <ol style="list-style-type: none"> <li>1. Determine Secondary Leakage Not Hazardous to Personnel or Equipment (<b>BOP</b> monitors) <ul style="list-style-type: none"> <li>) Plant habitability</li> <li>) Containment Pressure &lt; 2 psig</li> <li>) Safeguards bus fault</li> <li>) Equipment Operability</li> </ul> </li> <li>2. Maintain Plant Within Limits (C.A.S. for <b>RO</b> and <b>BOP</b> to monitor throughout the procedure) <ul style="list-style-type: none"> <li>) Rx power 100% per NIs (<b>RO</b>)</li> <li>) SG levels stable of trending to 64% (<b>BOP</b>)</li> <li>) Feed pump suction pressure &gt; 180 psig (<b>BOP</b>)</li> <li>) Condensate Pump motor current &lt; 185 amps (<b>BOP</b>)</li> </ul> </li> <li>3. Maintain RCS Tavg (C.A.S. for <b>RO</b> to monitor throughout the procedure)<br/>Note: Steps 4 through 10 are diagnostic steps to determine the source of the leak. These steps may be performed in any order. <i>No actions</i></li> <li>5. Check No Secondary Leakage to Atmosphere <ol style="list-style-type: none"> <li>a. Steam Generator Safety Valves Shut (<b>BOP</b> may contact Security or the PAB AO)</li> <li>b. Steam Generator atmospheric steam dump valves shut <ol style="list-style-type: none"> <li>i. 1MS-2015 for S/G B (<b>BOP</b>)</li> </ol> </li> </ol> <p>RNO: Perform the following: (<b>SRO</b> directs)</p> <ol style="list-style-type: none"> <li>1) <b>Manually shut valve(s) (BOP)</b><br/>Place 1HC-478 to Manual<br/>Take manual potentiometer to full close<br/>Note valve position lights do not indicate fully closed</li> <li>2) <b>IF valve(s) will NOT shut, THEN locally shut associated isolation valve:</b> <ul style="list-style-type: none"> <li>o <b>1MS-244 for 1MS-2015 (BOP directs AO)</b></li> </ul> </li> </ol> </li> <li>15. Check Plant Shutdown and Cooldown Required (<b>SRO</b>)</li> </ol> |

| Event # 3   | 1HC-478, Loop B ADV Hand Controller, Fails High   |                 |                 |                 |   |  |  |   |  |        |
|---|---|-----------------|-----------------|-----------------|---|--|--|---|--|--------|
|   | <p>RNO: Return to Procedure and Step in Effect<br/>Note: Steps 11 through 14 do not require any operator action.</p> <p>) Assess Technical Specifications: <b>(SRO)</b></p> <table border="1" data-bbox="402 489 1421 787"> <thead> <tr> <th data-bbox="402 489 703 562">CONDITION</th> <th data-bbox="703 489 1003 562">REQUIRED ACTION</th> <th data-bbox="1003 489 1421 562">COMPLETION TIME</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="402 562 1421 615"><b>TS 3.7.4 Atmospheric Dump Valve (ADV) Flowpath</b></td> </tr> <tr> <td data-bbox="402 615 703 787">A. One required ADV flowpath inoperable</td> <td data-bbox="703 615 1003 787">A. 1 Restore required ADV flowpath to OPERABLE status.</td> <td data-bbox="1003 615 1421 787">7 days</td> </tr> </tbody> </table> | CONDITION       | REQUIRED ACTION | COMPLETION TIME | <b>TS 3.7.4 Atmospheric Dump Valve (ADV) Flowpath</b> |  |  | A. One required ADV flowpath inoperable | A. 1 Restore required ADV flowpath to OPERABLE status. | 7 days |
| CONDITION   | REQUIRED ACTION   | COMPLETION TIME |                 |                 |   |  |  |   |  |        |
| <b>TS 3.7.4 Atmospheric Dump Valve (ADV) Flowpath</b> |   |                 |                 |                 |   |  |  |   |  |        |
| A. One required ADV flowpath inoperable               | A. 1 Restore required ADV flowpath to OPERABLE status.  | 7 days          |                 |                 |   |  |  |   |  |        |
| <b>ROLE PLAY</b>                                      | <p><b><u>Booth Communications:</u></b></p> <p>) PAB AO: 5 minutes after inserting trigger 3, or 2 minutes after being directed to investigate, report flow noise at the Unit 1 'B' Atmospheric Dump Valve.</p> <p>) PAB AO: If asked, after the crew attempts to shut the 'B' ADV from the CR, report that 1MS-2015 is <b>10%</b> OPEN and not moving.</p> <p>) PAB AO: When directed, use LOA1SGN026 to SHUT 1MS-244, Isolation for 1MS-2015, as directed by the crew. Report that flow noise has stopped when 1MS-244 is shut.</p> <p>) PAB AO: If asked, report that all S/G Safety Valves are shut.</p> <p>) Respond to other reports or direction to field operators as necessary.</p> <p><b><u>SM Communications:</u></b></p> <p>) Respond to reports from crew members as required.</p>      |                 |                 |                 |   |  |  |   |  |        |
| <b>NOTES</b>  | <p><b>Continuation Criteria:</b><br/>After the crew isolates the 'B' ADV and assesses Technical Specifications, or at the discretion of the Lead Examiner, continue with the next event.</p>  |                 |                 |                 |   |  |  |   |  |        |

| Event # 4   | Loss of All AC Safeguards Power   |
|---|---|
| <b>ACTION</b>   | Booth: Insert <b>TRIGGER 5</b> per Lead Evaluator   |
| <p><b>STUDENT RESPONSE</b></p> <p>Conditions for CT-24 event start here</p> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>) Dimming of lights in the Control Room</li> <li>) <b>UNIT 1 4.16 KV BUS UNDER VOLTAGE (C02D 1-4)</b></li> <li>) <b>UNIT 1 480 V BUS UNDER VOLTAGE (C02D 2-1)</b></li> <li>) <b>13.8 KV MAIN OR TIE BREAKER TRIP (C02E 2-8)</b></li> </ul> <p><b>BOP</b></p> <ul style="list-style-type: none"> <li>) Diagnoses loss of AC power to both trains of safeguards busses and performs immediate actions of ECA-0.0, Loss of All AC Power.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>) Implements ECA-0.0, Loss of All AC Power</li> </ul> <p><b>Crew (ECA-0.0) (SRO directs)</b></p> <ol style="list-style-type: none"> <li>1. Verify Reactor Trip (<b>RO</b>) <ul style="list-style-type: none"> <li>) Reactor Trip and By-Pass Breakers – OPEN</li> <li>RNO: <b>Manually trip reactor (RO)</b></li> </ul> </li> <li>2. Verify Turbine Trip (<b>RO</b>)</li> <li>3. Secure RCPs (<b>RO</b>) <ol style="list-style-type: none"> <li>a. <b>Ensure both RCPs – STOPPED (RO)</b><br/><i>Places 1P-1A and 1P-1B handswitches in STOP.</i></li> <li>b. <b>Place steam dump mode control – MANUAL (BOP)</b></li> </ol> </li> <li>4. Check if RCS is Isolated (<b>RO</b>) <ol style="list-style-type: none"> <li>a. PZR PORVs – BOTH SHUT</li> <li>b. Letdown orifice outlet valves – SHUT</li> <li>c. <b>Letdown containment isolation valves – SHUT (RO)</b> <ul style="list-style-type: none"> <li>) <b>1CV-371A</b></li> <li>) <b>1CV-371</b></li> </ul> </li> <li>d. <b>RCP Seal return isolation valves – SHUT (RO)</b> <ul style="list-style-type: none"> <li>) <b>1CV-313A</b></li> </ul> </li> <li>e. <b>RCS Sample valves – SHUT (BOP)</b> <ul style="list-style-type: none"> <li>) 1SC-966A, PZR Steam Space sample containment isolation valve</li> <li>) 1SC-966B, PZR liquid space sample containment isolation valve</li> <li>) <b>1SC-966C, RCS hot leg sample containment isolation valve.</b></li> </ul> </li> <li>f. Head vent system – ENERGIZED; RNO: Go to Step 5 (<b>RO</b>)</li> </ol> </li> <li>5. Verify AFW Flow – GREATER THAN OR EQUAL TO 275 GPM; RNO: Perform the following: (<b>BOP</b>) <ol style="list-style-type: none"> <li>a. <b>Ensure TDAFW Pump steam supply MOV's OPEN</b> <ul style="list-style-type: none"> <li>) <b>1MS-2020</b></li> <li>) <b>1MS-2019</b></li> </ul> </li> <li>b. Ensure TDAFW Pump discharge MOV's OPEN</li> </ol> </li> </ol> |

| Event # 4  | Loss of All AC Safeguards Power   |
|--|---|
| <p>CT-24 action. Conditions for CT-25 event start here</p> | <p>6. TRY TO RESTORE POWER TO ANY SAFEGUARDS BUS (<b>BOP</b>)<br/> <b>BOP or RO may call TH AOs to investigate EDGs</b><br/> <i>(G01 fails to start, can be manually started but will not close onto bus 1A-05; G02 is running; G03 is OOS; G04 is running but fails to close onto bus 1A-06)</i></p> <ul style="list-style-type: none"> <li>a. Emergency Diesel Generators – ALL RUNNING</li> <li>a. RNO: Try to start non-running EDGs               <ul style="list-style-type: none"> <li>1) Ensure diesel mode selector switch in AUTO</li> <li><b>2) Place control switch to START (G-01)</b></li> <li>3) Ensure generator field flash occurs</li> <li>4) Ensure green READY TO LOAD light is energized</li> <li>5) IF No diesel is running, THEN Go to Step 10</li> </ul> </li> <li>b. AC Safeguards buses – AT LEAST ONE TRAIN ENERGIZED</li> <li>b. RNO: IF NO 4160v SAFEGUARDS BUS is energized, THEN Go to Step 7</li> </ul> <p>7. Restore Power to 'A' Safeguards Bus: (<b>BOP</b>)</p> <ul style="list-style-type: none"> <li>a. Check G-01 – RUNNING           <ul style="list-style-type: none"> <li>1) IF G-01 is running AND breaker 1A52-60, G-01 to Bus 1A-05 Breaker, is NOT closed, THEN perform the following:               <ul style="list-style-type: none"> <li>a) Ensure 1A52-57, 1A-03 to 1A-05 Bus Tie Breaker, is open.</li> <li>b) <b>Try to auto close breaker by placing control switch to trip position then release.</b></li> <li>c) IF breaker will NOT auto close, THEN perform the following:                   <ul style="list-style-type: none"> <li><b>1. Place Mode Selector switch in EXERCISE.</b></li> <li><b>2. Turn sync switch ON</b></li> <li><b>3. At C-02, manually CLOSE breaker control switch.</b></li> <li><b>4. Turn sync switch OFF.</b></li> </ul> </li> <li>d) IF 1A-05 and 1B-03 are energized, THEN Go to Step 9.</li> </ul> </li> <li>a. RNO: Check G-02 – RUNNING               <ul style="list-style-type: none"> <li>2) IF G-02 is running AND 1A-05 is still NOT energized, THEN perform the following:                   <ul style="list-style-type: none"> <li>a) Ensure 1A52-57, 1A-03 to 1A-05 bus tie breaker is OPEN.</li> <li>b) <b>Ensure 1A52-60, G-01 to 1A-05 breaker, is OPEN and in PULLOUT.</b></li> <li>c) <b>(CT) Unlock (Key 43) and place 1A52-66, G-02 to 1A-05 breaker control switch in auto. (Energizes 1A-05)</b></li> <li>e) IF 1A-05 and 1B-03 are energized, THEN Go to Step 9.</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p>9. (or Step 46 per FOP) Verify One Train of Safeguards Bus Energized<br/> <i>(subsequent steps listed below in Event #5)</i> (<b>BOP</b>)</p> |



| Event # 4               | Loss of All AC Safeguards Power   |
|-------------------------|---|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>) TH AO: If directed to investigate G-01 failure to start, wait 2 minutes and report all conditions appear normal for G-01.</li> <li>) TH AO: If directed to investigate output breakers for G-01 and/or G-04 failure to close, wait 2 minutes and report that conditions appear normal locally.</li> <li>) TH AO: If directed to investigate the 1X-04 lockout, wait 3 minutes and report there is no apparent cause locally.</li> <li>) Respond to other reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>) Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     |   |

| Event # 5               | 'A' Train Service Water Pumps Fail to Start   |
|-------------------------|---|
| <b>ACTION</b>           | Booth: None   |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>) SW Header pressure, north and south, approximately 30 psig</li> <li>) NORTH OR SOUTH SERVICE WATER HEADER PRESSURE LOW (C01A 3-5)</li> <li>) 1P-30A OR B (2P-30A OR B) CIRC PUMPS COOLING WATER FLOW LOW (C01A 3-7 and 4-7)</li> <li>) G-01 (G-02) EMER DIESEL COOLER LOW FLOW (C02D 3-6 and C02F 3-1)</li> </ul> <p><b>BOP</b></p> <ul style="list-style-type: none"> <li>) Starts Service Water pumps to restore SW system pressure.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>) Implements ECA-0.0, Loss of ALL AC Power</li> </ul> <p><b>Crew</b></p> <ul style="list-style-type: none"> <li>9. Verify One Train of Safeguards Bus Energized (<b>BOP</b>)<br/> <b>BOP</b> or <b>RO</b> may call TH AOs to investigate SW Pumps and their breakers (1B-03, 1B-04, 2B-04, and 2B-03) <ul style="list-style-type: none"> <li>a. AC Safeguards buses – AT LEAST ONE TRAIN ENERGIZED</li> <li>b. Monitor running EDG status</li> <li>c. Service Water header pressure – GREATER THAN OR EQUAL TO 50 psig.</li> <li>c. <b>(CT) RNO: Manually start pumps and align valves as necessary to establish service water header pressure greater than or equal to 50 psig.</b><br/> Place control switch for P-32A, P-32B, and/or P-32F to start to raise pressure greater than 50 psig<br/> <i>P-32C has no power.</i></li> <li>d. <b>Trip and close contactor(s) for tripped battery chargers aligned to supply DC buses</b><br/> <ul style="list-style-type: none"> <li>) <b>D-07</b></li> </ul> </li> <li>e. Return to procedure and step in effect and implement CSPs as necessary.</li> </ul> </li> </ul> |
| <b>ROLE PLAY</b>        | <p><b>Booth Communications:</b></p> <ul style="list-style-type: none"> <li>) Respond to reports or direction to field operators as necessary.</li> <li>) If asked, all pumps are ready for start. Also, all pumps started are sat.</li> </ul> <p><b>SM Communications:</b></p> <ul style="list-style-type: none"> <li>) Respond to reports from crew members as required.</li> </ul>  |

|                  |  |
|------------------|--|
| <b>Event # 5</b> | <b>'A' Train Service Water Pumps Fail to Start</b> |
| <b>NOTES</b>     |  |

| Event # 6        | Stuck Rods (4)  |
|------------------|---|
| ACTION           | Booth: None   |
| STUDENT RESPONSE | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>) Control Rods B6 and B8, in Shutdown Bank A, and C5 and E11, in Control Bank A at 225 steps on IRPIs</li> <li>) B6, B8, C5, and E11 rod bottom lights NOT LIT</li> </ul> <p><b>RO</b></p> <ul style="list-style-type: none"> <li>) Recognize not all rods fully inserted, uses backup indications to verify the reactor is tripped.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>) Implements EOP-0, Reactor Trip or Safety Injection and EOP-0.1, Reactor Trip Response</li> </ul> <p><b>Crew</b></p> <p><u>EOP-0, Reactor Trip or Safety Injection (SRO directs)</u></p> <ol style="list-style-type: none"> <li>1. Verify Reactor Tripped; RNO: <b>Manually trip reactor. (RO performs since not all rods on the bottom)</b></li> <li>2. Verify Turbine Trip <b>(RO)</b></li> <li>3. Verify power to AC Safeguards Buses <b>(RO)</b> <ol style="list-style-type: none"> <li>a. Check safeguards buses – At least one train ENERGIZED</li> <li>b. Check safeguards buses – All ENERGIZED; RNO: Try to restore power to de-energized buses while continuing with this procedure. (Shift Manager will discuss with <b>SRO</b> having Unit 2 restore power to B Train using the AOP-18 and 19 procedures.)</li> </ol> </li> <li>4. Check If SI actuated <b>(RO)</b> <ol style="list-style-type: none"> <li>a. Any SI annunciators – LIT <i>No lights lit</i></li> <li>b. RNO: Check if SI is required: <i>SI not required (Pzr Pressure, Containment Pressure, SG Pressures)</i><br/> IF SI is not required, THEN perform the following: <ol style="list-style-type: none"> <li>1) Notify STA to MONITOR and IMPLEMENT CSP Status per CSP-ST.0 Unit 1, CSF Status trees. <b>(SRO)</b></li> <li>2) Go to EOP-0.1, Reactor Trip Response.</li> </ol> </li> </ol> </li> </ol> <p><u>EOP-0.1, Reactor Trip Response (SRO directs)</u></p> <ol style="list-style-type: none"> <li>1. Check RCS Temperature<br/> <b>Place Steam Dump Mode Selector in MANUAL (BOP)</b><br/> With NO RCPs running, Check RCS WR Cold Leg temp stable at or trending to 547°F <b>(RO)</b></li> <li>2. Check feedwater status <ol style="list-style-type: none"> <li>a. Main feedwater regulating control valves – BOTH SHUT <b>(BOP)</b></li> <li>b. Transfer feedwater control to bypass regulating valves: <b>(BOP)</b> <ol style="list-style-type: none"> <li>1) Check main feedwater pumps – AT LEAST ONE RUNNING</li> <li>2) <b>Control feedwater flow using regulating bypass valves:</b></li> <li>3) Maintain both S/G levels – BETWEEN 33% and 63%.</li> <li>4) <b>Reset Loss of Feedwater Turbine Trip</b></li> </ol> </li> </ol> </li> </ol> |

| Event # 6 | Stuck Rods (4)   |
|-----------|--|
|           | <p>5) <b>Stop any running AFW pumps.</b></p> <p>3. Verify all control rods – FULLY INSERTED (RO)<br/>RNO: IF two or more control rods are NOT fully inserted, THEN initiate emergency boration:</p> <ol style="list-style-type: none"> <li>a. Record initial level for in service BAST (RO or BOP)</li> <li>b. Perform the following to adjust charging flow: (RO)           <ol style="list-style-type: none"> <li>1) <b>Control charging pump speed as necessary to maintain flow GREATER THAN OR EQUAL TO 60 gpm.</b><br/>Places AUTO Charging Pump in MANUAL and dials manual pot to achieve 60 gpm</li> <li>2) <b>Control charging flow as necessary to maintain labyrinth seal P GREATER THAN 20 inches.</b><br/>Manipulates 1HC-142 dial to maintain &gt; 20 inches on Lab Seal DP.</li> </ol> </li> <li>c. <b>Start one boric acid transfer pump (RO)</b></li> <li>d. Open emergency borate valve: 1CV-350. <i>(No power to open valve)</i><br/><i>Evaluator's note: If the crew decides to have the PAB AO locally open 1CV-350, steps e. and f. apply. If the crew does not locally open the valve and continues with the RNO column, steps e. and f. have no actions.</i></li> <li>e. Borate 2825 gallons for each control rod not fully inserted. <i>(11,300 gallons)</i></li> <li>f. WHEN emergency boration is complete, THEN control charging as necessary to establish desired charging flow.</li> <li>g. <b>IF emergency boration can NOT be established, THEN perform boration per OP-5B while continuing with this procedure. (RO)</b><br/><i>RO may direct the PAB AO to locally open 1CV-350</i> <ol style="list-style-type: none"> <li>a. Determine desired output concentration.</li> <li>b. <b>Set 1HC-111, RMUW Flow Control, to desired flowrate and in AUTO</b></li> <li>c. <b>Set 1HC-110, Boric Acid Flow Control to desired flowrate and in AUTO</b></li> <li>d. Verify valves in AUTO: 1CV-111, 1CV-110A, 1CV-110B, 1CV-110C</li> <li>e. <b>Place Makeup Mode Selector to AUTO</b></li> <li>f. <b>Place Makeup Control Switch to START</b></li> <li>g. Monitor VCT level and ensure automatic operation.</li> </ol> </li> </ol> <p>4. Check PZR level control</p> <ol style="list-style-type: none"> <li>a. PZR Level – GREATER THAN 12%. (RO verifies)</li> <li>b. Charging – IN SERVICE; RNO: Place charging in service. (RO)       <ol style="list-style-type: none"> <li>1) Ensure RCS cold leg normal charging isolation valve is open: 1CV-1298. <i>(valve is open but with no power for indication)</i></li> <li>2) IF no charging pumps are running AND component cooling water flow to any RCP thermal barrier is lost, THEN locally shut affected RCP seal injection throttle valve before starting charging pumps.</li> <li>3) <b>Start charging pumps to establish at least one running.</b></li> </ol> </li> </ol> |

|                  |  |
|------------------|--|
| <b>Event # 6</b> | <b>Stuck Rods (4)</b>  |
|                  | <p><i>Place handswitch to START and hold, or START and release then START again (for the VFD logic)</i></p> <ol style="list-style-type: none"> <li>4) <b>Start additional charging pumps as necessary to establish desired charging flow.</b><br/><i>Dials manual pot to achieve desired flow</i></li> <li>5) <b>Maintain labyrinth seal P greater than 20 inches. 1HC-142</b><br/>Manipulates 1HC-142 dial to maintain &gt; 20 inches on Lab Seal DP.</li> </ol> <p>c. Letdown – IN SERVICE; RNO WHEN PZR level is greater than 12%, THEN place letdown in service: <b>(RO)</b></p> <ol style="list-style-type: none"> <li>1) <b>Open letdown line containment isolation valves</b><br/>1CV-371 and 1CV-371A</li> <li>2) Open RCS cold leg letdown isolation valve. 1RC-427</li> <li>3) <b>Ensure component cooling flow to non-regenerative heat exchanger is established. 1HC-130</b></li> <li>4) Ensure charging flow is at least 21 gpm</li> <li>5) <b>Adjust backpressure as necessary and open letdown isolation valves to establish desired letdown flow.</b><br/><i>Manipulates 1CV-135 to achieve desired backpressure</i><br/><i>Opens one of the Letdown Orifice Valves, 1CV 200A/B/C</i></li> </ol> <p>d. PZR Level – TRENDING TO 20% <b>(RO)</b></p> |
| <b>ROLE PLAY</b> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>) PAB AO: If directed to locally open 1CV-350, wait 2 minutes, use LOA1CVC054 to open 1CV-350, report when complete.</li> <li>) Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>) Respond to reports from crew members as required.</li> <li>) When EOP-0 directs trying to restore power to deenergized buses, discuss with the SRO having Unit 2 restore power with the AOP-18 and AOP-19 procedures.</li> </ul>  |
| <b>NOTES</b>     |  |
|                  | <b>Scenario Termination</b>  |
|                  | Terminate the scenario when the crew has completed Step 4 of EOP-0.1, or per Lead Evaluator.   |

| Event # 6    | Stuck Rods (4)  |
|--------------|---|
| <b>NOTES</b> | ) Freeze the simulator<br>) Determine if the NRC has any follow up questions<br>) <b>Save SBT Data (see sim setup instructions)</b> |

## QUANTITATIVE ATTRIBUTES

### **Malfunctions:**

*Before EOP Entry:*

- ) Dropped rod (K9)
- ) 1HC-478 Loop 'B' ADV controller fails high

*After EOP Entry:*

- ) 'A' train Service Water pumps fail to auto start
- ) 4 stuck rods

### **Abnormal Events:**

- ) Dropped Rod
- ) Secondary Coolant leak to atmosphere via ADV

### **Major Transients:**

- ) Loss of All AC to Safeguards Buses

### **Critical Tasks:**

|    |       |  |
|----|-------|--|
| 1. | CT-24 | Energize at least one emergency bus                |
| 2. | CT-25 | Manually start service water pumps for EDG cooling |

### **Major Procedures:**

AOP-6A   AOP-1D (potential)   AOP-2A   AOP-24 (potential)   ECA-0.0   EOP-0   EOP-0.1



CT-24

Energize at least one AC emergency bus

**Critical Task:**

Energize at least one AC emergency bus **prior to placing safeguards equipment switches in pull-out.**

**Plant Conditions:**

- ) Reactor trip
- ) Station blackout
- ) At least one EDG can be connected to an AC emergency bus

**Cues:**

Indication and/or annunciation that all AC emergency buses are de-energized

- ) Bus energized lamps extinguished
- ) Circuit breaker position
- ) Bus voltage
- ) EDG status

**Performance Indicator:**

Manipulation of controls as required to energize at least one ac emergency bus

- ) Bus energized lamp(s) illuminated
- ) Circuit breaker position lamps indicate closed
- ) Bus voltage indication shows nominal voltage present

**Feedback:**

Indication that at least one ac emergency bus is energized

- ) Safeguards equipment sequences onto the energized bus
- ) EDG status

**Basis:**

SAFETY SIGNIFICANCE -- Failure to energize an ac emergency bus constitutes misoperation or incorrect crew performance in which the crew does not prevent "degraded ... emergency power capacity." Failure to perform the critical task also results in needless "degradation of any barrier to fission product release," specifically of the RCS barrier at the point of the RCP seals. In this case, at least one ac emergency bus can be energized from the control room. Failure to perform the critical task means that RCS inventory lost through the RCP seals cannot be replaced. It also means that the RCP seals remain without cooling and gradually deteriorate. As the seals deteriorate the rate of RCS inventory loss increases.

CT-25

Manually start Service Water pump for EDG cooling

**Critical Task:**

Manually start service water pump(s) **such that the EDG does not fail due to damage from overheating.**

**Plant Conditions:**

- ) Station blackout with subsequent restoration of ac power from one EDG
- ) SW pumps aligned to provide cooling for the running EDG fail to start automatically when the associated ac emergency bus is reenergized by the EDG
- ) An SW pump aligned to provide cooling for the running EDG can be started, provided that manual action is taken as necessary
- ) All other EDGs inoperable

**Cues:**

- ) Indication and/or annunciation that one ac emergency bus is energized by an EDG
  - Circuit breaker position lamps indicate breaker closed
  - Bus voltage indication shows nominal voltage present
  - EDG status

AND

- ) Indication and/or annunciation that no SW pump is running
  - Control switch indication that the circuit breakers or contactors for all SW pumps are open
  - SW header pressure indicator reads < 50 psig

**Performance Indicator:**

Manipulation of controls as required to start the SW pump(s) powered from the ac emergency bus energized by the EDG

- ) Control switch indication that the circuit breaker or contactor for a SW pump aligned to supply cooling water to the running EDG is closed

**Feedback:**

Indication and/or annunciation that a SW pump is running, aligned to supply cooling water to the running EDG

- ) SW low flow condition clear (G-02 Emerg Diesel Cooler Low Flow alarm clear)
- ) SW low pressure condition clear (SW Header Pressure Low alarm clear)

**Basis:**

SAFETY SIGNIFICANCE -- Failure to manually start the SW pump under the postulated plant conditions means that the EDG is running without SW cooling. Running the EDG without SW cooling leads to a high-temperature condition that can result in EDG failure due to damage caused by engine overheating. Under the postulated plant conditions, the running EDG is the only operable EDG. Thus, failure to perform the critical task constitutes misoperation or incorrect crew performance in which the crew does not prevent "degraded... emergency power capacity."

### Booth Summary

|                  |  |
|------------------|--|
| <b>Event #1</b>  | <b>OP-1C Power Ascension</b>                                       |
| <b>Action</b>    | <b>Booth:</b> None   |
| <b>Role Play</b> | ) Respond to reports or direction to field operators as necessary. |

|                  |  |
|------------------|--|
| <b>Event #2</b>  | <b>Dropped Rod</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 1</b> per Lead Evaluator           |
| <b>Role Play</b> | ) Respond to reports or direction to field operators as necessary. |

|                  |  |
|------------------|--|
| <b>Event #3</b>  | <b>'B' ADV Stuck Open</b>  |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator<br>Trigger 4 inserts when 1HC-478 is placed in MANUAL.  |
| <b>Role Play</b> | ) PAB AO: 5 minutes after inserting trigger 3, or 2 minutes after being directed to investigate, report flow noise at the Unit 1 'B' Atmospheric Dump Valve.<br>) PAB AO: If asked, after the crew attempts to shut the 'B' ADV from the CR, report that 1MS-2015 is 50% OPEN and not moving.<br>) PAB AO: When directed, use LOA1SGN026 to SHUT 1MS-244, Isolation for 1MS-2015, as directed by the crew. Report that flow noise has stopped when 1MS-244 is shut.<br>) PAB AO: If asked, report that all S/G Safety Valves are shut.<br>) Respond to other reports or direction to field operators as necessary. |

|                  |  |
|------------------|--|
| <b>Event #4</b>  | <b>Loss of All AC Safeguards Power</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 5</b> per Lead Evaluator   |
| <b>Role Play</b> | ) TH AO: If directed to investigate G-01 failure to start, wait 2 minutes and report all conditions appear normal for G-01.<br>) TH AO: If directed to investigate output breakers for G-01 and/or G-04 failure to close, wait 2 minutes and report that conditions appear normal locally.<br>) TH AO: If directed to investigate the 1X-04 lockout, wait 3 minutes and report there is no apparent cause locally.<br>) Respond to other reports or direction to field operators as necessary. |

|                  |  |
|------------------|--|
| <b>Event #5</b>  | <b>'A' Train Service Water Pumps Fail to Auto Start</b>            |
| <b>Action</b>    | <b>Booth:</b> None   |
| <b>Role Play</b> | ) Respond to reports or direction to field operators as necessary. |

|                  |  |
|------------------|--|
| <b>Event #6</b>  | <b>Stuck Rods (4)</b>  |
| <b>Action</b>    | <b>Booth:</b> None   |
| <b>Role Play</b> | ) PAB AO: If directed to locally open 1CV-350, wait 2 minutes, use LOA1CVC054 to open 1CV-350, report when complete.<br>) Respond to reports or direction to field operators as necessary. |

## SHIFT TURNOVER INFORMATION

### PLANT CONDITIONS:

|                              | <b>UNIT 1</b> |
|------------------------------|---------------|
| Time in core life (MWD/MTU): | 1500          |
| Reactor power (%):           | 28%           |
| Boron concentration (ppm):   | 1786 ppm      |
| Rod height, CBD @:           | 141           |

### TECHNICAL SPECIFICATION ACTION CONDITIONS IN EFFECT:

| <u>TSAC</u>  | <u>Description</u>         | <u>Required Action &amp; Completion Time</u> |
|--------------|----------------------------|--|
| U1 3.3.1.A/K | RPS one channel inoperable | Place channel in trip – 1 hour               |

### EQUIPMENT OUT OF SERVICE:

- ) G03 Emergency Diesel Generator for maintenance.
- ) 1LT-426 Pressurizer Level Transmitter.

### PLANNED EVOLUTIONS:

- ) Power ascension per OP 1C, Startup to Power Operation. Startup is following a short forced outage. The crew has been maintaining the current power for about two hours for flux mapping.

### TURNOVER INFORMATION:

- ) G04 Emergency Diesel Generator is aligned to both 1A06 and 2A06 4160 Safeguards Busses.
- ) On line risk is GREEN.
- ) Today is Tuesday, day shift.

**Pre-Scenario Procedure Checks**

| Procedure   | SRO                   |                       |
|---|-----------------------|-----------------------|
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| AOP-1D  |                       |                       |
| AOP 2A  |                       |                       |
| AOP 6A  |                       |                       |
| AOP 6H  |                       |                       |
| AOP 24  |                       |                       |
| EOP 0   |                       |                       |
| EOP-0.1   |                       |                       |
| ECA-0.0   |                       |                       |
|   |                       |                       |
|   |                       |                       |
|   |                       |                       |
| Specific ARP/ARBs to be second checked – All Others first checked |                       |                       |
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| 1C04 1A 1-5   |                       |                       |
| 1C04 1A 1-7   |                       |                       |
| 1C04 1A 3-3   |                       |                       |
| 1C04 1A 4-5   |                       |                       |
| 1C03 1E2 1-2  |                       |                       |
| 1C03 1E2 1-5  |                       |                       |
|   |                       |                       |
|   |                       |                       |
|   |                       |                       |

**Post-Scenario Procedure Checks**

| Procedure                   | SRO                   |                       |
|-----------------------------|-----------------------|-----------------------|
|                             | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| AOP-1D                      |                       |                       |
| AOP 2A                      |                       |                       |
| AOP 6A                      |                       |                       |
| AOP 6H                      |                       |                       |
| AOP 24                      |                       |                       |
| EOP 0                       |                       |                       |
| EOP-0.1                     |                       |                       |
| ECA-0.0                     |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| 1C04 1A 1-5                 |                       |                       |
| 1C04 1A 1-7                 |                       |                       |
| 1C04 1A 3-3                 |                       |                       |
| 1C04 1A 4-5                 |                       |                       |
| 1C03 1E2 1-2                |                       |                       |
| 1C03 1E2 1-5                |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
| RESET IC                    |                       | N/A                   |
| Booth Cleared Exam Material |                       |                       |
| Magnets Replaced            |                       |                       |



# SIMULATOR EXERCISE GUIDE

**SEG**

**SITE:** PBNP **Revision #: 0**

**LMS ID:** PBN LOI NRC 23E **LMS Rev. Date:**

**SEG TITLE:** 2021 NRC Exam Scenario 2

**SEG TYPE:**  Training  Evaluation

**PROGRAM:**  LOCT  LOIT  Other:

**DURATION:** 90 minutes

**Developed by:** John Rogers \_\_\_\_\_  
Instructor/Developer Date

**Reviewed by:** Jeff Hinze \_\_\_\_\_  
Instructor (Instructional Review) Date

**Validated by:** John Rogers \_\_\_\_\_  
SME (Technical Review) Date

**Approved by:** Adam Moore \_\_\_\_\_  
Training Supervision Date

**Approved by:** Joe Krear \_\_\_\_\_  
Training Program Owner (Line) Date

Facility: Point Beach Scenario No.: 2 Op-Test No.: 2021

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: 0% power Mode 2. G02, EDG is OOS with G01, EDG is aligned, 1W-3A,  
Containment Shroud Fan OOS, 1PT-949, Containment Pressure transmitter removed from service.

Turnover: A plant up power to the POAH is planned per OP 1B, Reactor Startup

Critical Tasks: CT-5, Manually Start At Least One Low-Head ECCS Pump  
CT-36, Transfer to Cold Leg Recirculation

| Event No. | Malf. No. | Event Type*              | Event Description   |
|-----------|-----------|--------------------------|---|
| 1         |           | R-RO<br>N-BOP<br>N-SRO   | Raise Power to POAH   |
| 2         |           | C-BOP<br>C-SRO<br>TS-SRO | 1A06, 4160 Safeguards Bus Feeder Breaker trip – Does NOT auto restore, needs to be manually restored.<br><br><b>NEW</b>                 |
| 3         |           | C-RO<br>C-SRO<br>TS-SRO  | 1P-1B RCP thrust bearing failure/vibrations requiring manual reactor trip (degradation of flow or a trip of the pump)<br><br><b>NEW</b> |
| 4         |           | C-RO<br>C-SRO            | Reactor Trip breakers fail to auto open and buttons on 1C04 are unsuccessful (C01 still works)<br><br><b>2017 Repeat</b>                |
| 5         |           | M-ALL                    | Design Basis LBLOCA   |
| 6         |           | C-RO<br>C-SRO            | 1P-10B RHR pump trips, 1P-10A RHR pump fails to auto start<br><br><b>2017 Repeat</b>  |

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



## SIMULATOR EXERCISE GUIDE REQUIREMENTS

|                              |  |
|------------------------------|--|
| <b>Terminal Objective:</b>   | Given the site simulator and specific plant conditions, the students will be able to respond to various plant abnormal and emergency events, in accordance with site procedures and technical Specifications.  |
| <b>Enabling Objectives:</b>  | 1. None  |
| <b>Prerequisites:</b>        | <ol style="list-style-type: none"> <li>1. Simulator available</li> <li>2. Students enrolled in Initial License Program</li> </ol>  |
| <b>Training Resources:</b>   | <ol style="list-style-type: none"> <li>1. Floor Instructor as Shift Manager / Shift Technical Advisor</li> <li>2. Simulator Booth Operator</li> <li>3. Communicator</li> <li>4. NRC Evaluators</li> </ol>  |
| <b>References:</b>           | <ol style="list-style-type: none"> <li>1. OP 1B, Reactor Startup</li> <li>2. OP 1C, Startup to Power Operation Unit 1</li> <li>3. OP 5E, Establishing and Securing Excess Letdown, Bypass of CV-135, or Head Vent Letdown</li> <li>4. AOP-1B, Reactor Coolant Pump Malfunction</li> <li>5. AOP-18A, Train 'A' Equipment Operation</li> <li>6. AOP-19B, Train 'B' Safeguards Bus Restoration</li> <li>7. EOP-0, Reactor Trip or Safety Injection</li> <li>8. EOP-1, Loss of Reactor or Secondary Coolant</li> <li>9. EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection</li> <li>10. CSP-P.1, Response to Imminent Pressurized Thermal Shock Condition</li> <li>11. OM 3.7, AOP and EOP Procedure Usage for Response to Plant Transients</li> <li>12. Technical Specifications Manual</li> <li>13. Technical Requirements Manual</li> </ol> |
| <b>Protected Content:</b>    | None   |
| <b>Evaluation Method:</b>    | Simulator performance will be evaluated in accordance with NUREG 1021.   |
| <b>Operating Experience:</b> | None   |

**Risk Significant  
Operator Actions:**

**UPDATE LOG:** Indicate in the following table any minor changes or major revisions made to the material after initial approval.

| # | DESCRIPTION OF CHANGE               | REASON FOR CHANGE | AR/TWR# | PREPARER | DATE |
|---|-------------------------------------|-------------------|---------|----------|------|
|   |                                     |                   |         | REVIEWER | DATE |
| 0 | Developed for the 2021 ILT NRC Exam |                   |         |          |      |
|   |                                     |                   |         |          |      |

## OVERVIEW / SEQUENCE OF EVENTS

### OVERVIEW

Initial conditions for the scenario are: unit 1 is in MODE 2 with reactor power below the POAH, 1W-3A, Containment Shroud Fan is OOS, Emergency Diesel Generator G-02 is OOS with EDG G-01 aligned to 1A-05 and 2A-05, and 1PT-949, Containment Pressure instrument has been removed from service.

Examinees will start the scenario by raising reactor power to the POAH. Then the crew will respond to a loss of Safeguards Bus 1A-06 and Reactor Coolant Pump high vibrations. RCP vibrations will exceed criteria requiring the crew to manually trip the reactor. Coincident with the reactor trip, a LB LOCA will occur. The crew will respond per EOPs to establish containment sump recirculation.

The scenario will be terminated when the crew has established one train of containment sump recirculation.

### SEQUENCE OF EVENTS

| Event # | Description  |
|---------|--|
| 1.      | <p><b>Raise Reactor Power to POAH</b></p> <ul style="list-style-type: none"> <li>The crew will raise power to the POAH per OP-1B, Reactor Startup</li> </ul>   |
| 2.      | <p><b>Loss of Safeguards Bus 1A-06</b></p> <ul style="list-style-type: none"> <li>A loss of Safeguards Bus 1A-06 will occur due to feeder breaker trip. The emergency diesel (G-03) aligned to the bus fails to automatically start.</li> <li>The crew will respond per AOP-18A, Train 'A' Equipment Operation, and AOP-19B, Train 'B' Safeguards Bus Restoration, to stabilize the plant and restore power to bus 1A-06.</li> </ul> |
| 3.      | <p><b>High Reactor Coolant Pump Vibration – 1P-1B</b></p> <ul style="list-style-type: none"> <li>High vibration levels will occur on 1P-1B, Reactor Coolant Pump due to a bearing failure.</li> <li>The Crew will respond to the high vibrations per AOP-1B, Reactor Coolant Pump Malfunction.</li> <li>Conditions with the RCP will degrade, requiring the crew to trip the reactor and trip the RCP.</li> </ul>                    |
| 4.      | <p><b>Reactor Trip – Trip Pushbuttons Fail</b></p> <ul style="list-style-type: none"> <li>When the crew attempts to manually trip the reactor, the first set of trip pushbuttons will not work. The second set of pushbuttons will trip the reactor.</li> <li>Coincident with the reactor trip, a LBLOCA will occur.</li> </ul>  |

|    |  |
|----|--|
| 5. | <p><b>RHR Pump Failures</b></p> <ul style="list-style-type: none"> <li>• Safety Injection will automatically actuate due to the LOCA.</li> <li>• 1P-10A RHR Pump will fail to auto start, may be manually started.</li> <li>• 1P-10B RHR Pump will auto start, but trip and be unavailable for the remainder of the scenario.</li> </ul> |
| 6. | <p><b>LB LOCA – Containment Sump Recirculation</b></p> <ul style="list-style-type: none"> <li>• A LB LOCA occurs coincident with the reactor trip.</li> <li>• The crew will implement EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection, and establish one train of sump recirculation.</li> </ul>                |
|    | <p>Terminate the scenario when crew has established one train of containment sump recirculation, or per Lead Evaluator.</p>  |

## SIMULATOR SET-UP INSTRUCTIONS

Perform simulator set up per the site specific Simulator Setup Checklist.

| Check | Action  |
|-------|---|
| 1.    | Reset to IC-31  |
| 2.    | Perform Simulator Setup Checklist   |
| 3.    | Open schedule file. <b>Z:/2021 NRC Exam Simulator Files/NRC Scenario 2.sch</b>  |
| 4.    | To record SBT data: <ol style="list-style-type: none"> <li>1. Launch "SBT Report" from Thunderbar</li> <li>2. Open "Scenario Validation Checklist.sbt" (TRex_PB\Lightning)</li> </ol>   |
| 5.    | Take schedule(s) to <b>run</b>  |
| 6.    | Verify required event file(s) open if required  |
| 7.    | Take sim to <b>run</b>  |
| 8.    | Place turnover sheets on <b>CO1</b> desk  |
| 9.    | Place reactivity sheets on <b>CO1</b> desk  |
| 10.   | Guard the following: <ul style="list-style-type: none"> <li>• G01, G03, G04 EDG's</li> <li>• 1W-3B Shroud Fan</li> </ul> <p>Place the following OOS:</p> <ul style="list-style-type: none"> <li>• G02 EDG</li> <li>• 1W-3A, Shroud Fan</li> <li>• 1PT-949, Containment Pressure</li> </ul> <p>Place red dots on the G02 alarms and Containment Pressure Channel Alert:</p> <ul style="list-style-type: none"> <li>• C02 F 2-1</li> <li>• C02 F 2-2</li> <li>• C01 B 1-5</li> </ul> <p>Set recorder NR 45 to Low Power page at 30 sec/div</p>                  |
| 11.   | <ul style="list-style-type: none"> <li>• Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.</li> <li>• Brief the scenario evaluators</li> <li>• Brief surrogates using TR-AA-230-1007-F11, Surrogate Brief Checklist, if necessary</li> </ul>   |
| 12.   | Run Scenario  |
| 13.   | To save SBT Data: <ol style="list-style-type: none"> <li>1. In the SBT Report program click the Generate Report icon (green arrow)</li> <li>2. In Test Title enter a unique test title, to be same as file name</li> <li>3. In report name enter the location the test files are to be saved, use same file name as Test Title</li> <li>4. Click "Generate" (generates and saves two files in the selected folder)</li> <li>5. Verify files saved in the selected folder</li> <li>6. The generated report and SBT Report program may now be closed</li> </ol> |

|     |   |
|-----|---|
|     | <ul style="list-style-type: none"><li>7. Collect procedure markups for SBT</li><li>8. Save any InSight, Alarm, Event, Schedule Files to the secure drive that were in use</li></ul> |
| 14. | Reset simulator to appropriate IC.  |

**BOOTH OPERATOR BRIEFING:**

Review the scenario sequence, event triggers and expected field communications.

**Z:/2021 NRC Exam Simulator Files/NRC Scenario 2.sch**

| At Time  | On Event | Action   | Description  |
|----------|----------|--|--|
|          |          | <b>Preloads / Initial Conditions</b>                         |  |
| 00:00:00 |          | Insert malfunction MAL2DSG001A                               | DIESEL G02 FAILURE TO START                        |
| 00:00:00 |          | Insert malfunction BKR1CNM017 to Fail_Cntrl_Fuse             | 1-B523A W-3A CTL ROD SHROUD FAN CKTBKR             |
| 00:00:00 |          | Insert malfunction XMT1CNM016A to -6                         | 1-PT949 LOOP B CONT PRESSURE XMTR FIXED OUTPUT     |
| 00:00:00 |          | Event Z:/2021 ILT NRC Exam Simulator Files/NRC 2.evt         |  |
|          |          | <b>Event 2: Loss of 1A-06</b>                                |  |
|          | 1        | Insert malfunction BKR1EPS015 to Trip on event 1             | 1-A5277 4160V BUS TIE 1-A04 TO 1-A06               |
| 00:00:00 |          | Insert malfunction BKR1DSG003 to Failautocl                  | 1-A5280 G03 TO 1A06 BRK 80                         |
| 00:00:00 |          | Insert malfunction MAL1DSG007B                               | EDG G03 FAILURE TO AUTOSTART                       |
|          |          | <b>Event 3: RCP High Vibration</b>                           |  |
|          | 3        | Insert malfunction MAL1RCP007B to 89.7 in 600 on event 3     | RCP MOTOR THRUST BEARING FAILURE PUMP B            |
|          | 3        | Insert malfunction XMT1RCP015A to 2.3 in 600 on event 3      | 1-YVPNBFH RCP B FRAME HORIZ VIBRATION FIXED OUTPUT |
|          | 3        | Insert malfunction XMT1RCP016A to 2.4 in 600 on event 3      | 1-YVPNBFV RCP B FRAME VERT VIBRATION FIXED OUTPUT  |
|          | 3        | Insert malfunction XMT1RCP017A to 17.2 in 600 on event 3     | 1-YVPNBSh RCP B SHAFT HORIZ VIBRATION FIXED OUTPUT |
|          | 3        | Insert malfunction XMT1RCP018A to 17.3 in 600 on event 3     | 1-YVPNBsv RCP B SHAFT VERT VIBRATION FIXED OUTPUT  |
|          |          | <b>After pump trip</b>                                       |  |
|          | 7        | Insert malfunction MAL1RCP007B to 48.79930 in 100 on event 7 | RCP MOTOR THRUST BEARING FAILURE PUMP B            |
|          | 7        | Insert malfunction XMT1RCP015A to 0.49829 in 10 on event 7   | 1-YVPNBFH RCP B FRAME HORIZ VIBRATION FIXED OUTPUT |
|          | 7        | Insert malfunction XMT1RCP016A to 0.49829 in 10 on event 7   | 1-YVPNBFV RCP B FRAME VERT VIBRATION FIXED OUTPUT  |
|          | 7        | Insert malfunction XMT1RCP017A to 3.98335 in 10 on event 7   | 1-YVPNBSh RCP B SHAFT HORIZ VIBRATION FIXED OUTPUT |

|          |    |   |   |
|----------|----|---|---|
|          | 7  | Insert malfunction XMT1RCP018A to 3.98335 in 10 on event 7          | 1-YVPNBSV RCP B SHAFT VERT VIBRATION FIXED OUTPUT |
|          |    | <b>Event 4: DBA LOCA</b>  |   |
|          | 5  | Insert malfunction MAL1RCS001 to Hot_Leg_A on event 5               | DBA LOCA  |
|          |    | <b>Event 5: Trip pushbutton Failure</b>                             |   |
| 00:00:00 |    | Insert malfunction MAL1PPL001A to Fails_To_Open                     | REACTOR TRIP BREAKER 52/RTA FAILURE               |
| 00:00:00 |    | Insert malfunction MAL1PPL001B to Fails_To_Open                     | REACTOR TRIP BREAKER 52/RTB FAILURE               |
|          | 15 | Insert malfunction MAL1PPL001B to Trip on event 15                  | REACTOR TRIP BREAKER 52/RTB FAILURE               |
|          | 15 | Insert malfunction MAL1PPL001A to Trip on event 15                  | REACTOR TRIP BREAKER 52/RTA FAILURE               |
|          |    | <b>Event 6: RHR Pump Fail to Start</b>                              |   |
| 00:00:00 |    | Insert malfunction BKR1RHR001 to Fail_Auto_CI                       | 1-B5212A P-10A RH REMOVAL PUMP CKTBKR             |
|          | 5  | Insert malfunction MOT1RHR002 after 30 to Winding_Ground on event 5 | 1-P10B RESIDUAL HEAT REMOVAL PUMP MOTOR           |
|          |    | <b>EOP-1.3 LOAs</b>   |   |
|          | 9  | Insert remote LOA1SWS048 after 60 to 0.38000 in 30                  | SW-322 1HX-12A CC HTEXCH OUTLET                   |
|          | 9  | Insert remote LOA1SWS051 after 180 to 0.10000 in 30                 | SW-360 HX-12B CCW SW OUTLET                       |
|          | 9  | Insert remote LOA1CCW018 after 270 to 0 in 30                       | 1CC-744B CCW BYPASS/TEST LOOP OUTLET STOP VALVE   |
|          | 9  | Insert remote LOA1CCW016 after 420 to 0 in 30                       | 1CC-740A NON-REGEN HX-3A&B INLET VALVE            |
|          | 9  | Insert remote LOA1CCW021 after 450 to 0 in 30                       | 1CC-750A SEAL STR HX-5 INLET VALVE                |
|          | 11 | Insert remote LOA1SIS030 after 60 to 0 in 30                        | 1SI-897A HANDWHEEL GAG                            |
|          | 11 | Insert remote LOA1SIS031 after 180 to 0 in 30                       | 1SI-897B HANDWHEEL GAG                            |

Event file:

Trigger 7 Unit 1 Reactor Trip (JCRFTR)

Trigger 15: trigger 16 AND trigger 17 (et\_array(16) & et\_array(17))

Trigger 16: 1C04 Trip Pushbuttons (x14i057a == 1 | x14i055a == 1)

Trigger 17: C01 Trip Pushbuttons (x01i142a == 1 | x01i141a == 1)



## SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

| Event # 1               | Raise Reactor Power to POAH   |
|-------------------------|---|
| <b>ACTION</b>           | Booth: None   |
| <b>STUDENT RESPONSE</b> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>Perform OP 1B actions as directed.</li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>Implements OP 1B, reactor Startup to raise power to POAH starting from Step 5.16.49.</li> </ul> <p><b>Crew</b></p> <p>5.16.49 Allow flux level to rise further to confirm onset of nuclear heating reactivity effect and remain below 2% power.</p>           |
| <b>ROLE PLAY</b>        | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM communications:</u></b></p> <ul style="list-style-type: none"> <li>Brief the crew on current plant conditions and planned reactor startup tasks.</li> <li>Provide direction to the crew to raise power to POAH (approximately 4.0 E-6 amps).</li> </ul> |
| <b>NOTES</b>            | <p><b>Continuation Criteria:</b></p> <p>After power has been raised to POAH, or at the discretion of the Lead Examiner, continue with the next event.</p>   |

|                         |  |
|-------------------------|--|
| <b>Event # 2</b>        | <b>Loss of Safeguards Bus 1A-06</b>  |
| <b>ACTION</b>           | Booth: Insert <b>TRIGGER 1</b> per Lead Evaluator  |
| <b>STUDENT RESPONSE</b> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>• Diagnoses loss of Safeguards Bus 1A-06.</li> <li>• Recognizes the loss of letdown and reduces charging flow to minimum.</li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>• Implements AOP-18A, Train 'A' Equipment Operation and AOP-19B, Train 'B' Safeguards Bus Restoration.</li> </ul> <p><b>Crew</b><br/><u>AOP-18A, Train 'A' Equipment Operation</u></p> <ol style="list-style-type: none"> <li>1. Check bus 1A-05 – ENERGIZED</li> <li>2. Monitor diesel voltage and frequency within limits</li> <li>3. Check bus 1B-03 – ENERGIZED</li> <li>4. Check MCC 1B-32 – ENERGIZED</li> <li>5. Check blender operation on both units.</li> <li>6. Check RHR – REQUIRED; RNO: Go to Step 8</li> <li>8. Check Component Cooling Water pumps – AT LEAST ONE RUNNING</li> <li>9. Check Component Cooling water flow – LESS THAN OR EQUAL TO 3650 GPM</li> <li>10. Check only one Component Cooling Water pump – RUNNING</li> <li>11. Check Service Water header pressure – GREATER THAN OR EQUAL TO 50 PSIG</li> <li>12. Check one Instrument Air compressor – RUNNING</li> <li>13. Verify Charging flow             <ol style="list-style-type: none"> <li>a. Charging pumps – AT LEAST ONE RUNNING</li> <li>b. <b>Start additional charging pumps and adjust speed on running charging pumps to establish desired charging flow.</b></li> <li>c. <b>Adjust charging line flow controller to maintain labyrinth seal ΔP greater than 20 inches.</b></li> </ol> </li> <li>14. Check if letdown should be established.             <ol style="list-style-type: none"> <li>a. Normal letdown isolated</li> <li>b. Establish letdown                 <ol style="list-style-type: none"> <li>1) Open letdown containment isolation valves</li> <li>2) Open RCS Loop B cold leg letdown isolation valve</li> <li><b>3) Ensure component cooling flow to non-regenerative heat exchanger – ESTABLISHED</b></li> <li><b>4) Ensure charging flow – AT LEAST 21 GPM</b></li> <li><b>5) Adjust backpressure and open letdown orifice outlet valves to establish desired letdown flow.</b></li> </ol> </li> </ol> </li> <li>15. Check control room ventilation – IN MODE 1</li> <li>16. Check rod control system – IN AUTO</li> <li>17. SM make notifications and enter applicable TS action conditions.</li> <li><b>18. Restart Containment Accident fans as necessary.</b></li> <li>19. Restore Battery Chargers</li> <li>20. Reenergize MCC 1B-31             <ol style="list-style-type: none"> <li>a. Close 1B-03 feed to 1B-31: 1B52-14C</li> </ol> </li> </ol> |

| Event # 2 | Loss of Safeguards Bus 1A-06  |
|-----------|---|
|           | <p>b. Start one cavity cooling fan</p> <p><b>21. Restore PAB ventilation</b></p> <p>22. Restore fire pumps to normal</p> <p>23. Restore loads as time permits</p> <p>24. Ensure adequate spent fuel pool cooling</p> <p>25. Check bus 1A-06 – ENERGIZED; RNO: Go to AOP-19B, Train ‘B’ Safeguards Bus Restoration.</p> <p><u>AOP-19B, Train ‘B’ Safeguards Bus Restoration</u></p> <ol style="list-style-type: none"> <li>1. Check plant stable per AOP-18A, train ‘A’ Equipment Operation</li> <li>2. Energize bus 1A-06 from diesel G-03</li> <li>3. Check bus 1A-06 – ENERGIZED             <ol style="list-style-type: none"> <li>a. Check annunciator UNIT 1 4.16Kv BUS LOCKOUT – CLEAR: C02 D 3-4</li> <li>b. Check G-03 to bus 1A-06 breaker – IN AUTO: 1A52-80</li> <li>c. Check G-03 – RUNNING; RNO: Start G-03                 <ol style="list-style-type: none"> <li>1) Ensure G-03 diesel mode selector switch – IN AUTO</li> <li>2) <b>Turn G-03 diesel generator control switch to – START</b></li> <li>3) IF G-03 will NOT start, THEN go to step 6.</li> </ol> </li> <li>d. Ensure 1A-4 to 1A-6 bus tie breaker – OPEN: 1A52-77</li> <li>e. Check G-03 to 1A-06 breaker – CLOSED; RNO: Perform the following:                 <ol style="list-style-type: none"> <li>1) Try to auto close breaker by placing control switch to trip position and then release.</li> <li>2) IF breaker will NOT auto-close, THEN:                     <ol style="list-style-type: none"> <li>a) <b>Place G-03 Mode selector switch to – EXERCISE</b></li> <li>b) <b>Turn sync switch for G-03 to bus 1A-06 breaker – ON</b></li> <li>c) <b>Manually close G-03 to bus 1A-06 breaker: 1A52-80.</b></li> </ol> </li> </ol> </li> </ol> </li> <li>4. Refer to TS 3.8, Electrical Power System</li> <li>5. Go to AOP-18B, Train ‘B’ Equipment Operation</li> </ol> |

| Event # 2   | Loss of Safeguards Bus 1A-06   |   |                 |                 |  |  |  |   |   |          |   |  |   |
|---|--|---|-----------------|-----------------|--|--|--|---|---|----------|---|--|---|
|   | <ul style="list-style-type: none"> <li> <b>Assess Technical Specifications:</b> <table border="1" data-bbox="404 388 1419 1192"> <thead> <tr> <th data-bbox="404 388 704 459">CONDITION</th> <th data-bbox="704 388 1097 459">REQUIRED ACTION</th> <th data-bbox="1097 388 1419 459">COMPLETION TIME</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="404 459 1419 516"><b>TS 3.8.1 AC Sources - Operating</b></td> </tr> <tr> <td data-bbox="404 516 704 701">C. Associated unit's required off site power source to buses A05 and A06 inoperable</td> <td data-bbox="704 516 1097 701">C. 1 Restore required offsite power source(s) to OPERABLE status.</td> <td data-bbox="1097 516 1419 701">24 hours</td> </tr> <tr> <td data-bbox="404 701 704 1192">D. One or more required offsite power source(s) to one or more required Class 1E 4.16kV bus(es) inoperable.</td> <td data-bbox="704 701 1097 1192">           D.1 Declare required features supported by the inoperable required offsite power source inoperable when its required redundant feature is inoperable<br/>           AND<br/>           D.2 Restore required offsite power source to OPERABLE status.         </td> <td data-bbox="1097 701 1419 1192">           12 hours from discovery of Condition D concurrent with inoperability of required redundant feature.<br/><br/>           7 days<br/>           AND<br/>           14 days from discovery of failure to meet LCO         </td> </tr> </tbody> </table> </li> </ul> | CONDITION   | REQUIRED ACTION | COMPLETION TIME | <b>TS 3.8.1 AC Sources - Operating</b> |  |  | C. Associated unit's required off site power source to buses A05 and A06 inoperable | C. 1 Restore required offsite power source(s) to OPERABLE status. | 24 hours | D. One or more required offsite power source(s) to one or more required Class 1E 4.16kV bus(es) inoperable. | D.1 Declare required features supported by the inoperable required offsite power source inoperable when its required redundant feature is inoperable<br>AND<br>D.2 Restore required offsite power source to OPERABLE status. | 12 hours from discovery of Condition D concurrent with inoperability of required redundant feature.<br><br>7 days<br>AND<br>14 days from discovery of failure to meet LCO |
| CONDITION   | REQUIRED ACTION  | COMPLETION TIME   |                 |                 |  |  |  |   |   |          |   |  |   |
| <b>TS 3.8.1 AC Sources - Operating</b>  |  |   |                 |                 |  |  |  |   |   |          |   |  |   |
| C. Associated unit's required off site power source to buses A05 and A06 inoperable                         | C. 1 Restore required offsite power source(s) to OPERABLE status.  | 24 hours  |                 |                 |  |  |  |   |   |          |   |  |   |
| D. One or more required offsite power source(s) to one or more required Class 1E 4.16kV bus(es) inoperable. | D.1 Declare required features supported by the inoperable required offsite power source inoperable when its required redundant feature is inoperable<br>AND<br>D.2 Restore required offsite power source to OPERABLE status.   | 12 hours from discovery of Condition D concurrent with inoperability of required redundant feature.<br><br>7 days<br>AND<br>14 days from discovery of failure to meet LCO |                 |                 |  |  |  |   |   |          |   |  |   |
| <b>ROLE PLAY</b>  | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>TH AO: If directed to investigate G-03 failure to auto start, wait 3 minutes and report that G-03 is not running and all condition appear normal.</li> <li>TH AO: If directed to restore fire pumps to normal, acknowledge the report – take no action.</li> <li>PAB AO: If directed to close the supply breaker for MOV 1CV-285 (1B52-3210C), wait 2 minutes and report that the breaker cannot be closed, it immediately opens to trip-free when attempting to close.</li> <li>Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>Respond to reports from crew members as required.</li> <li>If asked for direction regarding reactor power, direct the crew to stabilize power at 10E-6 amps.</li> </ul>  |   |                 |                 |  |  |  |   |   |          |   |  |   |

| Event # 2    | Loss of Safeguards Bus 1A-06  |
|--------------|---|
| <b>NOTES</b> | <p><b>Note:</b> Once the crew completes actions in AOP-19B, they will proceed with implementing AOP-18B, Train 'B' Equipment Operation. AOP-18B actions are not necessary to meet the objectives of this scenario.</p> <p><b>Continuation Criteria:</b><br/>After power has been restored to Safeguards Bus 1A-06, or at the discretion of the Lead Examiner, continue with the next event.</p> <p><b>Note:</b> RCP high vibration alarm occurs approximately 8 minutes after the trigger 3 is entered.</p> |

| Event # 3                      | High Reactor Coolant Pump Vibration – 1P-1B  |
|--------------------------------|--|
| <p><b>ACTION</b></p>           | <p><b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator</p> <p><b>Note:</b> RCP high vibration alarm occurs approximately 8 minutes after the trigger is entered.</p> <p>Trigger 7 deletes malfunctions when the RCP is tripped.</p>   |
| <p><b>STUDENT RESPONSE</b></p> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>• Acknowledges alarms and references ARBs</li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>• Implements AOP-1B, Reactor Coolant Pump Malfunction</li> </ul> <p><b>Crew</b></p> <ol style="list-style-type: none"> <li>1. Check annunciator P-1A&amp;B RCP Vibration Alarm – CLEAR; RNO: check if RCP shutdown is required             <ol style="list-style-type: none"> <li>a. Vibration readings on PPCS page RCPS or locally at 1C-76                 <ul style="list-style-type: none"> <li>○ Shaft vibration greater than or equal to 20 mils.</li> <li>○ Shaft vibration greater than or equal to 15 mils and rising at 1 mil/hr</li> <li>○ Frame vibration greater than or equal to 5 mils</li> <li>○ Frame vibration greater than or equal to 3 mils and rising at 0.2 mil/hr</li> </ul> </li> <li>b. IF RCP shutdown required, THEN go to Step 19.</li> </ol> </li> <li>2. Check annunciator 1TR-2001 temperature monitor alarm – CLEAR</li> <li>3. Check annunciator 1P-1A or 1P-1B RCP Upper or Lower Sump Oil Level High or Low – CLEAR</li> <li>4. Check RCP No. 1 Seal Leakage – GREATER THAN 0.8 gpm</li> <li>5. Check RCP No. 1 Seal Leakage – LESS THAN 6 gpm</li> <li>19. Secure Affected RCP             <ol style="list-style-type: none"> <li>a. <b>Trip reactor</b></li> <li>b. Stabilize plant using EOPs while continuing with this procedure</li> <li>c. <b>Trip affected RCP</b></li> <li>d. Check at least one RCP running</li> <li>e. Shut associated PZR normal spray valve</li> <li>f. Check affected RCP has been tripped for 3 minutes</li> <li>g. <b>Shut affected RCP No. 1 seal water return MOV; 1CV-270B</b></li> <li>h. Check RCP seal water bypass control valve shut: 1CV-386</li> </ol> </li> </ol> |

| Event # 3               | High Reactor Coolant Pump Vibration – 1P-1B  |
|-------------------------|--|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• TH AO: If directed to check RCP vibration reading on 1C-76 in rod drive room, wait 2 minutes and report vibration readings as read from RCPs PPCS page.</li> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     | <p><b>Continuation Criteria:</b></p> <p>Once AOP-1B Step 19 actions have been completed, or at the discretion of the Lead Examiner, continue with the next event.</p>  |

| Event # 4               | Reactor Trip – Trip Pushbuttons Fail  |
|-------------------------|---|
| <b>ACTION</b>           | Booth: None   |
| <b>STUDENT RESPONSE</b> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>Attempts to manually trip the reactor, when first set of pushbuttons fail, uses alternate pushbuttons to trip the reactor. Performs EOP-0 Immediate Actions.</li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>Implements EOP-0, Reactor Trip or Safety Injection</li> </ul> <p><b>Crew</b></p> <ol style="list-style-type: none"> <li><b>Verify Reactor Trip; RNO: manually trip reactor</b></li> <li>Verify turbine trip</li> <li>Verify power to AC Safeguards buses</li> <li>Check if SI Actuated. RNO: IF Si is not required, THEN perform the following:             <ol style="list-style-type: none"> <li>Notify STA to monitor and implement CSP Status per CSP-ST.0, CSF Status Trees.</li> <li>Go to EOP-0.1, Reactor Trip Response.</li> </ol> </li> </ol> |
| <b>ROLE PLAY</b>        | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>Respond to reports from crew members as required.</li> </ul>   |
| <b>NOTES</b>            | <p><b>Note:</b> Once EOP-0 immediate actions have been completed, the crew will complete the actions of AOP-1B, Step 19.</p>  |



| Event # 5               | LOCA - RHR Pump Failures   |
|-------------------------|--|
| <b>ACTION</b>           | Booth: Insert <b>Trigger 5</b> per Lead Evaluator.   |
| <b>STUDENT RESPONSE</b> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>Recognizes RHR Pump failures (1P-10 fails to start, 1P-10B trips), and manually actuates SI and CI per EOP-0 Step 4 RNO.</li> <li><b>Manually starts 1P-10A, RHR Pump</b></li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>Directs 1P-10A manually started, continues implementing EOP-0, Reactor Trip or Safety Injection.</li> </ul> <p><b>Crew</b></p> <p><u>EOP-0 continued: (returns to EOP-0 Step 4 from EOP-0.1 when SI actuates)</u></p> <ol style="list-style-type: none"> <li>Check if SI actuated             <ol style="list-style-type: none"> <li>Any SI annunciators – LIT</li> <li>Both trains of SI – ACTUATED; RNO: <b>Manually actuate both trains of SI and Containment Isolation</b></li> </ol> </li> </ol> <p>FO1 RCP Trip Criteria: If both conditions listed below occur, THEN <b>trip both RCPs</b></p> <ul style="list-style-type: none"> <li>RCS subcooling – LESS THAN [40°F] 31°F</li> <li>SI Pumps – AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW</li> </ul> <ol style="list-style-type: none"> <li>Perform Attachment A, Automatic Action Verification, while continuing with this procedure.</li> <li>Verify AFW Pumps – RUNNING</li> <li>Check RCP Seal Cooling</li> <li>Check RCS Temperatures</li> <li>Check PZR PORVs and spray valves</li> <li>Check if RCPs Should be stopped RNO: Go to Step 11</li> <li>Check if S/G are NOT faulted</li> <li>Check if S/G tubes are NOT ruptured</li> <li>Check if RCS is intact; RNO:             <ol style="list-style-type: none"> <li>Notify STA to MONITOR CSP Status per CSP-ST.0, CSF Status Trees</li> <li>Go to EOP-1, Loss of Reactor or Secondary Coolant</li> </ol> </li> </ol> <p><u>EOP-1, Loss of Reactor or Secondary Coolant</u></p> <p>FO6 Containment Sump Recirculation Switchover Criteria</p> <p>IF either condition below is satisfied, THEN go to EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection:</p> <ul style="list-style-type: none"> <li>RWST Level – LESS THAN 60%</li> <li>RCS Pressure less than [450 psig] 325 psig AND RHR flow greater than 550 gpm</li> </ul> |

| Event # 5 | LOCA - RHR Pump Failures   |
|-----------|--|
|           | <p>CO3 performs EOP-0, Attachment A, Automatic Action Verification</p> <p>A1 – Verify feedwater isolation<br/> A2 – Verify containment isolation<br/> A3 – Verify ECCS Pumps RUNNING<br/> a. SI pumps – BOTH RUNNING<br/> b. RHR Pumps – BOTH RUNNING; RNO: <b>WHEN SI sequence is complete THEN manually start RHR Pumps.</b></p> <p>A4 – Verify service water pumps running<br/> A5 – Verify containment accident cooling units RUNNING<br/> A6 – Verify component cooling water pumps – ONLY ONE RUNNING<br/> A7 – Check if main steam lines can remain open<br/> A8 – Verify containment spray not required:<br/> A9 – Verify ECCS Flow<br/> A10 – verify AFW valve alignment – PROPPER EMERGENCY ALIGNMENT<br/> A11 – Verify proper ECCS valve alignment<br/> A12 – Check containment spray NOT ACTUATED; RNO: Check containment spray alignment<br/> 1. Ensure all containment spry pump discharge MOVs are open.<br/> 2. Ensure at least one containment spray pump is running.<br/> 3. <b>IF two containment spray pumps are running, THEN place one containment spray pump in pull-out.</b><br/> 4. WHEN containment spray has been actuated for greater than two minutes, THEN ensure spray additive eductor suction valve is open on the running train.</p> <p>A13 – Stop any boration via the blender in progress<br/> A14 – Ensure the Auxiliary building filter/exhaust fans – OPERATING<br/> A15 – Notify the STA to IMPLEMENT Status trees, Notify the SM of any equipment malfunctions previously noted.<br/> A16 – Verify Service Water system alignment<br/> A17 – Check miscellaneous valves – SHUT<br/> A18 – Check Control Room ventilation<br/> A19 – Check cable spreading room ventilation system – OPERATING<br/> A20 – Check Computer Room ventilation system – OPERATING<br/> A21 – Check AFW recirc fans – ONE RUNNING<br/> A22 – Check Circ Water Pump House temperature less than 105°F<br/> A23 – Check G03/G04 switchgear room temperature less than 95°F<br/> A24 – Periodically check status of spent fuel cooling.</p> |

| Event # 5               | LOCA - RHR Pump Failures  |
|-------------------------|---|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• PAB AO: If directed to investigate 1P-10B trip, wait 2 minutes and report the motor is stopped and hot to the touch.</li> <li>• TH AO: If directed to check the breaker for 1P-10B at 1B04, wait 2 minutes and report the breaker has tripped on overcurrent.</li> <li>• EOP-0, Att A communications:               <ul style="list-style-type: none"> <li>○ PAB AO: When directed to check rad waste service water valves SHUT at C-180, report the TV-LW61 and TV-LW62 are both SHUT</li> <li>○ TH AO: When directed to check Circ Water Pump House temperature, wait 1 minute and report 76°F and stable.</li> <li>○ TH AO: When directed to check G03/G04 switchgear room temperature, wait 1 minute and report 80°F and stable.</li> </ul> </li> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     |   |

| Event # 6                      | LB LOCA – Containment Sump Recirculation   |
|--------------------------------|--|
| <p><b>ACTION</b></p>           | <p><b>Booth:</b></p> <p>Insert <b>TRIGGER 9</b> when directed by crew for EOP-1.3, Att A alignment.</p> <p>Insert <b>TRIGGER 11</b> when directed by crew to isolate SI test lines.</p>  |
| <p><b>STUDENT RESPONSE</b></p> | <p><b>CO3/C01</b></p> <ul style="list-style-type: none"> <li>• Performs actions as directed.</li> </ul> <p><b>OS1</b></p> <ul style="list-style-type: none"> <li>• Implements EOP-1.3, Transfer to Containment Sump Recirculation – Low Head Injection</li> </ul> <p><b>Crew</b></p> <ol style="list-style-type: none"> <li>1. <b>Reset SI</b></li> <li>2. Check RCS break size.</li> <li>3. Align CCW per Attachment A, local Alignment of Component Colling Water, while continuing with this procedure.</li> <li>4. Direct unnecessary personnel to evacuate the PAB</li> <li>5. Check if containment sump pH must be adjusted</li> <li>6. Check if Train 'A' SI Flow should be stopped; RNO: Go to Step 7</li> <li>7. Check if Train 'B' SI flow should be stopped             <ol style="list-style-type: none"> <li>a. Check train 'A' RHR injection flow - GREATER THAN 550 gpm</li> <li>b. <b>Stop train 'B' SI pump and place in pull-out</b></li> <li>c. <b>Stop Train 'B' RHR pump and place in pull-out</b></li> </ol> </li> <li>8. Monitor core cooling</li> <li>9. Evaluate Control Room conditions</li> <li>10. Isolate component cooling flow to containment             <ol style="list-style-type: none"> <li>a. <b>Check RCPs – BOTH STOPPED</b></li> <li>b. <b>Shut containment equipment CC supply header isolation valve: 1CC-719</b></li> </ol> </li> <li>11. Isolate component cooling flow to non-regenerative heat exchanger             <ol style="list-style-type: none"> <li>a. Check normal letdown – ISOLATED</li> <li>b. <b>Place non-regen heat exchanger outlet temperature controller in manual and shut valve: 1HC-130</b></li> </ol> </li> <li>12. Check Service Water pumps – SIX RUNNING</li> <li>13. Check service water supply ring header – CONTINOUS FLOWPATH ESTABLISHED</li> <li>14. Establish component cooling flow to RHR heat exchangers:             <ol style="list-style-type: none"> <li>a. Ensure component cooling pumps – AT LEAST ONE RUNNING</li> <li>b. <b>Open only one RHR heat exchanger shell side inlet valve</b> <ul style="list-style-type: none"> <li>• 1CC-738A</li> <li>• 1CC-738B</li> </ul> </li> <li>c. <b>Start second component cooling pump</b> <ul style="list-style-type: none"> <li>• 1P-11A</li> <li>• 1P-11B</li> </ul> </li> <li>d. <b>Open second RHR heat exchanger shell side inlet valve</b> <ul style="list-style-type: none"> <li>• 1CC-738A</li> </ul> </li> </ol> </li> </ol> |

| Event # 6 | LB LOCA – Containment Sump Recirculation  |
|-----------|---|
|           | <ul style="list-style-type: none"> <li>• 1CC-738B</li> <li>15. Ensure RV Injection MOV's – BOTH OPEN</li> <li>16. Align SI test lines for recirculation               <ul style="list-style-type: none"> <li>a. Check containment spray discharge valves – AT LEAST ONE OPEN IN EACH TRAIN</li> <li><b>b. Locally shut both SI test line return isolation valves:</b> <ul style="list-style-type: none"> <li>• 1SI-897A</li> <li>• 1SI-897B</li> </ul> </li> </ul> </li> <li>17. Align RHR Suction Valves               <ul style="list-style-type: none"> <li><b>a. Open train 'A' RHR pump suction from containment sump 'B' isolation valve: 1SI-850A</b></li> <li><b>b. Open train 'B' RHR pump suction from containment sump 'B' isolation valve: 1SI-850B</b></li> </ul> </li> <li>18. Check Train 'A' Ready for Recirculation</li> <li>19. Check Train 'B' Ready for Recirculation; RNO: Try to prepare train 'B' for recirculation while continuing with this procedure.</li> <li>20. Check battery chargers supplying DC buses – ENERGIZED</li> <li>21. Check RHR trains – AT LEAST ONE READY FOR RECIRCULATION</li> <li>22. Check RWST level – LESS THAN OR EQUAL TO 34%; RNO: Perform the following:               <ul style="list-style-type: none"> <li>a. WHEN RWST level is less than or equal to 34%, THEN immediately return to this procedure and continue with Step 23.</li> <li>b. Implement Critical Safety Procedures and continue with procedure and step in effect.</li> </ul> </li> </ul> <p><u>Note:</u> The crew should address CSP-P.1, Response to Immanent Pressurized Thermal Shock Condition, and implement EOP-1, Loss of Reactor or Secondary Coolant until RWST level reaches 34%.</p> <ul style="list-style-type: none"> <li>23. Check containment sump 'B' level – GREATER THAN 38 inches.</li> <li>24. Prepare for high radiation levels in PAB</li> <li>25. Align Train 'B' of RHR for containment sump recirculation.               <ul style="list-style-type: none"> <li>a. Check RHR train 'B' – READY FOR RECIRCULATION; RNO: OBSERVE CAUTION PRIOR TO STEP 27 and go to Step 27.</li> </ul> </li> <li>27. Align train 'A' of RHR for containment sump recirculation               <ul style="list-style-type: none"> <li>a. Check RHR train 'A' – READY FOR RECIRCULATION</li> <li>b. Check SI test line return isolation AOVs – AT LEAST ONE SHUT</li> <li><b>c. Open train 'A' RHR pump suction from containment sump 'B' MOV: 1SI-851A</b></li> <li><b>d. Shut train 'A' RHR pump suction from RWST MOV: 1SI-856A</b></li> <li>e. Check train 'B' RHR – ON RECIRCULATION; RNO: Ensure train 'A' RHR pump is running.</li> </ul> </li> <li>28. Check CCW HX Outlet Temperature – LESS THAN 150°F</li> <li>29. Check RHR trains – AT LEAST ONE ON SUMP RECIRCULATION</li> <li>30. Monitor containment sump performance:               <ul style="list-style-type: none"> <li>• Containment sump level</li> <li>• RHR pump operation – NORMAL</li> <li>• Low head injection flow - STABLE</li> </ul> </li> </ul> |

| Event # 6               | LB LOCA – Containment Sump Recirculation   |
|-------------------------|--|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• PAB AO: When directed to perform EOP-1.3, Attachment A alignment, insert <b>trigger 9</b>, and report when all actions are complete.</li> <li>• PAB AO: When directed to shut 1SI-897A and 1SI-897B, insert <b>trigger 11</b> and report when complete.</li> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>STA Communication:</u></b></p> <ul style="list-style-type: none"> <li>• When CSF Status Trees are in effect and plant conditions are met, report to the OS1 that CSF INTEGRITY RED path conditions exist.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     |  |

|                     | Scenario Termination  |
|---------------------|---|
|                     | <p>Terminate the scenario when the crew has established one train of sump recirculation, or per Lead Evaluator.</p>   |
| <p><b>NOTES</b></p> | <ul style="list-style-type: none"> <li>• Freeze the simulator</li> <li>• Determine if the NRC has any follow up questions</li> <li>• <b>Save SBT Data (see sim setup instructions)</b></li> </ul> |

## QUANTITATIVE ATTRIBUTES

### **Malfunctions:**

*Before EOP Entry:*

- Loss of Safeguards Bus 1A-06
- RCP 1P-1B high vibration

*After EOP Entry:*

- One set of reactor trip pushbuttons fail
- 1P-10B RHR Pump trip
- 1P-10A RHR Pump fails to auto start

### **Abnormal Events:**

- Loss of Safeguards Bus
- RCP Malfunction

### **Major Transients:**

- LB LOCA

### **Critical Tasks:**

|    |       |  |
|----|-------|--|
| 1. | CT-5  | Manually start at least one low head ECCS pump     |
| 2. | CT-36 | Establish at least one train of sump recirculation |

### **Major Procedures:**

AOP-18A ⇒ AOP-19B ⇒ AOP-1B ⇒ EOP-0 ⇒ EOP-1 ⇒ EOP-1.3 ⇒ CSP-P.1 ⇒ EOP-1 ⇒ EOP-1.3

|             |  |
|-------------|--|
| <b>CT-5</b> | Manually start at least one low head ECCS pump |
|-------------|--|

**Critical Task:**

Manually start [at least one low-head ECCS pump]1 [before transition out of E-0]2

**Plant Conditions:**

- Large-break LOCA
- Reactor trip
- SI
- RCS pressure below the shutoff head of the low-head ECCS pumps
- Both low-head ECCS pumps fail to automatically start upon SI
- At least one low-head ECCS pump can be started, provided that manual action is taken as necessary

**Cues:**

Indication and/or annunciation that low-head ECCS pumped injection is required

- SI actuation
- RCS pressure below the shutoff head of the low-head ECCS pumps

AND

Indication and/or annunciation that no low-head ECCS pump is injecting into the core

- Control switch indication that the circuit breakers or contactors for both low-head ECCS pumps are open
- All low-head ECCS pump discharge pressure indicators read zero
- All flow rate indicators for low-head pumped injection read zero

**Performance Indicator:**

Manipulation of controls as required to start at least one low-head ECCS pump

- Control switch indication that the circuit breaker or contactor for at least one low-head ECCS pump is closed

**Feedback:**

Indication and/or annunciation that at least one low-head ECCS pump is injecting

- Flow rate indication of injection from at least one low-head ECCS pump

**Basis:**

SAFETY SIGNIFICANCE -- Failure to manually start at least one low-head ECCS pump under the postulated conditions constitutes misoperation or incorrect crew performance in which the crew does not prevent “degraded emergency core cooling system (ECCS) ...capacity.” In this case, at least one low-head ECCS pump can be manually started from the control room. Therefore, failure to manually start a low-head ECCS pump also represents a failure by the crew to “demonstrate the following abilities:

- Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin (beyond that irreparably introduced by the scenario)
- Recognize a failure or an incorrect automatic actuation of an ESF system or component”

Additionally, under the postulated plant conditions, failure to manually start a low-head ECCS pump (when it is possible to do so) is a “violation of the facility license condition.” The acceptable results obtained in the FSAR analysis of a large-break LOCA are predicated on the assumption of minimum ECCS pumped injection. The analysis assumes that a minimum pumped ECCS flow rate, which varies with RCS pressure, is injected into the core. The flow rate values assumed for minimum pumped injection are based on operation of one each of the



following ECCS pumps: high-head pump, intermediate-head pump, and low-head pump. Operation of this minimum required complement of ECCS injection pumps is consistent with the FSAR assumption that only minimum safeguards are actuated. For both the minimum and maximum cases specified in Comment 1 of this critical task worksheet and for all cases in between, failure to perform the critical task means that the plant is needlessly left in an unanalyzed condition. Performance of the critical task would return the plant to a condition for which analysis shows acceptable results.

CT-36

Transfer to cold leg recirculation

**Critical Task:**

Transfer to cold leg recirculation and establish ECCS recirculation flow from at least one train of RHR.

**Plant Conditions:**

- LOCA inside containment
- RWST level decreases to 34%
- Containment recirculation sump level is at or above 38 inches
- Transfer to cold leg recirculation can be performed manually from switches in the control room

**Cues:**

Indication and/or annunciation that safety injection is actuated

AND

Indication and/or annunciation that RWST level is at or below 34%

AND

Indication that containment sump level is at or above 38 inches

**Performance Indicator:**

Manipulation of controls as required to transfer to cold leg recirculation and establish ECCS recirculation flow that at least meets the assumptions of the plant-specific LOCA analyses:

- Valve position indication that the cold leg recirculation flow path is established
- Control switch indication that the circuit breakers or contactors for the low-head injection pumps are closed

**Feedback:**

Flow indication of the recirculation of containment sump water through the RHR heat exchangers and into the RCS

**Basis:**

The justification for selecting this task as critical can be thoroughly argued only on the basis of plant-specific requirements. A detailed justification cannot be presented on a generic basis because of the following plant-specific variables:

- ECCS recirculation-mode alignments
- Methods for transfer to cold leg recirculation
- RWST inventory criteria for initiating switchover
- RWST inventory transfer allowances for completing transfer of injection pumps and spray pumps

The plant-specific justification for selecting this task as critical should be argued along one or more of the following lines:

- Improper performance or omission by an operator will result in direct adverse consequence(s) or a significant degradation in the mitigative capability of the plant
- Operation or correct performance prevents a significant reduction of safety margin beyond that irreparably introduced by the scenario
- Operation or correct performance prevents unnecessary challenges to the following CSFs:
  - Core cooling
  - Containment
- The crew demonstrates the ability to take one or more actions that would prevent a challenge to plant safety

### Booth Summary

|                  |  |
|------------------|--|
| <b>Event #1</b>  | <b>Raise Reactor Power to POAH</b>   |
| <b>Action</b>    | <b>Booth:</b> None   |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul> |

|                  |   |
|------------------|---|
| <b>Event #2</b>  | <b>Loss of Safeguards Bus 1A-06</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 1</b> per Lead Evaluator  |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>TH AO: If directed to investigate G-03 failure to auto start, wait 3 minutes and report that G-03 is not running and all condition appear normal.</li> <li>TH AO: If directed to restore fire pumps to normal, acknowledge the report – take no action.</li> <li>PAB AO: If directed to close the supply breaker for MOV 1CV-285 (1B52-3210C), wait 2 minutes and report that the breaker cannot be closed, it immediately opens to trip-free when attempting to close.</li> <li>Respond to reports or direction to field operators as necessary.</li> </ul> |

|                  |   |
|------------------|---|
| <b>Event #3</b>  | <b>1P-1B RCP High Vibration</b>   |
| <b>Action</b>    | <p><b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator</p> <p><b>Note:</b> RCP high vibration alarm occurs approximately 8 minutes after the trigger is entered. Trigger 7 deletes malfunctions when the RCP is tripped.</p>   |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>TH AO: If directed to check RCP vibration reading on 1C-76 in rod drive room, wait 2 minutes and report vibration readings as read from RCPs PPCS page.</li> <li>Respond to reports or direction to field operators as necessary.</li> </ul> |

|                  |  |
|------------------|--|
| <b>Event #4</b>  | <b>Reactor Trip – Pushbuttons Fail</b>   |
| <b>Action</b>    | <p><b>Booth:</b> None</p> <p>Trigger 15 opens reactor trip breakers once the second set of pushbuttons is depressed.</p> |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul>       |

|                  |  |
|------------------|--|
| <b>Event #5</b>  | <b>RHR Pump Failures</b>   |
| <b>Action</b>    | <p><b>Booth:</b> None</p> <p>Trigger 5 inserts motor winding ground when the reactor is tripped.</p>   |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>PAB AO: If directed to investigate 1P-10B trip, wait 2 minutes and report the motor is stopped and hot to the touch.</li> <li>TH AO: If directed to check the breaker for 1P-10B at 1B04, wait 2 minutes and report the breaker has tripped on overcurrent.</li> <li>EOP-0, Att A communications: <ul style="list-style-type: none"> <li>PAB AO: When directed to check rad waste service water valves SHUT at C-180, report the TV-LW61 and TV-LW62 are both SHUT</li> <li>TH AO: When directed to check Circ Water Pump House temperature, wait 1 minute and report 76°F and stable.</li> <li>TH AO: When directed to check G03/G04 switchgear room temperature, wait 1 minute and report 80°F and stable.</li> </ul> </li> <li>Respond to reports or direction to field operators as necessary.</li> </ul> |

|                  |   |
|------------------|---|
| <b>Event #6</b>  | <b>LB LOCA – Containment Sump Recirculation</b>   |
| <b>Action</b>    | <p><b>Booth:</b></p> <p>Trigger 5 inserts when the reactor is tripped.</p> <p>Insert <b>TRIGGER 9</b> when directed by crew for EOP-1.3, Att A alignment.</p> <p>Insert <b>TRIGGER 11</b> when directed by crew to isolate SI test lines.</p>   |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>• PAB AO: When directed to perform EOP-1.3, Attachment A alignment, insert <b>trigger 9</b>, and report when all actions are complete.</li> <li>• PAB AO: When directed to shut 1SI-897A and 1SI-897B, insert <b>trigger 11</b> and report when complete.</li> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> |

## SHIFT TURNOVER INFORMATION

### PLANT CONDITIONS:

|                              | <b>UNIT 1</b>             |
|------------------------------|---------------------------|
| Time in core life (MWD/MTU): | BOL                       |
| Reactor power (%):           | 0% (1.3x10E-6 amps in IR) |
| Boron concentration (ppm):   | 2250 ppm                  |
| Rod height, CBD @:           | 196                       |

### TECHNICAL SPECIFICATION ACTION CONDITIONS IN EFFECT:

|    | <u>TSAC</u> | <u>Description</u>         | <u>Required Action &amp; Completion Time</u> |
|----|-------------|----------------------------|--|
| U1 | 3.3.1.A/K   | RPS one channel inoperable | Place channel in trip – 1 hour               |

### EQUIPMENT OUT OF SERVICE:

- G02 Emergency Diesel Generator for maintenance.
- 1PT-949, Containment Pressure instrument.
- 1W-3A, Control Rod Drive Shroud Fan.

### PLANNED EVOLUTIONS:

- Raise reactor power to POAH.

### TURNOVER INFORMATION:

- G01 Emergency Diesel Generator is aligned to both 1A05 and 2A05 4160 Safeguards Busses.
- On line risk is GREEN.
- Today is Tuesday, day shift.

**Pre-Scenario Procedure Checks**

| Procedure   | OS1                   |                       |
|---|-----------------------|-----------------------|
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| AOP-1B  |                       |                       |
| AOP-18A   |                       |                       |
| AOP-18B   |                       |                       |
| AOP-19B   |                       |                       |
| AOP-19A   |                       |                       |
| EOP 0   |                       |                       |
| EOP 1   |                       |                       |
| EOP 1.3   |                       |                       |
| CSP-P.1   |                       |                       |
| OP 5E   |                       |                       |
|   |                       |                       |
|   |                       |                       |
|   |                       |                       |
|   |                       |                       |
| Specific ARP/ARBs to be second checked – All Others first checked |                       |                       |
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| CO2 D 1-4   |                       |                       |
| CO2 D 2-1   |                       |                       |
| 1CO4 1C 1-5   |                       |                       |
| 1CO4 1C 3-10  |                       |                       |
|   |                       |                       |





# SIMULATOR EXERCISE GUIDE

**SEG**

**SITE:** PBNP **Revision #: 0**

**LMS ID:** PBN LOI NRC 25E **LMS Rev. Date:**

**SEG TITLE:** 2021 NRC Exam Scenario 4

**SEG TYPE:**  Training  Evaluation

**PROGRAM:**  LOCT  LOIT  Other:

**DURATION:** 90 minutes

**Developed by:** John Rogers \_\_\_\_\_  
Instructor/Developer Date

**Reviewed by:** Jeff Hinze \_\_\_\_\_  
Instructor (Instructional Review) Date

**Validated by:** John Rogers \_\_\_\_\_  
SME (Technical Review) Date

**Approved by:** Adam Moore \_\_\_\_\_  
Training Supervision Date

**Approved by:** Joe Krear \_\_\_\_\_  
Training Program Owner (Line) Date



Facility: Point Beach Scenario No.: 4 Op-Test No.: 2021

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: Reactor power is 47%. G03, EDG is out of service due to maintenance with G04, EDG aligned. 1LT-426, PZR Level transmitter (Red) removed from service

Turnover: Conduct an up power to 100% power at 15% per hour per OP 1C, Startup to Power Operations

Critical Tasks: CT-3, Manually Actuate Containment Cooling  
CT-17, Isolate Faulted SG

| Event No. | Malf. No. | Event Type*             | Event Description   |
|-----------|-----------|-------------------------|---|
| 1         |           | C-RO<br>C-SRO           | Letdown inadvertently isolates, needs to be re-established<br><br><b>NEW</b>  |
| 2         |           | R-RO<br>C-BOP<br>R-SRO  | Inadvertent Turbine trip with no reactor trip<br><br><b>NEW</b>   |
| 3         |           | C-RO<br>C-SRO<br>TS-SRO | Seismic event<br>1P-11A, CCW pumps failure due to a mechanical failure requiring pump shift<br><br><b>2019 Repeat</b> |
| 4         |           | M-ALL                   | Seismic event causes multiple dropped rods, without an automatic RX Trip  |
| 5         |           | C-BOP<br>C-SRO          | Steam Generator fault in containment upstream of the orifice<br><br><b>NEW</b>  |
| 6         |           | C-BOP<br>C-SRO          | Containment Spray fails to actuate<br><br><b>2017 Repeat</b>  |

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

## SIMULATOR EXERCISE GUIDE REQUIREMENTS

|   |   |
|---|---|
| <b>Terminal Objective:</b>                | Given the site simulator and specific plant conditions, the students will be able to respond to various plant abnormal and emergency events, in accordance with site procedures and technical Specifications.   |
| <b>Enabling Objectives:</b>               | 1. None   |
| <b>Prerequisites:</b>                     | <ol style="list-style-type: none"> <li>1. Simulator available</li> <li>2. Students enrolled in Initial License Program</li> </ol>   |
| <b>Training Resources:</b>                | <ol style="list-style-type: none"> <li>1. Floor Instructor as Shift Manager / Shift Technical Advisor</li> <li>2. Simulator Booth Operator</li> <li>3. Communicator</li> <li>4. NRC Evaluators</li> </ol>   |
| <b>References:</b>                        | <ol style="list-style-type: none"> <li>1. AOP-1D, Chemical and Volume Control System Malfunction</li> <li>2. AOP-6A, Dropped Rod</li> <li>3. AOP-9B, Component Cooling System Malfunction</li> <li>4. AOP-25, Turbine Trip Without Reactor Trip</li> <li>5. AOP-28, Seismic Event</li> <li>6. EOP-0, Reactor Trip or Safety Injection</li> <li>7. EOP-1, Loss of Reactor or Secondary Coolant</li> <li>8. EOP-1.1, SI Termination</li> <li>9. EOP-2, Faulted Steam Generator Isolation</li> <li>10. OM 3.7, AOP and EOP Procedure Usage For Response To Plant Transients</li> <li>11. Technical Specifications Manual</li> <li>12. Technical Requirements Manual</li> </ol> |
| <b>Protected Content:</b>                 | None  |
| <b>Evaluation Method:</b>                 | Simulator performance will be evaluated in accordance with NUREG 1021.  |
| <b>Operating Experience:</b>              | None  |
| <b>Risk Significant Operator Actions:</b> | <p><b><u>Initiating Event with Core Damage Frequency:</u></b></p> <p>Steam Break Inside Containment (4.12E-09 CDF) (2.00E-11 LERF)</p> <p>Failure to isolate AFW to the Faulted Steam Generator from T (1.41E-03)</p>   |

**UPDATE LOG:** Indicate in the following table any minor changes or major revisions made to the material after initial approval.

| # | DESCRIPTION OF CHANGE               | REASON FOR CHANGE | AR/TWR# | PREPARER | DATE |
|---|-------------------------------------|-------------------|---------|----------|------|
|   |                                     |                   |         | REVIEWER | DATE |
| 0 | Developed for the 2021 ILT NRC Exam |                   |         |          |      |
|   |                                     |                   |         |          |      |

## OVERVIEW / SEQUENCE OF EVENTS

### OVERVIEW

Initial conditions for the scenario are: Unit 1 reactor power is stable at approximately 47% during a plant startup following a short forced outage. Power ascension to 100% is planned for this shift.

Examinees will respond to an inadvertent CVCS letdown isolation. A seismic event causes the running CCW pump to degrade. A second seismic event causes two dropped rods, requiring a reactor trip. Coincident with the reactor trip, a S/G faults inside containment; containment spray will fail to automatically actuate.

The scenario will be terminated when the crew has completed actions through Step 7 of EOP-1.1, SI Termination.

### SEQUENCE OF EVENTS

| Event # | Description  |
|---------|--|
| 1.      | <p><b>Inadvertent Letdown Isolation</b></p> <ul style="list-style-type: none"> <li>Letdown Orifice Isolation valve, 1CV-200A inadvertently closes causing a loss of letdown flow.</li> <li>The crew will respond per AOP-1D, CVCS Malfunction, to minimize charging flow and restore letdown to service.</li> </ul>  |
| 2.      | <p><b>Inadvertent Turbine Trip Without Reactor Trip</b></p> <ul style="list-style-type: none"> <li>The Unit 1 Main Turbine will inadvertently trip with reactor power at approximately 47%. The reactor will not trip.</li> <li>The crew will stabilize the plant per AOP-25, Turbine Trip Without Reactor Trip</li> </ul>   |
| 3.      | <p><b>Seismic Event / 1P-11A, CCW Pump Failure</b></p> <ul style="list-style-type: none"> <li>A seismic event occurs that results in the mechanical failure of 1P-11A, CCW Pump.</li> <li>The crew will implement AOP-28, Seismic Event, in response to the Seismic Event.</li> <li>The crew will respond to the loss of 1P-11A, CCW Pump, per AOP-9B, Component Cooling System Malfunction, to restore CCW system flow.</li> <li>SRO will address Technical Specifications</li> </ul> |
| 4.      | <p><b>Multiple Dropped Rods</b></p> <ul style="list-style-type: none"> <li>A second seismic event causes two rods to drop, requiring a reactor trip.</li> <li>The crew will respond to AOP-6A, Dropped Rod, to trip the reactor.</li> </ul>  |
| 5.      | <p><b>Faulted Steam Generator</b></p> <ul style="list-style-type: none"> <li>Coincident with the reactor trip, the 'A' S/G will fault inside containment.</li> <li>The crew will isolate the faulted S/G per EOP-2, Faulted Steam Generator Isolation.</li> </ul>  |

|    |   |
|----|---|
| 6. | <b>Containment Spray Fails to Actuate</b> <ul style="list-style-type: none"><li>• The faulted S/G will cause containment pressure to rise above the containment spray actuation setpoint, but CS will fail to auto actuate.</li><li>• The crew will respond to manually initiate containment spray per EOP-0, Reactor Trip or Safety Injection.</li></ul> |
|    | Terminate the scenario when crew has completed through Step7 of EOP-1.1, SI Termination, or per Lead Evaluator.   |

## SIMULATOR SET-UP INSTRUCTIONS

Perform simulator set up per the site specific Simulator Setup Checklist.

| Check | Action  |
|-------|---|
| 1.    | Reset to IC-32  |
| 2.    | Perform Simulator Setup Checklist   |
| 3.    | Open schedule file. <b>Z:/2021 ILT NRC Simulator Files/NRC Scenario 4.sch</b>   |
| 4.    | To record SBT data: <ol style="list-style-type: none"> <li>1. Launch "SBT Report" from Thunderbar</li> <li>2. Open "Scenario Validation Checklist.sbt" (TRex_PBLightning)</li> </ol>  |
| 5.    | Take schedule(s) to <b>run</b>  |
| 6.    | Verify required event file(s) open if required  |
| 7.    | Take sim to <b>run</b>  |
| 8.    | Place turnover sheets on <b>RO</b> desk   |
| 9.    | Place reactivity sheets on <b>RO</b> desk   |
| 10.   | Guard the following: <ul style="list-style-type: none"> <li>• G01, G02, G04 EDG's</li> </ul> Place the following OOS: <ul style="list-style-type: none"> <li>• G03 EDG</li> <li>• 1LT-426 Pressurizer Level</li> </ul> Place red dots on the G03 alarm and PZR Level: <ul style="list-style-type: none"> <li>• C02 E 2-1</li> <li>• C02 E 2-2</li> <li>• 1C04 1C 3-3</li> </ul>   |
| 11.   | <ul style="list-style-type: none"> <li>• Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.</li> <li>• Brief the scenario evaluators</li> <li>• Brief surrogates using TR-AA-230-1007-F11, Surrogate Brief Checklist, if necessary</li> </ul>   |
| 12.   | Run Scenario  |
| 13.   | To save SBT Data: <ol style="list-style-type: none"> <li>1. In the SBT Report program click the Generate Report icon (green arrow)</li> <li>2. In Test Title enter a unique test title, to be same as file name</li> <li>3. In report name enter the location the test files are to be saved, use same file name as Test Title</li> <li>4. Click "Generate" (generates and saves two files in the selected folder)</li> <li>5. Verify files saved in the selected folder</li> <li>6. The generated report and SBT Report program may now be closed</li> <li>7. Collect procedure markups for SBT</li> <li>8. Save any InSight, Alarm, Event, Schedule Files to the secure drive that were in use</li> </ol> |
| 14.   | Reset simulator to appropriate IC.  |

**BOOTH OPERATOR BRIEFING:**

Review the scenario sequence, event triggers and expected field communications.

**Z:/2021 ILT NRC Simulator Files/NRC Scenario 4.sch**

| At Time  | On Event | Action  | Description   |
|----------|----------|---|---|
|          |          | <b>Preloads / Initial Conditions</b>                                      |   |
| 00:00:00 |          | Insert malfunction MAL1DSG001B  | DIESEL G03 FAILURE TO START                           |
| 00:00:00 |          | Insert malfunction XMT1RCS007C to -15                                     | 1-LT426 PRZR NARROW RANGE LEVEL FIXED BIAS            |
|          |          | Event Z:/2021 ILT NRC Exam Simulator Files/NRC 4.evt                      |   |
|          |          | <b>Event 1: Inadvertent Loss of Letdown</b>                               |   |
|          | 1        | Insert malfunction VLV1CVRO5 to Close on event 1 delete in 30             | 1-CV-200A LTDN ORIFICE STOP VLV NO 1-200A             |
|          |          | <b>Event 2: Inadvertent Turbine Trip</b>                                  |   |
|          | 3        | Insert malfunction MAL1EHC008 on event 3                                  | INADVERTANT TURBINE TRIP                              |
|          |          | <b>Event 3: Seismic Event / 'A' CCW Pump Failing</b>                      |   |
|          | 5        | Schedule Z:/2021 ILT NRC Exam Simulator Files\NRC 4 Seismic 1.sch         |   |
|          | 5        | Insert malfunction PMP1CCW001C to 50.00000 in 15 on event 5               | 1-P11A COMPONENT COOLING PUMP NO 1-P11A HEAD CAPACITY |
|          |          | <b>Event 4: Dropped Rods / 2nd Seismic Event</b>                          |   |
|          | 7        | Insert malfunction MAL1CRF002-J4 after 5 on event 7                       | ROD DROP J4   |
|          | 7        | Insert malfunction MAL1CRF002-I3 after 10 on event 7                      | ROD DROP I3   |
|          | 7        | Schedule Z:/2021 ILT NRC Exam Simulator Files\NRC 4 Seismic 2.sch after 5 |   |
|          | 7        | Insert remote LOA1ANN008 to ON on event 7 delete in 5                     | SEI-RESET Seismic detector reset C-206                |
|          |          | <b>Event 5: Faulted Steam Generator</b>                                   |   |
|          | 9        | Insert malfunction MAL1SGN002A to 10000000.00000 in 10 on event 9         | SG A MAIN STEAM LINE BREAK UPSTREAM OF FT             |
|          | 11       | Insert remote LOA1SGN023 to 0 in 10 on event 11                           | 1MS-235 P-29 AFP & RADWASTE STM ISOL                  |
|          |          | <b>Event 6: Containment Spray Fails to Actuate</b>                        |   |
| 00:00:00 |          | Insert malfunction BST1PPL057 to Fail_As_Is                               | 1-PC945B CONT PRESS HI-HI B/S (SPRAY)                 |
| 00:00:00 |          | Insert malfunction BST1PPL061 to Fail_As_Is                               | 1-PC947B CONT PRESS HI-HI B/S (SPRAY)                 |
| 00:00:00 |          | Insert malfunction BST1PPL065 to Fail_As_Is                               | 1-PC949B CONT PRESS HI-HI B/S (SPRAY)                 |

|          |  |   |                                       |
|----------|--|---|---------------------------------------|
| 00:00:00 |  | Insert malfunction BST1PPL059 to Fail_As_Is | 1-PC946B CONT PRESS HI-HI B/S (SPRAY) |
| 00:00:00 |  | Insert malfunction BST1PPL063 to Fail_As_Is | 1-PC948B CONT PRESS HI-HI B/S (SPRAY) |
| 00:00:00 |  | Insert malfunction BST1PPL067 to Fail_As_Is | 1-PC950B CONT PRESS HI-HI B/S (SPRAY) |

**Seismic Event Schedule Files**

| <b>At Time</b> | <b>On Event</b> | <b>Action</b>  | <b>Description</b>                         |
|----------------|-----------------|--|--|
| 00:00:00       |                 | Insert remote LOA1ANN004 to SEIS_EVT                         | SEI-6210 Switchgear Seismic Detector       |
| 00:00:00       |                 | Insert remote LOA1ANN005 to SEIS_EVT                         | SEI-6211 Facade Seismic Detector           |
| 00:00:00       |                 | Insert remote LOA1ANN006 to SEIS_EVT                         | SEI-6212 Drum Area Seismic Detector        |
| 00:00:00       |                 | Insert remote LOA1ANN007 to SEIS_EVT                         | SEI-6213 Aux FW Tunnel Seismic Detector    |
| 00:00:00       |                 | Insert malfunction ANN-ROA-B06 to On                         | SEISMIC DETECTOR ACTIVATION                |
| 00:00:00       |                 | Insert malfunction ANN-1BOPF-A01 after 5 to On delete in 15  | LO PRESS FEEDWATER HEATER 1A,2A OR 3A LEVE |
| 00:00:00       |                 | Insert malfunction ANN-1BOPF-B01 after 5 to On delete in 15  | LO PRESS FEEDWATER HEATER 1B,2B OR 3B LEVE |
| 00:00:00       |                 | Insert malfunction ANN-1BOPF-D02 after 10 to On delete in 20 | STILLING MANIFOLD LEVEL HI                 |
| 00:00:00       |                 | Insert malfunction ANN-1BOPF-B02 after 20 to On delete in 30 | HEATER DRAIN TANK LEVEL HI-LO              |
| 00:00:00       |                 | Insert malfunction ANN-ROD-A01 after 10 to On delete in 20   | SERVICE AIR HEADER PRESSURE LOW            |

**Event file: Trigger 9 Unit 1 Reactor Trip (JCRFTR)**



## SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

**Bolded steps are Verifiable Actions taken by the Operators.**

**(IA) actions are those allowed to be taken from memory, before referencing the procedure, as allowed by OM 3.7, Attachment F, AOP Actions Allowed From Memory.**

| Event # 1               | Inadvertent Letdown Isolation   |
|-------------------------|---|
| <b>ACTION</b>           | <b>Booth:</b> Insert <b>TRIGGER 1</b> per Lead Evaluator  |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>• PPCS Alarms: <ul style="list-style-type: none"> <li>○ PRIORITY 1 &amp; 2 COMPOSITE ALARM</li> <li>○ F-134 LETDOWN LINE FLOW</li> <li>○ P-135 LOW PRESS LETDOWN PRESS</li> </ul> </li> <li>• 1C04 Indications: <ul style="list-style-type: none"> <li>○ 1PI-135, Letdown Pressure lowers to &lt; 50 psig</li> <li>○ 1FI-134, Letdown Line Flow lowers to approximately 0 gpm</li> <li>○ Pressurizer level rising</li> <li>○ Auto Charging Pump speed lowering</li> <li>○ VCT Level lowering</li> </ul> </li> <li>• Annunciators <ul style="list-style-type: none"> <li>○ PRESSURIZER HIGH LEVEL CHANNEL ALERT (1C04 1C 3-3)</li> <li>○ PPCS PRIORITY ALARM (1C20D 2-1)</li> </ul> </li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>• Diagnoses the loss of letdown and reduces charging flow to minimum.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>• Implements AOP-1D, CVCS Malfunction</li> </ul> <p><b>Crew</b></p> <ol style="list-style-type: none"> <li>1. Check RCS leak – NOT IN PROGRESS (<b>RO</b>)</li> <li>2. Determine CVCS Malfunction: (<b>RO</b>) <ul style="list-style-type: none"> <li>○ IF inadvertent letdown isolation occurred, THEN go to Step 48</li> </ul> </li> <li>48. Check letdown – INADVERTENTLY ISOLATED (<b>RO</b>)</li> <li>49. <b>(IA) Reduce charging to – MINIMUM (RO)</b><br/><i>Go to manual on both charging pumps, secure one, and reduce the other charging pump to minimum speed</i></li> <li>50. Check that letdown restoration can be performed (<b>RO</b>)</li> <li>51. Ensure letdown orifice outlet valves –SHUT (<b>RO</b>)</li> <li>52. Ensure normal charging – IN SERVICE (<b>RO</b>)</li> <li>53. Check PZR Level – GREATER THAN 20% (<b>RO</b>)</li> <li>54. Establish letdown (<b>RO</b>) <ol style="list-style-type: none"> <li>a. Open letdown line containment isolation valves</li> <li>b. Open RC loop B cold leg letdown isolation valve</li> <li>c. <b>Ensure component cooling flow to non-regen heat exchanger – ESTABLISHED, 1HC-130</b></li> </ol> </li> </ol> |

| Event # 1                                     | Inadvertent Letdown Isolation  |                 |                 |                 |   |  |        |
|---|--|-----------------|-----------------|-----------------|---|--|--------|
|   | <p><i>Takes 1HC-130 controller to manual, and establishes flow using pot</i></p> <p>d. <b>Ensure charging flow – AT LEAST 20 GPM</b><br/><i>Adjusts charging pump controller until min of 20 gpm established</i></p> <p>e. <b>Adjust backpressure and open letdown orifice outlet valves – ESTABLISH DESIRED LETDOWN FLOW.</b><br/><i>Opens one of 1CV-200A/B/C while maintaining pressure using hand controller 1HC-135; LP Letdown Line Pressure Controller in manual. Once letdown is established and stable, takes hand controllers 1HC-130 and 1HC-135 to Auto</i></p> <p>55. Check PZR Level – AT PROGRAM LEVEL (RO)<br/>56. Notify Duty Station Manager (SRO directs SM to make notifications)<br/>57. Return to procedure and step in effect (SRO)</p> <ul style="list-style-type: none"> <li>Assess Technical Specifications:</li> </ul> <p><b>IF PZR level rises &gt;52%, THEN LCO 3.4.9 is NOT MET</b></p> <table border="1" data-bbox="402 825 1419 995"> <thead> <tr> <th>CONDITION</th> <th>REQUIRED ACTION</th> <th>COMPLETION TIME</th> </tr> </thead> <tbody> <tr> <td>A. PZR water level not within limit in MODE 1</td> <td>A.1 Restore PZR water level to within limit.</td> <td>1 hour</td> </tr> </tbody> </table> | CONDITION       | REQUIRED ACTION | COMPLETION TIME | A. PZR water level not within limit in MODE 1 | A.1 Restore PZR water level to within limit. | 1 hour |
| CONDITION                                     | REQUIRED ACTION  | COMPLETION TIME |                 |                 |   |  |        |
| A. PZR water level not within limit in MODE 1 | A.1 Restore PZR water level to within limit.   | 1 hour          |                 |                 |   |  |        |
| <p><b>ROLE PLAY</b></p>                       | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>If asked, direct the crew to restore letdown using 1CV-200B orifice Isolation valve.</li> <li>Respond to reports from crew members as required.</li> </ul>  |                 |                 |                 |   |  |        |
| <p><b>NOTES</b></p>                           | <p><b>Continuation Criteria:</b></p> <p>After the crew has restored letdown flow and is controlling charging flow, or at the discretion of the Lead Examiner, continue with the next event.</p>  |                 |                 |                 |   |  |        |

| Event # 2               | Inadvertent Turbine Trip Without Reactor Trip  |
|-------------------------|--|
| <b>ACTION</b>           | <b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator   |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>• Annunciators <ul style="list-style-type: none"> <li>○ AUTOMATIC ROD MOTION (1C04 1A 1-7)</li> <li>○ REACTOR COOLANT HIGH TAVG TREF DEVIATION (1C04 1A 4-10)</li> <li>○ BLEEDER TRIP VALVES AIR PRESSURE (1C03 1D 4-9 LOW)</li> <li>○ 20 / AST SOLENOID TRIP (1C03 1E1 4-2)</li> <li>○ TURBINE STOP VALVES TWO CLOSED (1C03 1E1 4-3)</li> <li>○ TAVG STEAM DUMP CHANNEL ALERT (1C03 1E2 4-2)</li> </ul> </li> <li>• 1C03 Indications <ul style="list-style-type: none"> <li>○ Condenser Steam Dumps indicate open</li> <li>○ S/G Steam Flow drops dramatically and then rises due to CSDs</li> <li>○ Turbine Stop Valves indicate closed</li> <li>○ Turbine Gov. Valves indicate closed</li> <li>○ Turbine First Stage Pressure indicates 0 psig</li> </ul> </li> <li>• 1C04 Indications <ul style="list-style-type: none"> <li>○ Tavg rising</li> <li>○ Tref lowering</li> <li>○ NI Power lowering</li> <li>○ Control Rods driving IN in AUTOMATIC at maximum rate</li> </ul> </li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>• Diagnoses the turbine trip without reactor trip, places rod control in manual.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>• Implements AOP-25, Turbine Trip Without Reactor Trip</li> </ul> <p><b>Crew</b></p> <ol style="list-style-type: none"> <li>1. Verify turbine trip (<b>BOP</b>)</li> <li>2. <b>(IA) Ensure rod control in MANUAL (RO)</b></li> <li>3. Check reactor power – BETWEEN 5% and 50% (<b>RO</b>)</li> <li>4. Stabilize reactor power and temperature. <ol style="list-style-type: none"> <li>a. Set condenser steam dumps to stabilize reactor power referencing ATTACHMENT A, Reactor Power, Tavg and CSD Controller Settings, as needed: (<b>BOP</b>) <ul style="list-style-type: none"> <li>○ Condenser steam dumps to pressure control mode <ol style="list-style-type: none"> <li>a) <b>Null 1HFC-484 output by adjusting Auto Setpoint to match 1PI-484, Steam Header Pressure.</b></li> <li>b) <b>Place condenser steam dump mode selector switch to MANUAL</b></li> <li>c) <b>Adjust 1HFC-484 Auto Setpoint to match reactor power to controller output.</b></li> </ol> </li> </ul> </li> <li>b. <b>Stabilize temperature as follows: (RO)</b> <ol style="list-style-type: none"> <li>1) If temperature is lowering: <ol style="list-style-type: none"> <li>a) Step rods out in 3 to 5 step increments to stabilize</li> </ol> </li> </ol> </li> </ol> </li> </ol> |

| Event # 2        | Inadvertent Turbine Trip Without Reactor Trip  |
|------------------|--|
|                  | <p style="text-align: right;">reactor temperature at approximate reactor power per Attachment A, Reactor Power, Tavg and CSD Controller Settings</p> <p>c. <b>Control reactor power between 5% and 40% as directed by shift management. (RO/BOP)</b><br/><i>1HFC-484 and rods will be adjusted as necessary to maintain reactor power</i></p> <ol style="list-style-type: none"> <li>5. Verify generator trip (<b>BOP</b>)</li> <li>6. Check steam generator levels – STABLE AT OR TRENDING TO NORMAL (<b>BOP</b>)</li> <li>7. Check pressurizer pressure – STABLE AT OR TRENDING TO 2235 PSIG (<b>RO</b>)</li> <li>8. Check pressurizer level – STABLE AT OR TRENDING TO PROGRAM LEVEL (<b>RO</b>)</li> </ol> |
| <b>ROLE PLAY</b> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• TH AO: If AOs are dispatched to investigate the cause of the turbine trip, wait 3 minutes and report that that there is no apparent cause.</li> <li>• Respond to other reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul>  |
| <b>NOTES</b>     | <p><b>Continuation Criteria:</b><br/>After the crew has stabilized reactor power and temperature, or at the discretion of the Lead Examiner, continue with the next event.</p>   |

| Event # 3     | Seismic Event / 1P11A, CCW Pump Failure   |
|---------------|---|
| <b>ACTION</b> | <b>Booth:</b> Insert <b>TRIGGER 5</b> per Lead Evaluator<br>Trigger 5 will open and run schedule file "NRC Seismic 1.sch." After all events have run, <b>CLOSE schedule file "NRC 4 Seismic 1.sch."</b> ( <i>This is necessary for the next seismic event to run properly</i> ) |

| Event # 3                      | Seismic Event / 1P11A, CCW Pump Failure  |  |                 |                 |                           |   |  |
|--------------------------------|--|--|-----------------|-----------------|---------------------------|---|--|
| <p><b>STUDENT RESPONSE</b></p> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>• Rumbling sound accompanied by various momentary alarms</li> <li>• Annunciators:               <ul style="list-style-type: none"> <li>○ SEISMIC DETECTOR ACTIVATION (C01A 2-6)</li> <li>○ 1C03 1D 1-4 and 1-5 1P-1A(B) RCP COOLING WATER FLOW LOW</li> <li>○ 1C03 1F 1-1, 2-1, 3-1, 4-1 LP Feedwater Heater High and Low Level alarms</li> </ul> </li> <li>• PPCS Alarms:               <ul style="list-style-type: none"> <li>○ SEI-6210 through 6213 SEISMIC DETECTOR alarms</li> </ul> </li> <li>• 1C03 Indications:               <ul style="list-style-type: none"> <li>○ 1P-11A indicates running but at reduced flow (1FI-619)</li> </ul> </li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>• Diagnoses reduced CCW system flow.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>• Implements AOP-28, Seismic Event and AOP-9B, Component Cooling System Malfunction.</li> </ul> <p><b>Crew</b></p> <p><u>AOP-9B, Component Cooling System Malfunction</u></p> <ol style="list-style-type: none"> <li>1. Check component cooling pumps – AT LEAST ONE RUNNING (<b>BOP</b>)<br/>RNO: IF component cooling surge tank level greater than 20%, <b>THEN start one component cooling pump.</b> <ul style="list-style-type: none"> <li>• <b>1P-11B</b></li> </ul> </li> </ol> <p><u>AOP-28, Seismic Event</u> (Implemented as a secondary priority)</p> <ol style="list-style-type: none"> <li>1. Check plant conditions – NORMAL (<b>RO/BOP</b> and crew will contact AOs for field walkdowns)</li> <li>2. Check seismic instruments – NOT TRIGGERED (<b>BOP</b>)</li> <li>3. Notify DSM and implement Emergency Plan (SRO will direct SM to make notifications)</li> <li>4. Perform a walkdown inspection per Attachment A, Seismic Event Checklist (Crew to coordinate with AOs)</li> </ol> <ul style="list-style-type: none"> <li>• Assess Technical Specifications:<br/><b>CCW LCO 3.7.7 is NOT MET</b></li> </ul> <table border="1" data-bbox="402 1583 1419 1793"> <thead> <tr> <th>CONDITION</th> <th>REQUIRED ACTION</th> <th>COMPLETION TIME</th> </tr> </thead> <tbody> <tr> <td>A. One CC pump inoperable</td> <td>A.1 Restore CC pump to OPERABLE status.</td> <td>72 hours<br/>AND<br/>144 hours from discovery of failure to meet the LCO</td> </tr> </tbody> </table> | CONDITION  | REQUIRED ACTION | COMPLETION TIME | A. One CC pump inoperable | A.1 Restore CC pump to OPERABLE status. | 72 hours<br>AND<br>144 hours from discovery of failure to meet the LCO |
| CONDITION                      | REQUIRED ACTION  | COMPLETION TIME  |                 |                 |                           |   |  |
| A. One CC pump inoperable      | A.1 Restore CC pump to OPERABLE status.  | 72 hours<br>AND<br>144 hours from discovery of failure to meet the LCO |                 |                 |                           |   |  |

| Event # 3               | Seismic Event / 1P11A, CCW Pump Failure  |
|-------------------------|--|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• PAB AO: One minute after the seismic event, report that 1P-11A, CCW Pump is making an excessive noise and you recommend securing the pump.</li> <li>• PAB AO: If asked, report pre-start check on 1P-11B, CCW pump, SAT</li> <li>• PAB AO: After 1P-11B is started, report a SAT start on 1P-11B.</li> <li>• Lead AO: If directed to perform plant walkdowns per AOP-28, Att A, wait 10 minutes and report that the only damage was the CCW Pump.</li> <li>• Respond to other reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• If asked, plant management has approved continued operation while walkdowns are being performed.</li> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     | <p><b>Continuation Criteria:</b></p> <p>After the crew has switched operating CCW pumps, or at the discretion of the Lead Examiner, continue with the next event.</p>  |

| Event # 4               | Multiple Dropped Rods (J4 and I3)  |
|-------------------------|--|
| <b>ACTION</b>           | <b>Booth:</b> Check that schedule file “NRC 4 Seismic 1.sch” is CLOSED, Then Insert <b>TRIGGER 7</b> per Lead Evaluator  |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and Indications:</b></p> <ul style="list-style-type: none"> <li>• Rumbling sound accompanied by various alarms</li> <li>• Annunciators: <ul style="list-style-type: none"> <li>○ SEISMIC DETECTOR ACTIVATION (C01A 2-6)</li> <li>○ ROD BOTTOM ROD DROP (1C04 1A 1-5)</li> <li>○ POWER RANGE ROD DROP (1C04 1A 4-5)</li> </ul> </li> <li>• PPCS Alarms: <ul style="list-style-type: none"> <li>○ SEI-6210 through 6213 SEISMIC DETECTOR alarms</li> </ul> </li> <li>• 1C04 Indications: <ul style="list-style-type: none"> <li>○ Control Rod I3 (CBA) and J4 (CBC) rod bottom lights lit</li> <li>○ Control Rod I3 and J4 IRPI indications at 0 steps</li> </ul> </li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>• Diagnoses multiple dropped rods and trips the reactor. (RO)</li> <li>• Performs EOP-0 Immediate Actions. (RO)</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>• Directs a reactor trip per AOP-6A, Dropped Rod</li> <li>• Implements EOP-0, Reactor Trip or Safety Injection</li> </ul> <p><b>Crew</b><br/><u>AOP-6A, Dropped Rod</u></p> <ul style="list-style-type: none"> <li>• Check only one rod dropped<br/>RNO: Perform the following: <ul style="list-style-type: none"> <li>○ <b>Trip the reactor (RO)</b></li> <li>○ Go to EOP-0, Reactor Trip or Safety Injection (SRO)</li> </ul> </li> </ul> <p><u>EOP-0, Reactor Trip or Safety Injection</u></p> <ul style="list-style-type: none"> <li>• Verify Reactor Trip (RO)</li> <li>• Verify Turbine Trip (RO)</li> <li>• Verify Power to AC Safeguards Busses (RO)</li> <li>• Check if SI actuated (RO)</li> </ul> <p>Foldout Page #3: Faulted S/G Isolation Criteria (BOP)<br/>IF any S/G pressure trending lower in an uncontrolled manner OR any S/G completely depressurized, THEN the following may be performed:</p> <ul style="list-style-type: none"> <li>• <b>(CT-17) Isolate feed flow to faulted S/G.</b><br/><i>Ensure 1FIC-4074A, 1P-53 AFP to 1HX-1A FCV in manual and shut AND 1AF-4001 AFP Disch SG A Inlet MOV shut</i></li> <li>• <b>Maintain total feed flow greater than or equal to 275 gpm until narrow range level in at least one S/G is greater than [52%] 33%.</b><br/><i>Control feed flow to B S/G using 1FIC-4074B, 1P-53 AFP to 1HX-1B FCV and 1AF-4000, 1P29 AFP Disch SG B Inlet MOV</i></li> </ul> |

Conditions for CT-3 and CT-17 start here

CT-17 action



| Event # 4        | Multiple Dropped Rods (J4 and I3)   |
|------------------|---|
|                  | <ul style="list-style-type: none"> <li>• Perform Attachment A, Automatic Action Verification, while continuing with this procedure. <b>(BOP)</b></li> <li>• Verify AFW Pumps – RUNNING <b>(RO)</b></li> <li>• Check RCP Seal Cooling <b>(RO)</b></li> <li>• Check RCS Temperatures <b>(RO)</b> <ul style="list-style-type: none"> <li>○ Condenser steam dumps - AVAILABLE<br/>RNO: <b>Adjust S/G(s) atmospheric steam dump controllers to 1005 psig</b></li> <li>○ RCS Temperature <ul style="list-style-type: none"> <li>▪ With and RCP running: RCS average temperature – STABLE AT OR TRENDING TO 547°F<br/>RNO: Perform the following:</li> </ul> </li> </ul> </li> <li>• IF temperature is less than 547°F and lowering, THEN perform the following: <ul style="list-style-type: none"> <li>○ Stop dumping steam</li> <li>○ IF cooldown continues, <b>THEN control total feed flow.</b><br/><i>Control feed flow to B S/G using 1FIC-4074B, 1P-53 AFP to 1HX-1B FCV and 1AF-4000, 1P29 AFP Disch SG B Inlet MOV</i></li> <li>○ <b>IF cooldown continues, THEN isolate main steam lines</b><br/><i>Shut 1MS-2017/2018, Steam Generator A/B Main Steam Stop CV</i></li> </ul> </li> <li>• Check PZR PORVs and spray valves <b>(RO)</b></li> <li>• Check if RCPs Should be stopped <b>(RO)</b></li> <li>• Check if S/G are NOT faulted <b>(RO)</b><br/>RNO: Perform the following: <b>(SRO)</b></li> <li>• Notify STA to MONITOR CSP Status per CSP-ST.0, CSF Status Trees</li> <li>• Go to EOP-2, Faulted Steam Generator Isolation</li> </ul> |
| <b>ROLE PLAY</b> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul>   |
| <b>NOTES</b>     |   |

| Event # 5               | Faulted 'A' Steam Generator   |
|-------------------------|---|
| <b>ACTION</b>           | <p><b>Booth:</b> TRIGGER 9 will auto insert on reactor trip.</p> <p>Insert <b>Trigger 11</b> per crew direction for local S/G isolations</p>  |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and indications:</b></p> <ul style="list-style-type: none"> <li>• Steam Flow indicated on A S/G</li> <li>• Containment Pressure rising rapidly to &gt;25 psig (Containment Spray setpoint)</li> <li>• S/G A level and pressure lowering rapidly, inconsistent with plant trip</li> </ul> <p><b>BOP/RO</b></p> <ul style="list-style-type: none"> <li>• Performs actions as directed.</li> </ul> <p><b>SRO</b></p> <ul style="list-style-type: none"> <li>• Implements EOP-2, Faulted Steam Generator Isolation</li> </ul> <p><b>Crew</b></p> <p><u>EOP-2, Faulted Steam Generator Isolation</u></p> <ol style="list-style-type: none"> <li>1. Check main steam isolation (<b>RO</b>)</li> <li>2. Check if any S/G is not faulted (<b>RO</b>)</li> <li>3. Identify faulted S/G (<b>RO</b>)</li> <li>4. <b>(CT-17)</b> Isolate faulted S/G (<b>RO</b>)             <ol style="list-style-type: none"> <li>a. Ensure feedwater isolation valve is – SHUT, 1CS-3124</li> <li>b. Ensure MDAFW valve – SHUT, 1AF-4074A</li> <li>c. Ensure TDAFW valve – SHUT, 1AF-4001</li> <li>d. Ensure SSG supply valve – SHUT, AF-4023</li> <li>e. Isolate flow from faulted S/G:                 <ol style="list-style-type: none"> <li>1) Ensure atmospheric steam dump – SHUT, 1MS-2016</li> <li>2) <b>Shut steam supply to turbine-driven AFW pump: 1MS-2020</b></li> <li>3) <b>Ensure S/G blowdown isolation valves – SHUT: 1MS-5958, 1MS-2042</b></li> <li>4) <b>Locally shut 1P-29 AFP/Radwaste steam isolation: 1MS-235</b></li> <li>5) <b>Locally shut main steam trap isolation: 1MS-228</b></li> </ol> </li> </ol> </li> <li>5. Check CST level – GREATER THAN 4 ft (<b>RO</b>)</li> <li>6. Check secondary radiation (<b>RO</b>)</li> <li>7. Go to EOP-1, Loss of Primary or Secondary Coolant (<b>SRO</b>)</li> </ol> |

CT-17 action

| Event # 5               | Faulted 'A' Steam Generator   |
|-------------------------|---|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• PAB AO: When directed to locally shut 1MS-235, AFP/Radwaste steam isolation, and 1MS-228, main steam trap isolation, then insert <b>Trigger 11</b>, wait two minutes and report the valves are shut.</li> <li>• Respond to reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     |   |

| Event # 6               | Containment Spray Fails to Actuate   |
|-------------------------|--|
| <b>ACTION</b>           | Booth: None  |
| <b>STUDENT RESPONSE</b> | <p><b>Symptoms and indications:</b></p> <ul style="list-style-type: none"> <li>• Containment Pressure rising rapidly to &gt;25 psig (Containment Spray setpoint)</li> <li>• SI and Containment Isolation actuation</li> <li>• NO Unit 1 Containment Spray actuation alarm C01B 2-6</li> <li>• NO response by Unit Containment Spray System</li> </ul> <p>BOP performs EOP-0, Attachment A, Automatic Action Verification (<b>BOP</b>)</p> <p>A1 – Verify feedwater isolation<br/> A2 – Verify containment isolation<br/> A3 – Verify ECCS Pumps RUNNING <ul style="list-style-type: none"> <li>a. SI pumps – BOTH RUNNING</li> <li>b. RHR Pumps – BOTH RUNNING</li> </ul> A4 – Verify service water pumps running<br/> A5 – Verify containment accident cooling units RUNNING<br/> A6 – Verify component cooling water pumps – ONLY ONE RUNNING<br/> A7 – Check if main steam lines can remain open<br/> A8 – <b>(CT-3)</b> Verify containment spray not required <ul style="list-style-type: none"> <li>a. Containment pressure recorder – HAS REMAINED LESS THAN 25 psig<br/> RNO: Perform the following: <ol style="list-style-type: none"> <li>1) Check containment spray actuated: annunciator C01 B 2-6, CONTAINMENT SPRAY, lit<br/> IF containment spray has not actuated, <b>THEN manually actuate containment spray.</b></li> </ol> </li> </ul> A9 – Verify ECCS Flow<br/> A10 – Verify AFW valve alignment – PROPER EMERGENCY ALIGNMENT<br/> A11 – Verify proper ECCS valve alignment<br/> A12 – Check containment spray NOT ACTUATED<br/> RNO: Check containment spray alignment: <ol style="list-style-type: none"> <li>1. Ensure all containment spray pump discharge valves are open</li> <li>2. Ensure at least one containment spray pump is running</li> <li>3. <b>IF two containment spray pumps are running, THEN place one containment spray pump in pull-out</b><br/> <i>Takes one of 1P-14A/B, Containment Spray pump to pullout</i></li> <li>4. WHEN containment spray has been actuated for GREATER THAN two minutes, THEN ensure spray additive eductor suction valve is open on the running train</li> </ol> A13 – Stop any boration via the blender in progress<br/> A14 – Ensure the Auxiliary building filter/exhaust fans – OPERATING<br/> A15 – Notify the STA to IMPLEMENT Status trees, Notify the SM of any equipment malfunctions previously noted.<br/> A16 – Verify Service Water system alignment<br/> A17 – Check miscellaneous valves – SHUT<br/> A18 – Check Control Room ventilation</p> |

CT-3 action

| Event # 6                      | Containment Spray Fails to Actuate  |
|--------------------------------|---|
|                                | <p>A19 – Check cable spreading room ventilation system – OPERATING<br/>           A20 – Check Computer Room ventilation system – OPERATING<br/>           A21 – Check AFW recirc fans – ONE RUNNING<br/>           A22 – Check Circ Water Pump House temperature less than 105°F<br/>           A23 – Check G03/G04 switchgear room temperature less than 95°F<br/>           A24 – Periodically check status of spent fuel cooling.</p>  |
| <p><b>STUDENT RESPONSE</b></p> | <p><u>EOP-1, Loss of Primary or Secondary Coolant:</u></p> <ol style="list-style-type: none"> <li>1. Check if RCPs should be stopped (<b>RO</b>)             <ol style="list-style-type: none"> <li>a. RCPs – ANY RUNNING; RNO: Go to Step 2 (<b>SRO</b>)</li> </ol> </li> <li>2. Check if S/Gs are NOT faulted (<b>BOP</b>)</li> <li>3. Check intact S/G level (<b>BOP</b>)             <ol style="list-style-type: none"> <li>a. S/G Level – Greater than [52%] 33%: RNO: Maintain total feed flow greater than 275 gpm until level is greater than [52%] 33% in at least one S/G.<br/> <i>Control feed to B S/G based on level using 1FIC-4074B, 1P-53 AFP to 1HX-1B FCV and 1AF-4000, 1P29 AFP Disch SG B Inlet MOV</i></li> </ol> </li> <li>4. Check secondary radiation (<b>BOP</b>)</li> <li>5. Check PORVs and Block valves (<b>RO</b>)</li> <li>6. <b>Reset SI (BOP)</b></li> <li>7. <b>Reset isolation and lockout signals (BOP)</b> <ul style="list-style-type: none"> <li>• <b>Containment isolation</b></li> <li>• <b>1B03 and 1B04 non-safeguards equipment lockouts</b></li> </ul> </li> <li>8. Establish Instrument Air to containment (<b>BOP</b>)             <ol style="list-style-type: none"> <li>a. Check instrument air header pressure – GREATER THAN 80 PSIG</li> <li>b. <b>Open instrument air containment isolation valves one at a time:</b> <ul style="list-style-type: none"> <li>• <b>IA 3047</b></li> <li>• <b>IA-3048</b></li> </ul> </li> </ol> </li> <li>9. Check power supply to charging pumps (<b>BOP</b>)</li> <li>10. Check if charging flow has been established (<b>RO</b>)</li> <li>11. Check if ECCS flow should be terminated<br/> <i>Evaluator Note: Step 11 is the same as Foldout Page #2</i> <ol style="list-style-type: none"> <li>a. RCS subcooling based on core exit thermocouples – GREATER THAN [62°F] 37°F (<b>RO</b>)</li> <li>b. Secondary heat sink: (<b>BOP</b>)               <ul style="list-style-type: none"> <li>o Level in at least one S/G – GREATER THAN [52%] 33%<br/>OR</li> <li>o Total feed flow to intact S/G – GREATER THAN OR EQUAL TO 275 GPM</li> </ul> </li> <li>c. RCS Pressure (<b>RO</b>)               <ul style="list-style-type: none"> <li>• Pressure – GREATER THAN [1850 psig] 1725 psig<br/>AND</li> <li>• Pressure – STABLE OR RISING</li> </ul> </li> <li>d. PZR Level – GREATER THAN [26%] 11% (<b>RO</b>)</li> <li>e. Go to EOP-1.1, SI Termination (<b>SRO</b>)</li> </ol> </li> </ol> |

| Event # 6 | Containment Spray Fails to Actuate  |
|-----------|---|
|           | <p><u>EOP-1.1, SI Termination</u></p> <p><i>Evaluator Note: Foldout Page #5 may apply upon entry to EOP-1.1.</i></p> <p>Foldout Page #5: <b>IF RCS hot leg temperatures are not stable, THEN control steam dump and total feed flow as necessary to stabilize RCS hot leg temperatures. (BOP)</b></p> <p><i>RCS temperature stabilized using B S/G feed flow and 1HC-478, SG B Atmos Steam Dump Controller</i></p> <ol style="list-style-type: none"> <li>1. Reset SI <b>(BOP)</b></li> <li>2. Reset isolation and lockout signals <b>(BOP)</b> <ul style="list-style-type: none"> <li>• Containment isolation</li> <li>• 1B03 and 1B04 non-safeguards equipment lockouts</li> </ul> </li> <li>3. Establish Instrument Air to containment <b>(BOP)</b> <ol style="list-style-type: none"> <li>c. Check instrument air header pressure – GREATER THAN 80 PSIG</li> <li>d. Open instrument air containment isolation valves one at a time: <ul style="list-style-type: none"> <li>• IA 3047</li> <li>• IA-3048</li> </ul> </li> </ol> </li> <li>4. Check if charging flow has been established <b>(RO)</b></li> <li>5. Stop ECCS pumps and place in standby: <b>(BOP)</b> <ol style="list-style-type: none"> <li>a. <b>Stop both SI pumps and place in auto</b></li> <li>b. RHR pumps – ANY RUNNING WITH SUCTION ALIGNED TO RWST</li> <li>c. <b>Stop both RHR pumps and place in auto</b></li> </ol> </li> <li>6. Verify SI flow not required <b>(RO)</b></li> <li>7. Check if containment spray should be stopped <b>(BOP)</b> <ol style="list-style-type: none"> <li>a. Containment spray pumps – ANY RUNNING</li> <li>b. Containment pressure – LESS THAN 20 psig</li> <li>c. <b>Reset containment spray signal</b></li> <li>d. Ensure containment spray pump RWST suction MOVs - OPEN</li> <li>e. <b>Stop both containment spray pumps and place in auto</b></li> <li>f. <b>Shut containment spray pump discharge valve and place in auto-after-shut position</b><br/><i>Shuts 1SI-860A/B/C/D, Containment Spray Pump flow MOVs, and places control switch in Auto</i></li> <li>g. <b>Ensure both spray additive eductor suction valves – SHUT</b><br/><i>Places 1YIC-926A/B, Spray Add Eductor Suct Flow controller in manual and shuts valve</i></li> </ol> </li> </ol> |

| Event # 6               | Containment Spray Fails to Actuate   |
|-------------------------|--|
| <p><b>ROLE PLAY</b></p> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>• EOP-0, Att A communications:               <ul style="list-style-type: none"> <li>○ PAB AO: When directed to check rad waste service water valves SHUT at C-180, report the TV-LW61 and TV-LW62 are both SHUT</li> <li>○ TH AO: When directed to check Circ Water Pump House temperature, wait 1 minute and report 76°F and stable.</li> <li>○ TH AO: When directed to check G03/G04 switchgear room temperature, wait 1 minute and report 80°F and stable.</li> </ul> </li> <li>• Respond to other reports or direction to field operators as necessary.</li> </ul> <p><b><u>SM Communications:</u></b></p> <ul style="list-style-type: none"> <li>• Respond to reports from crew members as required.</li> </ul> |
| <p><b>NOTES</b></p>     |  |

|                     | Scenario Termination  |
|---------------------|---|
|                     | <p>Terminate the scenario when crew has completed through Step 7 of EOP-1.1, SI Termination, or per Lead Evaluator.</p>   |
| <p><b>NOTES</b></p> | <ul style="list-style-type: none"> <li>• Freeze the simulator</li> <li>• Determine if the NRC has any follow up questions</li> <li>• <b>Save SBT Data (see sim setup instructions)</b></li> </ul> |

## QUANTITATIVE ATTRIBUTES

### **Malfunctions:**

*Before EOP Entry:*

- 1CV-200A inadvertently shuts
- Inadvertent turbine trip
- 1P-11A CCW Pump failure
- Two dropped rods

*After EOP Entry:*

- Containment spray fails to auto actuate

### **Abnormal Events:**

- CVCS Malfunction
- Turbine Trip Without Reactor Trip
- Dropped Rod
- Seismic Event

### **Major Transients:**

- Faulted Steam Generator

### **Critical Tasks:**

|    |       |                                      |
|----|-------|--------------------------------------|
| 1. | CT-3  | Manually actuate containment cooling |
| 2. | CT-17 | Isolate faulted S/G                  |

### **Major Procedures:**

AOP-1D ⇒ AOP-25 ⇒ AOP-9B ⇒ AOP-28 ⇒ AOP-6A ⇒ EOP-0 ⇒ EOP-2 ⇒ EOP-1 ⇒ EOP-1.1



CT-3

Manually actuate containment cooling

**Critical Task:**

Manually actuate at least one train of containment cooling before an extreme (RED path) challenge develops to the containment CSF.

**Plant Conditions:**

Containment cooling is required but the minimum required complement of containment cooling equipment is not automatically actuated

- The minimum required complement of containment cooling equipment can be manually actuated from the control room

**Cues:**

- Indication and/or annunciation that containment cooling is required
- Indication and/or annunciation that the minimum required complement of containment cooling equipment is not actuated

**Performance Indicator:**

- Manipulation of controls as required to actuate containment cooling equipment

**Feedback:**

Indication and/or annunciation that at least one train of containment cooling equipment is actuated

**Basis:**

SAFETY SIGNIFICANCE -- Failure to manually actuate the minimum required complement of containment cooling equipment under the postulated conditions demonstrates the inability of the crew to “recognize a failure or an incorrect automatic actuation of an ESF system or component.” that can be manually actuated from the control room. Therefore, failure to manually actuate containment cooling equipment also represents a failure by the crew to demonstrate the ability to “effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) ... capacity).” Additionally, under the postulated plant conditions, failure to manually actuate containment cooling equipment when it is possible to do so results in a failure to prevent “a significant reduction of safety margin beyond that irreparably introduced by the scenario.”

|              |                                 |
|--------------|---------------------------------|
| <b>CT-17</b> | Isolate faulted steam generator |
|--------------|---------------------------------|

**Plant Conditions:**

Faulted Steam Generator

**Cues:**

Indication and/or annunciation that both the following are occurring:

- Steam pressure and flow rate indications that make it possible to identify a single SG as faulted
- AND
- Valve position and flow rate indication that AFW continues to be delivered to the faulted SG

**Performance Indicator:**

Manipulation of controls as required isolating the faulted SG

- MSIVs indicate closed
- Indication of feedline isolation
  - Feedwater control valves indicate closed
  - Feedline isolation valves indicate closed
  - Main feed pumps indicate tripped
- Indication that AFW flow to the faulted SG is stopped
  - AFW flow control valves for faulted SG indicate closed

**Feedback:**

- Any depressurization of intact SGs stops
- Steam flow indication from faulted SG decreases to zero
- RCS cooldown stops
- Main feedwater flow rate indication of zero
- AFW flow rate indication to faulted SG of zero

**Basis:**

SAFETY SIGNIFICANCE - Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon plant conditions, it could constitute a failure by the crew to "demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component."

Failure to isolate a faulted SG can result in challenges to the following CSFs:

- Integrity
- Subcriticality

### Booth Summary

|                  |  |
|------------------|--|
| <b>Event #1</b>  | <b>Inadvertent Letdown Isolation</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 1</b> per Lead Evaluator   |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>Respond to reports or direction to field operators as necessary.</li> </ul> |

|                  |  |
|------------------|--|
| <b>Event #2</b>  | <b>Inadvertent Turbine Trip Without Reactor Trip</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 3</b> per Lead Evaluator   |
| <b>Role Play</b> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>TH AO: If AOs are dispatched to investigate the cause of the turbine trip, wait 3 minutes and report that there is no apparent cause.</li> <li>Respond to other reports or direction to field operators as necessary.</li> </ul> |

|                  |  |
|------------------|--|
| <b>Event #3</b>  | <b>Seismic Event / 1P11A, CCW Pump Failure</b>   |
| <b>Action</b>    | <p><b>Booth:</b> Insert <b>TRIGGER 5</b> per Lead Evaluator</p> <p>Trigger 5 will open and run schedule file "NRC Seismic 1.sch." After all events have run, <b>CLOSE schedule file "NRC 4 Seismic 1.sch."</b> (<i>This is necessary for the next seismic event to run properly</i>)</p>   |
| <b>Role Play</b> | <p><b><u>Booth Communications:</u></b></p> <ul style="list-style-type: none"> <li>PAB AO: One minute after the seismic event, report that 1P-11A, CCW Pump is making an excessive noise and you recommend securing the pump.</li> <li>PAB AO: If asked, report pre-start check on 1P-11B, CCW pump, SAT</li> <li>PAB AO: After 1P-11B is started, report a SAT start on 1P-11B.</li> <li>Lead AO: If directed to perform plant walkdowns per AOP-28, Att A, wait 10 minutes and report that the only damage was the CCW Pump.</li> <li>Respond to other reports or direction to field operators as necessary.</li> </ul> |

|                  |  |
|------------------|--|
| <b>Event #4</b>  | <b>Multiple Dropped Rods (J4 and I3)</b>   |
| <b>Action</b>    | <b>Booth:</b> Check that schedule file "NRC 4 Seismic 1.sch" is CLOSED, Then Insert <b>TRIGGER 7</b> per Lead Evaluator  |
| <b>Role Play</b> | <ul style="list-style-type: none"> <li>Respond to other reports or direction to field operators as necessary.</li> </ul> |

|                  |  |
|------------------|--|
| <b>Event #5</b>  | <b>Faulted 'A' Steam Generator</b>   |
| <b>Action</b>    | <b>Booth:</b> Insert <b>TRIGGER 9</b> per Lead Evaluator<br>Insert <b>Trigger 11</b> per crew direction for local S/G isolations   |
| <b>Role Play</b> | <b><u>Booth Communications:</u></b> <ul style="list-style-type: none"> <li>• PAB AO: When directed to locally shut 1MS-235, AFP/Radwaste steam isolation, and 1MS-228, main steam trap isolation, then insert <b>Trigger 11</b>, wait two minutes and report the valves are shut.</li> <li>• Respond to other reports or direction to field operators as necessary.</li> </ul> |

|                  |   |
|------------------|---|
| <b>Event #6</b>  | <b>Containment Spray Fails to Actuate</b>   |
| <b>Action</b>    | <b>Booth:</b> None  |
| <b>Role Play</b> | <b><u>Booth Communications:</u></b> <ul style="list-style-type: none"> <li>• EOP-0, Att A communications: <ul style="list-style-type: none"> <li>○ PAB AO: When directed to check rad waste service water valves SHUT at C-180, report the TV-LW61 and TV-LW62 are both SHUT</li> <li>○ TH AO: When directed to check Circ Water Pump House temperature, wait 1 minute and report 76°F and stable.</li> <li>○ TH AO: When directed to check G03/G04 switchgear room temperature, wait 1 minute and report 80°F and stable.</li> </ul> </li> <li>• Respond to other reports or direction to field operators as necessary.</li> </ul> |

## SHIFT TURNOVER INFORMATION

### PLANT CONDITIONS:

|                              | <b>UNIT 1</b> |
|------------------------------|---------------|
| Time in core life (MWD/MTU): | 9500          |
| Reactor power (%):           | 47%           |
| Boron concentration (ppm):   | 1111 ppm      |
| Rod height, CBD @:           | 220           |

### TECHNICAL SPECIFICATION ACTION CONDITIONS IN EFFECT:

| <u>TSAC</u>  | <u>Description</u>         | <u>Required Action &amp; Completion Time</u> |
|--------------|----------------------------|--|
| U1 3.3.1.A/K | RPS one channel inoperable | Place channel in trip – 1 hour               |

### EQUIPMENT OUT OF SERVICE:

- G03 Emergency Diesel Generator for maintenance.
- 1LT-426 Pressurizer Level Transmitter.

### PLANNED EVOLUTIONS:

- Power ascension to 100%.

### TURNOVER INFORMATION:

- G04 Emergency Diesel Generator is aligned to both 1A06 and 2A06 4160 Safeguards Busses.
- On line risk is GREEN.
- Today is Tuesday, day shift.

**Pre-Scenario Procedure Checks**

| Procedure   | SRO                   |                       |
|---|-----------------------|-----------------------|
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| AOP-1D  |                       |                       |
| AOP-6A  |                       |                       |
| AOP-9B  |                       |                       |
| AOP-25  |                       |                       |
| AOP-28  |                       |                       |
| EOP-0   |                       |                       |
| EOP-1   |                       |                       |
| EOP-1.1   |                       |                       |
| EOP-2   |                       |                       |
|   |                       |                       |
|   |                       |                       |
|   |                       |                       |
| Specific ARP/ARBs to be second checked – All Others first checked |                       |                       |
|   | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| 1C20D 2-1   |                       |                       |
| 1C03 1E1 4-2  |                       |                       |
| 1C03 E1 4-3   |                       |                       |
| 1C03 D 1-4  |                       |                       |
| 1C03 D 1-5  |                       |                       |
|   |                       |                       |

**Post-Scenario Procedure Checks**

| Procedure                   | SRO                   |                       |
|-----------------------------|-----------------------|-----------------------|
|                             | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| AOP-1D                      |                       |                       |
| AOP-6A                      |                       |                       |
| AOP-9B                      |                       |                       |
| AOP-25                      |                       |                       |
| AOP-28                      |                       |                       |
| EOP-0                       |                       |                       |
| EOP-1                       |                       |                       |
| EOP-1.1                     |                       |                       |
| EOP-2                       |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
|                             |                       |                       |
| ARB's                       | 1 <sup>st</sup> Check | 2 <sup>nd</sup> Check |
| 1C20D 2-1                   |                       |                       |
| 1C03 1E1 4-2                |                       |                       |
| 1C03 1E1 4-3                |                       |                       |
| 1C03 D 1-4                  |                       |                       |
| 1C03 D 1-5                  |                       |                       |
|                             |                       |                       |
| RESET IC                    |                       | N/A                   |
| Booth Cleared Exam Material |                       |                       |
| Magnets Replaced            |                       |                       |