February 13, 2019

Kelly Clayton
NRC Chief Examiner
U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Blvd.
Arlington, TX 76011-4511

Callaway Plant, Unit 1
Facility Operating License No. NPF-30
Docket No. STN 50-483

Dear Mr. Clayton

Subject: Submittal of Integrated Initial License Training Class 19-1 Examination Materials

Enclosed you will find the examination materials, supporting the initial license exam scheduled for 3/4/2019 through 3/13/2019, at Callaway Station.

This submittal includes the Senior Reactor Operator and Reactor Operator Written Examinations, Job Performance Measures, and Integrated Plant Operation Scenario Guides.

These examination materials have been developed in accordance with NUREG-1021, "Operator Licensing Examination Standards," Revision 11.

In accordance with NUREG-1021, Revision 11, Section ES-201, please ensure that these materials are withheld from public disclosure until after the examinations are complete.

Should you have any questions concerning the examination materials, please contact Phil Swan (573)544-8102 or Mark Otten (573)544-8071.

Respectfully,

Mark Covey
Manager Operations - Support
Callaway Station

Enclosures:

- SRO Composite Examination
- Control Room Systems and Facility Walk-Through Job Performance Measures
- Administrative Topic Job Performance Measures
- Integrated Plant Operation Scenario Guides
- Simulator Scenario Quality Checklist (Form ES-301-4)
- Examination Security Agreements (Form ES-201-3)
- Record of Rejected K/As (Form ES-401-4)
- Updated Administrative Topics Outline(s) (Form ES-301-1)
- Updated Control Room/In-Plant Systems Outline (Form ES-301-2)
- Updated PWR Examination Outline (Forms ES-401-2)
- Updated Generic Knowledge and Abilities Outline (Tier 3) (Form ES-401-3)
- Updated Scenario Outlines (Form ES-D-1)
- Site-Specific SRO Written Examination Cover Sheet (Form ES-401-8)

Bcc: (without enclosures)
Operations Director – Callaway Station
Training Director – Callaway Station

Facility: Callaway Date of Examination: 3/4/19

Examination Level: RO ☐ SRO ☒ Operating Test Number: 2019-1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A1	R, N	2.1.40 (3.9) Knowledge of refueling administrative requirements. JPM: Review OSP-SF-00003 to determine if core alterations can begin
Conduct of Operations A2	R, N	2.1.18 (3.8) Ability to make accurate, clear, and concise logs, records, status boards, and reports. JPM: Determine Reportability for a deviation during severe weather
Equipment Control A3	R, N	2.2.17 (3.8) Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, and coordination with the transmission system operator. JPM: Review Work Week Schedule and determine Technical Specifications and risk mitigation strategies
Radiation Control A4	R, N	2.3.6 (3.6) Ability to approve release permits. JPM: Review CA0855 for accuracy and determine ODCM LCO limits will be exceeded
Emergency Plan A5	R, D	2.4.41 (4.6) Knowledge of the Emergency Action Level (EAL) thresholds and classification JPM: Classify Event and Complete Notification Form – Sentry Not Available

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes and Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs and RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1, randomly selected)

SRO Administrative JPMs:

SRO Admin #1 This is a NEW JPM. The SRO candidate will be required to review OSP-SF-00003 surveillance (Attachment 2 and 3) to determine if core alteration can begin. The candidate will determine that core alterations can not begin due to the configuration of CTMT Purge Gas Detectors, GTRE0022 and GTRE0033. Additionally, direct communications have not been established supporting core alterations.

SRO Admin #2 This is a NEW JPM. The SRO candidate will be required to determine the reportability for a deviation and implementation of 10CFR50.54 X&Y during a severe weather event. A 1 hour report is required to the NRC Operations Center.

SRO Admin #3 This is a NEW JPM. The SRO candidate will be required to review a work week schedule with 5 planned activities. Out of these activities, 1 will require Technical Specification 3.8.1 Condition B entry. Furthermore, the candidate will determine that the planned work activities cannot occur due to parallel work on the Security Diesel and the "A" EDG day tank.

SRO Admin #4 This is a NEW JPM. The SRO candidate will be required to find multiple errors on CA0855, Liquid / Gaseous Release Worksheet, concerning a 'B' Waste Gas Decay Tank Batch release. Additionally, the SRO candidate will determine that an ODCM Gaseous Effluent LCO will not be met if the Batch release is completed.

SRO Admin #5 This is a BANK JPM. This JPM has not been used on a previous ILT NRC Exam. This JPM is Time Critical and the candidate will have 15 minutes to classify an event based on the conditions given and then an additional 15 minutes (from the time of declaration) to complete EIP-ZZ-00102 Attachment 4, Notification Form – Sentry NOT Available. Sentry not available is a change from the original bank JPM and will allow the JPM to be given in a classroom setting

ES-301 **Control Room/In-Plant Systems Outline** **Form ES-301-2**

Facility: Callaway Date of Examination: 3/4/19

Exam Level: RO ☐ SRO-I ☒ SRO-U ☐ Operating Test Number: 2019-1

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U		
System/JPM Title	Type Code*	Safety Function
S1. 001 Rod Control / Raise power during plant startup and respond to a shutdown bank rod drop	M, S, L, A	1
S2. 004 CVCS (BG) / Swap From the NCP to 'B' CCP	M, S, A, P[1]	2
S3. 006 Emergency Core Cooling System / Raise Safety Injection Accumulator Level	M, S, EN	3
S4. 005 Residual Heat Removal / Borate the "A" train of RHR	D, S, EN	4P
S5. 028 Hydrogen Recombiner and Purge Control System / Place Containment Hydrogen Analyzer in service	D, S	5
S6. 015 Nuclear Instrument System / Perform a PR NI Gain Adjustment	M, S	7
S7. 060 Accidental Gas Release / Respond to area / process radiation alarms and manually align CRVIS	N, S, A	9
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
P1. 035 Main and Reheat Steam System (AB) / Isolate a Failed Open Atmospheric Steam Dump	A, D, E, R, P[1]	4S
P2. 004 Chemical and Volume Control System / Locally initiate Emergency Boration per FR-S.1	A, M, R	1
P3. 002 Reactor Coolant System / Swap Seal Injection Filters	D, R	2

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for R /SRO-I/SRO-U

(A)lternate path	4–6/4–6 /2–3
(C)ontrol room	
(D)irect from bank	≤ 9/≤ 8/≤ 4
(E)mergency or abnormal in-plant	≥ 1/≥ 1/≥ 1
(EN)gineered safety feature	≥ 1/≥ 1/≥ 1 (control room system)
(L)ow-Power/Shutdown	≥ 1/≥ 1/≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2/≥ 2/≥ 1
(P)revious 2 exams	≤ 3/≤ 3/≤ 2 (randomly selected)
(R)CA	≥ 1/≥ 1/≥ 1
(S)imulator	

Note 1. The JPMs from the 2016 exam were randomly selected by placing 11 slips of paper labeled “A” through “K” in a container. No JPMs from the 2017 NRC exam were available for random selection as those JPMs will be used as a part of 2019 Audit Exam.

Simulator JPMs

S1 This is an ALTERNATE PATH, MODIFIED bank JPM. The reactor is critical at 10E-8 amps and the applicant is directed to raise power to 1% per OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE. While moving Control Bank 'D' rods, a shutdown bank rod, N-7, drops fully into the core. The applicant will enter OTO-SF-00001 and Attachment A directs the reactor to be shutdown if less than 5% power. The applicant must begin the reactor shutdown. The Bank JPM, id#URO-SSF-03-C120J, is not an alternate path nor does it include the dropped rod and requirement to shutdown the reactor.

S2 This is an ALTERNATE PATH, MODIFIED bank JPM id#BG-RO-S-004(A). The original JPM was used on the 2016 Exam. The applicant will perform the actions of OTN-BG-00001, Addendum 1 to shift from the NCP to the B CCP. After the B CCP is started and during the transition from the NCP flow controller to the B CCP flow controller, the B CCP shaft will shear, requiring the applicant to restore charging flow. Upon completion of this JPM, the applicant will have restored charging flow to normal.

S3 This is a MODIFIED BANK JPM. The bank JPM id #EP-RO-S-001. The JPM has not been used on ILT NRC Exam since at least 2013. The applicant will have started 'B' SI Pump, raised SI Accumulator 'A' level to between 35% and 55%, and restored the Safety Injection System lineup.

S4 This is a BANK JPM. The bank JPM id #URO-SEJ-02-C023J. The JPM has not been used on ILT NRC Exam since at least 2013. The applicant will perform Boration of the "A" Train of RHR in preparation for being placed in service.

S5 This is a BANK JPM. The bank JPM id #EOP-RO-S-006 (previously id# URO-SGS01C29J). The JPM has not been used on ILT NRC Exam since at least

2013. Upon completion of this JPM, the applicant will have placed hydrogen analyzer 'A' in service.

S6 This is a MODIFIED bank JPM. The bank JPM id #SE-RO-S-003(A). The JPM has not been used on ILT NRC Exam since at least 2013. The applicant will be required to perform a PR NI gain adjustment per OSP-SE-00004 Attachment 1. This JPM was modified from an Alternate Path JPM by removing a malfunction which required additional actions to reset PR NI trips. This JPM is now a normal evolution/task (i.e not alternate path).

S7 This is an ALTERNATE PATH, NEW JPM. The applicant will be directed to respond to an area radiation alarm. In the process of responding, a separate set of process rad alarms will actuate and the Control Room Ventilation Isolation Signal (CRVIS) will fail to automatically actuate and will not actuate using the actuation pushbutton. Upon completion of this JPM, the applicant will have manually aligned either "A" or "B" train of CRVIS using component hand switches per an EFSAS abnormal procedure attachment.

In Plant JPMs

P1 This is an ALTERNATE PATH, BANK JPM. This JPM was used on the 2016 Exam and the Bank ID is AB-NLO-P-001(A). The applicant will be assigned the task of locally closing Atmospheric Steam Dumps, AB PV-1 AND AB PV-4. Upon completion of this JPM, the applicant will have closed AB PV-1 and isolated AB PV-4. AB PV-1 was closed by isolating Air/N2 from the valve. AB PV-4 was isolated by closing the manual isolation valve, ABV0007.

P2 This is an ALTERNATE PATH, MODIFIED BANK JPM. This is a Bank JPM id# URO-AEO-07-P024J (A). This JPM has not been used on an ILT NRC exam since at least 2013. The Bank JPM was alternate path based on starting conditions and control room actions. This JPM was modified to initially cue the RNO which is not alternate path but later steps are alternate path. The applicant will be directed to perform action in the plant to emergency borate per FR-S.1 Step #4 RNO. Once completed, the applicant will be required to trip the RTB and RTB Bypass breakers which wont work requiring an alternate path. The JPM will be complete when borate flow is established using BGV0177, alternate boration valve and the both Generator and Motor Circuit Control Breakers in Pull To Lock on panels SF103A&B.

P3 This is a BANK JPM. This is a Bank JPM id# BG-NLO-R-001. This JPM has not been used on an ILT NRC exam since at least 2013. The applicant will be directed to swap RCP Seal Injection filters per a normal procedure. The JPM will be complete when the 'B' CVCS seal water injection filter will have been placed in service and 'A' placed in standby.

ES-301	Control Room/In-Plant Systems Outline	Form ES-301-2

Facility: Callaway	Date of Examination: 3/4/19
Exam Level: RO ☐ SRO-I ☐ SRO-U ☒	Operating Test Number: 2019-1

Control Room Systems:* 8 for RO, 7 for SRO-I, and 2 or 3 for SRO-U		
System/JPM Title	Type Code*	Safety Function
S1. 001 Rod Control / Raise power during plant startup and respond to a shutdown bank rod drop	M, S, L, A	1
S3. 006 Emergency Core Cooling System / Raise Safety Injection Accumulator Level	M, S, EN	3
S7. 060 Accidental Gas Release / Respond to area / process radiation alarms and manually align CRVIS	N, S, A	9
In-Plant Systems:* 3 for RO, 3 for SRO-I, and 3 or 2 for SRO-U		
P1. 035 Main and Reheat Steam System (AB) / Isolate a Failed Open Atmospheric Steam Dump	A, D, E, R, P[1]	4S
P3. 002 Reactor Coolant System / Swap Seal Injection Filters	D, R	2

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions, all five SRO-U systems must serve different safety functions, and in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for R /SRO-I/SRO-U
(A)lternate path	4–6/4–6 /2–3
(C)ontrol room	
(D)irect from bank	≤ 9/≤ 8/≤ 4
(E)mergency or abnormal in-plant	≥ 1/≥ 1/≥ 1
(EN)gineered safety feature	≥ 1/≥ 1/≥ 1 (control room system)
(L)ow-Power/Shutdown	≥ 1/≥ 1/≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2/≥ 2/≥ 1
(P)revious 2 exams	≤ 3/≤ 3/≤ 2 (randomly selected)
(R)CA	≥ 1/≥ 1/≥ 1
(S)imulator	

Note 1. The JPMs from the 2016 exam were randomly selected by placing 11 slips of paper labeled “A” through “K” in a container. No JPMs from the 2017 NRC exam were available for random selection as those JPMs will be used as a part of 2019 Audit Exam.

Simulator JPMs

S1 This is an ALTERNATE PATH, MODIFIED bank JPM. The reactor is critical at 10E-8 amps and the applicant is directed to raise power to 1% per OTG-ZZ-

00003, Plant Startup Hot Zero Power to 30% Power – IPTE. While moving Control Bank 'D' rods, a shutdown bank rod, N-7, drops fully into the core. The applicant will enter OTO-SF-00001 and Attachment A directs the reactor to be shutdown if less than 5% power. The applicant must begin the reactor shutdown. The Bank JPM, id#URO-SSF-03-C120J, is not an alternate path nor does it include the dropped rod and requirement to shutdown the reactor.

S3 This is a MODIFIED BANK JPM. The bank JPM id #EP-RO-S-001. The JPM has not been used on ILT NRC Exam since at least 2013. The applicant will have started 'B' SI Pump, raised SI Accumulator 'A' level to between 35% and 55%, and restored the Safety Injection System lineup.

S7 This is an ALTERNATE PATH, NEW JPM. The applicant will be directed to respond to an area radiation alarm. In the process of responding, a separate set of process rad alarms will actuate and the Control Room Ventilation Isolation Signal (CRVIS) will fail to automatically actuate and will not actuate using the actuation pushbutton. Upon completion of this JPM, the applicant will have manually aligned either "A" or "B" train of CRVIS using component hand switches per an EFSAS abnormal procedure attachment.

In Plant JPMs

P1 This is an ALTERNATE PATH, BANK JPM. This JPM was used on the 2016 Exam and the Bank ID is AB-NLO-P-001(A). The applicant will be assigned the task of locally closing Atmospheric Steam Dumps, AB PV-1 AND AB PV-4. Upon completion of this JPM, the applicant will have closed AB PV-1 and isolated AB PV-4. AB PV-1 was closed by isolating Air/N2 from the valve. AB PV-4 was isolated by closing the manual isolation valve, ABV0007.

P3 This is a BANK JPM. This is a Bank JPM id# BG-NLO-R-001. This JPM has not been used on an ILT NRC exam since at least 2013. The applicant will be directed to swap RCP Seal Injection filters per a normal procedure. The JPM will be complete when the 'B' CVCS seal water injection filter will have been placed in service and 'A' placed in standby.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A1

JPM No:	No bank id yet-	KSA No:	Gen 2.1.40
Revision Date:	02/25/2019	KSA Rating:	3.9
Job Title:	SRO		
Duty:	Refuel		
Task Title:	Review OSP-SF-00003 to determine if Core Alterations can begin		
Completion Time:	20 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☒ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: OSP-SF-00003, Pre-Core Alterations Verifications, Rev 30

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A1

Initial Conditions: The Plant is MODE 6. You are an extra SRO on shift that will be the Fuel Handling Supervisor when core alterations start in 45 minutes. A Reactor Operator has completed the surveillance OSP-SF-00003 Section 6.3 "Prior to Core Alterations".

Applicable plant data is as follows:

- Per OSP-SF-00001, the required refueling boron concentration is 1900 ppm.
- Current RCS boron concentration 2050 ppm.
- Current Refueling Pool boron concentration is 2030 ppm.
- OSP-BL-00001, Unborated Water Source Isolation Valves/MODE 6, is current.
- The FIN team is troubleshooting a Gaitronics site wide outage.
- Source Range Nuclear Instruments N31 & N32 are Operable.
- N60 & N61, Gamma metric Nuclear Instruments, are NON-Functional due to an emergent Engineering issue.
- Refueling water level is 24ft above the top of the reactor vessel flange with "A" RHR Operable and in service with 3000 gpm flow.
- Refuel Building radio and cell phone repeater power fuses are blown.
- OSP-GT-00003 was just performed.
- Containment Personnel Airlock Doors and the Emergency Access Hatch Doors are CLOSED and will remain closed during core alterations.
- Containment Equipment Hatch is OPEN and will remain open during core alterations. Designated individuals are briefed and standing by to close it if necessary.
- Containment Purge is in service with GTRE0022 and GTRE0033, CTMT Purge EXH Gas Detector, in OPERATE.
- CRVIS plus GKRE04 and GKRE05 are Operable.
- OSP-GT-00004 is current.

Initiating Cues: The Shift Outage Manager (SOM) has directed you to review the completed OSP-SF-00003 surveillance, to ensure core alterations can start when scheduled. Report your results to the SOM.

Task Standard: The SRO applicant completed all critical steps correctly and determined that core alternations cannot proceed as scheduled because (both are required):

1. GTRE0022 and GTRE0033 are in Operate but should be in BYPASS (As the Equipment Hatch is OPEN with Purge in operation) per step 6.3.6.
2. Direct Communications are NOT established as required per step 6.3.10.

Start Time:_____

Stop Time:_____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A1

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OSP-SF-00003, , Pre Core Alterations Verifications	Provide the applicant with a the completed OSP-SF-00003, Pre Core Alterations Verifications	Applicant obtained surveillance procedure.	**S** **U** Comments:
*2	Determines GTRE0022 and GTRE033 are not in the correct configuration OSP-SF-00003 step 6.3.6	Note: If the applicant stops after determining only one reason core alteration can not begin, "Ask if there are addition reasons core alteration can not begin"	Applicant determined GTRE0022 and GTRE033 are in OPERATE but should be in BYPASS per step 6.3.6	**S** **U** Comments:
*3	Determines that direct communications have not been established are required before core alteration can begin OSP-SF-00003 step 6.3.10		Applicant determined direct communications between the control room and the refueling station are NOT yet established and are required to be established within 1 hour prior to start.	**S** **U** Comments:
4.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S** **U** Comments:

*Critical Step

Initial Conditions: The Plant is MODE 6. You are an extra SRO on shift that will be the Fuel Handling Supervisor when core alterations start in 45 minutes. A Reactor Operator has completed the surveillance OSP-SF-00003 Section 6.3 "Prior to Core Alterations".

Applicable plant data is as follows:

- Per OSP-SF-00001, the required refueling boron concentration is 1900 ppm.
- Current RCS boron concentration 2050 ppm.
- Current Refueling Pool boron concentration is 2030 ppm.
- OSP-BL-00001, Unborated Water Source Isolation Valves/MODE 6, is current.
- The FIN team is troubleshooting a Gaitronics site wide outage.
- Source Range Nuclear Instruments N31 & N32 are Operable.
- N60 & N61, Gamma metric Nuclear Instruments, are NON-Functional due to an emergent Engineering issue.
- Refueling water level is 24ft above the top of the reactor vessel flange with "A" RHR Operable and in service with 3000 gpm flow.
- Refuel Building radio and cell phone repeater power fuses are blown.
- OSP-GT-00003 was just performed.
- Containment Personnel Airlock Doors and the Emergency Access Hatch Doors are CLOSED and will remain closed during core alterations.
- Containment Equipment Hatch is OPEN and will remain open during core alterations. Designated individuals are briefed and standing by to close it if necessary.
- Containment Purge is in service with GTRE0022 and GTRE0033, CTMT Purge EXH Gas Detector, in OPERATE.
- CRVIS plus GKRE04 and GKRE05 are Operable.
- OSP-GT-00004 is current.

Initiating Cues: The Shift Outage Manager (SOM) has directed you to review the completed OSP-SF-00003 surveillance, to ensure core alterations can start when scheduled. Report your results to the SOM.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A2

JPM No:	Admin1-SRO-SO-003, Determine Reportability	KSA No:	Gen 2.1.18
Revision Date:	01/28/2019	KSA Rating:	3.8
Job Title:	SRO		
Duty:	Administrative		
Task Title:	Determine Reportability Requirements		
Completion Time:	20 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☒ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: APA-ZZ-00520, Reporting Requirements and Responsibilities, Rev 50
OTO-ZZ-00012, Severe Weather, Rev 39

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A2

Initial Conditions: Reactor Power is 100%.

OTO-ZZ-00012, Severe Weather, Attachment E, 'Tornado Warning for Callaway Plant' is in progress.

The Shift Manager has authorized a security staffing deviation due to the severe weather IAW 10 CFR50.54X&Y. This deviation is also a Technical Specification deviation.

The Shift Manager has reviewed EALS and none are applicable.

Initiating Cues: You are an extra SRO on shift performing Control Room observations. The Shift Manager has directed you to determine the initial reportability requirements for this event per APA-ZZ-00520, Reporting Requirements and Responsibilities.

Inform the Shift Manager of the shortest time requirement AND the agency(s) requiring notification.

Task Standard: The SRO applicant determined that a 1 hour report is required to be made to the NRC Operation Center and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A2

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of APA-ZZ-00520, REPORTING REQUIREMENTS AND RESPONSIBILITIES	Provide the applicant with a copy of APA-ZZ-00520, REPORTING REQUIREMENTS AND RESPONSIBILITIES	Applicant obtained correct procedure.	**S** **U** Comments:
*2	Determines a 1 hour report is required Attachment 1, Step 3.d OR Attachment 4 Sheet 1 OR Attachment 2 Sheet 9 OR Attachment 3 sheet 16		Applicant determined a 1 hour report is needed per Step #3d	**S** **U** Comments:
*3	Determines the NRC Operations Center is the agency required to be notified. Attachment 1, Step 3.d OR Attachment 4 Sheet 1		Applicant determined the NRC Operations Center (NRC OD) is the agency required to be notified. (Step 3.d.1 on Attachment 1 OR Attachment 4 Sheet 1)	**S** **U** Comments:
4.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S** **U** Comments:

*Critical Step

Initial Conditions: Reactor Power is 100%.

OTO-ZZ-00012, Severe Weather, Attachment E, 'Tornado Warning for Callaway Plant' is in progress.

The Shift Manager has authorized a security staffing deviation due to the severe weather IAW 10 CFR50.54X&Y. This deviation is also a Technical Specification deviation.

The Shift Manager has reviewed EALS and none are applicable.

Initiating Cues: You are an extra SRO on shift performing Control Room observations. The Shift Manager has directed you to determine the initial reportability requirements for this event per APA-ZZ-00520, Reporting Requirements and Responsibilities.

Inform the Shift Manager of the shortest time requirement AND the agency(s) requiring notification.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A3

JPM No:	Admin2-SRO-SO-001, Review Work Week Schedule and determine Technical Specifications and risk mitigation strategies	KSA No:	Gen 2.2.17
Revision Date:	01/25/2019	KSA Rating:	3.8
Job Title:	SRO		
Duty:	Administrative		
Task Title:	Assess Plant Risk		
Completion Time:	20 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☒ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: ODP-ZZ-00002, Appendix 2 Risk Management Actions for Planned Risk Significant Activities, Rev 15
EDP-ZZ-01129, Callaway Energy Center Risk Assessment, Rev 47
Technical Specifications 3.8.1, AC Sources Operating, and it basis

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A3

Initial Conditions: Reactor Power is projected to be 100%.

Your upcoming "A" Train work week schedule is as follows:

Task / Scope	Estimated Start	Estimated Finish
Security Diesel – WPA required for engine rebuild with piston replacement	Monday @0700	Thursday @1200
"A" CCW pump – WPA required for clean and inspect	Monday @0700	Tuesday @1500
"C" Air Compressor – WPA required for clean and inspect compressor and dryer inspection	Tuesday @0700	Wednesday @1500
"A" EDG day tank – WPA required to drain tank for drain valve replacement	Wednesday @0700	Wednesday @1500
"A" Intake Pump – WPA required for bay inspection	Thursday @0700	Friday @1500

Initiating Cues: The Shift Manager has directed you to review your upcoming work week schedule to determine the Technical Specifications, if any, that will be entered during the week.

Additionally, determine risk management actions / requirements / limitations / conflicts, if any, per ODP-ZZ-00002 Appendix 2.

Inform the Shift Manager of the results of your review by writing the results below.

Task Standard: The SRO applicant should determine that T.S. 3.8.1 Condition B is not met due to the "A" EDG day tank work. Furthermore, the parallel work on the "A" EDG day tank and the Security Diesel is not allowed per ODP-ZZ-00002, Appendix 2, Risk Management Actions for planned Risk Significant Activities. The applicant completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A3

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*1.	Determines "A" EDG will be Inoperable.	**Note:** T.S. 3.8.3 DG fuel oil is not applicable. Also T.S. 3.7.7 is not applicable as 1 "A" Train CCW pump will still be operable with only 1 being required.	Applicant determined that due to the day tank work the "A" EDG will be inoperable and T.S. LCO 3.8.1 Condition B is not met.	**S** **U** Comments:
*2.	Determines Risk Mitigation Activities		Applicant determined that the actions of Section 3.0 and Step 2.2 are applicable and due to the fact that "A" EDG and the Security Diesel are scheduled to happen in parallel which is NOT allowed per ODP-ZZ-00002 Appendix 2.	**S** **U** Comments:
3.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S** **U** Comments:

*Critical Step

Initial Conditions: Reactor Power is projected to be 100%.

Your upcoming "A" Train work week schedule is as follows:

Task / Scope	Estimated Start	Estimated Finish
Security Diesel – WPA required for engine rebuild with piston replacement	Monday @0700	Thursday @1200
"A" CCW pump – WPA required for clean and inspect	Monday @0700	Tuesday @1500
"C" Air Compressor – WPA required for clean and inspect compressor and dryer inspection	Tuesday @0700	Wednesday @1500
"A" EDG day tank – WPA required to drain tank for drain valve replacement	Wednesday @0700	Wednesday @1500
"A" Intake Pump – WPA required for bay inspection	Thursday @0700	Friday @1500

Initiating Cues: The Shift Manager has directed you to review your upcoming work week schedule to determine the Technical Specifications, if any, that will be entered during the week.

Additionally, determine risk management actions / requirements / limitations / conflicts, if any, per ODP-ZZ-00002 Appendix 2.

Inform the Shift Manager of the results of your review by writing the results below.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A4

JPM No:	Admin3-SRO-SO-001, Review CA0855 for accuracy and determine ODCM LCO will be not met if WGDT release is completed	KSA No:	Gen 2.3.6
Revision Date:	01/28/2019	KSA Rating:	3.8
Job Title:	SRO		
Duty:	Administrative		
Task Title:	Determine Technical Specifications/TRM/ODCM		
Completion Time:	25 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☒ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: TRM 16.11.2.2 (ODCM 9.7.1)
HTP-ZZ-02014, Release permit processing using the EMS Application Software, Rev 59
CA0855 Liquid / Gaseous Release Worksheet, Rev 0
Offsite Dose Calculation Manual, ODCM, Rev 6/18

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A4

Initial Conditions: Reactor Power is 100%.

Due to an emergent issue, the 'B' Waste Gas Decay Tank (WGDT) is required to be fully discharged. There is limited Rad/Chem Technician support. Applicable plant data is as follows:

- Permit #19-050
- Initial 'B' WGDT Pressure is 150 psig
- Calculated start and stop time are Today @ 0900 and 1030 respectively
- Effluent monitor Background is 1uCi/ml
- Only the GSP Noble gas file will be used and the File name is: File #01
- No specific values have been adjusted as directed by RP supervision

RP has provided the following release data (due to noble gases):

- Dose from this release at the SITE Boundary: 3 mrads gamma and 5 mrads beta.
- Dose from previous releases at the SITE Boundary this calendar quarter: 1 mrad gamma and 0 mrad beta
- Dose from previous releases at the SITE Boundary this calendar year: 8 mrads gamma and 7 mrad beta

Initiating Cues: You are an extra SRO on shift. The Shift Manager has directed you to review the CA0855 for accuracy per HTP-ZZ-02014 step 6.4.1.

Review the estimated Dose projection for compliance with the FSAR (Technical Requirements Manual)

Inform the Shift Manager of the results of your CA0855 review and if all Gaseous Effluent parameters will be within allowed limits.

Task Standard: The SRO applicant determined that there were 2 errors on the CA0855: waste flowrate and Eff Monitor background radiation reading. Additionally, the applicant determined that TRM 16.11.2.2 (ODCM 9.7.1) is NOT met as this upcoming release will exceed the gamma dose at the SITE BOUNDARY for the calendar year and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*1.	Determines multiple errors were made on the CA0855 – SEE KEY for ERRORS.		Applicant determined that the following errors were made on the CA0855: • Waste Flowrate should 5 cfm per Attachment 1 • Eff Monitor Background should be 1uCi/ml not 10 uCi/ml	**S** **U** Comments:
*2.	Determines TRM 16.11.2.2 (ODCM 9.7.1) LCO will not be met.	.	Applicant determined that TRM 16.11.2.2 (ODCM 9.7.1) will be exceeded (LCO not met) based on the current calendar year gamma dose exceeding 10 mrads.	**S** **U** Comments:
3.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S** **U** Comments:

*Critical Step

Initial Conditions: Reactor Power is 100%.

Due to an emergent issue, the 'B' Waste Gas Decay Tank (WGDT) is required to be fully discharged. There is limited Rad/Chem Technician support. Applicable plant data is as follows:

- Permit #19-050
- Initial 'B' WGDT Pressure is 150 psig
- Calculated start and stop time are Today @ 0900 and 1030 respectively
- Effluent monitor Background is 1uCi/ml
- Only the GSP Noble gas file will be used and the File name is: File #01
- No specific values have been adjusted as directed by RP supervision

RP has provided the following release data (due to noble gases):

- Dose from this release at the SITE Boundary: 3 mrads gamma and 5 mrads beta.
- Dose from previous releases at the SITE Boundary this calendar quarter: 1 mrad gamma and 0 mrad beta
- Dose from previous releases at the SITE Boundary this calendar year: 8 mrads gamma and 7 mrad beta

Initiating Cues: You are an extra SRO on shift. The Shift Manager has directed you to review the CA0855 for accuracy per HTP-ZZ-02014 step 6.4.1.

Review the estimated Dose projection for compliance with the FSAR (Technical Requirements Manual)

Inform the Shift Manager of the results of your CA0855 review and if all Gaseous Effluent parameters will be within allowed limits.

A4 KEY

Liquid / Gaseous Release Worksheet

Release Permit Number: L / G 19-050

Release Sample Point:

___	RP #05	S/G Blowdown Surge Tank'	___ RP #11A	Containment Vent
___	RP #09	Discharge Monitor Tank 'A'	___ RP #11B	Containment Mini-Purge
___	RP #10	Discharge Monitor Tank 'B'	___ RP #11C	Containment S/D Purge
			___ RP #12	Aux/Fuel Building Vent
___	UR #03	Aux Boiler	___ RP #13	Radwaste Building Vent
			X RP #14	Waste Gas Decay Tank (Circle one)
				A (B) C D E F G H
			___ RP #15	Laundry Decon. Facility

Chemistry Data[1]:

N_2H_4	N/A

Release Data:	**OPEN**	**UPDATE**	**CLOSURE**
Sample or Filter Change Date and time	TODAY / 0630		
Sampled by (Initials/ PIN)	RPT / 12678		
Waste Volume (GAL or CF or ΔP)	150 psi		
Waste Flowrate (GPM or CFM)[2]	25 cfm	should be	5 cfm
Dilution Flowrate (GPM or CFM)[2]	0		
Eff. Monitor Background (μCi/unit)	10 μCi/ml	should be	1 μCi/ml
GSP Configuration Files			
Liquid			
Noble Gas	File #01		
Particulate			
Iodine			
Release Start Date and time[3]	TODAY / 0900		
Release Stop Date and time[3]	TODAY / 1030		
Release Permit Version Number	**Always Zero (0)**		

Notes

A4 KEY

[1] To be completed by Rad/Chem Technician (Chemistry).
[2] Enter only if different from data base default.
[3] To be completed by Rad/Chem Technician (Count Room)

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A5

JPM No:	Admin4-SRO- S&O-002(TC)	KSA No:	Gen 2.4.41
Revision Date:	03/11/2019	KSA Rating:	4.6
Job Title:	SRO		
Duty:	RERP Implementation		
Task Title:	Emergency Event Classification		
Completion Time:	≤ 30 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☐ Simulator/Lab ☐ Plant ☒ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☒ Time Critical ☐ RCA

References:
EIP-ZZ-00101, Classification Of Emergencies, Rev 55
EIP-ZZ-00101, Addendum 1, Emergency Action Level Classification Matrix, Rev 8
EIP-ZZ-00102, Emergency Implementing Actions, Rev 64
EIP-ZZ-00212, Protective Action Recommendations, Rev 30
CA3255, Sentry – "Release Status" Decision Tree, Rev 0

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A5

Initial Conditions: The Plant was at 100% and has been on line for 15 days following a refuel outage when:

- PZR level and pressure begin lowering.
- The Crew entered OTO-BB-00003, RCS Excessive Leakage.
- The RO stabilized PZR level and then estimated the leakage at 40 gpm.
- Sentry is NOT Available.
- CTMT NORM SUMP LEV on LF-LI-9 is 63” and rising.
- GT-RE-21B, Unit Vent Monitor, is reading 4.8 E^{+2} µCi/cc.
- GT-RE-21B's Hi Hi Alarm setpoint is 3.0 E^{+4} µCi/cc.
- Wind Speed is 5 mph from 270° (due west).
- Currently, the crew is continuing to reduce power per OTO-BB-00003.

Initiating Cues: You're an extra SRO on shift and have been provided the EIP-ZZ-00101, EIP-ZZ-00102, EIP-ZZ-00212 and CA3255. Determine the Emergency Event Classification and complete EIP-ZZ-00102 Attachment 4, Notification Form – Sentry NOT Available within the required time limits.

This JPM is TIME CRITICAL.

Simulator Set up and/or Note(s): None

Task Standard: Upon completion of the JPM, the applicant should determine an Unusual Event, SU 5.1, Unidentified or pressure boundary leakage > 10 gpm, within 15 minutes of start. The applicant will then complete EIP-ZZ-00102 Attachment 4, Notification Form – Sentry NOT Available, within 15 minutes of the event classification time. Total time shall not exceed 30 minutes but the second 15 minute clock started at the EAL classification time and completes all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

A5

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of EIP-ZZ-00101, Classification of Emergencies, ADD 1 Wall Chart, and combined EAL attachments		Applicant obtained procedure copies	**S U** Comments:
*2.	Using the given conditions and Addendum 1, determine the appropriate emergency classification	NOTE: If after the declaration, the applicant begins to make a crew update or call security etc (EIP-ZZ-00102 EC flowchart actions), respond **"Another SRO will take care of the EC flowchart actions, complete Attachment 4"**	Applicant declared a Unusual Event based on EAL SU5.1 within 15 minutes T1 – T0 ≤ 15 minutes	**S U** Comments: Time of Declaration _____T1 (Start of new 15 min clock)
*3.	Complete EIP-ZZ-00102 Attachment 4 – Notification Form – Sentry NOT Available.	See KEY for correct answers. Note: Items in red text on KEY are critical	Applicant completed Attachment 4, Notification Form – Sentry NOT Available, within 15 minutes of completing the EAL classification T2 – T1 ≤ 15 minutes	**S U** Comments: Time Notification Sent _____T2 (Completion time of 2nd 15 min clock)
4.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments

*Critical Step

Attachment 4
Notification Form - Sentry NOT Available

Sheet 1 of 1

☒Initial Message / ☐Follow-up Message

01.DRILL: ☒Yes / ☐No	
*** 02.Emergency Classification:** ☒Unusual Event / ☐Alert / ☐Site Emergency / ☐General Emergency / ☐Drill Termination / ☐Event Closeout / ☐Plant Recovery	
*** 03.Emergency Declared Date/Time:** # / # *(Time first declaration was made for current EAL level.)*	
*** 04.Emergency Action Level (EAL): SU5.1**	
05. Emergency Action Level Description: RCS unidentified or pressure boundary leakage >10 gpm for ≥ 15 minutes	
***06.Reactor Status:** ☐Operating ☒Reducing Power ☐Shut Down	
-Release Status-	
***08.Release Information:** ☒Release evaluation is in progress There ☐IS / ☐is NO Release above normal operating limits (0.1 mr/hr at EAB)	
09. Liquid Release: ☐Yes or ☐No *(Yes only if EAL RU1.2 and/or RA1.2 is declared)*	
10. Release Start Time:	
11. Release Duration Hours:	
***12.Wind Direction (from): 270°**	
***14.Affected Sectors: D,E,F**	
***15.Wind Speed: 5 miles per hour**	
16. Plume Arrival at 2 Miles:	
17. Plume Arrival at 5 Miles:	
18. Plume Arrival at 10 Miles:	
-Protective Actions-	-Projected Doses-
***19.Protective Actions Required (PAR):** ☐Yes / ☒No	31. Proj. Dose Basis: ☐Effluent Monitors / ☐Field Team
20. Protective Action Basis: ☐Effluent Monitor ☐Field Team ☐Plant Conditions	32. TEDE (mRem) - EAB:
21. PAR 1 Type: ☐Evacuate / ☐Shelter / ☐None / ☐Other	33. TEDE (mRem) - 2 Miles:
22. PAR 1 Location: 2 miles	34. TEDE (mRem) - 5 Miles:
23. PAR 1 Sectors:	35. TEDE (mRem) - 10 Miles:
24. PAR 2 Type: ☐Evacuate / ☐Shelter / ☐None / ☐Other	36. Thyroid (mRem) - EAB:
25. PAR 2 Location: 5 miles	37. Thyroid (mRem) - 2 Miles:
26. PAR 2 Sectors:	38. Thyroid (mRem) - 5 Miles:
27. PAR 3 Type: ☐Evacuate / ☐Shelter / ☐None / ☐Other	39. Thyroid (mRem) - 10 Miles:
28. PAR 3 Location: 10 miles	
29. PAR 3 Sectors:	
30. Additional Protective Actions: (SAE) Place milk animals within 10 miles of the plant on stored feed, covered water and shelter, if possible.	
40. Additional Notes:	

*Critical Steps are **Bolded and shown in Red if color copy – correct data is shown in Red or with a** ☒

Initial Conditions: The Plant was at 100% and has been on line for 15 days following a refuel outage when:

- PZR level and pressure begin lowering.
- The Crew entered OTO-BB-00003, RCS Excessive Leakage.
- The RO stabilized PZR level and then estimated the leakage at 40 gpm.
- Sentry is NOT Available.
- CTMT NORM SUMP LEV on LF-LI-9 is 63” and rising.
- GT-RE-21B, Unit Vent Monitor, is reading 4.8 E^{+2} µCi/cc.
- GT-RE-21B's Hi Hi Alarm setpoint is 3.0 E^{+4} µCi/cc.
- Wind Speed is 5 mph from 270° (due west).
- Currently, the crew is continuing to reduce power per OTO-BB-00003.

Initiating Cues: You're an extra SRO on shift and have been provided the EIP-ZZ-00101, EIP-ZZ-00102, EIP-ZZ-00212 and CA3255. Determine the Emergency Event Classification and complete EIP-ZZ-00102 Attachment 4, Notification Form – Sentry NOT Available within the required time limits.

This JPM is TIME CRITICAL.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S1

JPM No:	No bank id yet	KSA No:	001A2.03
Revision Date:	01/29/2019	KSA Rating:	3.5 / 4.2
Job Title:	URO/SRO		
Duty:	SF – Control Rod Drive System		
Task Title:	REACTOR START UP CONTROL ROD REPOSITIONING		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☒ Alternate Path ☐ Time Critical ☐ RCA

References: OTO-SF-00001, Rod Control Malfunctions, Rev 17
OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE, Rev 63
Curve Book Table 1.8 SDM

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S1

Initial Conditions: The Plant is in MODE 2 at 10^{-8} AMPS.

All precautions and limitations of OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE, are met.

Initiating Cues: The CRS has directed you to withdraw control rods to raise power to 1% per OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE, step 5.2.7a.

Simulator Setup and / or Notes: Initialize at 10-8 AMPS with the following rod positions:
ALL SHUTDOWN BANKS to 228 STEPS.
CONTROL BANKS A & B to 228 STEPS.
CONTROL BANK C to 215 STEPS.
CONTROL BANK D to ~84 STEPS.

Simulator Operator: Once rods are being withdrawn, and per the cue IMF SFN07_DR stationary gripper to cause shutdown bank rod N-7 to fully drop into the core.

Task Standard: Upon completion of this JPM, the applicant completed all critical steps correctly and determined that during rod withdrawal for startup, rod N-7 dropped into the core, which required an insertion of negative reactivity by either:

- Fully inserting control banks to position 00 manually using SE HS-9 in Manual and SF HS-2 to Insert or
- Tripping the Reactor using SB1 or SB42 or
- Establishing emergency boration flow of greater than 30 gpm as read on BG FI-183A.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S1

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE.	Provide applicant with copy of OTG-ZZ-00003	Applicant obtained a copy	**S U** Comments:
2.	Review Precautions and Limitations Section 3.0	If necessary "**ALL PRECAUTIONS AND LIMITATIONS ARE SATISFIED**"	Applicant reviewed precautions and limitations	**S U** Comments:
3.	Review Prerequisites Section 4.0	If necessary **"ALL PREREQUISITE CONDITIONS ARE SATISFIED"**	Applicant reviewed prerequisites	**S U** Comments:
4.	Review Continuous Actions Section 5.1		Applicant reviewed continuous actions	**S U** Comments:
5.	PERFORM the following: a. INITIATE raising Reactor power to less than 1%. Step 5.2.7.a	If the applicant attempts to adjust MFP or its settings, then cue that **"the BOP is starting a MFP IAW OTN-AE-00001"**	Applicant verified SE HS-9 ROD BANK SEL SW, is in Manual	**S U** Comments:
6.	PERFORM the following: a. INITIATE raising Reactor power to less than 1%. Step 5.2.7.a	Note: the withdraws should be in small incremental steps with the goal of maintaining SUR ≤ 1DPM.	Applicant began withdrawing Control Bank 'D' by using SF HS-2 to the withdraw position.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
7.	PERFORM the following: a. INITIATE raising Reactor power to less than 1%. Step 5.2.7.a	**BOOTH OPERATOR:** After the 2nd rod withdrawal is completed and before 1% is reached, **INSERT malfunction to drop shutdown bank rod N-7**	Applicant monitored NI and rod positions while power was raised toward 1%.	**S U** Comments:
8.	PERFORM the following: a. INITIATE raising Reactor power to less than 1%. Step 5.2.7.a	**Start of Alternate Path**	Applicant repositioned control banks by using SF HS-2 to the withdraw position.	**S U** Comments:
9.	Dropped rod recognized and transition to OTO-SF-00001, Rod Control Malfunctions	Note: Annunciator 81B will also direct the applicant to OTO-SF-00001. If required and or asked **"respond to the annunciator as appropriate"**	Applicant determined that a shutdown bank rod dropped fully into the core and entered OTO-SF-00001.	**S U** Comments:
10.	CHECK Both Of The Following Are Met For Indication Of Multiple Dropped Rods: Annunciator 81A, Two/More Rods At Bottom - LIT Rod Bottom lights for greater than one rod – LIT OTO-SF-00001, Step #1		Applicant determined that only 1 rod dropped and implemented RNO to proceed to step 3	**S U** Comments:
11.	CHECK Main Turbine Runback Or Load Reject - IN PROGRESS OTO-SF-00001, Step #3		Applicant determined the turbine is not online so there is no runback in progress and implemented RNO to proceed to step 5	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
12.	PLACE Rod Control in MANUAL: ● SE HS-9 And CHECK Control Rods Motion – STOPPED OTO-SF-00001, Step #5 & 6	Note: SE HS-9 was in Manual	Applicant verified SE HS-9 in Manual.	**S U** Comments:
13.	CHECK Instruments Indications – NORMAL OTO-SF-00001, Step #7		Applicant determined that Instrument Indications are normal.	**S U** Comments:
14.	NOTES • An Urgent Failure in the Logic Cabinet prevents all automatic and manual rod motion in overlap. • An Urgent Failure in a Power Cabinet prevents all rod motion by the rods powered from the failed cabinet. Note prior to OTO-SF-00001, Step #8		Applicant read and placekept note	**S U** Comments:
15.	CHECK Annunciator 79A, Rod Ctrl Urg Fail – LIT OTO-SF-00001, Step #8	If the applicant begins to adjust boron concentration respond as the CRS **"BOP will control Tave"**	Applicant determined that Ann 79A is NOT LIT and read the RNO but as the turbine is off line Tave will have to be controlled with boron concentration and goes to step #10.	**S U** Comments:
16.	CHECK Both Of The Following Are – EXTINGUISHED Annunciator 81B, Rod At Bottom All Rod Bottom lights OTO-SF-00001, Step #10		Applicant determined that only 1 rod is at bottom and proceeded to Attachment A per the RNO.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*17.	CHECK Reactor Power – LESS THAN 5% OTO-SF-00001, Attachment A, Step #1		Applicant determined power is less than 5% and proceeded to step A2 and determined that a Reactor shutdown is required.	**S U** Comments:
*18.	SHUTDOWN The Reactor OTO-SF-00001, Attachment A, Step #2	**Note: There are 2 distinct actions in Step #17 and #18 – both of which are CRITICAL:** 1) Determine the requirement to shutdown the reactor 2) Taking action to insert negative reactivity into the core by either of the 3 actions listed Note: the value of 1691 ppm is from Curve Book Table 1-8 SDM value and will Shutdown the reactor under all conditions Note: the emergency boration steps in the step standard are from OTO-ZZ-00003, step 6	Applicant took action to inserted negative reactivity to shutdown the reactor by either: • Fully inserting control banks to position 00 manually using SE HS-9 in Manual and SF HS-2 to Insert (upward direction) • Tripping the Reactor using SB1 or SB42 • Emergency Boration of the RCS to a shutdown value of 1691 ppm by starting at least one BAT pump (BG HIS 5A/6A), opening the Emergency borate to charging pump suction valve (BG HIS-8104) and then observing emergency boration flow of greater than 30 gpm on BG FI-183A.	**S U** Comments:
19.	**THE JPM IS COMPLETE**	Record Stop time on Page 2	Applicant informed the CRS that a reactor shutdown is required.	**S U** Comments:

*Critical Step

Initial Conditions: The Plant is in MODE 2 at 10^{-8} AMPS.

All precautions and limitations of OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE, are met.

Initiating Cues: The CRS has directed you to withdraw control rods to raise power to 1% per OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE, step 5.2.7a.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S2

JPM No:	BG-RO-S-004(A)	KSA No:	004A4.08
Revision Date:	01/30/2019	KSA Rating:	3.8 / 3.4
Job Title:	URO/SRO		
Duty:	CVCS		
Task Title:	Swap from the NCP to 'B' CCP		
Completion Time:	15 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☒ Alternate Path ☐ Time Critical ☐ RCA

References: OTN-BG-00001 ADD 1, Shifting from the NCP to One of the CCPs, Rev 12

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S2

Initial Conditions: The NCP is running with 75 GPM letdown flow.

Preparations have been made to tag out the NCP.

Initiating Cues: The CRS has directed you to place the B CCP in service and secure the NCP per OTN-BG-00001 ADD 1, Shifting from the NCP to one of the CCP's, and beginning at step 5.1. Inform the CRS when complete.

The boron concentration when the B CCP was run last week was 5 PPM higher than the existing boron concentration.

An OT has been briefed and is standing by to perform local actions.

Simulator Set up and/or Notes: use any IC where the NCP AND 'B' CCW ARE RUNNING. ENSURE LETDOWN FLOW IS 75 GPM AND BG HV-8111 IS OPEN ('B' CCP MINIFLOW).

- Run scenario file ILT_JPM_S2.sce to **Insert Malfunction DPBG05BTFSHEAR = 1 (with DPBG05BARMED = 1 and DPBG05BACTIVE = 1) condition HWX01D124M LE 0.10** (This will shear the 'B' CCP shaft after flow is increased (and NCP flow lowered) which is triggered after 'B' CCP Handswitch is taken to RUN).

Task Standard: Upon completion of this JPM, the applicant will have completed all critical steps correctly and restored charging flow by either restoring NCP flow by raising the output of BG FK-124 or starting the 'A' CCP using BG HS-1A when the 'B' CCP shaft shears during a swap to the 'B' CCP from the NCP.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S2

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OTN BG 00001 ADD 1, SHIFTING FROM THE NCP TO ONE OF THE CCP'S		Applicant obtained a copy.	**S U** Comments:
2.	Review Precautions and Limitations Section 3.0	If necessary **"ALL PRECAUTIONS AND LIMITATIONS ARE SATISFIED"**	Applicant reviewed precautions and limitations.	**S U** Comments:
3.	Review Prerequisites Section 4.0	If necessary **"**ALL PREREQUISITE CONDITIONS ARE SATISFIED"	Applicant reviewed prerequisites.	**S U** Comments:
4.	All hand switches referenced in this section are located on RL001 or RL002 unless noted otherwise. Transferring charging pumps will cause area radiation levels to change in both pump rooms. NOTE prior to Step 5.1.1		Applicant read and placekept.	**S U** Comments:
5.	NOTIFY RP that the 'B' CCP will be started and that the NCP will be secured. Step 5.1.1	RP ACKNOWLEDGES	Applicant notified RP and informed them of swapping NCP to 'B' CCP.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
6.	PLACE the Auxiliary Lube Oil Pump handswitch for the 'B' CCP to be started in AUTO and ENSURE the RUN light is on. BG HIS-2AX, CCP B AUX L-O PUMP Step 5.1.2		Applicant placed BG HIS-2AX, CCP B AUX L-O PUMP, in Auto and ensured the RUN light it LIT.	**S U** Comments:
7.	ENSURE 'B' CCP is supplied by 'B' CCW TRAIN in service Step 5.1.3		Applicant verified 'B' CCW TRAIN is in service.	**S U** Comments:
*8.	PLACE BG FK-121, CCP DISCH FLOW CTRL, in "MANUAL" and set at MINIMUM FLOW Step 5.1.4		Applicant placed BG FK-121, CCP DISCH FLOW CTRL, in "MANUAL" and set to MINIMUM FLOW. BG FK-121 "MANUAL" LIGHT COMES ON AND "AUTO" LIGHT GOES OFF.	**S U** Comments:
9.	CAUTION: The CCPs should NOT be run at less than 130 gpm, (including recirc flow), for more than 30 minutes. The CCPs should NOT be run at less than 60 gpm. The CCP recirculation valves ensure 60 gpm recirc to the VCT. [Ref: 6.2.7]. CAUTION prior to Step 5.1.5		Applicant read and placekept caution.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
10.	CHECK the Charging Pump Recirculation valve for the pump to be started is OPEN: BG HIS-8111, CCP B RECIRC VLV Step 5.1.5		Applicant verified BG HV-8111 is open by verifying BG HIS-8111 RED LIGHT is ON and GREEN LIGHT is OFF.	**S U** Comments:
11.	NOTE : It is recommended that the Auxiliary Lube Oil Pump be allowed to run for at least 5 minutes prior to starting the associated CCP. NOTE prior to Step 5.1.6	If necessary, **"the Auxiliary Lube Oil Pump has been running for 10 minutes"** If asked as a OT, Role play and report**, "pre start checks on the "B" CCP are complete sat"**	Applicant read and placekept note.	**S U** Comments:
*****12.	START the CCP supplied by the in service CCW train using the appropriate switch: BG HIS-2A, CCP B Step 5.1.6		Applicant started 'B' CCP by placing BG HIS-2A TO RUN. BG HIS-2A RED LIGHT goes ON and GREEN LIGHT goes OFF.	**S U** Comments:
13.	Locally CHECK that the Room Cooler has started for the CCP that was started SGL12B, AUX BLD CCP B RM CLR, for CCP B Step 5.1.7	When the applicant contacts an OT to locally verify that the room cooler has started: CUE: **"SGL12B, AUX BLD CCP B RM CLR has started."**	Applicant verified SGL12B, AUX BLD CCP B RM CLR, is in service.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
14.	IF this Addendum was entered from Section for Charging Pump Breaker NB0104 OR NB0201 Operability Check in OTN-BG-00001, Chemical And Volume Control System, CHECK the CCP Breaker closed properly. Step 5.1.8	NOTE: STEP 5.1.8 IS NOT REQUIRED	Applicant determines that step is Not Applicable.	**S** **U** Comments:
15.	NOTE: If the Aux Lube Oil Pump remains in service following the next step, the system engineer should be notified. Note prior to Step 5.1.9		Applicant read and placekept note.	**S** **U** Comments:
16.	CHECK that the Auxiliary Lube Oil Pump handswitch RUN light has gone OUT and the STOP light is LIT after a reasonable time following start of the CCP. BG HIS-2AX, CCP B AUX L-O PUMP Step 5.1.9		Applicant verified 'B' AUX LUBE OIL PUMP has stopped by observing handswitch light indication on BG HIS-2AX. BG HIS-2AX GREEN LIGHT is ON and RED LIGHT is OFF.	**S** **U** Comments:
*17.	PLACE BG FK-124, NCP DISCH FLOW CTRL, in MANUAL. Step 5.1.10		Applicant placed BG FK-124 IN “MANUAL” and observes BG FK-124 “MANUAL” LIGHT comes ON and “AUTO” LIGHT goes OFF.	**S** **U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
18.	NOTE: IF BGHV8109, NCP RECIRC VLV, is closed and flow through the NCP drops below 100 gpm, Annunciator Window 41F, NCP FLOW HI/LO, will alarm. IF flow through the NCP drops below 65 gpm, Annunciator Window 41F, NCP FLOW HI/LO, will reflash and BGHV8109, NCP RECIRC VLV, will open. BGHV8109, NCP RECIRC VLV, is opened when lowering NCP flow to prevent a transient in seal injection flow. Steps 5.1.11 through 5.1.13 should be performed together to enable transfer of the pumps. Note prior to Step 5.1.11		Applicant read and placekept note.	**S U** Comments:
19.	WHEN flow through the NCP is less than 100 gpm, as indicated by Annunciator Window 41F, use BG HIS-8109, NCP RECIRC VLV and OPEN BGHV8109. Step 5.1.11		Applicant observed BG HIS-8109 red light LIT, green light OFF after Annunciator 49F was LIT.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
20.	RAISE CCP flow using BG FK-121, CCP DISCH FLOW CTRL, while LOWERING NCP flow using BG FK-124, NCP DISCH FLOW CTRL, to maintain a constant charging flow as indicated on BG FI-121A, CHG HDR FLOW. Step 5.1.12	**WHEN BG FK-124, NCP DISCH FLOW CTRL, is lowered to less than or equal to 10% scale, the sheared shaft malfunction is automatically inserted for 'B' CCP.** **Start of Alternate Path** **Simulator operator verifies the conditional malfunction to shear the 'B' CCP's shaft is inserted.** Note: If the applicant identifies an issue with the "B" CCP and trips the pump, the applicant should perform immediate actions of OTO-BG-00001 and either start the A CCP or return the NCP fully to service Note: At this point the applicant will stop performing steps of OTN-BG-00001 ADD1	Applicant depressed the DOWN arrow button on BG FK-124 and depressed the UP arrow button on BG FK-121 which raised CCP flow using BG FK-121, CCP DISCH FLOW CTRL, and LOWERED NCP flow using BG FK-124, NCP DISCH FLOW CTRL. Applicant observed lowering charging flow and/or lower PZR level with no effect when raising "B" CCP control output. "B" CCP pump indication (green, yellow, red) did not change.	**S U** Comments:
***21.**	IF desired to restore the NCP, ADJUST BG FK-124 and BG HC-182 as required to maintain the following: • SEAL INJ FLOW 8-13 GPM / RCP • CHARGING FLOW MAINTAINING STABLE PZR	IF the applicant asks the CRS what to do, respond "**What actions do you recommend?"** After the applicant describes the actions they will take state **"Take the actions you have described"**	Applicant raised NCP Flow by raising the output of BG FK-124. Note: BG FK-124 is in manual and pushing the up arrow on the controller will raise the output.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
22.	If the applicant proceeds to OTO-BG-00001 due to "IF a Charging pump has tripped, Go To OTO-BG-00001, Pressurizer Level Control Malfunction." Ann 42E step 3.2	Note: the applicant can either restore the NCP or start the "A" CCP in step 1 of OTO-BG-00001.	The Applicant should perform immediate actions of OTO-BG-00001.	**S U** Comments
23.	CHECK Charging Pumps – AT LEAST ONE RUNNING: Step 1 of OTO-BG-00001		Applicant observed the following: NCP is running at reduced flow. B CCP is degraded (sheared shaft). A CCP is in standby.	**S U** Comments **NOTE: Step 1 of OTO-BG-00001 is an immediate action step. It is required to be performed from memory per ODP-ZZ-00025.**

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*24.	PERFORM the following: a. ENSURE CCP Recirc valves OPEN: • BG HIS-8110 • BG HIS-8111 b. ENSURE CCP or NCP suction is aligned to VCT or RWST c. *START one CCP: • BG HIS-1A • BG HIS-2A d. IF CCP can NOT be started, THEN START NCP • BG HIS-3 e. ENSURE CCW Pump is running in the same train as the CCP that was started. f. IF a charging pump can not be started, THEN ISOLATE letdown by closing all Letdown Throttle Isolation Valves: • BG HIS-8149AA • BG HIS-8149BA • BG HIS-8149CA RNO Step 1		Applicant observes CCP suction is aligned to the VCT. *Applicant starts A CCP using BG HIS-1A to the right (Run position) and observes the Red light is LIT and Green Light is OFF. Applicant observes A Train CCW Pump is running	**S U** Comments Note: The critical task is to restore charging by either starting the 'A' CCP in step 24 or to restore flow using the NCP in step 21. This JPM step only shows the performance standard for the 'A' CCP. The NCP option to restore flow is shown in JPM step 21.
25.	Inform the CRS that charging flow has been restored.	**THE CONTROL ROOM SUPERVISOR ACKNOWLEDGES**	Applicant informed the CRS that the 'B' CCP is not functioning correctly and that charging flow has been restored.	**S U** Comments:
26.	**THE JPM IS COMPLETE**	Record Stop Time on Page 2		**S U** Comments:

*Critical Step

Initial Conditions: The NCP is running with 75 GPM letdown flow.

Preparations have been made to tag out the NCP.

Initiating Cues: The CRS has directed you to place the B CCP in service and secure the NCP per OTN-BG-00001 ADD 1, Shifting from the NCP to one of the CCP's, and beginning at step 5.1. Inform the CRS when complete.

The boron concentration when the B CCP was run last week was 5 PPM higher than the existing boron concentration.

An OT has been briefed and is standing by to perform local actions.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S3

JPM No:	EP-RO-S-001	KSA No:	006A1.13
Revision Date:	01/28/2019	KSA Rating:	3.5 / 3.7
Job Title:	URO/SRO		
Duty:	Safety Injection Accumulators		
Task Title:	Raising Safety Injection Accumulator Level		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: OTN-EP-00001, Accumulator Safety Injection System
OTN-EP-00001 Addendum 1, SI Accumulator Level Control
CAR 200303918, Containment Spray Pump Gas Binding

Tools / Equipment: NONE

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S3

Initial Conditions: The Plant is in MODE 1. Emergent maintenance has been completed on SI Accumulator 'A'. SI Accumulator 'A' level is 25%.

The SI test header is NOT in service.

Initiating Cues: You have been directed to raise SI Accumulator 'A' level to 40%, using SI Pump 'B', per OTN-EP-00001 Addendum 01, SI ACCUMULATOR LEVEL CONTROL Section 5.1, and maintain Accumulator pressure between 602 and 648 psig.

All precautions and limitations are met.

Notify the CRS when complete.

Simulator Set up and/or Note(s):

- Ensure CCW Train B is in service.
- Set Plant Parameter/EP/TEP01ATAZTCPLL/10.31
- Plant Parameter/EP/TEP01ATAZTCPGP/629

Task Standard: Upon completion of this JPM, the applicant will have started the 'B' SI pump, raised SI Accumulator 'A' level to between 35% and 55%, restored the Safety Injection System lineup, and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S3

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OTN-EP-00001 Add 1	Cue: After locating a working copy, provide procedure.	Applicant obtained a procedure copy	**S U** Comments:
2.	Review precautions, limitations, and prerequisites	Cue: If necessary, "All Precautions and Limitations are met."	Applicant place kept.	**S U** Comments:
3.	SI Accumulator pressure and level indicators are listed on Attachment 1, SI Accumulator Pressure And Level Indication On RL018. SI Accumulator levels and corresponding points are listed on Attachment 2, SI Accumulator Level Percentage To Volume Points. Flow through EP8956A-D would require leak testing in accordance with T/S SR 3.4.14.1. NOTES before Step 5.1		Applicant read and placekept note.	**S U** Comments:
4.	Changing accumulator level causes a corresponding change in accumulator pressure. Accumulator pressure must be closely monitored when adjusting level. CAUTION before Step 5.1		Applicant read and placekept caution.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
5.	Normal accumulator level is equal to or greater than 15%, and equal to or less than 85%, as indicated on EP LI-950 through EP LI-957. Normal accumulator pressure is equal to or greater than 602 psig, and equal to or less than 648 psig, as indicated on EP PI-960 through EP PI-967. NOTE before Step 5.1.1		Applicant read and placekept note.	**S U** Comments:
6.	CHECK that the reactor is in ONE of the following: • MODE 1 • MODE 2 • MODE 3 Step 5.1.1		Applicant observed plant conditions to correlate MODE.	**S U** Comments:
7.	CHECK that RCS pressure is equal to or greater than 2000 psig. Step 5.1.2		Applicant observed RCS pressure indications.	**S U** Comments:
8.	ENSURE the following are in standby alignment per OTN-EM-00001, Safety Injection System: • SI System • RWST Step 5.1.3	If required: Cue: " SI system and RWST are in a standby alignment per OTN-EM-00001, Safety Injection System."	Applicant observed EM system status.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
9.	IF the SI Test Line and EMV0257, SI TEST LINE PRESS REGULATOR, are in service, on RL017, REMOVE BOTH from service by performing the following: Step 5.1.4	If required: Cue: " The SI Test Line and EMV0257, SI TEST LINE PRESS REGULATOR, are NOT in service."	Applicant observed indications on RL017	**S U** Comments:
10.	REQUEST SM/CRS to determine desired final level and pressure of selected accumulator and RECORD below: Step 5.1.5		Applicant wrote values in the spaces provided consistent with the Initiating Cues.	**S U** Comments:
11.	REQUEST SM/CRS to determine SI Pump to start and MARK below: • SI Pump A • SI Pump B Step 5.1.6		Applicant circled (marked) SI Pump B	**S U** Comments:
12.	ENSURE the component cooling water train is in service for the respective SI Pump to be started per OTN-EG-00001, Component Cooling Water System. Step 5.1.7		Applicant observed a B train CCW pump with red light LIT and green light EXTINGUISHED.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
13.	The SI Pumps should NOT be run on only recirculation flow for greater than 30 minutes due to the pump manufacturer's constraints for running these pumps at reduced flow rates. Pump flow rates should NOT be lowered to less than 45 gpm. CAUTION before Step 5.1.8		Applicant read and placekept caution.	**S U** Comments:
*14.	At RL017, as directed by the SM/CRS, START an SI Pump per the following: IF starting SI Pump B, PERFORM the following: 1. Using BN HIS-8806B, RWST TO SI PUMPS, ENSURE BNHV8806B is OPEN. 2. Using EM HIS-8923B, SI PUMP B SUCT VLV, ENSURE EMHV8923B is OPEN. *3. Using EM HIS-5, SI PUMP B, START SI Pump B. 4. Using EM PI-923, SI PUMP B DISCH PRESS, CHECK SI Pump B discharge rises to approximately 1500 psig. Step 5.1.8.b.	Note: Starting the pump is the only critical item in this step.	Applicant observed BN HIS-8806B handswitch red light LIT, green light EXTINGUISHED. Applicant observed EM HIS-8923B handswitch red light LIT, green light EXTINGUISHED. *Applicant rotated EM HIS-5 to right RUN until redlight LIT and green light EXTINGUISHED. Applicant observed EM PI-923 indication	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*15.	At RL018, using EM HIS-8888, ACC TANKS FILL LINE VLV, OPEN EMHV8888. Step 5.1.9		Applicant depressed OPEN pushbutton on EM HIS-8888 until red light LIT.	S U Comments:
*16.	FILL and VENT the accumulators per the following: a. At RL018, OPEN the selected accumulator tank fill line isolation valve and MARK the one opened: *• Using EP HIS-8878A, ACC TANK A FILL LINE VLV, OPEN EPHV8878A. b. MONITOR selected accumulator pressure while filling and VENT as necessary in accordance with OTN-EP-00001 ADD02, SI Accumulator Pressure Control, to maintain pressure in the required range. c. MONITOR all accumulators for rising pressure or level. Step 5.1.10	Note: Opening EPHV8878A is the only critical part of this step.	Applicant depressed OPEN pushbutton on EP HIS-8878A until red light LIT. Applicant circled (marked) in procedure first bullet on step. Applicant observed Accumulator tank level indicators Applicant observed Accumulator tank pressure indicators	S U Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
17.	Backleakage past EP8956A (B, C, D), SI ACC TK A (B, C, D) OUT UPSTRM CHECK, may cause forward flow through Pressure Isolation Valves (PIVs) EPV0010/20/30/40, SI PMPS TO RCS COLD LEG LOOP 1(2, 3, 4) CHECK. CAUTION before Step 5.1.10.d.		Applicant read and placekept caution.	**S U** Comments:
18.	IF level or pressure rises in any accumulator NOT being filled, Refer To T/S SR 3.4.14.1 for testing due to possible forward flow through Pressure Isolation Valves (PIVs) EPV0010/20/30/40, SI PMPS TO RCS COLD LEG LOOP 1(2, 3, 4) CHECK. Step 5.1.10.d.		Applicant observed accumulator MCB indications.	**S U** Comments:
*19.	WHEN the selected accumulator reaches the desired level recorded in Step 5.1.5, at RL018 CLOSE the selected accumulator tank fill line isolation valve and MARK the one closed. • Using EP HIS-8878A, ACC TANK A FILL LINE VLV, CLOSE EPHV8878A. Step 5.1.11		Applicant observed MCB level indication for Accumulator A. Applicant depressed CLOSE pushbutton on EM HIS-8878A until green light LIT.	**S U** Comments: **NOTE: Level must be between 35% and 55% on either the PPC or control board indication to meet Critical Task.**

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
20.	To raise level in another accumulator, REPEAT Steps 5.1.10 and 5.1.11 for that accumulator. Step 5.1.12		Applicant proceeded to step 5.1.13	**S U** Comments:
21.	WHEN completed with raising the accumulator levels, PERFORM the following: • Using EP HIS-8878A, ACC TANK A FILL LINE VLV, ENSURE EPHV8878A is CLOSED. Step 5.1.13	Note: EPHV8878A was closed in procedure step 5.1.11 (2 steps previous)	Applicant observed EP HIS-8878A green light LIT, red light EXTINGUISHED.	**S U** Comments:
*22.	At RL017, STOP the running SI Pump and MARK the one stopped: • Using EM HIS-5, SI PUMP B, STOP SI Pump B. Step 5.1.14		Applicant rotated EM HIS-5 handswitch to STOP until green light LIT, red light EXTINGUISHED.	**S U** Comments:
*23.	At RL018, using EM HIS-8888, ACC TANKS FILL LINE VLV, CLOSE EMHV8888. Step 5.1.15		Applicant depressed CLOSE pushbutton on EM HIS-8888 until green light LIT.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
24.	IF the SI Test Line AND EMV0257 were removed from service in Step 5.1.4, RESTORE the SI Test Line AND EMV0257 to service per OTN-EM-00001, Safety Injection System. Step 5.1.16		Applicant N/A'ed step.	**S U** Comments:
25.	**THE JPM IS COMPLETE**	Record Stop Time on Page 2		**S U** Comments

*Critical Step

Initial Conditions:	The Plant is in MODE 1. Emergent maintenance has been completed on SI Accumulator 'A'. SI Accumulator 'A' level is 25%.
Initiating Cues:	You have been directed to raise SI Accumulator 'A' level to 40%, using SI Pump 'B', per OTN-EP-00001 Addendum 01, SI ACCUMULATOR LEVEL CONTROL Section 5.1, and maintain Accumulator pressure between 602 and 648 psig. All precautions and limitations are met. Notify the CRS when complete.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S4

JPM No:	URO-SEJ-02-C023J	KSA No:	005A4.01
Revision Date:	01/25/2019	KSA Rating:	3.6/3.4
Job Title:	URO/SRO		
Duty:	RESIDUAL HEAT REMOVAL		
Task Title:	BORATION OF RHR SYSTEM		
Completion Time:	20 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: OTN-EJ-00001, Addendum 1, A RHR Train Boration, Rev 9

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S4

Initial Conditions: The Plant is in MODE 4 cooling down for a refueling outage.

- The RWST Boron Concentration is 2400 ppm and the "A" RHR Train is 700 ppm. The RCS Boron concentration is 2142 ppm.
- "B" CCW is supplying the Service Loop and the "A" CCW Pump is running.
- The SI test Header and EMV0257 are NOT in service.
- The Hot Lab Technician has been notified that samples will be needed.
- An OT is standing by and has a key for BN8717 from Key Issue
- "B" RHR Train is in a Standby alignment.
- All precautions and limitations are met.
- Another RO will address the CCW system, CCW alarms, and EFSAS alarms.

Initiating Cues: The Control Room Supervisor has directed you to perform OTN-EJ-00001 Addendum 1 Section 5.1 to Borate the "A" train of RHR in preparation to place it in service. Start at OTN-EJ-00001 Addendum 1 step 5.1.5 and inform the CRS when you are ready to direct Chemistry to sample the "A" RHR Train.

Simulator Set up and/or Note(s): Load Configuration 18-4, use a Mode 4 IC. (IC167 was setup for this JPM)

- Ensure the "B" CCW is supplying the Service Loop and the "A" CCW Pump is running.

Task Standard: Upon completion of this JPM, the applicant borated the ‘A” RHR train in preparation for placing it in service and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S4

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OTN-EJ-00001, Addendum 1 A RHR Train Boration.	Provide applicant procedure copy	Applicant obtained procedure copy	**S U** Comments:
2.	NOTE Closing all RHR suction isolations from the RCS prevents sending hot RCS fluid into the common ECCS suction piping. [Ref: 6.2.11] Note in Step 5.1.5		Applicant read and placekept note	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
3.	PERFORM the following: • Using EJ HIS-8811A, CTMT RECIRC SUMP TO RHR PUMP A SUCT, ENSURE EJHV8811A is CLOSED. • Using BB HIS-8702A, LOOP 1 HOT LEG TO RHR PUMP A SUCT, ENSURE BBPV8702A is CLOSED. • Using EJ HIS-8701A, LOOP 1 HOT LEG TO RHR PUMP A SUCT, ENSURE EJHV8701A is CLOSED. • Using EJ HIS-8804A, RHR A TRN A TO CHG PUMPS, ENSURE EJHV8804A is CLOSED. • ENSURE EJV0001, RHR TRN A TO CVCS LETDOWN ISO, is CLOSED. • Using EJ HIS-8840, RHR HOT LEG RECIRC VLV, for both Train A and Train B, ENSURE EJHV8840 is CLOSED. Step 5.1.5	Note: BBPV8702 and BBPV8701A are closed with power removed (due to # of boration flowpaths) If asked, "**Primary Operator reports that EJV0001 is CLOSED**"	Applicant observed GREEN Light LIT and RED Light OFF for each valve listed.	**S U** Comments
4.	IF RCS pressure is less than 400 psig, using BOTH of the following handswitches, CLOSE EJHV8809A: a. EJ HIS-8809AA, POWER LOCKOUT FOR EJ HV-8809A b. EJ HIS-8809A, RHR TO ACC INJ LOOPS 1 & 2 Step 5.1.6	.	Applicant N/A'ed procedure step	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
5.	Using BN HIS-8812A, RWST TO RHR PUMP A SUCT, ENSURE BNHV8812A is OPEN. Step 5.1.7		Applicant observed GREEN Light OFF and RED Light LIT for BN HIS-8821A.	**S U** Comments
6.	Using EJ FK-618, RHR HX A BYPASS CTRL, CLOSE EJFCV0618. Step 5.1.8		Applicant observed GREEN Light LIT and RED Light OFF.	**S U** Comments
7.	CAUTION With either EJHV8716A or B closed while in MODES 4 and 5, the RHR train which is aligned for boration will be inoperable for both RHR and SI. [Ref: 6.2.19, 6.2.12] The train lined up for SI should be isolated from the train in recirculation mode when only one train of RHR is in the recirculation mode of operation. Performing the following step ensures that B RHR Train remains OPERABLE for Safety Injection. [Ref: 6.2.8, 6.2.10] Caution prior to Step 5.1.9		Applicant read and placekept caution	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*8.	PERFORM the following: • Using EJ HIS-8716A, RHR TRN A HOT LEG RECIRC VLV, ENSURE EJHV8716A is OPEN. *• Using EJ HIS-8716B, RHR TRN B HOT LEG RECIRC VLV, ENSURE EJHV8716B is CLOSED. Step 5.1.9	Note: Bulleted steps may be performed in any order. EJHIS-8716B is the only CRITICAL part of this step.	Applicant observed EJHV8716A GREEN Light OFF and RED Light LIT. Applicant depressed the close Pushbutton and observed EJHV8716B GREEN Light LIT and RED Light OFF.	**S U** Comments
9.	CAUTION - The temperature of CCW supplied to the various components during normal operation should not exceed 105°F. During initial RHR operation, the temperature limit may be allowed to reach 120°F for a maximum of 4 hours. Caution prior to step 5.1.10		Applicant read and placekept caution	**S U** Comments
10.	PERFORM the following to align CCW to the A RHR HX per OTN-EG-00001,Component Cooling Water System: a. ENSURE SW/ESW is aligned to the A CCW HX. b. ENSURE the A CCW Train is in operation. c. ENSURE adequate flow to the various CCW system loads. Step 5.1.10 a-c	Information provided in the initiating cue	Applicant verified the CCW trains were in the correct lineup to support A RHR Boration. Applicant verified that EF HIS 51 is open by observing GREEN Light OFF and RED Light LIT.	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
11.	CAUTION Closing the CCW inlet valve to RHR heat exchanger while in service will result in flashing the CCW side of the heat exchanger to steam. Caution prior to step 5.1.10 d		Applicant read and placekept caution	**S U** Comments
12.	d. Using EG HIS-101, CCW TO RHR HX A, ENSURE EGHV0101 is open. e. IF Annunciator 51A, RHR HX A CCW FLOW HILO, is in ALARM, THROTTLE CLOSED EC HIS-11, SFP HX A CCW OUTLET VLV, until Annunciator 51A clears. Step 5.1.10 d-e	If Annunciator 51A alarms and the applicant proceeds to address it, Cue **" Another RO will address the CCW system and its alarms"**	Applicant opened EGHV0101 by pushing the OPEN pushbutton on EJ HIS-101 and observed GREEN Light OFF and RED Light LIT.	**S U** Comments
*13.	Using EJ HIC-606, RHR HX A FLOW CTRL, CLOSE EJHCV0606. Step 5.1.11		Applicant fully rotated EJ HIC-606 in the clockwise direction to close EJ HIC-606.	**S U** Comments
14.	Using EJ HIS-610, RHR PUMP A MINIFLOW VLV, ENSURE EJFCV0610 is OPEN. Step 5.1.12		Applicant observed GREEN Light OFF and RED Light LIT.	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*15.	Using EJ HIS-1, RHR PUMP A, START PEJ01A, RHR PUMP A. Step 5.1.13		Applicant started the A RHR Pump by rotating EJ HIS-1 to the START position	**S U** Comments
16.	ENSURE that the following RHR pump minimum flow criteria are complied with: [Ref: 6.2.9] • Not less than 500 gpm • Should NOT be run with flow less than 1700 gpm for greater than 2 hours 15 minutes Step 5.1.14	**BOOTH OPERATOR:** If asked, role play as OT in the field, reply **"RHR flow is ~1000gpm."**	Applicant monitored RHR flow indicated and ensured above the stated limits.	**S U** Comments
17.	ADJUST boron concentration in A RHR Train per Attachment 1. Step 5.1.14		Applicant proceeded to Attachment 1.	**S U** Comments
18.	ENSURE there are no flow paths that could depressurize the RCS when BN8717, RHR SPLY TO RWST ISO, is opened. Att 1 Step 1		Applicant verified no flowpath could depressurize the RCS when BN8717 is opened Locally	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
19.	2) ESTABLISH recirculation flow as follows: a) Using EJFIS0610, RHR PUMP A DISCH TO RHR HX A FLOW IND SWITCH, to monitor flow, PERFORM the following: (1) UNLOCK BN8717, RHR SPLY TO RWST ISO. Att 1 Step 2.a.(1)	**BOOTH OPERATOR:** Cue: Role Play as OT and report "BN8717 is unlocked"	Applicant directed OT to unlock BN0717.	**S U** Comments
20.	(2) THROTTLE OPEN BN8717 to establish a recirculation flow (approximately 1700 gpm) through the A RHR train back to the RWST. Att 1 Step 2.a.(2)	**BOOTH OPERATOR:** Cue: Role Play as OT and report "EJFIS610 is reading ~1700 gpm."	Applicant directed OT to throttle Open BN8717 to ~1700 gpm.	**S U** Comments
21.	(3) As the recirculation flow is being raised, PERFORM the following: • Using EJ PI-614, RHR PUMP A DISCH PRESS, MONITOR PEJ01A, RHRPUMP A, discharge pressure. • IF signs of pump cavitation or any other abnormal pump or system transients occur, STOP PEJ01A, RHR PUMP A, using EJ HIS-1. Att 1 Step 2.a.(3)		Applicant monitored RHR for signs of cavitation	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
22.	NOTE After performing the next step, approximately five minutes are allowed to elapse before continuing with the procedure. Note prior to Att1 Step 2.b		Applicant read and placekept note	**S U** Comments
*23.	Using EJ HIC-606, RHR HX A FLOW CTRL, THROTTLE OPEN EJHCV0606 approximately 10%. Att1 Step 2.b	**Note: the critical part of this step is to open EJHCV0606, the amount that EJHCV0606 is open is NOT critical.**	Applicant raised RHR flow by rotating EJ HIC-606 in the counterclockwise direction until it indicates ~10% open.	**S U** Comments
*24.	c) WAIT approximately five minutes. *d) Using EJ HIC-606, RHR HX A FLOW CTRL, CLOSE EJHCV0606. Att1 Step 2.c-d	Cue "5 minutes has elapsed" Note: Step 2.d is Critical	Applicant fully rotated EJ HIC-606 in the clockwise direction to close EJ HIC-606.	**S U** Comments
25.	NOTE After performing the next step, approximately five minutes are allowed to elapse before continuing with the procedure. Note prior to Att1 Step 2.e		Applicant read and placekept note	**S U** Comments
*26.	Using EJ FK-618, RHR HX A BYPASS CTRL, THROTTLE OPEN EJFCV0618 approximately 10%. Att1 Step 2.e		Applicant raised RHR flow by raising the output on EJ FK-618 to ~10%. (MAN selected and up button depressed on EJ FK-618)	**S U** Comments

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*27.	f) WAIT approximately five minutes. *g) Using EJ FK-618, RHR HX A BYPASS CTRL, CLOSE EJFCV0618. Att1 Step 2.f-g	Cue "5 minutes has elapsed" Note: Step 2.g is Critical	Applicant lowered RHR flow by taking the output on EJ FK-618 to zero. (MAN selected and down button depressed on EJ FK-618	**S U** Comments
28.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments

*Critical Step

Initial Conditions: The Plant is in MODE 4 cooling down for a refueling outage.

- The RWST Boron Concentration is 2400 ppm and the "A" RHR Train is 700 ppm. The RCS Boron concentration is 2142 ppm.
- "B" CCW is supplying the Service Loop and the "A" CCW Pump is running.
- The SI test Header and EMV0257 are NOT in service.
- The Hot Lab Technician has been notified that samples will be needed.
- An OT is standing by and has a key for BN8717 from Key Issue
- "B" RHR Train is in a Standby alignment.
- All precautions and limitations are met.
- Another RO will address the CCW system, CCW alarms, and EFSAS alarms.

Initiating Cues: The Control Room Supervisor has directed you to perform OTN-EJ-00001 Addendum 1 Section 5.1 to Borate the "A" train of RHR in preparation to place it in service. Start at OTN-EJ-00001 Addendum 1 step 5.1.5 and inform the CRS when you are ready to direct Chemistry to sample the "A" RHR Train.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S5

JPM No:	EOP-RO-S-006 EOP Add 16	KSA No:	028A4.03
Revision Date:	01/25/2019	KSA Rating:	3.1 / 3.3
Job Title:	URO/SRO		
Duty:	CONTAINMENT HYDROGEN CONTROL		
Task Title:	PLACING CONTAINMENT H2 ANALYZER IN SERVICE		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: EOP ADDENDUM 16, Placing Hydrogen analyzers in Service, Rev 1

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S5

Initial Conditions: Callaway experienced a large loss of coolant accident. Operators are performing the actions of E-1, Loss of Reactor or Secondary Coolant.

Initiating Cues: You have been directed to place hydrogen analyzer 'A' in service per EOP Addendum 16.

Simulator Set up and/or Note(s): Use any Mode 1 IC and perform the following:

- Select Override Meters (GS)
- Select HWX20D3M, HWX20D4M, HWX20D5M and SET to 0.15 (run ILT JPM S5.sce if applicable)
- Ensure all CTMT Coolers and Hydrogen Mixing Fans are in SLOW

If desired for Sim to model the LOCA, Select Malfunction

- Select BB002_A and SET to 5000.
- Ramp of 5 sec.
- Trip RCPs when RCS pressure lowers to less than 1400.
- Freeze simulator.
- Roll recorders on RL017 and CTMT&H2 recorders (5 of them) on RL019.

Task Standard: Upon completion of this JPM, the applicant placed the 'A" hydrogen analyzer in service and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S5

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of EOP Addendum 16	Provide applicant with procedure	Applicant obtained procedure copy	S U Comments:
*2.	Place power lockout switches for hydrogen analyzer containment isolation valves in non-iso position as necessary: Train A: • GS HIS-40 • GS HIS-42 Step 1		Applicant placed GS HIS-40 and GS HIS-42 in the non-iso position.	S U Comments:
*3.	Open hydrogen analyzer a containment isolation valves: • GS HIS-12 • GS HIS-13 • GS HIS-14 • GS HIS-17 • GS HIS-18 Step 2	If asked about Admin control for these valves (per the cover), Role Play as CRS and reply "I will address admin controls later"	Applicant opened GS HIS-12 GS HIS-13 GS HIS-14 GS HIS-17 GS HIS-18 By depressing the OPEN pushbutton	S U Comments:
*4.	Place containment hydrogen analyzer 'A' in analyze position and record time: GS HIS-16A Time: _____ Step 3		Applicant placed GS HIS-16A in analyze	S U Comments:
5.	Open hydrogen analyzer 'B' containment isolation valves: Step 4	Cue was for the "A" Hydrogen Analyzer only.	Applicant N/A'd step	S U Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
6.	Place containment hydrogen analyzer 'B' in analyze position and record time: _____ Step 5		Applicant N/A'd step	**S** **U** Comments:
7.	Check containment cooler fans – running in slow speed • GN HIS-9 • GN HIS-17 • GN HIS-5 • GN HIS-13 Step 6		Applicant checked ALL containment cooler fans – running in slow speed	**S** **U** Comments:
8.	Check containment hydrogen mixing fans – running in slow speed • GN HIS-2 • GN HIS-4 • GN HIS-1 • GN HIS-3 Step 7		Applicant checked ALL containment hydrogen mixing fans – running in slow speed	**S** **U** Comments:

*Critical Step

S5

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
9.	NOTE: To ensure an accurate hydrogen measurement, the following warmup times are required: Analyzer heat trace has been energized in ANALYZE or STANDBY position for at least 2 Hours. Analyzer has been in ANALYZE position with supply and return valves open for at least 15 Minutes. Note prior to step 8	IF asked if either the heat trace has been in operation for 2 hours or the supply and return valves open for 15 minutes, respond to the applicant and confirm that either or both conditions have been met.	Applicant read and placekept note	**S U** Comments:
10.	Monitor containment hydrogen concentration: GS AI-19 (Analyzer A) Step 8		Applicant monitored GS AI-19	**S U** Comments:
11.	**THE JPM IS COMPLETE**	Record Stop time on Page 2	Applicant informed the CRS that the "A" Hydrogen analyzer is in service.	**S U** Comments:

*Critical Step

Initial Conditions: Callaway experienced a large loss of coolant accident. Operators are performing the actions of E-1, Loss of Reactor or Secondary Coolant.

Initiating Cues: You have been directed to place hydrogen analyzer ‘A’ in service per EOP Addendum 16.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S6

JPM No:	No bank id yet	KSA No:	015A1.01
Revision Date:	01/25/2019	KSA Rating:	3.5/3.8
Job Title:	URO/SRO		
Duty:	Nuclear Instrumentation (SE)		
Task Title:	Perform a Power Range NI Gain Adjustment		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☐ Alternate Path ☐ Time Critical ☐ RCA

References: OSP-SE-00004, NIS POWER RANGE HEAT BALANCE, Rev 38

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S6

Initial Conditions: A Plant Computer Heat Balance was just calculated in accordance with OSP-SE-00004, NIS POWER RANGE HEAT BALANCE.

Based on the data it has been determined that NIS Power Range Channel N42 needs to have its gain adjusted.

Steps 6.3.1 through 6.3.7 of OSP-SE-00004 have been completed.

Initiating Cues: The Control Room Supervisor directs you to perform gain adjustment for NIS Power Range Channel N42 and complete section 6.3 of OSP-SE-00004, NIS POWER RANGE HEAT BALANCE.

Calorimetric Calculation summary has been printed out.

Inform the CRS when complete.

Note: The operator will receive the cue sheet and 2 calorimetric images (enclosed after cue sheet)

Simulator Set up and/or Note(s):

- Load 100% IC-10
- Adjust N42 to slightly less than 99%
- Ensure Rod Selection HS, SE HS-9, is in Automatic
- Placekeep OSP-SE-00004 up to and including step 6.3.7.

Task Standard: Upon completion of this JPM, the applicant will have adjusted N42 to a final indicated Reactor Power of 99.9% to 100.9% (i.e. greater than calculated RTP, but not greater than 1% above the calculated RTP) without generating a Rod Block at 103% RTP or a Positive Rate Trip and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a copy of OSP-SE-00004, NIS POWER RANGE HEAT BALANCE	Provide applicant with procedure copy	Applicant obtained procedure copy.	**S U** Comments:
2.	Review Acceptance Criteria, Precautions, Limitations, and Prerequisites	All Precautions, Limitations, and Prerequisites are met.	Applicant reviewed Acceptance Criteria, Precautions, Limitations, and Prerequisites	**S U** Comments:
3.	Note: Attachment 1 provides instructions and may be used as stand-alone work instructions for Power Range Channel gain adjustment performance. During a rapid downpower change of more than 10% per hour, NIS Power Range Channels should be adjusted to greater than calculated RTP, but NOT greater than 2% above calculated RTP during the performance of Step 6.3.8. Note Prior to Step 6.3.8	Note: section 6.3 is applicable and at step 6.3.5 the applicant is directed to step 6.3.8 which is to perform Attachment 1. There are no action in steps 6.3.1 through 6.3.7 and are not listed here and the Note prior to Step 6.3.8 explains that Attachment may be used as a stand alone document hence not all of section 6.3 is provided in the JPM.	Applicant read and placekept Note	**S U** Comments:
4.	CAUTION Gain adjustment can cause a POSITIVE RATE TRIP if performed too fast (more than 4.25% of RTP in 2 seconds). Power Range Channel gain adjustments are performed one channel at a time. Two Channel trips will cause a Reactor Trip. Caution prior to Step 6.3.8		Applicant read and placekept Caution	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
5.	RECORD calculated RTP for Power Range Channel N42 gain adjustment. Attachment 1, 1st row		Applicant recorded 99.9% on Attachment 1 (given in initial conditions)	**S U** Comments:
6.	IF RTP is less than 40% AND indicated Reactor Power will be adjusted DOWN, RECORD Neutron Flux High Trip setpoint for Channel N42, OR N/A. Attachment 1, 2nd row		Applicant recorded N/A on Attachment 1	**S U** Comments:
7.	STA REVIEW to indicate compliance with APA-ZZ-01300, Reactivity Management Program, IF any NIS Power Range Channel will be adjusted DOWN more than 1%, OR N/A. Attachment 1, 3rd row		Applicant recorded N/A on Attachment 1	**S U** Comments:
8.	SM/CRS APPROVAL for NIS Power Range Channel N42 gain adjustments. Attachment 1, 4th row	Role play as the CRS. **"Approval Granted to perform the NIS Power Range Channel gain adjustment. initial and date have been provided on Attachment 2"**	Applicant obtained CRS approval on Attachment 1	**S U** Comments:
*9.	PLACE SE HS-9, ROD BANK AUTO/MAN SEL, in the MAN position. Attachment 1, 5th row		Applicant PLACED SE HS-9, ROD BANK AUTO/MAN SEL, in the MAN position.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
10.	At SE054B, PERFORM the following to adjust N42: RECORD As Found position of GAIN potentiometer on drawer N42B. Attachment 1, N42 column, 1st row	Note: Applicant may use PPC screen CAL-NI values readings of 0 to -1.0%	Applicant RECORDED As Found position of GAIN potentiometer on drawer N42B on Attachment 1	**S U** Comments:
11.	RECORD As Found PERCENT FULL POWER indicated on drawer N42A. Attachment 1, N42 column, 2nd row		Applicant RECORDED As Found PERCENT FULL POWER indicated on drawer N42A on Attachment 1	**S U** Comments:
*12.	SLOWLY ADJUST Channel N42 GAIN potentiometer without generating a POSITIVE RATE TRIP and/or ROD BLOCK at 103% RTP, UNTIL final indicated Reactor Power is greater than calculated RTP, but NOT greater than 1% above calculated RTP. Attachment 1, N42 column, 3rd row		Applicant SLOWLY ADJUSTED Channel N42 GAIN potentiometer, UNTIL final indicated Reactor Power was greater than calculated RTP, but NOT greater than 1% above calculated RTP.	**S U** Comments:
13.	RECORD As Left position of GAIN potentiometer on drawer N42B. Attachment 1, N42 column, 4th row		Applicant RECORDED As Left position of GAIN potentiometer on drawer N42B on Attachment 1	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
14.	RECORD As Left PERCENT FULL POWER indicated on drawer N42A. Attachment 1, N42 column, 5th row		Applicant RECORDED As Left PERCENT FULL POWER indicated on drawer N42A on Attachment 1	**S U** Comments:
15.	RECORD As Left DETECTOR CURRENT microamperes for drawer N42B (upper detector). Attachment 1, N42 column, 6th row		Applicant RECORDED As Left DETECTOR CURRENT microamperes for drawer N42B (upper detector).	**S U** Comments:
16.	RECORD As Left DETECTOR CURRENT microamperes on drawer N42B (lower detector). Attachment 1, N42 column, 7th row		Applicant RECORDED As Left DETECTOR CURRENT microamperes on drawer N42B (lower detector).	**S U** Comments:
17.	IF this is the last channel to be adjusted, PLACE SE HS-9, ROD BANK AUTO/MAN SEL, in required position as directed by SM/CRS. Attachment 1	If asked, role play as the CRS and say: "no other adjustments are desired at this point in time, place SE HS-9 in the AUTO position."	Applicant placed SE HS-9 ROD BANK AUTO/MAN SEL, in the AUTO position.	**S U** Comments:
18.	WHEN the required NIS Power Range Channel gain adjustments are all complete, PERFORM the following: a. PRINT calorimetric heat balance calculation for As Left data. b. WRITE on the printout near the first page header As Left.	Note: The task standard and its acceptable range of N42 values will be evaluated against the generated AS LEFT report	Applicant, at the plant computer, selected CALORIMETRIC MENU by Turn on Code (TOC) CALM. Applicant selected, GENERATE CURRENT CALORIMETRIC REPORT. Applicant wrote "AS LEFT" on the report.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
19.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments:

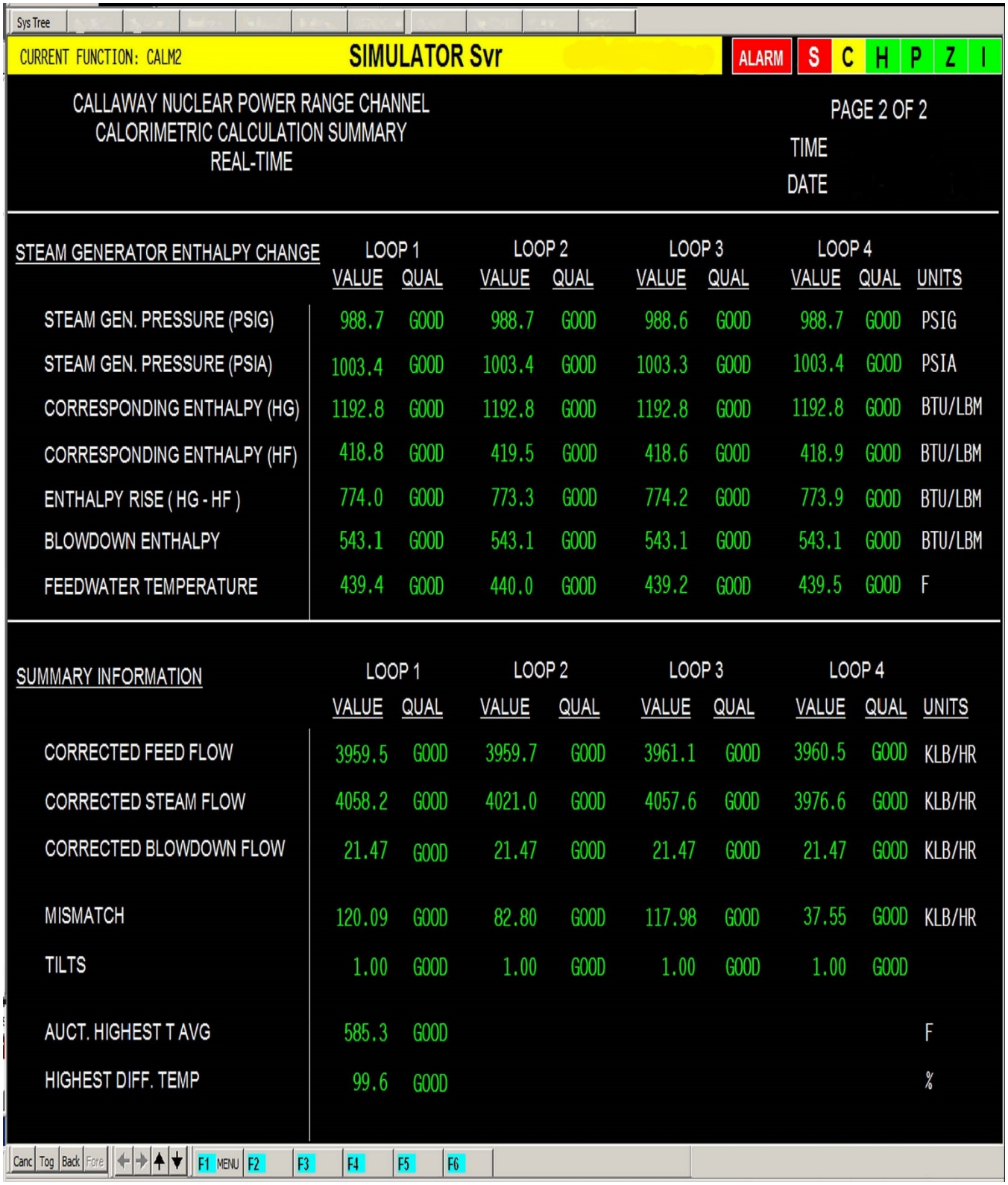
*Critical Step

Initial Conditions:	A Plant Computer Heat Balance was just calculated in accordance with OSP-SE-00004, NIS POWER RANGE HEAT BALANCE. Based on the data it has been determined that NIS Power Range Channel N42 needs to have its gain adjusted. Steps 6.3.1 through 6.3.7 of OSP-SE-00004 have been completed.
Initiating Cues:	The Control Room Supervisor directs you to perform gain adjustment for NIS Power Range Channel N42 and complete section 6.3 of OSP-SE-00004, NIS POWER RANGE HEAT BALANCE. Calorimetric Calculation summary has been printed out. Inform the CRS when complete.

AS FOUND


Sys Tree
CURRENT FUNCTION: CALM1
SIMULATOR Svr
ALARM
S C H P Z I
CALLAWAY NUCLEAR POWER RANGE CHANNEL
CALORIMETRIC CALCULATION SUMMARY
REAL-TIME
PAGE 1 OF 2
TIME
DATE
TOTAL CORE THERMAL POWER
VALUE
QUAL
UNITS
STEAM GENERATOR THERMAL POWER - LOOP 1 3050.2 GOOD MBTU/HR
- LOOP 2 3047.7 GOOD MBTU/HR
- LOOP 3 3052.3 GOOD MBTU/HR
- LOOP 4 3050.5 GOOD MBTU/HR
TOTAL 12200.6 GOOD MBTU/HR
TOTAL CORE THERMAL POWER (CTP) 3561.1 GOOD MW
CORE THERMAL POWER (PERCENT) 99.9 GOOD %
AVERAGE OF NIS READINGS 99.75 GOOD %
1 MIN AVG OF RCS LOOP AVG DT 98.9 GOOD %
DELTA T DEVIATION FROM CTPPC 1.0 GOOD %
SUMMARY OF NIS INDICATIONS
VALUE
QUAL
UNITS
CAL - NIS
ONE MINUTE AV OF NIS CH1 100.15 GOOD % -0.26
ONE MINUTE AV OF NIS CH2 98.75 GOOD % 1.16
ONE MINUTE AV OF NIS CH3 100.09 GOOD % -0.20
ONE MINUTE AV OF NIS CH4 100.04 GOOD % -0.15
FEED (1) / STEAM (2) OPTION = 1
Canc Tog Back Fore
F1 MENU F2 F3 F4 F5 F6

AS FOUND



Sys Tree

CURRENT FUNCTION: CALM2 **SIMULATOR Svr** ALARM S C H P Z I

CALLAWAY NUCLEAR POWER RANGE CHANNEL
CALORIMETRIC CALCULATION SUMMARY
REAL-TIME

PAGE 2 OF 2
TIME
DATE

STEAM GENERATOR ENTHALPY CHANGE	LOOP 1		LOOP 2		LOOP 3		LOOP 4		
	VALUE	QUAL	VALUE	QUAL	VALUE	QUAL	VALUE	QUAL	UNITS
STEAM GEN. PRESSURE (PSIG)	988.7	GOOD	988.7	GOOD	988.6	GOOD	988.7	GOOD	PSIG
STEAM GEN. PRESSURE (PSIA)	1003.4	GOOD	1003.4	GOOD	1003.3	GOOD	1003.4	GOOD	PSIA
CORRESPONDING ENTHALPY (HG)	1192.8	GOOD	1192.8	GOOD	1192.8	GOOD	1192.8	GOOD	BTU/LBM
CORRESPONDING ENTHALPY (HF)	418.8	GOOD	419.5	GOOD	418.6	GOOD	418.9	GOOD	BTU/LBM
ENTHALPY RISE (HG - HF)	774.0	GOOD	773.3	GOOD	774.2	GOOD	773.9	GOOD	BTU/LBM
BLOWDOWN ENTHALPY	543.1	GOOD	543.1	GOOD	543.1	GOOD	543.1	GOOD	BTU/LBM
FEEDWATER TEMPERATURE	439.4	GOOD	440.0	GOOD	439.2	GOOD	439.5	GOOD	F

SUMMARY INFORMATION	LOOP 1		LOOP 2		LOOP 3		LOOP 4		
	VALUE	QUAL	VALUE	QUAL	VALUE	QUAL	VALUE	QUAL	UNITS
CORRECTED FEED FLOW	3959.5	GOOD	3959.7	GOOD	3961.1	GOOD	3960.5	GOOD	KLB/HR
CORRECTED STEAM FLOW	4058.2	GOOD	4021.0	GOOD	4057.6	GOOD	3976.6	GOOD	KLB/HR
CORRECTED BLOWDOWN FLOW	21.47	GOOD	21.47	GOOD	21.47	GOOD	21.47	GOOD	KLB/HR
MISMATCH	120.09	GOOD	82.80	GOOD	117.98	GOOD	37.55	GOOD	KLB/HR
TILTS	1.00	GOOD	1.00	GOOD	1.00	GOOD	1.00	GOOD	
AUCT. HIGHEST T AVG	585.3	GOOD							F
HIGHEST DIFF. TEMP	99.6	GOOD							%

Canc Tog Back Fore F1 MENU F2 F3 F4 F5 F6

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S7

JPM No:	No bank id yet	KSA No:	APE 060AA2.05
Revision Date:	01/25/2019	KSA Rating:	3.7/4.2
Job Title:	URO/SRO		
Duty:	SA – EFSAS		
Task Title:	Respond to Off-Normal Conditions		
Completion Time:	15 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☒ Simulator/Lab ☐ Plant ☐ Classroom

Method of Performance: ☐ Simulated ☒ Performed

☒ Alternate Path ☐ Time Critical ☐ RCA

References: OTA-RK-00020, Addendum 63B, control Room Radiation High CRVIS, Rev 0
OTO-SA-00001, EFSAS Verification and Restoration, Rev 41
OTA-SP-RM011, Radiation Monitor Control Panel RM-11, Rev 43

Tools / Equipment: None

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S7

Initial Conditions: Reactor Power is 100%. A CVCS mixed bed demin has been sluiced to radwaste and preparations are underway to fill the mixed bed with new resin.

Annunciator 62B, Area Radiation High, has just alarmed.

Initiating Cues: The CRS has directed you to respond to Control Room Annunciator(s).

Simulator Set up and/or Notes: Any MODE 1 IC. Close BG HIS-8245 CVCS Demin Outlet Valve.

(Running Scenario file ILT_JPM_S7 will perform the below actions)

- Fail CRVIS to Actuate by inserting the following malfunctions:
  - Automatic Actuation Signal
    - SA036D_CRVIS=0
    - SA036E_CRVIS=0
  - Manual Pushbuttons
    - X18I94A=0
    - X18I98A=0

- Insert the following Radiation Monitor Alarms as follows:
  - (Setup) IMF SDRE0005 to 5 mr/hr
  - (Pending) IMF GKRE0004 = 5.0 x 10^{-3} uCi/ml (5E-3)
  - (Pending) IMF GKRE0005 = 8.0 x 10^{-3} uCi/ml (8E-3)

Task Standard: Upon completion of this JPM, the applicant responded to Annunciator 62B (ARM HI) and when it is noticed that CRVIS should have actuated and did not, the applicant actuated one train of CRVIS and completed all critical steps correctly.

Start Time: _____

Stop Time: _____

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

S7

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of Annunciator 62B.		Applicant obtained a copy.	**S U** Comments:
2.	NOTE: A loss of control power to SD055A or SD055B may cause alarms on the following annunciator windows: • 62A, AREA RAD HIHI • 62B, AREA RAD HI • 62C, AREA RAD MON FAIL Annunciator 62B - Note prior to Step 3.1		Applicant read and placekept note.	**S U** Comments:
3.	CHECK the following AND DETERMINE the affected monitor: • SD055A, CTRL PNL -- AREA RADN MONITOR • SD055B, CTRL PNL -- AREA RADN MONITOR Annun 62B – Step 3.1	Note: Panels SD055A&B are not modeled and are represented by pictures. SDRE0005 is top row 5th from the left. When the Applicant arrives at the mockup and is reviewing the panel for indications CUE **"SDRE0005 yellow light is LIT".** Using pen, point to meter and indicate the pin is approximately midpoint of the meter face.		**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
4.	IF either panel has lost control power, ENSURE CLOSED the applicable breaker(s): SD055A PN0704, FU LS FEED TO - SD055A - RADIATION MONITOR AC INPUT THRU FUSE F1 PN0827, FU LS FEED TO - SD055A - RADIATION MONITOR SD055B PN0735, FU LS FEED TO - SD055B - RADIATION MONITOR AC INPUT PN0825, FU LS FEED TO - SD055B - RADIATION MONITOR Annun 62B – Step 3.2		Applicant N/A'ed step	**S U** Comments:
5.	Refer To the Rad Monitor Table following these steps AND PERFORM the following: • DETERMINE the alarming location. • CONFIRM the alarm using the indicated Computer Points. Annun 62B – Step 3.3		Applicant determined that the Radwaste Building is affected.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
6.	IF the affected area is accessible by plant personnel: 3.4.1. NOTIFY Radiation Protection to survey the area to determine actual radiation levels. 3.4.2. DISPATCH an operator to the area to assist RP in determining the source of increased radiation levels. Annun 62B – Step 3.4	**BOOTH OPERATOR:** **AS soon as the applicant returns from SD055A&B inspections in the back panel area: IMFs to cause GKRE0004/5 to read the values listed in the setup. Ensure Annunciators 61A, 61B, and 63B alarm**	Applicant notified Radiation Protection of ARM alarm in the Radwaste Building and dispatched an operator to assist RP.	**S U** Comments:
7.	Obtain a verified working copy of Annunciator 61A and per step 3.1 proceeded to the RM-11 and determined OTA-SP-RM011 Attachment 13 is appropriate.		Applicant obtained a copy of Annunciator 61A and proceeded to the RM-11 console. The applicant determined Attachment 13 of OTA-RM-00011 is the correct section to implement.	**S U** Comments:
8.	1. AUTOMATIC ACTIONS: a. On RED alarm of GAS Channel 043 or 053, CRVIS actuates. 2. IMMEDIATE ACTIONS: None OTA-SP-RM011 Attachment 13 – Step 1 & 2	Note: The applicant may try to actuate CRVIS at panel RL017/018 by pushing SA HS-9 and 13. Per the setup, the pushbuttons are failed.	Applicant reviewed Automatic Actions and Immediate Actions	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
9.	OPERATOR ACTIONS: NOTE: For YELLOW alarm of the Particulate Channels 041 and 051, and Iodine Channels 042 and 052,ESFAS trip function does NOT occur. a. IF alarm is YELLOW on the Particulate Channels 041 and 051, and Iodine Channels 042 and 052, NOTIFY Count Room to sample and determine the source. Attachment 13 – Step 3.a and NOTE prior to step 3.a		Applicant determined a RED alarm is present and proceed on to step 3.b	**S U** Comments:
10.	IF alarm is RED on GAS channels 043 or 053, ENSURE CRVIS has actuated by the following: • Visual observation of ESFAS status panels • Main Control Board Annunciator 63A, CRVIS Attachment 13 – Step 3b	Note: The applicant may try to actuate CRVIS at panel RL017/018 by pushing SA HS-9 and 13. Per the setup, the pushbuttons are failed. NOTE: the first step of Annunciator 63B is ENSURE CRVIS actuation per OTO-SA-00001, Engineered Safety Features Actuation Verification and Restoration and is not listed here.	Applicant determined that a CRVIS should have occurred but did not and proceeds to OTO-SA-00001.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
11.	CHECK Applicable ESF Components - PROPER EMERGENCY ALIGNMENT - Refer To the following Attachment(s) as necessary: OTO-SA-00001, Step 1	If asked what CVRIS train should be placed in service, respond "**its up to your discretion"** Note: Attachment AB and AC are very similar only separated by Train and component ID. Only Attachment AB is listed in the JPM but either are successful and B Train manual actuation can be followed by using the below JPM steps.	Applicant determined that either ● Attachment AB, CRVIS Train A Verification OR ● Attachment AC, CRVIS Train B Verification Should be entered.	**S U** Comments:
12.	NOTE See numbered NOTES on the last page of this Attachment. OTO-SA-00001, Attachment AB, Note prior to Step 1	Attachment AB items are bulleted and can be performed in any order.	Applicant read and placekept note	**S U** Comments:
*13.	AB1. CRVIS Train A (SA066X): CGK01A, CONTROL BLDG EXH FAN is stopped OTO-SA-00001, Step 1		Applicant stopped CGK01A by taking GK HIS-16 to the STOP position	**S U** Comments:
*14.	AB1. CRVIS Train A (SA066X): CGK02A, ACCESS CONTROL EXH FAN is stopped OTO-SA-00001, Step 1		Applicant stopped CGK02A by taking GK HIS-47 to the STOP position	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*15.	AB1. CRVIS Train A (SA066X): 14-E CGK03A, CONTROL RM FILTRATION FAN 14-F GKHZ19A, FILTRATION FAN INLET 14-G GKHZ19B, FILTRATION FAN OUTLET 14-H GKHZ19C, A/C EQUIP RM EXH 14-J GKHZ19D, A/C EQUIP RM SUPPLY OTO-SA-00001, Step 1		Applicant started or opened multiple fans/dampers by taking GK HIS-19 to the OPEN/RUN position	**S U** Comments:
*16.	AB1. CRVIS Train A (SA066X): 15-E CGK04A, CONTROL RM PRESSURIZATION FAN 15-F GKHZ75A, PRESSURIZATION FILTER TRAIN INLET 15-G GKHZ75B, PRESSURIZATION FILTER TRAIN OUTLET(14-D GKHZ75C, ESF SWGR ROOMS X-CONN OTO-SA-00001, Step 1		Applicant started or opened multiple fans/dampers by taking GK HIS-75 to the OPEN/RUN position	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*17.	AB1. CRVIS Train A (SA066X): SGK02, CONTROL BLDG SUPPLY UNIT OTO-SA-00001, Step 1		Applicant stopped SGK02 by taking GK HIS-8 to the STOP position	**S** **U** Comments:
18.	AB1. CRVIS Train A (SA066X): 16-E SGK04A, CONTROL RM A/C UNIT 16-F GKHZ29A, A/C UNIT INLET 16-G GKHZ29B, A/C UNIT OUTLET OTO-SA-00001, Step 1		Applicant ensured multiple fans/dampers were open / running.	**S** **U** Comments:
19.	AB1. CRVIS Train A (SA066X): 17-D SGK05A, CLASS IE A/C UNIT OTO-SA-00001, Step 1		Applicant ensured SGK05A was running by observing RED Light LIT and GREEN Light OFF.	**S** **U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*20.	AB1. CRVIS Train A (SA066X): 15-H GKHZ13A, MAIN SUPPLY DAMPER 15-J GKHZ13B, MAIN EXH DAMPER 15-K GKHZ13C, MAIN EXH DAMPER 15-L GKHZ13D, MAIN SUPPLY DAMPER 16-H GKHZ13E, MAIN EXH DAMPER 16-J GKHZ13F, MAIN SUPPLY DAMPER 16-K GKHZ13G, MAIN EXH DAMPER 16-L GKHZ13H, MAIN EXH DAMPER OTO-SA-00001, Step 1		Applicant closed multiple dampers by taking GK HIS-13 to the CLOSED position	**S U** Comments
*21.	AB1. CRVIS Train A (SA066X): 14-K GKHZ59A, LOWER SPREADING RM SUPPLY 14-L GKHZ59B, LOWER SPREADING RM EXH OTO-SA-00001, Step 1		Applicant closed multiple dampers by taking GK HIS-59 to the CLOSED position	**S U** Comments:
*22.	AB1. CRVIS Train A (SA066X): 17-G GKHZ160, SPREADING RMS TO CR FILTER TRAIN OTO-SA-00001, Step 1		Applicant opened GKHZ160 by taking GK HIS-160 to the OPEN position	**S U** Comments:

*Critical Step

S7

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*23.	AB1. CRVIS Train A (SA066X): 17-H GKHZ172A, CHASE & TK AREA SUPPLY 17-J GKHZ172B, CHASE & TK AREA EXH OTO-SA-00001, Step 1		Applicant closed multiple dampers by taking GK HIS-172 to the CLOSED position	**S U** Comments:
*24	AB1. CRVIS Train A (SA066X): 17-K GKHZ174A, HOT LAB/FUME HOOD EXH 17-L GKHZ174B, HOT LAB/COUNT RM SUPPLY OTO-SA-00001, Step 1		Applicant closed multiple dampers by taking GK HIS-174 to the CLOSED position	**S U** Comments:
25.	**THE JPM IS COMPLETE**	Record Stop Time on Page 2		**S U** Comments:

*Critical Step

Initial Conditions: Reactor Power is 100%. A CVCS mixed bed demin has been sluiced to radwaste and preparations are underway to fill the mixed bed with new resin.

Annunciator 62B, Area Radiation High, has just alarmed.

Initiating Cues: The CRS has directed you to respond to Control Room Annunciator(s).

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P1

JPM No:	AB-NLO-P-001(A)	KSA No:	041A2.02
Revision Date:	01/25/2019	KSA Rating:	3.6 / 3.9
Job Title:	OT/URO/SRO		
Duty:	Main Steam System		
Task Title:	Isolate a Failed Open Atmospheric Steam Dump		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☐ Simulator/Lab ☒ Plant ☐ Classroom

Method of Performance: ☒ Simulated ☐ Performed

☒ Alternate Path ☐ Time Critical ☒ RCA

References: OTO-AB-00001, Steam Dump Malfunction, Rev 18

Tools / Equipment: PPE

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P1

Initial Conditions: A Reactor trip occurred from 100% power.

The crew has entered E-2, Faulted Steam Generator Isolation, due to Atmospheric Steam Dumps, AB PV-1 AND AB PV-4, failing open.

The valves cannot be closed from the Control Room.

Initiating Cues: The Control Room Supervisor (CRS) directs you to close AB PV-1 (SG A) first, then AB PV-4 (SG D) using Step 3 RNO of OTO-AB-00001, Steam Dump Malfunction.

Inform the CRS when both valves are closed.

Task Standard: Upon completion of this JPM, the applicant will have isolated air to AB PV-1 and AB PV-4, which closed AB PV-1 but not AB PV-4. The applicant must then isolate AB PV-4 by closing the manual isolation valve AB-0007 and have completed all critical steps correctly.

Start Time: _____

Stop Time: _____

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of OTO-AB-00001, Steam Dump Malfunction.	Provide applicant with procedure copy	Applicant obtained procedure copy	**S U** Comments:
*2.	Close the Air/N2 Isolation Valve for the affected SG ASD: • ABV0733 (SG A) Step 3 RNO a.	**ABV0733 is in the position you described**	Applicant closed ABV0733 by rotating the handwheel in the clockwise direction	**S U** Comments:
*3.	Open the Air/N2 Drain Valve for the affected SG ASD: • ABV0734 (SG A) Step 3 RNO b.	**ABV0734 is in the position you described** **AB PV-1 indicates closed and steam flow can NOT be heard through the ASD** May contact the control room at this time	Applicant opened ABV0734 by rotating the handwheel in the counterclockwise direction.	**S U** Comments:
4.	Close the Air/N2 Isolation Valve for the affected SG ASD: • ABV0739 (SG D) Step 3 RNO a.	**ABV0739 is in the position you described**	Applicant closed ABV0739 by rotating the handwheel in the clockwise direction	**S U** Comments:
5.	Open the Air/N2 Drain Valve for the affected SG ASD: • ABV0740 (SG D) Step 3 RNO b.	**ABV0740 is in the position you described** **"AB PV-4 indicates open and steam flow can be heard through the ASD".**	Applicant opened ABV0740 by rotating the handwheel in the counterclockwise direction.	**S U** Comments:
		The next step is the start of the alternate path. The applicant must recognize that AB PV-4 is NOT isolated and take additional actions to isolate the valve.		

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*6.	If the SG ASD is not closed, then unlock and close the manual isolation valve for the affected SG ASD: • ABV0007 (SG D) Step 3 RNO	After ABV0007 is unlocked and closed: **"ABV0007 is in the position you described"** After ABV0007 is closed **"steam flow can NOT be heard through the ASD"** May contact the control room at this time	Applicant determined AB PV-4 is NOT closed and unlocked and closed ABV0007 by rotating the handwheel in the clockwise direction.	**S U** Comments:
7.	Notify CRS that AB PV-1 and AB PV-4 have been closed/isolated	CRS acknowledges	Applicant notified CRS that AB PV-1 was closed and AB PV-4 has been manually isolated	**S U** Comments:
8.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments

*Critical Step

Initial Conditions: A Reactor trip occurred from 100% power.

The crew has entered E-2, Faulted Steam Generator Isolation, due to Atmospheric Steam Dumps, AB PV-1 AND AB PV-4, failing open.

The valves cannot be closed from the Control Room.

Initiating Cues: The Control Room Supervisor (CRS) directs you to close AB PV-1 (SG A) first, then AB PV-4 (SG D) using Step 3 RNO of OTO-AB-00001, Steam Dump Malfunction.

Inform the CRS when both valves are closed.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P2

JPM No:	URO-AEO-07-P024J (A)	KSA No:	004 2.1.30
Revision Date:	11/16/2018	KSA Rating:	4.4/4.0
Job Title:	OT/URO/SRO		
Duty:	Unit Reactor Operator		
Task Title:	Abnormal / Emergency Operations		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☐ Simulator/Lab ☒ Plant ☐ Classroom

Method of Performance: ☒ Simulated ☐ Performed

☒ Alternate Path ☐ Time Critical ☒ RCA

References: FR-S.1, Response to Nuclear Power Generation, Rev 12

Tools / Equipment: PPE

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P2

Initial Conditions: The Reactor failed to trip following receipt of a valid trip signal. The crew attempted to manually trip the Reactor, but was unsuccessful.

The "A" CCP is running and BOTH Boric Acid Transfer pumps are running.

BG-HIS-8104 is OPEN and Emergency Boration Flow is 0 GPM.

Boration from the RWST is unavailable.

Initiating Cues: The Control Room Supervisor directs you to initiate Local Emergency Boration of the RCS per Step 4.b RNO "Normal or alternate boration flow path" on page 5 of FR-S.1, Response to Nuclear Power Generation/ATWS. Steps 4.b RNO substeps a) – d) are complete.

Inform the Control Room Supervisor when Emergency Boration is established.

Task Standard: Upon completion of this JPM, the applicant will have aligned a boration flow path from a boric acid source, through alternate boration valve BGV0177, to the Reactor Coolant System. In addition, the applicant will have placed both Generator and Motor Circuit Control Breakers in Pull To Lock on panels SF103A&B and have completed all critical steps correctly.

Start Time: _____

Stop Time: _____

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a verified working copy of FR-S.1, Response to Nuclear Power Generation / ATWS.	Provide Applicant with procedure copy	Applicant obtained procedure copy	**S U** Comments:
2.	Normal or alternate boration flow path: a) PLACE RCS Makeup Control switch in STOP position: ● BG HS-26 b) OPEN Boric Acid To Boric Acid Blending Tee valve: ● BG HIS-110A c) OPEN Makeup To VCT Outlet valve: ● BG HIS-110B d) START Boric Acid Transfer Pumps: ● BG HIS-5A ● BG HIS-6A Step 4 RNO substeps a-d	Given in initial conditions **"substeps a) through d) are complete.**	Applicant proceeded to step 4.b.RNO substep e as the initial cue states that steps a) - d) of the "Normal or alternate boration flow path:" section are complete.	**S U** Comments:
*3.	e) CHECK Boric Acid Flow greater than 30 GPM: ● BG FR-110 IF boric acid flow is less than 30 GPM, THEN locally UNLOCK and OPEN CVCS Alternate Immediate Boration valve: ● BGV0177 (AB-1974 Plant North side SI pp rm A) f) MAINTAIN charging flow greater than emergency boration flow. Step 4 RNO substeps e-f	Role Play as the RO and report **"Boric Acid Flow is 0 gpm."** After BGV0177 is opened, Role Play as the RO and report when asked **"Boric Acid Flow is 45 gpm."** **After BGV0177 is open, Role Play as RO "The reactor has failed to Trip, Perform Step 6 RNO of FR-S.1"**	Applicant unlocked and OPENED (by turning counterclockwise) BGV0177.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
4.	Check if the following Trips have occurred: a. Locally TRIP Reactor (Reactor Trip Switchgear): ●PUSH breaker TRIP buttons on the following: ●Reactor Trip Breakers AND ●Bypass Trip Breakers Step 6 RNO a	**Cue: "There is NO change in voltage and no noise is heard".** **Note: Do not allow the applicant to open the doors.**	Applicant pushed TRIP pushbuttons on the ●Reactor Trip Breakers AND ●Bypass Trip Breakers	**S U** Comments:
*5.	Check if the following Trips have occurred: IF breaker(s) will NOT trip, THEN PLACE the following MG Set breakers on Panels SF103A and SF103B in PULL-TO-LOCK (AB-2026 MG Set room): ●Generator Circuit Breaker Control switches AND ●Motor Circuit Breaker Control switches Step 6 RNO a	**START OF ALTERNATE PATH** After the applicant placed each breaker in Pull To Lock, **"the breaker is in the position you indicate"** **If asked and after the applicant placed either breaker (Generator or Motor) in PTL for a given MG set, "generator line voltage and or amps go to zero". For breaker light position "Red light OFF and Green Light ON".** **Note: there are a total of 4 breakers that are required for this critical step. Generator Circuit Breaker Control and Motor Circuit Breaker control switches on each SF103 A and B.**	Applicant proceeded to Panels SF103A and SF103B and placed the following MG Set Breakers in Pull To Lock: ●Generator Circuit Breaker Control switches AND ●Motor Circuit Breaker Control switches	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
6.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments

*Critical Step

Initial Conditions:	The Reactor failed to trip following receipt of a valid trip signal. The crew attempted to manually trip the Reactor, but was unsuccessful. The "A" CCP is running and BOTH Boric Acid Transfer pumps are running. BG-HIS-8104 is OPEN and Emergency Boration Flow is 0 GPM. Boration from the RWST is unavailable.
Initiating Cues:	The Control Room Supervisor directs you to initiate Local Emergency Boration of the RCS per Step 4.b RNO "Normal or alternate boration flow path" on page 5 of FR-S.1, Response to Nuclear Power Generation/ATWS. Steps 4.b RNO substeps a) – d) are complete. Inform the Control Room Supervisor when Emergency Boration is established.

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P3

JPM No:	BG-NLO-R-001	KSA No:	002G2.1.20
Revision Date:	11/19/2018	KSA Rating:	4.6/4.6
Job Title:	OT/URO/SRO		
Duty:	Reactor Coolant System		
Task Title:	Shift and vent CVCS seal water injection filters		
Completion Time:	10 minutes		

The performance of this task was evaluated against the standards contained in this JPM and determined to be:

☐ SATISFACTORY ☐ UNSATISFACTORY

Reason, if UNSATISFACTORY:

_____

_____

Evaluator Signature: _____ Date: _____

Task Performer: _____

Location of Performance:

☐ Control Room ☐ Simulator/Lab ☒ Plant ☐ Classroom

Method of Performance: ☒ Simulated ☐ Performed

☐ Alternate Path ☐ Time Critical ☒ RCA

References: OTN-BG-00005, CVCS Filters, Rev 10
Surveys for rooms 1306A & 1306B

Tools / Equipment: PPE

CALLAWAY ENERGY CENTER
JOB PERFORMANCE MEASURE

P3

Initial Conditions: The Plant is in MODE 1. 'A' CVCS seal water injection filter has a high D/P and needs to be changed out. 'B' seal water injection filter has been filled, vented, and is in standby.

Initiating Cues: The CRS directs you to place 'B' CVCS seal water injection filter in service and place 'A' filter in standby per OTN-BG-00005, CVCS Filters, section 5.1. Inform the CRS when complete.

Simulator Set up and/or Note(s): None

Task Standard: Upon completion of this JPM, the 'B' CVCS seal water injection filter will have been placed in service and 'A' placed in standby with all critical steps completed correctly.

Start Time: _____

Stop Time: _____

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
1.	Obtain a working copy of OTN-BG-00005, CVCS Filters	Provide applicant with procedure copy	Applicant obtained a procedure copy	**S U** Comments:
2.	Review precautions, limitations, and prerequisites	If asked, "Radwaste and RP have been notified"	Applicant reviewed and place kept section 3.0 and 4.0.	**S U** Comments:
3.	If the valves in Step 5.1.1 are NOT in the desired position, the SM/CRS should be contacted to determine the required action. NOTE before Step 5.1		Applicant read and placekept.	**S U** Comments:
4.	Improper sequence of steps may cause a loss of RCP Seal Injection or increased RCS leakage. CAUTION before Step 5.1.1		Applicant read and placekept.	**S U** Comments:
5.	PERFORM the following (to confirm FBG04B is in standby): • CHECK BGV0105, CVCS SEAL WTR INJ FLTR B IN ISO, OPEN. • CHECK BGV0106, CVCS SEAL WTR INJ FLTR B OUT ISO, CLOSED. Step 5.1	Cue: "BGV0105 stem is up." Cue: "BGV0106 stem is down."	Applicant observed valve stem indication.	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
*6.	Slowly OPEN BGV0106. Step 5.1.2	Cue: "Handle is turning." PAUSE "Handle stops, stem is up."	Applicant rotated BGV0106 handle in counter-clockwise (OPEN) direction.	**S U** Comments: NOTE speed of valve manipulation is not important for JPM. Applicant may open valve incrementally
7.	MONITOR for flow through FBG04B by observing a rise on BGPIS0141, SEAL WTR INJ FLTR B. Step 5.1.3	Cue: Using a pointer indicate pressure on BGPIS0141 is slowly rising from the initial value of zero.	Applicant observed BGPIS0141 indication	**S U** Comments:
*8.	CLOSE BGV0102, CVCS SEAL WTR INJ FLTR A OUT ISO. Step 5.1.4	Cue: "Handle is turning." PAUSE "Handle stops, stem is down."	Applicant rotated BGV0102 handle in clockwise (CLOSED) direction.	**S U** Comments:
9.	ENSURE the d/p on BGPIS0141 is less than 28 psid. Step 5.1.5	Cue: Using a pointer indicate pressure is ~15 psid on BGPIS0141.	Applicant observed BGPIS0141 indication	**S U** Comments:

*Critical Step

JPM STEP	TASK ELEMENT	EXAMINER CUE	PERFORMANCE STANDARD	SCORE
10.	ADJUST flow to RCP Seals per OTN-BG-00001, Chemical and Volume Control System. Step 5.1.6	Cue: "Understand filters are swapped."	Applicant called the Control Room Supervisor	**S U** Comments:
11.	**THE JPM IS COMPLETE**	Record Stop time on Page 2		**S U** Comments

*Critical Step

Initial Conditions: The Plant is in MODE 1. 'A' CVCS seal water injection filter has a high D/P and needs to be changed out. 'B' seal water injection filter has been filled, vented, and is in standby.

Initiating Cues: The CRS directs you to place 'B' CVCS seal water injection filter in service and place 'A' filter in standby per OTN-BG-00005, CVCS Filters, section 5.1. Inform the CRS when complete.

Facility: Callaway Scenario No. 2, Rev 5 Op-Test No.: 2019-1

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: Mode 2 at 10-8 AMPS, BOC

Turnover: No equipment out of service. The crew is directed to withdraw control rods to raise power to 1% per OTG-ZZ-00003, Plant Startup hot Zero Power to 30% Power – IPTE, step 5.2.7a.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	SRO (R) RO (R)	Withdraw control rods to raise power to 1% OTG-ZZ-00003, Plant Startup Hot Zero Power to 30% Power – IPTE
2	AL / X05I157R	SRO (C) BOP (C) RO (C)	Inadvertent Start of "B" MDAFP
3	AB / ABPV0001A_1	SRO (C) BOP (C)	Atmospheric Steam Dump 'A' fails open with manual control OTO-AB-00001, Steam Dump Malfunction (Tech Spec 3.7.4)
4	BB / CRCPV2_1	SRO (C) RO (C) BOP (C)	"A" RCP High Vibration OTO-BB-00002, RCP Off Normal (Tech Spec 3.4.4)
5	BB / BB001_A	SRO (M) RO (M) BOP (M)	RCS Leak that becomes DBA LOCA. RX Trip E-0, Reactor Trip or Safety Injection, then E-1, Loss of Primary or Secondary Coolant, then ES-1.3, Transfer to Cold Leg Recirculation CT-16, Manually Trip RCPs CT-36 Transfer to Cold Leg Recirculation
6	SA / SIS_A_Block_Auto SIS_B_Block_Auto	SRO (I) RO (I)	Safety Injection fails to Automatically Actuate CT-2, Manually actuate SI
7	SB / PEG01C_PEJ01A_SEQ PEG01D_PEJ01B_SEQ	SRO (C) RO (C)	Both RHR pump fails to Auto start CT-5, Manually start at least one low-head ECCS pump

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5-8)	6
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal events (2-4)	3
4. Major transients (1-2)	1
5. EOPs entered/requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	0
7. Critical tasks (2-3)	3

Scenario #2 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

The Plant is stable in Mode 2 at 10^{-8} AMPS. The crew has been directed to withdraw control rods to raise power to 1% per OTG-ZZ-00003, Plant Startup hot Zero Power to 30% Power – IPTE, step 5.2.7a.

Once power is raised to ~1%, the 'B' MDAFP will autostart (due to scaffold builders bumping the local breaker (NB0205)) and feed "A" and "D" Steam Generators. The crew will respond and secure the 'B' MDAFP and/or close the respective flow control valves. The RO will insert rods to stabilize reactor power.

After the crew has addressed "B" MDAFP, the 'A' Atmospheric Steam Dump fails open. The BOP operator should close the dump valve using manual control. The crew should enter OTO-AB-00001, Steam Dump Malfunction. This failure will result in Technical Specification 3.7.4 not being met.

After the ASD is addressed including its Technical Specifications, a mechanical failure causes ‘A’ RCP vibrations to rise rapidly above the immediate trip setpoint. This will drive the crew to enter OTO-BB-00002, RCP Off Normal. The crew will recognize the need to immediately trip the 'A' RCP. This failure will result in Technical Specification 3.4.4 not being met.

Due to the ‘A’ RCP vibrations, a leak develops on the Loop 1 Hot Leg piping. The crew may respond by entering OTO-BB-00003, RCS Excessive Leakage, but the leak continues to grow quickly into a DBA LOCA. The Crew will respond IAW E-0, Reactor Trip or Safety Injection. The crew will transition to E-1, Loss of Reactor or Secondary Coolant. When RWST Level lowers to 36%, the crew will transition to ES-1.3 and complete the ECCS swap from the RWST to the Containment sumps. Once completed the crew will return to E-1, Loss of Reactor or Secondary Coolant.

During the LOCA, Safety Injection will fail to automatically actuate and both "A" and "B" RHR pumps will fail to auto start.

The scenario may be terminated after the transition back to E-1 from ES-1.3.

Critical Tasks:

Critical Tasks	Manually actuate at least one train of SIS-actuated safeguards equipment before transition to E-1, E-2 or E-3 series or transition to any FRG.	Establish flow from at least one RHR Pump before completion of E-0 Attachment A
EVENT	6	7
Safety significance	Failure to manually actuate SI under the postulated conditions constitutes mis-operation or incorrect crew performance in which the crew does not prevent "degraded emergency core cooling system (ECCS)…capacity." In this case, SI can be manually actuated from the control room. Therefore, failure to manually actuate SI also represents a failure by the crew to "demonstrate the following abilities: • Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS)…capacity) • Recognize a failure or an incorrect automatic actuation of an ESF system or component Take one or more actions that would prevent a challenge to plant safety"	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." 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.
Cueing	Indication and/or annunciation that that SI is required • PRZR pressure or SG pressure less than SI actuation setpoint • Containment pressure greater than SI actuation setpoint • Subcooled margin less than the foldout page criterion for SI actuation in ES-0.1 • PRZR water level less than the foldout page criterion for SI actuation in ES-0.1 No indication or annunciation that SI is actuated	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 actuate at least one train of SI • SB HS-27 • SB HS-28	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
Performance feedback	Indication that both Trains of SI – Actuated • LOCA Sequencer annunciator 30A – Lit • LOCA Sequencer annunciator 30B – Lit • SB069 SI Actuate Red Light – Lit SOLID (NOT blinking)	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
Justification for the chosen performance limit	The crew has had ample opportunity to recognize the need for SI and the fact that SI has not automatically actuated. Given the postulated plant conditions, transition from E-0 to ES-0.1 constitutes an error in using the E-0 procedure. The crew is in the wrong procedure; however, the crew is allowed to recover from this error up through Step 3.a of ES-0.1. The ERG network is designed to "catch" errors in procedure usage. Step 3.a is designed to get the crew back to E-0, if that is in fact where the crew should be. If the crew members pass through Step 3.a and remain in ES-0.1, they have missed the last step that would return them to the correct procedure.	"before completion of Attachment A of E-0" is in accordance with the PWR Owners Group Emergency Response Guidelines. It allows enough time for the crew to take the correct action while at the same time preventing avoidable adverse consequences.
PWR Owners Group Appendix	CT-2, Manually actuate SI	CT-5, Manually start at least one low-head ECCS pump

Scenario #2 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Critical Tasks	Trip all RCPs within 5 minutes of meeting RCP trip criteria.	Transfer to Cold Leg Recirculation by completing ES-1.3 steps 1-4 before transferring back to E-1
EVENT	5	5
Safety significance	Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents misoperation or incorrect crew performance in which the crew has failed to prevent "degradation of...{the fuel cladding} ...barrier to fission product release" and which leads to "violation of the facility license condition."	Operation or correct performance prevents degraded ECCS or emergency power Capacity • 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
Cueing	Indications of a SBLOCA AND Indication and/or annunciation of safety injection AND Indication and/or annunciation that at least one CCP/SI pump is running AND Indication that the RCP trip criteria are met Note: The 5 minute trip criteria will start once the first CCP or SI pump is started.	Indication and/or annunciation that safety injection is actuated AND Indication and/or annunciation that RWST level is at or below the [plant-specific value corresponding to ERG Footnote U.02]4 AND Indication that containment sump level is at or above the minimum level required for transfer to cold leg recirculation
Performance indicator	Manipulation of controls as required to trip all RCPs • RCP breaker position lights indicate breaker open	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 providing suction to SIPs and CCPs.
Performance feedback	Indication that all RCPs are stopped • RCP breaker position lights • RCP flow decreasing • RCP motor amps decreasing	Flow indication of the recirculation of containment sump water through the RHR heat exchangers and into the RCS
Justification for the chosen performance limit	In a letter to the NRC titled "Justification of the Manual RCP Trip for Small Break LOCA Events" (OG-117, March 1984) (also known as the Sheppard letter), the WOG provided the required assurance based on the results of the analyses performed in conjunction with WCAP-9584. The WOG showed that for all Westinghouse plants, more than two minutes were available between onset of the trip criteria and depletion of RCS inventory to the critical inventory. In fact, additional analyses sponsored by the WOG in connection with OG-117 conservatively showed that manual RCP trip could be delayed for five minutes beyond the onset of the RCP trip criteria without incurring any adverse consequence.	Establishing ECCS recirculation flow at least consistent with minimum safeguards Preventing the following, with respect to the ECCS pumps: – Cavitation – Loss of suction – Air binding
PWR Owners Group Appendix	CT-16, Manually Trip RCPs Note: CT-16 may not be counted towards the minimum CT count if it is run after another scenario is run that contains this same CT, depending on order and selection of scenarios used during exam week. It is still a CT, however.	CT-36 Transfer to cold leg recirculation

"NOTE: (Per NUREG-1021, Appendix D) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review. "

References
OTG-ZZ-00003, Plant Startup hot Zero Power to 30% Power – IPTE
OTO-SA-00001, EFSAS Verification and Restoration
OTO-BB-00002, RCP Off Normal
OTO-AD-00001, Steam Dump Malfunction
E-0, Reactor Trip or Safety Injection
E-1, Loss of Primary or Secondary Coolant
ES-1.3, Transfer to Cold Leg Recirculation
Technical Specification 3.7.4 Atmospheric Steam Dump Valves
Technical Specification 3.7.5 AFW System
Technical Specification 3.4.4 RCS Loops – Modes 1 and 2
ODP-ZZ-00025, EOP/OTO User's Guide

PRA Systems, Events or Operator Actions

- Small LOCA is a 16% contribution to CDF
- Medium LOCA is a 19% contribution to CDF

Top 10 Callaway Risk Important Systems (F-V)

8. Residual Heat Removal (EJ)

Scenario Simulator Lesson Plan
Callaway 2019-1 NRC Scenario #2, Rev. 5

Scenario Setup Guide:

- Load 18-05 (IC163 is setput for the following conditions)
- Initialize at 10-8 AMPS with the following rod positions:
  ALL SHUTDOWN BANKS to 228 STEPS.
  CONTROL BANKS A & B to 228 STEPS.
  CONTROL BANK C to 215 STEPS.
  CONTROL BANK D to ~84 STEPS.

==========SCENARIO PRELOADS / SETUP ITEMS==========

Pre-Load: Block Auto SI both trains, RHR pumps (both) Fail to start on sequencer

- Expert Command: insert SIS_A_Block_Auto 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SIS_B_Block_Auto 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert PEG01C_PEJ01A_SEQ 2 delay=0 ramp=0 on=0 off=0
- Expert Command: insert PEG01D_PEJ01B_SEQ 2 delay=0 ramp=0 on=0 off=0

========== EVENT 1 ==========
N/A
========== EVENT 2 ==========

EVENT 2: Inadvertant Start of B MDAFP

To insert the Inadvertant Start of B MDAFP

- Expert Command: insert X05I157R 1 delay=0 ramp=0 on=0 off=0

To delete the Inadvertant Start of B MDAFP

- Expert Command: delia X05I157R 2 delay=2

==========EVENT 3 ==========

Fail ASD A open w/ manual control

- Expert Command: insert ABPV0001A_1 1 delay=0 ramp=30 on=0 off=0
- Expert Command: insert ANNUN_F109 1 delay=1 ramp=0 on=0 off=0

==========EVENT 4 ==========

RCP A shaft vibration

- CRCPV2_1 Value = 20 Ramp =120

==========EVENT 5 ==========

RCS Leak that becomes a DBA LOCA ((7500 gpm over 6 minutes then to 285000 gpm over the next 2 minutes)

- Expert Command: insert BB001_A 7500 delay=0 ramp=360 on=0 off=0
- Expert Command: insert ANNUN_A088 2 delay=0 ramp=0 on=0 off=0
- Expert Command: insert ANNUN_C088 2 delay=0 ramp=0 on=0 off=0

Leak rate rises to 285000 gpm over next 2 minutes (after a delay of 360 from the first BB001 insertion)

- Expert Command: insert BB001_A 285000 delay=0 ramp=120 on=0 off=0

==========EVENT 6==========

Both Trains of Safety Injection Fail to automatically actuate (Preloaded)

==========EVENT 7==========

Both RHR Pumps fail to auto start (Preloaded)

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • N/A		
Indications Available • Raising Nuclear Instrument Count rates • DPRI rod positions • Individual rod position step counters		
		OTG-ZZ-00003
OTG-ZZ-00003	**CRS**	Implement OTG-ZZ-00003, PLANT STARTUP HOT ZERO POWER TO 30% POWER - IPTE
	RO	Step 5.2.7. PERFORM the following: a. INITIATE raising Reactor power to less than 1%.
	RO	Verify SE-HS-9 is in the Man Position and then using SF-HS-2 to the withdraw position (Down direction) withdraw rods in increments to raise power to ~1%.
NOTE		**At Lead Examiner's discretion move to the next Event**

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:
• IMFs
  • To insert the Inadvertant Start of B MDAFP
  o Expert Command: insert X05I157R 1 delay=0 ramp=0 on=0 off=0
  • To delete the Inadvertant Start of B MDAFP
  o Expert Command: delia X05I157R 2 delay=2		

Indications Available • Annunciator 127A, AFW Pump Suction Pressure Low • Annunciator 108C &111C, SG A & D Level Deviation • Rising SG level on A and D SGs • AFW Flow indication to A and D SGs on RL005		
OTA-RK-00026, Addendum 127A AFW Pump Suction Pressure Low		
Annun 127A	**CRS**	Implement OTA-RK-00026, Addendum 127A AFW Pump Suction Pressure Low
Booth Operator		Call the control room and role play and report as a "scaffold builder foreman near NB02 and a piece of our equipment hit a handswitch – We heard a large metal spring action sound. We are standing by in the area waiting further instructions".
		NOTE: The instruments for this alarm are at the suction to each AFP. IF a valid LSP signal exists, annunciator window 127C, AFW SUCT SWITCH TO ESW, will be in alarm.
	BOP	Step 3.1 - IF window 127C is in alarm, Refer To Addendum 127C, Auxiliary Feedwater Suction Switch to ESW, while continuing with this procedure. N/A and continues to step 3.2
	BOP	Step 3.2 - DETERMINE the affected pump using the following (on RL005): • AL PI-24A, MD AFP B SUCT PRESS

Proc /Time	Position	Applicant's Actions or Behavior
	BOP	Step 3.3 - IF AFP suction valve lineup is in question, ENSURE the lineup (on RL005), as follows: MDAFP B • ALHV0034, using AL HIS-34A, CST TO MD AFP B ALHV0030, using AL HIS-30A, ESW TO MD AFP B NO problem with the suction lineup exists – continues to step 3.4
	BOP	Step 3.4 - IF AFP operation is in question: 3.4.1. CHECK the following: MDAFP B ALI0021, Motor Amps (Comp Pt) AFP 1B, Suction Pressure AL PI-24A, Discharge Pressure AL PI-15A AFW flow to the A and D SG is present as read on • AL FI-2A, AFW TO SG A FLOW • AL FI-1A, AFW TO SG D FLOW 3.4.2 CHECK AP LI-4A, CST LEV, (RL005).
	BOP	Step 3.5 - IF a valid Aux Feed Pump problem exists, STOP the affected AFP(s) as follows: 3.5.2. STOP MDAFP B by placing AL HIS-22A, MDAFP B in PTL.
NOTE		It is acceptable and expected that the crew places the "B" MDAFP HS (AL HIS 22A) in PTL and / or take the "B" MDAFP FCV to the A and D SGs (AL HK-7A & 5A respectively) to Manual and Close.
	RO	Drive in control rods to stabilize reactor power (from the startup).

Proc /Time	Position	Applicant's Actions or Behavior
	CRS	***This event will not be counted as one of the required Technical Specification opportunities due to the fact that the initial conditions of 2 different scenarios have this specific T.S. condition not met. However the applicant must assess Technical Specifications associated with this malfunctions correctly which are as follows:*** ***If AL HIS-22A, MDAFP B is in PTL, then T.S. Condition 3.7.5 Condition C is not met and Required Action C.1 to restore AFW train to operable status within 72 hours is applicable.*** ***If AL HK-7A & 5A (FCV to the A and D SGs respectively) are taken to Manual and Close, the train of AFW is still operable with NO Technical Specification actions required.***
NOTE		**At Lead Examiner's discretion move to the next Event.**

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMFs •Expert Command: insert ABPV0001A_1 1 delay=0 ramp=30 on=0 off=0 •Expert Command: insert ANNUN_F109 1 delay=1 ramp=0 on=0 off=0		
Indications Available Annunciator 109F, Steam Generator Power Operated Relief Valve Open		
	OTO-AB-00001	
OTO-AB-00001	**CRS**	Implement OTO-AB-00001, Steam Dump Malfunction
	RO	Step 1 - CHECK Reactor Power - LESS THAN 100%. • SE NI-41B • SE NI-42B • SE NI-43B • SE NI-44B • BB TI-411A (ΔT) • BB TI-421A (ΔT) • BB TI-431A (ΔT) • BB TI-441A (ΔT)
	BOP	Step 2 - CHECK At Least One SG ASD - FAILED OPEN
	BOP	Step 3 - PLACE The Affected SG ASD Controller In Manual And CLOSE The Valve: ● AB PIC-1A (SG A)
	RO / BOP	Step 4 - NOTIFY Count Room Technician Of Opening And Closing Times Of The SG ASD
	BOP	Step 5 - Go To Step 17
	CRS	Step 17 - INITIATE Actions To Repair The Failed Component
	CRS	Step 18 - REVIEW Technical Specification 3.7.4

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AB-00001		***The CRS should declare Tech Spec 3.7.4 Condition A is not met with required action A.1 to restore required ASD line to operable status within 7 days.***
NOTE		**At Lead Examiner's discretion move to the next Event**

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMF CRCPV2_1 Value = 20 Ramp =120		
Indications Available Annunciators • 70A, Reactor Coolant Pump Vibration Danger • 70B, Reactor Coolant Pump Vibration/System Alert		
OTO-BB-00002		
OTO-BB-00002	**CRS**	Implement OTO-BB-00002, RCP Off-Normal
		NOTE RCPs that lose Seal Injection AND CCW To Thermal Barrier Heat Exchanger must have at least one restored within 6 minutes or the RCP MUST be secured.
	BOP	Step 1 - CHECK All RCPs - RUNNING
	BOP	Step 2 - Go To One Of The Following Attachments, As Applicable: • Attachment A, RCP High Vibration
OTO-BB-00002 Attachment A		NOTE RCP vibration can be monitored using Group Display RCPVIB or monitoring RP312, BB YI-471.
	BOP	Step A1 - CHECK RCP Vibration Level: • ALL RCPs vibration on the frame - LESS THAN 5 MILS • ALL RCPs vibration on the shaft - LESS THAN 20 MILS PERFORM ONE of the following: • IF Reactor power is less than 48% (P-8 extinguished), THEN Go To Attachment E, RCP Trip.
Evaluator CUE		When the BOP proceeds around back to verify vibration data, provide cue sheet on Vibrations levels. (The cue sheet is located at the end of the scenario)

Proc /Time	Position	Applicant's Actions or Behavior
OTO-BB-00002 Attachment E	**RO / BOP**	NOTE Tripping an RCP with Reactor Power less than 48%: ● Will result in problems controlling the SG level in the stagnant loop. Control of SG level in the stagnant loop may be accomplished with the MFRV Bypass valve. ● May result in problems controlling the Pressurizer pressure. Control of Pressurizer pressure may be accomplished by cycling of Pressurizer heaters.
	BOP	Step E1 - TRIP The Affected RCP
	BOP	Step E2 - Check RCP A – RUNNING NO Go To the RNO
	RO	Step E2 RNO - PLACE Pressurizer Spray Loop 1 Controller in Manual at zero output. • BB PK-455B for A RCP
	BOP	Step E3 - Check RCP B - RUNNING
	RO	Step E4 - DEFEAT Tavg And ΔT For Idle RCS Loop: E4. • BB TS-412T for Tavg • BB TS-411F for ΔT
	BOP	Step E5 - CHECK No. 1 Seal Leakoff Flow Was LESS THAN 6 GPM Prior To Securing The RCP: • BG FR-157 • BG FR-156 • BG FR-155 • BG FR-154

Proc /Time	Position	Applicant's Actions or Behavior
OTO-BB-00002 Attachment E	**BOP**	Step E6 - CHECK No. 1 Seal Leakoff Flow Was GREATER THAN 0.8 GPM Prior To Securing The RCP: • BG FR-157 • BG FR-156 • BG FR-155 • BG FR-154
	BOP	Step E7 - CHECK Steam Generator NR Levels Within One Of The Following: • Trending to between 45% and 55% OR • Between 45% and 55%
	RO	Step E8 - CHECK Pressurizer Pressure Within One Of The Following: • Trending to between 2220 psig and 2250 psig OR • Between 2220 psig and 2250 psig
	CRS	Step E9 - Refer To Technical Specification 3.4.4 ***The CRS should declare Tech Spec 3.4.4 Condition A is not met with required action A.1 to be in MODE 3 within 6 hours.***
	BOP	Step E10 - TRANSITION To Mode 3 Within 6 hours Using Any Of The Following: • OTO-MA-00008, Rapid Load Reduction • OTG-ZZ-00004, Power Operation • OTG-ZZ-00005, Plant Shutdown 20% Power to Hot Standby
NOTE		**At Lead Examiner's discretion move to the next Event**

Event Description: RCS Leak that becomes DBA LOCA. RX Trip E-0, Reactor Trip or Safety Injection, then E-1, Loss of Primary or Secondary Coolant, then ES-1.3, Transfer to Cold Leg Recirculation

Safety Injection fails to Automatically Actuate and both RHR pump fails to Auto start

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

For Event 5, IMF:

- Expert Command: insert BB001_A 7500 delay=0 ramp=360 on=0 off=0
- Expert Command: insert ANNUN_A088 2 delay=0 ramp=0 on=0 off=0
- Expert Command: insert ANNUN_C088 2 delay=0 ramp=0 on=0 off=0

Leak rate rises to 285000 gpm over next 2 minutes (after a delay of 360 from the first BB001 insertion)

- Expert Command: insert BB001_A 285000 delay=0 ramp=120 on=0 off=0

For Event 6 and Event 7 are preloaded:

- Expert Command: insert SIS_A_Block_Auto 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SIS_B_Block_Auto 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert PEG01C_PEJ01A_SEQ 2 delay=0 ramp=0 on=0 off=0
- Expert Command: insert PEG01D_PEJ01B_SEQ 2 delay=0 ramp=0 on=0 off=0

Note: it takes approximately 23 minutes from the time that the DBA LOCA reaches 285,000 gpm until RWST lowers to 36%, the ES-1.3 transition criteria.

Indications Available

Multiple

E-0, Reactor Trip or Safety Injection		
		NOTE: Steps 1 through 4 are immediate action steps.
E-0	**RO**	Step 1 - CHECK Reactor Trip: • Rod Bottom Lights - ALL LIT • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2 - CHECK Turbine Trip: • All Turbine Stop valves - CLOSED
	BOP	Step 3 - CHECK Power to AC Emergency Buses: a. AC emergency buses – AT LEAST ONE ENERGIZED b. AC emergency buses – BOTH ENERGIZED

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**RO**	Step 4 - Check SI Status: a. Check if SI is actuated • Ann 88A thru 88D Lit – OR- • SB069 SI Actuate Red light is lit – OR- • LOCA Sequencers alarms 30A & 31A b. CHECK both Trains of SI-Actuated • ANN 30A lit • ANN 31A lit • SB069 SI Actuate Red light lit SOLID Go To RNO and transition to ES-0.1
NOTE		Based on the timing on the malfunction and ramp rate and when the crew manually initiates SI, ES-0.1 Steps 1&2 are listed in case the transition occurs and then E-0 Steps 1-4 are relisted to aid the evaluator. See explanation for CT-2, Manually initiate SI before a description of the bounding "before a transition to E-1, E-2, E-3 or FRG" - ES-0.1 steps 1-2 is excluded from that requirement. I.e. the crew may transition to ES-0.1 and then back to E-0 without manually initiating SI and still meet the requirements of the CT.
ES-0.1 Reactor Trip Response		
	RO	FOLDOUT PAGE ACTION #1 - SI ACTUATION CRITERIA IF either condition listed below occurs, THEN ACTUATE SI and Go To E-0, Reactor Trip Or Safety Injection, Step 1: ● RCS subcooling - LESS THAN 30°F OR ● PZR level - CANNOT BE MAINTAINED GREATER THAN 6%
	BOP	FOLDOUT PAGE ACTION #3 - RCS TEMPERATURE CONTROL CRITERIA: IF a Loss of Offsite Power has occurred, THEN CLOSE MSIVs.
	RO	Step 1a - CHECK RCS Temperature Control: CHECK RCPs - ANY RUNNING

Proc /Time	Position	Applicant's Actions or Behavior
ES-0.1	**RO**	Step 1 RNO a- TRANSFER Condenser Steam Dump to Steam Pressure Mode: 1) Check Condenser - AVAILABLE • C-9 interlocks LIT • MSIVs - ANY OPEN 2) PLACE Steam Header Pressure Controller in MANUAL and ZERO OUTPUT: • AB PK-507 3) PLACE Steam Dump Select switch in STM PRESS position: • AB US-500Z 4) PLACE Steam Header Pressure Controller in AUTO: • AB PK-507
	RO	Step 1b - CHECK RCS temperature response – NORMAL • RCS AVERAGE TEMPERATURE STABLE AT OR TRENDING TO 557°F IF ANY RCP RUNNING OR • RCS COLD LEG TEMPERATURES STABLE AT OR TRENDING TO 557°F IF NO RCP RUNNING
	BOP	Step 2a - CHECK Status Of AC Buses: CHECK Generator Output Breakers – OPEN • MA ZL-3A (V55) • MA ZL-4A (V53)
	BOP	Step 2b - CHECK All AC Buses - ENERGIZED BY OFFSITE POWER • PA01 • PA02 • NB01 • NB02
ES-0.1	**BOP**	Step 2 RNO b - ENSURE both PZR PORVs are in AUTO unless closed due to low PZR pressure: 1) ENSURE both PZR PORVs are in AUTO unless closed due to low PZR pressure: • BB HIS-455A

Proc /Time	Position	Applicant's Actions or Behavior
		• BB HIS-456A 2) ENSURE both PORV Block Valves are energized and OPEN unless closed to isolate an open • BB HIS-8000A • (NG01BBR3) • BB HIS-8000B • (NG02BDF1) 3) IF any AC emergency bus(es) are NOT energized by offsite power, THEN ENSURE DGs have assumed the following loads: • CCP(s) • ESW Pump(s) • CCW Pump(s) (One per Train) • Containment Cooler Fan(s) • MD AFW Pump(s) • Control Room AC Unit(s) • Class 1E Electrical Equipment Room AC Unit(s)
E-0, Reactor Trip or Safety Injection		
E-0		NOTE: Steps 1 through 4 are immediate action steps.
	RO	Step 1 - CHECK Reactor Trip: • Rod Bottom Lights - ALL LIT • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2 - CHECK Turbine Trip: • All Turbine Stop valves - CLOSED
	BOP	Step 3 - CHECK Power to AC Emergency Buses: c. AC emergency buses – AT LEAST ONE ENERGIZED d. AC emergency buses – BOTH ENERGIZED
	RO	Step 4 - Check SI Status: c. Check if SI is actuated • Ann 88A thru 88D Lit – OR- • SB069 SI Actuate Red light is lit – OR-

Proc /Time	Position	Applicant's Actions or Behavior
		• LOCA Sequencers alarms 30A & 31A d. CHECK both Trains of SI-Actuated • ANN 30A lit • ANN 31A lit • SB069 SI Actuate Red light lit SOLID
E-0		
CRITICAL TASK		**Manually actuate at least one train of SIS-actuated safeguards equipment before transition to E-1, E-2 or E-3 series or transition to any FRG.**
	RO	Step 5 - PERFORM Attachment A, Automatic Action Verification, While Continuing With This Procedure.
NOTE		E-0 Attachment A steps and critical tasks are an attachment at the end of the scenario.
	BOP	Step 6 - CHECK Generator Output Breakers – OPEN • MA ZL-3A (V55) • MA ZL-4A (V53)
	BOP	Step 7 - CHECK Feedwater Isolation: a. MFPs Tripped a. ANN 120A, MFP A Trip – LIT b. ANN 123A, MFP B Trip b. Main Feedwater Reg Valves – CLOSED • AE ZL-510 • AE ZL-520 • AE ZL-530 • AE ZL-540 c. Main Feedwater Reg Bypass Valves – CLOSED • AE ZL-550 • AE ZL-560 • AE ZL-570

Proc /Time	Position	Applicant's Actions or Behavior
		• AE ZL-580 d. Feedwater Isolation Valves – CLOSED • AE HIS-39 • AE HIS-40 • AE HIS-41 • AE HIS-42
E-0		
	BOP	Step 8 - CHECK AFW Pumps: a. MD AFW Pumps – BOTH RUNNING • AL HIS-23A • AL HIS-22A b. TDAFP -Running if Necessary
	BOP	Step 9 - CHECK AFW Valves – proper emergency alignment • MD AFP Flow Control Valves – THROTTLED • AL HK-7A • AL HK-9A • AL HK-11A • AL HK-5A • TD AFP Flow Control Valves – FULL OPEN • AL HK-8A • AL HK-10A • AL HK-12A • AL HK-6A • TD AFP Loop Steam Supply Valves – BOTH OPEN IF NECESSARY • AB HIS-5A • AB HIS-6A
	BOP	Step 10 - CHECK Total AFW Flow > 270,000 lbm/hr
	BOP	Step 11 - CHECK PZR PORVs and Spray Valves:

Proc /Time	Position	Applicant's Actions or Behavior
		a. PZR PORVs – CLOSED 1. BB HIS-455A 2. BB HIS-456A b. PZR PORVs – Both in AUTO • BB HIS-455A • BB HIS-456A c. PORV Block Valves – BOTH OPEN • BB HIS-8000A • BB HIS-8000B d. Normal PZR Spray valves – CLOSED • BB ZL-455B • BB ZL-455C
E-0	**BOP**	Step 12 - CHECK if RCPs should be stopped: a. RCPs – ANY RUNNING b. ECCS Pumps – AT LEAST ONE RUNNING • CCP OR • SI Pump c. RCS Pressure < 1425 psig. d. Stop all RCPs
CRITICAL TASK		**Trip all RCPs within 5 minutes of meeting RCP trip criteria.** This CT "time clock starts" when the crew manually initiates SI and when RCS pressure lowers to or less than 1425 psig during the performance of E-0. This is only applicable during the performance of E-0 and does not apply during the performance of E-2, and ES-1.1. This action can be performed per E-0 foldout page #1 or Step #12 of E-0.
	BOP	Step 13 - CHECK RCS Temperatures: • Any RCP Running – RCS Tavg stable at 557°F or trending to 557°F

Proc /Time	Position	Applicant's Actions or Behavior
		-OR- • NO RCPs running - RCS COLD LEG TEMPERATURES STABLE AT 557°F OR TRENDING TO 557°F
E-0		
	BOP	Step 14 - CHECK if any SG is faulted: a. Check pressures in all SGs: RNO: GO TO Step #15 • Any SG pressure lowering in an uncontrolled manner or completely depressurized. b. Go to E-2, Faulted SG Isolation Step 1
	BOP	Step 15 - CHECK If SG Tubes Are Intact: • Levels in all SGs: • NO SG NARROW RANGE LEVEL RISING IN AN UNCONTROLLED MANNER • SG Steamline N16 radiation - NORMAL • N16 161 (SG A) • N16 162 (SG B) • N16 163 (SG C) • N16 164 (SG D) • Condenser Air Removal radiation - NORMAL BEFORE ISOLATION • GEG 925 • SG Blowdown and Sample radiation - NORMAL BEFORE ISOLATION • BML 256 • SJL 026 • SG ASD radiation - NORMAL • AB RIC-111 (SG A) • AB RIC-112 (SG B) • AB RIC-113 (SG C) • AB RIC-114 (SG D) • Turbine Driven Auxiliary Feedwater Pump Exhaust radiation - NORMAL • FC RIC-385
	RO	Step 16 – CHECK If RCS Is Intact: *RNO GO TO E-1, Loss of Reactor or Secondary Coolant Step 1.*

Proc /Time	Position	Applicant's Actions or Behavior
		● Containment Pressure - NORMAL ● GN PI-934 ● GN PI-935 ● GN PI-936 ● GN PI-937 ● GN PR-934 ● Containment Normal Sump Level - NORMAL ● LF LI-9 ● LF LI-10 ● Containment Radiation - NORMAL BEFORE ISOLATION ● GTG 313 ● GTG 323 ● GTA 591 ● GTA 601
NOTE		FRPs will apply after a transition from E-0 and E-0 Attachment A is complete. A Red Path on FR-P.1 will exist due to the DBA LOCA and associated cooldown >100F/hr but at FR-P.1 Step #1 it is determined FR-P.1 is Not applicable and the crew will return to procedure and step in effect.
E-1, Loss of Reactor or Secondary Coolant		
E-1		NOTE: Seal injection flow should be maintained to all RCPs.
	RO	Step 1 - CHECK If RCPs Should Be Stopped: a. RCPs - ANY RUNNING b. ECSS pumps - AT LEAST ONE RUNNING ● CCP OR ● SI Pump c. c. RCS pressure - LESS THAN 1425 PSIG d. d. STOP all RCPs

Proc /Time	Position	Applicant's Actions or Behavior
E-1		NOTE The ESFAS SG pressure transmitters may be inaccurate if a secondary line break occurs in Area 5. The pressure indicators on the SG ASD controllers are NOT affected and should be used for comparison.
	BOP	Step 2 - CHECK If Any SG Is Faulted: a. CHECK pressures in all SGs: • ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED b. CHECK all faulted SG(s) - ISOLATED • Steamlines • Feedlines
	BOP	Step 3 - CHECK Intact SG Levels: a. Narrow range levels - GREATER THAN 7% [25%] b. CONTROL feed flow to maintain narrow range levels between 7% [25%] and 52%
	BOP	Step 3 RNO a - MAINTAIN total feed flow greater than 270,000 lbm/Hr until narrow range level is greater than 7% [25%] in at least one SG.
	BOP	Step 4 - CHECK Secondary Radiation - NORMAL a. PERFORM the following: • PERFORM EOP Addendum 11, Restoring SG Sampling After SI Actuation • DIRECT Chemistry to periodically sample all SGs for activity • DIRECT Radiation Protection to survey steamlines in Auxiliary Building Area 5 as necessary b. CHECK unisolated secondary radiation monitors: • SG Sample radiation:

Proc /Time	Position	Applicant's Actions or Behavior
		SJL 026 • SG ASD radiation: AB RIC-111 (SG A) AB RIC-112 (SG B) AB RIC-113 (SG C) AB RIC-114 (SG D) • Turbine Driven Auxiliary Feedwater Pump Exhaust radiation: FC RIC-385 c. Secondary radiation - NORMAL
E-1		
		CAUTION If any PZR PORV opens because of high PZR pressure, Step 5.b should be repeated after pressure lowers to less than the PORV setpoint.
	RO / BOP	Step 5 - CHECK PZR PORVs And Block Valves: a. Power to Block Valves - AVAILABLE • BB HIS-8000A • BB HIS-8000B b. PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A c. Block Valves - BOTH OPEN • BB HIS-8000A • BB HIS-8000B
	RO	Step 6 - CHECK If ECCS Flow Should Be Reduced: a. RCS subcooling – GREATER THAN 30°F [50°F] b. Secondary heat sink: • Narrow range level in at least one intact SG - GREATER THAN 7% [25%] OR

Proc /Time	Position	Applicant's Actions or Behavior
		• Total feed flow to intact SGs – GREATER THAN 270,000 LBM/HR c. RCS pressure - STABLE OR RISING d. PZR level - GREATER THAN 9% [29%] There are one or more of the above SI termination that are NOT MET and the crew should implement the RNO which is to go to Step 7
E-1	**RO**	Step 7 - CHECK If Containment Spray Should Be Stopped: a. Spray Pumps - ANY RUNNING No RNO - Go To Step 8. OBSERVE CAUTIONS prior to Step 8.
		CAUTIONS • If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. • If RCS pressure lowers in an uncontrolled manner to less than 325 PSIG, the RHR pumps must be manually restarted to supply water to the RCS.
	RO	Step 8 - CHECK If RHR Pumps Should Be Stopped: a. CHECK RCS pressure: 1) Pressure - GREATER THAN 325 PSIG 2) Pressure - STABLE OR RISING No RNO Go To Step 9.
	RO	Step 9 - CHECK SG And RCS Pressures: • CHECK pressure in all SGs - STABLE OR RISING • CHECK RCS pressure - STABLE OR LOWERING

Proc /Time	Position	Applicant's Actions or Behavior
E-1	**BOP**	Step 10 - CHECK If Diesel Generators Should Be Stopped: a. AC emergency buses - ENERGIZED BY OFFSITE POWER • NB01 • NB02 b. RESET SI if necessary: • SB HS-42A • SB HS-43A c. LOAD equipment on AC emergency bus(es) as necessary using EOP Addendum 8, Loading Equipment On AC Emergency Buses d. STOP any unloaded DG(s) and PLACE in standby: 1) PUSH START/RESET button: • KJ HS-8A • KJ HS-108A 2) PUSH STOP button: • KJ HS-8A • KJ HS-108A 3) PERFORM EOP Addendum 9, Placing DGs In Standby
NOTE		While the crew is waiting for the RWST to lower to 36% and in the "do loop" of E-1, EOP Addendum 8, 9, and 11 will be directed. These Addendum's are included as attachments at the end of the guide.
		CAUTION Failure of one train of UHS Cooling (Bypass Valve or a Fan) can cause the UHS to exceed its design temperature of 92.3°F. NOTES ● UHS Cooling Tower Bypass Valves are designed to close at 84°F ESW return temperature. The UHS Cooling Tower Bypass Valves will reopen when temperature lowers to 78°F. ● UHS Fans auto start in slow speed with ESW return temperature to the UHS cooling tower of 95°F and fast speed with ESW cooling tower return temperature of 105°F. The reset temperature is designed to shift the fans back to slow speed once ESW return temperature lowers to 102.5°F. The UHS Fans will auto shift to stop from slow speed when ESW return temperature lowers to 92.5°F.

Proc /Time	Position	Applicant's Actions or Behavior
E-1	**BOP**	Step 11 - CHECK Ultimate Heat Sink - NORMAL a. NG07 and NG08 Bus annunciators - CLEAR ● 30E, NG07 Bus UV/OV ● 31E, NG08 Bus UV/OV b. DETERMINE ESW Return Temperature: ● Computer point EFT0067A, UHS Cool Twr In Temp A OR ● Computer point EFT0068A, UHS Cool Twr In Temp B c. CHECK UHS Cooling Tower Bypass Valve 1) COMPARE UHS Cooling Tower Bypass Valve Position to ESW Return Temperature: ● IF ESW Return temperature is ≥84°F, the Cooling Tower Bypass Valve is CLOSED ● IF ESW Return temperature is <78°F, the Cooling Tower Bypass Valve is OPEN 2) UHS Cooling Tower Bypass Valves- NORMAL ● EF HIS-65A (A Train) ● EF HIS-66A (B Train) CAUTION Dual indication for UHS Fan Speed lights is indicative of fans in the same train running at different speeds and that a problem exists. d. CHECK UHS Cooling Tower Fans Speeds 1) Compare UHS Fan Speed to ESW Return Temperature ● If ESW Return temperature is ≥95°F both Cooling Tower Fans are ON in Slow Speed. ● If ESW Return temperature is ≥105°F both Cooling Tower Fans are ON in Fast Speed. ● If ESW Return temperature is restored to ≤102.5°F both Cooling Tower Fans are ON in Slow Speed. ● If ESW Return temperature is restored to ≤92.5°F both Cooling Tower Fans are OFF. 2) UHS Cooling Tower Fan Status - NORMAL

Proc /Time	Position	Applicant's Actions or Behavior
E-1	**RO / BOP**	Step 12 - INITIATE Evaluation Of Plant Status: a. CHECK cold leg recirculation capability: ● Train A - AVAILABLE ● RHR Pump A (EJ HIS-1) ● CCW Pump A (EG HIS-21) Or CCW Pump C (EG HIS-23) ● RWST To RHR Pump A Suction (BN HIS-8812A) ● Containment Recirc Sump To RHR Pump A Suction (EJ HIS-8811A) ● CCW To RHR HX A (EG HIS-101) ● Train B - AVAILABLE ● RHR Pump B (EJ HIS-2) ● CCW Pump B (EG HIS-22) or CCW Pump D (EG HIS-24) ● RWST To RHR Pump B Suction (BN HIS-8812B) ● Containment Recirc Sump To RHR Pump B Suction (EJ HIS-8811B) ● CCW To RHR HX B (EG HIS-102) b. CHECK Auxiliary Building radiation - NORMAL ● Aux Building Process Radiation monitor: ● GLP 604 ● Aux Building Area Radiation monitors c. OBTAIN samples: 1) DIRECT Chemistry to initiate post accident sampling: ● RCS boron concentration ● RCS activity ● Containment atmosphere 2) PLACE Hydrogen Analyzers In Service using EOP Addendum 16, Placing Hydrogen Analyzers In Service 3) CONSULT Plant Engineering Staff for assessing additional sampling requirements for fuel damage d. EVALUATE plant equipment for long term recovery as necessary: e. START additional plant equipment to assist in recovery as directed by SM/CRS

Proc /Time	Position	Applicant's Actions or Behavior
E-1	**RO / BOP**	Step 13 - CHECK If RCS Cooldown And Depressurization Is Required: a. RCS pressure – GREATER THAN 325 PSIG GO TO RNO
	RO / BOP	Step 13a RNO - a. CHECK RHR Pump Flow: ● EJ FI-618 ● EJ FI-619 IF either RHR Pump Flow is greater than 850 GPM, THEN Go To Step 14. GO TO Step 14
	RO / BOP	Step 14 - CHECK If Transfer To Cold Leg Recirculation Is Required: a. RWST level - LESS THAN 36% RNO a. Return To Step 11. b. Go To ES-1.3, Transfer To Cold Leg Recirculation, Step 1
NOTE		Until RWST lowers to 36% as shown by Annunciator 47C, (RWST LoLo 1), the crew will be in a "do loop" from E-1 step #11 to Step 14 RNO.
CRITICAL TASK		**Transfer to Cold Leg Recirculation by completing ES-1.3 steps 1-4 before transferring back to E-1.**

Proc /Time	Position	Applicant's Actions or Behavior
ES-1.3, Loss of Reactor or Secondary Coolant		
ES-1.3	**RO / BOP**	CAUTIONS ● ECCS recirculation flow to RCS must be maintained at all times. ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● Switchover to recirculation raises Auxiliary Building radiation levels. Radiation Protection must go with the operator to monitor radiation levels when performing local actions. NOTES ● Steps 1 through 4 should be performed without delay. ● FR Procedures should NOT be implemented prior to completion of step 4. ● Valves within the same step should be actuated sequentially without waiting for the previous valve to fully stroke.
ES-1.3	**RO**	Step 1 - RESET SI: ● SB HS-42A ● SB HS-43A
	BOP	Step 2 - CHECK CCW Flow To RHR Heat Exchangers: a. CHECK CCW To RHR HX valves - OPEN ● EG HIS-101 ● EG HIS-102 b. CHECK Spent Fuel Pool HX CCW Outlet Valves - CLOSED ● EC HIS-11 ● EC HIS-12 c. CHECK CCW Pumps – ONE RUNNING IN EACH TRAIN ● Red Train: ● EG HIS-21 or EG HIS-23 ● Yellow Train: ● EG HIS-22 or EG HIS-24
		CAUTION Any pumps taking suction from the RWST should be stopped if RWST level lowers to 6%.

Proc /Time	Position	Applicant's Actions or Behavior
ES-1.3	**RO / BOP**	Step 3 a - f- ALIGN ECCS For Cold Leg Recirculation: a. CHECK Containment Normal Sump Level - GREATER THAN 73 INCHES: ● LF LI-9 and LF LI-10 b. CHECK RHR pump automatic suction switchover – COMPLETE 1) RHR Pump A: ● Containment Recirc Sump To RHR Pump A Suction - OPEN ● EJ HIS-8811A ● RWST To RHR Pump A Suction - CLOSED ● BN HIS-8812A 2) RHR Pump B: ● Containment Recirc Sump To RHR Pump B Suction - OPEN ● EJ HIS-8811B ● RWST To RHR Pump B Suction - CLOSED ● BN HIS-8812B c. CHECK RHR Pumps – BOTH RUNNING ● EJ HIS-1 and EJ HIS-2 d. CHECK both the following conditions - SATISFIED ● RCS pressure - LESS THAN 1700 PSIG ● SI Pump Discharge – FLOW INDICATED ● EM FI-918 ● EM FI-922 e. CLOSE SI Pump Recirc To RWST valves: ● CLOSE BOTH the following: ● EM HIS-8814A (SI Pump A) AND ● EM HIS-8814B (SI Pump B) OR ● PERFORM the following: 1) PLACE Power Lockout For BN HIS-8813 in NON ISO position: ● BN HIS-8813A 2) CLOSE BN HIS-8813 3) PLACE Power Lockout For BN HIS-8813 in ISO position:

Proc /Time	Position	Applicant's Actions or Behavior
		● BN HIS-8813A
ES-1.3	**RO / BOP**	Step 3 f - n - ALIGN ECCS For Cold Leg Recirculation: f. Close RHR Train Hot Leg Valves ● EJ HIS-8716A ● EJ HIS-8716B g. OPEN the following suction crosstie valves: ● CVCS To SI Pump A Suction valves: ● EM HIS-8807A ● EM HIS-8807B h. CHECK CVCS To SI Pump Isolation valve - OPEN ● ESFAS status panel SIS section SA066Y location 2Q, CVCS To SI Pmp Iso Vlv EM HV-8924, WHITE light – LIT i. OPEN the following suction crosstie valves: ● RHR To Charging Pumps: ● EJ HIS-8804A ● RHR To SI Pump B Suction: ● EJ HIS-8804B j. CHECK if any SI Pump - RUNNING ● EM HIS-4 ● EM HIS-5 k. MONITOR SI pump flow AND CLOSE RWST To SI Pump suction valves: ● BN HIS-8806A ● BN HIS-8806B l. MONITOR CCP discharge flow AND CLOSE CCP Suction From RWST valves: ● BN HIS-112D ● BN HIS-112E m. CHECK at least one flow path from recirculation sump to RCS - ESTABLISHED n. CHECK RHR Pump Room Coolers - RUNNING ●ESFAS status panels SIS sections: ● SA066X WHITE light 8B (SGL10A) - LIT ● SA066Y WHITE light 8B (SGL10B) - LIT
	RO / BOP	Step 4 - START ECCS Pumps As Necessary

Proc /Time	Position	Applicant's Actions or Behavior
		NOTE Plant Computer System TOC SUMPBLK is available for indication of sump blockage.
	RO / BOP	Step 5 - MONITOR ECCS Pumps – NOT AFFECTED BY SUMP BLOCKAGE DURING ALL SUBSEQUENT MITIGATION AND FR PROCEDURES
ES-1.3	**RO / BOP**	Step 6 - ALIGN Containment Spray System For Recirculation If Necessary: a. Containment Spray Pumps - ANY RUNNING – RNO ● EN HIS-3 ● EN HIS-9 IF containment spray pump(s) were NOT stopped due to loss of RWST suction, THEN Go To Step 7.
		NOTE Switchover to Cold Leg Recirculation raises Auxiliary Building radiation levels. Utilize resources such as the Technical Support Center(TSC) or Dose Assessment Technician(DAT) to determine higher than normal radiation levels.
	RO / BOP	Step 7 - MONITOR For ECCS Leaks: a. Auxiliary Building Area Radiation Monitors - NORMAL ● SD RE-12 through SD RE-28 b. Auxiliary Building Process Radiation Monitors - NORMAL c. Auxiliary Building Sump Levels - NORMAL ● RHR Pump Room ● CRW ● DRW
	RO / BOP	Step 8 - CHECK Spent Fuel Pool Status: a. MONITOR spent fuel pool temperature on EC TI-42 b. CHECK time since CCW flow isolated to SFP HX - 4 HOURS

Proc /Time	Position	Applicant's Actions or Behavior
		RNO b. WHEN time requirement is satisfied, THEN PERFORM Step 8.c. CONTINUE with Step 9.
	RO / BOP	Step 9 - Determine IF RWST Refill Should be initiated
Booth Operator / NOTE		Step 9 and its assessments are performed by the TSC, role play as necessary and state that the ERO organization will perform this assessment.
ES-1.3	**RO / BOP**	Step 10 - DETERMINE If Transfer To Hot Leg Recirculation Will Be Required: a. WHEN TSC is activated, request Plant Engineering Staff to begin monitoring for Vessel Blockage. b. CHECK if entry for this procedure is from either of the following: ● E-0, Reactor Trip Or Safety Injection OR ● E-1, Loss Of Reactor Or Secondary Coolant
	RO / BOP	Step 11 - Return To Procedure And Step In Effect Crew returns to E-1 and step in effect.
NOTE		**The scenario can be terminated at the discretion of the Lead Examiner**

E-0 Attachment A		
	BOP	Step A1 - Check Charging Pumps: a. CCPs – Both Running • BG HIS-1A • BG HIS-2A b. Stop NCP using BG HIS-3
	BOP	Step A2 - CHECK SI and RHR Pumps: • SI Pumps – BOTH RUNNING • EM HIS-4 • EM HIS-5 • RHR Pumps – BOTH RUNNING • EJ HIS-1 • EJ HIS-2
CRITICAL TASK		**Manually start at least one RHR Pump before completion of E-0 Attachment A**
	BOP	Step A3 - CHECK ECCS flow: a. CCPs to Boron Inj Header – FLOW INDICATED • EM FI-917A • EM FI-917B b. RCS pressure – Less than 1700 psig c. SI Pump Discharge - FLOW INDICATED • EM FI-918 • EM FI-922 d. RCS pressure – LESS THAN 325 PSIG e. RHR To Accumulator Injection Loop - FLOW INDICATED • **EJ FI-618** • **EJ FI-619**
	BOP	Step A4 - CHECK ESW Pumps – BOTH RUNNING • EF HIS-55A • EF HIS-56A
	BOP	Step A5 - CHECK CCW Alignment: a. CCW Pumps – one running in each train • Red Train: EG HIS-21 or EG HIS-23

		• Yellow Train: EG HIS-22 or EG HIS-24 b. CCW Service Loop Supply and Return valves for one operating CCW pump – OPEN • EG ZL-15 and EG ZL-53 • OR • EG ZL-16 and EG ZL-54 c. OPEN CCW to RHR HX valves: • EG HIS-101 • EG HIS-102 d. CLOSE Spent Fuel Pool HX CCW Outlet Valves: • EC HIS-11 • EC HIS-12 e. STOP Spent Fuel Pool Cooling Pump(s): • EC HIS-27 • EC HIS-28 f. RECORD the time spent fuel pool cooling pump secured g. MONITOR time CCW flow isolated to SFP HX < 4 hours
	BOP	Step A6 - CHECK Containment Cooler Fans running in slow speed • GN HIS-9 • GN HIS-17 • GN HIS-5 • GN HIS-13
	BOP	Step A7 - CHECK Containment H2 Mixing Fans in slow speed • GN HIS-2 • GN HIS-4 • GN HIS-1 • GN HIS-3
	BOP	Step A8 - CHECK if Containment Spray should be actuated • Containment Pressure > 27 psig -OR- • GN PR-934 indicates ctmt pressure has been > 27 psig - OR- • Annunciator 59A CSAS LIT - OR- • Annunciator 59B CISB LIT RNO: Go to step A9

	BOP	Step A9 - CHECK if Main Steamlines should be Isolated a. Check the following: • Containment pressure > 17 psig -OR- • GN PR-934 indicates ctmt pressure has been > 17 psig -OR- • Steamline pressure < 615 psig -OR- • AB PR-514 or 535 shows pressure has been < 615 psig -OR- b. CHECK MSIVs and Bypass valves - CLOSED
	BOP	Step A10 - CHECK ECCS Valves in proper alignment a. ESFAS Status Panels SIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A11 - CHECK Containment Isolation Phase A: a. ESFAS status panels CISA sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A12 - CHECK SG Blowdown Isolation: a. ESFAS status panels SGBSIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A13 - CHECK Both Trains of CRVIS a. ESFAS status panels CRVIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A14 - CHECK Containment Purge Isolation: a. ESFAS status panels CPIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A15 - NOTIFY CRS of the following: • Unanticipated manual actions taken • Failed Equipment Status • Attachment A completion

EOP Addendum 8, LOADING EQUIPMENT ON AC EMERGENCY BUSES		
	RO / BOP	Step 1 - MAINTAIN Power Source Load - LESS THAN LOAD LIMITS • DG load ratings: • Continuous - 620l KW • 2000 hours - 6635 KW • Seven days - 682l KW • 30 minutes - 744l KW • Single offsite power source supplying both NB0l and NB02 load limits: • XNB0l - MSIIXNB0ll ESF Xfmr XNB0l Ammeter: • 520 amps • XNB02 - l3.8 KV XMR0l To XNB02 Amps NB-II-8: • 520 amps
NOTE:		Based on resource loading and progression through E-1, the CRS may assign EOP Addendum 8 , 9, and 11 to either the RO or the BOP.
	RO / BOP	NOTE: Load addition for each PZR Backup Heater group is 690 KW and 29 amps.
	RO / BOP	Step 2 - RESTORE Power To PZR Backup Heater Buses: a. PLACE PZR Backup Heaters in TRIP position: • BB HIS-5lA (Group A) • BB HIS-52A (Group B) b. CLOSE Breaker NB0l06: • PG HIS-l9 c. CLOSE Breaker NB0208: • PG HIS-2l
	RO / BOP	NOTE: Load addition for each Air Compressor is l90 KW and l0 amps.
	RO / BOP	Step 3 - START Air Compressor(s) As Necessary: a. CHECK one ESW valve to Service Air Compressors OPEN: • EF HIS-43 • EF HIS-44

		b. START Service Air Compressor(s) with ESW flowpath as necessary: • KA HIS-3C • KA HIS-2C
	RO / BOP	NOTE: Load addition for each Boric Acid Transfer Pump is 16 KW and 1 amp.
	RO / BOP	Step 4 - Locally CLOSE The Following Breakers: • Boric Acid Transfer Pump A: o NG0lAHF4 • Boric Acid Transfer Pump B: o NG02AAF4 • BG HIS-8l04 Emergency Borate To Charging Pumps Suction valve: o NG04CPF2 • CRDM Fan B: o NG02BJF5 • CRDM Fan D: o NG0lBJF5 RO/BOP direct OTs / Field Supervisor to locally close the above breakers
	RO / BOP	CAUTION Do NOT run more than THREE CRDM Fans at the same time. NOTE Load addition for each CRDM Fan is 34 KW and 2 amps.
	RO / BOP	Step 5 - START CRDM Fans: • GN HIS-42 (Fan B) • GN HIS-44 (Fan D)
	RO / BOP	Step 6 - EENERGIZE Battery Chargers: • PK HIS-2 • PK HIS-4 • PK HIS-5 • PK HIS-3
	RO / BOP	Step 7 - Locally RESTORE Emergency Lights: RO/BOP will direct OTs / Field Supervisor to Local close several breakers to restore local plant lighting.

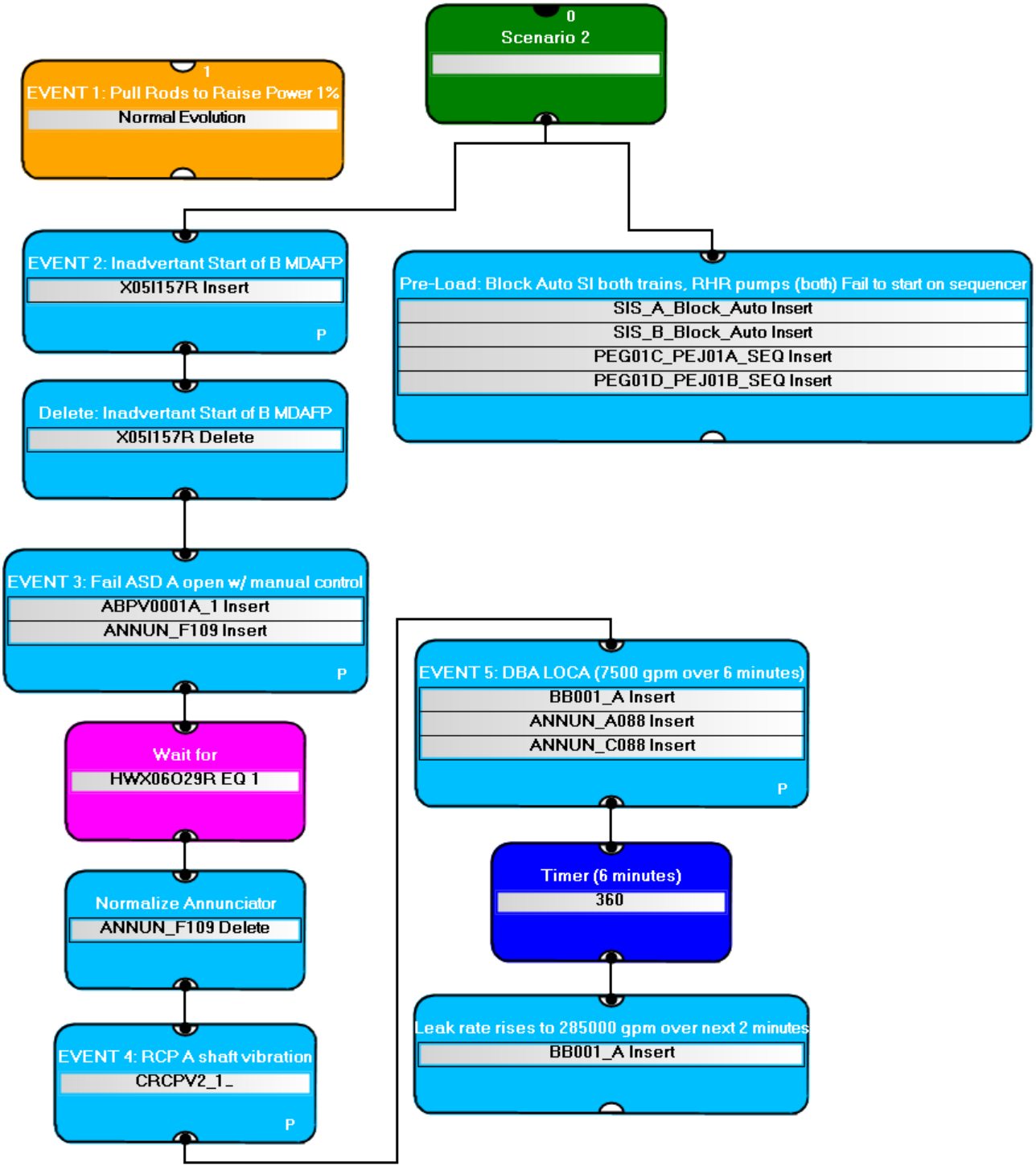
EOP Addendum 9, PLACING DGS IN STANDBY		
	RO / BOP	Step – 1 CHECK If DG A - STOPPED FROM MCR AFTER AN EMERGENCY START YES – Proceed to Step #2
	RO / BOP	Step – 2 Locally PERFORM Attachment A, DG A Restoration Control Room Operator Directs performance of Attachment A
	RO / BOP	Step – 3 CHECK If DG B - STOPPED FROM MCR AFTER AN EMERGENCY START YES – Proceed to Step #4
	RO / BOP	Step – 2 Locally PERFORM Attachment B, DG B Restoration Control Room Operator Directs performance of Attachment B
NOTE		All of the Actions in Attachment A&B are local in field action that would be performed by OTs and are not listed here

EOP Addendum 11, RESTORING SG SAMPLING AFTER SI ACTUATION		
	RO / BOP	CAUTION: If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment
	RO / BOP	Step 1 - RESET SI If Necessary: • SB HS-42A • SB HS-43A Applicant depressed both SI reset switches
	RO / BOP	Step 2 - RESTORE Instrument Air If Necessary: a. CHECK if ESW To Air Compressor valves - OPEN • EF HIS-43 • EF HIS-44 b. START Air Compressor(s): • KA HIS-3C • KA HIS-2C Applicant either restores air to containment or verified it was done in a previous EOP Addendum or in E-0 Attachment A.
	RO / BOP	Step 3 - OPEN CCW To Radwaste Supply/Return Valves: • EG HS-69 • EG HS-70
	RO / BOP	NOTE: SG upper sample lines provide the fastest response time.
	RO / BOP	Step 3 - Sample SG(s) As Necessary: a. OPEN SG Upper or Lower Sample Inner Containment Isolation Valve(s): • SG A: • BM HIS-19 (upper) • BM HIS-35 (lower) • SG B: • BM HIS-20 (upper) • BM HIS-36 (lower) • SG C: • BM HIS-21 (upper) • BM HIS-37 (lower)

		• SG D:
		  • BM HIS-22 (upper)
		  • BM HIS-38 (lower)
		b. OPEN SG Sample Outer Containment Isolation Valve(s):
		  • BM HIS-65 (SG A)
		  • BM HIS-66 (SG B)
		  • BM HIS-67 (SG C)
		  • BM HIS-68 (SG D)
		c. DIRECT Chemistry to obtain sample(s) one SG at a time as necessary

NOTE		At this point in the EOP Addendum, the control room operators are waiting sampling results from Chemistry. AS no results will be provided in thee timeframe of this scenario, no other EOP Addendum actions are listed.

SCE File Display



RCP	Shaft Vibration	Frame Vibration
A	22.6 mils	0.9 mils
B	5.0 mils	0.9 mils
C	5.0 mils	0.9 mils
D	5.0 mils	0.9 mils

Facility: Callaway Scenario No. 3, Rev 5 Op-Test No.: 2019-1

Examiners: _____ Operators: As run for crew 2 only

_____ _____

_____ _____

Initial Conditions: 100%, MOC

Turnover: 'A' MDAFP is out of service for breaker maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	AC / FCV0049MANTYP AC / FCV0049TASTEM SB / HWXSP3FO7W	SRO (R) RO (R) BOP (C)	Main Turbine Control Valve #3 fails closed OTO-MA-00001, Turbine Load Reject
2	SF / SFB08_DR	SRO (C) RO (C) BOP (C)	Dropped rod B-8 OTO-SF-00001, Rod Control Malfunctions (Tech Spec 3.1.4) and (TS 3.2.4)
3	TVHM1705 RCCFUELFAIL	SRO (C) RO (C)	RCS High Activity OTO-BB-00005 / Place 120 gpm Letdown in-service (Tech Spec 3.4.16)
4	AE / AEPT0508A, B, C FC / FCXY0001A_2 FC / FCXY0003A_1 FC / FCXY0002A_2	SRO (I) RO (I) BOP (I)	DFWCS failure – loss of MFW with a manual reactor trip required
5	SF / SF006	SRO (I) RO (I)	Failure of the automatic reactor trip, E-0 Reactor Trip or Safety Injection CT-1, Manually trip the reactor
6	AB / AB002_D	SRO (M) RO (M) BOP (M)	'D' SG Fault, E-2 Faulted SG Isolation CT-17 Isolate faulted SG ~~CT-16, Manually Trip RCPs~~
7	SA / SA075A_MSLIS SA / SA075B_MSLIS	SRO (I) BOP (I)	Failure of the automatic SL isolation
8	SA / SAS9XX_4 SA / SAS9XX_8	SRO (C) BOP (C)	Failure of 'D' MSIV to close with Fast Close PB

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5-8)	8
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal events (2-4)	3
4. Major transients (1-2)	1
5. EOPs entered/requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical tasks (2-3)	3

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

The Plant is stable at 100% with the 'A' MDAFP out of service.

After the reactivity brief is complete, Main Turbine Control Valve #3 will fail closed and crew will take actions per OTO-MA-00001. The crew will stabilize the plant and adjust Tavg and turbine controls in response.

After the plant is stabilized, a dropped rod (B-8) occurs as indicated by DRPI and Control Rod Alarms. The crew will establish conditions for rod recovery per OTO-SF-00001, identify Technical Specifications and begin restoration. Technical Specifications 3.1.4 and TS 3.2.4 are not met.

Once the plant is stable (~10 minutes after the dropped rod), Annunciator 61B alarms indicating high activity in the RCS. The Crew will enter OTO-BB-00005, RCS High Activity and establish 120 gpm letdown flow IAW OTN-BG-00001 Addendum 04, Operation of CVCS Letdown. Technical Specification 3.4.16 is not met.

After a load reduction is begun, a failure of the DFWCS occurs resulting in both main feed pump speed lowering and therefore flow lowering to the point that a manual reactor trip is required (auto trip will not work). The crew will enter E-0, Reactor Trip or Safety Injection, and perform the immediate actions.

Upon the Rx trip, the 'D' SG develops a fault which can be seen by the crew as RCS pressure and temperature lower. A transition should be made to E-2, Faulted Steam Generator Isolation, at E-0 step#14. When performing E-2, the crew should determine that the automatic steamline isolation failed to occur and manually initiate it. Additionally, the MSIV fast closed Pushbuttons (AB HS 79/80) will fail to close "D" MSIV. "D" MSIV can be closed with is individual pushbutton (AB HIS 11).

Once the faulted Steam Generator is isolated and, after the secondary side blows dry, SI termination criteria should be met. The crew will transition to ES-1.1, SI Termination from E-2.

The scenario is complete when the Boron Injection Header is isolated per step 6 of ES-1.1, SI Termination.

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Critical Tasks:

Critical Tasks	Manually trip the reactor before any SG level indicates less than 10% WR	Isolate the faulted 'D' SG before transition out of E-2
EVENT	4	5
Safety significance	Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy" and demonstrates the inability of the crew to "recognize a failure or an incorrect automatic actuation of an ESF system or component."	Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Failure to isolate a faulted SG can result in challenges to the following CSFs: • Integrity • Subcriticality • Containment (if the break is inside containment)
Cueing	Indication and/or annunciation that plant parameter(s) exist that should result in automatic reactor trip but reactor does not automatically trip • SG lev low low RX trip annunciator (85A)	Both of the following: • Steam pressure and flow rate indications that make it possible to identify 'D' SG as faulted AND • Valve position and flow rate indication that AFW continues to be delivered to the faulted 'D' SG
Performance indicator	Manipulation of control room reactor trip switches as required to trip the reactor • Reactor trip and bypass breakers indicate open	ISOLATE AFW flow to faulted SG(s): • CLOSE associated MD AFP Flow Control Valve(s): o AL HK-5A (SG D) • CLOSE associated TD AFP Flow Control Valve(s): o AL HK-6A (SG D) • CLOSE Steamline Low Point Drain valve from faulted SG(s): o AB HIS-10 (SG D) FAST CLOSE all MSIVs and Bypass valves: o AB HS-79 o AB HS-80 Close "D" MSIV using individual MSIV handswitch o AB HIS 11
Performance feedback	Indications of reactor trip • Control rods at bottom of core • Neutron flux decreasing	Crew will observe the following: • Any depressurization of intact SGs stops • AFW flow rate indication to faulted SG of zero
Justification for the chosen performance limit	Not tripping the reactor prior to any SG reaching dryout conditions when it is possible to do so forces an immediate extreme challenge to the subcriticality CSF, availability of the heat sink, and containment. Additionally, the incorrect performance of failing to trip the reactor necessitates the crew taking compensating action that seriously complicates the event mitigation strategy. This misoperation constitutes a "significant reduction of safety margin beyond that irreparably introduced by the scenario."	"before transition out of E-2" is in accordance with the PWR Owners Group Emergency Response Guidelines. It allows enough time for the crew to take the correct action while at the same time preventing avoidable adverse consequences.
PWR Owners Group Appendix	CT-1, Manually trip the reactor	CT-17 Isolate faulted SG

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Critical Tasks	~~Trip all RCPs within 5 minutes of meeting RCP trip criteria.~~	Note that this Critical task was not met for this crew because they acted so quickly to bottle up the "D" steam generator that RCS pressure did not go below 1650 psig and therefore did not meet the criteria to trip the RCPs. This CT was removed from this scenario for this crew. Because there were still two other valid CT's the scenario was still deemed acceptable for the crew.
EVENT	5	
Safety significance	Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents misoperation or incorrect crew performance in which the crew has failed to prevent "degradation of...{the fuel cladding} ...barrier to fission product release" and which leads to "violation of the facility license condition."	
Cueing	Indications of a SBLOCA AND Indication and/or annunciation of safety injection AND Indication and/or annunciation that at least one CCP/SI pump is running AND Indication that the RCP trip criteria are met Note: The 5 minute trip criteria will start once the first CCP or SI pump is started.	
Performance indicator	Manipulation of controls as required to trip all RCPs • RCP breaker position lights indicate breaker open	
Performance feedback	Indication that all RCPs are stopped • RCP breaker position lights • RCP flow decreasing • RCP motor amps decreasing	
Justification for the chosen performance limit	In a letter to the NRC titled "Justification of the Manual RCP Trip for Small Break LOCA Events" (OG-117, March 1984) (also known as the Sheppard letter), the WOG provided the required assurance based on the results of the analyses performed in conjunction with WCAP-9584. The WOG showed that for all Westinghouse plants, more than two minutes were available between onset of the trip criteria and depletion of RCS inventory to the critical inventory. In fact, additional analyses sponsored by the WOG in connection with OG-117 conservatively showed that manual RCP trip could be delayed for five minutes beyond the onset of the RCP trip criteria without incurring any adverse consequence.	
PWR Owners Group Appendix	CT-16, Manually Trip RCPs Note: CT-16 may not be counted towards the minimum CT count if it is run after another scenario is run that contains this same CT, depending on order and selection of scenarios used during exam week. It is still a CT, however.	

"NOTE: (Per NUREG-1021, Appendix D) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review. "

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Scenario Procedure References
Callaway 2019-1 NRC Scenario #3, Rev. 5

References
OTO-SF-00001, Rod Control Malfunctions
OTO-MA-00001, Turbine Load Reject
OTO-BB-00005, RCS High Activity
OTN-BG-00001 Addendum 04, Operation of CVCS Letdown
E-0, Reactor Trip or Safety Injection
E-2, Faulted Steam Generator Isolation
ES-1.1, SI Termination
Technical Specification 3.1.4, Rod Group Alignment Limits
Technical Specification 3.4.16, RCS Specific Activity
ODP-ZZ-00025, EOP/OTO User's Guide

PRA Systems, Events or Operator Actions

1. Secondary Line Breaks (10% contribution to CDF)
2. Loss of MFW (1% contribution to CDF)

Scenario Simulator Lesson Plan
Callaway 2019-1 NRC Scenario #3, Rev. 5

Scenario Setup Guide:

Establish the initial conditions of IC#10,

- Load 18-05
- Place "A" MDAFP in PTL and hang a WIP tag on hand switch.

==========SCENARIO PRELOADS / SETUP ITEMS==========

Setup: Rack out NB0105, Prevent Auto Rx Trip, MSLIS, "D" MSIV failure to close

- Expert Command: insert AL01NB0105TA_BKPOS 3 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SF006 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SA075A_MSLIS 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SA075B_MSLIS 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SAS9XX_4 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SAS9XX_8 1 delay=0 ramp=0 on=0 off=0

========== EVENT 1 ==========

CV #3 fails closed

- Expert Command: insert ACFCV0049ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert ACFCV0049TASTEM 0 delay=0 ramp=10 on=0 off=0
- Expert Command: insert HWXSP3F07W 1 delay=0 ramp=0 on=0 off=0

========== EVENT 2 ==========

Drop CB rod B8

- SFB08_DR Value = 1

==========EVENT 3 ==========

Minor fuel failure for Hi RCS Activity

- Expert Command: insert TVHM1705 0.1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert RCCFUELFAIL 3E-8 delay=0 ramp=0 on=0 off=0

==========EVENT 4 ==========

DFW Control Station fails, AE PDI-508 fails high, Close 'A' MFP Stm Supply

- Expert Command: insert AEPT0508A 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508B 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508C 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert FCXY0001A_2 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0003A_1 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0002A_2 1 delay=0 ramp=0 on=0 off=0

And as a contingency to ensure the SG level is not stabilized

- Expert Command: insert FCFV0075ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCFV0075TASTEM 0 delay=0 ramp=90 on=0 off=0

==========EVENT 5 ==========

Failure of the Automatic Reactor Trip - PRELOADED

==========EVENT 6 ==========

Fault D SG (outside CTMT) when Rx trips

- AB002_D Value = 2000 Condition = sfawctrd560517dpos eq 0.0

==========EVENT 7 ==========

Failure of the automatic SL isolation - PRELOADED

==========EVENT 8 ==========

Failure of 'D' MSIV to close with Fast Close PB - PRELOADED

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMFs: o Expert Command: insert ACFCV0049ZMANTYP 1 delay=0 ramp=0 on=0 off=0 o Expert Command: insert ACFCV0049TASTEM 0 delay=0 ramp=10 on=0 off=0 o Expert Command: insert HWXSP3F07W 1 delay=0 ramp=0 on=0 off=0		
Indications Available Annunciators: • Multiple Indications of lowering turbine load • 78C, Power Range Lower Detector Flux Deviation • 77A, Reactivity Deviation • Control Bank D stepping inward • SB069, Turb Auto top 63 AST 3, LIT • RL005 indications of CV#3 closed and CV#4 opening		
OTO-MA-00001		
	CRS	Implement OTO-MA-00001, Turbine Load Rejection
	RO	Step 1 - PLACE Rod Control In AUTO: SE HS-9
	RO	Step 2 - CHECK Rod Control System Responding To RCS Tavg/Tref Deviation By Ensuring One Of The Following: • Control Rods are inserting AND RCS Tavg trending to within 5°F of Tref OR • RCS Tavg within 5°F of Tref
	BOP	Step 3 - CHECK Stator Cooling Status: • Inlet Pressure – GREATER THAN 50 PSIG o CE PI-26 • Conductivity - LESS THAN 8.0 µmhos/cm o CEC0006 o CEC0007 • Outlet Temperature – LESS THAN 76°C o CE TI-38A • Annunciator 130E, GEN AUX TROUBLE - EXTINGUISHED

Proc /Time	Position	Applicant's Actions or Behavior
OTO-MA-00001	**RO**	Step 4 - CHECK Both Of The Following Annunciator Windows - EXTINGUISHED • 82B, OTΔT Rod Stop • 82C, OPΔT Rod Stop
	BOP	Step 5 -CHECK All Circulating Water Pumps – RUNNING • Circ Water Pump A • Circ Water Pump B • Circ Water Pump C
		CAUTION Turbine Runback and Setback functions will be defeated upon transfer to Standby Operation. However, Trip Protective functions will still be enabled.
	BOP	Step 6 - CHECK Main Turbine Control System Responding To A Turbine Load Rejection: Turbine Load STABLE OR LOWERING AS EXPECTED following a Turbine Runback OR Setback
	BOP	Step 7 - CHECK If Plant Parameters Can Be MAINTAINED BELOW The Operating Curve In Curve Book Figure 10-7.
	BOP	Step 8 - CHECK Stator Cooling Water Inlet Pressure - LESS THAN 50 PSIG : CE PI-26 RNO – Go To Step 18.
	BOP	Step 18 - MAINTAIN Main Generator MVARs Within One Of The Following: • (-)100 to +100 MVARs OR • Limits of Curve Book, Figure 10-1 through 10-6
	BOP	Step 19 - CHECK HP Heaters Bypass Valve - CLOSED: • AE HIS-38

Proc /Time	Position	Applicant's Actions or Behavior
OTO-MA-00001		CAUTIONS • If a Turbine Admission Valve is not fully closed performing Attachment B, Turbine Steam Admission Valve Failure, will fail affected valve closed. • Closing Turbine Admission Valves may affect reactivity. NOTE Placing the Turbine on Load Set for a Control Valve failure will allow other Control Valves to respond.
	BOP	Step 20 – IF Turbine Steam Admission Valve Failure Has Occurred Perform the Following: a. If a Control Valve has failed Place the Turbine on Load Set: 1) Slowly LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: • Load Limit Limiting Light – EXTINGUISHED • Decrease Loading Rate "OFF" Light-LIT • Loading Rate Limit %/MIN "1/2" Light-LIT 2) ROTATE Load Limit Set potentiometer fuilly clockwise 3) SELECT Decrease Loading Rate – ON b. IF possible Close the affected Turbine Steam Admission Valve. c. MAINTAIN the affected Turbine Steam Admission Valve closed by performing ATTACHMENT B, Turbine Steam Admission Valve Failure. d. MONITOR Turbine Vibration and Exhaust Hood temperature. e. MONITOR MSR levels and temperatures. f. IMPLEMENT APA-ZZ-00152, Emergent Issues Response g. CONTACT Main Turbine System Engineer.
OTO-MA-00001 ATT B	**RO/ BOP**	Step B5 - IF ACFCV0049, MN TURB CTRL VLV #3 has failed, PERFORM THE FOLLOWING: DISCONNECT the Electrical Connection (Amphenol) at CHFY0043 (CV #3 SPLY SERVO) This is the only applicable step from Attachment B – the crew will direct I&C to prepare a package for removal of the Amphenol

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator		Role Play as Secondary OT and Acknowledge request to disconnect amphenol at CHFY0043 (CV #3 SPLY SERVO)
NOTE		**At Lead Examiner's discretion move to the next Event**

Op Test No.: 2019-1	Scenario # 3	Event # 2	Page 13 of 40
Event Description:	Dropped rod B-8 OTO-SF-00001, Rod Control Malfunctions (Tech Spec 3.1.4)		

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

- IMF SFB08_DR Value = 1, B-8 Control Bank Rod drop

Indications Available

Annunciator(s):

- 78A, Power Range Channel Deviation
- 78C, Power Range Lower Detector Flux Deviation (In and then clears)
- 78F, Power Range Tilt
- 77A, Reactivity Deviation
- 79C, Control Rod Deviation
- 80C, Rod Position Indication Rod Deviation
- 81B, Rod at Bottom
- 33C, PZR Pressure Low / Heaters On

DRPI indications of B-8 full in.

		OTO-SF-00001
	CRS	Implement OTO-SF-00001, Rod Control Malfunctions
	RO	Step 1 - CHECK Both Of The Following Are Met For Indication Of Multiple Dropped Rods: • Annunciator 81A, Two/More Rods At Bottom - LIT • Rod Bottom lights for greater than one rod – LIT RNO Go To Step 3
	RO	Step 3 - CHECK Main Turbine Runback Or Load Reject - IN PROGRESS RNO Go To Step 5
	RO	Step 5 - PLACE Rod Control in MANUAL: • SE HS-9
	RO	Step 6 - CHECK Control Rods Motion – STOPPED Only 1 rod dropped into the core and therefore there should be NO rod motion

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001	**RO**	Step 7 - CHECK Instruments Indications - NORMAL a. RCS Tavg: • BB TI-412 • BB TI-422 • BB TI-432 • BB TI-442 b. HP Turbine First Stage Pressure: • AC PI-505 • AC PI-506 c. Power Range Nuclear Instrument: • SE NI-41B • SE NI-42B • SE NI-43B • SE NI-44B
		NOTES: An Urgent Failure in the Logic Cabinet prevents all automatic and manual rod motion in overlap. An Urgent Failure in a Power Cabinet prevents all rod motion by the rods powered from the failed cabinet.
	RO	Step 8 - CHECK Annunciator 79A, Rod Ctrl Urg Fail – LIT 79A is not LIT and Go To RNO
	BOP	Step 8 RNO - PERFORM The Following: a. MAINTAIN RCS Tavg/Tref deviation within 1.5°F using either of the following: IF Tref greater than Tave, THEN ADJUST Turbine load. OR IF Tave greater than Tref, THEN ADJUST RCS boron concentration. b. Go To Step 10. As Tref > Tavg, the BOP should adjust turbine Load

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001	**RO**	Step 10 - CHECK Both Of The Following Are - EXTINGUISHED • Annunciator 81B, Rod At Bottom • All Rod Bottom lights RNO - Go To Attachment A, Dropped/Misaligned Control Rod.
OTO-SF-00001 ATT A	**RO**	Step A1 - CHECK Reactor Power – LESS THAN 5%. NO RNO – Go To Step A3
	BOP	Step A3 - CONTACT I&C To Determine The Reason For The Dropped/Misaligned Rod
Booth Operator		Time Compress and Role Play as I&C and state "will develop a troubleshooting package to determine the reason. Estimated time for the package to be executed is 2 hours."
	RO/ CRS	Step A4 - CHECK Shutdown Margin Is Within The Limits Provided In The COLR Within 1 Hour
Booth Operator		Role Play as Reactor Engineers and state " Reactor Engineering will check that SDM is within the Limits of the COLR and report back to you"
	RO	Step A5 - CHECK Axial Flux Difference (AFD) - WITHIN THE LIMITS OF CURVE BOOK, FIGURE 1-1, AXIAL FLUX DIFFERENCE LIMITS

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001 ATT A	**RO**	Step A6 - CHECK QPTR - LESS THAN OR EQUAL TO 1.02 ● REU1151 ● REU1152 ● REU1153 ● REU1154 ● REU1159 ● REU1160 ● REU1161 ● REU1162 QPTR is NOT within limits (1.03) – RNO Refer To Technical Specification 3.2.4. Note: See Technical Specification declaration on page 17.
	RO	Step A7 - CHECK Dropped/Misaligned Rod Can Be Recovered In Less Than 1 Hour Proceed to the RNO as the cue from I&C was ~2 hours
	BOP	Step A7 RNO - REDUCE Reactor Power to less than or equal to 75% within 2 hours per one of the following: ● OTO-MA-00008, Rapid Load Reduction. OR ● OTG-ZZ-00004, Power Operation.
OTO-MA-00008		
	CRS	Implement OTO-MA-00008, Rapid Load Reduction
	RO	Step 1 PLACE Rod Control In AUTO: ● SE HS-9
	RO	MANAGE Reactivity: a. PERFORM Reactivity Management Brief: • DISCUSS Amount And Rate of Turbine Load reduction • DETERMINE amount of boric acid needed

Proc /Time	Position	Applicant's Actions or Behavior
		CAUTIONS ●If using the Load Limit Potentiometer, unloading at greater than 50 MWe per minute may arm the Main Condenser Steam Dumps. ● If changing load reduction methods to the Load Limiter ENSURE Load Set is restored to AT SET LOAD prior to using the Load Limiter. Note Steps 3 and 4 may be performed concurrently while continuing in this procedure
	BOP	REDUCE Turbine Load At Less Than Or Equal To 5% Per Minute Using Any Of The Following: REDUCE Turbine load using the %/Min Loading Rate: a. SLOWLY LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: ● Load Limit Limiting Light - EXTINGUISHED ● Decrease Loading Rate "OFF" Light - LIT ● Loading Rate Limit %/MIN "1/2" Light - LIT b. ROTATE Load Limit Set potentiometer fully clockwise c. SELECT Decrease Loading Rate - ON d. SET Loading Rate Limit %/Min to desired value e. LOWER load set MW toward desired load using the DECREASE LOAD pushbutton
NOTE		Both the QPTR limit T.S and OTO-SF-00001 Step #A7 require a power reduction. The dropped rod power reduction is more restrictive than the QTPR limit violation (3% for every 1% over 1.00 = 9% power reduction), hence the target power should be less than or equal to 75%.

Proc /Time	Position	Applicant's Actions or Behavior
	RO	BORATE From The BAST By Performing Following: BORATE using OTN-BG-00002 Attachment 8 OR BORATE to the VCT: a. PLACE RCS Makeup Control in STOP: ● BG HS-26 b. PLACE RCS Makeup Control Selector in BORATE: ● BG HS-25 c. SET Boric Acid Flow Controller to the desired flow rate: ● BG FK-110 d. PLACE BG FK-110 in AUTO e. RESET Boric Acid Counter to 000: ● BG FY-110B f. SET BG FY-110B for the desired gallons of boric acid to be added g. PLACE BG HS-26 in RUN h. WHEN desired boration is complete, THEN PLACE BG HS-26 in STOP i. REPEAT Boration as necessary
NOTE		The steps of OTN-BG-00002 Attachment 8 are the same as the steps listed in OTO-MA-00008 which are listed above.
	CRS	REVIEW Applicable Technical Specifications
		The CRS should declare Tech Spec 3.1.4 Condition B not met. If plant conditions (PR NI) show QPTR >1.02, then T.S. 3.2.4 Condition A is not met and Required Actions A.1, A.2, A.3, A.4, A.5, and A.6 are appropriate.
NOTE		**At Lead Examiner's discretion move to the next Event.** **Event 3 is triggered the same time event 2 is and the indication appear (annunciator) ~ 10 minutes later. This is done as it take time for the fuel failure to buildup in the RCS and affect the CVCS letdown rad monitor. It may be necessary to evaluate T.S post scenario via candidate questioning.**

Op Test No.: 2019-1	Scenario # 3	Event # 3	Page 19 of 40
Event Description:	RCS High Activity OTO-BB-00005 / Place 120 gpm Letdown in-service (Tech Spec 3.4.16)		

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • Verify the following malfunctions are active: o Expert Command: insert TVHM1705 0.1 delay=0 ramp=0 on=0 off=0 o Expert Command: insert RCCFUELFAIL 3E-8 delay=0 ramp=0 on=0 off=0		
Indications Available Annunciator 61B, Process Radiation High		
		OTO-BB-00005
	CRS	Implement OTO-BB-00005, RCS High Activity
OTO-BB-00005	**RO**	Step 1 - MAXIMIZE Letdown Flow Through CVCS Letdown Mixed Bed Demineralizer: a. ENSURE Letdown System Containment Isolation Valves - OPEN: • BG HIS-8152 • BG HIS-8160 b. ENSURE RCS Letdown To Regenerative Heat Exchanger Valves - OPEN: • BG HIS-459 • BG HIS-460 c. ESTABLISH 120 gpm Charging Header flow while maintaining seal injection flow: • BG HC-182 • BG FK-124 (NCP) d. PLACE Letdown Hx Outlet Pressure Controller in Manual at 75% or greater: • BG PK-131 e. OPEN Letdown Throttle Isolation Valve(s) to establish desired letdown flow: • BG HIS-8149AA (45 gpm) f. ADJUST Letdown Hx Outlet Pressure Controller to establish desired pressure and PLACE in Automatic: • BG PK-131 g. ADJUST Charging flow as necessary to maintain Pressurizer level. h. PLACE Pressurizer Level Master Controller in MANUAL to obtain an output of 64% - 68% demand: • BB LK-459 i. WHEN PZR Level is being maintained at PROGRAM, THEN PLACE the following in AUTO as required: • BG FK-124 • BB LK-459
		NOTE RCS coolant and seal injection filters D/P will rise if a crud burst has occurred.

Proc /Time	Position	Applicant's Actions or Behavior
OTO-BB-00005	**RO**	Step 2 - MONITOR D/P On RCS Coolant And Seal Injection Filters
Booth Driver		Role Play as Primary OT and acknowledge request to monitor D/P on RCS Coolant and Seal Injection filters
	RO	Step 3 - DIRECT Chemistry To Sample RCS For Activity
Booth Driver		Role Play as Chemistry report that "TIME Compression on the RCS Sample results - the last RCS sample is 65uCi/gm of Dose Equivalent Iodine"
	RO	Step 5 - DIRECT Chemistry To Determine If Decontamination Factor (DF) of CVCS Letdown Mixed Bed Demineralizer Is Acceptable Per CDP-ZZ-00800, Callaway Resin Monitoring Program
	RO	Step 6 - CHECK DF Of Inservice CVCS Letdown Mixed Bed Demineralizer - ACCEPTABLE
	CRS	Step 7 - REVIEW Technical Specifications 3.4.16
		The CRS should declare Tech Spec 3.4.16 Condition A and C not met. Required Action A.1, Verify Dose Equivalent I-131 is ≤ 60uCi/gm within 4 hours AND A.2 Restore Dose Equivalent I-131 to within limit in 48 hours plus Required Action C.1, Be in Mode 3 in 6 hours AND C.2 Be in Mode 5 in 36 hours are all applicable. **It may be necessary to evaluate T.S post scenario via candidate questioning.**
OTO-MA-00008		
	CRS	Implement OTO-MA-00008, Rapid Load Reduction
	RO	Step 1 PLACE Rod Control In AUTO: ● SE HS-9

Proc /Time	Position	Applicant's Actions or Behavior
	RO	MANAGE Reactivity: b. PERFORM Reactivity Management Brief: • DISCUSS Amount And Rate of Turbine Load reduction • DETERMINE amount of boric acid needed
		CAUTIONS ●If using the Load Limit Potentiometer, unloading at greater than 50 MWe per minute may arm the Main Condenser Steam Dumps. ● If changing load reduction methods to the Load Limiter ENSURE Load Set is restored to AT SET LOAD prior to using the Load Limiter. Note Steps 3 and 4 may be performed concurrently while continuing in this procedure
	BOP	REDUCE Turbine Load At Less Than Or Equal To 5% Per Minute Using Any Of The Following: REDUCE Turbine load using the %/Min Loading Rate: a. SLOWLY LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: ● Load Limit Limiting Light - EXTINGUISHED ● Decrease Loading Rate "OFF" Light - LIT ● Loading Rate Limit %/MIN "1/2" Light - LIT b. ROTATE Load Limit Set potentiometer fully clockwise c. SELECT Decrease Loading Rate - ON d. SET Loading Rate Limit %/Min to desired value e. LOWER load set MW toward desired load using the DECREASE LOAD pushbutton

Proc /Time	Position	Applicant's Actions or Behavior
	RO	BORATE From The BAST By Performing Following: BORATE using OTN-BG-00002 Attachment 8 OR BORATE to the VCT: a. PLACE RCS Makeup Control in STOP: ● BG HS-26 b. PLACE RCS Makeup Control Selector in BORATE: ● BG HS-25 c. SET Boric Acid Flow Controller to the desired flow rate: ● BG FK-110 d. PLACE BG FK-110 in AUTO e. RESET Boric Acid Counter to 000: ● BG FY-110B f. SET BG FY-110B for the desired gallons of boric acid to be added g. PLACE BG HS-26 in RUN h. WHEN desired boration is complete, THEN PLACE BG HS-26 in STOP i. REPEAT Boration as necessary
NOTE		The steps of OTN-BG-00002 Attachment 8 are the same as the steps listed in OTO-MA-00008 which are listed above.
NOTE		**At Lead Examiner's discretion move to the next Event. The crew may start a down power due to RCS Activity / Dropped Rod failures. It is recommended to insert the next malfunction before the down power begins such that it is NOT masked.**

Event Description: DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection

'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

- Expert Command: insert AEPT0508A 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508B 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508C 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert FCXY0001A_2 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0003A_1 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0002A_2 1 delay=0 ramp=0 on=0 off=0

And as a contingency to ensure the SG level is not stabilized

- Expert Command: insert FCFV0075ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCFV0075TASTEM 0 delay=0 ramp=90 on=0 off=0

For D SG Faulted (outside CTMT) upon reactor trip:

- AB002_D Value = 2000 Condition = sfawctrd560517dpos eq 0.0

The failure of the Automatic Reactor Trip, automatic SLIS, and "D" MSIV to close on Fast Pushbuttons are preloaded.

Indications Available

Annunciators 108C through 111C, SG A through D Level Deviation

OTO-AE-00001 / E-0 / E-2		
Booth Driver		AS a contingency, have the malfunction for the a MFP (PAE01B_1 = 1) trip ready to insert if the loss of the DFW control station is arrested by utilizing DFWCS Display #2 (usual alarm display) and selecting Manual on the MFP controls. Note: The event may be moving fast enough that OTO-AE-00001 is not implement as the crew inserts a manual reactor trip (Auto trip is disabled)
	CRS	Implement OTO-AE-00001, Feedwater System Malfunction
CRITICAL TASK		**Manually trip the reactor before any SG level indicates less than 10% WR.**
OTO-AE-00001		

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 24 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AE-00001	**BOP**	Step 1 - CHECK BOTH Main Feed Pumps – TRIPPED a. Manually TRIP the Reactor b. Go To E-0, Reactor Trip Or Safety Injection
	BOP	Step 2 - CHECK ONE Main Feed Pump - TRIPPED
NOTE:		At this point it may be difficult to determine if a main feed pump is tripped and continuing in the AER column to step #3 and then performing the RNO at ste#3 to manually trip the reactor. If the applicant determines that a main feed pump is not tripped and performs the RNO at step #2 to go to step #10, the applicant will perform steps #10 and #11 (listed below) Either path is acceptable as the decision to trip the reactor is the intent.
	BOP	Step 3 - Check Reactor Power - LESS THAN 70% RNO - IF only one Main Feed pump is running, THEN PERFORM the following: a. Manually TRIP the Reactor. b. Go To E-0, Reactor Trip or Safety Injection.
	BOP	Step 10 - MAINTAIN MFP Suction Pressure Greater Than The Following: ● 300 psig (One MFP Running) OR ● 240 psig (Two MFPs Running)

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AE-00001	**BOP**	Step 11 - CHECK DFWCS Operator on RL005 AVAILABLE: ● Main Feed System UPDATING ● HMI Monitor ACTIVE ● DFWCS Operator Station RESPONDS to Operator Action RNO - PERFORM The Following: a. SELECT Main Feed System on RL028 b. IF neither Normal Operator Stations RESPOND, THEN ENABLE the Auxiliary Operator Station on RL028. c. CONTACT Engineering for restoration to normal.
E-0, Reactor Trip or Safety Injection		
E-0	**RO**	NOTE: Steps 1 through 4 are immediate action steps.
	RO	Step 1 - CHECK Reactor Trip: • Rod Bottom Lights - ALL LIT • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2 - CHECK Turbine Trip: • All Turbine Stop valves - CLOSED
	BOP	Step 3 - CHECK Power to AC Emergency Buses: a. AC emergency buses – AT LEAST ONE ENERGIZED b. AC emergency buses – BOTH ENERGIZED

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 26 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**BOP**	Step 4 - Check SI Status: a. Check if SI is actuated • Ann 88A thru 88D Lit – OR- • SB069 SI Actuate Red light is lit – OR- • LOCA Sequencers alarms 30A & 31A b. CHECK both Trains of SI-Actuated • ANN 30A lit • ANN 31A lit • SB069 SI Actuate Red light lit SOLID
	BOP	Step 5 - PERFORM Attachment A, Automatic Action Verification, While Continuing With This Procedure.
E-0 FOLDOUT PAGE		2. FAULTED SG ISOLATION CRITERIA IF any SG pressure is lowering in an uncontrolled manner OR is completely depressurized, THEN PERFORM the following as desired: ● FAST CLOSE MSIVs. (AB-HS 79/80) ● Manually CLOSE or locally ISOLATE any failed open ASD(s). ● ISOLATE feed flow to faulted SG(s). (AL HK 5A/6A) MAINTAIN total feed flow greater than 270,000 lbm/Hr until narrow range level is greater than 7% [25%] in at least one SG.
E-0	**BOP**	Step 6 - CHECK Generator Output Breakers – OPEN • MA ZL-3A (V55) • MA ZL-4A (V53)

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 27 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**BOP**	Step 7 - CHECK Feedwater Isolation: a. MFPs Tripped • ANN 120A, MFP A Trip – LIT • ANN 123A, MFP B Trip b. Main Feedwater Reg Valves – CLOSED • AE ZL-510 • AE ZL-520 • AE ZL-530 • AE ZL-540 c. Main Feedwater Reg Bypass Valves – CLOSED • AE ZL-550 • AE ZL-560 • AE ZL-570 • AE ZL-580 d. Feedwater Isolation Valves – CLOSED • AE HIS-39 • AE HIS-40 • AE HIS-41 • AE HIS-42
	BOP	Step 8 - CHECK AFW Pumps: a. MD AFW Pumps – BOTH RUNNING • AL HIS-23A–NO Initial conditions of the scenario has it in PTL. • AL HIS-22A b. TDAFP -Running if Necessary

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 28 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
CRITICAL TASK		~~**Trip all RCPs within 5 minutes of meeting RCP trip criteria.**~~ ~~This is only applicable during the performance of E-0 and does not apply during the performance of E-2, and ES-1.1. This action can be performed per E-0 foldout page #1 or Step #12 of E-0. If during the performance of E-0, RCS pressure lowers to or less than 1425 psig and a SI or CCP is running, the crew has 5 minutes to trip all RCPs. This task was not met by crew 2 because of their speed in isolating the ruptured D SG. The lowest RCS pressure was approximately 1650 psig and 1450 psig is the pressure where the RCPs would be tripped.~~

E-0	**BOP**	Step 9 - CHECK AFW Valves – proper emergency alignment
		• MD AFP Flow Control Valves – THROTTLED
		  • AL HK-7A
		  • AL HK-9A
		  • AL HK-11A
		  • AL HK-5A
		• TD AFP Flow Control Valves – FULL OPEN
		  • AL HK-8A
		  • AL HK-10A
		  • AL HK-12A
		  • AL HK-6A
		• TD AFP Loop Steam Supply Valves – BOTH OPEN IF NECESSARY
		  • AB HIS-5A
		  • AB HIS-6A

	BOP	Step 10 - CHECK Total AFW Flow > 270,000 lbm/hr

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 29 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**RO**	Step 11 - CHECK PZR PORVs and Spray Valves: a. PZR PORVs – CLOSED • BB HIS-455A • BB HIS-456A b. PZR PORVs – Both in AUTO • BB HIS-455A • BB HIS-456A c. PORV Block Valves – BOTH OPEN • BB HIS-8000A • BB HIS-8000B d. Normal PZR Spray valves – CLOSED • BB ZL-455B • BB ZL-455C
	RO	Step 12 - CHECK if RCPs should be stopped: a. RCPs – ANY RUNNING b. ECCS Pumps – AT LEAST ONE RUNNING • CCP OR • SI Pump c. RCS Pressure < 1425 psig. d. Stop all RCPs
	RO	Step 13 - CHECK RCS Temperatures: • Any RCP Running – RCS Tavg stable at 557°F or trending to 557°F -OR- • NO RCPs running - RCS COLD LEG TEMPERATURES STABLE AT 557°F OR TRENDING TO 557°F Go To RNO

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**RO**	Step 13 RNO - IF temperature is less than 557°F AND lowering, THEN PERFORM the following: a. STOP dumping steam. b. IF cooldown continues, THEN CONTROL total feed flow: • MAINTAIN total feed flow greater than 270,000 lbm/Hr until narrow range level is greater than 7% [25%] in at least one SG. c. IF cooldown continues, THEN FAST CLOSE all MSIVs and Bypass valves: • AB HS-79 • AB HS-80
	BOP	Step 14 - CHECK if any SG is faulted: a. Check pressures in all SGs: RNO: GO TO Step #15 • Any SG pressure lowering in an uncontrolled manner or completely depressurized. b. Go to E-2, Faulted SG Isolation Step 1
E-2, Faulted SG Isolation		

Proc /Time	Position	Applicant's Actions or Behavior
CRITICAL TASK		**Isolate the faulted 'D' SG before transition out of E-2.** Note: to isolate the D SG, the following actions and handswitches will be manipulated in different steps of E-2. These switches are bolded in the applicable E-2 steps and listed here for convenience. ISOLATE AFW flow to faulted SG(s): • CLOSE associated MD AFP Flow Control Valve(s): o AL HK-5A (SG D) • CLOSE associated TD AFP Flow Control Valve(s): o AL HK-6A (SG D) • CLOSE Steamline Low Point Drain valve from faulted SG(s): o AB HIS-10 (SG D) FAST CLOSE all MSIVs and Bypass valves: o AB HS-79 o AB HS-80 Close "D" MSIV using individual MSIV handswitch o AB HIS 11 Note: "D" MSIV may have been closed during the performance or E-0. Note: The Automatic SLIS is blocked requiring the candidates to manually initiate SLIS. When the Fast Close PB to close all MSIVs is depressed, the "D" MSIV will not close. The "D" MSIV can be closed with its individual handswitch (See Step #1 RNO).
		CAUTIONS • At least one SG must be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.
E-2	**BOP**	Step 1 - CHECK MSIVs And Bypass Valves – CLOSED Go To RNO (if not previously closed)

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 1 RNO - FAST CLOSE all MSIVs and Bypass valves: • **AB HS-79** • **AB HS-80** IF valve(s) will NOT fast close, THEN CLOSE MSIV(s) and bypass valves as necessary. 'D' MSIV handswitch close button depressed – **AB HIS 11**
	BOP	Step 2 - CHECK If Any SG Secondary Pressure Boundary Is Intact: a. CHECK pressures in all SGs - ANY STABLE OR RISING
		NOTE The ESFAS SG pressure transmitters may be inaccurate if a secondary line break occurs in Area 5. The pressure indicators on the SG ASD controllers are NOT affected and should be used for comparison.
	BOP	Step 3 - IDENTIFY Faulted SG(s): a. CHECK pressures in all SGs: • ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED "D" SG identified as the faulted SG
		CAUTION - If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from at least one SG.

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 33 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 4 - ISOLATE Faulted SG(s): a. ISOLATE AFW flow to faulted SG(s): ● CLOSE associated MD AFP Flow Control Valve(s): ● **AL HK-5A (SG D)** ● CLOSE associated TD AFP Flow Control Valve(s): ● **AL HK-6A (SG D)** b. CHECK ASD from faulted SG(s)- CLOSED ● AB PIC-4A (SG D) c. Locally CLOSE TDAFP Steam Supply From Main Steam Loop Manual Isolation valve from faulted SG(s): ● ABV0085 (SG B) ● ABV0087 (SG C) (step is N/A as it's the D SG) d. CHECK Main Feedwater valves to faulted SG(s) – CLOSED ● Main Feedwater Reg Valve: ● AE ZL-540 (SG D) ● Main Feedwater Reg Bypass valve: ● AE ZL-580 (SG D) ● Feedwater Isolation Valve: ● AE HIS-42 (SG D) e. CHECK SG Blowdown Containment Isolation Valve from faulted SG(s) - CLOSED ● BM HIS-4A (SG D) f. CLOSE Steamline Low Point Drain valve from faulted SG(s): ● **AB HIS-10 (SG D)**
	BOP	Step 5 - CHECK CST To AFP Suction Header Pressure – GREATER THAN 2.75 PSIG
		NOTE Subsequent actions should NOT be delayed while awaiting SG sampling. Sampling of the SGs is repeated in E-1, Loss Of Reactor Or Secondary Coolant.

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 34 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 6 - CHECK Secondary Radiation: a. PERFORM the following: • PERFORM EOP Addendum 11, Restoring SG Sampling After SI Actuation • DIRECT Chemistry to periodically sample all SGs for activity • DIRECT Radiation Protection to survey steamlines in Auxiliary Building Area 5 as necessary b. CHECK unisolated secondary radiation monitors: • SG Sample radiation: ● SJL 026 • SG ASD radiation: ● AB RIC-114 (SG D) • Turbine Driven Auxiliary Feedwater Pump Exhaust radiation: ● FC RIC-385 c. Secondary radiation – NORMAL d. Levels in all SGs: - NO SG LEVEL RISING IN AN UNCONTROLLED MANNER
	RO	Step 7 - CHECK If ECCS Flow Should Be Reduced: a. RCS subcooling – GREATER THAN 30°F [50°F] b. Secondary heat sink: Narrow range level in at least one intact SG - GREATER THAN 7% [25%] OR Total feed flow to intact SGs – GREATER THAN 270,000 LBM/HR c. RCS pressure - STABLE OR RISING d. PZR level – GREATER THAN 9% [29%]
		CAUTION - If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.
	RO	Step 8 - RESET SI: ● SB HS-42A ● SB HS-43A

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**RO**	Step 9 - STOP All But One CCP: ● BG HIS-1A OR ● BG HIS-2A
	CRS	Step 10 - Go To ES-1.1, SI Termination, Step 3
ES-1.1, SI Termination		
ES-1.1	**RO**	Step 3 - RESET Containment Isolation Phase A And Phase B: ● Phase A (CISA): ● SB HS-53 ● SB HS-56 ● Phase B (CISB): ● SB HS-52 ● SB HS-55
	BOP	Step 4 - ESTABLISH Instrument Air To Containment: a. CHECK if ESW To Air Compressor valves - OPEN ● EF HIS-43 & EF HIS-44 b. START Air Compressor(s): ● KA HIS-3C ● KA HIS-2C c. OPEN Instrument Air Supply Containment Isolation valve: ● KA HIS-29
	BOP	Step 5 - CHECK RCS Pressure - STABLE OR RISING

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 36 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
ES-1.1	**BOP**	Step 6 – ISOLATE Boron Injection Header a. CCP – Suction Aligned to RWST b. RESET CCP Recirc valves: ● BG HS-8110 ● BG HS-8111 c. CHECK CCP Recirc valves – OPEN ● BG HIS-8110 ● BG HIS-8111 d. CLOSE Boron Injection Header Inlet valves: ● EM HIS-8803A ● EM HIS-8803B e. CLOSE Boron Injection Header Outlet valves: ● EM HIS-8801A ● EM HIS-8801B
NOTE		**The scenario can be terminated at the discretion of the Lead Examiner**

E-0 Attachment A

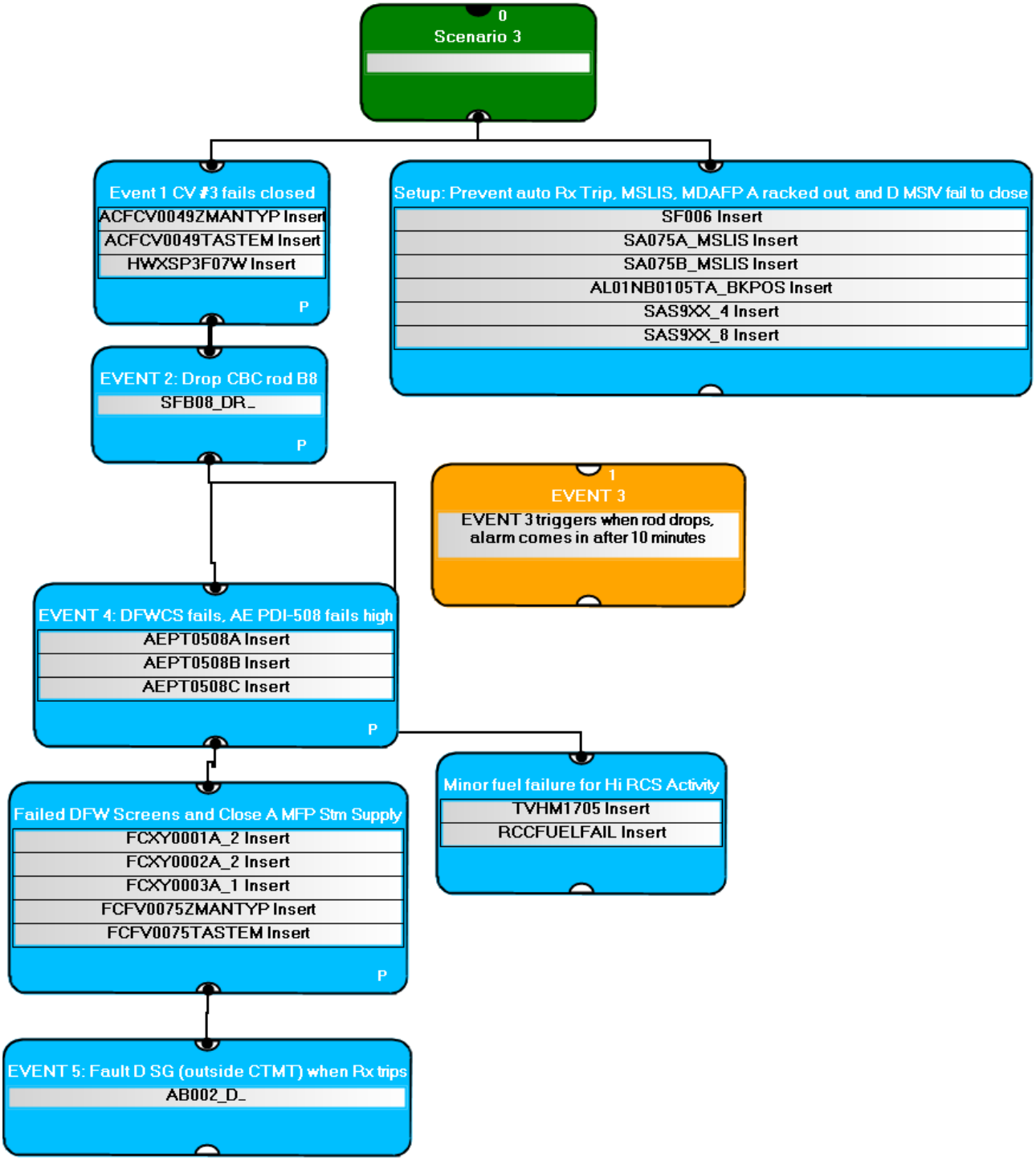
E-0 Attachment A	**BOP**	Step A1 - Check Charging Pumps: a. CCPs – Both Running • BG HIS-1A • BG HIS-2A b. Stop NCP using BG HIS-3
	BOP	Step A2 - CHECK SI and RHR Pumps: • SI Pumps – BOTH RUNNING • EM HIS-4 • EM HIS-5 • RHR Pumps – BOTH RUNNING • EJ HIS-1 • EJ HIS-2
	BOP	Step A3 - CHECK ECCS flow: a. CCPs to Boron Inj Header – FLOW INDICATED • EM FI-917A • EM FI-917B b. RCS pressure – Less than 1700 psig c. SI Pump Discharge - FLOW INDICATED • EM FI-918 • EM FI-922 d. RCS pressure – LESS THAN 325 PSIG e. RHR To Accumulator Injection Loop - FLOW INDICATED • EJ FI-618 • EJ FI-619
	BOP	Step A4 - CHECK ESW Pumps – BOTH RUNNING • EF HIS-55A • EF HIS-56A

E-0 Attachment A	**BOP**	Step A5 - CHECK CCW Alignment: a. CCW Pumps – one running in each train • Red Train: EG HIS-21 or EG HIS-23 • Yellow Train: EG HIS-22 or EG HIS-24 b. CCW Service Loop Supply and Return valves for one operating CCW pump – OPEN • EG ZL-15 and EG ZL-53 • OR • EG ZL-16 and EG ZL-54 c. OPEN CCW to RHR HX valves: • EG HIS-101 • EG HIS-102 d. CLOSE Spent Fuel Pool HX CCW Outlet Valves: • EC HIS-11 • EC HIS-12 e. STOP Spent Fuel Pool Cooling Pump(s): • EC HIS-27 • EC HIS-28 f. RECORD the time spent fuel pool cooling pump secured g. MONITOR time CCW flow isolated to SFP HX < 4 hours
	BOP	Step A6 - CHECK Containment Cooler Fans running in slow speed • GN HIS-9 • GN HIS-17 • GN HIS-5 • GN HIS-13
	BOP	Step A7 - CHECK Containment H2 Mixing Fans in slow speed • GN HIS-2 • GN HIS-4 • GN HIS-1 • GN HIS-3

E-0 Attachment A	**BOP**	Step A8 - CHECK if Containment Spray should be actuated • Containment Pressure > 27 psig -OR- • GN PR-934 indicates ctmt pressure has been > 27 psig - OR- • Annunciator 59A CSAS LIT - OR- • Annunciator 59B CISB LIT RNO: Go to step A9
	BOP	Step A9 - CHECK if Main Steamlines should be Isolated a. Check the following: • Containment pressure > 17 psig -OR- • GN PR-934 indicates ctmt pressure has been > 17 psig -OR- • Steamline pressure < 615 psig -OR- • AB PR-514 or 535 shows pressure has been < 615 psig -OR- b. CHECK MSIVs and Bypass valves - CLOSED
	BOP	Step A10 - CHECK ECCS Valves in proper alignment a. ESFAS Status Panels SIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A11 - CHECK Containment Isolation Phase A: a. ESFAS status panels CISA sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A12 - CHECK SG Blowdown Isolation: a. ESFAS status panels SGBSIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT

	BOP	Step A13 - CHECK Both Trains of CRVIS a. ESFAS status panels CRVIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A14 - CHECK Containment Purge Isolation: a. ESFAS status panels CPIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A15 - NOTIFY CRS of the following: • Unanticipated manual actions taken • Failed Equipment Status • Attachment A completion

SCE File Display



Facility: Callaway Scenario No. 3, Rev 5 Op-Test No.: 2019-1

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: 100%, MOC

Turnover: 'A' MDAFP is out of service for breaker maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	AC / FCV0049MANTYP AC / FCV0049TASTEM SB / HWXSP3FO7W	SRO (R) RO (R) BOP (C)	Main Turbine Control Valve #3 fails closed OTO-MA-00001, Turbine Load Reject
2	SF / SFB08_DR	SRO (C) RO (C) BOP (C)	Dropped rod B-8 OTO-SF-00001, Rod Control Malfunctions (Tech Spec 3.1.4) and (TS 3.2.4)
3	TVHM1705 RCCFUELFAIL	SRO (C) RO (C)	RCS High Activity OTO-BB-00005 / Place 120 gpm Letdown in-service (Tech Spec 3.4.16)
4	AE / AEPT0508A, B, C FC / FCXY0001A_2 FC / FCXY0003A_1 FC / FCXY0002A_2	SRO (I) RO (I) BOP (I)	DFWCS failure – loss of MFW with a manual reactor trip required
5	SF / SF006	SRO (I) RO (I)	Failure of the automatic reactor trip, E-0 Reactor Trip or Safety Injection CT-1, Manually trip the reactor
6	AB / AB002_D	SRO (M) RO (M) BOP (M)	'D' SG Fault, E-2 Faulted SG Isolation CT-17 Isolate faulted SG CT-16, Manually Trip RCPs
7	SA / SA075A_MSLIS SA / SA075B_MSLIS	SRO (I) BOP (I)	Failure of the automatic SL isolation
8	SA / SAS9XX_4 SA / SAS9XX_8	SRO (C) BOP (C)	Failure of 'D' MSIV to close with Fast Close PB

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

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5-8)	8
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal events (2-4)	3
4. Major transients (1-2)	1
5. EOPs entered/requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical tasks (2-3)	3

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

The Plant is stable at 100% with the 'A' MDAFP out of service.

After the reactivity brief is complete, Main Turbine Control Valve #3 will fail closed and crew will take actions per OTO-MA-00001. The crew will stabilize the plant and adjust Tavg and turbine controls in response.

After the plant is stabilized, a dropped rod (B-8) occurs as indicated by DRPI and Control Rod Alarms. The crew will establish conditions for rod recovery per OTO-SF-00001, identify Technical Specifications and begin restoration. Technical Specifications 3.1.4 and TS 3.2.4 are not met.

Once the plant is stable (~10 minutes after the dropped rod), Annunciator 61B alarms indicating high activity in the RCS. The Crew will enter OTO-BB-00005, RCS High Activity and establish 120 gpm letdown flow IAW OTN-BG-00001 Addendum 04, Operation of CVCS Letdown. Technical Specification 3.4.16 is not met.

After a load reduction is begun, a failure of the DFWCS occurs resulting in both main feed pump speed lowering and therefore flow lowering to the point that a manual reactor trip is required (auto trip will not work). The crew will enter E-0, Reactor Trip or Safety Injection, and perform the immediate actions.

Upon the Rx trip, the 'D' SG develops a fault which can be seen by the crew as RCS pressure and temperature lower. A transition should be made to E-2, Faulted Steam Generator Isolation, at E-0 step#14. When performing E-2, the crew should determine that the automatic steamline isolation failed to occur and manually initiate it. Additionally, the MSIV fast closed Pushbuttons (AB HS 79/80) will fail to close "D" MSIV. "D" MSIV can be closed with is individual pushbutton (AB HIS 11).

Once the faulted Steam Generator is isolated and, after the secondary side blows dry, SI termination criteria should be met. The crew will transition to ES-1.1, SI Termination from E-2.

The scenario is complete when the Boron Injection Header is isolated per step 6 of ES-1.1, SI Termination.

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Critical Tasks:

Critical Tasks	Manually trip the reactor before any SG level indicates less than 10% WR	Isolate the faulted 'D' SG before transition out of E-2
EVENT	4	5
Safety significance	Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy" and demonstrates the inability of the crew to "recognize a failure or an incorrect automatic actuation of an ESF system or component."	Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Failure to isolate a faulted SG can result in challenges to the following CSFs: • Integrity • Subcriticality • Containment (if the break is inside containment)
Cueing	Indication and/or annunciation that plant parameter(s) exist that should result in automatic reactor trip but reactor does not automatically trip • SG lev low low RX trip annunciator (85A)	Both of the following: • Steam pressure and flow rate indications that make it possible to identify 'D' SG as faulted AND • Valve position and flow rate indication that AFW continues to be delivered to the faulted 'D' SG
Performance indicator	Manipulation of control room reactor trip switches as required to trip the reactor • Reactor trip and bypass breakers indicate open	ISOLATE AFW flow to faulted SG(s): • CLOSE associated MD AFP Flow Control Valve(s): o AL HK-5A (SG D) • CLOSE associated TD AFP Flow Control Valve(s): o AL HK-6A (SG D) • CLOSE Steamline Low Point Drain valve from faulted SG(s): o AB HIS-10 (SG D) FAST CLOSE all MSIVs and Bypass valves: o AB HS-79 o AB HS-80 Close "D" MSIV using individual MSIV handswitch o AB HIS 11
Performance feedback	Indications of reactor trip • Control rods at bottom of core • Neutron flux decreasing	Crew will observe the following: • Any depressurization of intact SGs stops • AFW flow rate indication to faulted SG of zero
Justification for the chosen performance limit	Not tripping the reactor prior to any SG reaching dryout conditions when it is possible to do so forces an immediate extreme challenge to the subcriticality CSF, availability of the heat sink, and containment. Additionally, the incorrect performance of failing to trip the reactor necessitates the crew taking compensating action that seriously complicates the event mitigation strategy. This misoperation constitutes a "significant reduction of safety margin beyond that irreparably introduced by the scenario."	"before transition out of E-2" is in accordance with the PWR Owners Group Emergency Response Guidelines. It allows enough time for the crew to take the correct action while at the same time preventing avoidable adverse consequences.
PWR Owners Group Appendix	CT-1, Manually trip the reactor	CT-17 Isolate faulted SG

Scenario #3 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

Critical Tasks	Trip all RCPs within 5 minutes of meeting RCP trip criteria.	
EVENT	5	
Safety significance	Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents misoperation or incorrect crew performance in which the crew has failed to prevent "degradation of...{the fuel cladding} ...barrier to fission product release" and which leads to "violation of the facility license condition."	
Cueing	Indications of a SBLOCA AND Indication and/or annunciation of safety injection AND Indication and/or annunciation that at least one CCP/SI pump is running AND Indication that the RCP trip criteria are met Note: The 5 minute trip criteria will start once the first CCP or SI pump is started.	
Performance indicator	Manipulation of controls as required to trip all RCPs • RCP breaker position lights indicate breaker open	
Performance feedback	Indication that all RCPs are stopped • RCP breaker position lights • RCP flow decreasing • RCP motor amps decreasing	
Justification for the chosen performance limit	In a letter to the NRC titled "Justification of the Manual RCP Trip for Small Break LOCA Events" (OG-117, March 1984) (also known as the Sheppard letter), the WOG provided the required assurance based on the results of the analyses performed in conjunction with WCAP-9584. The WOG showed that for all Westinghouse plants, more than two minutes were available between onset of the trip criteria and depletion of RCS inventory to the critical inventory. In fact, additional analyses sponsored by the WOG in connection with OG-117 conservatively showed that manual RCP trip could be delayed for five minutes beyond the onset of the RCP trip criteria without incurring any adverse consequence.	
PWR Owners Group Appendix	CT-16, Manually Trip RCPs Note: CT-16 may not be counted towards the minimum CT count if it is run after another scenario is run that contains this same CT, depending on order and selection of scenarios used during exam week. It is still a CT, however.	

"NOTE: (Per NUREG-1021, Appendix D) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review. "

Scenario Procedure References
Callaway 2019-1 NRC Scenario #3, Rev. 5

References
OTO-SF-00001, Rod Control Malfunctions
OTO-MA-00001, Turbine Load Reject
OTO-BB-00005, RCS High Activity
OTN-BG-00001 Addendum 04, Operation of CVCS Letdown
E-0, Reactor Trip or Safety Injection
E-2, Faulted Steam Generator Isolation
ES-1.1, SI Termination
Technical Specification 3.1.4, Rod Group Alignment Limits
Technical Specification 3.4.16, RCS Specific Activity
ODP-ZZ-00025, EOP/OTO User's Guide

PRA Systems, Events or Operator Actions

1. Secondary Line Breaks (10% contribution to CDF)
2. Loss of MFW (1% contribution to CDF)

Scenario Simulator Lesson Plan
Callaway 2019-1 NRC Scenario #3, Rev. 5

Scenario Setup Guide:

Establish the initial conditions of IC#10,

- Load 18-05
- Place "A" MDAFP in PTL and hang a WIP tag on hand switch.

==========SCENARIO PRELOADS / SETUP ITEMS==========

Setup: Rack out NB0105, Prevent Auto Rx Trip, MSLIS, "D" MSIV failure to close

- Expert Command: insert AL01NB0105TA_BKPOS 3 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SF006 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SA075A_MSLIS 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SA075B_MSLIS 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SAS9XX_4 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert SAS9XX_8 1 delay=0 ramp=0 on=0 off=0

========== EVENT 1 ==========

CV #3 fails closed

- Expert Command: insert ACFCV0049ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert ACFCV0049TASTEM 0 delay=0 ramp=10 on=0 off=0
- Expert Command: insert HWXSP3F07W 1 delay=0 ramp=0 on=0 off=0

========== EVENT 2 ==========

Drop CB rod B8

- SFB08_DR Value = 1

==========EVENT 3 ==========

Minor fuel failure for Hi RCS Activity

- Expert Command: insert TVHM1705 0.1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert RCCFUELFAIL 3E-8 delay=0 ramp=0 on=0 off=0

==========EVENT 4 ==========

DFW Control Station fails, AE PDI-508 fails high, Close 'A' MFP Stm Supply

- Expert Command: insert AEPT0508A 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508B 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508C 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert FCXY0001A_2 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0003A_1 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0002A_2 1 delay=0 ramp=0 on=0 off=0

And as a contingency to ensure the SG level is not stabilized

- Expert Command: insert FCFV0075ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCFV0075TASTEM 0 delay=0 ramp=90 on=0 off=0

==========EVENT 5 ==========

Failure of the Automatic Reactor Trip - PRELOADED

==========EVENT 6 ==========

Fault D SG (outside CTMT) when Rx trips

- AB002_D Value = 2000 Condition = sfawctrd560517dpos eq 0.0

==========EVENT 7 ==========

Failure of the automatic SL isolation - PRELOADED

==========EVENT 8 ==========

Failure of 'D' MSIV to close with Fast Close PB - PRELOADED

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMFs: o Expert Command: insert ACFCV0049ZMANTYP 1 delay=0 ramp=0 on=0 off=0 o Expert Command: insert ACFCV0049TASTEM 0 delay=0 ramp=10 on=0 off=0 o Expert Command: insert HWXSP3F07W 1 delay=0 ramp=0 on=0 off=0		
Indications Available Annunciators: • Multiple Indications of lowering turbine load • 78C, Power Range Lower Detector Flux Deviation • 77A, Reactivity Deviation • Control Bank D stepping inward • SB069, Turb Auto top 63 AST 3, LIT • RL005 indications of CV#3 closed and CV#4 opening		
	OTO-MA-00001	
	CRS	Implement OTO-MA-00001, Turbine Load Rejection
	RO	Step 1 - PLACE Rod Control In AUTO: SE HS-9
	RO	Step 2 - CHECK Rod Control System Responding To RCS Tavg/Tref Deviation By Ensuring One Of The Following: • Control Rods are inserting AND RCS Tavg trending to within 5°F of Tref OR • RCS Tavg within 5°F of Tref
	BOP	Step 3 - CHECK Stator Cooling Status: • Inlet Pressure – GREATER THAN 50 PSIG o CE PI-26 • Conductivity - LESS THAN 8.0 µmhos/cm o CEC0006 o CEC0007 • Outlet Temperature – LESS THAN 76°C o CE TI-38A • Annunciator 130E, GEN AUX TROUBLE - EXTINGUISHED

Proc /Time	Position	Applicant's Actions or Behavior
OTO-MA-00001	**RO**	Step 4 - CHECK Both Of The Following Annunciator Windows - EXTINGUISHED • 82B, OTΔT Rod Stop • 82C, OPΔT Rod Stop
	BOP	Step 5 -CHECK All Circulating Water Pumps – RUNNING • Circ Water Pump A • Circ Water Pump B • Circ Water Pump C
		CAUTION Turbine Runback and Setback functions will be defeated upon transfer to Standby Operation. However, Trip Protective functions will still be enabled.
	BOP	Step 6 - CHECK Main Turbine Control System Responding To A Turbine Load Rejection: Turbine Load STABLE OR LOWERING AS EXPECTED following a Turbine Runback OR Setback
	BOP	Step 7 - CHECK If Plant Parameters Can Be MAINTAINED BELOW The Operating Curve In Curve Book Figure 10-7.
	BOP	Step 8 - CHECK Stator Cooling Water Inlet Pressure - LESS THAN 50 PSIG : CE PI-26 RNO – Go To Step 18.
	BOP	Step 18 - MAINTAIN Main Generator MVARs Within One Of The Following: • (-)100 to +100 MVARs OR • Limits of Curve Book, Figure 10-1 through 10-6
	BOP	Step 19 - CHECK HP Heaters Bypass Valve - CLOSED: • AE HIS-38

Proc /Time	Position	Applicant's Actions or Behavior
OTO-MA-00001		CAUTIONS • If a Turbine Admission Valve is not fully closed performing Attachment B, Turbine Steam Admission Valve Failure, will fail affected valve closed. • Closing Turbine Admission Valves may affect reactivity. NOTE Placing the Turbine on Load Set for a Control Valve failure will allow other Control Valves to respond.
	BOP	Step 20 – IF Turbine Steam Admission Valve Failure Has Occurred Perform the Following: a. If a Control Valve has failed Place the Turbine on Load Set: 1) Slowly LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: • Load Limit Limiting Light – EXTINGUISHED • Decrease Loading Rate "OFF" Light-LIT • Loading Rate Limit %/MIN "1/2" Light-LIT 2) ROTATE Load Limit Set potentiometer fuilly clockwise 3) SELECT Decrease Loading Rate – ON b. IF possible Close the affected Turbine Steam Admission Valve. c. MAINTAIN the affected Turbine Steam Admission Valve closed by performing ATTACHMENT B, Turbine Steam Admission Valve Failure. d. MONITOR Turbine Vibration and Exhaust Hood temperature. e. MONITOR MSR levels and temperatures. f. IMPLEMENT APA-ZZ-00152, Emergent Issues Response g. CONTACT Main Turbine System Engineer.
OTO-MA-00001 ATT B	**RO/ BOP**	Step B5 - IF ACFCV0049, MN TURB CTRL VLV #3 has failed, PERFORM THE FOLLOWING: DISCONNECT the Electrical Connection (Amphenol) at CHFY0043 (CV #3 SPLY SERVO) This is the only applicable step from Attachment B – the crew will direct I&C to prepare a package for removal of the Amphenol

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator		Role Play as Secondary OT and Acknowledge request to disconnect amphenol at CHFY0043 (CV #3 SPLY SERVO)
NOTE		**At Lead Examiner's discretion move to the next Event**

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

- IMF SFB08_DR Value = 1, B-8 Control Bank Rod drop

Indications Available

Annunciator(s):

- 78A, Power Range Channel Deviation
- 78C, Power Range Lower Detector Flux Deviation (In and then clears)
- 78F, Power Range Tilt
- 77A, Reactivity Deviation
- 79C, Control Rod Deviation
- 80C, Rod Position Indication Rod Deviation
- 81B, Rod at Bottom
- 33C, PZR Pressure Low / Heaters On

DRPI indications of B-8 full in.

		OTO-SF-00001
	CRS	Implement OTO-SF-00001, Rod Control Malfunctions
	RO	Step 1 - CHECK Both Of The Following Are Met For Indication Of Multiple Dropped Rods: • Annunciator 81A, Two/More Rods At Bottom - LIT • Rod Bottom lights for greater than one rod – LIT RNO Go To Step 3
	RO	Step 3 - CHECK Main Turbine Runback Or Load Reject - IN PROGRESS RNO Go To Step 5
	RO	Step 5 - PLACE Rod Control in MANUAL: • SE HS-9
	RO	Step 6 - CHECK Control Rods Motion – STOPPED Only 1 rod dropped into the core and therefore there should be NO rod motion

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001	**RO**	Step 7 - CHECK Instruments Indications - NORMAL a. RCS Tavg: • BB TI-412 • BB TI-422 • BB TI-432 • BB TI-442 b. HP Turbine First Stage Pressure: • AC PI-505 • AC PI-506 c. Power Range Nuclear Instrument: • SE NI-41B • SE NI-42B • SE NI-43B • SE NI-44B
		NOTES: An Urgent Failure in the Logic Cabinet prevents all automatic and manual rod motion in overlap. An Urgent Failure in a Power Cabinet prevents all rod motion by the rods powered from the failed cabinet.
	RO	Step 8 - CHECK Annunciator 79A, Rod Ctrl Urg Fail – LIT 79A is not LIT and Go To RNO
	BOP	Step 8 RNO - PERFORM The Following: a. MAINTAIN RCS Tavg/Tref deviation within 1.5°F using either of the following: IF Tref greater than Tave, THEN ADJUST Turbine load. OR IF Tave greater than Tref, THEN ADJUST RCS boron concentration. b. Go To Step 10. As Tref > Tavg, the BOP should adjust turbine Load

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001	**RO**	Step 10 - CHECK Both Of The Following Are - EXTINGUISHED • Annunciator 81B, Rod At Bottom • All Rod Bottom lights RNO - Go To Attachment A, Dropped/Misaligned Control Rod.
OTO-SF-00001 ATT A	**RO**	Step A1 - CHECK Reactor Power – LESS THAN 5%. NO RNO – Go To Step A3
	BOP	Step A3 - CONTACT I&C To Determine The Reason For The Dropped/Misaligned Rod
Booth Operator		Time Compress and Role Play as I&C and state "will develop a troubleshooting package to determine the reason. Estimated time for the package to be executed is 2 hours."
	RO/ CRS	Step A4 - CHECK Shutdown Margin Is Within The Limits Provided In The COLR Within 1 Hour
Booth Operator		Role Play as Reactor Engineers and state " Reactor Engineering will check that SDM is within the Limits of the COLR and report back to you"
	RO	Step A5 - CHECK Axial Flux Difference (AFD) - WITHIN THE LIMITS OF CURVE BOOK, FIGURE 1-1, AXIAL FLUX DIFFERENCE LIMITS

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SF-00001 ATT A	**RO**	Step A6 - CHECK QPTR - LESS THAN OR EQUAL TO 1.02 ● REU1151 ● REU1152 ● REU1153 ● REU1154 ● REU1159 ● REU1160 ● REU1161 ● REU1162 QPTR is NOT within limits (1.03) – RNO Refer To Technical Specification 3.2.4. Note: See Technical Specification declaration on page 17.
	RO	Step A7 - CHECK Dropped/Misaligned Rod Can Be Recovered In Less Than 1 Hour Proceed to the RNO as the cue from I&C was ~2 hours
	BOP	Step A7 RNO - REDUCE Reactor Power to less than or equal to 75% within 2 hours per one of the following: ● OTO-MA-00008, Rapid Load Reduction. OR ● OTG-ZZ-00004, Power Operation.
OTO-MA-00008		
	CRS	Implement OTO-MA-00008, Rapid Load Reduction
	RO	Step 1 PLACE Rod Control In AUTO: ● SE HS-9
	RO	MANAGE Reactivity: a. PERFORM Reactivity Management Brief: • DISCUSS Amount And Rate of Turbine Load reduction • DETERMINE amount of boric acid needed

Proc /Time	Position	Applicant's Actions or Behavior
		CAUTIONS ●If using the Load Limit Potentiometer, unloading at greater than 50 MWe per minute may arm the Main Condenser Steam Dumps. ● If changing load reduction methods to the Load Limiter ENSURE Load Set is restored to AT SET LOAD prior to using the Load Limiter. Note Steps 3 and 4 may be performed concurrently while continuing in this procedure
	BOP	REDUCE Turbine Load At Less Than Or Equal To 5% Per Minute Using Any Of The Following: REDUCE Turbine load using the %/Min Loading Rate: a. SLOWLY LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: ● Load Limit Limiting Light - EXTINGUISHED ● Decrease Loading Rate "OFF" Light - LIT ● Loading Rate Limit %/MIN "1/2" Light - LIT b. ROTATE Load Limit Set potentiometer fully clockwise c. SELECT Decrease Loading Rate - ON d. SET Loading Rate Limit %/Min to desired value e. LOWER load set MW toward desired load using the DECREASE LOAD pushbutton
NOTE		Both the QPTR limit T.S and OTO-SF-00001 Step #A7 require a power reduction. The dropped rod power reduction is more restrictive than the QTPR limit violation (3% for every 1% over 1.00 = 9% power reduction), hence the target power should be less than or equal to 75%.

Proc /Time	Position	Applicant's Actions or Behavior
	RO	BORATE From The BAST By Performing Following: BORATE using OTN-BG-00002 Attachment 8 OR BORATE to the VCT: a. PLACE RCS Makeup Control in STOP: ● BG HS-26 b. PLACE RCS Makeup Control Selector in BORATE: ● BG HS-25 c. SET Boric Acid Flow Controller to the desired flow rate: ● BG FK-110 d. PLACE BG FK-110 in AUTO e. RESET Boric Acid Counter to 000: ● BG FY-110B f. SET BG FY-110B for the desired gallons of boric acid to be added g. PLACE BG HS-26 in RUN h. WHEN desired boration is complete, THEN PLACE BG HS-26 in STOP i. REPEAT Boration as necessary
NOTE		The steps of OTN-BG-00002 Attachment 8 are the same as the steps listed in OTO-MA-00008 which are listed above.
	CRS	REVIEW Applicable Technical Specifications
		The CRS should declare Tech Spec 3.1.4 Condition B not met. If plant conditions (PR NI) show QPTR >1.02, then T.S. 3.2.4 Condition A is not met and Required Actions A.1, A.2, A.3, A.4, A.5, and A.6 are appropriate.
NOTE		**At Lead Examiner's discretion move to the next Event.** **Event 3 is triggered the same time event 2 is and the indication appear (annunciator) ~ 10 minutes later. This is done as it take time for the fuel failure to buildup in the RCS and affect the CVCS letdown rad monitor. It may be necessary to evaluate T.S post scenario via candidate questioning.**

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • Verify the following malfunctions are active: o Expert Command: insert TVHM1705 0.1 delay=0 ramp=0 on=0 off=0 o Expert Command: insert RCCFUELFAIL 3E-8 delay=0 ramp=0 on=0 off=0		
Indications Available Annunciator 61B, Process Radiation High		
OTO-BB-00005		
	CRS	Implement OTO-BB-00005, RCS High Activity
OTO-BB-00005	**RO**	Step 1 - MAXIMIZE Letdown Flow Through CVCS Letdown Mixed Bed Demineralizer: a. ENSURE Letdown System Containment Isolation Valves - OPEN: • BG HIS-8152 • BG HIS-8160 b. ENSURE RCS Letdown To Regenerative Heat Exchanger Valves - OPEN: • BG HIS-459 • BG HIS-460 c. ESTABLISH 120 gpm Charging Header flow while maintaining seal injection flow: • BG HC-182 • BG FK-124 (NCP) d. PLACE Letdown Hx Outlet Pressure Controller in Manual at 75% or greater: • BG PK-131 e. OPEN Letdown Throttle Isolation Valve(s) to establish desired letdown flow: • BG HIS-8149AA (45 gpm) f. ADJUST Letdown Hx Outlet Pressure Controller to establish desired pressure and PLACE in Automatic: • BG PK-131 g. ADJUST Charging flow as necessary to maintain Pressurizer level. h. PLACE Pressurizer Level Master Controller in MANUAL to obtain an output of 64% - 68% demand: • BB LK-459 i. WHEN PZR Level is being maintained at PROGRAM, THEN PLACE the following in AUTO as required: • BG FK-124 • BB LK-459
		NOTE RCS coolant and seal injection filters D/P will rise if a crud burst has occurred.

Proc /Time	Position	Applicant's Actions or Behavior
OTO-BB-00005	**RO**	Step 2 - MONITOR D/P On RCS Coolant And Seal Injection Filters
Booth Driver		Role Play as Primary OT and acknowledge request to monitor D/P on RCS Coolant and Seal Injection filters
	RO	Step 3 - DIRECT Chemistry To Sample RCS For Activity
Booth Driver		Role Play as Chemistry report that "TIME Compression on the RCS Sample results - the last RCS sample is 65uCi/gm of Dose Equivalent Iodine"
	RO	Step 5 - DIRECT Chemistry To Determine If Decontamination Factor (DF) of CVCS Letdown Mixed Bed Demineralizer Is Acceptable Per CDP-ZZ-00800, Callaway Resin Monitoring Program
	RO	Step 6 - CHECK DF Of Inservice CVCS Letdown Mixed Bed Demineralizer - ACCEPTABLE
	CRS	Step 7 - REVIEW Technical Specifications 3.4.16
		The CRS should declare Tech Spec 3.4.16 Condition A and C not met. Required Action A.1, Verify Dose Equivalent I-131 is ≤ 60uCi/gm within 4 hours AND A.2 Restore Dose Equivalent I-131 to within limit in 48 hours plus Required Action C.1, Be in Mode 3 in 6 hours AND C.2 Be in Mode 5 in 36 hours are all applicable. **It may be necessary to evaluate T.S post scenario via candidate questioning.**
OTO-MA-00008		
	CRS	Implement OTO-MA-00008, Rapid Load Reduction
	RO	Step 1 PLACE Rod Control In AUTO: ● SE HS-9

Proc /Time	Position	Applicant's Actions or Behavior
	RO	MANAGE Reactivity: b. PERFORM Reactivity Management Brief: • DISCUSS Amount And Rate of Turbine Load reduction • DETERMINE amount of boric acid needed
		CAUTIONS ●If using the Load Limit Potentiometer, unloading at greater than 50 MWe per minute may arm the Main Condenser Steam Dumps. ● If changing load reduction methods to the Load Limiter ENSURE Load Set is restored to AT SET LOAD prior to using the Load Limiter. Note Steps 3 and 4 may be performed concurrently while continuing in this procedure
	BOP	REDUCE Turbine Load At Less Than Or Equal To 5% Per Minute Using Any Of The Following: REDUCE Turbine load using the %/Min Loading Rate: a. SLOWLY LOWER Load using the DECREASE LOAD pushbutton until all of the following are met: ● Load Limit Limiting Light - EXTINGUISHED ● Decrease Loading Rate "OFF" Light - LIT ● Loading Rate Limit %/MIN "1/2" Light - LIT b. ROTATE Load Limit Set potentiometer fully clockwise c. SELECT Decrease Loading Rate - ON d. SET Loading Rate Limit %/Min to desired value e. LOWER load set MW toward desired load using the DECREASE LOAD pushbutton

Proc /Time	Position	Applicant's Actions or Behavior
	RO	BORATE From The BAST By Performing Following: BORATE using OTN-BG-00002 Attachment 8 OR BORATE to the VCT: a. PLACE RCS Makeup Control in STOP: ● BG HS-26 b. PLACE RCS Makeup Control Selector in BORATE: ● BG HS-25 c. SET Boric Acid Flow Controller to the desired flow rate: ● BG FK-110 d. PLACE BG FK-110 in AUTO e. RESET Boric Acid Counter to 000: ● BG FY-110B f. SET BG FY-110B for the desired gallons of boric acid to be added g. PLACE BG HS-26 in RUN h. WHEN desired boration is complete, THEN PLACE BG HS-26 in STOP i. REPEAT Boration as necessary
NOTE		The steps of OTN-BG-00002 Attachment 8 are the same as the steps listed in OTO-MA-00008 which are listed above.
NOTE		**At Lead Examiner's discretion move to the next Event. The crew may start a down power due to RCS Activity / Dropped Rod failures. It is recommended to insert the next malfunction before the down power begins such that it is NOT masked.**

Event Description: DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection

'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

- Expert Command: insert AEPT0508A 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508B 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert AEPT0508C 1200 delay=0 ramp=300 on=0 off=0
- Expert Command: insert FCXY0001A_2 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0003A_1 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCXY0002A_2 1 delay=0 ramp=0 on=0 off=0

And as a contingency to ensure the SG level is not stabilized

- Expert Command: insert FCFV0075ZMANTYP 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCFV0075TASTEM 0 delay=0 ramp=90 on=0 off=0

For D SG Faulted (outside CTMT) upon reactor trip:

- AB002_D Value = 2000 Condition = sfawctrd560517dpos eq 0.0

The failure of the Automatic Reactor Trip, automatic SLIS, and "D" MSIV to close on Fast Pushbuttons are preloaded.

Indications Available

Annunciators 108C through 111C, SG A through D Level Deviation

OTO-AE-00001 / E-0 / E-2		
Booth Driver		AS a contingency, have the malfunction for the a MFP (PAE01B_1 = 1) trip ready to insert if the loss of the DFW control station is arrested by utilizing DFWCS Display #2 (usual alarm display) and selecting Manual on the MFP controls. Note: The event may be moving fast enough that OTO-AE-00001 is not implement as the crew inserts a manual reactor trip (Auto trip is disabled)
	CRS	Implement OTO-AE-00001, Feedwater System Malfunction
CRITICAL TASK		**Manually trip the reactor before any SG level indicates less than 10% WR.**
OTO-AE-00001		

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AE-00001	**BOP**	Step 1 - CHECK BOTH Main Feed Pumps – TRIPPED a. Manually TRIP the Reactor b. Go To E-0, Reactor Trip Or Safety Injection
	BOP	Step 2 - CHECK ONE Main Feed Pump - TRIPPED
NOTE:		At this point it may be difficult to determine if a main feed pump is tripped and continuing in the AER column to step #3 and then performing the RNO at ste#3 to manually trip the reactor. If the applicant determines that a main feed pump is not tripped and performs the RNO at step #2 to go to step #10, the applicant will perform steps #10 and #11 (listed below) Either path is acceptable as the decision to trip the reactor is the intent.
	BOP	Step 3 - Check Reactor Power - LESS THAN 70% RNO - IF only one Main Feed pump is running, THEN PERFORM the following: a. Manually TRIP the Reactor. b. Go To E-0, Reactor Trip or Safety Injection.
	BOP	Step 10 - MAINTAIN MFP Suction Pressure Greater Than The Following: ● 300 psig (One MFP Running) OR ● 240 psig (Two MFPs Running)

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AE-00001	**BOP**	Step 11 - CHECK DFWCS Operator on RL005 AVAILABLE: ● Main Feed System UPDATING ● HMI Monitor ACTIVE ● DFWCS Operator Station RESPONDS to Operator Action RNO - PERFORM The Following: a. SELECT Main Feed System on RL028 b. IF neither Normal Operator Stations RESPOND, THEN ENABLE the Auxiliary Operator Station on RL028. c. CONTACT Engineering for restoration to normal.
E-0, Reactor Trip or Safety Injection		
E-0	**RO**	NOTE: Steps 1 through 4 are immediate action steps.
	RO	Step 1 - CHECK Reactor Trip: • Rod Bottom Lights - ALL LIT • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2 - CHECK Turbine Trip: • All Turbine Stop valves - CLOSED
	BOP	Step 3 - CHECK Power to AC Emergency Buses: a. AC emergency buses – AT LEAST ONE ENERGIZED b. AC emergency buses – BOTH ENERGIZED

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 25 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**BOP**	Step 4 - Check SI Status: a. Check if SI is actuated • Ann 88A thru 88D Lit – OR- • SB069 SI Actuate Red light is lit – OR- • LOCA Sequencers alarms 30A & 31A b. CHECK both Trains of SI-Actuated • ANN 30A lit • ANN 31A lit • SB069 SI Actuate Red light lit SOLID
	BOP	Step 5 - PERFORM Attachment A, Automatic Action Verification, While Continuing With This Procedure.
E-0 FOLDOUT PAGE		2. FAULTED SG ISOLATION CRITERIA IF any SG pressure is lowering in an uncontrolled manner OR is completely depressurized, THEN PERFORM the following as desired: ● FAST CLOSE MSIVs. (AB-HS 79/80) ● Manually CLOSE or locally ISOLATE any failed open ASD(s). ● ISOLATE feed flow to faulted SG(s). (AL HK 5A/6A) MAINTAIN total feed flow greater than 270,000 lbm/Hr until narrow range level is greater than 7% [25%] in at least one SG.
E-0	**BOP**	Step 6 - CHECK Generator Output Breakers – OPEN • MA ZL-3A (V55) • MA ZL-4A (V53)

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**BOP**	Step 7 - CHECK Feedwater Isolation: a. MFPs Tripped • ANN 120A, MFP A Trip – LIT • ANN 123A, MFP B Trip b. Main Feedwater Reg Valves – CLOSED • AE ZL-510 • AE ZL-520 • AE ZL-530 • AE ZL-540 c. Main Feedwater Reg Bypass Valves – CLOSED • AE ZL-550 • AE ZL-560 • AE ZL-570 • AE ZL-580 d. Feedwater Isolation Valves – CLOSED • AE HIS-39 • AE HIS-40 • AE HIS-41 • AE HIS-42
	BOP	Step 8 - CHECK AFW Pumps: a. MD AFW Pumps – BOTH RUNNING • AL HIS-23A–NO Initial conditions of the scenario has it in PTL. • AL HIS-22A b. TDAFP -Running if Necessary

Proc /Time	Position	Applicant's Actions or Behavior
CRITICAL TASK		**Trip all RCPs within 5 minutes of meeting RCP trip criteria.** This is only applicable during the performance of E-0 and does not apply during the performance of E-2, and ES-1.1. This action can be performed per E-0 foldout page #1 or Step #12 of E-0. If during the performance of E-0, RCS pressure lowers to or less than 1425 psig and a SI or CCP is running, the crew has 5 minutes to trip all RCPs.

E-0	**BOP**	Step 9 - CHECK AFW Valves – proper emergency alignment
		• MD AFP Flow Control Valves – THROTTLED
		  • AL HK-7A
		  • AL HK-9A
		  • AL HK-11A
		  • AL HK-5A
		• TD AFP Flow Control Valves – FULL OPEN
		  • AL HK-8A
		  • AL HK-10A
		  • AL HK-12A
		  • AL HK-6A
		• TD AFP Loop Steam Supply Valves – BOTH OPEN IF NECESSARY
		  • AB HIS-5A
		  • AB HIS-6A

	BOP	Step 10 - CHECK Total AFW Flow > 270,000 lbm/hr

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 28 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**RO**	Step 11 - CHECK PZR PORVs and Spray Valves: a. PZR PORVs – CLOSED • BB HIS-455A • BB HIS-456A b. PZR PORVs – Both in AUTO • BB HIS-455A • BB HIS-456A c. PORV Block Valves – BOTH OPEN • BB HIS-8000A • BB HIS-8000B d. Normal PZR Spray valves – CLOSED • BB ZL-455B • BB ZL-455C
	RO	Step 12 - CHECK if RCPs should be stopped: a. RCPs – ANY RUNNING b. ECCS Pumps – AT LEAST ONE RUNNING • CCP OR • SI Pump c. RCS Pressure < 1425 psig. d. Stop all RCPs
	RO	Step 13 - CHECK RCS Temperatures: • Any RCP Running – RCS Tavg stable at 557°F or trending to 557°F -OR- • NO RCPs running - RCS COLD LEG TEMPERATURES STABLE AT 557°F OR TRENDING TO 557°F Go To RNO

Proc /Time	Position	Applicant's Actions or Behavior
E-0	**RO**	Step 13 RNO - IF temperature is less than 557°F AND lowering, THEN PERFORM the following: a. STOP dumping steam. b. IF cooldown continues, THEN CONTROL total feed flow: • MAINTAIN total feed flow greater than 270,000 lbm/Hr until narrow range level is greater than 7% [25%] in at least one SG. c. IF cooldown continues, THEN FAST CLOSE all MSIVs and Bypass valves: • AB HS-79 • AB HS-80
	BOP	Step 14 - CHECK if any SG is faulted: a. Check pressures in all SGs: RNO: GO TO Step #15 • Any SG pressure lowering in an uncontrolled manner or completely depressurized. b. Go to E-2, Faulted SG Isolation Step 1
E-2, Faulted SG Isolation		

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 30 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
CRITICAL TASK		**Isolate the faulted 'D' SG before transition out of E-2.** Note: to isolate the D SG, the following actions and handswitches will be manipulated in different steps of E-2. These switches are bolded in the applicable E-2 steps and listed here for convenience. ISOLATE AFW flow to faulted SG(s): • CLOSE associated MD AFP Flow Control Valve(s): o AL HK-5A (SG D) • CLOSE associated TD AFP Flow Control Valve(s): o AL HK-6A (SG D) • CLOSE Steamline Low Point Drain valve from faulted SG(s): o AB HIS-10 (SG D) FAST CLOSE all MSIVs and Bypass valves: o AB HS-79 o AB HS-80 Close "D" MSIV using individual MSIV handswitch o AB HIS 11 Note: "D" MSIV may have been closed during the performance or E-0. Note: The Automatic SLIS is blocked requiring the candidates to manually initiate SLIS. When the Fast Close PB to close all MSIVs is depressed, the "D" MSIV will not close. The "D" MSIV can be closed with its individual handswitch (See Step #1 RNO).
		CAUTIONS • At least one SG must be maintained available for RCS cooldown. • Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.
E-2	**BOP**	Step 1 - CHECK MSIVs And Bypass Valves – CLOSED Go To RNO (if not previously closed)

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 1 RNO - FAST CLOSE all MSIVs and Bypass valves: • **AB HS-79** • **AB HS-80** IF valve(s) will NOT fast close, THEN CLOSE MSIV(s) and bypass valves as necessary. 'D' MSIV handswitch close button depressed – **AB HIS 11**
	BOP	Step 2 - CHECK If Any SG Secondary Pressure Boundary Is Intact: a. CHECK pressures in all SGs - ANY STABLE OR RISING
		NOTE The ESFAS SG pressure transmitters may be inaccurate if a secondary line break occurs in Area 5. The pressure indicators on the SG ASD controllers are NOT affected and should be used for comparison.
	BOP	Step 3 - IDENTIFY Faulted SG(s): a. CHECK pressures in all SGs: • ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED "D" SG identified as the faulted SG
		CAUTION - If the turbine-driven AFW pump is the only available source of feed flow, steam supply to the turbine-driven AFW pump must be maintained from at least one SG.

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 32 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 4 - ISOLATE Faulted SG(s): a. ISOLATE AFW flow to faulted SG(s): ● CLOSE associated MD AFP Flow Control Valve(s): ● **AL HK-5A (SG D)** ● CLOSE associated TD AFP Flow Control Valve(s): ● **AL HK-6A (SG D)** b. CHECK ASD from faulted SG(s)- CLOSED ● AB PIC-4A (SG D) c. Locally CLOSE TDAFP Steam Supply From Main Steam Loop Manual Isolation valve from faulted SG(s): ● ABV0085 (SG B) ● ABV0087 (SG C) (step is N/A as it's the D SG) d. CHECK Main Feedwater valves to faulted SG(s) – CLOSED ● Main Feedwater Reg Valve: ● AE ZL-540 (SG D) ● Main Feedwater Reg Bypass valve: ● AE ZL-580 (SG D) ● Feedwater Isolation Valve: ● AE HIS-42 (SG D) e. CHECK SG Blowdown Containment Isolation Valve from faulted SG(s) - CLOSED ● BM HIS-4A (SG D) f. CLOSE Steamline Low Point Drain valve from faulted SG(s): ● **AB HIS-10 (SG D)**
	BOP	Step 5 - CHECK CST To AFP Suction Header Pressure – GREATER THAN 2.75 PSIG
		NOTE Subsequent actions should NOT be delayed while awaiting SG sampling. Sampling of the SGs is repeated in E-1, Loss Of Reactor Or Secondary Coolant.

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**BOP**	Step 6 - CHECK Secondary Radiation: a. PERFORM the following: • PERFORM EOP Addendum 11, Restoring SG Sampling After SI Actuation • DIRECT Chemistry to periodically sample all SGs for activity • DIRECT Radiation Protection to survey steamlines in Auxiliary Building Area 5 as necessary b. CHECK unisolated secondary radiation monitors: • SG Sample radiation: ● SJL 026 • SG ASD radiation: ● AB RIC-114 (SG D) • Turbine Driven Auxiliary Feedwater Pump Exhaust radiation: ● FC RIC-385 c. Secondary radiation – NORMAL d. Levels in all SGs: - NO SG LEVEL RISING IN AN UNCONTROLLED MANNER
	RO	Step 7 - CHECK If ECCS Flow Should Be Reduced: a. RCS subcooling – GREATER THAN 30°F [50°F] b. Secondary heat sink: Narrow range level in at least one intact SG - GREATER THAN 7% [25%] OR Total feed flow to intact SGs – GREATER THAN 270,000 LBM/HR c. RCS pressure - STABLE OR RISING d. PZR level – GREATER THAN 9% [29%]
		CAUTION - If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.
	RO	Step 8 - RESET SI: ● SB HS-42A ● SB HS-43A

Proc /Time	Position	Applicant's Actions or Behavior
E-2	**RO**	Step 9 - STOP All But One CCP: ● BG HIS-1A OR ● BG HIS-2A
	CRS	Step 10 - Go To ES-1.1, SI Termination, Step 3
ES-1.1, SI Termination		
ES-1.1	**RO**	Step 3 - RESET Containment Isolation Phase A And Phase B: ● Phase A (CISA): ● SB HS-53 ● SB HS-56 ● Phase B (CISB): ● SB HS-52 ● SB HS-55
	BOP	Step 4 - ESTABLISH Instrument Air To Containment: a. CHECK if ESW To Air Compressor valves - OPEN ● EF HIS-43 & EF HIS-44 b. START Air Compressor(s): ● KA HIS-3C ● KA HIS-2C c. OPEN Instrument Air Supply Containment Isolation valve: ● KA HIS-29
	BOP	Step 5 - CHECK RCS Pressure - STABLE OR RISING

Op Test No.: 2019-1	Scenario # 3	Event # 4&5&6&7&8	Page 35 of 40
Event Description:	DFWCS failure – loss of MFW with a manual reactor trip required (failure of the automatic reactor trip), E-0 Reactor Trip or Safety Injection 'D' SG Fault, E-2 Faulted SG Isolation with a failure of the automatic SL isolation and failure of 'D' MSIV to close with Fast Close PB		

Proc /Time	Position	Applicant's Actions or Behavior
ES-1.1	**BOP**	Step 6 – ISOLATE Boron Injection Header a. CCP – Suction Aligned to RWST b. RESET CCP Recirc valves: ● BG HS-8110 ● BG HS-8111 c. CHECK CCP Recirc valves – OPEN ● BG HIS-8110 ● BG HIS-8111 d. CLOSE Boron Injection Header Inlet valves: ● EM HIS-8803A ● EM HIS-8803B e. CLOSE Boron Injection Header Outlet valves: ● EM HIS-8801A ● EM HIS-8801B
NOTE		**The scenario can be terminated at the discretion of the Lead Examiner**

E-0 Attachment A

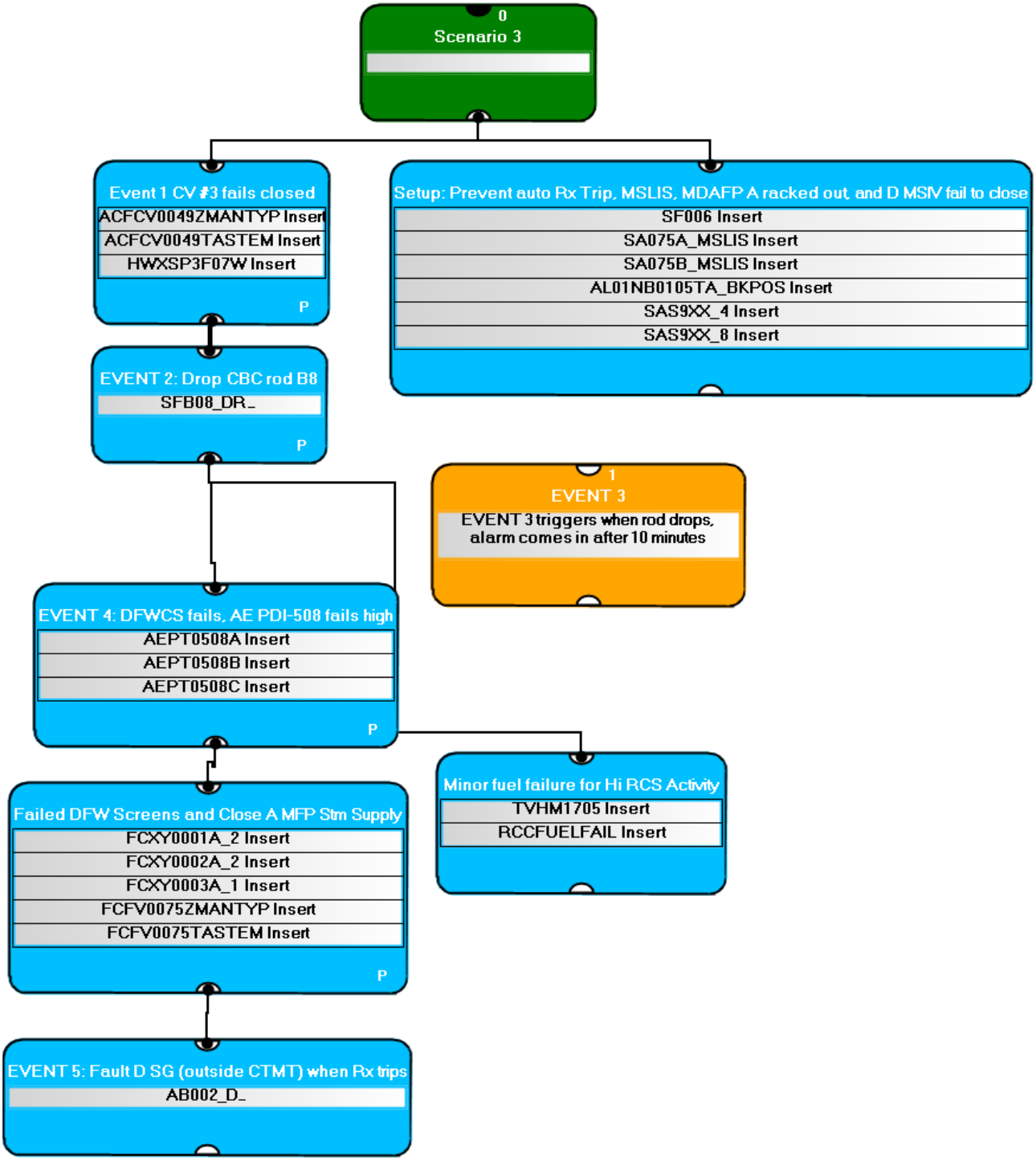
E-0 Attachment A	**BOP**	Step A1 - Check Charging Pumps: a. CCPs – Both Running • BG HIS-1A • BG HIS-2A b. Stop NCP using BG HIS-3
	BOP	Step A2 - CHECK SI and RHR Pumps: • SI Pumps – BOTH RUNNING • EM HIS-4 • EM HIS-5 • RHR Pumps – BOTH RUNNING • EJ HIS-1 • EJ HIS-2
	BOP	Step A3 - CHECK ECCS flow: a. CCPs to Boron Inj Header – FLOW INDICATED • EM FI-917A • EM FI-917B b. RCS pressure – Less than 1700 psig c. SI Pump Discharge - FLOW INDICATED • EM FI-918 • EM FI-922 d. RCS pressure – LESS THAN 325 PSIG e. RHR To Accumulator Injection Loop - FLOW INDICATED • EJ FI-618 • EJ FI-619
	BOP	Step A4 - CHECK ESW Pumps – BOTH RUNNING • EF HIS-55A • EF HIS-56A

E-0 Attachment A	**BOP**	Step A5 - CHECK CCW Alignment: a. CCW Pumps – one running in each train • Red Train: EG HIS-21 or EG HIS-23 • Yellow Train: EG HIS-22 or EG HIS-24 b. CCW Service Loop Supply and Return valves for one operating CCW pump – OPEN • EG ZL-15 and EG ZL-53 • OR • EG ZL-16 and EG ZL-54 c. OPEN CCW to RHR HX valves: • EG HIS-101 • EG HIS-102 d. CLOSE Spent Fuel Pool HX CCW Outlet Valves: • EC HIS-11 • EC HIS-12 e. STOP Spent Fuel Pool Cooling Pump(s): • EC HIS-27 • EC HIS-28 f. RECORD the time spent fuel pool cooling pump secured g. MONITOR time CCW flow isolated to SFP HX < 4 hours
	BOP	Step A6 - CHECK Containment Cooler Fans running in slow speed • GN HIS-9 • GN HIS-17 • GN HIS-5 • GN HIS-13
	BOP	Step A7 - CHECK Containment H2 Mixing Fans in slow speed • GN HIS-2 • GN HIS-4 • GN HIS-1 • GN HIS-3

E-0 Attachment A	**BOP**	Step A8 - CHECK if Containment Spray should be actuated • Containment Pressure > 27 psig -OR- • GN PR-934 indicates ctmt pressure has been > 27 psig - OR- • Annunciator 59A CSAS LIT - OR- • Annunciator 59B CISB LIT RNO: Go to step A9
	BOP	Step A9 - CHECK if Main Steamlines should be Isolated a. Check the following: • Containment pressure > 17 psig -OR- • GN PR-934 indicates ctmt pressure has been > 17 psig -OR- • Steamline pressure < 615 psig -OR- • AB PR-514 or 535 shows pressure has been < 615 psig -OR- b. CHECK MSIVs and Bypass valves - CLOSED
	BOP	Step A10 - CHECK ECCS Valves in proper alignment a. ESFAS Status Panels SIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A11 - CHECK Containment Isolation Phase A: a. ESFAS status panels CISA sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A12 - CHECK SG Blowdown Isolation: a. ESFAS status panels SGBSIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT

	BOP	Step A13 - CHECK Both Trains of CRVIS a. ESFAS status panels CRVIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A14 - CHECK Containment Purge Isolation: a. ESFAS status panels CPIS sections: • SA066X WHITE lights – ALL LIT • SA066Y WHITE lights – ALL LIT
	BOP	Step A15 - NOTIFY CRS of the following: • Unanticipated manual actions taken • Failed Equipment Status • Attachment A completion

SCE File Display



Facility: Callaway Scenario No. 4, Rev 5 Op-Test No.: 2019-1

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: 48%, BOC

Turnover: 'B' MDAFP is out of service for breaker maintenance.

Event No.	Malf. No.	Event Type*	Event Description
1	AE / AELT0551	SRO (I) BOP (I)	SG Level Instrument Fails to 75% OTO-AE-00002, Steam Generator Water Level Control Instrument Malfunctions (Tech Specs 3.3.1 and 3.3.2)
2	SE / SEN0044	SRO (R) RO (R) BOP (I)	Power Range Channel N44 fails high. OTO-SE-00001, Nuclear Instrument Malfunction (Tech Spec 3.3.1)
3	NB / XNB02_4 EF / PEF01B	SRO (C) BOP (C) RO (C)	Loss of ESF transformer XNB02 causing a Loss of NB02/ EDG "B" starts, ESW Pump "B" trips. OTO-NB-00002, Loss of Power to NB02
4	MD / MDCB1 MD / MDLC1 MD / MT7 MD / MDMT8 # MD / MDESFB	SRO (C) BOP (C) RO (C)	Loss of offsite power / RX Trip / E-0, Reactor Trip or Safety Injection
5	NB / NB04RL186 NB / NB01_F	SRO (M) RO (M) BOP (M)	NB01 Bus Lockout / Loss of All AC Power / ECA-0.0 Loss of All AC Power / Restore Power with AEPS with COOP power unavailable CT-24, Energize at least one ac emergency bus
6	AL / PAL02_1	SRO (C) BOP (C)	TDAFW trips 30 seconds after Auto Start on overspeed, can be reset and restarted CT-23, Establish AFW flow during SBO

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

Note: Grid voltage swings accomplished by adjusting GRID_VOLTAGE (Grid Voltage Multiplier) under external parameters in browser

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Total malfunctions (5-8)	7
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal events (2-4)	3
4. Major transients (1-2)	1
5. EOPs entered/requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical tasks (2-3)	2

Scenario #4 Event Description
Callaway 2019-1 NRC ES-D-1, rev. 5

The Plant is stable at 48% with the 'B' MDAFP out of service.

After the reactivity brief is complete, ‘A’ SG controlling level channel slowly fails to 75%. The crew will respond using OTO-AE-00002, Steam Generator Water Level Control Instrument Malfunctions, to control SG level. Technical Specification 3.3.1 and 3.3.2 are not met.

After Tech Specs are addressed, Power Range Nuclear Instrument Channel N44 fails high causing an automatic rod insertion. The crew should respond to the rod insertion by placing rods in manual. The crew will enter OTO-SE-00001, Nuclear Instrument Malfunction, to bypass channel N44 and restore control rods to desired position. Technical Specification 3.3.1 is not met.

After Tech Specs are addressed, a fault on ESF Transformer XNB02 occurs, resulting in a loss of the normal power to Bus NB02. “B” EDG starts, but Essential Service Water Pump “B” trips 10 seconds following pump start, forcing the crew to trip the affected Diesel and enter OTO-NB-00002, Loss of Power to NB02. The TDAFP will start due to an undervoltage signal on NB02 and pump will trip 30 seconds on overspeed. Local inspections of the TDAFP show no damage and its available to be reset and restarted by the crew.

8 minutes after the ESW Pump "B" trip, offsite power will begin to fluctuate and a Loss of offsite power will occur resulting in a Reactor Trip. 2 minutes after the reactor trip, NB01 lockout occurs due to a bus fault and the crew will transition to ECA-0.0, Loss of All AC Power.

The crew will manually reset the overspeed trip and restart the TDAFW in addition to restoring power to NB02 using EOP Addendum 39, Alternate Emergency Power Supply.

The scenario can be terminated after power has been restored to NB02 using EOP Addendum 39 without Central Electric COOP power available requiring the AEPS DGS to be started.

Critical Tasks:

Critical Tasks	Establish greater than 270,000 lbm/hr AFW flow rate to the SGs prior to SG dryout occurring.	Energize NB02 AC Emergency Bus using EOP Addendum 39 with Central Electric COOP unavailable
EVENT	6	5
Safety significance	Failure to establish minimum AFW flow in this scenario is a violation of the basic objective of ECA-0.0 and of the assumptions of the analyses upon which ECA-0.0 is based. Without AFW flow, the SGs could not support any significant plant cooldown. Thus, the crew would lose the ability to delay the adverse consequences of core uncovery.	In the scenario, failure to energize at least one ac emergency bus results in the needless continuation of a situation in which the pumped ECCS capacity and the emergency power capacity are both in a completely degraded status, as are all other active safeguards requiring electrical power. Although the completely degraded status is not due to the crew's action (was not initiated by operator error), continuation in the completely degraded status is a result of the crew's failure to energize at least one ac emergency bus.
Cueing	Indication of ATWS (the reactor is not tripped and that a manual reactor trip is not effective) with no AFW flow indication present	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 the: • TDAFW Steam Supply valve(s): o AB HIS-5A(SG B) o AB HIS-6A(SG C) • TDAFP Mechanical Trip/Throttle valve: o FC HIS-312A	Manipulation of controls as required to energize at least one ac emergency bus from the AEPS: • Using PBXY0001, Open AEPS FDR BKR TO PA501 VIA Central Electric Reform Feeder Breaker To XFMR o PA50101 • Close NB02 AEPS Supply BKR NB0214 o NB HIS-68
Performance feedback	Crew will observe the following: • Greater than 270,000 lbm/hr AFW flow to the SGs.	Indication that NB02 is energized: • NB02 Bus energized light • NB02 bus voltage
Justification for the chosen performance limit	Without AFW flow, decay heat would open the SG safety valves and would rapidly deplete the SG inventory, leading to a loss of secondary heat sink, or SG dryout. Decay heat would then increase RCS temperature and pressure until the pressurizer PORVs open, imposing a larger LOCA than RCP seal leakage.	Failure to perform the critical task prior to the completion of EOP Addendum 39 results in needless degradation of RCS barrier (and to fission product release, specifically of the RCS barrier at the point of the RCP seals. 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.
PWR Owners Group Appendix	CT - 23, Establish AFW flow during SBO	CT - 24, Energize at least one ac emergency bus

"NOTE: (Per NUREG-1021, Appendix D) If an operator or the Crew significantly deviates from or fails to follow procedures that affect the maintenance of basic safety functions, those actions may form the basis of a CT identified in the post-scenario review. "

References
OTO-AE-00002, Steam Generator Water Level Control Instrument Malfunctions
OTO-SE-00001, Nuclear Instrument Malfunction
OTO-NB-00002, Loss of Power to NB02.
OTN-AL-00001 Addendum 1, TDAFP Trip/Throttle Valve Trip Check and Reset
EOP Addendum 39, Alternate Emergency Power Supply
E-0, Reactor Trip or Safety Injection
ECA-0.0, Loss of All AC Power
Technical Specification 3.3.1, Reactor Trip System Instrumentation
Technical Specification 3.3.2, EFSAS Instrumentation
ODP-ZZ-00025, EOP/OTO User's Guide

PRA Systems, Events or Operator Actions

1. SBO (Loss of All AC) is a 19% contribution to CDF

PRA Systems, Events or Operator Actions

2. Alternate Electric Power Supply (PA) is #6 of the Top #10 Callaway Risk Important Systems

Scenario Simulator Lesson Plan
Callaway 2019-1 NRC Scenario #4, Rev. 5

Scenario Setup Guide:

Establish the initial conditions of IC#4

- Load 18-05
- Reactor Power is ~48% at BOL being maintained constant per load dispatcher.
- Ensure Control Rods are in Auto.
- Ensure AE LT 551 is selected for control for "A" SG
- Place "B" MDAFP in PTL and hang a WIP tag on hand switch.
- Run the following 18-05 SIFTs
  - 20180059
  - 20180049

==========SCENARIO PRELOADS / SETUP ITEMS==========

Setup: Rack out NB0205, Fail of A EDG to Autostart

- Expert Command: insert AL02NB0105TA_BKPOS 3 delay=0 ramp=0 on=0 off=0
- Expert Command: insert DGBLOCK_1 2 delay=0 ramp=0 on=0 off=0

==========EVENT 1 ==========

AELT0551 slow fail to 75%

- SG A CHANNEL 1 (RED) NARROW RANGE LEV XMTR Failure Value = 65.6875 ramp=60

==========EVENT 2 ==========

PR NI-44 fails high

- SEN0044 Value = 200 ramp=60

==========EVENT 3 ==========

XNB02 Lockout, B ESW pump trip 10 sec after start, TDAFP Trip on overspeed 30 seconds after start

- Expert Command: insert XNB02_4 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert PEF01B 1 cd='hwx19o241r eq 1' delay=10 ramp=0 on=0 off=0
- Expert Command: insert PAL02_1 1 delay=30 ramp=0 on=0 off=0

==========EVENT 4 ==========
Switchyard Voltage fluctuations followed by a Loss of Switchyard and Rx Trip (480 seconds after "B" ESW pump trips)

Grid Voltage fluctuations:

- Expert Command: insert GRID_VOLTAGE 0.9 delay=0 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.04347 delay=10 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.16 delay=20 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.04347 delay=30 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 0.86 delay=40 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.04347 delay=50 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.3 delay=60 ramp=10 on=0 off=0
- Expert Command: insert GRID_VOLTAGE 1.04347 delay=70 ramp=10 on=0 off=0

Loss of Switchyard (80 seconds after Grid Volts is complete)

- Expert Command: insert MDCB1 1 delay=2 ramp=0 on=0 off=0
- Expert Command: insert MDLC1 1 delay=3 ramp=0 on=0 off=0
- Expert Command: insert MDMT7 1 delay=4 ramp=0 on=0 off=0
- Expert Command: insert MDMT8 1 delay=5 ramp=0 on=0 off=0
- Expert Command: insert MDESFB 1 delay=0 ramp=0 on=0 off=0

==========EVENT 5 ==========
NB01 Lockout (120 seconds after RX Trip)

- Expert Command: insert NB01_F 1 delay=0 ramp=0 on=0 off=0
- Expert Command: insert NB04RL186_FTVSP 1 delay=0 ramp=0 on=0 off=0

==========EVENT 6==========
Preloaded – Trip of the TDAFP pump on overspeed 30 seconds after start

To reset the TDAFP pump trip:

- Expert Command: insert FCHS0332A 0 delay=0 ramp=0 on=0 off=0
- Expert Command: insert FCZS0312D 1 delay=2 ramp=0 on=0 off=0

Op Test No.: 2019-1	Scenario # 4	Event # 1	Page 7 of 36
Event Description:	SG Level Instrument Fails to 75% OTO-AE-00002, Steam Generator Water Level Control Instrument Malfunctions (Tech Specs 3.3.1 and 3.3.2)		

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMF AELT0551 Value = 65.6875 ramp=60		
Indications Available: Annunciator 108C, SG Generator A Level Deviation		
OTO-AE-00002, Steam Generator Water Level Control Malfunctions		
	CRS	Implement OTO-AE-00002
	BOP	Step 1 - CHECK SG Water Level Control Instruments -NORMAL SG A: AE LI-519 / AE LI-551 Go to RNO
	BOP	Step 1 RNO - Take MANUAL Control of Affected SG MFRV or MFRV Bypass and MAINTAIN SG Level: • SG A: AE FK-510, SG A MFW REG VLV CTRL Manual pushbutton depressed on AE FK-510 and light becomes LIT
	BOP	Step 2 - For The Failed Instrument, SELECT An Operable Channel: • SG A: AE LS-519C / AE FS-510C / AB FS-512C AND • On DFWCS, SELECT appropriate Level, FW Flow or Steam Flow on AE SS-500 AE LI 519 selected on RL005/006 AND on DFWCS "LEVEL" selected
	BOP	Step 3 - RESTORE Affected SG NR Level to between 45% and 55% Raise pushbutton depressed on AEFK-510 until Feedwater flow higher than steam flow on "A" SG. Level restored between 45% to 55% before proceeding on to step #4.

Proc /Time	Position	Applicant's Actions or Behavior
OTO-AE-00002	**BOP**	Step 4 - RETURN Affected SG MFRV or MFRV Bypass to AUTO Control: • SG A: AE FK-510 Auto button depressed
	RO / BOP	Step 5 - REVIEW Attachment A, Effects Of Instrument Failure.
	CRS	Step 6 - REVIEW Applicable Technical Specifications
		The CRS should declare Tech Spec 3.3.1 and 3.3.2 not met. ***Specifically, 3.3.1 Condition A and per the Table Function 14a&b which requires 3.3.1 Condition E 72 hrs to place the channel in trip OR be in MODE 3 in 78 hrs.*** ***3.3.2 Condition A and per the Table Function 5c & e plus 6d. Function 5e and 6d require 3.3.2 Condition D 72 hrs to place the channel in trip OR be in MODE 3 in 78 hrs AND MODE 4 in 84 hours. 3.3.2 Condition I is required from 3.3.2 function 5c which requires 72 hrs to place the channel in trip OR be in MODE 3 in 78 hrs.***
NOTE		**At Lead Examiner's discretion move to the next Event**

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • IMF SEN0044 Value = 200 ramp=60		
Indications Available Annunciators: • 77A, Reactivity Deviation • 78A, Power Range Channel Deviation • 82A, Power Range Over Power Rod Stop • 83C, Reactor Partial Trip		
OTO-SE-00001, Nuclear Instrument Malfunction		
	CRS	Implement OTO-SE-00001
	RO	Step 1 - CHECK Power Range Nuclear Instruments – NORMAL Go To RNO
	RO	Step 1 RNOa - ENSURE Rod Control in MANUAL: SE HS-9 SE HS -9 placed in Manual
	RO	Step 1 RNO b - IF any MFW Reg Valve Bypass Valves are being used to feed a Steam Generator, THEN PERFORM the following: 1) PLACE the affected valve in MANUAL: AE LK-550 (SG A) AE LK-560 (SG B) AE LK-570 (SG C) AE LK-580 (SG D) 2) CONTROL Steam Generator NR Level between 45% and 55%. This step is N/A
	RO	Step 1 RNO c - Go To Attachment A, Power Range Instrument Malfunction. Proceed to Attachment A

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SE-00001, ATT A	**RO**	Step A1 - STOP Any Main Turbine Load Changes No load changes were in progress
	RO	Step A2 - MAINTAIN RCS Tavg Within 1.5°F Of Tref Using Manual Control Rods
	RO / BOP	Step A2 RNO - RESTORE RCS Tavg to within 1.0°F of Tref using any of the following: • ADJUST Turbine load • ADJUST RCS Boron concentration BOP began a Turbine load reduction while RO monitors Tavg vs Tref
	RO	Step A3 - CHECK The Following Permissives Are In The Correct State Within One Hour Of The Power Range Channel Failure Per Attachment H, Permissives: P-7, P-8, P-9, P-10 Proper status and time recorded
	NOTE	At this power level, P7 & P10 should be LIT and P8 & P9 are NOT LIT
	RO	Step A4 - SELECT An Operable Channel On NIS Recorder: SE NR-45 PR SENI43,or 42, or 41 selected

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SE-00001, ATT A	**BOP**	Step A5a - BYPASS The Malfunctioning Power Range Channel By Selecting The Affected Channel On The Following Switches: a. On the Detector Current Comparator drawer: • PLACE Upper Section switch to the failed channel. • PLACE Lower Section switch to the failed channel. • PLACE Rod Stop Bypass switch to the failed channel. • PLACE Power Mismatch Bypass switch to the failed channel. On the NI Backpanel control board, these above switches selected to SE NI 44.
	BOP	Step A5b - On the Comparator and Rate Drawer, PLACE Comparator Channel Defeat switch to the failed channel. Comparator Channel Defeat switch placed to SE NI 44.
	RO	Step A5c - ENSURE the following Annunciators are extinguished: • Annunciator 78A, PR Channel Dev • Annunciator 78B, PR Upper Detector Flux Dev • Annunciator 78C, PR Lower Detector Flux Dev • Annunciator 82A, PR Over Pwr Rod Stop Annunciators verified as NOT LIT

Proc /Time	Position	Applicant's Actions or Behavior
OTO-SE-00001, ATT A	**RO / BOP**	Step A5d - DELETE applicable computer points from processing for the Bypassed Channel in order to maintain the AFD Monitor OPERABLE: 1) At a PPC terminal with a security level 0-3, TYPE "DFP" (Delete From Processing) -Select OK. 2) ENSURE the "Delete From Processing" dialog box is displayed. 3) ENTER each computer Point ID for the bypassed channel separately in the "Point ID" field: • N44 - REN0052A, REN0047A, REN0048A 4) ENTER your initials in the "Modified by" field. 5) ENTER "OTO-SE-00001" in the "Reason" field. 6) CLICK the "Execute" button. 7) CLICK the CANCEL button to close the "Delete From Processing" dialog box. 8) At the PPC terminal, TYPE "SHOW <point id>" and verify the value displayed is "DEL". SE NI 44 removed from PPC scanning
	RO	Step A6 - CHECK Control Rod Insertion From Instrument Failure Yes – proceeded to step A7
	RO / CRS	Step A7 - RESTORE Control Rods As Determined By CRS RO restored rods such that Tavg matches Tref
	RO	Step A8 - CHECK Tavg To Tref Within 0.3°F.
	RO	Step A9 - RESTORE Rod Control To AUTO: SE HS-9 SE HS 9 placed in Manual
	CRS	Review Applicable Tech Specs

Proc /Time	Position	Applicant's Actions or Behavior
		The CRS should declare Tech Spec 3.3.1 Condition A and per the Table Function 2a & 3 &6 which requires 3.3.1 Condition D and E: Condition D1.1. is N/A due to power level D.1.2 72 hrs to place the channel in trip OR D.2 be in MODE 3 in 78 hrs. Condition E requires 72 hrs to place the channel in trip OR be in MODE 3 in 78 hrs. ***The CRS should also declare Tech Spec 3.3.1 Condition S&T (per the Table 3.3.1-1) as Function 18. c, d, and e are required. These require the CRS to verify interlock is in required state for existing unit conditions within 1 hour or be in Mode 3 (respectively) within 7 hours.***
NOTE		**At Lead Examiner's discretion move to the next Event**

Event Description: Loss of ESF transformer XNB02 causing a Loss of NB02/EDG "B" starts, ESW Pump "B" trips. OTO-NB-00002, Loss of Power to NB02.

TDAFW trips 30 seconds after Auto Start on overspeed, can be reset and restarted

Proc /Time	Position	Applicant's Actions or Behavior

Booth Operator:

- Insert the following:
  - Expert Command: insert XNB02_4 1 delay=0 ramp=0 on=0 off=0
  - Expert Command: insert PEF01B 1 cd='hwx19o241r eq 1' delay=10 ramp=0 on=0 off=0
  - Expert Command: insert PAL02_1 1 delay=30 ramp=0 on=0 off=0

NOTE: The TDAFP Trip on overspeed is preloaded but listed about for information. The TDAFP pump will receive an autostart signal due to the NB02 undervoltage and will trip 30 seconds after. It is available to be reset and restarted anytime in the scenario based on direction from the control room crew.

Indications Available

Annunciation 22A, XNB02 Transformer Lockout

Annunciator 128A, Aux FWP Discharge Pressure Low

RL005 indication of FC ZL-321DA Green Light OFF.

		OTO-NB-00002, Loss of Power to NB02
NOTE		The procedure flow path will be the crew proceeding to Attachment A at Step #1 as NB02 is powered from the B EDG with no ESW pump running. When the crew secures the B EDG, then continuous action step #1 will proceed down the AER column. 8 minutes after the initial event, the next event (switchyard voltage swings and loss) will be triggered automatically.
	BOP	Step 1 – CHECK 4160 VAC Bus NB02 - DEENERGIZED 4.16 KV Bus NB02 light - EXTINGUISHED • NB ZL-6 4.16 KV Bus NB02 Voltage indicates zero • NB EI-2 Both are LIT and proceeds to RNO
	BOP	Step 1 RNO - Go To Attachment A, Power Restored to NB02.

Proc /Time	Position	Applicant’s Actions or Behavior
OTO-NB-00002 Att A	**BOP**	Step A1 - CHECK 4160 VAC Bus NB02 – ENERGIZED 4.16 KV Bus NB02 light - LIT • NB ZL-6 4.16 KV Bus NB02 Voltage indicates approximately 4160 volts: • NB EI-2
NOTE		When the ESW pump trips and the crew must secure the B EDG, Continuous Action Step #A1 will direct the crew back to Step#1 of the main procedure.
Booth Operator		When dispatched as an OT, wait 3 minutes and report that the "B" ESW pump is hot to the touch.
	BOP	Step A2 - CHECK EDG B - RUNNING
	BOP	Step A3 – CHECK ESW Flow - ALIGNED TO EDG B ESW Pump B – RUNNING (NO) • EF HIS-56A ESW Train B to UHS - OPEN • EF HIS-38 Proceed to A3 RNO

Proc /Time	Position	Applicant’s Actions or Behavior
	BOP	Step A3 RNO - PERFORM the following: a. ATTEMPT to align ESW flow to EDG B. c. IF ESW flow can not be established to EDG B AND control of the EDG is local, THEN PERFORM the following: 1) PLACE NE02 Local Master Transfer Switch to LOCAL/MAN position: ● KJ HS-109 2) PRESS DG train B local STOP push-button to stop the EDG: ● KJ HS-108B **"B" EDG is directed to be secured locally by control room operators. KJ HS-109 placed in Local/Man position and KJ HS-108B pushbutton depressed.** Per CAS step #A1, returned to Step #1
OTO-NB-00002	**BOP**	Step 1 – CHECK 4160 VAC Bus NB02 - DEENERGIZED 4.16 KV Bus NB02 light - EXTINGUISHED • NB ZL-6 4.16 KV Bus NB02 Voltage indicates zero • NB EI-2 Both are EXTINGUISHED and proceed to step 2
	BOP	Step 2 - CHECK Turbine Driven Auxiliary Feedwater Pump - SECURED.
NOTE		Due to the preloaded failure, the TDAFP trips on overspeed 30 seconds after it started. It is available to be restarted by completing actions of OTN-AL-00001, Addendum 1.
OTN-AL-00001, ADD 1 Section 3.2		NOTE: Two operators are required to reset the mechanical overspeed trip, one operator standing Plant South of the turbine and one operator standing next to FCHV0312. See Figure 3.

Proc /Time	Position	Applicant’s Actions or Behavior
Note		The crew may elect not to address the inspection and resetting of the TDAFP in this event and wait until Event 5&6. OTN-AL-00001, Add 1 section 3.2 actions are valid for the rest of the scenario.
Booth Operator		Role Play when directed to inspect the TDAFP pump, wait 3 minutes and report "the TDAFP tripped on overspeed but there is nothing visual wrong with the system" Role Play when directed as the Field Supervisor and an extra OT "We are ready and available to reset the TDAFP". After being directed to reset the TDAFP, wait 1 minute and run the step Reset TDAFP which inserts the following remote functions: FCHS0332A to 0 and FCZS0312D to 1.
OTN-AL-00001, ADD 1 Section 3.2		Step 3.2.1. Perform the following actions concurrently: a. MOVE linkage towards FCHV0312, AFP TURB MECH TRIP/THROT HV, b. PUSH down on Tappet Nut to verify it is completely seated. c. Slowly RELEASE FCHV0312 linkage so Head Lever rests against the flat side of Tappet Nut.
		Step 3.2.2. ENSURE vertical face-to-face contact between Tappet Nut and Head Lever per Figure 2.
	BOP	Step 3.2.3. CHECK FCZL0312DA, TDAFP MECHANICAL OVERSPEED RESET INDICATOR LIGHT, on RL005 is lit.

Proc /Time	Position	Applicant's Actions or Behavior
OTO-NB-00002	**BOP**	Step 3 – CHECK Reactor Power – LESS THAN 100% • SE NI-41B • SE NI-42B • SE NI-43B • SE NI-44B • BB TI-411A (ΔT) • BB TI-421A (ΔT) • BB TI-431A (ΔT) • BB TI-441A (ΔT) Power is less than 100% and proceed to step 4
	BOP	Step 4 – CHECK CCW Pump A Or C - RUNNING • EG HIS-21 • EG HIS-23
	BOP	Step 5 – CHECK CCW Service Loop Is Being Supplied From Train A: • EG ZL-53 - OPEN • EG ZL-15 – OPEN Valves are NOT open (RED LIGHT OFF) and proceed to RNO
OTO-NB-00002	**BOP**	Step 5 RNO a. – PERFORM The Following: CLOSE both CCW Surge Tank Vent Control valves: • EG HIS-9 • EG HIS-10
	BOP	Step 5 RNO b&c - OPEN the following: CCW Train A Supply/Return valves: • EG HS-15 ESW Train A to CCW Hx A: • EF HIS-51

Proc /Time	Position	Applicant’s Actions or Behavior
	BOP	Step 5 RNO d - DISPATCH an operator to locally close the following valves: • EGHV0016, CCW Train B Supply/Return Isolation (AB2026, RM1402) • EGHV0054, CCW Train B Supply Isolation (AB2026, RM1401)
Booth Operator		Role Play as Primary OT and wait 2 minutes then report the valves are closed after directed to close EGHV0016 and EGHV0054.
	BOP	Step 5 RNO e- WHEN EGHV0016 and EGHV0054 are closed, THEN OPEN both CCW Surge Tank Vent Control Valves: • EG HIS-9 • EG HIS-10
	RO	Step 6 - CHECK If CCW aligned to the RCPs
OTO-NB-00002	**RO**	Step 7 - CHECK NCP Or CCP A – RUNNING • BG HIS-3 (NCP) OR • BG HIS-1A (CCP A)
	RO	Step 8 - CHECK RCP Seal Injection Flow - BETWEEN 8 GPM AND 13 GPM PER PUMP
	BOP	Step 9 - CHECK RHR – IN SERVICE PRIOR TO EVENT NO – RNO Go To Step 12

Proc /Time	Position	Applicant’s Actions or Behavior
	BOP	Step 12 - CHECK Steam Generator NR Level Within One Of The Following: • Trending to between 45% and 55% OR • Between 45% and 55%
	RO	Step 13 - CHECK Pressurizer Level Within One Of The Following: • Trending to Program Level OR • At Program Level
	BOP	Step 14 - CHECK Pressurizer Pressure Within One Of The Following: Trending to between 2220 psig and 2250 psig OR Between 2220 psig and 2250 psig
	BOP	Step 15 - ENSURE the following 4160 VAC bus NB02 loads shed: (LSELS actuation, handswitch light green): • ESW Pump B - EF HIS-56A • CCW Pump B/D - EG HIS-22 & EG HIS-24 • SI Pump B - EM HIS-5 • Ctmt Spray Pump B: - EN HIS-9 • RHR Pump B: - EJ HIS-2
OTO-NB-00002	**BOP**	Step 16 - OPEN NB02 Normal And Alternate Feeder Breakers: • NB HIS-4, NB02 Normal Supply Breaker NB0209 • NB HIS-5, NB02 Alternate Supply Breaker NB0212
		NOTE Attachment B, Diesel Generator B Engine Shutdown Relay, may be used as an aid.

Proc /Time	Position	Applicant’s Actions or Behavior
	BOP	Step 17 - CHECK EDG B – RUNNING NO it was secured earlier in Attachment A Step #A3
		NOTES Attachment C, Requirements For Auto Closure Of NE02 Output Breaker, may be used as an aid. Attachment D, NE02 Output Breaker Trips, may be used as an aid.
	BOP	Step 18 - CHECK NB02 Emergency Supply Breaker – CLOSED NO but don’t perform the RNO as the EDG was secured per procedure earlier
		NOTE 'B' Train CCW pump handswitches are placed in Pull-To-Lock to prevent breaker cycling while NB02 is de-energized.
	BOP	Step 19 - CHECK 4160 VAC Bus NB02 - ENERGIZED NO Perform the RNO
OTO-NB-00002	**BOP**	Step 19 RNO - Perform the following: Place 'B' CCW Train Pump handswitches in Pull-To-Lock until power is restored to NB02: • EG HIS-22 • EG HIS-24
	BOP	Step 20 - CHECK Any Service Air Compressor – RUNNING Service Air Compressor A is running.
	BOP	Step 21 - CHECK Panel PN08 Transferred To Emergency Source (PG20GER5) • Annunciator 14F, PN07/09 PN08/10 Xfr - LIT

Proc /Time	Position	Applicant’s Actions or Behavior
	BOP	Step 22 - CHECK SFP Cooling Pump A – RUNNING • EC HIS-27
NOTE		**At Lead Examiner’s discretion move to the next Event**

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator: • Verify malfunctions for switchyard voltage swings occur 8 minutes after event 3. There will be 80 second delay and a then loss of the switchyard. The loss of NB01 will occur automatically 120 seconds after the reactor trip, this loss will result in a station blackout. The A EDG will fail to autostart but is not consequential as NB01 has a bus lockout.		
Indications Available Annunciator 134D, Switchyard Voltage High Low		
E-0, Reactor Trip or Safety Injection		
		NOTE: Steps 1 through 4 are immediate action steps.
E-0	**RO**	Step 1 - CHECK Reactor Trip: • Rod Bottom Lights - ALL LIT • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2 - CHECK Turbine Trip: • All Turbine Stop valves - CLOSED
	BOP	Step 3 - CHECK Power to AC Emergency Buses: a. AC emergency buses – AT LEAST ONE ENERGIZED - YES b. AC emergency buses – BOTH ENERGIZED - NO
	RO	Step 4 - Check SI Status: a. Check if SI is actuated • Ann 88A thru 88D Lit – OR- • SB069 SI Actuate Red light is lit – OR- • LOCA Sequencers alarms 30A & 31A b. CHECK both Trains of SI-Actuated • ANN 30A lit • ANN 31A lit • SB069 SI Actuate Red light lit SOLID Go To RNO and transition to ES-0.1

Proc /Time	Position	Applicant's Actions or Behavior
ES-0.1 Reactor Trip Response		
ES-0.1	**BOP**	FOLDOUT PAGE ACTION #3 - RCS TEMPERATURE CONTROL CRITERIA: IF a Loss of Offsite Power has occurred, THEN CLOSE MSIVs.
	RO	Step 1a - CHECK RCS Temperature Control: CHECK RCPs - ANY RUNNING
	RO	Step 1 RNO a- TRANSFER Condenser Steam Dump to Steam Pressure Mode: 1) Check Condenser - AVAILABLE • C-9 interlocks LIT • MSIVs - ANY OPEN 2) PLACE Steam Header Pressure Controller in MANUAL and ZERO OUTPUT: AB PK-507 3) PLACE Steam Dump Select switch in STM PRESS position: • AB US-500Z 4) PLACE Steam Header Pressure Controller in AUTO: • AB PK-507
	RO	Step 1b - CHECK RCS temperature response – NORMAL • RCS AVERAGE TEMPERATURE STABLE AT OR TRENDING TO 557°F IF ANY RCP RUNNING OR • RCS COLD LEG TEMPERATURES STABLE AT OR TRENDING TO 557°F IF NO RCP RUNNING
		Step 2a - CHECK Status Of AC Buses: CHECK Generator Output Breakers – OPEN • MA ZL-3A (V55) and MA ZL-4A (V53)
		Step 2b - CHECK All AC Buses - ENERGIZED BY OFFSITE POWER None are powered from offsite.
NOTE		At some time during the performance of ES-0.1, NB01 bus will lockout and the crew will transition to ECA-0.0, Loss of ALL AC Power.

Proc /Time	Position	Applicant's Actions or Behavior
ECA-0.0, Loss of All AC Power		
		NOTES: • Steps 1 and 2 are immediate action steps. • CSF status trees should be monitored for information only. Functional Restoration Procedures should NOT be implemented.
	RO	Step 1 - `CHECK Reactor Trip:` • Reactor Trip and Bypass Breakers - OPEN • Neutron Flux - LOWERING
	BOP	Step 2a - `All Turbine Stop valves - CLOSED`
	RO	Step 3 - CHECK If RCS Is Isolated: a. Letdown isolation valves – CLOSED – RNO CLOSE valve(s) as necessary. 1) Letdown Throttle Isolation valves: • BG HIS-8149AA • BG HIS-8149BA • BG HIS-8149CA 2) RCS Letdown to Regen HX valves: • BG HIS-459 • BG HIS-460 b. PZR PORVs - CLOSED • BB HIS-455A • BB HIS-456A c. RCS To Excess Letdown HX valves - CLOSED • BG HIS-8153A • BG HIS-8154A • BG HIS-8153B • BG HIS-8154B d. Reactor Head Vent Valves - CLOSED • BB HIS-8001A • BB HIS-8002A • BB HIS-8001B • BB HIS-8002B

Proc /Time	Position	Applicant's Actions or Behavior
ECA-0.0		CAUTION In order to preserve water in the HCST for use to feed SGs, TDAFP recirc MUST be realigned to the HCST within 3 hours of the loss of the CST supplying TDAFW Pump suction.
		NOTE ALHV0220, HCST TO AFP HV, Auto opens at 11.5 PSIG, Aux Feedwater Suction Pressure.
	BOP	Step 4 - CHECK AFW Flow - GREATER THAN 270,000 LBM/HR a. IF Aux Feedwater suction header pressure lowers to 11.5 PSIG, THEN CHECK HCST has aligned by performing EOP Addendum 42, HCST Alignment. – IF TDAFP previous reset and started, proceed to step #5 NO – Proceed to RNO
NOTE		The TDAFP tripped on overspeed earlier in the scenario but can be reset and started. See event 3 & 6 earlier in scenario.
CRITICAL TASK		**Establish greater than 270,000 lbm/hr AFW flow rate to the SGs prior to SG dryout occurring.**
	BOP	Step 4 RNO - PERFORM the following: 1. CHECK TDAFW Pump running. IF TDAFW Pump is NOT running, THEN START TDAFW Pump: a) OPEN AFP Turbine Loop Steam Supply valve(s): • AB HIS-5A (SG B) and AB HIS-6A (SG C) – already OPEN b) OPEN TDAFW Pump Mechanical Trip/Throttle valve: FC HIS-312A 2. ENSURE TDAFW Pump Valves in proper emergency alignment: a) TDAFW Pump Flow Control Valves are OPEN or THROTTLED: • AL HK-8A for S/G A • AL HK-10A for S/G B • AL HK-12A for S/G C • AL HK-6A for S/G D b) ESFAS status panel SA066X AFAS section WHITE valve light is LIT: • AP-V015 (15C)

Proc /Time	Position	Applicant's Actions or Behavior
		c) IF AFW flow greater than 270,000 lbm/Hr from the AFW normal source can NOT be established or maintained, THEN PERFORM the following concurrently: ●PERFORM EOP Addendum 38, Non Safety Auxiliary Feedwater Pump ● DISPATCH Operator to locally POSITION valve(s) as necessary
Booth Operator **(Same Cue as cue in event #3 section – page 16)**		Role Play when directed to inspect the TDAFP pump, wait 3 minutes and report "the TDAFP tripped on overspeed but there is nothing visual wrong with the system" Role Play when directed as the Field Supervisor and an extra OT "We are ready and available to reset the TDAFP". After being directed to reset the TDAFP, wait 1 minute and run the step Reset TDAFP which inserts the following remote functions: FCHS0332A to 0 and FCZS0312D to 1.
Booth Operator		Role Play as OTs / Field Supervisor when dispatched to the NSAFP pump wait 2 minutes and report a large oil leak is present on the NSAFP and the NSAFP pump is unavailable.
	BOP	Step 5 - TRY To Restore Power To Any AC Emergency Bus: a. ENERGIZE AC emergency bus with diesel generator: 1) CHECK both DGs – RUNNING – NO RNO not applicable • KJ HS-8A • KJ HS-108A 2) CHECK AC emergency buses - AT LEAST ONE ENERGIZED - NB01 OR NB02 - NO RNO not applicable b. CHECK AC emergency buses - AT LEAST ONE ENERGIZED • NB01 OR • NB02 NO Go to RNO 5 b).
Booth Operator		Role Play as Ameren Power Dispatching / Power Ops when asked for estimate for offsite power restore and report **"NO time estimate is available"**

Proc /Time	Position	Applicant's Actions or Behavior
ECA-0.0	**BOP**	Step 5 RNO b. - IF at least one AC emergency bus can NOT be readily energized from the Control Room, THEN PERFORM the following: 1) IF offsite power source is NOT available, THEN RESTORE power to one NB Bus using EOP Addendum 39, Alternate Emergency Power Supply. 2) OPEN Control Room cabinet doors using EOP Addendum 20, Control Room Cabinet Door List. 3) COORDINATE with an Operations Tech to locally shed non-essential DC and AC loads using Attachment B, DC and AC Load Shedding. 4) ADJUST SG ASDs controller setpoint to 1000 psig. 5) Go To Step 6. OBSERVE CAUTIONS prior to Step 6. Crew proceeds to EOP Add 39 to restore power to NB02.
		CAUTIONS ● When power is restored to any AC emergency bus, recovery actions should continue starting with Step 27. ● If an SI signal exists or if an SI signal is actuated during this procedure, it should be reset to permit manual loading of equipment on AC emergency bus(es). ● An ESW pump should remain available (NOT locked out) to automatically load on its energized AC emergency bus to provide diesel generator cooling.
	RO	Step 6 - PLACE Following Equipment Switches in Pull to Lock Position: CCPs: ● BG HIS-1A ● BG HIS-2A SI Pumps: ● EM HIS-4 ● EM HIS-5 RHR Pumps: ● EJ HIS-1

Proc /Time	Position	Applicant's Actions or Behavior
		● EJ HIS-2 Containment Spray Pumps: ● EN HIS-3 ● EN HIS-9 CCW Pumps: ● EG HIS-21 ● EG HIS-22 ● EG HIS-23 ● EG HIS-24 Containment Cooler Fans: ● GN HIS-5 ● GN HIS-9 ● GN HIS-13 ● GN HIS-17 Motor Driven AFW Pumps: ● AL HIS-22A ● AL HIS-23A Control Room AC Unit: ● GK HIS-29 ● GK HIS-40 Class 1E Electrical Equipment Room AC Unit: ● GK HIS-100 ● GK HIS-103
	BOP	Step 7 – RESTORE AC Power: a. CHECK if offsite power source – AVAILABLE – NO Proceed to RNO Applicable step #7 RNO actions IF offsite power source is NOT available, THEN RESTORE power to one NB Bus using: EOP Addendum 39, Alternate Emergency Power Supply (EOP ADD 39 should be in progress per step #5 RNO)

Proc /Time	Position	Applicant's Actions or Behavior
Booth Operator		Role Play as Field Supervisor and confirm an extra RO and extra OTs will perform: • EOP ADD 20, Control Room Doors. • Shed non-essential DC and AC loads using Attachment B, DC and AC Load Shedding. • Emergency Purge of the main generator within 2 hrs. • Energize PJ31. • Technical Support Center EDG and ATO switch. • EOP ADD 22, Local RCP Seal Isolation
EOP ADD 39, AEPS		CAUTION The Diesels from the Alternate Emergency Power Supply (AEPS) are designed to support only one AC Emergency Bus at a time. Central Electric Power Reform Substation may be able to supply power to both AC Emergency Buses depending on power reserves.
		NOTES Figure 1, Alternate Emergency Power Supply One Line Diagram, is available for reference. Attachment F, AEPS Diesel Generator Alarms and Trips, is available for reference.
	BOP	Step 1 - EVALUATE Plant Status To Determine Which AC Emergency Bus To Energize: Based on NB01 Lockout, NB02 should be selected
Booth Operator		If asked to investigate NB01 Bus Lockout, wait 3 minutes and report Lockout on NB0112, Normal Feeder Breaker due to overcurrent.
	RO	Step 2 - IF ALIGNING Power To "A" TRAIN, THEN PLACE The Following Equipment Switches In PULL-TO-LOCK Position: Go To RNO which directs going to Step 5

Proc /Time	Position	Applicant's Actions or Behavior
EOP ADD 39	**BOP**	Step 5 - IF ALIGNING Power To "B" TRAIN, THEN PLACE The Following Equipment Switches In PULL-TO-LOCK Position: • CCP: BG HIS-2A • SI Pump: EM HIS-5 • RHR Pump: EJ HIS-2 • Containment Spray Pump: EN HIS-9 • CCW Pumps: EG HIS-22 & EG HIS-24 • Containment Cooler Fans: GN HIS-9 GN HIS-17 • Motor Driven AFW Pump: AL HIS-22A • Control Room AC Unit: GK HIS-40 • Class 1E Electrical Equipment Room AC Unit: GK HIS-103 This can be done per this procedure step or ECA-0.0 Step #7
	BOP	Step 6 - ALIGN Train "B" AC Emergency Bus NB02 For Alternate Emergency Power Supply: a. PLACE NB02 Emergency Supply Breaker NB0211 in PULL-TO-LOCK • NE HIS-26 b. PLACE NB02 Alternate Supply Breaker NB0212 in PULL-TO-LOCK • NB HIS-5 c. PLACE NB02 Normal Supply Breaker NB0209 in PULL-TO-LOCK • NB HIS-4 d. PLACE NB02 AEPS Supply Breaker NB0214 in PULL-TO-LOCK • NB HIS-68
	BOP	Step 7 - PERFORM Attachment B, Energizing NB02 From Alternate Emergency Power Supply (AEPS)

Proc /Time	Position	Applicant's Actions or Behavior
EOP ADD 39, ATT B	**BOP**	CAUTION Starting an ESW pump with less than three AEPS DGs OR less than 6 MW power from Central Electric Power Reform Substation may trip supply breakers. NOTES Each AEPS DG is rated for continuous 2000 KW. The limiting component for power is breaker PA50101. The overcurrent device will trip PA50101 at 660 Amps (Approximately 15 MW).
	BOP	Step B1 - CHECK PB05 – ENERGIZED a. CHECK PB05 Energized by Central Electric Power Reform Substation b. NOTIFY Central Electric Power Transmission System Operator (TSO) of Callaway's required approximately 6 MW for emergency power from the Reform Substation.
Booth Operator		Role Play as CE Power TSO, and state **"NO Power is available to Callaway based on Grid overloading and surging demand"**
	BOP	Step B1.b RNO - IF Central Electric Power cannot provide a minimum of 6 MW Go To Attachment C, Placing Alternate Emergency Power Supply DGs on PA501 Bus, Step C1 Proceeds to Attachment C and Step C1

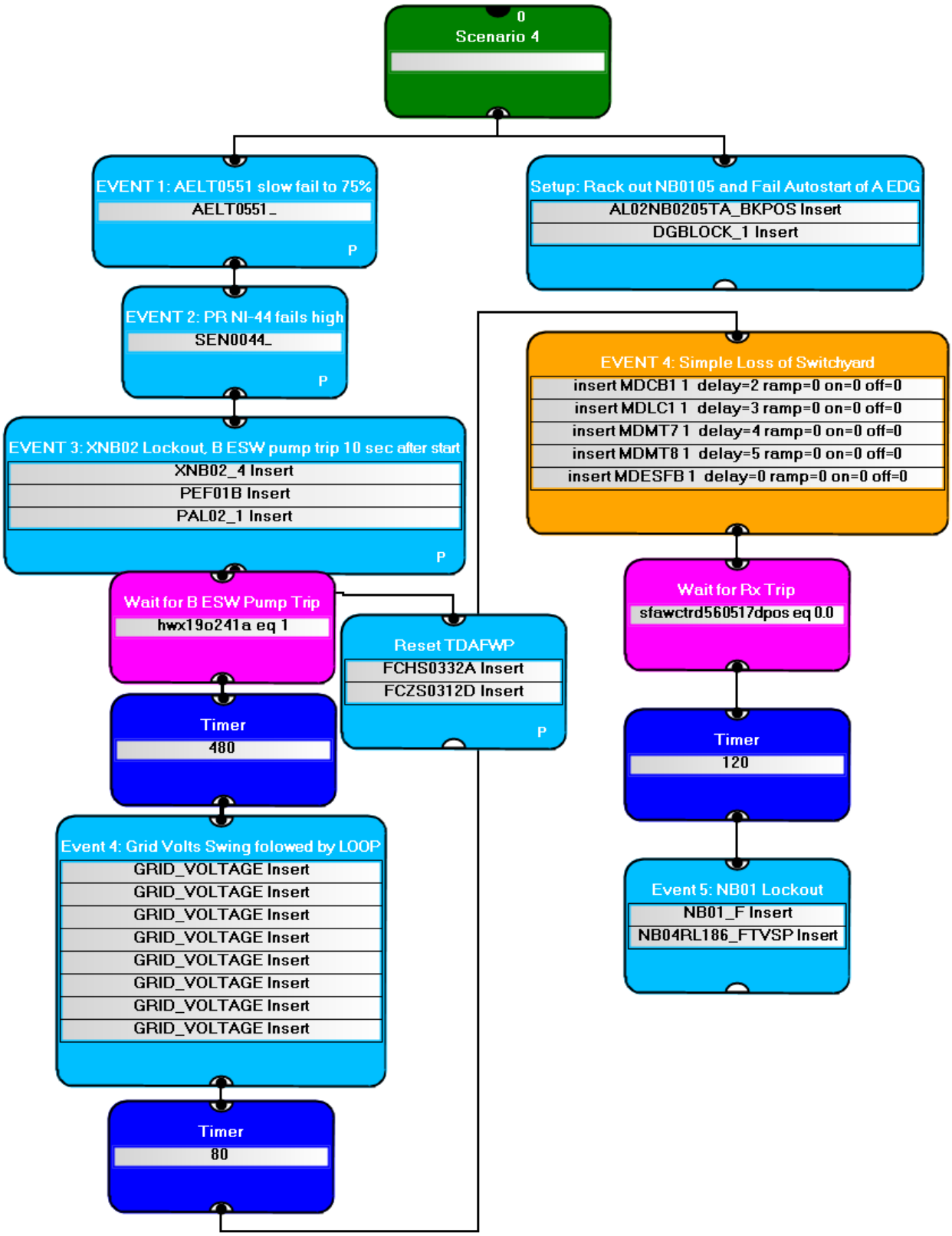
Proc /Time	Position	Applicant's Actions or Behavior
EOP ADD 39, ATT C	**BOP**	Notes: ● Opening Breaker PA50101 will cause breakers PA50103 and PB0501 to Open and the AEPS DGs to start. The AEPS DG output breakers will close and PA50103 and PB0501 will auto reclose. This will restore power to PB05. ● Attachment F, AEPS Diesel Generator Alarms and Trips, is available for reference. ● Attachment G, Alternate Emergency Power Supply Breaker Trip Interlocks, is available for reference. ● Keys that are necessary in the following steps are located at the Main Access Facility (MAF) with tag #263.
	BOP	Step C1 - Using PBXY0001 PLACE AEPS FDR BKR TO PA501 VIA Central Electric Reform Feeder - OPEN • PA50101 On PBXY0001, open PA50101 by selected breaker and pushing open and confirming selection.
	BOP	Step C2 - Using PBXY0001 CHECK ALL AEPS DGs – RUNNING ● EDGPA5001, AEPS D/G #1 ● EDGPA5002, AEPS D/G #2 ● EDGPA5003, AEPS D/G #3 ● EDGPA5004, AEPS D/G #4
	BOP	Step C3 - Using PBXY0001 CHECK ALL Running AEPS D/G Output Breakers - CLOSED: ● PA50104, AEPS FDR BKR TO EDGPA5001 ● PA50105, AEPS FDR BKR TO EDGPA5002 ● PA50106, AEPS FDR BKR TO EDGPA5003 ● PA50107, AEPS FDR BKR TO EDGPA5004

Proc /Time	Position	Applicant's Actions or Behavior
	BOP	Step C4 - Using PBXY0001 CHECK The Following Breakers – CLOSED a. Feeder Breaker PA50103, AEPS FDR BKR TO XFMR XPB05 b. Feeder Breaker PB0501, AEPS FDR BKR To PB05 FROM PA50103
	BOP	Step C5 - RETURN To Procedure Section And Step In Effect: Attachment B, Energizing NB02 From Alternate Emergency Power Supply (AEPS), Step B2
EOP ADD 39, ATT B	**BOP**	Step B2 - PLACE ESW PUMP B In PULL-TO-LOCK • EF HIS-56A
	BOP	Step B3 - Using PBXY0001 CLOSE AEPS FDR BKR PB0502 TO NB0214 • PB0502 At the PBXY0001 console, the close button is tapped and then confirmed to close PB0502.
		NOTES Handswitch NB HIS-68 must be held in the CLOSE position for a minimum of 3 seconds to allow the Undervoltage relay to reset. Ensure NB02 Auto-Sequenced equipment has been placed in PULL-TO-LOCK position prior to re-energization.
	BOP	Step B4 - CLOSE NB02 AEPS SUPPLY BKR NB0214 • NB HIS-68
CRITICAL TASK		**Energize NB02 AC Emergency Bus utilizing the AEPS EDGs due to unavailability of Central Electric COOP prior to EOP Addendum 39 completion.**

Op Test No.: 2019-1	Scenario # 4	Event # 4&5&6	Page 35 of 36
Event Description:	Loss of offsite power / RX Trip / E-0, Reactor Trip or Safety Injection NB01 Bus Lockout / Loss of All AC Power / ECA-0.0 Loss of All AC Power / Restore Power with AEPS with COOP power unavailable		

Proc /Time	Position	Applicant's Actions or Behavior
		NOTE An AEPS DG at full load uses 139 gal/hr fuel. At this rate, the low fuel level alarm will be received in approximately 19 hours and will be empty in 25 hours.
	BOP	Step B5 - MONITOR AEPS System Using PBXY0001: • Watts • Amps • Volts • Fuel (DG only)
	BOP	Step B6 - NOTIFY Jefferson City Oil To REFUEL AEPS DGs As Necessary: • Contact information located in Call Out List
		CAUTION To avoid tripping other NB02 loads 'B' ESW pump must be started first.
		NOTE No loading restrictions apply if NB02 is energized by Central Electric Power Reform Substation.
	BOP	Step B7 - CHECK NB02 Energized By Central Electric Power Reform Substation Or A Minimum Of 3 AEPS DGs
The scenario can be terminated at the discretion of the Lead Examiner		

SCE File Display



Facility: Callaway Plant		Date of Exam: March 4, 2019												Operating Test No.: 2019-1			
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		3			2			4			1 (Spare)						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
Crew 1 I1, I2, I3		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
I1	RX	1					0		2					2	1	1	0
RO ☐	NOR	0					0		0					0	1	1	1
SRO-I ■	I/C	1, 2, 3, 4, 5-7					2-5		3,4					13	4	4	2
SRO-U ☐	MAJ	5					5		5					3	2	2	1
	TS	2,3												2	0	2	2
I2	RX		1		1					0				2	1	1	0
RO ☐	NOR		0		0					0				0	1	1	1
SRO-I ■	I/C		2-4, 5, 6		2					1-4, 6				11	4	4	2
SRO-U ☐	MAJ		5		5					5				3	2	2	1
	TS				3,4									2	0	2	2
I3	RX			0		1		2						2	1	1	0
RO ☐	NOR			0		0		0						0	1	1	1
SRO-I ■	I/C			1, 2, 3, 5-7		2, 4,6,7		1, 3, 4,6						13	4	4	2
SRO-U ☐	MAJ			5		5		5						3	2	2	1
	TS							1,2						2	0	2	2

NOTE:

Totals are added from Scenarios 3, 2, and 4.

Scenario 1 attributes are not included in the totals since it was the spare.

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: Callaway Plant		Date of Exam: March 4, 2019												Operating Test No.: 2019-1			
APPLICANT Crew 2 I4, I5, I6	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		3			2			4			1 (Spare)						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
I4 RO ☐ SRO-I ■ SRO-U ☐	RX	1					0		2					2	1	1	0
	NOR	0					0		0					0	1	1	1
	I/C	1, 2, 3, 4, 5-7					2-5		3,4					13	4	4	2
	MAJ	5					5		5					3	2	2	1
	TS	2,3												2	0	2	2
I5 RO ☐ SRO-I ■ SRO-U ☐	RX		1		1					0				2	1	1	0
	NOR		0		0					0				0	1	1	1
	I/C		2-4, 5, 6		2					1-4, 6				11	4	4	2
	MAJ		5		5					5				3	2	2	1
	TS				3,4									2	0	2	2
I6 RO ☐ SRO-I ■ SRO-U ☐	RX			0		1		2						2	1	1	0
	NOR			0		0		0						0	1	1	1
	I/C			1, 2, 3, 5-7		2, 4,6,7		1, 3, 4,6						14	4	4	2
	MAJ			5		5		5						3	2	2	1
	TS							1,2						2	0	2	2

NOTE:

Totals are added from Scenarios 3, 2, and 4.

Scenario 1 attributes are not included in the totals since it was the spare.

Instructions:

5. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
6. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
7. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
8. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: Callaway Plant		Date of Exam: March 4, 2019												Operating Test No.: 2019-1				
APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)			
		3			2			4			1 (Spare)							
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION							
Crew 3 I7, I8, U1		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
I7	RX		1		1					0				2	1	1	0
RO ☐	NOR		0		0					0				0	1	1	1
SRO-I ■	I/C		2-4, 5, 6		2					1-4, 6				13	4	4	2
SRO-U ☐	MAJ		5		5					5				3	2	2	1
	TS				3,4									2	0	2	2
I8	RX			0		1		2						2	1	1	0
RO ☐	NOR			0		0		0						0	1	1	1
SRO-I ■	I/C			1, 2, 3, 5-7		2, 4,6,7		1, 3, 4,6						14	4	4	2
SRO-U ☐	MAJ			5		5		5						3	2	2	1
	TS							1,2						2	0	2	2
U1	RX	1					0		SUR					1	1	1	0
RO ☐	NOR	0					0		SUR					0	1	1	1
SRO-I ☐	I/C	1-7					2-5		SUR					11	4	4	2
SRO-U ■	MAJ	5					5		SUR					2	2	2	1
	TS	2,3							SUR					2	0	2	2

NOTE: Totals are added from Scenarios 3, 2, and 4.

Scenario 1 attributes are not included in the totals since it was the spare.

Instructions:

9. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls" (ATC) and "balance-of-plant" (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.
10. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.
11. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements specified for the applicant's license level in the right-hand columns.
12. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: Callaway Plant	Date of Examination: March 4, 2019								Operating Test No.: 2019-1							
Competencies	APPLICANTS – Crew 1															
	RO ☐ SRO-I1 ☒ SRO-U ☐				RO ☐ SRO-I2 ☒ SRO-U ☐				RO ☐ SRO-I3 ☒ SRO-U ☐							
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	3 CRS	2 BOP	4 ATC	1	3 ATC	2 CRS	4 BOP	1	3 BOP	2 ATC	4 CRS	1				
Interpret/Diagnose Events and Conditions	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Comply With and Use Procedures (1)	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Operate Control Boards (2)	N/A	2-5	2-5		1-7	N/A	1-4, 5-7		1,2, 4-7	1,4, 5-7	N/A					
Communicate and Interact	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Demonstrate Supervisory Ability (3)	ALL	N/A	N/A		N/A	ALL	N/A		N/A	N/A	ALL					
Comply With and Use Tech. Specs. (3)	2,3	N/A	N/A		N/A	3,4	N/A		N/A	N/A	1,2					

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Additional NOTE: Competencies for Scenarios are estimates for board operators.

Instructions:

Check the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant. (This includes all rating factors for each competency.) (Forms ES-303-1 and ES-303-3 describe the competency rating factors.)

Facility: Callaway Plant	Date of Examination: March 4, 2019												Operating Test No.: 2019-1			
Competencies	APPLICANTS – Crew 2															
	RO ☐ SRO-I4 ☒ SRO-U ☐				RO ☐ SRO-I5 ☒ SRO-U ☐				RO ☐ SRO-I6 ☒ SRO-U ☐							
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	3 CRS	2 BOP	4 ATC	1	3 ATC	2 CRS	4 BOP	1	3 BOP	2 ATC	4 CRS	1				
Interpret/Diagnose Events and Conditions	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Comply With and Use Procedures (1)	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Operate Control Boards (2)	N/A	2-5	2-5		1-7	N/A	1-4, 5-7		1,2, 4-7	1,4, 5-7	N/A					
Communicate and Interact	ALL	2-5	2-5		1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL					
Demonstrate Supervisory Ability (3)	ALL	N/A	N/A		N/A	ALL	N/A		N/A	N/A	ALL					
Comply With and Use Tech. Specs. (3)	2,3	N/A	N/A		N/A	3,4	N/A		N/A	N/A	1,2					

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Additional NOTE: Competencies for Scenarios are estimates for board operators.

Instructions:

Check the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant. (This includes all rating factors for each competency.) (Forms ES-303-1 and ES-303-3 describe the competency rating factors.)

Facility: Callaway Plant	Date of Examination: March 4, 2019															
Competencies	APPLICANTS – Crew 3															
	RO ☐ SRO-I7 ☒ SRO-U ☐				RO ☐ SRO-I8 ☒ SRO-U ☐				RO ☐ SRO ☐ SRO-U1 ☒							
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	3 ATC	2 CRS	4 BOP	1	3 BOP	2 ATC	4 CRS	1	3 CRS	2 BOP	4	1				
Interpret/Diagnose Events and Conditions	1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL		ALL	2-5						
Comply With and Use Procedures (1)	1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL		ALL	2-5						
Operate Control Boards (2)	1-7	N/A	1-4, 5-7		1,2, 4-7	1,4, 5-7	N/A		N/A	2-5						
Communicate and Interact	1-7	ALL	1-4, 5-7		1,2, 4-7	1,4, 5-7	ALL		ALL	2-5						
Demonstrate Supervisory Ability (3)	N/A	ALL	N/A		N/A	N/A	ALL		ALL	N/A						
Comply With and Use Tech. Specs. (3)	N/A	3,4	N/A		N/A	N/A	1,2		2,3	N/A						

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Additional NOTE: Competencies for Scenarios are estimates for board operators.

Instructions:

Check the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant. (This includes all rating factors for each competency.) (Forms ES-303-1 and ES-303-3 describe the competency rating factors.)