

Facility:	Davis-Besse	Scenario No.:	1	Op Test No.:	DB NRC 2018
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	ATC	
	_____		_____	BOP	
Initial Conditions:	<ul style="list-style-type: none"> 5% power / Mode 1 				
	<ul style="list-style-type: none"> Rod Control Panel in Auto 				
	<ul style="list-style-type: none"> MFPT 2 in service MDFP is Unavailable while being aligned for AFW mode 				
Turnover:	<ul style="list-style-type: none"> Plant was shut down for bushing replacement on the Main Transformer. Reactor startup is in progress and currently at 5% (Mode 1 entered). Continue a plant startup per DB-OP-06901, starting at Step 3.43. Completed testing of both AFPTs for operability. 				
Planned:	<ul style="list-style-type: none"> Continue Reactor startup. Complete line-ups for placing MDFP in AFW mode (currently in progress). Complete venting of FW779 and FW780. 				
Critical tasks: 1. Trip All Reactor Coolant Pumps (CT1)					
2. Initiate HPI Flow Balancing (CT2)					
Event No.	Malfunction No.	Event Type*	Event Description		
1		R-ATC/SRO	Continue Reactor startup from 5% to 10%. Stabilize at 10% to perform NIP to HBP comparison		
2		N-BOP/SRO	Place Main Feed Reg Valves in service (Open Block Valves)		
3		C-BOP/SRO	Rising Cond pressure - Vacuum Pump auto start fail		
4		SRO (TS)	Inverter YV1 DC input failure (TS)		
5		C-ATC/SRO	Makeup Filter High diff press		
6		I-BOP/SRO (TS)	SFAS CTMT Press transmitter fails low (TS)		
7		C-ATC/SRO	RCS Leak – trip Reactor at 100 inches		
8		M-ALL	LOCA		
9		C-ATC/SRO	HPI Pump trip requiring flow balancing		
<small>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor </small>					

DAVIS-BESSE 2018 NRC SCENARIO 1

The Crew will be allowed the opportunity to review the in progress DB-OP-06901, Plant Startup, procedure prior to entering Simulator and assuming control.

The Crew will take the watch with power stabilized at approximately 5% (Mode 1 entered). A reactor startup is in progress following a shutdown for bushing replacement on the Main Transformer. The MDFP is unavailable while in the process of being transferred to the Auxiliary Feedwater mode. Direction will be to increase power to 10%, stabilize for NIP to Heat Balance comparison and continue to 14% power (event 1).

An Equipment Operator will report the steps complete for venting the bonnets of the MFW Block Valves. The BOP RO will open the MFW Block Valves placing the Main Feedwater Control Valves in service (event 2).

When the Main Feedwater Control Valves are in service the Lead Evaluator will cue rising condenser pressure. The crew will identify rising pressure from trend recorder data or from receipt of annunciator alarms 15-1-F and/or 15-2-F, Hi/Lo Pressure Condenser Pressure Hi. The Unit Supervisor will enter abnormal procedure DB-OP-02518, High Condenser Pressure. The Mechanical Hogger will fail to auto start and the BOP will manually start the Mechanical Hogger. Condenser pressure will stabilize at less than 5.0 inches HgA and reactor power reduction to maintain less than or equal to 5.0 HgA will not be required (event 3).

At the Lead Evaluators cue, INV YV1-YV3 TRBL Annunciator alarm will be received and an Equipment Operator will report breaker D1P03 found in the tripped position. Inverter YV1 will be declared Inoperable. Tech Spec 3.8.7, Condition A, for Inverters-Operating will be entered (event 4).

At the Lead Evaluators cue annunciator 2-4-A, Letdown or MU Filter Differential Pressure Hi, will alarm due to high differential pressure across the #1 Makeup Filter (PDI MU13 greater than 25 psid). The crew will implement alarm procedure actions, validate #1 Makeup Filter differential pressure is high, and swap to #2 Makeup Filter using DB-OP-06006, Makeup and Purification System (event 5).

At the Lead Evaluators cue SFAS Channel 4 Containment Pressure Transmitter will fail low. Annunciator 5-4-B, SFAS CTMT PRESS LO FAIL will alarm. The SRO will enter Tech Spec 3.3.5 Condition A and the BOP will trip the required Bistables in SFAS Channel 4 (event 6).

On Lead Evaluators cue an RCS leak will develop in Containment resulting in Pressurizer level dropping below 100 inches and requiring the ATC to trip the reactor per DB-OP-02522, Small RCS Leaks, immediate action (event 7).

When the reactor is tripped the RCS leak will increase resulting in a loss of Adequate Subcooling Margin which will require tripping of all 4 Reactor Coolant Pumps (CT-1) (event 8).

High Pressure Injection Pump 2 will trip requiring HPI Flow Balancing to be performed (CT-2) (event 9).

When HPI Flow Balancing has been performed the scenario can be terminated.

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Event Description: Power Increase / Place MFW Reg Valves In Service									
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> • Power Range Nis • Core differential temperature 		
	SRO	Direct increase reactor power to 10% and stabilize per DB-OP-06901, starting at Step 3.43 <ul style="list-style-type: none"> • Perform NI Power and Heat Balance Power comparison
	ATC	Increase reactor power to 10% at 35°F/hr <ul style="list-style-type: none"> • Increase power using Reactor Demand Station • Perform NI Power and Heat Balance Power comparison
	Booth Cue	<i>When directed by Lead Evaluator, role-play EO and report: "Steps 3.44.1.a and b of DB-OP-06901 are complete. FW 779 and FW 780 bonnets have been vented and are ready to be opened per steps 3.44.2 through 3.44.7"</i>
	BOP	Open MFW Block Valves, FW779 and FW 780 <ul style="list-style-type: none"> • Open SP 6B to 5%, Close SP 6B • Open FW 780 (Takes ~ 2 minutes to stroke) • Open SP 6A to 5%, Close SP 6A • Open FW 779 (Takes ~ 2 minutes to stroke)
	SRO	Note: It is not necessary to wait for full power increase prior to proceeding to next event Direct increase reactor power to 14% and stabilize per DB-OP-06901, starting at Step 3.43 <ul style="list-style-type: none"> • Perform NI Power and Heat Balance Power comparison
		On Lead Evaluator's discretion insert Event 3, rising condenser pressure

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Event Description: <u>Rising Condenser Pressure – Mechanical</u>									
Time	Position	Applicant's Actions or Behavior							

Indications Available: <ul style="list-style-type: none"> • Annunciator 15-1-F HP CNDSR HI • Annunciator 15-2-F LP CNDSR HI • HP PR 530 rising (trend recorder) • LP-PR 541 rising (trend recorder) 		
	Crew	NOTE: May recognize prior to alarms Recognize indications of slowly increasing condenser pressure
	SRO	Implement DB-OP-02518, High Condenser Pressure
	BOP	Verify the Mechanical Hogger Starts at 4.5 inches HgA LP Condenser (Auto start is failed) <ul style="list-style-type: none"> • Position switch HIS1005 to START (Condenser pressure will stop increasing and slowly improve)
	BOP	Verify proper Circ Water Pump operation
	BOP	Verify Condenser Vacuum Breakers are Closed (HIS634)
	BOP	Check proper operation of Gland Sealing Steam system
	SRO	Request assistance to determine the cause (Attachment 1)
	SRO	Notify the Shift Manager to refer to Notification requirements
On Lead Evaluator's discretion, proceed to Event 4, Inverter YV1 DC input failure		

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Event Description: Inverter YV1 DC input failure									
Time	Position	Applicant's Actions or Behavior							

Indications Available		
1-6-A INV YV1-YV3 TRBL		
D1P03 Red Light is Off		
	CREW	Respond to DB-OP-02001, Electrical Distribution Alarm Panel 1 Annunciators, alarm 1-6-A
	CREW	Recognize Inverter YV1 DC input failure D1P03 red light is off
	SRO	Refer to DB-OP-06319, Instrument AC System Procedure, Sect. 5.1, Response to INV YV1 TRBL Alarms
	Booth Cue	<i>Role Play as Equipment Operator and report: "Breaker D1P03 for Inverter YV1 is tripped. Inverter YV1 indications are normal"</i>
	SRO	Declare Inverter YV1 Inoperable. Enter TS 3.8.7 Inverters Operating, Condition A
	SRO	Contact Electrical Maintenance to investigate
When Tech Spec has been declared proceed to Event 5, Makeup Filter high differential pressure		

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Event Description: Makeup Filter high differential pressure									
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- **PDI MU13 indicates >25 PSID**
- **2-4-A LETDOWN OR MU FILT ΔP HI**

	CREW	Recognize Makeup Filter high differential pressure for in service Makeup Filter 1 (indications available listed above)
	ATC	Implement DP-OP-02002 Letdown/Makeup Alarm Panel 2 Annunciators for 2-4-A LETDOWN OR MU FILT ΔP HI
	ATC	Validate Makeup Filter high differential pressure with PDI MU13 indicating >25 psid
	SRO	Direct placing Makeup Filter 2 in service in accordance with DB-OP-06006, Makeup and Purification System
	SRO/ATC	Verify Makeup Filter 2 is not aligned as the Purification Demin Filter
	SM CUE	<i>If necessary, Role-play Shift Manager and inform the SRO that Makeup Filter 2 has been verified to not be aligned as the Purification Demin Filter</i>
	ATC	Swap to Makeup Filter 2
	ATC	Open MU12B, MAKEUP FILTER 2 INLET ISOLATION, using HISMU12B.
	ATC	Close MU12A, MAKEUP FILTER 1 INLET ISOLATION, using HISMU12A.
	CREW	Ensure work request initiated to have filter replaced (alarm procedure guidance)
On Lead Evaluator's discretion proceed to Event 6, SFAS CTMT Press transmitter fails low		

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Event Description:		SFAS CTMT Press transmitter fails low							
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> 5-4-B, SFAS CTMT PRESS LO FAIL 		
	CREW	Refer to DB-OP-02005, Primary Instrumentation Alarm Panel
	SRO	Determine SFAS 4 Channel CTMT Pressure is INOPERABLE. <ul style="list-style-type: none"> PI M403 is failed low and BA 408 is tripped (Red light lit) in SFAS Channel 4 cabinet.
	SRO	REFER TO Technical Specifications 3.3.5 and Table 3.3.5-1 Parameters 3 and 4 and take action as required. Enters Condition A, one (1) hour to trip channel.
	SRO	Direct action IAW DB-OP-06405, SFAS, Section 4.1 for tripping the Inoperable SFAS Instrument String Trip Bistable.
	SRO	Direct circling SFAS Channel 4 indicating the Inoperable SFAS Instrument String Trip Bistable selected.
	SRO	Determines bistable(s), BA409 and BA410, are required to be tripped to achieve the desired results
	BOP	Perform actions for an Inoperable SFAS Instrument String Trip Bistable
	BOP	Obtains the door key for the designated SFAS cabinet. (Key 28)
	BOP	Depress the TEST pushbutton on the trip bistable(s) listed in Step 4.1.3 (BA409 and BA410) AND verify the TRIP light is ON.

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Event Description: SFAS CTMT Press transmitter fails low		
Time	Position	Applicant's Actions or Behavior

SFAS CTMT PRESS LO FAIL (cont.)		
	BOP	Verify the associated 1/5 lights on the output modules for all four SFAS Channels are ON.
	BOP	Verify the SFAS cabinet door is closed and locked.
	BOP	Return the SFAS door key.
Proceed to Event 7, 8 and 9 - RCS leak, LOCA and HPI Flow Balancing		

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Event Description: RCS Leak, LOCA and HPI Flow Balancing									
Time	Position	Applicant's Actions or Behavior							

Indications Available: <ul style="list-style-type: none"> • Increasing Makeup flow • Lowering Pressurizer level • Lowering Makeup Tank level 		
	CREW	Recognize RCS leak
	ATC	Trip Reactor per immediate actions of DB-OP-02522, Small RCS Leaks (Pressurizer level < 100 inches)
	ATC	Perform DB-OP-02000 Immediate Actions <ul style="list-style-type: none"> • Manually trip the reactor • Verify power decreasing in the intermediate range • Manually trip the turbine
	SRO	Route to DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
	CREW	Recognize SCM is < 20 °F
*Critical Task	ATC	Implement Specific Rule 2, LSCM <ul style="list-style-type: none"> • *Trip RCPs when SCM is lost • Select Incores on the PAM Panel
	BOP	Implement Specific Rule 4, Steam Generator Control <ul style="list-style-type: none"> • Verify both SG levels are increasing to 124 inches
	ATC	Implement Specific Rule 6, C1/D1/EDGs <ul style="list-style-type: none"> • Verify both EDGs are running • Verify C1 and D1 are energized • Verify both CCW Pumps are running • Verify both Service Water Pumps are running

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Event Description: RCS Leak, LOCA and HPI Flow Balancing									
Time	Position	Applicant's Actions or Behavior							

Event 7 & 8, LOCA and HPI Flow Balancing continued		
	CREW	Check for Symptom direction <ul style="list-style-type: none"> Recognize loss of subcooling margin
	SRO	Implement DB-OP-02000, Section 5
	ATC	Verify RCPs are tripped
	ATC	Implement Attachment 8, Place MU/HPI/LPI in Service <ul style="list-style-type: none"> Start/Verify running both CCW Pumps Recognize only HPI Pump 1 is running Refer to attachment 11 for HPI flow balancing
*Critical Task	ATC	*Implement Attachment 11, HPI Flow Balancing <ul style="list-style-type: none"> Close MU 6421 Verify HP 2C and HP 2D are open Determine FYI HP3C has a lower flow than FYI HP3D Throttle HP 2D until FYI HP3C is acceptable per Figure 3 Open MU 6421 Monitor RCS Pressure Start both LPI Pumps Open DH 64 and DH 63 Transfer MU Pump suctions to the BWST Set Pressurizer Level Controller to 100 inches Start/Verify running the second MU Pump Lock MU Pump suctions on the BWST Isolate Letdown Verify Pressurizer heaters are off Open MU 6421 Open MU 6419 Direct an Equipment Operator to open MU6423B
	ATC	Control MU\HPI\LPI per specific Rule 3 and Attachment 13

Event 7 & 8, LOCA and HPI Flow Balancing continued		
	ATC	Verify proper SFAS actuation • Recognize HPI Pump 2 has tripped
	BOP	Verify proper SFRCS actuation
	BOP	Verify proper SG level control
	BOP	Realign AFW if an SFRC low pressure trip occurs
	ATC	Check for LPI flow into the RCS
When HPI flow balancing has been performed the scenario can be terminated		

Justification for Critical Tasks

A. Trip all Reactor Coolant Pumps. (CT-1)

When Subcooling Margin is lost all Reactor Coolant Pumps are required to be stopped immediately. Continued RCP operation during certain small break LOCA accidents could lead to fuel clad failure.

B. Initiate High Pressure Injection (CT-2)

Following the Reactor trip High Pressure Injection Pump 1, Line 1-2 will develop an unisolable leak and HPI Pump 2 will trip after starting on Safety Features Actuation System Level 2. This will require High Pressure Injection Train 1 flows to be balanced to minimize flow out of the broken line.

SIMULATOR SETUP INFORMATION

1. Simulator Setup
 - a) 5% Power
 - b) DB-OP-06901, complete up to Step 3.43
 - c) Makeup filter 1 in service with elevated differential pressure
 - d) Unisolable leak on HPI Line 1-2 increases on Reactor trip
 - e) High Pressure Injection Pump 2 trips upon SFAS Level 2 actuation
 - f) SPDS HUS Curve on front monitor
 - g) Magnetic tag OPEN on ABS34620
 - h) Emergency Feedwater Pump OOS
2. Procedures
 - a) DB-OP-06901, Plant Startup
 - b) DB-OP-02518, High Condenser Pressure
 - c) DB-OP-06251, Station and Instrument Air
 - d) DB-OP-02001, Electrical Distribution Alarm Panel
 - e) DB-OP-06319, Instrument AC System Procedure
 - f) DP-OP-02002, Letdown/Makeup Alarm Panel
 - g) DB-OP-06006, Makeup and Purification System
 - h) DB-OP-02005, Primary Instrumentation Alarm Panel
 - i) DB-OP-06405, Safety Features Actuation System
 - j) DB-OP-02522, Small RCS Leaks
 - k) DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
- 2) For Simulator Instructor:
 - a) None
 - b)

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Examiners:	_____	Operators:	_____	SRO	
	_____		_____	ATC	
	_____		_____	BOP	
Initial Conditions:	<ul style="list-style-type: none"> 100% Power 				
Turnover: Maintain 100% Power Routine activities					
Planned: Add 50 gallons of water to the Makeup Tank (MUT) to verify proper operation of batch controller (FIN request)					
Critical tasks: 1. Shutdown the Reactor - ATWS (CT-24)					
2. Initiate MU/HPI PORV Cooling (CT-14)					
Event No.	Malf. No.	Event Type*	Event Description		
1		N-ATC/SRO	Add 50 gal of water to the RCS Makeup tank		
2		C-BOP/SRO (TS)	NI Power Range NI5 fails low		
3		I-ATC/SRO	Selected PZR Level Transmitter fails Low		
4		C-BOP/SRO (TS)	Isolable steam Leak – loss AFP		
5		C-BOP/SRO	Main Feed Turbine Pump 1 High Vibrations		
6		R-ATC/SRO	MFP Runback fails – reduce power		
7		Major	Loss of all Feedwater – ATWS (Momentarily de-energize 480 Volt Unit Substations E2 and F2)		
8		C-ATC/SRO	STBY MUP trips – establish MU/HPI PORV Cooling		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

DAVIS-BESSE 2018 NRC SCENARIO 2

The crew will take the watch with power at 100%. The ATC will add 50 gallons of water to the Makeup Tank (MUT) to verify proper operation of batch controller (event 1).

The Lead Evaluator will cue Power Range NI 5 to fail low which will cause RPS Ch 2 to trip on $\phi/\Delta\phi/\text{flow}$. The SRO will enter DB-OP-02505, NI Failures, and enter Technical Specification 3.3.1 Condition A, and will direct the BOP to place RPS Channel 2 in Manual Bypass (event 2).

The Lead Evaluator will cue the selected PZR Level instrument failure which will fail low over two minutes. Annunciator 4-2-E, PZR LVL LO, will alarm. The SRO will implement DB-OP-02513, PZR Abnormal Operations. The ATC will place PZR level control valve MU32 in manual, select the alternate instrument and return MU32 to automatic control (event 3).

The Lead Evaluator will cue an isolable steam leak which will result in the loss of #2 AFP. The crew will respond to annunciator 12-2-A, SG 1 to AFP 2 Mn Stm Press Lo, and implement abnormal procedure DB-OP-02525, Steam Leaks. The steam leak will be determined to be in AFPT Room 2, and attachment 1 of DB-OP-02525 will be used to isolate the steam leak. The Unit Supervisor will review applicable Technical Specifications and enter 3.7.5 Condition A and B for Inoperable Steam Supply (event 4).

The Lead Evaluator will then cue Main Feedwater Pump Turbine (MFPT) 1 High Vibrations. The SRO will direct the BOP to trip MFPT #1 as directed by DB-OP-02010 Feedwater Alarm Panel 10 (event 5).

When MFPT 1 is tripped the auto runback will fail requiring the ATC to place HIC ICS13, SG/RX DEMAND, in HAND and perform the runback at 20% / minute to 55% power per DB-OP-06401, Integrated Control System Operating Procedure (event 6).

The Lead Evaluator will then cue the loss of all feedwater event. Main Feedwater Pump 2 will trip. AFW Pump 1 **will start and the** Motor Driven Feedwater pump will fail to start. The CREW will determine an ATWS has occurred. The ATC will be required to **momentarily de-energize 480 Volt Unit Substations E2 and F2** to de-energize the CRDMs and shut down the reactor (CT-24) (event 7).

The Crew will stabilize the plant and route through DB-OP-02000 supplemental section. After 10 minutes the remaining AFW Pump will trip resulting in a loss of all feedwater. The ATC will start the standby Makeup Pump per specific rule 4.

The SRO will enter Section 6, Lack of Heat Transfer and direct the ATC to prepare for MU/HPI Cooling. One minute after the standby Makeup Pump is started Annunciator Alarm 2-1-B, MU PMP 1 LUBE OIL PRESS LO, will sound and the standby Makeup Pump will trip. The CREW will determine Specific Rule 4 applies and the SRO will direct immediate initiation of MU/HPI PORV Cooling (CT-14) (event 8).

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Event Description: Add water to the RCS Makeup Tank									
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> • Batch Controller • Makeup Tank level 		
	SRO	Direct addition of 50 gallons from the Clean Waste Monitor tank to the RCS Makeup tank, IAW DB-OP-06001, Boron Concentration Control
	ATC	Determine MU39, Batch Flow Control Valve, position. Depress and release: <ul style="list-style-type: none"> • DISPLAY (lower) • VALVE CE • Valve % should indicate 0 Verify MU23 closed using HC MU23 Verify WC 3526 closed using HIS 3526 Estimate the time for batch completion (~ 4 minutes)
	ATC	Program Batch Controller using following keystroke sequence: <ul style="list-style-type: none"> • BATCH SET • # keys equating to 50 • ENTER • Exit BATCH SET mode by depressing DISPLAY • Display batch size by depressing BATCH • Repeat a through e if not correct • Verify desired batch size indicated
	ATC	Reset indicated total on the Batch Controller: <ul style="list-style-type: none"> • DISPLAY (lower) • TOTAL • TOTAL RESET Display FLOW RATE <ul style="list-style-type: none"> • DISPLAY (upper) ZERO • RATE

[illegible]

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Event Description: Power Range NI5 fail low									
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> • 5-1-H RPS CH 2 TRIP • 5-3-I RPS FLUX-ΔFLUX-FLOW TRIP 		
	CREW	Identify symptoms of an NI failure <ul style="list-style-type: none"> • 5-1-H RPS CH 2 TRIP • 5-3-I RPS FLUX-ΔFLUX-FLOW TRIP
	SRO	Route to DB-OP-02505, NI Failures
	ATC	Recognize NI 5 has failed low <ul style="list-style-type: none"> • NI panel indicator NI5 failed low
	SRO	Refer to Tech Specs: <ul style="list-style-type: none"> • Enter Tech Spec 3.3.1 RPS Instrumentation Condition A for Functions 1, 7 and 8 INOPERABLE on Channel 2 • Refer to Tech Spec 3.3.16 for ARTS (only 3 ARTS Channels required)
	SRO	Directs placing RPS 2 in Manual Bypass per DB-OP-06403, Reactor Protective System (RPS) and Nuclear Instrumentation (NI) Operating Procedure
	BOP	Place RPS Channel 2 in bypass <ul style="list-style-type: none"> • Obtain RPS Manual Bypass key and Ch2 door key • Rotate the MANUAL-BYPASS KEY SWITCH to actuate the manual bypass relay in RPS Channel 2 • Check MANUAL-BYPASS light is BRIGHT • Check SUB-SYSTEM light is DIM • Place the Power Range Test Module in TEST OPERATE
At Lead Evaluators discretion proceed to Event 3, Pressurizer Level Transmitter Failure		

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Event Description: PZR Level Transmitter fails low over 2 minutes									
Time	Position	Applicant's Actions or Behavior							

Indications Available:**Makeup flow increasing with no change in PZR level**

- 4-2-E PZR LVL LO
- 4-1-E PZR LO LVL HTR TRIP
- MU 32 demand increasing

	CREW	Recognize a Pressurizer level transmitter failure
	SRO	Implement DB-OP-02513, Pressurizer System Abnormal Operations, for Failure of Selected Pressurizer Level or Temperature Instruments
	ATC	Place MU 32 in HAND and control PZR level
	ATC	Compare Pressurizer level instruments and select a functional alternate level instrument: <ul style="list-style-type: none"> • LTRC14-1 (L772) X instrument OR • LTRC14-3 (L773) Y instrument
	SRO	If NNI-Y instrument selected refer to DB-OP-06407 for non-preferred selector switch alignment
	ATC	Return MU 32 to automatic control
	SRO	IF Pressurizer Level is greater than 228 inches, then refer to Technical Specification 3.4.9 Condition A
	Booth Cue	Role play Work Week Manager/I&C as necessary to investigate pressurizer level transmitter failure
Proceed to Event 4, Isolable steam leak – Loss of AFP 2		

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Event Description: Isolable steam leak – Loss of AFP 2									
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- 12-2-A SG 1 TO AFPT 2 MN STM PRESS LO
- P012 AFPT 2 STM IN LOW PRESS
- Fire alarms

	CREW	Recognize a steam leak in AFPT Room 2 <ul style="list-style-type: none"> • 12-2-A SG 1 TO AFPT 2 MN STM PRESS LO • Fire alarms
	SRO	Implement DB-OP-02525, Steam Leaks
	ATC	Monitor reactor power <ul style="list-style-type: none"> • Lower power as needed to maintain $\leq 100\%$
	SRO	Direct Shift Manager to refer to RA-EP-01500, Emergency Classification
	BOP	Determine the leak location is in AFPT Room 2 based on annunciator 12-2-A, P012, and/or fire alarms
	SRO	Direct BOP to perform DB-OP-02525, Steam Leaks Attachment 1, Isolation of Main Steam Line 1 to AFPT 2 Leak
	BOP	Attempt to isolate the leak as follows: <ul style="list-style-type: none"> • Close MS 107A • Verify MS 107 is closed • Verify MS 106 is closed
	BOP	Recognize annunciator 12-2-A is extinguished - Notify the US that the leak is isolated and to GO TO Attachment 8 for continued operation
	SRO	Go to Attachment 8, Evaluation for Continued Operation
Isolable steam leak – Loss of AFP 2 continued		

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Event Description:		Main Feed Pump Turbine 1 High Vibrations/Auto Runback Failure							
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- 10-3-A MFP 1 OR BFP 1 BEARING VIB HI
- V650 MFP, MFPT, GEAR OR BFP 1 BRG VIB
- V657 MFP, MFPT, GEAR OR BFP 1 BRG VIB
- Excessive vibration reading from ZJR 2538

	CREW	Recognize high vibrations on MFPT 1
	BOP	Refer to Annunciator Response DB-OP-02010
	BOP	Trip MFPT 1 (setpoint is 5 mils)
	CREW	Recognize automatic runback to 55% is not occurring
	SRO	Implement DB-OP-06401, Integrated Control System Operating Procedure for MFPT Trip runback
	SRO	Direct the ATC to place HIC ICS13, SG/RX DEMAND station in HAND and perform the runback at 20% / minute to 55% power
	ATC	Place HIC ICS13, SG/RX DEMAND station in HAND and perform the runback at 20% / minute to 55% power
	ATC	IF the pressurizer spray valve was operated, THEN verify RC2, PRESSURIZER SPRAY VALVE is in AUTO AND closed
	ATC/BOP	Perform a NIP/HBP comparison for the current power level
	ATC	Return HIC ICS13, SG/RX DEMAND to Auto
Proceed to Event 7 & 8, Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling		

Op Test No.:	<u>2018</u>	Scenario #	<u>2</u>	Event #	<u>7 & 8</u>	Page	<u>10</u>	of	<u>15</u>
Event Description:		Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling							
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> 8-4-B MFPT 2 TRIP 		
	CREW	Recognize loss of Main Feedwater
	CREW	Recognize Reactor trip should have occurred but did not trip
*Critical Task	ATC	Perform DB-OP-02000 immediate actions <ul style="list-style-type: none"> Attempt to manually trip reactor, attempt to use key switch Report failure of manual pushbuttons and key switch to trip reactor *De-energize E2 and F2 Re-energize E2 and F2 Verify power decreasing on the Intermediate Range Manually trip the turbine
	SRO	Implement DB-OP-02000
	SRO/ATC	Verify immediate actions: <ul style="list-style-type: none"> Trip the Reactor Verify power decreasing Trip the turbine Verify all Turbine Stop Valves OR Control Valves are closed
	CREW	Check for Specific Rule or Symptom Direction
	BOP	Implement Specific Rule 4
	BOP	Enable MDFP Discharge Valves <ul style="list-style-type: none"> HIS 6459 HIS6460

Op Test No.:	<u>2018</u>	Scenario #	<u>2</u>	Event #	<u>7 & 8</u>	Page	<u>11</u>	of	<u>15</u>
Event Description: <u>Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling</u>									
Time	Position	Applicant's Actions or Behavior							

Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling - continued		
	BOP	Close both MDFP discharge valves <ul style="list-style-type: none"> • LIC 6459 • LIC 6460
	BOP	Attempt to start the MDFP – MDFP does not start
	SRO	NOTE: During the performance of supplemental section (10 minutes following reactor trip) a loss of all feedwater will occur Continue with DB-OP-02000 Section 4, Supplemental <ol style="list-style-type: none"> 1. Check Group 1-7 Rods inserted 2. Direct ATC to perform attachment 1 Primary inventory control 3. Direct BPO to perform Attachment 2 SG inventory and pressure control actions 4. Check for NNI power available (all 4 NNI Power lights lit) 5. Check for ICS Power available (ICS annunciators off/hand auto stations lit) 6. Check for Instrument Air available 7. Check for SFAS not actuated and not required 8. Check for proper SFRCS actuation (isolation trip) 9. Check for adequate SCM 10. Check for proper Primary to Secondary Heat Transfer 11. Verify MSL rad monitors in gross 12. Check SGTR does not exist 13. Direct performing Attachment 26 Electrical actions
	CREW	Note: AFP 1 will trip 10 minutes following reactor trip Recognize AFPT Trip (annunciator alarm)
	BOP	Use Attachment 5 to attempt to restore a source of feedwater
	ATC	Start the standby Makeup Pump 1
NOTE: The standby Makeup Pump will trip on low oil pressure after 1 minute		

Op Test No.:	<u>2018</u>	Scenario #	<u>2</u>	Event #	<u>7 & 8</u>	Page	<u>12</u>	of	<u>15</u>
Event Description: <u>Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling</u>									
Time	Position	Applicant's Actions or Behavior							

Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling - continued		
	ATC	Recognize Makeup Pump 1 has tripped <ul style="list-style-type: none"> 2-1-B MUP 1 LUBE OIL PRESS LO
	SRO	Go to Attachment 4 for aligning MU/HPI/PORV Cooling
*Critical Task	ATC	*Trip all but one RCP NOTE: RCP 2-2 left running to maximize spray flow
*Critical Task	ATC	Implement Attachment 8, Place MU/HPI/LPI in Service <ul style="list-style-type: none"> *Start/Verify running both CCW Pumps *Start both HPI Pumps *Open HP 2A, HP 2B, HP 2C and HP 2D *Start both LPI Pumps *Open DH 64 *Open DH 63 Transfer MU Pump 1 suction to the BWST- MU6405 - not critical since MUP 1 is not running *Transfer MU Pump 2 Suction to the BWST- MU3971 *Set Pressurizer Level Controller to 100 inches
*Critical Task	ATC	*Place all PZR Heaters in OFF
*Critical Task	ATC	Lock MU Pump suctions on the BWST <ul style="list-style-type: none"> MU 6405 - not critical since MUP 1 is not running *MU 3971
*Critical Task	ATC	*Close MU6409
*Critical Task	ATC	*Open MU6420
	ATC	Verify Open MU6422

Op Test No.:	<u>2018</u>	Scenario #	<u>2</u>	Event #	<u>7 & 8</u>	Page	<u>13</u>	of	<u>15</u>
Event Description: <u>Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling</u>									
Time	Position	Applicant's Actions or Behavior							

Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling - continued		
	ATC	Close MU6407 - not critical since MUP 1 is not running
*Critical Task	ATC	*Close MU6406
	ATC	Verify RC11 is open
*Critical Task	ATC	*Lock open the PORV
	SRO/ATC	Specific Rule 6 check for EDGs running on SFAS initiate: <ul style="list-style-type: none"> • Check for EDGs running and proper cooling
*Critical Task	ATC	Open Loop 1 High Point Vents <ul style="list-style-type: none"> • *RC4608B • *RC4608A
*Critical Task	ATC	Open Loop 2 High Point Vents <ul style="list-style-type: none"> • *RC4610B • *RC4610A
*Critical Task	ATC	Open PZR High Point Vents <ul style="list-style-type: none"> • *RC200 • *RC239A
	CREW	Check for entry into PTS Criteria, REFER to Specific Rule 5
	ATC	Close either of the following to isolate letdown: <ul style="list-style-type: none"> • MU2B, LETDOWN ISO • MU3, LETDOWN CLRS OUTLET

Op Test No.: <u>2018</u> Scenario # <u>2</u> Event # <u>7 & 8</u> Page <u>14</u> of <u>15</u>		
Event Description: <u>Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling</u>		
Time	Position	Applicant's Actions or Behavior

Loss of all Feedwater/ATWS/Initiate MU//HPI/PORV Cooling - continued		
	ATC	Prevent transfer of CTMT Normal Sump to the Auxiliary Building by performing the following: <ul style="list-style-type: none"> Close DR 2012A, CTMT NORMAL SUMP Close DR 2012B, CTMT NORMAL SUMP
	SRO	GO TO Section 12, MU/HPI PORV Cooldown
NOTE: If subcooling margin is lost prior to terminating the scenario a new Critical Task will be developed to stop the remaining Reactor Coolant Pump per Specific Rule 2, Actions for loss of Subcooling Margin		
When MU/HPI/PORV cooling is in progress and at Lead Evaluators discretion the scenario can be terminated		

Justification for Critical Tasks

A. Shutdown the Reactor - ATWS (CT-24)

When Main Feedwater is lost the Reactor will fail to trip by either automatically, the Reactor trip pushbuttons or the CRDM Key switch. This will require 480V Unit Substations E2 and F2 to be momentarily de-energized to shut down the reactor

B. Establish MU/HPI Cooling (CT-14)

MU/HPI cooling is required to be established immediately when only one makeup pump is available during a loss of all feedwater. Establishing MU/HPI cooling will prevent the RCS pressure from exceeding the shut off head of the HPI pump.

SIMULATOR SETUP INFORMATION

1. Simulator Setup

- a) 100% Power
- b) Loss of MFPT Runback fails
- c) ATWS (require de-energize E2/F2)
- d) AFPT 1 trips 10 minutes following reactor trip
- e) MDFP fails to start
- f) STBY MUP trips on low oil pressure 1 minute after start
- g) EFW Pump OOS

2. Procedures

- a) DB-OP-06001, Boron Concentration Control
- b) DB-OP-02005, Primary Instrumentation Alarm Panel
- c) DB-OP-02505, NI Failures
- d) DB-OP-06403, Reactor Protective System (RPS) and Nuclear Instrumentation (NI) Operating Procedure
- e) DB-OP-02513, Pressurizer System Abnormal Operations
- f) DB-OP-02012, STM GEN/SFRCS Alarm Panel
- g) DB-OP-02525, Steam Leaks
- h) DB-OP-06401, Integrated Control System Operating Procedure
- i) DB-OP-02010, Feedwater Alarm Panel
- j) DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture

2) For Simulator Instructor:

- a) None
- b)

Facility:	Davis-Besse	Scenario No.:	3	Op Test No.:	DB NRC 2018
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	ATC	
	_____		_____	BOP	
Initial Conditions:	<ul style="list-style-type: none"> 70% Power RCP 1-1 shutdown due to high vibrations (3 days ago) 				
Turnover: Maintain 70% Power					
Planned: Swap Main Feed Pump Turbine Main Oil Pumps per the Monthly Activity Log					
Critical tasks: 1. Isolate RCS Leak Path (CT-3)					
2. Minimize SCM (CT-7)					
Event No.	Malfunction No.	Event Type*	Event Description		
1		N-BOP/SRO	Swap MFPT Main Oil Pumps		
2		C-BOP/SRO	Main Seal Oil Pump Shaft Shear		
3		C-ATC/SRO (TS)	PORV fails open		
4		C-BOP/SRO	TPCW Pump High Bearing Temperature		
5		R-ATC/SRO (TS)	Steam Generator Tube Leak		
6		C-ATC/SRO	Loss of ICS DC – Trip Reactor		
7		Major	Steam Generator Tube Rupture		
8		C-ATC/SRO	Pressurizer Spray and Block Valves Fail Open		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

DAVIS-BESSE 2018 NRC SCENARIO 3

The Crew will take the watch with power at 70% and RCP 1-1 shutdown three days ago due to high vibrations. Following shift turnover the Crew will swap running Main Feed Pump Turbine Main Oil Pumps as required by the Monthly Activity Log (event 1).

After the MFPT Oil Pumps are swapped the Lead Evaluator will cue the Main Seal Oil Pump shaft shear. The Emergency Seal Oil Pump (ESOP) will Auto start, but the Main Seal Oil pump will continue to run. The crew will respond to ESOP Annunciator(s) 16-1-H. An EO will be sent to investigate and report a Main Seal Oil Pump shaft shear. The BOP will turn off the Main Seal Oil Pump. (event 2).

When the Main Seal Oil Pump is stopped the Lead Evaluator will cue the PORV to fail open. The crew will respond with immediate actions to isolate the PORV IAW DB-OP-02513, PRESSURIZER SYSTEM ABNORMAL OPERATION (CT-3). The SRO will declare the PORV Inoperable, enter T.S. 3.4.11 Condition A, and direct opening breaker BE1602 for RC11, PORV Block Valve (event 3).

The Lead Evaluator will cue #1 TPCW pump upper motor bearing high oil temperature requiring pump shutdown and start of standby pump. The crew will diagnose the trend and shutdown #1 TPCW Pump and start the standby TPCW Pump. The system procedure may be used to swap pumps or the abnormal may be used after stopping #1 TPCW Pump (event 4).

The Lead Evaluator will then cue indications of a tube leak in #2 Steam Generator (approximately 25 gpm). The crew will respond to annunciator 12-1-B, MN STM LINE 2 RAD HI, in accordance with DB-OP-06012, STM GEN/SFRCS Alarm Panel 12 Annunciator and then enter DB-OP-02531, STEAM GENERATOR TUBE LEAK. The crew will evaluate the SG leakage and determine the leak rate is in excess of T.S. 3.4.13 (TS) and start a rapid shutdown (event 5).

When a rapid shutdown is in progress the Lead Evaluator will cue a loss of ICS DC power which will require the crew to implement immediate actions of DB-OP-02532 and trip the reactor and manually initiate and isolate SFRCS. The crew will then implement the Emergency Procedure DB-OP-02000 (event 6).

After the Reactor is tripped **the Lead Evaluator will cue the** tube leak **to** increase to a tube rupture at approximately **400** gpm. The Unit Supervisor will implement the Emergency Procedure by routing to section 8 for Steam Generator Tube Rupture. (event 7)

The BOP will control RCS temperature using the AVVs and the ATC will begin depressurizing the Reactor Coolant System to minimum subcooling margin (CT-7). When the RCS spray valve is opened it will fail and the spray valve block valve will also fail to close. The SRO will direct the ATC to shut down the loop 2 RCP **2-2** and **RCP 2-1** to reduce spray flow to zero per DB-OP-02000, Table 5 or DB-OP- 02513, Pressurizer Abnormal Attachment 1 (event 8).

When the RCS Pressure reduction is controlled the scenario can be terminated.

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>3</u>	of	<u>15</u>
Event Description: Swap running MFPT Main Oil Pumps									
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> PI 1206 Lube Oil System HDR Pressure 		
	SRO	Direct BOP to swap running MFPT 1 and 2 Main Oil Pumps as directed by the Monthly Activity Log per DB-OP-06224, Main Feed Pump and Turbine, sections 3.23 and 3.24
	BOP	Swap MFPT 1 Main Oil Pumps
	BOP	Verify Equipment Operator standing by to monitor oil pressures
	BOP	<ol style="list-style-type: none"> 1. Start MFPT 1 Main Oil Pump 2, using HIS 1198 MAIN FEED PUMP 1 Main Oil Pump 2 2. Stop MFPT 1 Main Oil Pump 1, using HIS 1195, MAIN FEED PUMP 1 Main Oil Pump 1
	BOP	NOTE: Contacts Equipment Operator for local indications Check MFPT 1 Main Oil Pump pressure indications: <ul style="list-style-type: none"> • PI 1194 Hydraulic Oil Pressure is > 200 PSIG • PI 1216 Turbine Bearing Oil Pressure is > 10 PSIG • PI 1207 Pump Bearing Oil Pressure is > 10 PSIG • PI 2650 Control Oil Pressure is 52.5 – 62.5 PSIG • PI 1206 Lube Oil System HDR Pressure (CTRM) is between 10 and 16 PSIG
	Booth Cue	<i>"PI 1194 indicates 238 psig. PI 1216 indicates 12 psig. PI 1207 indicates 12 psig PI 2650 indicates 55 psig."</i>
	BOP	Verify the available MFPT 1 Main Oil Pumps are in AUTO START: <ul style="list-style-type: none"> • HIS 1195, MAIN FEED PUMP 1 Main Oil Pump 1 • HIS 1198, MAIN FEED PUMP 1 Main Oil Pump 2
	BOP	Swap MFPT 2 Main Oil Pumps

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>1</u>	Page	<u>4</u>	of	<u>15</u>
Event Description: Swap running MFPT Main Oil Pumps									
Time	Position	Applicant's Actions or Behavior							

Swap MFPT Main Oil Pumps - continued		
	BOP	Verify Equipment Operator standing by to monitor oil pressures
	BOP	<ol style="list-style-type: none"> 1. Start MFPT 2 Main Oil Pump 1, using HIS 1236, MAIN FEED PUMP 2 Main Oil Pump 1 2. Stop MFPT 2 Main Oil Pump 2, using HIS 1247, MAIN FEED PUMP 2 Main Oil Pump 2
	BOP	NOTE: Contacts Equipment Operator for local indications Check MFPT 1 Main Oil Pump pressure indications: <ul style="list-style-type: none"> • PI 1246 Hydraulic Oil Pressure is > 200 PSIG • PI 1259 Turbine Bearing Oil Pressure is > 10 PSIG • PI 1257 Pump Bearing Oil Pressure is > 10 PSIG • PI 2630 Control Oil Pressure is 52.5 – 62.5 PSIG • PI 1256 Lube Oil System HDR Pressure (CTRM) is between 10 and 16 PSIG
	Booth Cue	<i>“PI 1246 indicates 238 psig. PI 1259 indicates 12 psig. PI 1257 indicates 12 psig PI 2630 indicates 55 psig.”</i>
	BOP	Verify the available MFPT 2 Main Oil Pumps are in AUTO START: <ul style="list-style-type: none"> • HIS 1236, MAIN FEED PUMP 1 Main Oil Pump 1 • HIS 1247, MAIN FEED PUMP 1 Main Oil Pump 2
Proceed to Event 2, Main Seal Oil Pump shaft shears		

Indications Available:		
<ul style="list-style-type: none"> 16-1-H ESOP ON 16-2-H Seal Oil ΔP 		
	CREW	Recognize indications
	SRO	Implements DB-OP-02016, Generator Alarm Panel 16 Annunciators
	CREW	Dispatch an Operator to the Seal Oil Room to Investigate
	BOOTH CUE	<i>Role play as Equipment Operator to report: “The Main Seal Oil Pump shaft is sheared. (if asked) ESOP parameters are normal.</i>
	BOP	Stop Main Seal Oil Pump
	SRO	Refer to DB-OP-02035, Generator Seal Oil Alarm Panel 35 Annunciators
	SRO	Direct removal of the Seal Oil Vacuum Tank from service
Proceed to Event 3, PORV Fails Open		

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>6</u>	of	<u>15</u>
Event Description: PORV Fails Open									
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> • (4-1 -D) PZR RLF VLV OPEN • (4-2-D) PZR QUENCH TK PRESS HI • (4-3-D) PZR QUENCH TK LVL HI 		
	CREW	Identify that the PORV has failed OPEN
	ATC	Take actions to Isolate the PORV to prevent a reactor trip
*Critical Task	ATC	*Close RC11, PORV Block, using HISRC11
	CREW	Monitor plant indications for isolation of the PORV
	SRO	Implement DB-OP-02513, Pressurizer Systems Abnormal Operating Procedure Section 4.4 Leaking PORV
	SRO	Refer to Tech Spec 3.4.11 Pressurizer Pilot Operated Relief Valve (PORV) <ul style="list-style-type: none"> • Declare PORV INOPERABLE • Enter 3.4.11 Condition A • Remove power from PORV Block valve
	Booth Cue	Role play opening BE1602 for PORV Block Valve
	SRO	Refer to Tech Specs 3.4.13, RCS Operational Leakage, and TRM 8.4.4, Reactor Coolant System Vents – No entry required

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>3</u>	Page	<u>7</u>	of	<u>15</u>
Event Description: PORV Fails Open									
Time	Position	Applicant's Actions or Behavior							

PORV Fails Open Event 3 continued		
	Note	DNBR Tech Spec 3.4.1 may be entered and exited during this scenario
	ATC	Verify proper Quench Tank operation. Refer to DB-OP-06004, Quench Tank
	SRO	<p>Notify Shift Manager to consult with Plant Management as necessary to confirm that normal operation may continue:</p> <ul style="list-style-type: none"> • REFER TO Technical Requirements Manual for Reactor Coolant System Vents 8.4.4 and determine Conditions met due to RC239A and RC200 available • REFER TO DB-OP-00002, Operations Section Event/Incident Notifications and Actions • REFER TO DB-OP-01200, Reactor Coolant System Leakage Management • REFER TO NOP-OP-1010, Operational Decision Making • REFER TO DB-OP-06003, Pressurizer System Operations (Operation with PORV Block closed)
Procced to Event 4, TPCW High bearing temperature		

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>4</u>	Page	<u>8</u>	of	<u>15</u>
Event Description: TPCW High bearing temperature									
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- **T159 TPCW Pump 1 Upper Motor Bearing Oil Temperature**

	CREW	Recognize computer alarm T159 indicating high temperature TPCW Pump 1 Upper Motor Bearing Oil Temperature
	BOP	Dispatch Equipment Operator to evaluate TPCW Pump 1
	Booth Cue	<i>Equipment Operator reports:</i> <i>"There is no oil level indicated in TPCW Pump 1 upper motor bearing sight glass and there is a loud sound appearing to come from the bearing"</i>
	SRO	Direct stopping TPCW Pump 1
	BOP	Stop TPCW Pump 1 using HIS627
	SRO	Direct placing TPCW Pump 3 in service per DB-OP-06263, Turbine Plant Cooling Water Operating Procedure NOTE: Abnormal Procedure DB-OP-02514, TURBINE PLANT COOLING WATER MALFUNCTIONS may be entered by the crew which will provide guidance to start the standby pump
		NOTE: Starting standby TPCW Pump not required prior to continuing with scenario.
	BOP	Start TPCW Pump 3 using HIS629
Proceed to Event 5, Steam Generator Tube Leak		

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>5</u>	Page	<u>9</u>	of	<u>15</u>
Event Description: Steam Generator Tube Leak									
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- **Annunciator 9-4-A VAC SYS DISCH RAD HI**
- **Annunciator 12-1-B MN STM LINE 2 RAD HI**
- **Increasing Makeup flow**

	Crew	Recognize indications of a SG tube leak <ul style="list-style-type: none"> • Annunciator 9-4-A VAC SYS DISCH RAD HI • Annunciator 12-1-B MN STM LINE 2 RAD HI • Increasing Makeup flow
	SRO	Route to DB-OP-02531, Steam Generator Tube Leak
	ATC	Calculate a leak rate (~25 gpm). REFER to Attachment 1, Steam Generator Tube Leak Calculation
	Crew	Determine SG 2 has the tube leak (~25 gpm) Note: If >50 gpm is calculated the crew will route to OP2000
	SRO	Notify SM to refer to EP Classification, Offsite Dose assessment, and notification requirements
	SRO	Enter TS 3.4.13, RCS Operational Leakage, Condition B for primary to secondary leakage Enter TS 3.4.17, SG Tube Integrity, Condition B
	SRO	Direct a plant shutdown per DB-OP-02504, Rapid Shutdown, Attachment 1, Power Reduction Actions ICS Full Automatic
	ATC	Begin plant shutdown <ul style="list-style-type: none"> • Set rate of change as directed • Select target Power – 20% RTP for Low level limits • Monitor Power

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>5</u>	Page	<u>10</u>	of	<u>15</u>
Event Description: Steam Generator Tube Leak									
Time	Position	Applicant's Actions or Behavior							

Steam Generator Tube Leak, Event 5 continued		
	SRO	Direct BOP to perform Attachment 6, BOP Actions
	SRO	Notify EOs to commence Attachment 15, Field Actions
	SRO/RO	<p>Review/Direct DB-OP-02504, Attachment 16, Three Reactor Coolant Pump Operation:</p> <ul style="list-style-type: none"> Set the minimum load limit on the load control panel to 13% during 3 RCP operation Prior to the first SG going on Low Level Limits, verify the S/G LOAD RATIO H/A station is in HAND with a demand of 0°F ΔTc The SG in the Loop with 1 running RCP will go on Low Level Limits at ~ 40% RTP. This will result in an increase in ΔTc as power reduction continues. Once the second Steam Generator goes on Low Level Limit control, at ~ 22% RTP, the ΔTc will begin to reduce toward zero as power reduction continues Power Range Nuclear Instruments may vary significantly from actual power during power reduction. A core tilt will exist due to ΔTc once the first Steam Generator reaches Low Level Limit Control. Monitor NI's, Core ΔT, and Feedwater flow.
	SRO	Notify Load Dispatcher
	SRO	Notify Chemistry to monitor polisher operation and sample for isotopic analysis of iodine per TS 3.4.16
	SRO	Notify SM to complete required notifications
When Tech Spec has been declared and desired reactivity manipulation has been observed proceed to Events 6, 7 & 8, Loss of ICS DC, SGTR and Spray Failure		

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 & 8</u>	Page	<u>11</u>	of	<u>15</u>
Event Description: Loss of ICS DC, SGTR and Pressurizer Spray and Block Failure									
Time	Position	Applicant's Actions or Behavior							

Indications Available:

- ICS IN TRACK (14-6-D)
- ICS 24 VDC BUS TRIP (14-1-C)
- ICS H/A Station Lights OFF

	CREW	Recognize a loss of ICS DC Power <ul style="list-style-type: none"> • ICS IN TRACK (14-6-D) • ICS 24 VDC BUS TRIP (14-1-C) • ICS H/A Station Lights OFF
	ATC	Implement immediate actions per DB-OP-02532, Loss of ICS power: <ul style="list-style-type: none"> • Trip the Reactor • Verify power decreasing • Trip the turbine
	ATC	Manually actuate initiate & isolation of SFRCS
	SRO	Implement DB-OP-02000
	SRO/ATC	Verify immediate actions: <ul style="list-style-type: none"> • Trip the Reactor • Verify power decreasing • Trip the turbine • Verify all Turbine Stop Valves OR Control Valves are closed
	CREW	Check for Specific Rule or Symptom Direction
	CREW	Check for Symptom Mitigation section implementation
Note: When pressurizer level is recovering from the reactor trip the lead evaluator SG leak will increase to a tube rupture when reactor		
	CREW	Recognize increase in leak rate indicates a SG Tube Rupture <ul style="list-style-type: none"> • Increased MU Flow • Lower than expected AFW Flow

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 & 8</u>	Page	<u>12</u>	of	<u>15</u>
Event Description: Loss of ICS DC, SGTR and Pressurizer Spray and Block Failure									
Time	Position	Applicant's Actions or Behavior							

SGTR and Pressurizer Spray and Block Failure events continued		
	SRO	Route to DB-OP-02000, Section 8
	ATC/BOP	Implement Attachment 8, Place MU/HPI/LPI in Service <ul style="list-style-type: none"> • Start/Verify running both CCW Pumps • Start/Verify running both HPI Pumps • Verify open HP 2A, HP 2B, HP 2C and HP 2D • Start both LPI Pumps • Open DH 64 and DH 63 • Transfer MU Pump suctions to the BWST • Set Pressurizer level to 100 Inches
	SRO	Verify DB-OP-02531 Attachments are in progress <ul style="list-style-type: none"> • Direct Chemistry to perform Attachment 2 • Direct Radiation Protection to perform Attachment 3 • Direct an Equipment Operator/Field Supervisor to perform Attachment 4
	BOP	If the Aux Boiler is running then direct an Equipment Operator/Field Supervisor to transfer Aux Steam and Gland Steam to the Aux Boiler
	ATC	Turn off all Pressurizer heaters
	SRO	Route to step 8.40
	ATC	Use Pressurizer Spray to reduce RCS pressure to Minimize Subcooling Margin
	ATC	When directed use Pressurizer Spray to reduce RCS pressure to maintain minimum adequate subcooling margin <ul style="list-style-type: none"> • Verify RC10 PZR Spray Block Valve is open • Open RC2 PZR Spray Valve • Cycle RC2 and control PZR Heaters as necessary to maintain RCS Pressure

Op Test No.:	<u>2018</u>	Scenario #	<u>3</u>	Event #	<u>6, 7 & 8</u>	Page	<u>13</u>	of	<u>15</u>
Event Description: Loss of ICS DC, SGTR and Pressurizer Spray and Block Failure									
Time	Position	Applicant's Actions or Behavior							

SGTR and Pressurizer Spray and Block Failure events continued		
	ATC	Block SFAS low RCS pressure trips
	ATC	Control MU/HPI to maintain Pressurizer level 80 to 120 inches
	BOP	Begin a RCS cooldown using the Atmospheric Vent Valves <ul style="list-style-type: none"> Open AVVs to achieve 100 °F/hr C/D rate
	ATC	Recognize RC2, Pressurizer Spray Valve fails to close
	ATC	Attempt to close RC10 PZR Spray Block Valve <ul style="list-style-type: none"> Determine RC10 is failed open
	SRO	Direct stopping RCPs to reduce spray flow. Refer to one of the following for PZR Spray Flow vs RCP combination: <ul style="list-style-type: none"> Attachment 1 of DB-OP-02513, PZR System Abnormal Table 5, DB-OP-02000 RPS, SFAS, SFRCS Trip or SG Tube Rupture
	SRO	Note: One RCP in Loop 1 and 0 RCPs in loop 2 equates to 0% of full spray flow. Stopping all RCPs would also result in 0% spray flow but is not preferred Direct stopping RCPs to leave a maximum of 1 RCP in RCS Loop 1
*Critical Task	ATC	*Stop pressure reduction by stopping RCPs as directed to result in 0% Pressurizer spray flow
When 0% Pressurizer spray flow has been achieved following Spray malfunction the scenario can be terminated		

Justification for Critical Tasks

A. Isolate RCS Leak Path (CT-3)

When the PORV fails open it will become an RCS leak path which must be isolated by closing the PORV Block valve

B. Minimize SCM (CT-7)

The Pressurizer spray valve will be required to be open to reduce RCS pressure to allow for isolation of the Steam Generator with the tube rupture. When pressure control is attempted the spray valve and the spray block valve will be failed open requiring the RCP running pump combination to be reduced to one RCP in RCS Loop 1 or less to achieve 0% spray flow and stop the pressure reduction

SIMULATOR SETUP INFORMATION

1. Simulator Setup

- a) 70% Power
- b) RCP 1-1 OOS
- c) MFPT 1 Main Oil Pump 1 in service
- d) MFPT 2 Main Oil Pump 2 in service
- e) TPCW Pump 1 in service
- f) RC2 fails open when opened for pressure reduction and RC10 is failed open
 - LIZ28API≤90%&& Red Light On Spray Valve ==1
(add label to make spray valve and block valve fail open)
- g) EFW OOS

2. Procedures

- a) DB-OP-06224, Main Feed Pump and Turbine
 - b) DB-OP-02016, Generator Alarm Panel 16
 - c) DB-OP-02035, Generator Seal Oil Alarm Panel 35
 - d) DB-OP-02513, Pressurizer Systems Abnormal Operating Procedure
 - e) DB-OP-06004, Quench Tank
 - f) DB-OP-06003, Pressurizer System Operations
 - g) DB-OP-06263, Turbine Plant Cooling Water Operating Procedure
 - h) DB-OP-02514, Turbine Plant Cooling Water Malfunctions
 - i) DB-OP-02531, Steam Generator Tube Leak
 - j) DB-OP-02504, Rapid Shutdown
 - k) DB-OP-02532, Loss of ICS power
 - l) DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
- 2) For Simulator Instructor:
- a) None
 - b)