Facility: Davis-Besse NPS Scenario No.: 2 Op-Test No.: 1, 2, and 3

Examiners: _____ Operators: _____

Initial Conditions: 100% Reactor Power, Makeup Pump 1 Out of Service

Turnover: _____

Event No.	Malf. No.	Event Type*	Event Description
1	L616O	I (BOP)	Safety Features Actuation System RCS pressure transmitter fails high (Tech. Spec.)
2	FAKMD	C (BOP)	High Pressure Feedwater Heater tube leak
3	-----	R (RO)	Power reduction
4	G530A	C (SRO)	EDG 1 Trouble Alarm (Tech. Spec.)
5	L1T2V or L1T2N	I (BOP)	Main Steam Header Pressure transmitter fails mid-scale
6	HH46	C (RO)	Small RCS leak
7	-----	R (RO)	Power reduction
8	F41S1595	-------	Loss of all Condensate Pumps
9	L4, L8	C (RO)	ATWS
10	FKM1D	C (BOP)	Auxiliary Feedwater Target Rock Valve fails open
11	HH46	M (All)	Small Break LOCA

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

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 1 Page 1 of 1

Event Description: Safety Features Actuation System (SFAS) RCS pressure transmitter fails high which requires the SFAS channel to be tripped to comply with Tech Specs

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a RCS pressure transmitter failure - Annunciator Alarm 5-4-C, SFAS RC PRESS HI FAIL - SFAS Channel 2 RCS pressure indicators fail high - SFAS RCS Pressure Hi Failure Bistable trips
	SRO	Determine if SFAS Channel is operable - Direct the RO/BOP to perform a channel check per DB-OP-03006, Miscellaneous Instrument Shift Check
	RO/BOP	Perform a SFAS channel check per SRO direction - Determine the difference in the RCS pressure is greater than the maximum allowable
	SRO	Refer to Tech Spec 3.3.2.1, Action 10 and take actions for an inoperable SFAS channel per DB-OP-06405, Safety Features Actuation System Procedure Refer to Tech Spec 3.3.3.6 for less than two operable RCS pressure indications for RCS Loop 2
	RO/BOP	Perform actions per DB-OP-06405, Section 4.1 - Determine the SFAS bistable required to be tripped - Depress the TEST pushbutton on bistables 206 and 204 - Verify the appropriate 1/5 lights are lit in all four SFAS channels

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 2, 3 Page 1 of 1

Event Description: After SFAS Channel 2 is tripped a tube leak will develop in High Pressure Feedwater (HPFW) Heater 1-4 which forces a power reduction to remove the HPFW Heater string from service.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a tube leak in HPFW heater 1-4 - Annunciator Alarm13-6-E, HP FW HTR 1-4 LVL - HPFW Heater level increase - Computer Alarm L454, HP HEATER 1-4 HIGH LEVEL ALARM
	SRO	Direct RO/BOP actions per DB-OP-02013, Condensate Feedwater Alarm Panel 13 Annunciators and DB-OP-06229, High Pressure Feedwater Heater System Operation - Direct an Equipment Operator to check HPFW Heater level locally - Initiate a power reduction to 95% per DB-OP-02504, Rapid Shutdown or DB-OP-06902, Power Operations - Notify the System Dispatcher - On the Load Control Panel, set Rate of Change - On the Load Control Panel, set Min Limit-MW to 180 MWE - Lower unit load to 95% power - Isolate HPFW Heater train 1 per DB-OP-06229, High Pressure Feedwater Heater System Operation, section 5.1 - Throttle open FW 460, HP Htr Trains Bypass while closing FW 448 and FW 440, HP Heater Trains Isolation valves - Close ES 2014, Ext Stm to HP Htrs Iso Train 1 - Verify open ES 252, Feedwater Heater-Ext Stm Line Drains Train 1 - Direct an Equipment Operator to locally isolate HPFW Heater Train 1 using Attachment 10 of DB-OP-06229
	RO/BOP	Execute procedure actions per SRO direction
	BOP	Monitor feedwater flow and throttle FW 460 as necessary

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 4 Page 1 of 1

Event Description: Emergency Diesel Generator (EDG) 1 annunciator alarms. Investigation of the annunciator leads to declaring the EDG inoperable due to a blown fuse.

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Recognize indications of a problem with EDG 1 - Annunciator 1-1-A, EDG 1 TRBL
	SRO	Perform actions per DB-OP-02001, Electrical Distribution Alarm Panel 1 Annunciators - Direct a Equipment Operator to investigate the annunciator alarm using DB-OP-2043, EDG 1 Alarm Panel Annunciators - After the Equipment Operator reports the blown fuse light for the DC Motor Driven Fuel Oil Pump, refer to Attachment 13 of DB-OP-06316, Diesel Generator Operating Procedure - Recognize EDG 1 is inoperable and refer to Tech Spec 3.8.1.1 - May recommend or direct starting the EDG to return to operable status

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 5 Page 1 of 1

Event Description: The selected steam header pressure transmitter will fail mid-scale requiring manual control of the Main Turbine until the alternate transmitter is selected

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a steam header pressure transmitter failure - Turbine control valves going open - SG pressure decreasing - Actual header pressure decreasing - Annunciator alarm 14-4-E, ICS INPUT MISMATCH
	SRO	Direct RO/BOP actions per DB-OP-02014, MSR/ICS Alarm Panel 14 Annunciators, DB-OP-06407, Non Nuclear Instrumentation System Operating Procedure and DB-OP-06401, Integrated Control System Operating Procedure - Determine which instrument pair has caused the mismatch - Reset the SASS annunciator - Place the affected ICS Hand/Auto stations in HAND and control parameters manually - EHC Control Panel - Steam Generator/Reactor Demand -Turbine Bypass Valves - Atmospheric Vent Valves - Select the good header pressure transmitter - Raise header pressure with the Turbine in manual - Return the ICS stations to automatic
	RO/BOP	Execute alarm procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 6,7 Page 1 of 2

Event Description: After ICS is returned to automatic a small RCS leak (≈ 150 gpm) will require a plant shutdown.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of an RCS leak - Makeup Tank (MUT) level dropping - Makeup flow rising - Containment sump level rising - Containment Radiation levels rising - Pressurizer level lowering
	SRO	Direct RO actions per DB-OP-02522, Small RCS Leaks - Verify Pressurizer level is NOT being maintained - Isolate Letdown by closing MU 2B, Letdown Isolation - Monitor Pressurizer level - Monitor MUT level (Crew may swap to the BWST) - Calculate the leak rate using Attachment 1 of DB-OP-02522 - Locate the leak - Attempt to isolate the leak using Attachment 2 of DB-OP-02522 - Close RC 11, Pressurizer PORV Block - Close RC 2, Spray Valve - Close RC 10, Spray Block Valve - Verify closed RC 239A and RC 239B, Pressurizer sample valves - Verify closed RC 4608A, RC 4608B, RC 4610A and RC4610B, RCS high point vents - Verify closed RC 4632, RC Cold Leg Loop 2-1 Determine the leak is not in the Makeup system Determine the leak is not in the Letdown system Commence a plant shutdown
	RO	Execute abnormal procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 6,7 Page 2 of 2

Event Description: Events 5,6 continued

Time	Position	Applicant's Actions or Behavior

	SRO	Supervise/coordinate the power reduction per DB-OP-02504, Rapid Shutdown
		- Notify the System Dispatcher
		- At the Load Control Panel, set the Rate of Change
		- At the Load Control Panel, set the Min Limit
		- Lower unit load
		- Control core imbalance with axial power shaping rods (APSR)
		- Request Chemistry monitor condensate polishers and sample the RCS
		- If time permits
		  - Transfer station electrical loads
		  - Lineup the Motor Driven Feed Pump in the Main Feedwater mode
		  - Start the Auxiliary Boiler
		  - Maintain MUT level 55 to 86 inches
		- Direct an Equipment Operator to remove AFPT minimum flow lines from service

	RO/BOP	Execute abnormal procedure action per SRO direction - Coordinate to initiate the power reduction
	SRO	Direct the initiation of Makeup/High Pressure Injection piggyback operation per DB-OP-02522 - Verify MU 6405 and MU 3971, MUP Three-Way Suction Valves, are in the BWST position - Start the standby Component Cooling Water (CCW) Pump - Start both High Pressure Injection (HPI) Pumps - Open HP 2A, HP2B, HP2C and HP2D, HPI Injection Valves - Start both Low Pressure Injection (LPI) Pumps - Open DH 63 and DH 64, Decay Heat Cooler Outlet to HPI Pump Suction valves
	RO/BOP	Execute abnormal procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 8, 9 Page 1 of 1

Event Description: A loss of all Condensate Pumps will occur and require a reactor trip and manual initiation of the Steam Feed Rupture Control System (SFRCS). The control rods will fail to insert requiring the Reactor Operator to perform the actions for an ATWS.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize a loss of all Condensate Pumps - Annunciator Alarm13-2-B, CNDS PMP DISCH HDR PRESS - Annunciator Alarm 13-4-C, DEAR STRG TK 1 LVL - Annunciator Alarm 13-4-D, DEAR STRG TK 2 LVL - Decreasing Condensate flow - No Condensate Pumps running

	SRO	Direct RO/BOP actions per DB-OP-02013, Condensate Feedwater Alarm Panel 13 Annunciators
		- Determine Condensate header pressure is low
		- Determine Deaerator Storage Tank (DST) level is low
		- When DST level approaches off-scale low then:
		  - Manually trip the reactor
		  - Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
		  - Trip both Main Feedwater Pumps
		  - Initiate SFRCS

	RO	Perform DB-OP-02000 immediate actions: - Recognize the control rods did not insert on the manual Reactor trip - *Momentarily de-energize 480 VAC unit substations E2 and F2 simultaneously - Verify control rods inserted - Verify power is lowering on the Intermediate Range - Manually trip the turbine - Verify the Main Turbine Stop or Control valves are closed

* Critical Task

Op-Test No.: 1,2,3 Scenario No.: 2 Event No.: 10,11 Page 1 of 1

Event Description: After the reactor is tripped, the RCS leak will increase in size leading to a loss of subcooling margin. AF 6451, Auxiliary Feedwater Pump 2 Discharge Valve, will fail open causing an overfeed of SG 2 (OR SG 1 if a low pressure SFRCS trip has occurred on SG 2)

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a loss of subcooling margin - TSAT meters indicate less than 20ºF - Annunciator alarm 4-1-B, SUBCOOL MARGIN LO
	SRO	Direct RO actions per section 5 of DB-OP-02000 - *Trip all Reactor Coolant Pumps - Verify both CCW trains are in service - Verify both HPI Pumps are running - Verify all HPI injection line valves are open - Lock MUP suctions to the BWST - Start both LPI Pumps - Open MU 6420 - Verify MU 6422 is open - Open DH 63 and DH 64 - Verify proper SFAS response
	RO	Execute EOP actions per SRO direction
	SRO	Direct BOP actions per section 5 of DB-OP-02000 - Verify proper SFRCS response - Verify proper SG level control by AFW
	BOP	Execute EOP actions per SRO direction - Recognize indications of a SG 2 (1) overfill due to AF 6451 failed open
	SRO	Direct BOP actions per section 7 of DB-OP-02000 - *Stop the SG 2 (1) overfill by taking manual control of AFW - Reduce AFPT 2 speed OR - Close AF 599 (AF 608) OR - Close AF 3872 (AF 3871) - Manually control SG 2 (1) level
	BOP	Execute EOP actions per SRO direction

*Critical Task

Simulator Instructions

Scenario No.: _04 - 2__

1. Initialize at 100% power (IC 04-2 scen2)

2. Equipment Status

    a. Tagout Makeup Pump 1

        - Place caution tags on MUP 1 control switch

        - Place caution tags on MUP 1 Oil Pumps control switches

    b. Make the following entries on the Tech Spec status sheet:
        Makeup Pump 1: Tech Spec 3.1.2.4, Out of service to repair an oil leak.
        Return time is (current date and time + 60 hours)

    c. Hang Protected Train 2 signs

    d. Ensure the Safety Monitor computer program reflects MUP1 out of service

    e. Ensure CCW Pump 1 and Makeup Pump 2 are running

3. Initial Malfunctions (Setup)

    a. Remove MUP 1 from service.

        IRF B2M1A 3.0

        IRF BME5A open

        IRF BME5D open

        IRF BME5I open

    b. Override RPS, ARTS and DSS trips

        IMF L4

        IMF L8

        IMF L5D2

        IMF L5D1

4. Events

a. SFAS Channel 2 RCS Pressure Transmitter fails high

Event 1 - imf l6i6o (1)

b. HPFW Heater 1-4 Tube leak over a 3 minute ramp

Event 2 - imf fakkd (2) 0.5 00:03:00

c. Header Pressure instrument fails mid-scale

Event 5 - imf l1t2n (5) 0.5 00:01:00 0.45

d. RCS leak

Event 6 - imf hh46 (6) 0.0001

e. AFP Target Rock 2 valve fails open (AF 6451)

Event 10 - imf fkm1d (10)

5. CAEP File

a. Event 4 - EDG 1 Trouble Alarm (Enter using Monitor)

set tala111 = 0.01 │06:00:00 │ 1

b. Event 8 - Hotwell Level Switch fails low (Enter using Monitor)

set f4lsl595 = T │ 06:00:00 │ 2

c. Event 11 - RCS leak size increase

mmf hh46 0.0017 │ 6:00:00│3

6. Triggers

a. Event 10 on the Reactor Trip

TRGSET 10 "LIZG1API(1) < 90

7. Instructor Station Cues

Event 1- SFAS Channel 2 Press Transmitter fails high

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called

If called, role play as station management for notifications.

Event 2 - HPFW Heater 1-4 tube leak

Role play as an Equipment Operator to isolate the HPFW heater locally

Event 4 - EDG 1 annunciator

Role play as an Equipment Operator to investigate EDG 1. Report annunciator 43-1-E, BLOWN FUSE is in alarm. The FU3 blue light is not lit.

Role play as station management for notifications.

Event 5 - Main Steam Header pressure failure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called

If called, role play as station management for notifications

Event 6 – Small RCS leak

Role play as the Zone 3 operator to report the Misc. Waste Drain Tank level is increasing and the containment normal sump pumps run time meters show the sump pumps are running.

Facility: Davis-Besse NPS Scenario No.: 2a Op-Test No.: 1, 2, and 3

Examiners: _____ Operators: _____

Initial Conditions: 100% Reactor Power, Makeup Pump 1 Out of Service

Turnover: _____

Event No.	Malf. No.	Event Type*	Event Description
1	L616O	I (BOP)	Safety Features Actuation System RCS pressure transmitter fails high (Tech. Spec.)
~~2~~	~~FAKMD~~	~~C (BOP)~~	~~High Pressure Feedwater Heater tube leak~~ **[NOT used]**
~~3~~	-----	~~R (RO)~~	~~Power reduction~~ **[NOT used]**
4	G530A	C (SRO)	EDG 1 Trouble Alarm (Tech. Spec.)
5	L1T2V or L1T2N	I (BOP)	Main Steam Header Pressure transmitter fails mid-scale
6	HH46	C (RO)	Small RCS leak
7	-----	R (RO)	Power reduction
8	F41S1595	-------	Loss of all Condensate Pumps
9	L4, L8	C (RO)	ATWS
10	FKM1D	C (BOP)	Auxiliary Feedwater Target Rock Valve fails open
11	HH46	M (All)	Small Break LOCA

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

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 1 Page 1 of 1

Event Description: Safety Features Actuation System (SFAS) RCS pressure transmitter fails high which requires the SFAS channel to be tripped to comply with Tech Specs

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a RCS pressure transmitter failure - Annunciator Alarm 5-4-C, SFAS RC PRESS HI FAIL - SFAS Channel 2 RCS pressure indicators fail high - SFAS RCS Pressure Hi Failure Bistable trips
	SRO	Determine if SFAS Channel is operable - Direct the RO/BOP to perform a channel check per DB-OP-03006, Miscellaneous Instrument Shift Check
	RO/BOP	Perform a SFAS channel check per SRO direction - Determine the difference in the RCS pressure is greater than the maximum allowable
	SRO	Refer to Tech Spec 3.3.2.1, Action 10 and take actions for an inoperable SFAS channel per DB-OP-06405, Safety Features Actuation System Procedure Refer to Tech Spec 3.3.3.6 for less than two operable RCS pressure indications for RCS Loop 2
	RO/BOP	Perform actions per DB-OP-06405, Section 4.1 - Determine the SFAS bistable required to be tripped - Depress the TEST pushbutton on bistables 206 and 204 - Verify the appropriate 1/5 lights are lit in all four SFAS channels

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 2, 3 Page 1 of 1

[Events NOT used]

Event Description: After SFAS Channel 2 is tripped a tube leak will develop in High Pressure Feedwater (HPFW) Heater 1-4 which forces a power reduction to remove the HPFW Heater string from service.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a tube leak in HPFW heater 1-4 - Annunciator Alarm13-6-E, HP FW HTR 1-4 LVL - HPFW Heater level increase - Computer Alarm L454, HP HEATER 1-4 HIGH LEVEL ALARM
	SRO	Direct RO/BOP actions per DB-OP-02013, Condensate Feedwater Alarm Panel 13 Annunciators and DB-OP-06229, High Pressure Feedwater Heater System Operation - Direct an Equipment Operator to check HPFW Heater level locally - Initiate a power reduction to 95% per DB-OP-02504, Rapid Shutdown or DB-OP-06902, Power Operations - Notify the System Dispatcher - On the Load Control Panel, set Rate of Change - On the Load Control Panel, set Min Limit-MW to 180 MWE - Lower unit load to 95% power - Isolate HPFW Heater train 1 per DB-OP-06229, High Pressure Feedwater Heater System Operation, section 5.1 - Throttle open FW 460, HP Htr Trains Bypass while closing FW 448 and FW 440, HP Heater Trains Isolation valves - Close ES 2014, Ext Stm to HP Htrs Iso Train 1 - Verify open ES 252, Feedwater Heater-Ext Stm Line Drains Train 1 - Direct an Equipment Operator to locally isolate HPFW Heater Train 1 using Attachment 10 of DB-OP-06229
	RO/BOP	Execute procedure actions per SRO direction
	BOP	Monitor feedwater flow and throttle FW 460 as necessary

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 4 Page 1 of 1

Event Description: Emergency Diesel Generator (EDG) 1 annunciator alarms. Investigation of the annunciator leads to declaring the EDG inoperable due to a blown fuse.

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Recognize indications of a problem with EDG 1 - Annunciator 1-1-A, EDG 1 TRBL
	SRO	Perform actions per DB-OP-02001, Electrical Distribution Alarm Panel 1 Annunciators - Direct a Equipment Operator to investigate the annunciator alarm using DB-OP-2043, EDG 1 Alarm Panel Annunciators - After the Equipment Operator reports the blown fuse light for the DC Motor Driven Fuel Oil Pump, refer to Attachment 13 of DB-OP-06316, Diesel Generator Operating Procedure - Recognize EDG 1 is inoperable and refer to Tech Spec 3.8.1.1 - May recommend or direct starting the EDG to return to operable status

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 5 Page 1 of 1

Event Description: The selected steam header pressure transmitter will fail mid-scale requiring manual control of the Main Turbine until the alternate transmitter is selected

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a steam header pressure transmitter failure - Turbine control valves going open - SG pressure decreasing - Actual header pressure decreasing - Annunciator alarm 14-4-E, ICS INPUT MISMATCH
	SRO	Direct RO/BOP actions per DB-OP-02014, MSR/ICS Alarm Panel 14 Annunciators, DB-OP-06407, Non Nuclear Instrumentation System Operating Procedure and DB-OP-06401, Integrated Control System Operating Procedure - Determine which instrument pair has caused the mismatch - Reset the SASS annunciator - Place the affected ICS Hand/Auto stations in HAND and control parameters manually - EHC Control Panel - Steam Generator/Reactor Demand -Turbine Bypass Valves - Atmospheric Vent Valves - Select the good header pressure transmitter - Raise header pressure with the Turbine in manual - Return the ICS stations to automatic
	RO/BOP	Execute alarm procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 6,7 Page 1 of 2

Event Description: After ICS is returned to automatic a small RCS leak (≈ 150 gpm) will require a plant shutdown.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of an RCS leak - Makeup Tank (MUT) level dropping - Makeup flow rising - Containment sump level rising - Containment Radiation levels rising - Pressurizer level lowering
	SRO	Direct RO actions per DB-OP-02522, Small RCS Leaks - Verify Pressurizer level is NOT being maintained - Isolate Letdown by closing MU 2B, Letdown Isolation - Monitor Pressurizer level - Monitor MUT level (Crew may swap to the BWST) - Calculate the leak rate using Attachment 1 of DB-OP-02522 - Locate the leak - Attempt to isolate the leak using Attachment 2 of DB-OP-02522 - Close RC 11, Pressurizer PORV Block - Close RC 2, Spray Valve - Close RC 10, Spray Block Valve - Verify closed RC 239A and RC 239B, Pressurizer sample valves - Verify closed RC 4608A, RC 4608B, RC 4610A and RC4610B, RCS high point vents - Verify closed RC 4632, RC Cold Leg Loop 2-1 Determine the leak is not in the Makeup system Determine the leak is not in the Letdown system Commence a plant shutdown
	RO	Execute abnormal procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 6,7 Page 2 of 2

Event Description: Events 5,6 continued

Time	Position	Applicant's Actions or Behavior

	SRO	Supervise/coordinate the power reduction per DB-OP-02504, Rapid Shutdown
		- Notify the System Dispatcher
		- At the Load Control Panel, set the Rate of Change
		- At the Load Control Panel, set the Min Limit
		- Lower unit load
		- Control core imbalance with axial power shaping rods (APSR)
		- Request Chemistry monitor condensate polishers and sample the RCS
		- If time permits
		  - Transfer station electrical loads
		  - Lineup the Motor Driven Feed Pump in the Main Feedwater mode
		  - Start the Auxiliary Boiler
		  - Maintain MUT level 55 to 86 inches
		- Direct an Equipment Operator to remove AFPT minimum flow lines from service

	RO/BOP	Execute abnormal procedure action per SRO direction - Coordinate to initiate the power reduction
	SRO	Direct the initiation of Makeup/High Pressure Injection piggyback operation per DB-OP-02522 - Verify MU 6405 and MU 3971, MUP Three-Way Suction Valves, are in the BWST position - Start the standby Component Cooling Water (CCW) Pump - Start both High Pressure Injection (HPI) Pumps - Open HP 2A, HP2B, HP2C and HP2D, HPI Injection Valves - Start both Low Pressure Injection (LPI) Pumps - Open DH 63 and DH 64, Decay Heat Cooler Outlet to HPI Pump Suction valves
	RO/BOP	Execute abnormal procedure actions per SRO direction

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 8, 9 Page 1 of 1

Event Description: A loss of all Condensate Pumps will occur and require a reactor trip and manual initiation of the Steam Feed Rupture Control System (SFRCS). The control rods will fail to insert requiring the Reactor Operator to perform the actions for an ATWS.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize a loss of all Condensate Pumps - Annunciator Alarm13-2-B, CNDS PMP DISCH HDR PRESS - Annunciator Alarm 13-4-C, DEAR STRG TK 1 LVL - Annunciator Alarm 13-4-D, DEAR STRG TK 2 LVL - Decreasing Condensate flow - No Condensate Pumps running

	SRO	Direct RO/BOP actions per DB-OP-02013, Condensate Feedwater Alarm Panel 13 Annunciators
		- Determine Condensate header pressure is low
		- Determine Deaerator Storage Tank (DST) level is low
		- When DST level approaches off-scale low then:
		  - Manually trip the reactor
		  - Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
		  - Trip both Main Feedwater Pumps
		  - Initiate SFRCS

	RO	Perform DB-OP-02000 immediate actions: - Recognize the control rods did not insert on the manual Reactor trip - *Momentarily de-energize 480 VAC unit substations E2 and F2 simultaneously - Verify control rods inserted - Verify power is lowering on the Intermediate Range - Manually trip the turbine - Verify the Main Turbine Stop or Control valves are closed

* Critical Task

Op-Test No.: 1,2,3 Scenario No.: 2a Event No.: 10,11 Page 1 of 1

Event Description: After the reactor is tripped, the RCS leak will increase in size leading to a loss of subcooling margin. AF 6451, Auxiliary Feedwater Pump 2 Discharge Valve, will fail open causing an overfeed of SG 2 (OR SG 1 if a low pressure SFRCS trip has occurred on SG 2)

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a loss of subcooling margin - TSAT meters indicate less than 20ºF - Annunciator alarm 4-1-B, SUBCOOL MARGIN LO
	SRO	Direct RO actions per section 5 of DB-OP-02000 - *Trip all Reactor Coolant Pumps - Verify both CCW trains are in service - Verify both HPI Pumps are running - Verify all HPI injection line valves are open - Lock MUP suctions to the BWST - Start both LPI Pumps - Open MU 6420 - Verify MU 6422 is open - Open DH 63 and DH 64 - Verify proper SFAS response
	RO	Execute EOP actions per SRO direction
	SRO	Direct BOP actions per section 5 of DB-OP-02000 - Verify proper SFRCS response - Verify proper SG level control by AFW
	BOP	Execute EOP actions per SRO direction - Recognize indications of a SG 2 (1) overfill due to AF 6451 failed open
	SRO	Direct BOP actions per section 7 of DB-OP-02000 - *Stop the SG 2 (1) overfill by taking manual control of AFW - Reduce AFPT 2 speed OR - Close AF 599 (AF 608) OR - Close AF 3872 (AF 3871) - Manually control SG 2 (1) level
	BOP	Execute EOP actions per SRO direction

*Critical Task

Simulator Instructions

Scenario No.: _04 – 2a__

1. Initialize at 100% power (IC 04-2 scen2)

2. Equipment Status

    a. Tagout Makeup Pump 1

        - Place caution tags on MUP 1 control switch

        - Place caution tags on MUP 1 Oil Pumps control switches

    b. Make the following entries on the Tech Spec status sheet:
        Makeup Pump 1: Tech Spec 3.1.2.4, Out of service to repair an oil leak.
        Return time is (current date and time + 60 hours)

    c. Hang Protected Train 2 signs

    d. Ensure the Safety Monitor computer program reflects MUP1 out of service

    e. Ensure CCW Pump 1 and Makeup Pump 2 are running

3. Initial Malfunctions (Setup)

    a. Remove MUP 1 from service.

        IRF B2M1A 3.0

        IRF BME5A open

        IRF BME5D open

        IRF BME5I open

    b. Override RPS, ARTS and DSS trips

        IMF L4

        IMF L8

        IMF L5D2

        IMF L5D1

4. Events

a. SFAS Channel 2 RCS Pressure Transmitter fails high

Event 1 - imf l6i6o (1)

~~b. HPFW Heater 1-4 Tube leak over a 3 minute ramp~~ **[Event NOT used]**

~~Event 2 - imf fakkd (2) 0.5 00:03:00~~

c. Header Pressure instrument fails mid-scale

Event 5 - imf l1t2n (5) 0.5 00:01:00 0.45

d. RCS leak

Event 6 - imf hh46 (6) 0.0001

e. AFP Target Rock 2 valve fails open (AF 6451)

Event 10 - imf fkm1d (10)

5. CAEP File

a. Event 4 - EDG 1 Trouble Alarm (Enter using Monitor)

set tala111 = 0.01 │06:00:00 │ 1

b. Event 8 - Hotwell Level Switch fails low (Enter using Monitor)

set f4lsl595 = T │ 06:00:00 │ 2

c. Event 11 - RCS leak size increase

mmf hh46 0.0017 │ 6:00:00│3

6. Triggers

a. Event 10 on the Reactor Trip

TRGSET 10 "LIZG1API(1) < 90

7. Instructor Station Cues

Event 1- SFAS Channel 2 Press Transmitter fails high

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called

If called, role play as station management for notifications.

~~Event 2 - HPFW Heater 1-4 tube leak~~ **[Event NOT used]**

~~Role play as an Equipment Operator to isolate the HPFW heater locally~~

Event 4 - EDG 1 annunciator

Role play as an Equipment Operator to investigate EDG 1. Report annunciator 43-1-E, BLOWN FUSE is in alarm. The FU3 blue light is not lit.

Role play as station management for notifications.

Event 5 - Main Steam Header pressure failure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called

If called, role play as station management for notifications

Event 6 – Small RCS leak

Role play as the Zone 3 operator. Misc. Waste Drain Tank level is increasing and containment normal sump pumps run time meters show the sump pumps are running.

Facility: Davis-Besse NPS Scenario No.: 3 Op-Test No.: 1,2, 3

Examiners: _____ Operators: _____

Initial Conditions: 50% Reactor Power, both Main Feedwater Pumps in service

Turnover: Main Feedwater Pump 2 has been placed in service, Perform DB-SS-04055, MFPT 2 Emergency (Overspeed) Governor periodic test and then begin power increase

Event No.	Malf. No.	Event Type*	Event Description
1	------	N (BOP)	Perform MFPT 2 Governor Test
2	------	R (RO)	Raise reactor power
3	H1C1C	I (RO)	Fail Pressurizer Temperature Transmitter mid-scale (Tech. Spec)
4	BMF1	C (RO)	Makeup Filter differential pressure high
5	------	C (SRO)	Loss of Shield Building Integrity (Tech Spec)
6	DCM1	C (BOP)	Loss of Condenser Vacuum
7	HH51	M (All)	Steam Generator Tube Rupture
8	L1TL20	I (BOP)	Steam Generator Level Transmitter fails mid-scale

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

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 1 Page 1 of 1

Event Description: After turnover is complete, perform DB-SS-04055, MFPT 2 (Overspeed) Governor test

Time	Position	Applicant's Actions or Behavior
	ROS	Depress and hold HS 802, GOVERNOR OVRSPD TRIP TEST pushbutton - Verify amber LOCKOUT light is on - Verify green NORMAL light is off
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to trip - Verify red TRIP light is on - Verify green RESET light is off - Verify annunciator 8-4-B alarms
	SRO	Contact local operator to verify local annunciator
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to reset - Verify green RESET light is on - Verify red TRIP light is off - Verify annunciator 8-4-B resets
	ROS	Release HS 804, GOVERNOR OVRSPD TRIP TEST handswitch - Verify amber LOCKOUT light is off - Verify green NORMAL light is on
	SRO	Direct the local operator to reset the local annunciator panel

Op-Test No.: 1,2,3 Scenario No.: 3 Event No.: 2,3 Page 1 of 1

Event Description: Begin a power increase towards 100% power. During the power increase, the selected Pressurizer temperature transmitter will fail mid-scale requiring manual control of MU 32, Pressurizer Level Control Valve

Time	Position	Applicant's Actions or Behavior
	SRO	Direct the power increase per DB-OP-06902, Power Operations - Adjust the Unit Load Demand (ULD) on the Load Control Panel by depressing the INCREASE pushbutton
	RO	Execute procedure actions per SRO direction
	RO/BOP	Perform actions as necessary - Maintain generator transfer volts at zero - Maintain MFPT transfer volts at zero - Perform an Nuclear Instrument / Heat Balance Power (NI/HBP) comparison - Maintain Axial Power Imbalance (API) and Rod Insertion Limits within limits of the Core Operating Limits Report (COLR)
	RO/SRO/BOP	Recognize indications of a Pressurizer temperature transmitter failure - Annunciator alarm 4-2-E, PZR LVL LO - MU 32 going open - Indicated Pressurizer level low - Indicated Pressurizer temperature low
	SRO	Direct RO actions per DB-OP-02513, Pressurizer System Abnormal Operation - Stop the power increase - Place MU 32 in HAND and adjust to desired flow - Select the alternate temperature instrument - Place MU 32 in automatic control - Throttle open MU6 to increase Letdown flow as necessary
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Refer to Tech Spec 3.4.4 if Pressurizer level exceeds 228 inches

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 4 Page 1 of 1

Event Description: After Tech Specs have been reviewed by the SRO, the in-service Makeup filter will begin to clog which requires the standby filter to be placed in service

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Recognize indications of a high differential pressure on the in-service Makeup filter - Annunciator alarm 2-4-A, LETDOWN OR MU FILT ΔP HI - Makeup Filter differential pressure indicates greater than 25 psid
	SRO	Direct RO actions per DB-OP-02002, Letdown/Makeup Alarm Panel 2 Annunciators and DB-OP-06006, Makeup and Purification System - Place the spare Makeup Filter in service - Open MU 12B, Makeup Filter 2 Inlet Isolation - Close MU 12 A, Makeup Filter 1 Inlet Isolation
	RO	Execute alarm procedure actions per SRO direction

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 5 Page 1 of 1

Event Description: After the standby Makeup Filter is placed in service, the Control Room will receive a report that Door 107, Access from ECCS Room 2 to Misc. Waste Monitor Tank Room, is not operating properly which will require the SRO to enter the Tech Spec for Shield Building integrity.

Time	Position	Applicant's Actions or Behavior
	SRO	After receiving a report that Door 107 will not close, recognize that the door is required to be closed to comply with Tech Spec 3.6.5.2, Shield Building Integrity. - Review Tech Specs - Announce Tech Spec entry

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 6 Page 1 of 1

Event Description: Main Condenser vacuum will slowly rise requiring a power reduction. One of the Main Feedwater Pumps (MFP) will be removed from service prior to correcting the vacuum leak.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a decreasing Main Condenser vacuum - Condenser pressure rising - Annunciator alarm 15-1-F, HP COND PRESS HI - Annunciator alarm 15-2-F, LP COND PRESS HI
	SRO	Direct RO/BOP actions per DB-OP-02518, High Condenser Pressure - Verify the Mechanical Hogger starts at 4.5 inches - Reduce Reactor power when Condenser vacuum reaches 5.0 inches per DB-OP-02504, Rapid Shutdown - At the Load Control Panel set Rate of Change - At the Load Control Panel set the Minimum Limit - At the Load Control Panel set press the Decrease pushbutton - Control Axial Power Imbalance with Axial Power Shaping Rods (APSR) - Request Chemistry monitor Condensate Polishers and RCS iodine - Shutdown MFP 1(2)
	RO/BOP	Execute abnormal procedure actions per SRO direction
	BOP	Shutdown MFP 1(2) using Attachment 4 of DB-OP-02504 - Place MFP 1(2) ICS Hand/Auto station in HAND and reduce speed to 3900 RPM - Adjust MDT 20 output to indicate zero amps on the Transfer Meter - Place MDT 20 in manual control - Lower MFPT 1(2) speed until the Low Speed Switch (LSS) light is lit - Trip MFPT 1(2)
	RO/SRO/BOP	Stop the power decrease after the vacuum problem is corrected

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 7,8 Page 1 of 3

Event Description: A tube rupture will develop in Steam Generator (SG) 1 which will require a rapid shutdown to Low Level Limits (LLL). After the plant reaches LLLs, steam loads will be transferred from the Main Turbine to the Turbine Bypass Valves (TBV) and the reactor will be manually tripped. After the Reactor is tripped, Condenser vacuum will rise to the point where the crew will be required to manually initiate SFRCS. After SFRCS is initiated, the level transmitter for SG 2 will fail mid-scale requiring manual control of AFW to SG 2.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a tube rupture in SG 1 - Annunciator alarm 9-4-A, VACM SYS DISCH RAD HI - Annunciator Alarm 12-1-A, MN STM LINE 1 RAD HI - Pressurizer level decreasing - Makeup flow increasing
	SRO	Direct RO actions per DB-OP-02531, Steam Generator Tube Leaks - *Isolate Letdown - *Start the second Makeup Pump - Recognize Pressurizer level is decreasing - Route to DB-OP-02000, RPS, SFAS or SFRCS Trip or Steam Generator Tube Rupture
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Direct RO/BOP actions per DB-OP-02000 - Lock MUP suctions on the BWST - *Place the Alternate Makeup Injection Line in service - Control Pressurizer level using MU 32 and MU 6419 - Begin a plant shutdown with the SG/Reactor Hand/Auto station - Direct an Equipment Operator to start the Auxiliary Boiler - Lineup and start piggyback operation - Start the standby CCW Pump - Start both High Pressure Injection (HPI) Pumps - Open HP 2A, HP 2B, HP 2C and HP 2D - Start both Low Pressure Injection (LPI) Pumps - Open DH 63 and DH 64 - Transfer station electrical loads
	RO/BOP	Execute EOP actions per SRO direction

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 7,8 Page 2 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02000, section 8 - Verify SG/Reactor Demand Hand/Auto station is at zero demand - Place both Feedwater Loop Demand Hand/Auto stations in HAND and reduce demand to zero - Manually open the Turbine Bypass Valves (TBV) to transfer steam loads from the Turbine - Manually trip the reactor
	RO/BOP	Execute EOP actions per SRO direction
	RO	Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture: - Manually trip the reactor - Verify reactor power lowering - Manually trip the turbine
	BOP	Announce the reactor trip
	ROP/SRO	Verify the immediate actions are complete
	BOP	Recognize Condenser vacuum is rapidly rising - Manually initiate SFRCS
	RO/SRO/BOP	Check for Specific Rule or Symptom Direction - Recognize AFW flow to SG 2 is low per Specific Rule 4
	BOP	*Manually control AFW - Manually control AF 6451, SG 2 AFW Level Control Valve

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3 Event No.: 7,8 Page 3 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior

	SRO	Direct RO/BOP actions per DB-OP-02000, section 8
		- Verify HPI piggyback operation is in service
		- Verify Makeup is properly aligned
		- Verify SG1 and SG 2 are at the proper level
		- Depressurize the RCS
		  - Turn off all Pressurizer heaters
		  - Open the Pressurizer Spray Valve
		  - Block SFAS low RCS pressure trips
		  - Begin cooling down the RCS using Atmospheric Vent Valves (AVV) to 500°F at a maximum rate of 100°F per hour

	RO/BOP	Execute EOP actions per SRO direction

Simulator Instructions

Scenario No.: _04 - 3__

1. Initialize at 50% power with both Main Feed Pumps in service

2. Equipment Status

    a. Hang Protected Train 2 signs

    b. Ensure the Safety Monitor computer program reflects no equipment out of service

    c. Ensure Pressurizer temperature is selected to TT 15-1

3. Initial Malfunctions (Setup)

4. Triggers

    a. Fail SG 2 startup range level transmitter mid-scale when AFPT 2 speed is > 1000 rpm

        target set 8 s5:S816 > 1000"
        imf l1th20 (8) 0.5

5. Events

    a. Fail Pressurizer temperature transmitter TT 15-1 to mid-scale

        Event 3 - imf h1c1c (3) 0.5

    b. Clog Makeup Filter 1 on a 5 minute ramp

        Event 4 - imf bmf1 (4) 0.815 00:05:00 0

    c. Increase Condenser pressure on a 5 minute ramp

        Event 6 - imf dcm1 (6) 0.0005 00:05:00

    d. SG 1 tube rupture on a 5 minute ramp

        Event 7 - imf hh50 (7) 0.08 00:05:00

6. CAEP File

    a. Increase the condenser vacuum leak when the reactor trips

        mmf dcm1 0.8 **|** 06:00:00 **|** 1

7. Instructor Station Cues

Event 1 – MFPT 2 Governor “Overspeed” Test

Role play as Equipment Operator to obtain a key for local annunciator panel for MFPT 2.
Role play as the Equipment Operator to report annunciator MFPT 2 Trip is lit.
Role play as an Equipment Operator to reset the local annunciator panel for MFPT 2.

Event 2 - Power increase

Role play as the System Dispatcher for the power increase

Event 3 - Pressurizer temperature transmitter mid-scale failure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will discuss with your manager and assemble a team to begin the trouble shooting and repair of TT 15-1.

Role play as station management for notifications.

Event 4 - Makeup filter high differential pressure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will initiate the order to replace the filter cartridge.

Role play as station management for notifications.

Event 5 - Door 107, Access from ECCS Room 2 to the MISC. Waste Monitor Tank Room, failure

Role play as an Equipment Operator to report the latch mechanism on Door 107 is broken and the door will not close

Role play as station management for notifications.

Event 6 - Condenser pressure rising

Role play as Equipment Operators to look for vacuum leaks. After MFPT 1(2) is removed from service, report that the condenser boot seal water level is low and request permission to fill the boot seal.

Role Play as the System Dispatcher for the power decrease

Event 7 and 8 - SG 1 Tube Rupture

Role play as Chemistry and Radiation Protection to perform Attachments 2 and 3 of DB-OP-02531, SG Tube Leak.

Facility: Davis-Besse NPS Scenario No.: 3a Op-Test No.: 1,2, 3

Examiners: _____ Operators: _____

Initial Conditions: 50% Reactor Power, both Main Feedwater Pumps in service

Turnover: Main Feedwater Pump 2 has been placed in service, Perform DB-SS-04055, MFPT 2 Emergency (Overspeed) Governor periodic test and then begin power increase

Event No.	Malf. No.	Event Type*	Event Description
1	------	N (BOP)	Perform MFPT 2 Governor Test
2	------	R (RO)	Raise reactor power
3	H1C1C	I (RO)	Fail Pressurizer Temperature Transmitter mid-scale (Tech. Spec)
4	BMF1	C (RO)	Makeup Filter differential pressure high
~~5~~	------	~~C (SRO)~~	~~Loss of Shield Building Integrity (Tech Spec)~~ **[NOT used]**
6	DCM1	C (BOP)	Loss of Condenser Vacuum
7	HH51	M (All)	Steam Generator Tube Rupture
8	L1TL20	I (BOP)	Steam Generator Level Transmitter fails mid-scale

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

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 1 Page 1 of 1

Event Description: After turnover is complete, perform DB-SS-04055, MFPT 2 (Overspeed) Governor test

Time	Position	Applicant's Actions or Behavior
	ROS	Depress and hold HS 802, GOVERNOR OVRSPD TRIP TEST pushbutton - Verify amber LOCKOUT light is on - Verify green NORMAL light is off
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to trip - Verify red TRIP light is on - Verify green RESET light is off - Verify annunciator 8-4-B alarms
	SRO	Contact local operator to verify local annunciator
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to reset - Verify green RESET light is on - Verify red TRIP light is off - Verify annunciator 8-4-B resets
	ROS	Release HS 804, GOVERNOR OVRSPD TRIP TEST handswitch - Verify amber LOCKOUT light is off - Verify green NORMAL light is on
	SRO	Direct the local operator to reset the local annunciator panel

Op-Test No.: 1,2,3 Scenario No.: 3a Event No.: 2,3 Page 1 of 1

Event Description: Begin a power increase towards 100% power. During the power increase, the selected Pressurizer temperature transmitter will fail mid-scale requiring manual control of MU 32, Pressurizer Level Control Valve

Time	Position	Applicant's Actions or Behavior
	SRO	Direct the power increase per DB-OP-06902, Power Operations - Adjust the Unit Load Demand (ULD) on the Load Control Panel by depressing the INCREASE pushbutton
	RO	Execute procedure actions per SRO direction
	RO/BOP	Perform actions as necessary - Maintain generator transfer volts at zero - Maintain MFPT transfer volts at zero - Perform an Nuclear Instrument / Heat Balance Power (NI/HBP) comparison - Maintain Axial Power Imbalance (API) and Rod Insertion Limits within limits of the Core Operating Limits Report (COLR)
	RO/SRO/BOP	Recognize indications of a Pressurizer temperature transmitter failure - Annunciator alarm 4-2-E, PZR LVL LO - MU 32 going open - Indicated Pressurizer level low - Indicated Pressurizer temperature low
	SRO	Direct RO actions per DB-OP-02513, Pressurizer System Abnormal Operation - Stop the power increase - Place MU 32 in HAND and adjust to desired flow - Select the alternate temperature instrument - Place MU 32 in automatic control - Throttle open MU6 to increase Letdown flow as necessary
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Refer to Tech Spec 3.4.4 if Pressurizer level exceeds 228 inches

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 4 Page 1 of 1

Event Description: After Tech Specs have been reviewed by the SRO, the in-service Makeup filter will begin to clog which requires the standby filter to be placed in service

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Recognize indications of a high differential pressure on the in-service Makeup filter - Annunciator alarm 2-4-A, LETDOWN OR MU FILT ΔP HI - Makeup Filter differential pressure indicates greater than 25 psid
	SRO	Direct RO actions per DB-OP-02002, Letdown/Makeup Alarm Panel 2 Annunciators and DB-OP-06006, Makeup and Purification System - Place the spare Makeup Filter in service - Open MU 12B, Makeup Filter 2 Inlet Isolation - Close MU 12 A, Makeup Filter 1 Inlet Isolation
	RO	Execute alarm procedure actions per SRO direction

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 5 Page 1 of 1

[Event NOT used]

Event Description: After the standby Makeup Filter is placed in service, the Control Room will receive a report that Door 107, Access from ECCS Room 2 to Misc. Waste Monitor Tank Room, is not operating properly which will require the SRO to enter the Tech Spec for Shield Building integrity.

Time	Position	Applicant's Actions or Behavior
	SRO	After receiving a report that Door 107 will not close, recognize that the door is required to be closed to comply with Tech Spec 3.6.5.2, Shield Building Integrity. - Review Tech Specs - Announce Tech Spec entry

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 6 Page 1 of 1

Event Description: Main Condenser vacuum will slowly rise requiring a power reduction. One of the Main Feedwater Pumps (MFP) will be removed from service prior to correcting the vacuum leak.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a decreasing Main Condenser vacuum - Condenser pressure rising - Annunciator alarm 15-1-F, HP COND PRESS HI - Annunciator alarm 15-2-F, LP COND PRESS HI
	SRO	Direct RO/BOP actions per DB-OP-02518, High Condenser Pressure - Verify the Mechanical Hogger starts at 4.5 inches - Reduce Reactor power when Condenser vacuum reaches 5.0 inches per DB-OP-02504, Rapid Shutdown - At the Load Control Panel set Rate of Change - At the Load Control Panel set the Minimum Limit - At the Load Control Panel set press the Decrease pushbutton - Control Axial Power Imbalance with Axial Power Shaping Rods (APSR) - Request Chemistry monitor Condensate Polishers and RCS iodine - Shutdown MFP 1(2)
	RO/BOP	Execute abnormal procedure actions per SRO direction
	BOP	Shutdown MFP 1(2) using Attachment 4 of DB-OP-02504 - Place MFP 1(2) ICS Hand/Auto station in HAND and reduce speed to 3900 RPM - Adjust MDT 20 output to indicate zero amps on the Transfer Meter - Place MDT 20 in manual control - Lower MFPT 1(2) speed until the Low Speed Switch (LSS) light is lit - Trip MFPT 1(2)
	RO/SRO/BOP	Stop the power decrease after the vacuum problem is corrected

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 7,8 Page 1 of 3

Event Description: A tube rupture will develop in Steam Generator (SG) 1 which will require a rapid shutdown to Low Level Limits (LLL). After the plant reaches LLLs, steam loads will be transferred from the Main Turbine to the Turbine Bypass Valves (TBV) and the reactor will be manually tripped. After the Reactor is tripped, Condenser vacuum will rise to the point where the crew will be required to manually initiate SFRCS. After SFRCS is initiated, the level transmitter for SG 2 will fail mid-scale requiring manual control of AFW to SG 2.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a tube rupture in SG 1 - Annunciator alarm 9-4-A, VACM SYS DISCH RAD HI - Annunciator Alarm 12-1-A, MN STM LINE 1 RAD HI - Pressurizer level decreasing - Makeup flow increasing
	SRO	Direct RO actions per DB-OP-02531, Steam Generator Tube Leaks - *Isolate Letdown - *Start the second Makeup Pump - Recognize Pressurizer level is decreasing - Route to DB-OP-02000, RPS, SFAS or SFRCS Trip or Steam Generator Tube Rupture
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Direct RO/BOP actions per DB-OP-02000 - Lock MUP suctions on the BWST - *Place the Alternate Makeup Injection Line in service - Control Pressurizer level using MU 32 and MU 6419 - Begin a plant shutdown with the SG/Reactor Hand/Auto station - Direct an Equipment Operator to start the Auxiliary Boiler - Lineup and start piggyback operation - Start the standby CCW Pump - Start both High Pressure Injection (HPI) Pumps - Open HP 2A, HP 2B, HP 2C and HP 2D - Start both Low Pressure Injection (LPI) Pumps - Open DH 63 and DH 64 - Transfer station electrical loads
	RO/BOP	Execute EOP actions per SRO direction

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 7,8 Page 2 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02000, section 8 - Verify SG/Reactor Demand Hand/Auto station is at zero demand - Place both Feedwater Loop Demand Hand/Auto stations in HAND and reduce demand to zero - Manually open the Turbine Bypass Valves (TBV) to transfer steam loads from the Turbine - Manually trip the reactor
	RO/BOP	Execute EOP actions per SRO direction
	RO	Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture: - Manually trip the reactor - Verify reactor power lowering - Manually trip the turbine
	BOP	Announce the reactor trip
	ROP/SRO	Verify the immediate actions are complete
	BOP	Recognize Condenser vacuum is rapidly rising - Manually initiate SFRCS
	RO/SRO/BOP	Check for Specific Rule or Symptom Direction - Recognize AFW flow to SG 2 is low per Specific Rule 4
	BOP	*Manually control AFW - Manually control AF 6451, SG 2 AFW Level Control Valve

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3a Event No.: 7,8 Page 3 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior

	SRO	Direct RO/BOP actions per DB-OP-02000, section 8
		- Verify HPI piggyback operation is in service
		- Verify Makeup is properly aligned
		- Verify SG1 and SG 2 are at the proper level
		- Depressurize the RCS
		  - Turn off all Pressurizer heaters
		  - Open the Pressurizer Spray Valve
		  - Block SFAS low RCS pressure trips
		  - Begin cooling down the RCS using Atmospheric Vent Valves (AVV) to 500°F at a maximum rate of 100°F per hour

	RO/BOP	Execute EOP actions per SRO direction

Simulator Instructions

Scenario No.: _04 – 3a__

1. Initialize at 50% power with both Main Feed Pumps in service

2. Equipment Status

    a. Hang Protected Train 2 signs

    b. Ensure the Safety Monitor computer program reflects no equipment out of service

    c. Ensure Pressurizer temperature is selected to TT 15-1

3. Initial Malfunctions (Setup)

4. Triggers

    a. Fail SG 2 startup range level transmitter mid-scale when AFPT 2 speed is > 1000 rpm

        target set 8 s5:S816 > 1000"
        imf l1th20 (8) 0.5

5. Events

    a. Fail Pressurizer temperature transmitter TT 15-1 to mid-scale

        Event 3 - imf h1c1c (3) 0.5

    b. Clog Makeup Filter 1 on a 5 minute ramp

        Event 4 - imf bmf1 (4) 0.815 00:05:00 0

    c. Increase Condenser pressure on a 5 minute ramp

        Event 6 - imf dcm1 (6) 0.0005 00:05:00

    d. SG 1 tube rupture on a 5 minute ramp

        Event 7 - imf hh50 (7) 0.08 00:05:00

6. CAEP File

    a. Increase the condenser vacuum leak when the reactor trips

        mmf dcm1 0.8 **|** 06:00:00 **|** 1

7. Instructor Station Cues

Event 1 – MFPT 2 Governor “Overspeed” Test

Role play as Equipment Operator to obtain a key for local annunciator panel for MFPT 2.
Role play as the Equipment Operator to report annunciator MFPT 2 Trip is lit.
Role play as an Equipment Operator to reset the local annunciator panel for MFPT 2.

Event 2 - Power increase

Role play as the System Dispatcher for the power increase

Event 3 - Pressurizer temperature transmitter mid-scale failure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will discuss with your manager and assemble a team to begin the trouble shooting and repair of TT 15-1.

Role play as station management for notifications.

Event 4 - Makeup filter high differential pressure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will initiate the order to replace the filter cartridge.

Role play as station management for notifications.

~~Event 5 - Door 107, Access from ECCS Room 2 to the MISC. Waste Monitor Tank Room, failure~~ **[Event NOT used]**

~~Role play as an Equipment Operator to report the latch mechanism on Door 107 is broken and the door will not close~~

~~Role play as station management for notifications.~~

Event 6 - Condenser pressure rising

Role play as Equipment Operators to look for vacuum leaks. After MFPT 1(2) is removed from service, report that the condenser boot seal water level is low and request permission to fill the boot seal.

Role Play as the System Dispatcher for the power decrease

Event 7 and 8 - SG 1 Tube Rupture

Role play as Chemistry and Radiation Protection to perform Attachments 2 and 3 of DB-OP-02531, SG Tube Leak.

Facility: Davis-Besse NPS Scenario No.: 3b Op-Test No.: 1,2, 3

Examiners: _____ Operators: _____

Initial Conditions: 50% Reactor Power, both Main Feedwater Pumps in service

Turnover: Main Feedwater Pump 2 has been placed in service, Perform DB-SS-04055, MFPT 2 Emergency (Overspeed) Governor periodic test and then begin power increase

Event No.	Malf. No.	Event Type*	Event Description
~~1~~	------	~~N (BOP)~~	~~Perform MFPT 2 Governor Test~~ **[Event NOT used]**
2	------	R (RO)	Raise reactor power
3	H1C1C	I (RO)	Fail Pressurizer Temperature Transmitter mid-scale (Tech. Spec)
4	BMF1	C (RO)	Makeup Filter differential pressure high
5	------	C (SRO)	Loss of Shield Building Integrity (Tech Spec)
6	DCM1	C (BOP)	Loss of Condenser Vacuum
7	HH51	M (All)	Steam Generator Tube Rupture
8	L1TL20	I (BOP)	Steam Generator Level Transmitter fails mid-scale

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

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 1 Page 1 of 1

[Event NOT used]

Event Description: After turnover is complete, perform DB-SS-04055, MFPT 2 (Overspeed) Governor test

Time	Position	Applicant's Actions or Behavior
	ROS	Depress and hold HS 802, GOVERNOR OVRSPD TRIP TEST pushbutton - Verify amber LOCKOUT light is on - Verify green NORMAL light is off
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to trip - Verify red TRIP light is on - Verify green RESET light is off - Verify annunciator 8-4-B alarms
	SRO	Contact local operator to verify local annunciator
	ROS	Rotate HS 804, GOVERNOR OVRSPD TRIP TEST handswitch to reset - Verify green RESET light is on - Verify red TRIP light is off - Verify annunciator 8-4-B resets
	ROS	Release HS 804, GOVERNOR OVRSPD TRIP TEST handswitch - Verify amber LOCKOUT light is off - Verify green NORMAL light is on
	SRO	Direct the local operator to reset the local annunciator panel

Op-Test No.: 1,2,3 Scenario No.: 3b Event No.: 2,3 Page 1 of 1

Event Description: Begin a power increase towards 100% power. During the power increase, the selected Pressurizer temperature transmitter will fail mid-scale requiring manual control of MU 32, Pressurizer Level Control Valve

Time	Position	Applicant's Actions or Behavior
	SRO	Direct the power increase per DB-OP-06902, Power Operations - Adjust the Unit Load Demand (ULD) on the Load Control Panel by depressing the INCREASE pushbutton
	RO	Execute procedure actions per SRO direction
	RO/BOP	Perform actions as necessary - Maintain generator transfer volts at zero - Maintain MFPT transfer volts at zero - Perform an Nuclear Instrument / Heat Balance Power (NI/HBP) comparison - Maintain Axial Power Imbalance (API) and Rod Insertion Limits within limits of the Core Operating Limits Report (COLR)
	RO/SRO/BOP	Recognize indications of a Pressurizer temperature transmitter failure - Annunciator alarm 4-2-E, PZR LVL LO - MU 32 going open - Indicated Pressurizer level low - Indicated Pressurizer temperature low
	SRO	Direct RO actions per DB-OP-02513, Pressurizer System Abnormal Operation - Stop the power increase - Place MU 32 in HAND and adjust to desired flow - Select the alternate temperature instrument - Place MU 32 in automatic control - Throttle open MU6 to increase Letdown flow as necessary
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Refer to Tech Spec 3.4.4 if Pressurizer level exceeds 228 inches

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 4 Page 1 of 1

Event Description: After Tech Specs have been reviewed by the SRO, the in-service Makeup filter will begin to clog which requires the standby filter to be placed in service

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Recognize indications of a high differential pressure on the in-service Makeup filter - Annunciator alarm 2-4-A, LETDOWN OR MU FILT ΔP HI - Makeup Filter differential pressure indicates greater than 25 psid
	SRO	Direct RO actions per DB-OP-02002, Letdown/Makeup Alarm Panel 2 Annunciators and DB-OP-06006, Makeup and Purification System - Place the spare Makeup Filter in service - Open MU 12B, Makeup Filter 2 Inlet Isolation - Close MU 12 A, Makeup Filter 1 Inlet Isolation
	RO	Execute alarm procedure actions per SRO direction

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 5 Page 1 of 1

Event Description: After the standby Makeup Filter is placed in service, the Control Room will receive a report that Door 107, Access from ECCS Room 2 to Misc. Waste Monitor Tank Room, is not operating properly which will require the SRO to enter the Tech Spec for Shield Building integrity.

Time	Position	Applicant's Actions or Behavior
	SRO	After receiving a report that Door 107 will not close, recognize that the door is required to be closed to comply with Tech Spec 3.6.5.2, Shield Building Integrity. - Review Tech Specs - Announce Tech Spec entry

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 6 Page 1 of 1

Event Description: Main Condenser vacuum will slowly rise requiring a power reduction. One of the Main Feedwater Pumps (MFP) will be removed from service prior to correcting the vacuum leak.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a decreasing Main Condenser vacuum - Condenser pressure rising - Annunciator alarm 15-1-F, HP COND PRESS HI - Annunciator alarm 15-2-F, LP COND PRESS HI
	SRO	Direct RO/BOP actions per DB-OP-02518, High Condenser Pressure - Verify the Mechanical Hogger starts at 4.5 inches - Reduce Reactor power when Condenser vacuum reaches 5.0 inches per DB-OP-02504, Rapid Shutdown - At the Load Control Panel set Rate of Change - At the Load Control Panel set the Minimum Limit - At the Load Control Panel set press the Decrease pushbutton - Control Axial Power Imbalance with Axial Power Shaping Rods (APSR) - Request Chemistry monitor Condensate Polishers and RCS iodine - Shutdown MFP 1(2)
	RO/BOP	Execute abnormal procedure actions per SRO direction
	BOP	Shutdown MFP 1(2) using Attachment 4 of DB-OP-02504 - Place MFP 1(2) ICS Hand/Auto station in HAND and reduce speed to 3900 RPM - Adjust MDT 20 output to indicate zero amps on the Transfer Meter - Place MDT 20 in manual control - Lower MFPT 1(2) speed until the Low Speed Switch (LSS) light is lit - Trip MFPT 1(2)
	RO/SRO/BOP	Stop the power decrease after the vacuum problem is corrected

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 7,8 Page 1 of 3

Event Description: A tube rupture will develop in Steam Generator (SG) 1 which will require a rapid shutdown to Low Level Limits (LLL). After the plant reaches LLLs, steam loads will be transferred from the Main Turbine to the Turbine Bypass Valves (TBV) and the reactor will be manually tripped. After the Reactor is tripped, Condenser vacuum will rise to the point where the crew will be required to manually initiate SFRCS. After SFRCS is initiated, the level transmitter for SG 2 will fail mid-scale requiring manual control of AFW to SG 2.

Time	Position	Applicant's Actions or Behavior
	RO/SRO/BOP	Recognize indications of a tube rupture in SG 1 - Annunciator alarm 9-4-A, VACM SYS DISCH RAD HI - Annunciator Alarm 12-1-A, MN STM LINE 1 RAD HI - Pressurizer level decreasing - Makeup flow increasing
	SRO	Direct RO actions per DB-OP-02531, Steam Generator Tube Leaks - *Isolate Letdown - *Start the second Makeup Pump - Recognize Pressurizer level is decreasing - Route to DB-OP-02000, RPS, SFAS or SFRCS Trip or Steam Generator Tube Rupture
	RO	Execute abnormal procedure actions per SRO direction
	SRO	Direct RO/BOP actions per DB-OP-02000 - Lock MUP suctions on the BWST - *Place the Alternate Makeup Injection Line in service - Control Pressurizer level using MU 32 and MU 6419 - Begin a plant shutdown with the SG/Reactor Hand/Auto station - Direct an Equipment Operator to start the Auxiliary Boiler - Lineup and start piggyback operation - Start the standby CCW Pump - Start both High Pressure Injection (HPI) Pumps - Open HP 2A, HP 2B, HP 2C and HP 2D - Start both Low Pressure Injection (LPI) Pumps - Open DH 63 and DH 64 - Transfer station electrical loads
	RO/BOP	Execute EOP actions per SRO direction

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 7,8 Page 2 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02000, section 8 - Verify SG/Reactor Demand Hand/Auto station is at zero demand - Place both Feedwater Loop Demand Hand/Auto stations in HAND and reduce demand to zero - Manually open the Turbine Bypass Valves (TBV) to transfer steam loads from the Turbine - Manually trip the reactor
	RO/BOP	Execute EOP actions per SRO direction
	RO	Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture: - Manually trip the reactor - Verify reactor power lowering - Manually trip the turbine
	BOP	Announce the reactor trip
	ROP/SRO	Verify the immediate actions are complete
	BOP	Recognize Condenser vacuum is rapidly rising - Manually initiate SFRCS
	RO/SRO/BOP	Check for Specific Rule or Symptom Direction - Recognize AFW flow to SG 2 is low per Specific Rule 4
	BOP	*Manually control AFW - Manually control AF 6451, SG 2 AFW Level Control Valve

*Critical Step

Op-Test No.: 1,2, 3 Scenario No.: 3b Event No.: 7,8 Page 3 of 3

Event Description: Events 6 and 7 continued

Time	Position	Applicant's Actions or Behavior

	SRO	Direct RO/BOP actions per DB-OP-02000, section 8
		- Verify HPI piggyback operation is in service
		- Verify Makeup is properly aligned
		- Verify SG1 and SG 2 are at the proper level
		- Depressurize the RCS
		  - Turn off all Pressurizer heaters
		  - Open the Pressurizer Spray Valve
		  - Block SFAS low RCS pressure trips
		  - Begin cooling down the RCS using Atmospheric Vent Valves (AVV) to 500°F at a maximum rate of 100°F per hour

	RO/BOP	Execute EOP actions per SRO direction

Simulator Instructions

Scenario No.: _04 – 3b__

1. Initialize at 50% power with both Main Feed Pumps in service

2. Equipment Status

    a. Hang Protected Train 2 signs

    b. Ensure the Safety Monitor computer program reflects no equipment out of service

    c. Ensure Pressurizer temperature is selected to TT 15-1

3. Initial Malfunctions (Setup)

4. Triggers

    a. Fail SG 2 startup range level transmitter mid-scale when AFPT 2 speed is > 1000 rpm

        target set 8 s5:S816 > 1000"
        imf l1th20 (8) 0.5

5. Events

    a. Fail Pressurizer temperature transmitter TT 15-1 to mid-scale

        Event 3 - imf h1c1c (3) 0.5

    b. Clog Makeup Filter 1 on a 5 minute ramp

        Event 4 - imf bmf1 (4) 0.815 00:05:00 0

    c. Increase Condenser pressure on a 5 minute ramp

        Event 6 - imf dcm1 (6) 0.0005 00:05:00

    d. SG 1 tube rupture on a 5 minute ramp

        Event 7 - imf hh50 (7) 0.08 00:05:00

6. CAEP File

    a. Increase the condenser vacuum leak when the reactor trips

        mmf dcm1 0.8 **|** 06:00:00 **|** 1

7. Instructor Station Cues

~~Event 1 – MFPT 2 Governor "Overspeed" Test~~ **[Event NOT used]**

~~Role play as Equipment Operator to obtain a key for local annunciator panel for MFPT 2.~~
~~Role play as the Equipment Operator to report annunciator MFPT 2 Trip is lit.~~
~~Role play as an Equipment Operator to reset the local annunciator panel for MFPT 2.~~

Event 2 - Power increase

Role play as the System Dispatcher for the power increase

Event 3 - Pressurizer temperature transmitter mid-scale failure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will discuss with your manager and assemble a team to begin the trouble shooting and repair of TT 15-1.

Role play as station management for notifications.

Event 4 - Makeup filter high differential pressure

Role play as I&C, System Engineer, Field Supervisor and/or the Work Week Manager if called. Inform the Control Room you will initiate the order to replace the filter cartridge.

Role play as station management for notifications.

Event 5 - Door 107, Access from ECCS Room 2 to the MISC. Waste Monitor Tank Room, failure

Role play as an Equipment Operator to report the latch mechanism on Door 107 is broken and the door will not close

Role play as station management for notifications.

Event 6 - Condenser pressure rising

Role play as Equipment Operators to look for vacuum leaks. After MFPT 1(2) is removed from service, report that the condenser boot seal water level is low and request permission to fill the boot seal.

Role Play as the System Dispatcher for the power decrease

Event 7 and 8 - SG 1 Tube Rupture

Role play as Chemistry and Radiation Protection to perform Attachments 2 and 3 of DB-OP-02531, SG Tube Leak.