FINAL AS-ADMINISTERED SCENARIOS

FOR THE DAVIS-BESSE INITIAL EXAMINATION - MARCH 2002

Facility: Davis Besse Scenario No.: 1 Op-Test No.: 1

Examiners: _____ Operators: _____

Initial Conditions: 100% Power, 3 circ. pump operation, HPI Pump 1 out of service

Turnover: Return to 4 circ. pump operation

Event No.	Malf No.	Event Type*	Event Description
1	-----	N (ROS)	Start Circ. Water Pump 3
2	CT-03-4C	C (ROS)	Circ. Water Pump 3 discharge valve fails to open
3	RCS-10-12	I (ROP)	T-Hot input to SCM meter fails high
4	SG-06	I (ROS)	SG1 Startup level instrument midscale failure
5	MUP 12-1	C (ROP)	Makeup Pump 1 trip
6	MUP 12-2	C (ROP)	Makeup Pump 2 electrical fault
7	AC-06-2	C (All)	D1 bus lockout
8	-----	R (ROP)	Power reduction
9	RCS-02-4	M (All)	Small break LOCA, loss of SCM

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

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

Event Description: Start Circulating Water Pump 3 (CWP3) to restore from three CWP operation. CT 868, CWP3 Discharge Valve, fails to automatically open, which requires stopping CWP3 using the Emergency stop pushbutton.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-06232, Circulating Water
		System and Cooling Tower Operation Procedure.
		- Monitor reactor power, generated megawatts, condenser pressure,
		and circ water temperatures.
		- Verify no fire detectors are in alarm on the main transformer.
		- Notify the System Dispatcher.
		- Verify an operator is stationed at CWP3.
		- Depress and hold C1 and D1 undervoltage trip bypass pushbuttons.
		- Start CWP3.
	RO/BOP	Perform DB-OP-06232 actions per SRO directions.
	BOP	Recognize CT 868 does not open to the throttle position after
		starting CWP3.
		- CT 868 green CLOSED light goes out.
		- CT 868 amber THROTTLE light does not light.
	SRO/BOP	Direct the local operator to stop CWP3 using the local emergency
		stop pushbutton.
		- CWP3 green STOP light lights.
		- CWP3 amps go to zero.

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

Event Description: RC TE3A6, RCS hotleg temperature input to the Post Accident Monitoring (PAM) panel fails high.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of RC TE3A6 failure.
		- Annunciator Alarm 4-1-B, SUBCOOL MARGIN LO
		- RC TI3A6 indicates approximately 900°F
		- Subcooling margin meter indicates 0°F
	SRO	Review Tech. Spec. 3.3.3.6, Post Accident Monitoring.
	RO	Recognize Annunciator 4-1-B is locked in and will not reflash if
		subcooling margin is lost.

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

Event Description: LT SP9B4, Steam Generator 1 Startup Level to ICS, fails as is (approximately 155 inches).

Time	Position	Applicant's Actions or Behavior
	SRO/BOP	Recognize LT SP9B4 fails (failure will not be evident until a power
		reduction is started).
		- Annunciator Alarm 14-4-E, ICS INPUT MISMATCH
		- Mismatch alarm on the SASS unit
	SRO	Direct BOP actions per DB-OP-02014, MSR/ICS Alarm Panel 14
		Annunciators.
		- Reset the annunciator at the SASS unit.
		- Refer to DB-OP-06407, Non-Nuclear Instrumentation System
		Operating Procedure.
		- Select the alternate level instrument for SG 1 (LT SP9B3).
	BOP	Perform DB-OP-02014 and DB-OP-06407 actions per SRO
		directions.

Op-Test No.: 1 Scenario No.: 1 Event No.: 5, 6, 7 Page 1 of 1

Event Description: Makeup Pump (MUP) 1 trips due to an electrical fault. When Makeup Pump 2 is started, a lockout of D1 occurs. The loss of makeup leads to a rapid plant shutdown. The loss of D1 requires selective battery load shedding.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of MUP 1 trip.
		- Annunciator 6-5-C, SEAL INJ FLOW LO
		- Annunciator 6-6-C, SEAL INJ TOTAL FLOW
		- MUP 1 GREEN light lit.
	SRO	Direct RO actions per DB-OP-02512, Loss of RCS Makeup.
		- Isolate letdown.
		- Isolate seal injection.
		- Isolate normal makeup.
		- Start The AC Oil Pump
		- Attempt to start MUP 2.
		- Verify CCW is available to the RCPs per DB-OP-02515, RCP
		Abnormal Operations.
	RO	Perform DB-OP-02512 actions per SRO directions.
	SRO/RO/BOP	Recognize indications of a loss of D1 Bus and a loss of all makeup.
	SRO	Direct RO/BOP actions per DB-OP-02521, Loss of AC Power.
		- Direct an Equipment Operator to trip EDG 2 locally.
		- Direct an Equipment Operator to perform selective load shedding
		for DC MCC 2.
	RO/BOP	Perform DB-OP-02521 actions per SRO directions.
	SRO	Direct RO/BOP actions per DB-OP-02512 for loss of all makeup.
		- May start LPI Pump 1 and open DH 63 and DH 64, DH CLR
		OUTLETs to HPI PUMP SUCT.
		- Start a reactor shutdown.
	RO/BOP	Perform DB-OP-02512 actions per SRO direction.
	SRO	Review Tech. Specs. 3.1.2.4 and 3.0.3.
	SRO	Review EAL 3.B.3, Site Area Emergency, based upon a complete
		loss of function needed for plant hot shutdown.

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

Event Description: Start a reactor shutdown due to a loss of all makeup pumps. During the shutdown, a small break LOCA develops and leads to a reactor trip and a loss of subcooling margin (LSCM).

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02504, Rapid Shutdown.
		- Notify the System Control Center Load Dispatcher.
		- Set the RATE OF CHANGE.
		- Set the MIN LIMIT – MW.
		- Lower unit load.
		- Request Chemistry to monitor condensate polishers and sample the RCS.
		- As time permits:
		• Transfer station electrical loads.
		• Line up the MDFP in the MFW mode.
		• Start the auxiliary boiler.
		- Stop a condensate pump.
		- Remove the AFPT minimum flow lines from service.
		- Control reheat steam low load valves.
		- Remove a main feed pump from service.
		- Stop low pressure heater drain pumps.
		- Stop a condensate pump.
	RO/BOP	Perform DB-OP-02504 actions per SRO directions.
	SRO/RO/BOP	Recognize indications of a loss of coolant accident and a reactor trip.
	SRO	Direct RO/BOP actions per DB-OP-02000, RPS, SFAS, SFRCS
		Trip, or SG Tube Rupture.
	RO	Perform immediate actions.
		- Trip the reactor. when pressurizer level reaches 160 inches
		- Verify power is decreasing.
		- Manually trip the turbine.
		- Verify turbine stop or control valves are closed.
	RO/BOP	Perform Specific Rule 2 actions.
		- Trip all Reactor Coolant Pumps (RCPs).

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

Event Description: Start a reactor shutdown due to a loss of all makeup pumps. During the shutdown, a small break LOCA develops and leads to a reactor trip and a loss of subcooling margin (LSCM).

Time	Position	Applicant's Actions or Behavior
	BOP	Perform Specific Rule 4 actions.
		- Verify AFW is maintaining SGs at 124 inches.
	RO/BOP	Perform actions for a loss of SCM.
		- Trip RCPs.
		- Verify CCW Train 1 in service.
		- May perform Makeup System actions.
		- May start LIP Pump 1
		- Verify proper SFAS response.
		- Verify proper SFRCS response.
		- Isolate possible RCS leaks.
		• Verify the PORV is in AUTO.
		• Close the PORV BLOCK valve.
		• Verify letdown is isolated.
		• Verify PRZ SPRAY is closed.
		• Close PRZ SPRAY BLOCK.
		• Close pressurizer sample isolation valves.
		• Verify high point vents are closed.
	BOP	Fully open the Atmospheric Vent Valves (AVVs) to cool down the
		RCS at the maximum attainable rate.
	RO	Verify Core Flood Tank (CFT) isolation valves are open.
	BOP	Block SFRCS low main steam line pressure and high SG level trip.
	BOP	When low pressure injection is established, then reduce cooldown
		rate.
	SRO	Route to Section 10, Large Break LOCA.

A. Trip reactor coolant pumps on a loss of subcooling margin

The RCPs are tripped immediately upon a loss of adequate SCM to prevent possible core damage if a subsequent trip of the RCPs occurred during certain size small break LOCAs. If the RCS void fraction is greater than about 70% when RCPs are tripped, the peak clad temperature can exceed the maximum temperature allowed by 10 CFR 50.46. A manual trip of the RCPs before the RCS void fraction reaches 70% prevents this possibility.

B. Open the Atmospheric Vent Valves to begin a rapid plant cooldown at the fastest possible rate

Since HPI and makeup flow are not available at this time, a rapid cooldown must be performed rather than maintain hot conditions while trying to regain HPI or makeup. Maximizing the RCS cooldown will minimize loss of RCS inventory until the core flood tanks and low pressure injection can provide inventory for the RCS.

I. Simulator Setup

A. Initial Conditions

1. 100% power, 3 circ water pump operation.
2. Hang a Red Tag on HPI Pump 1 control switch.
3. Hang the chemistry sheet on the status board.
4. Calculate and print a batch for the current RCS boron concentration and place on Control Panel A01.
5. Post Protected Train 2 signs.
6. Turn on HPI BLUE light.
7. Hang tag for CT 882 OPEN.
8. Initial malfunctions
   a. Rack out HPI Pump 1 breaker.
   b. Fail CT 868 closed.

B. Procedures

1. DB-OP-06232, Circulating Water System and Cooling Tower Operation
   a. N/A Steps 4.13.1 and 4.13.2.
   b. Sign off Step 4.13..3.
   c. Sign off Steps 4.2.1, 4.2.2, 4.2.3 for CWP3, 4.2.4 for CPW 3 and 4.2.5 for CWP 4.

C. Event Triggers

1. Fail CWP 3 breaker closed when CWP 3 is started.
2. Delete malfunction to fail CWP 3 breaker closed (when requested) to simulate stopping CWP 3 using Emergency Stop Pushbutton.
3. Fail the Thot input (TE RC3A6) to the Channel 2 subcooling margin meter.
4. Fail the controlling startup level transmitter (LT SP9B4) for SG 1 as is.
5. Trip Makeup Pump 1.
6. Lockout D1 bus when Makeup Pump 2 is started.
7. Emergency shutdown EDG 2.
8. Transfer YAU to alternate for battery load shed.
9. Insert an RCS small break LOCA.

II. Cues

A. Events 1 and 2

1. EO will be stationed at Circ Water Pump 3.
2. EO will report stopping CWP 3 with the Emergency Stop Pushbutton.
3. EO will report CT 868 started to open and then stopped.
4. EO will report BE 3157 is tripped
5. Electricians will troubleshoot BE 3157

B. Event 3

1. I&C will troubleshoot the failure of TE RC3A6.

C. Event 4

1. I&C will troubleshoot the failure of LT SP9B4.

D. Events 5, 6, and 7

1. EO will report MU Pump 1 appears normal (if requested).
2. EO/electrician will report 50 GS relay (ground) on MU Pump 1 (if requested).
3. EO will report MU Pump 2 oil systems are normal (if requested).
   a. Lube oil flow is normal.
   b. Lube oil pressure on PI MU 106A is 13 psig.
   c. Lube oil pressure on PI MU 109A is 14 psig.
   d. No leakage.
   e. No vibration.
4. EO will report EDG 2 has been emergency shut down.
5. EO/electrician will report a 50/51 relay (overcurrent) on D1 bus.
6. EO will report YAU has been transferred to alternate.

E. Events 8 and 9

1. Role play as the System Control Center Load Dispatcher to start the rapid shutdown (if contacted).
2. Role play as Chemistry to monitor condensate polishers and to sample the RCS (if requested).
3. EO will report synchro check relays are open/closed for A bus and B bus transfer (if requested).
4. Role play as an EO to align the MDFP to the MFW mode (if requested).
5. Role play as an EO to remove the AFPT minimum flow lines from service.
6. Role play as an EO to control RSLLVs.

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

Examiners: Operators:

Initial Conditions: 50% Power, both main feed pumps in service, AFPT 2 is out of service

Turnover: Increase power to 100%, Transfer Gland Steam from Main Steam to Aux Steam

Event No.	Malf No.	Event Type*	Event Description
1	-----	R (ROP)	Add water to the makeup tank
2	-----	N (ROS)	Transfer Gland Steam from Main Steam to Aux. Steam
3	MUP-16	I (ROP)	Seal injection flow instrument fails low
4	MFW 14-3	I (ROS)	MFW control valve delta pressure instrument fails low
4a	G-539	C (SRO)	DG low air start pressure
5	CCW-08	M (All)	CCW System leak
6	CRD-04	C (ROP)	ATWS
7	AFW-02	C (ROS)	AFPT 1 overspeed trip
8	AFW-09	C (ROS)	MDFP target rock valve fails open

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

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

Event Description: Add water to the Makeup Tank (MUT) in preparation for increasing power from 50% to 100%.

Time	Position	Applicant's Actions or Behavior
	RO	Perform actions of DB-OP-06001, Boron Concentration Control, for
		adding clean waste water to the MUT.
		- Set up batch controller for 300 gallon batch.
		- Enable the batch controller.
		- Open MU 40, BATCH ISO.
		- Open WC 3526, BOOSTER SYSTEM BYPASS.
	RO	When water addition is complete,
		- Verify MU 40 is closed.
		- Close WC 3526.

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

Event Description: Transfer Gland Steam from Main Steam to Auxiliary Steam

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BPO to transfer Gland Steam from Main Steam to Auxiliary
		Steam
	BPO	Open AS 1934, AUX STEAM SUPPLY TO 5# CONDENSATE
		TANK 1-1 CONTROL VALVE, for 1 minute and then re-close
	BPO	Throttle GS 2385, STEAM SEAL FEED BYPASS
	BPO	Close GS 2384, SEAL STEAM SUPPLY VALVE
	BPO	Open GS 2380, AUXILIARY SUPPLY STEAM SEAL VALVE
	BPO	Close GS 2385
	BPO	Verify Steam Seal Header pressure is between 2.5 and 4.5 psig

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

Event Description: FT MU 19, RCP Seal Injection Flow Transmitter, fails low causing MU 19, RCP SEAL INJ FLOW CONTROLLER to open. MU 19 will have to be controlled manually.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of FT MU 19 failing low.
		- Annunciator 6-6-C, SEAL INJ TOTAL FLOW.
		- Seal injection flow increasing.
	SRO	Direct RO actions per DB-OP-02006, RCP ALARM PANEL 6
		ANNUNCIATORS.
		- Place MU 19 in HAND.
		- Reduce seal injection flow.
	RO	Perform DB-OP-02006 actions per SRO direction.

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

Event Description: MFW control valve delta pressure transmitter fails low. Main feed pumps speed up causing an SG overfill. MFP controls are taken to HAND and a different instrument is selected for control. The MFP controls are returned to AUTO.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize PDT SP5B1 failing low.
		- Annunciator 14-4-E, ICS INPUT MISMATCH
		- Annunciator 12-5-A, SG 1 OR 2 FW VLV DELTA P LO
		- MFP speed increasing.
	SRO	Direct BOP actions per DB-OP-02014, MSR/ICS Alarm Panel 14
		Annunciators.
		- Determine which instrument pair has caused the alarm.
		- Reset the SASS annunciator.
	BOP	Perform DB-OP-02014 actions per SRO direction.
	SRO	Direct BOP actions per DB-OP-06401, ICS Operating Procedure,
		and DB-OP-06407, NNI System Operating Procedure.
		- Place both MFP controllers in HAND.
		- Lower MFP speed.
		- Select a good delta pressure instrument.
		- Return MFP controllers to AUTO.
	BOP	Perform DB-OP-06401 and DB-OP-06407 per SRO direction.

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

Event Description: Low starting air pressure for EDG 2 requires the SRO to dispatch an operator locally and to refer to Tech Specs. The air pressure is restored prior to taking any Tech Spec actions.

Time	Position	Applicant's Actions or Behavior
	SRO	Reference DB-OP-02001 for Annunciator 1-1-K.
		- Dispatch operator to locally acknowledge alarm and report status
		of low air receiver pressure at EDG 2.
		- EO reports EDG 2 air compressor failed to auto start on low
		pressure. Pressure is currently 200 psig.
		- SRO identifies EDG 2 inoperable in accordance with T.S. 3.8.1.1,
		Action B.

Op-Test No.: 1 Scenario No.: 2 Event No.: 5 and 6 Page 1 of 1

Event Description: An unisolable leak develops in the CCW System. The CCW surge tank level decreases requiring a trip of the reactor and RCPs. The reactor will not trip from the manual pushbuttons requiring 480 VAC Buses E2 and F2 to be de-energized.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of a CCW leak.
		- Annunciator 11-3-A, CCW SURGE TK LVL LO.
		- CCW surge tank level decreasing.
	SRO	Direct actions per DB-OP-02011, Heat Sink Alarm Panel 11
		ANNUNCIATORS (SRO may route to the abnormal procedure).
		- Check CCW heat exchanger outlet temperature.
		- Open DW 2643, DEMIN WTR MAKEUP.
	RO/BOP	Perform DB-OP-02011 actions per SRO directions.
	SRO	Direct actions per DB-OP-02523, CCW System Malfunctions.
		- Verify CC 1495, CCW TO AUX BLDG NON-ESSEN HEADER
		closes.
		- Trip the reactor.
	RO/BOP	Perform DB-OP-02523 actions per SRO direction.
	SRO/RO/BOP	Recognize indications of an ATWS.
		- Rods do NOT drop when the manual trip pushbuttons are pushed.
		- Reactor power is NOT decreasing.
	RO	Perform immediate actions of DB-OP-02000, RPS, SFAS, SFRCS
		Trip or SG Tube Rupture.
		- Manually de-energize the Control Rod Drive System by
		momentarily de-energizing E2 and F2.
		- Verify reactor power is decreasing.
		- Manually trip the turbine.
	BOP	Trip the RCPs per DB-OP-02523.
	BOP	Verify Non-Essential CCW Isolation Valves are closed per DB-OP-02523
		- CC5095, CC5097, CC2645
		- CC5096, CC5098, CC2649
		- CC1328, CC1338
		- CC1411A, CC1411B, CC1460

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

Event Description: After the reactor trips, an RCS overcooling occurs due to the loss of RCPs. Following the manual SFRCS actuation, AFPT 1 will overspeed trip. After starting the MDFP, SG 1 will overfeed due to AF 6459, MDFP TO AUX FEED LINE 1 FLOW CONTROL, failing open.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02000.
	SRO/RO/BOP	Recognize indications of an RCS overcooling.
		- SG pressures less than 960 psig.
		- Secondary steam demand exceeds primary heat production.
	SRO	Direct RO/BOP actions per DB-OP-02000.
	RO	- Transfer MUP suctions to the BWST.
	RO	- Start the standby MUP.
	RO/BOP	- Manually actuate SFRCS.
	SRO/RO/BOP	Recognize AFP 1 trips on overspeed.
		- No AFW flow to either SG.
		- Annunciator 10-2-G, AFPT 1 OVRSPD TRIP.
	SRO	Direct BOP actions per DB-OP-02000.
		- Enable both Motor Driven Feed Pump (MDFP) discharge valves.
		- Close both MDFP discharge valves.
		- Start the MDFP.
	BOP	Perform DB-OP-02000 actions per SRO direction.
	SRO/RO/BOP	Recognize an overfeed of SG 1 due to AF 6459 loss of power
		(failed open).
	SRO	Direct BOP actions per DB-OP-02000.
		- Close AF 608, AUX FEED TO SG 1 LINE STOP VALVE.
		- Use atmospheric vent valves to control RCS pressure constant or
		slightly decreasing.
		- Check for SG tube rupture.
	BOP	Perform DB-OP-02000 actions per SRO direction.
	SRO	Direct RO/BOP actions per DB-OP-02000.
		- Check for control rods inserted.
		- Check for Makeup System operation.

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

Event Description: After the reactor trips, an RCS overcooling occurs due to the loss of RCPs. Following the manual SFRCS actuation, AFPT 1 will overspeed trip. After starting the MDFP, SG 1 will overfeed due to AF 6459, MDFP TO AUX FEED LINE 1 FLOW CONTROL, failing open.

Time	Position	Applicant's Actions or Behavior
	SRO	- Check for Secondary System operation.
	(cont.)	• Establish one condensate pump operation.
		- Check for NNI power.
		- Check for ICS power.
		- Check for instrument air.
		- Check for SFAS actuation.
		- Check for SFRCS actuation.
		• Shift MDFP recirc to the CST.
		- Check for adequate subcooling margin.
		- Check for lack of heat transfer.
		- Check for overcooling.
		- Check for SG tube rupture.
	RO/BOP	Perform DB-OP-02000 actions per SRO direction.
	SRO	Check RA-EP-01500, Emergency Classification.
		- Alert, per EAL 3.A.2, Failure of RPS to initiate and complete a trip
		which brings reactor subcritical.

A. De-energize E2 and F2 to shut down the reactor

The reactor must be shut down prior to proceeding since the Technical Bases Document accident mitigation is based on having the reactor shut down.

B. Start the MDFP and deliver flow to the SGs

Feedwater is required to at least one SG to ensure the secondary systems are available for primary system heat removal. Primary to secondary heat transfer is preferred to prevent degrading the containment building environment.

C. Stop overfeed of SG 1 after the MDFP is started

Stopping the AFW overfeed (from MDFP) will terminate the RCS overcooling. Concerns related to an extended overcooling include loss of pressurizer level, saturated RCS, SG damage, and pressurized thermal shock.

I. Simulator Setup

A. Initial Conditions

1. 50% power, both main feed pumps in service.
2. Adjust Group 7 control rods to 75% withdrawn.
3. Adjust makeup tank to 65 inches.
4. Hang Red Tag on AFPT 2 speed controller.
5. Hang the Chemistry sheet on the status board.
6. Hang the Tech. Spec. sheet on the status board.
7. Post Protected Train 1 signs.
8. Calculate and print a batch addition for raising reactor power to 100%.
9. Place tags for CCW Pump 3 in standby as CCW Pump 2
10. Initial malfunctions:
    a. Close AFPT 2 trip throttle valve.
    b. Align CCW Pump 3 as 2.
    c. Prevent the reactor from tripping.
    d. CCW Pump 1 and Makeup Pump 2 running.
    e. Fail open AF 6459, MDFP to Aux. Feed Line 1.
    f. Align clean waste for makeup tank batching operations.

B. Procedures

1. DB-OP-06001, Boron Concentration Control
    a. N/A Step 3.1.1.
    b. Step 3.1.2 complete.

C. Event Triggers

1. Fail FT MU 19, RCP Seal Inj Flow Transmitter, low.
2. Fail PDT SP5B1, MFW Valve Delta Pressure Transmitter, low.
3. Insert a CCW System leak.
4. Insert AFPT 1 overspeed trip when SFRCS is manually actuated.

II. Cues

A. Event 3

1. Role play as I&C (if requested).

B. Event 4

1. Role play as I&C (if requested).

C. Event 5 and 6

1. Role play as an EO to look for CCW leak (if requested).

D. Event 7 and 8

1. Role play as an EP/maintenance to investigate AFPT 1 overspeed trip (if requested). After ≈5 minutes, report the trip throttle valve linkage is bent and will not reset.
2. EO will report MDFP recirc has been shifted to the CST (if requested).

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

Examiners: _____ Operators: _____

Initial Conditions: Mode 2, 2% power, startup in progress, MFP 2 out of service

Turnover: MFP 1 ready to be placed in service.

Event No.	Malf No.	Event Type*	Event Description
1	-----	N (ROS)	Transfer from Motor Driven Feed Pump to MFP 1
2	-----	R (ROP)	Increase power to 5%
3	MUP-17	I (ROP)	Makeup Tank level instrument fails low
4	SG-04	I (ROS)	SG2 pressure instrument fails high
5	SG-01	C (All)	SG1 tube leak
6	AC-02	M (All)	Loss of off-site power
7	SW-07	C (ROP)	Service Water Pump 1 fails to auto start
8	SFRCS-02	C (ROS)	SFRCS fails to automatically actuate
9	SG-01	C (All)	SG1 tube rupture

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

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

Event Description: Transfer the source of Main Feedwater (MFW) from the Motor Driven Feed Pump (MDFP) to Main Feedwater Pump 1 (MFP). Raise reactor power from 2% to 4% using the Rod Control Panel.

Time	Position	Applicant's Actions or Behavior
	BOP	Complete startup of MFP 1.
		- Transfer MFW from MDFP to MFP 1.
		• Raise MFP 1 speed and pressure.
		• Close (FW 6396) MDFP discharge valve.
		• Stop the MDFP.
		• Open FW 6396.
		• Adjust MFP speed to maintain MFW valve delta pressure.
		• Verify FW 170 is closed.
		• Close FW 104.
		• Open FW 33.
		- Complete shutdown of the MDFP.
		• Close FW 20.
		• Open FW 119.
		• Open AS 8.
		• Throttle FW 20.
	BOP	In all four ARTS channels:
		- Place test toggle switches for MFPT 1 in OPERATE.
		- Verify test toggle switches for MFPT 2 is in TRIP.
		- Verify all 1/5 lights OFF.
		- Place BYPASS key switch in normal.
		- Remove Operation Information Tags.
	BOP	Monitor auxiliary boiler steam flowrate.

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

Event Description: Transfer the source of Main Feedwater (MFW) from the Motor Driven Feed Pump (MDFP) to Main Feedwater Pump 1 (MFP). Raise reactor power from 2% to 4% using the Rod Control Panel.

Time	Position	Applicant's Actions or Behavior
	RO	Raise reactor power from the Rod Control Panel.
		- Control heatup rate at less than 35°F/hr.
		- Stabilize at 4% power.

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

Event Description: LT MU 16-2, Makeup Tank (MUT) Level Transmitter, fails low causing the Makeup Pump (MUP) suction valves to shift to the Borated Water Storage Tank (BWST). Suction from the BWST will cause RCS boron concentration to increase and RCS temperature and reactor power to decrease.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of LT MU 16-2 failing low.
		- Annunciator 2-2-C, MU TK LVL LO.
		- LI MU 16-2 indicates 0 percent.
		- MU 3971, MUP 2 suction three-way, and MU 6405, MUP 1
		suction three-way, switches from the MUT to the BWST.
	SRO	Direct RO/BOP actions per DB-OP-02002, Letdown/Makeup Alarm
		Panel 2 Annunciators.
		- Verify MU 3971 and MU 6405 switches to the BWST.
		- Pull the fuse for LT MU 1602. Fuse 3 in NNI Y Cabinet 6
		(not simulated).
		- Shift MU 3971 and MU 6405 to the MUT position.
		- Monitor reactor power and RCS temperature.
	RO/BOP	Perform DB-OP-02002 actions per SRO directions.

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

Event Description: PT SP12A2, SG 2 Pressure Transmitter, fails high causing Turbine Bypass Valves (TBVs) to open and lower actual SG pressure and RCS temperature.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of PT SP12A2 failing high.
		- Annunciator 14-4-E, ICS INPUT MISMATCH.
		- Side 2 TBVs and AVV going open.
		- SG 2 pressure decreasing.
	SRO	Direct RO/BOP actions per DB-OP-02014.
		- Determine which instrument has caused the alarm.
		- Reset the SASS annunciator.
	RO/BOP	Perform DB-OP-02014 actions per SRO directions.
	SRO	Direct BOP actions per DB-OP-06401, ICS Operating Procedure,
		and DB-OP-06407, NNI System Operating Procedure.
		- Place Loop 2 TBVs in HAND and lower the demand.
		- Place AVV 2 in HAND and close
		- Select PT SP12A1.
		- Return Loop 2 TBVs and AVV to AUTO.
	BOP	Perform DB-OP-06401 and DB-OP-06407 actions per SRO
		directions.

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

Event Description: A tube leak develops in SG 1 requiring a reactor shutdown.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize indications of an SG tube leak.
		- Annunciator 9-4-A, VAC SYS DISCH RAD HI.
		- Makeup System flow increasing.
	SRO	Direct RO/BOP actions per DB-OP-02531, Steam Generator Tube
		Leak.
		- Monitor pressurizer level.
		- Determine which SG is leaking.
		- Calculate a leak rate.
		- Determine emergency classification.
		- Direct Chemistry to perform Attachment 2.
		- Direct Radiation Protection to perform Attachment 3.
		- Direct Equipment Operators to perform Attachment 4.
	RO/BOP	Perform DB-OP-02531 actions per SRO directions.
	SRO	Determine leak rate is greater than Tech. Spec. 3.4.6.2 limits.
	SRO	Direct RO/BOP actions per DB-OP-02504, Rapid Shutdown.
		- Shutdown the reactor from the Rod Control Panel.
		- Maintain cooldown rate less than 1.67°F/minute.
		- Monitor pressurizer level.
		- Place the MDFP in service.
		- Place all four ARTS channels test trip bypass switches in the
		MFP position.
		- Shut down MFP 1.

Op-Test No.: 1 Scenario No.: 3 Event No.: 6, 7, 8, 9 Page 1 of 2

Event Description: During the reactor shutdown, a loss of offsite power occurs. SFRCS fails to automatically actuate and Service Water Pump (SWP) 1 fails to automatically start. The SG tube leak rate increases and becomes an SG tube rupture (SGTR).

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO/BOP actions per DB-OP-02000, RPS, SFAS, SFRCS
		Trip, or SG Tube Rupture.
	RO	Perform Immediate Actions.
		- Trip the reactor.
		- Verify power is decreasing.
		- Trip the turbine.
	BOP	Using Specific Rule 4, SG Level Setpoints, recognize SFRCS did not
		automatically actuate and Auxiliary Feedwater Pumps (AFPs) are
		not running.
		- Manually initiate SFRCS.
	RO	Using Specific Rule 6, Power for C1 and D1 Busses, recognize
		SWP 1 did not start.
		- Start SWP 1.
	SRO/RO/BOP	Recognize indications for an SGTR.
		- Makeup System flow increasing.
		- Pressurizer level decreasing.
	SRO	Direct RO/BOP actions per DB-OP-02000, Section 8, SGTR.
	RO	- Isolate letdown.
	RO	- Lock MUP suctions to the BWST.
	RO	- Start the second MUP.
	RO	- Place the alternate injection line in service.
	RO	- Lineup and start HPI piggyback.
		• Start both HPI pumps.
		• Open HPI discharge valves.
		• Start both LPI pumps.
		• Open piggyback valves.
	RO	- Depressurize the RCS.
		• Turn off pressurizer heaters.

Op-Test No.: 1 Scenario No.: 3 Event No.: 6, 7, 8, 9 Page 2 of 2

Event Description: During the reactor shutdown, a loss of offsite power occurs. SFRCS fails to automatically actuate and Service Water Pump (SWP) 1 fails to automatically start. The SG tube leak rate increases and becomes an SG tube rupture (SGTR).

Time	Position	Applicant's Actions or Behavior
	RO	• Open HPI discharge valves.
	(cont.)	• Start both LPI pumps.
		• Open piggyback valves.
	RO	- Depressurize the RCS.
		• Turn off pressurizer heaters.
		• Reduce RCS pressure through the pressurizer vent line OR
		through the PORV.
		• Block SFAS.
		• Throttle makeup and HPI to control pressurizer level.
	SRO	- Check for entry into PTS.
	BOP	- May take action to energize D2 bus to power an air compressor.
	BOP	- Begin an RCS cooldown at 50°F/hr. using the Atmospheric Vent
		Valves (AVVs).
	BOP	- Block SFRCS low pressure trips.
	SRO	When the RCS Thot is at 520°F and RCS pressure is 1000 psig, then
		route to DB-OP-06903, Plant Shutdown and Cooldown.
	SRO	Review EAL 2.A.2, Alert, based upon a RCS leak greater than 50
		gpm.

Justification for Critical Tasks

A. Start Service Water Pump 1 on a loss of offsite power

Operation without service water will lead to emergency diesel generator overheating and subsequent failure. The high temperature trips for the EDG is bypassed on a safety start.

B. Manually initiate SFRCS when the automatic actuation fails to function

Closure of the main steam isolation valves will minimize the RCS overcooling due to low decay heat and no RCPs running. The initiation of AFW will support natural circulation as provided in Tech. Spec. 3.4.1.1 for SG level when no RCPs are running.

I. Simulator Setup

A. Initial Conditions

1. 2% power, MDFP in service.
2. Hang a Red Tag on Main Feed Pump 2 RESET pushbutton.
3. Hang the Chemistry sheet on the status board.
4. Post Protected Train 1 signs.
5. Calculate and print a batch addition sheet for increasing power.
6. Set up MFP 1 at 3900 RPM in MDT 20 control.
7. Isolate two TBVs on each steam header and post ISOLATED tags.
8. Set vacuum controller at ~4 inches.
9. Place Ops Info Tags on ARTS channels IAW step 4.25.8 of DB-OP-06900
10. Initial malfunctions:
    a. Fail SFRCS to automatically actuate.
    b. Fail Service Water Pump 1 to automatically start.

B. Procedures

1. DB-OP-06901, Plant Startup
    a. Sign off all steps through Step 3.19.

2. DB-OP-06224, Main Feed Pump and Turbine
    a. Sign off all steps through Step 3.6.41.

C. Event Triggers

1. Close FW 6396, MDFP Discharge Valve.
2. Open FW 6396, MDFP Discharge Valve.
3. Close FW 170.
4. Close FW 104.
5. Open FW 33.
6. Fail LT MU 16-2, Makeup Tank Level Transmitter low.
7. Fail LT MU 16-2 to midscale. (Simulates pulling the fuse in the NNI cabinet.)
8. Fail PT SP12A2, SG 2 Pressure Transmitter, high over a five minute ramp.
9. Insert a 30 gpm tube leak on SG 1.
10. Insert a loss of offsite power conditional to Control Rod Group 7 at 20 percent.
11. Insert an SGTR in SG 1 of 300 gpm conditional to the reactor trip with a one minute ramp.

II. Cues

A. Events 1 and 2

1. EO will report FW 6396 is closed.
2. EO will report FW 6396 is open.
3. EO will report:
    a. FW 170 is closed.
    b. FW 104 is closed.
    c. FW 33 is open.
    d. FW 20 is closed.
    e. FW 119 is closed
    f. AS 8 is closed.
    g. FW 20 is throttled.

B. Event 3

1. I&C will investigate the failure of LT MU 16-2 (if requested).
2. The floor evaluator will provide guidance on when to fail LT MU 16-2 to midscale to simulate pulling the fuse in the NNI cabinet.

C. Event 4

1. I&C will investigate the failure of PT SP12A2 (if requested).

D. Event 5

1. Chemistry will begin performing Attachment 2 of DB-OP-02531.
2. Radiation Protection will begin performing Attachment 3 of DB-OP-02531. After ten minutes, report Main Steam Line 1 radiation levels are higher than Main Steam Line 2 radiation levels.
3. Equipment Operator will begin performing Attachment 4 of DB-OP-02531. After 20 minutes, report Steps 1, 2, and 3 of Attachment 4 have been completed.
4. Equipment Operator will assist in starting the MDFP and shutting down the MFP (if requested).

E. Event 6, 7, 8, and 9

1. Role play as the Load Dispatcher for the loss of offsite power (if requested). After ten minutes, report offsite power from Bayshore should be restored within the next two hours.
2. Equipment Operators will control AVVs locally if instrument air is not restored.