

Facility:	Davis-Besse	Scenario No.:	3	Op Test No.:	DB NRC 2020
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	ATC	
	_____		_____	BOP	
Initial Conditions: 100% Power					
Turnover: SFAS Ch 2 RCS Pressure LO and LOLO Bistables have been tripped due to an instrument failure last shift.					
Planned:					
<ul style="list-style-type: none"> <li>• Stop #1 HDP for maintenance</li> <li>• I&amp;C to repair failed instrument and restore to service</li> </ul>					
Critical tasks:					
<ol style="list-style-type: none"> <li>1. Isolate overcooling SG (CT-17)</li> <li>2. Restore Seal Return or Shutdown the Reactor Coolant Pumps (CT-B)</li> </ol>					
Event No.	Malf. No.	Event Type*	Event Description		
1		N-BOP/SRO	Stop #1 Heater Drain Pump for maintenance		
2		C-ATC/SRO	Makeup Filter High diff press		
3		TS-SRO	Containment Spray Pump Oil Leak (TS)		
4		R-ATC/SRO C-BOP TS-SRO	RCP 1-1 high vibrations – reduce power – trip RCP (TS)		
5		C-BOP/SRO	FW auto re-ratio fails when trip RCP		
6		C-ATC/SRO	Inadvertent SFAS Levels 1 through 3 – Trip reactor		
7		Major	OVCLG - Leaking Main Steam Safety Valve		
8		C-BOP/SRO	SFRCS fails to auto initiate on Low Steam Pressure		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**DAVIS-BESSE 2020 NRC SCENARIO 3**

The crew will take the watch with power at 100%. SFAS Ch 2 RCS Pressure LO and LOLO Bistables have been tripped due to an instrument failure last shift. I&C will commence troubleshooting later this shift.

**EVENT 1: Stop #1 HDP for maintenance**

The crew will Stop #1 HDP IAW DB-OP-06227, Low Pressure Feedwater Heaters in preparation for planned PMs.

**EVENT 2: Makeup Filter High diff press**

After #1 Heater Drain Pump (HDP) has been stopped, the Lead Evaluator will cue event 2. Annunciator 2-4-A, Letdown or MU Filter Differential Pressure Hi, will alarm due to high differential pressure across the #1 Makeup Filter (PDI MU13 greater than 25 psid). The crew will implement alarm procedure DB-OP-02002, Letdown/Makeup Alarm Panel 2 Annunciators actions, validate #1 Makeup Filter differential pressure is high, and swap to #2 Makeup Filter using DB-OP-06006, Makeup and Purification System.

**EVENT 3: Containment Spray Pump Oil Leak (TS)**

The Lead Evaluator will then cue event 3. An EO performing normal rounds will call the control room and report the oil has leaked out of the Containment Spray Pump 1. The SRO will declare the Containment Spray Pump 1 Inoperable and enter TS 3.6.6 Condition A. The crew will direct disabling Containment Spray Pump 1 from starting.

**EVENT 4 & 5: RCP 1-1 high vibrations- FW auto re-ratio fails when trip RCP**

The Lead Evaluator will then cue RCP 1-1 high vibrations. Annunciators 6-1-A, MOTOR VIB HI and 6-5-A, MONITOR SYSTEM TRBL will alarm. The SRO will implement DB-OP-02515, RCP Pump and Motor Abnormal. The SRO will implement DB-OP-02504, Rapid Shutdown to reduce power. The ATC will reduce power to less than 72% and RCP 1-1 will be stopped. When the RCP is stopped FW will fail to auto re-ratio and the BOP will be required to take loop demands to hand and re-ratio. The CSRO will check RCS flow is greater than the flow required by TS 3.4.1, DNB Limits and Notify I&C to reduce the RPS High Flux Trip setpoints within 10 hours IAW TS 3.4.4, RCS Loops.

**EVENT 6: Inadvertent SFAS Levels 1 through 3 – Trip reactor**

After the plant has stabilized the Lead Evaluator will cue event 6. SFAS Channel 2 loses power causing SFAS levels 1 - 3 to actuate. An SFAS Level 3 inadvertent actuation is entry criteria for DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture. SFAS Level 3 inadvertent actuation causes a loss of Seal Return to the RCPs. The 30-minute timer to restore Seal Return or SD the RCP's starts when RCP Seal Return is lost (CT-3).

**EVENT 7 & 8: OVCLG - Leaking Main Steam Safety Valve & SFRCS fails to auto initiate**

Following the reactor trip the crew will identify Overcooling due to a MSSV on SG 2 failing to reseal. The crew will implement attachment 20, lowering steam generator pressure attempting to seat the safety. The crew will recognize the Main Steam Safety Valve will not close and initiate and isolate SFRCS. SFRCS fails to automatically actuate on SG low pressure requiring manual re-positioning of the AFW valves. The crew will then isolate the OTSG and terminate the overcooling (CT-17). Due to the Inadvertent SFAS Actuation, Seal Return will be required to be restored within 30 minutes or the RCPs shutdown to prevent seal failure (CT-3).

When the overcooling steam generator is isolated, and Seal Return or RCPs shutdown is established the scenario can be terminated.

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Event Description:		Stop #1 HDP in preparation for planned PMs							
Time	Position	Applicant's Actions or Behavior							

<b>Indications Available:</b>		
		<ul style="list-style-type: none"> <li>HIS318, LP HEATER DRAIN TANK PUMPS 1 indicating lights</li> <li>II318, HEATER DRAIN PUMP 1 (HDP 1) AMMETER</li> </ul>
	TEAM	Brief stopping Heater Drain Pump 1 IAW DB-OP-06227, Low Pressure Feedwater Heaters Section 3.5
	TEAM	Verify adequate condensate pump capacity exists for the loss of the Heater Drain Pump flow.
	BOP	Direct EO to adjust HC311, FAIRCHILD RELAY LY311 HAND CONTROL for HDP 1 discharge valve, until the DIAPHRAGM PRESSURE TO LV311, is approximately 15 PSIG
	<b>BOOTH CUE</b>	<b><i>Role play as EO, DIAPHRAGM PRESSURE TO LV311, is approximately 15 PSIG</i></b>
	BOP	Stop Heater Drain Pump 1, using HIS318, LP HEATER DRAIN TANK PUMPS 1
	BOP	Direct EO to Close HD 5, LOW PRESSURE HEATER DRAIN PUMP 1 DISCHARGE ISOLATION
	<b>BOOTH CUE</b>	<ul style="list-style-type: none"> <li><b><i>Role play as EO, HD 5, LOW PRESSURE HEATER DRAIN PUMP 1 DISCHARGE ISOLATION is Closed</i></b></li> <li><b><i>Role play as I&amp;C, remove from service and drain LSH391, LP FW HEATER DRAIN TK 1 IAW DB-OP-06227 step 3.5.5.</i></b></li> </ul>
	TEAM	Monitor Condensate Flow and Reactor Power.
	TEAM	Evaluate expected Annunciators
<b>At Lead Evaluators direction, cue Event 2, Makeup Filter High diff press</b>		

Op Test No.:	<u>2020</u>	Scenario #	<u>3</u>	Event #	<u>2</u>	Page	<u>1</u>	of	<u>1</u>
Event Description:	Makeup Filter High diff press								
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> <li>• PDI MU13 indicates &gt;25 PSID</li> <li>• 2-4-A LETDOWN OR MU FILT ΔP HI</li> </ul>		
	CREW	Recognize Makeup Filter high differential pressure for in service Makeup Filter 1 (indications available listed above)
	ATC	Implement DP-OP-02002 Letdown/Makeup Alarm Panel 2 Annunciators for 2-4-A LETDOWN OR MU FILT ΔP HI
	ATC	Validate Makeup Filter high differential pressure with PDI MU13 indicating >25 psid
	SRO	Direct placing Makeup Filter 2 in service in accordance with DB-OP-06006, Makeup and Purification System
	SRO/ATC	Verify Makeup Filter 2 is not aligned as the Purification Demin Filter
	<b>SM CUE</b>	<b><i>If necessary, Role-play Shift Manager and inform the SRO that Makeup Filter 2 has been verified <u>NOT</u> aligned as the Purification Demin Filter</i></b>
	ATC	Swap to Makeup Filter 2
	ATC	Open MU12B, MAKEUP FILTER 2 INLET ISOLATION, using HISMU12B.
	ATC	Close MU12A, MAKEUP FILTER 1 INLET ISOLATION, using HISMU12A.
	CREW	Ensure work request initiated to have filter replaced (alarm procedure guidance)
<b>On Lead Evaluator's discretion proceed to Event 3, MDFP Oil Leak</b>		

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Event Description:	Containment Spray Pump 1 Oil Leak (TS)								
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> <li>Local indication only, Equipment Operator report</li> </ul>		
	<b>Booth Cue</b>	<b><i>Role-play EO and report: "While performing my zone tour, I noticed that all the oil has drained out of Containment Spray Pump 1 inboard bearing reservoir. The sight glass is broken and will need replaced."</i></b>
	SRO	Declare Containment Spray Pump 1 Inoperable and enter TS 3.6.6, Condition A
	SRO	May contact Maintenance and/or Work Week Manager
	<b>Note</b>	<b>Crew may discuss/direct disabling Containment Spray Pump 1 from starting</b>
	Crew	May discuss/review plant risk with Containment Spray Pump 1 unavailable and discuss protecting equipment (Containment Spray Pump 2)
	<b>Booth Cue</b>	<b><i>If necessary, role play as maintenance and report "Containment Spray Pump 1 will be required to be removed from service to repair broken sight glass"</i></b>
	BOP	Turn on CS Pump Blue Operability Light
	<b>Booth Cue</b>	<b><i>If necessary, role play as EO to disable CSP IAW DB-OP-01000, OPERATION OF STATION BREAKERS:</i></b> <ul style="list-style-type: none"> <li><b><i>Remove the emergency close control power fuses behind the CSP 1 Emergency Control Transfer Switch on E1 upper right cubicle</i></b></li> <li><b><i>Place Emergency Control Transfer Switch for CSP 1 on E1 in EMERGENCY</i></b></li> </ul>
<b>On Lead Evaluator's discretion, proceed to Event 4 &amp; 5, RCP High Vibrations</b>		

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Event Description:	RCP High Vibrations and Auto FW Reratio Failure								
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
		<ul style="list-style-type: none"> <li>• <b>6-1-A MOTOR VIB HI</b></li> <li>• <b>6-5-A MONITOR SYSTEM TRBL</b></li> </ul>
	CREW	Recognize RCP 1-1 high vibrations
	SRO	Implement DB-OP-02515, RCP and Motor Abnormal procedure
	CREW	Verify the RCP 1-1 motor conditions exceed operational limits using the PPC or SPDS
	SRO	Implement DB-OP-02515 Attachment 1, Reactor Coolant Pump Shutdown
	SRO	Implement DB-OP-02504, Rapid Shutdown <ul style="list-style-type: none"> <li>• Commence a power reduction to 72% or less</li> </ul>
	ATC	<u>ULD with ICS in Automatic</u> <ul style="list-style-type: none"> <li>• At the LOAD CONTROL Panel, set the rate of change to the rate specified by the Command SRO</li> <li>• Select the target RTP as determined by the Command SRO</li> </ul>
	CREW	Monitor Reactor Power to confirm power is being reduced at approximately the expected rate (NI vs. HBP)
	ATC	Monitor Regulating Rod Insertion Limits during the Shutdown per Technical Specification 3.2.1
	ATC	Attempt to maintain Axial Power Imbalance between 0 and negative 20 percent using APSRs
	BOP	Perform Attachment 6, Balance of Plant Actions for Rapid Shutdown

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Event Description:	RCP High Vibrations and Auto FW Reratio Failure								
Time	Position	Applicant's Actions or Behavior							

	BOP	At approximately 90 percent power, notify the Field Supervisor to remove the Auxiliary Feed Pump Turbine Main Steam Minimum flow lines from service
	BOP	When Condensate flow is less than 7.0 MPPH (FI578), then establish two Condensate pumps in operation
	SRO	Notify the System Control Center (SCC) Load Dispatcher of the unit load reduction
	BOP	Place the SG Load Ratio ( $\Delta T_c$ ) in Auto
	ATC	Reduce reactor power to $\leq 72$ percent
	ATC	Stop RCP 1-1
	BOP	Verify proper Feedwater flow ratios of 2.4 to 1
	BOP	Recognize auto re-ratio is not occurring: <ul style="list-style-type: none"> <li>• Take both FW Loop Demands to Hand</li> <li>• Ratio FW to approximately 2.38 MPPH on SG1</li> <li>• Ratio FW to approximately 5.74 MPPH on SG2</li> </ul>
	ATC	Verify Tave control is on RCS Loop 2
	ATC	Monitor Pressurizer level due to Tave transient 4-2-E (Lo LVL) may alarm reduce MU-32 Setpoint to ~180" 4-3-E (Hi LVL) may alarm refer to TS 3.4.9
	SRO	Check RCS flow is greater than the flow required by TS 3.4.1, DNB Limits. REFER TO DB-OP-03006, Miscellaneous Instrument Shift Checks. (Computer Point F744)





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Event Description: <b>Inadvertent Actuation of SFAS Levels 1 through 3</b>									
Time	Position	Applicant's Actions or Behavior							

<b>Indications Available:</b>		
<ul style="list-style-type: none"> <li>• SFAS annunciators</li> <li>• SFAS components repositioning</li> <li>• SAM lights lit</li> </ul>		
<b>*Critical Task (CT-B)</b>	TEAM	Recognize an actuation of SFAS Levels 1 through 3  <b>*Time of SFAS (Loss of RCP Seal Return) _____</b>
	ATC	Perform DB-OP-02000 Immediate Actions <ul style="list-style-type: none"> <li>• Trip the reactor</li> <li>• VERIFY Reactor Power is lowering on the Intermediate Range</li> <li>• Trip the turbine</li> <li>• VERIFY all Turbine Stop Valves OR Control Valves are closed</li> </ul>
	US	Route to DB-OP-02000, Section 3
	US/ATC	Verify Immediate Actions
	TEAM	Implement any necessary Specific Rules Actions <ul style="list-style-type: none"> <li>• ACTIONS FOR LOSS OF SUBCOOLING MARGIN</li> <li>• STEAM GENERATOR CONTROL</li> <li>• POWER FOR C1 AND D1 BUSES OR EDG START</li> </ul>
	ATC	Implement Specific Rule 6 <ul style="list-style-type: none"> <li>• Verify both EDGs are running</li> <li>• Verify C1 and D1 are energized</li> <li>• Verify both CCW Pumps are running</li> <li>• Verify both Service Water Pumps are running</li> </ul>
	TEAM	Implement any necessary Symptom Mitigation Sections <ul style="list-style-type: none"> <li>• LACK OF ADEQUATE SUBCOOLING MARGIN</li> <li>• LACK OF HEAT TRANSFER</li> <li>• OVERCOOLING</li> </ul>
<b>Proceed to Events 7 &amp; 8, Partially Stuck Open Main Steam Safety Valve and SFRCS failure to actuate on Low Steam Generator Pressure</b>		

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Event Description:	Partially Stuck Open Main Steam Safety Valve and SFRCS failure to actuate on Low Steam Generator Pressure								
Time	Position	Applicant's Actions or Behavior							

Indications Available:		
<ul style="list-style-type: none"> <li>• Lowering Steam Generator Pressure</li> <li>• SFRCS Low Steam Pressure Actuation Fails</li> </ul>		
	BOP	Recognize Overcooling due to SG 2 less than 960 psig
	SRO	Route to DB-OP-02000, Section 7 for Overcooling
	ATC	Implement Attachment 8, Place MU/HPI/LPI in Service <ul style="list-style-type: none"> <li>• Start/Verify running both CCW Pumps</li> <li>• Start both HPI Pumps</li> <li>• Open HP 2A, HP 2B, HP 2C and HP 2D</li> <li>• Start both LPI Pumps</li> <li>• Open DH 64 and DH 63</li> <li>• Transfer Makeup Pump suctions, MU6405 &amp; MU3971, to the BWST (depress off)</li> <li>• Set Pressurizer Level Controller to 100 inches</li> <li>• Start Standby Makeup Pump 2</li> <li><b><u>IF AT ANY TIME Pressurizer Level is less than 40 inches</u></b></li> <li>• Lock MU Pump suctions, MU6405 &amp; MU3971, on the BWST</li> <li>• Verify Pressurizer heaters are off</li> <li>• Isolate Letdown by closing MU2B</li> <li>• Open MU6421</li> <li>• Throttle open MU6419 as needed (Alternate Injection Line)</li> <li>• Direct EO to open MU6423B</li> </ul>
	<b>Booth Cue</b>	<b><i>If security is called inform that steam continues to issue from aux building roof steam relief exhaust pipe</i></b>
	BOP	Perform Attachment 20 to attempt to reseal the MSSV <ul style="list-style-type: none"> <li>• Lower SG pressure toward 700 psig using the TBVs</li> <li>• Recognize the MSSV has <u>NOT</u> reseated</li> </ul>
	BOP	Initiate AND Isolate SFRCS using SFRCS MANUAL ACTUATION switches
	BOP	Verify proper SFRCS alignment

Op Test No.:	<u>2020</u>	Scenario #	<u>3</u>	Event #	<u>7 &amp; 8</u>	Page	<u>2</u>	of	<u>3</u>
Event Description:	Partially Stuck Open Main Steam Safety Valve and SFRCS failure to actuate on Low Steam Generator Pressure								
Time	Position	Applicant's Actions or Behavior							

	CREW	Determine the overcooling cannot be isolated
	CREW	Determine SG 2 is causing the overcooling
<b>Critical Task (CT-17)</b>		<b>NOTE: Overcooling must be isolated &lt;10 minutes from the time SG 2 is less than 630 psig</b>  <b>If applicable, Time SG 2 less than 630 psig _____</b>
<b>Critical Task (CT-17)</b>	BOP	<b>Close AF 599 (isolate FW flow SG 2)</b>  <b>Time AF 599 is closed _____</b>
	BOP	Recognize AFW is not properly aligned for a low pressure trip on SG 2 and <ul style="list-style-type: none"> <li>• Realign AFW components as required</li> </ul>
	BOP	Stabilize RCS temperature using the AVV on SG 1
	ATC	Initiate RCS depressurization to minimum adequate SCM
	ATC	Throttle MU/HPI as necessary to control Pressurizer level
	ATC	Restore Seal Injection using Attachment 10 <ul style="list-style-type: none"> <li>• Close MU 19</li> <li>• Block and open MU 66A, MU 66B, MU 66C and MU 66D</li> <li>• Open MU 19 to obtain 12 - 15 gpm Seal Injection flow</li> </ul>
	BOP	Recognize SFRCS SG level setpoint on High due to inadvertent SFAS



## **Justification for Critical Tasks**

The term "Critical Task", is defined in NUREG-1021, OPERATOR LICENSING EXAMINER STANDARDS FOR POWER REACTORS. The listed critical tasks were compiled based on a review of Areva Technical Document 47-1229003-06, EOP Technical Bases Document, and additional CTs were added based on established DB Operations expectations and standards for previously identified Critical Task.

### CT-17: Isolate Overcooling SG

1. Safety Significance:  
The partially open Main Steam Safety Valve on Steam Generator 2 will cause an uncontrollable overcooling
2. Cues:
  - Lowering Pressure on Steam Generator 2
  - DB-OP-02000 Section 7 Overcooling
3. Measured by:
  - Time zero for CT-17 is when Steam Generator 2 is less than 630 psig
  - The required action to complete the critical task is to Close AF 599 (isolate FW flow SG 2)
  - The required end time for completion of CT-17 is 10 minutes from when SG 2 is less than 630 psig
4. Feedback:
  - Feedwater flow lowering
  - AF599 indicates closed

### CT-B: Protect RCP Seals

1. Safety Significance:  
The inadvertent actuation of SFAS levels 1-3 will result in a loss of seal return flowpath. Extended operation without a RCP Seal Return flowpath may result in seal failure and unisolable RCS leakage.
2. Cues:
  - Loss of seal return flow as indicated by MU38 closed and RCPs running
  - DB-OP-02515, REACTOR COOLANT PUMP AND MOTOR ABNORMAL OPERATION and DB-OP-02000 Attachment 10
3. Measured by:
  - Time zero for CT-B is when MU38 goes closed (inadvertent actuation of SFAS levels 1-3)
  - The required action to complete CT-B is to restore Seal Return or shutdown RCPs
  - The required end time for completion of CT-B is 30 minutes
4. Feedback:  
MU38, MU59A, MU59B, MU59C and MU59D are opened or RCPs are stopped

## SIMULATOR SETUP INFORMATION

### Simulator Setup:

- 100% Power
- Fail SFRCS low pressure trip on SG 2 automatic actuation
- Establish SG 2 unisolable steam leak following reactor trip

### Procedures:

- DB-OP-06227, Low Pressure Feedwater Heaters
- DB-OP-02002, Letdown/Makeup Alarm Panel 2 Annunciators
- DB-OP-06006, Makeup and Purification System
- DB-OP-02006, RCP Alarm Panel 6 Annunciators
- DB OP 02515, RCP and Motor Abnormal
- DB-OP-02504, Rapid Shutdown
- DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture
- DB-OP-01000, Operation of Station Breakers

### For Simulator Instructor:

- DB-OP-06227, Low Pressure Feedwater Heaters
- Simulator Commands for disabling Containment Spray Pump 1 if required
  - BDP3H CSP1 LOCAL/REMOTE fuses TRUE
  - BDP3D CSP1 CLOSE FUSE 242 remove
  - BDP3E CSP1 CLOSE FUSE 243 remove

**SHIFT MGR/UNIT/FIELD SUPERVISOR/SHIFT ENGINEER TURNOVER CHECKLIST**

<b><u>DATE: Today</u></b>	<b><u>SHIFT: NIGHTS</u></b>	<b><u>MODE: 1</u></b>	<b><u>POWER: 100%</u></b>
	<b><u>SECURITY RISK: GREEN</u></b>		
<b><u>PLANT ONLINE RISK: GREEN</u></b>		<b><u>PLANT CONDITION: 1</u></b>	<b><u>PROTECTED TRAIN: 2</u></b>
<b><u>ACTIVE ALERTS: NONE</u></b>	<b><u>GRID CONDITION: NORMAL</u></b>	<b><u>SHUTDOWN DEFENSE-IN-DEPTH: N/A</u></b>	

**ADDITIONAL PROTECTED EQUIPMENT** – None

**CONTINGENCY PLANS FOR OPERABILITY/AVAIL IN EFFECT** – None

**OUTSTANDING PROMPT OPERABILITY DETERMINATIONS** – None

**SHIFT ACTIVITIES** –

Entered T.S. 3.3.5 Condition A.1 Safety Features Actuation System (SFAS) Instrumentation due to a failed RCS Pressure Transmitter I&C will commence troubleshooting on Day Shift  
 Stop #1 HDP for maintenance

**ALARM STATUS** -None

**ZONE 1 – ODMI TRIGGER POINTS** -None

**ZONE 1 – WORKAROUNDS** – None

**ZONE 1 – BURDENS** – None

**ZONE 2 – ODMI TRIGGER POINTS** -None

**ZONE 2 – WORKAROUNDS** – None

**ZONE 2 – BURDENS** – None

**ZONE 3 – ODMI TRIGGER POINTS** -None

**ZONE 3 – WORKAROUNDS** – None

**ZONE 3 – BURDENS** – None

**CONTROL ROOM – ODMI TRIGGER POINTS**-None

**CONTROL ROOM – WORKAROUNDS**-None

**CONTROL ROOM – BURDENS** – None

**CONTROL ROOM – DEFICIENCIES** -None

**OUTAGE-RELATED repairs in the CTRM**

**GENERAL STATUS**

**SHIFT MGR/UNIT/FIELD SUPERVISOR/SHIFT ENGINEER TURNOVER CHECKLIST**

Intake Chlorination (Primary Oxidant) – OOS

Intake Actibrom (Oxidant enhancer) – OOS

Circwater Chlorination (Primary Oxidant) – Pumps 1 & 3

Circwater Actibrom (Oxidant Enhancer) – I/S

Circwater Trasar (Scale inhibitor) – I/S Pumps 1 & 3

Collection Box Sodium Bisulfite (Dechlorinator) – I/S

RCS Zinc Injection (Crud Layer Enhancement) – I/S

Polishers I/S: 1, 2, 3, 4

MUT press band: 30-40 psig

MSD Skid #1: I/S

MSR 1 Drains: Forward

MSD Skid #2: I/S

MSR 2 Drains: Forward

\*\*\*\*\* Screen Wash Catch Basin aligned to the North Settling Basin 5/18/2016 \*\*\*\*\*

**EVOLUTIONS IN PROGRESS** – None

**FOLLOW-UP ITEMS**-None



**SHIFT MGR/UNIT/FIELD SUPERVISOR/SHIFT ENGINEER TURNOVER CHECKLIST**

**ACTIVE DB LICENSE REQUIREMENTS (TS, TRM, FHAR, ODCM, FLEX)**

Date & Time Entered	Equipment Affected	Specification	Action Required	Next Action Due Responsible Individual	Issue Owner/ Test Leader
Today 0100	SFAS Ch 2 RCS Pressure Transmitter	T.S. 3.3.5 Condition A	A.1 One or more Parameters with one channel inoperable. Place channel in trip within 1 hour.	Action Completed	I&C

**FUNCTIONAL EP RELATED EQUIPMENT REQUIRING COMPENSATORY ACTIONS**

Facility:	Davis-Besse	Scenario No.:	4	Op Test No.:	DB NRC 2020
Examiners:	_____	Operators:	_____	SRO	
	_____		_____	ATC	
	_____		_____	BOP	
Initial Conditions: 100% Power					
Turnover: Maintain 100% Power					
Planned: Shift routines					
Critical tasks:					
1. Shutdown the Reactor - ATWS (CT-24)					
2. Control HPI (CT-5)					
Event No.	Malf. No.	Event Type*	Event Description		
1		N-BOP/SRO	Swap Cooling Tower Makeup Pumps		
2		TS-SRO	RC TE3A6 Hot Leg temp to SCM meter (TS)		
3		C-ATC/SRO	MU32 fails closed (use alt inj line)		
4		C-BOP/SRO TS-SRO	Startup Transformer 02 Lockout (TS)		
5		C-BOP/SRO	MFP low oil pressure - trip MFP - runback works		
6		R-ATC/SRO C-BOP	SG Tube Rupture		
7		Major	ATWS – Key Switch Works		
8		C-ATC/SRO	PZR Spray valve fails closed		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**DAVIS-BESSE 2020 NRC SCENARIO 4**

The crew will take the watch with the plant at 100% power.

**EVENT 1: Swap Cooling Tower Makeup (CTMU) Pumps**

The BOP will swap CTMU Pumps IAW DB-OP-06232, Circ Water and Cooling Tower Operation to support planned maintenance.

**EVENT 2: RC TE3A6 Hot Leg temp to SCM meter fails high (TS)**

The Lead Evaluator will cue event 2, RC TE3A6 Hot Leg temperature to SCM meter failure high. The crew will respond to annunciator 4-1-B, Sub Cooling Margin LO, and indications of RC TE3A6 failure, and SCM meter of 0 degrees. The SRO will identify this as a Tech Spec required Post Accident Monitoring instrument and enter TS 3.3.17 Condition A (TS).

**EVENT 3: MU32 fails closed (use alt inj line)**

When the Tech Spec 3.3.17 is entered the Lead Evaluator will cue MU32, Pressurizer Level Control Valve to fail closed. The crew will diagnose the failure with indications of low makeup flow and Pressurizer level lowering with MUT level rising. Manual control of MU32 demand signal will not affect makeup flow. The Unit Supervisor will implement abnormal procedure DB-OP-02512, Loss of RCS Makeup. MU32 will be isolated IAW DB-OP-06006. The alternate injection line may be placed in service at this time.

**EVENT 4: Startup Transformer 02 Lockout (TS)**

After letdown is in service, the Lead Evaluator will cue the Startup Transformer 02 Lockout. Annunciator 1-1-G, SU XFMR 02 LOCKOUT will alarm and the SRO will implement DB-OP-02001, Electrical Distribution Alarm Panel 1 Annunciators and enter T.S. 3.8.1 Off-Site AC Sources.

**EVENT 5: MFP low oil pressure - trip MFP - runback works**

When the T.S 3.8.1 is entered the Lead Evaluator will cue MFP low oil pressure. The BOP will implement DB-OP-02010, Feedwater Alarm Panel 10 Annunciators. The standby oil pump will fail to start which will require MFPT 2 to be tripped. The plant will runback to 55% power.

**EVENT 6: SG Tube Rupture**

At Lead Evaluators discretion a Steam Generator Tube Rupture will be cued. DB-OP-02000, Section 8 will be implemented. The Plant will be reduced to low level limits and steam flow will be transferred from the Turbine to the Turbine Bypass Valves.

**EVENT 7: ATWS – Key Switch Works**

After Steam Loads are transferred the Reactor Trip Buttons will fail resulting in an ATWS (CT-24). The ATC will activate the key switch which will shut down the reactor.

**EVENT 8: PZR Spray valve fails closed**

The ATC will be directed to reduce RCS pressure to minimum subcooling margin. When this is attempted it will be recognized that the PZR spray valve is failed closed and the alternate PZR Vent Line method will be used. The ATC will control HPI to maintain RCS inventory (CT-5)

When the pressure reduction has begun and HPI has been throttled the scenario can be terminated.



Op Test No.:	2020	Scenario #	4	Event #	2	Page	1	of	1
Event Description:		RC TE3A6 Hot Leg temp to SCM meter (TS)							
Time	Position	Applicant's Actions or Behavior							

<b>Indications Available:</b>		
<ul style="list-style-type: none"> <li>• 4-1-B, SUB COOLING MARGIN LO</li> <li>• RC TE3A6 indicates 899 °F</li> <li>• Subcooling margin meter indicates 0 °F</li> </ul>		
	TEAM	Recognize indications of RC TE3A6 loop 2 Thot PAM failure.
	TEAM	Refer to DB-OP-02004, Reactor Coolant Alarm Panel 4 Annunciators, for 4-1-B <ul style="list-style-type: none"> <li>• Determines subcooling margin is satisfactory</li> <li>• Determines RC TE3A6 loop 2 Thot instrument failure (TI RC3A6, Channel 2 Loop 2 Thot, fails high)</li> </ul>
	SRO	Enter TS 3.3.17 Function 2, Condition A for RC TE3A6 Inoperable Action - Restore within 30 days
	SRO	May refer to TRM 8.3.7 for SCM meter – only 1 channel is required
<b>NOTE:</b>		
<i>There is no procedure direction to reference TS 3.3.17. If necessary, ask this TS reference as a follow-up.</i>		
<i>May refer to the following surveillance tests to evaluate operability of RC TE3A6</i>		
<ul style="list-style-type: none"> <li>• <b>DB-SC-03180, REMOTE SHUTDOWN, POST ACCIDENT MONITORING INSTRUMENTATION MONTHLY CHANNEL CHECK</b></li> <li>• <b>DB-SC-03165, PSAT/TSAT MONTHLY TEST</b></li> </ul>		
<b><i>On Lead Evaluator's discretion, proceed to Event 3, MU32 Fails closed</i></b>		

Op Test No.: 2020 Scenario # 4 Event # 3 Page 1 of 2

Event Description: MU32 Fails closed

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- **MU32 demand rising with no increase in makeup flow**
- **PZR level lowering**

	CREW	Recognize MU flow inappropriate for existing PZR level and MU32 demand signal
	CREW	Dispatch EO and/or I&C to MU32
	<b>BOOTH CUE</b>	<b><i>After 2 minutes EO reports MU32 local position indicates closed, all other indications look normal. I&amp;C does not see anything obvious, will get a work order started to troubleshoot</i></b>
	SRO	Implement DB-OP-02512, Loss of RCS Makeup
	ATC	IF level is below set point by 20 inches then close MU2B using HISMU2B
	ATC	Reduce Letdown flow to a minimum of 25 gpm by throttling MU6 using HCMU6 and verify MU4 is closed
	ATC	Place MU32 in hand (LICRC14) and reduce demand to zero
<b>NOTE:</b>		
<b><i>The crew may elect to use the guidance in DB-OP-02512 Attachment 4 to isolate MU32 and place the alternate injection line in service.</i></b>		
	SRO	REFER TO DB-OP-06006, Makeup and Purification System, Section 4.20, Removal of MU32 from Service for Maintenance.
	ATC	Throttle MU6, LETDOWN FLOW CONTROL, as necessary to maintain a Pressurizer Level band of 210 to 220 inches.



Op Test No.: 2020 Scenario # 4 Event # 4 Page 1 of 2

Event Description: Startup Transformer Lockout

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- 1-1-G SU XFMR 02 LOCKOUT
- 1-2-G SU XFMR 02 DNDR
- ACB 34562 Open
- 81-B-65 Open & 81-B-67 Open

	BOP	Implement DB-OP-02001, Electrical Distribution Panel 1
	CREW	Recognize Startup Transformer 02 Lockout and loss of K bus
	BOP	Check Bus A and B are energized
	ATC/BOP	Verify the following are open: <ul style="list-style-type: none"> <li>• 34562</li> <li>• 81-B-65</li> <li>• 81-B-67</li> <li>• HX02A</li> <li>• HX02B</li> </ul>
	SRO	Notify the Load Dispatcher K Bus is de-energized
	<b>Booth Cue</b>	<b>Role play as Load Dispatcher: "We are sending a crew to investigate"</b>
	SRO	Direct Isolation of SU Transformer 02 <ul style="list-style-type: none"> <li>• Refer to DB-OP-06311, 345KV Switchyard Procedure</li> </ul>
	<b>Booth Cue</b>	<b>Role Play as the Field Supervisor, "Isolate SU Transformer 02 IAW DB-OP-06311"</b>
	BOP/ATC	Dispatch Equipment Operator to investigate S/U Xfmr 02



Op Test No.:	<u>2020</u>	Scenario #	<u>4</u>	Event #	<u>4</u>	Page	<u>2</u>	of	<u>2</u>
Event Description:	Startup Transformer Lockout								
Time	Position	Applicant's Actions or Behavior							

	<b>Booth Cue</b>	<b>Role play as Equipment Operator: "Local Annunciator Alarm (102-7-A) SUDDEN PRESSURE is in alarm. SU Transformer 02 has no visible damage."</b>
	SRO	Implement DB-OP-02521, Loss of AC Bus Power Sources
	SRO	Notify the Shift Manager to perform the following: <ul style="list-style-type: none"> <li>• REFER TO RA-EP-01500, Emergency Classification.</li> <li>• REFER TO NOP-OP1003, Grid Reliability Protocol.</li> <li>• REFER TO NOP-OP-1015, Event Notifications.</li> <li>• REFER TO NOBP-OP-0011, Fleet Reporting and Updates.</li> </ul>
	SRO	Refer to Tech Spec 3.8.1, AC Sources – Operating <ul style="list-style-type: none"> <li>• Enter TS 3.8.1, Condition A</li> <li>• Direct performance of DB-SC-03023, Off-Site Sources</li> </ul>
	<b>SM Cue</b>	<b>Another Operator will ensure completion and review of DB-SC-03023, Off-Site Sources</b>
	SRO	Inform the System Dispatcher to take all necessary steps to restore power to 02 Startup Transformer
	ATC/BOP	Refer to DB-OP-02102, Startup Transformer 02 Alarm Panel 102 Annunciators for alarm 102-7-A (same actions as transformer lockout)
	BOP	Transfer B bus reserve source selector switch to X01
	<b>Booth Cue</b>	<b>If necessary, role play as the Field Supervisor, "IAW DB-OP-06311, Step 3.17.A, verify HS6295, BUS B RESERVE SOURCE, in the X01 position."</b>
<b>When Tech Spec is entered and On Lead Evaluator's direction, proceed to Event 5, MFP low oil pressure - trip MFP, runback works</b>		

Op Test No.: 2020 Scenario # 4 Event # 5 Page 1 of 1Event Description: **MFPT low oil pressure - trip MFP, runback works**

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- 10-1-D, MFPT 2 LUBE OIL PRESS LO
- PI1256, HDR PRESS

	BOP	Implement DB-OP-02010, Feedwater Alarm Panel 10 Annunciators
	BOP	Determine Bearing Pressure is low using PI1256, HDR PRESS
	BOP	Attempt to start standby MFPT 2 Main Oil Pump
	BOP	Start MFPT 2 Emergency Bearing Oil Pump using HIS1188, EMER BEARING OIL PUMP
	BOP	Trip MFPT 2 using HS798, TURBINE TRIP
	CREW	Monitor Plant Runback to 55% power
	SRO	REFER TO DB-OP-06401, Integrated Control System Operating Procedure for plant runback
	SRO	REFER TO DB-OP-06902, Power Operations, for guidance to operate plant equipment for the current power level
	BOP	Dispatch Zone 1 Operator
	<b>Booth Cue</b>	<b>No Indication of oil leaks at MFPT 2</b>
	SRO	Enter TS 3.4.9 Condition A <b>IF</b> Pressurizer water level > 228 inches

**When the plant has stabilized and at Lead Evaluator's direction, proceed to Event 6, Steam Generator Tube Rupture with ATWS**

Op Test No.: 2020 Scenario # 4 Event # 6, 7 & 8 Page 1 of 4

Event Description: Steam Generator Tube Rupture with ATWS and Spray valve failed closed

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- **12-1-B MN STM LINE 2 RAD HI**
- **9-4-A VAC SYS DISCH RAD HI**
- **High activity on condenser off-gas radiation monitors**
- **High activity on either main steam line radiation monitor**
- **Increasing Makeup flow**

Time	Position	Applicant's Actions or Behavior
	CREW	Recognize indications of a tube leak #2 Steam Generator
	SRO	Implement DB-OP-02531, Steam Generator Tube Leak
	ATC	Calculate the RCS Leak rate using the computer calculation for RCS Leakage. (5 minute average preferred)
	SRO	Route to DB-OP-02000, SFAS, RPS, SFRCS Trip or SG Tube Rupture, Section 8
	ATC	Monitor Pressurizer level <ul style="list-style-type: none"> <li>• Anytime Pressurizer level is &lt;100 inches – trip Reactor</li> </ul>
	SRO	Notify the Shift Manager to refer to RA-EP-01500, Emergency Classification
	BOP	Implement Attachment 8, Place MU/HPI/LPI in Service <ul style="list-style-type: none"> <li>• Start the STBY CCW Pump</li> <li>• Start both HPI Pumps</li> <li>• Open HP 2A, HP 2B, HP 2C and HP 2D</li> <li>• Start both LPI Pumps</li> <li>• Open DH 64 and DH 63</li> <li>• Transfer MU Pump suctions to the BWST AND press OFF</li> <li>• Start the STBY Makeup pump</li> <li>• May place Alternate Injection Line in-service</li> </ul>
	ATC	If Pressurizer <200 inches isolate Letdown – Close MU2B

Op Test No.:	<u>2020</u>	Scenario #	<u>4</u>	Event #	<u>6, 7 &amp; 8</u>	Page	<u>2</u>	of	<u>4</u>
Event Description:	Steam Generator Tube Rupture with ATWS and Spray valve failed closed								
Time	Position	Applicant's Actions or Behavior							

	ATC	Place SG/RX in Hand and reduce power to place both SGs on low level limits
	SRO	Direct Chemistry to perform Attachment 2
	SRO	Direct Radiation Protection to perform Attachment 3
	SRO	Direct an Equipment Operator/Field Supervisor to perform Attachment 4
	SRO	Direct startup of the Auxiliary Boiler on Demineralized water and then transfer Auxiliary Steam to the Auxiliary Boiler
	<b>Booth Cue</b>	<b><i>If necessary, role play as EO, " Aux Boiler start-up in progress."</i></b> <b><i>NOTE: Booth operator to prevent Aux Boiler Trip</i></b>
	ATC/BOP	When both SGs on low level limits <ul style="list-style-type: none"> <li>• Verify SG/RX Demand at zero demand (ATC)</li> <li>• Place BOTH SG Feedwater Demands ICS stations in HAND AND reduce the demands to zero</li> <li>• Place Turbine Bypass valves in Hand</li> <li>• Reduce Generator load to less than 50 MWe</li> </ul>
	ATC	Attempt to Trip Reactor at 50 MWe
<b>Critical Task (CT-24)</b>	ATC	Recognize the reactor does not trip and perform DB-OP-02000, Immediate Actions response not obtained <ul style="list-style-type: none"> <li>• At the Rod Control Panel, insert the Reactor Trip Test key <u>AND</u> rotate clockwise to depower the CRDMs</li> </ul>

Op Test No.:	<u>2020</u>	Scenario #	<u>4</u>	Event #	<u>6, 7 &amp; 8</u>	Page	<u>3</u>	of	<u>4</u>
Event Description:	Steam Generator Tube Rupture with ATWS and Spray valve failed closed								
Time	Position	Applicant's Actions or Behavior							

Time	Position	Applicant's Actions or Behavior
	ATC	Complete DB-OP-02000 Immediate Actions <ul style="list-style-type: none"> <li>• Verify power decreasing in the intermediate range</li> <li>• Manually trip the turbine</li> </ul>
	CREW	Implement Specific Rules
	CREW	Check for Symptoms
	SRO	Route to Section 8 for SG Tube Rupture
	BOP	Verify Attachment 8 is complete
	ATC	If Pressurizer Level is less than 40 inches: <ul style="list-style-type: none"> <li>• Lock MU Pump suctions on the BWST</li> <li>• Isolate Letdown</li> <li>• Verify Pressurizer heaters are off</li> </ul>
	ATC	Verify Pressurizer level controller set at 100 inches <b>NOTE: MU 32 failed closed, may use MU 32 Bypass and/or place Alternate Injection Line in service</b>
	SRO	Verify DB-OP-02531 Attachments are in progress <ul style="list-style-type: none"> <li>• Direct Chemistry to perform Attachment 2</li> <li>• Direct Radiation Protection to perform Attachment 3</li> <li>• Direct an Equipment Operator/Field Supervisor to perform Attachment 4</li> </ul>
	ATC	Turn off all Pressurizer heaters
	ATC	When directed use Pressurizer Spray to reduce RCS pressure <ul style="list-style-type: none"> <li>- Recognize the Spray valve is failed closed</li> </ul>

Op Test No.: 2020 Scenario # 4 Event # 6, 7 & 8 Page 4 of 4

Event Description: Steam Generator Tube Rupture with ATWS and Spray valve failed closed

Time	Position	Applicant's Actions or Behavior
	SRO	Route to step 8.25 for using the Pressurizer Vent for RCS pressure reduction
	ATC	Start the Quench Tank Circ Pump
	ATC	Close DR2012A and DR2012B
	ATC	Block SFAS low RCS pressure trips when Block Permits light
	ATC	Reduce RCS pressure to close to the minimum adequate SCM: Pressurizer Vent Line Method <ul style="list-style-type: none"> <li>• Open RC 200</li> <li>• Open RC 239A</li> <li>• Cycle RC 239A and Pressurizer Heaters to control RCS Pressure</li> </ul>
<b>Critical Task (CT-5)</b>	ATC	Throttle High Pressure Injection <ul style="list-style-type: none"> <li>• Control Pressurizer level by controlling MU and HPI</li> </ul>
	CREW	Check for PTS Criteria, REFER TO Specific Rule 5
	BOP	Begin an RCS cooldown AND depressurization at 100°F/hr, using both SGs
<b>When RCS Pressure Reduction and Cooldown have begun, and HPI has been throttled the scenario can be terminated</b>		

## **Justification for Critical Tasks**

The term "Critical Task", is defined in NUREG-1021, OPERATOR LICENSING EXAMINER STANDARDS FOR POWER REACTORS. The listed critical tasks were compiled based on a review of Areva Technical Document 47-1229003-06, EOP Technical Bases Document, and additional CTs were added based on established DB Operations expectations and standards for previously identified Critical Task.

### CT-24: Shutdown Reactor- ATWS

1. Safety Significance:  
When the Reactor is tripped the reactor trip pushbuttons will fail to cause a reactor trip.
2. Cues:
  - Reactor power not lowering on the Intermediate Range
  - DB-OP-02000, Perform RNO IAs for ATWS (Reactor Trip Test Key turned clockwise)
3. Measured by:  
Continuing in EOP with mitigation strategy prior to reactor being tripped
4. Feedback:  
Reactor Power is lowering on the Intermediate Range

### CT-5: Control High Pressure Injection

1. Safety Significance:  
A Steam Generator Tube Rupture will require High Pressure Injection to be placed in service and throttled to prevent violating the RPV P-T Limit by maintaining RCS inventory and minimum subcooling margin
2. Cues:
  - SCM Meters
  - HPI Flow
  - DB-OP-02000 Specific Rule 3
3. Measured by:  
HPI must be throttled prior to violating RV P-T Limit
4. Feedback:
  - SCM Meters
  - Pressurizer level
  - RCS MU Flow

- **SIMULATOR SETUP INFORMATION**

1. Simulator Setup

- 100% Power
- ATWS (Key switch works)
- PZR Spray valve failed closed on Rx trip
- #1 CTMU in service

2. Procedures

- DB-OP-06232 Circ Water and Cooling Tower Operation
- DB-OP-02004, Reactor Coolant Alarm Panel 4 Annunciators
- DB-OP-02512 Makeup and Purification System Malfunctions
- DB-OP-02001, Electrical Distribution Alarm Panel 1 Annunciators
- DB-OP-02521, Loss of AC Bus Power Sources
- DB-OP-06311, 345KV Switchyard Procedure
- DB-OP-02102, Startup Transformer 02 Alarm Panel 102 Annunciators
- DB-OP-02010, Feedwater Alarm Panel 10
- DB-OP-06401, Integrated Control System
- DB-OP-06902, Power Operations
- DB-OP-02531, Steam Generator Tube Leak
- DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture

3. For Simulator Instructor:

- None



**SHIFT MGR / UNIT/FIELD SUPERVISOR/ SHIFT ENGINEER TURNOVER CHECKLIST**

<b>DATE:</b> Today	<b>SHIFT:</b> <u>NIGHTS</u>	<b>MODE:</b> <u>1</u>	<b>POWER:</b> <u>100 %</u>
<b>PROTECTED TRAIN:</b> <u>2</u>			
<b>PLANT RISK:</b> <u>GREEN</u>	<b>SECURITY RISK:</b> <u>YELLOW</u>	<b>GRID RISK:</b> <u>GREEN</u>	

**LICENSE REQUIREMENTS:****CONTINGENCY PLANS IN EFFECT:****OUTSTANDING OPERABILITY EVALUATIONS:****ALARM STATUS:****AT THE CONTROLS RO / ZONE 3 EO****CONTROL ROOM LEVEL 1 WORK AROUNDS****CONTROL ROOM LEVEL 2 WORK AROUNDS****CTRM DEFICIENCIES****GENERAL STATUS**

Maintain 100% power  
 Shift Routines  
 Swap CTMU in preparation for planned maintenance

**ZONE 3 – LEVEL 1 WORKAROUNDS****ZONE 3 – LEVEL 2 WORKAROUNDS****GENERAL NOTES****BALANCE OF PLANT RO / ZONE 1 EO / ZONE 2 EO****GENERAL STATUS****ZONE 1 – LEVEL 1 WORKAROUNDS****ZONE 1 – LEVEL 2 WORKAROUNDS****ZONE 2 – LEVEL 1 WORKAROUNDS****ZONE 2 – LEVEL 2 WORKAROUNDS****GENERAL NOTES**

CCW 1 – 85 °F   CCW 2 – 85 °F   CCW 3 – 110 °F

**Command SRO / Field Supervisor / Shift Engineer Input****CHEMISTRY – STATUS**

Intake Chlorination – Bays 2 & 3   Circwater Chlorination – 1 & 3   Circwater Dynacool – I/S   Sodium Bisulfite – I/S  
 MSD Skid ⇒ I/S   MSR Drains: #1 ⇒ Forward   #2 ⇒ Forward   Polishers I/S – 1,2,3,4

**Evolutions in Progress****Follow-up Items****M&TE Issued for Testing- NOP-WM-5002 Compliance:**

**SHIFT MGR / UNIT/FIELD SUPERVISOR/ SHIFT ENGINEER TURNOVER CHECKLIST**

<b>Specification</b>	<b>Equipment Affected</b>	<b>Date &amp; Time Entered</b>	<b>Action Required</b>	<b>Issue Owner/ Test Leader</b>	<b>Next Action Due/ Responsible Individual</b>

Facility:	Davis-Besse	Scenario No.:	5	Op Test No.:	DB NRC 2020
Examiners:	_____	Operators:	_____		SRO
	_____		_____		ATC
	_____		_____		BOP
Initial Conditions: 100% Power					
Turnover: Maintain 100% Power					
Planned: Routine activities					
Critical tasks:					
1. Isolate Overcooling SG (CT-17)					
2. FW Flow Control (CT-16)					
3. Control RCS Inventory (CT-30)					
Event No.	Malf. No.	Event Type*	Event Description		
1		R-ATC/SRO TS-SRO	D2 Lockout - Power reduction (TS)		
2		C-BOP/SRO	SAC 2 trip (SAC 1 and EIAC Auto start fail)		
3		I-ATC/SRO	Power range (NI5) high failure		
4		I-BOP/SRO TS-SRO	Place RPS Channel 2 in Manual Bypass (TS)		
5		C-ATC/SRO	Turbine Vibration - trip Rx		
6		Major/ALL	OVCLG - MSR 2ND STG FAIL		
7		C-BOP/SRO	AFP Target rock fails open - SG overfeed		
8		C-ATC/SRO	MUP Trip – Loss of Both MUPs		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

## Scenario Event Summary

### **DAVIS-BESSE 2020 NRC SCENARIO 5**

Direction for the crew is to maintain 100% power.

#### **EVENT 1: D2 Lockout - Power reduction due to loss of Cond Pump (TS)**

The lead evaluator will cue event 1, D2 Lockout. The CSRO will implement DB-OP-02521, Loss of AC Bus Sources. The crew will identify a loss of #2 Cond Pump. DB-OP-02504, Rapid Shutdown will be utilized to lower power to within the capacity of two condensate pumps.

#### **EVENT 2: SAC 2 trip (SAC 1 and EIAC Auto start fail) (TS)**

SAC 2 trip will also lose power when Bus D2 is lost. SAC 1 and EIAC fail to Auto start causing entry into DB-OP-02528, Loss of Instrument Air. The BOP will manually start SAC 1 and verify IA pressure recovers. T.S. 3.7.5 for the Motor Driven Feed Pump will be entered.

#### **EVENT 3: Power range (NI5) high failure**

When T.S. 3.7.5 has been entered, the lead evaluator will cue event 3, Power Range Nuclear Instrument NI-5 fails high, which will cause rods to insert due to the ICS system responding to the failed high signal. The crew will take actions to stabilize the plant per abnormal procedure DB-OP-02505, Nuclear Instrument Failures.

#### **EVENT 4: Place RPS Channel 2 in Manual Bypass (TS)**

When the plant is stable, the Unit Supervisor will direct placing RPS Channel 2 in Manual Bypass IAW DB-OP-06403, Reactor Protective System (RPS) and Nuclear Instrumentation (NI) Operating Procedure, and the Power Range Test Module in Test Operate IAW DB-OP-02505, Nuclear Instrumentation Failures. The Unit Supervisor will enter applicable T.S. 3.3.1 for RPS Channel 2 in Manual Bypass.

#### **EVENT 5: Turbine Vibration - trip Rx**

The Lead Evaluator will cue the Main Turbine bearing vibration increase. Annunciator 15-2-E, T-G BEARING VIB HI will alarm. The crew will respond in accordance with DB-OP-02015, Turbine Alarm Panel Annunciators, trip the reactor and GO TO DB-OP-02000, RPS, SFAS SFRCS Trip or SG Tube Rupture.

#### **EVENT 6: OVCLG - MSR 2ND STG FAIL**

Event 6 will be automatically triggered when the reactor trips. The MSR Second Stage Reheat Valves fail to auto close. The crew will identify indications of Overcooling and the Unit Supervisor will route to section 7 for Overcooling. Implementation of attachment 20, Isolate or Control Potential Source of Overcooling, should identify the MSR Second Stage Reheat Valves failing to auto close. MS314 and 199 will not close if attempted to manually close. The crew will then Initiate and isolate SFRCS to terminate the overcooling. (CT-17)

#### **EVENT 7: AFP Target rock fails open - SG overfeed**

AFPT 2 will start and feed at full flow with its discharge valve failed open. The BOP will be required to control SG2 level with AFPT 2 speed control. (CT-16)

#### **EVENT 8: MUP Trip – Loss of Both MUPs**

The Makeup pump (MUP) will trip due to low lube oil pressure at the same time as the Reactor Trip. The STBY MUP will not start. RCS Pressure will be lowered to allow HPI flow to maintain RCS Inventory. (CT-30)

When SG2 level and the Pressurizer level are being controlled the scenario can be terminated.

Op Test No.: 2020 Scenario # 5 Event # 1 and 2 Page 1 of 2

Event Description: D2 Lockout Power Reduction SAC 1 fails to Auto start

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- **0 volts on EI6261**
- **All D2 Bus load and supply breakers open**
- **AD213 Open**

Time	Position	Applicant's Actions or Behavior
	Team	Recognize D2 bus has locked out
	SRO	Route to DB-OP-02521, Loss of AC Bus Sources
	SRO	Notify the Shift Manager to perform the following: <ul style="list-style-type: none"> <li>• REFER TO RA-EP-01500, Emergency Classification.</li> <li>• REFER TO NOP-OP-1015, Event Notifications.</li> <li>• REFER TO NOBP-OP-0011, Fleet Reporting and Updates.</li> </ul>
	TEAM	Review E-1040A, Electrical Distribution Manual to determine what loads have been lost
	TEAM	Recognize loss of Condensate Pump 2 and Heater Drain Pump 2
	SRO	Refer to DB-OP-02504, Rapid Shutdown
	SRO	Determine the power reduction method, target power level, and rate of power reduction for 2 Condensate Pumps
	ATC	Use DB-OP-02504 Attachment 1, Power Reduction Actions ICS Full Automatic to reduce power <ul style="list-style-type: none"> <li>• At the LOAD CONTROL Panel, set the rate of change to the rate specified by the Command SRO</li> <li>• Select the target RTP as determined by the Command SRO</li> <li>• Monitor Reactor Power to confirm power is being reduced at approximately the expected rate</li> </ul>
	ATC	Monitor Regulating Rod Insertion Limits during the Shutdown per Technical Specification 3.2.1



Op Test No.: 2020 Scenario # 5 Event # 3 and 4 Page 1 of 2  
 Event Description: Power range (NI5) high failure and Place RPS Channel 2 in Manual Bypass (TS)

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- Annunciator 5-1-H, RPS Ch 2 Trip
- Annunciator 5-2-H, RPS Hi Flux Trip
- Rods inserting

Time	Position	Applicant's Actions or Behavior
	Crew	Recognize that NI5 has failed high
	SRO	Implement DB-OP-02505, Nuclear Instrumentation Failures
	ATC	<ul style="list-style-type: none"> <li>• Place the Rod Control Panel in MANUAL</li> <li>• Place the Reactor Demand Hand Auto Station in HAND</li> </ul>
	BOP	IF proper RCS Tave control by Feedwater is NOT indicated, THEN, place BOTH Feedwater Loop Demands to HAND AND adjust FW Demand to stabilize RCS Tave
	Crew	Determine which Power Range Nuclear Instrument(s) have failed
	SRO	<ul style="list-style-type: none"> <li>• Enter TS 3.3.1, Condition A for function 1,7, and 8</li> <li>• Refer to TS 3.3.16 (only 3 ARTS Channels required)</li> </ul>
	SRO	Notify SM to refer to reactivity management, event notifications, and Fleet Update requirements
	SRO	Brief contingency actions for Power Range instrument failure <ul style="list-style-type: none"> <li>• RFR will not actuate</li> <li>• TBV Bias for reactor trip will not function</li> <li>• Main FW block valves will not auto close</li> </ul>
	SRO	Enter TS 3.4.9 Condition A <b>IF</b> Pressurizer water level rises to 228 inches during the transient (Pressurizer Level Annunciator comes in at 226 inches)

Op Test No.: 2020 Scenario # 5 Event # 3 and 4 Page 2 of 2  
 Event Description: Power range (NI5) high failure and Place RPS Channel 2 in Manual Bypass (TS)

Time	Position	Applicant's Actions or Behavior
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	SRO	<ul style="list-style-type: none"> <li>Directs placing RPS Ch 2 in Manual Bypass per DB-OP-06403, Reactor Protective System (RPS) and Nuclear Instrumentation (NI) Operating Procedure</li> <li>Directs placing the Power Range Test Module for the affected channel in TEST OPERATE</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Obtain RPS Manual Bypass key and RPS Ch 2 door key</li> <li>Rotate the MANUAL-BYPASS KEY SWITCH to actuate the manual bypass relay in RPS Channel 2</li> <li>Check MANUAL-BYPASS light is BRIGHT</li> <li>Check SUB-SYSTEM light is DIM</li> </ul>
	BOP	Place the Power Range Test Module for NI5 in TEST OPERATE

**NOTE: ICS IS NOT REQUIRED TO BE IN AUTO TO CONTINUE SCENARIO**

	SRO	Directs placing ICS in Auto per DB-OP-06401, Integrated Control System Operating Procedure
	ATC	<ul style="list-style-type: none"> <li>Depress AUTO on HC NI44, ROD CONTROL PANEL</li> <li>Verify Tave at setpoint</li> <li>Depress AUTO on HIC ICS20, REACTOR DEMAND</li> </ul>
	BOP	If necessary, place Feedwater Loop Demands in auto <ul style="list-style-type: none"> <li>Adjust FEEDWATER DEMAND to place measured variable on the caret</li> <li>Press AUTO on FIC ICS32B(A), FEEDWATER DEMAND(S)</li> </ul>

**On Lead Evaluator's discretion, proceed to Event 5, Turbine Vibration – Reactor Trip**



Op Test No.: 2020 Scenario # 5 Event # 5, 6, 7, 8 Page 1 of 4

Event Description: Turbine Vibration - Trip Rx, Overcooling, Overfeed, and Loss of MUPs

Time	Position	Applicant's Actions or Behavior
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**Indications Available:**

- **15-2-E T-G BEARING VIB HI**

	CREW	Recognize Turbine Vibrations increasing
	BOP	Refer to DB-OP-02015, Turbine Alarm panel 15 Annunciators
	BOP	Identify Turbine bearing vibration above 12 mils
	ATC	Trip the reactor GO TO DB-OP-02000, RPS, SFAS SFRCS Trip or SG Tube Rupture. <ul style="list-style-type: none"> <li>• Manually trip the reactor</li> <li>• Verify power decreasing in the intermediate range</li> <li>• Manually trip the turbine</li> <li>• Verify all Turbine Stop Valves OR Control Valves are closed.</li> </ul>
	SRO	Route to DB-OP-02000, Section 3
	SRO/ATC	Verify immediate actions <ul style="list-style-type: none"> <li>• Verify Reactor is tripped</li> <li>• Verify power decreasing in the intermediate range</li> <li>• Verify Turbine is Tripped</li> <li>• Verify all 4 Stop Valves or Control Valves are closed</li> </ul>
	SRO	Route to DB OP 02000, Section 4 Supplemental Actions
	CREW	Implement any necessary Specific Rules Actions <ul style="list-style-type: none"> <li>• ACTIONS FOR LOSS OF SUBCOOLING MARGIN</li> <li>• STEAM GENERATOR CONTROL</li> <li>• POWER FOR C1 AND D1 BUSES OR EDG START</li> </ul>

Op Test No.: 2020 Scenario # 5 Event # 5, 6, 7, 8 Page 2 of 4

Event Description: Turbine Vibration - Trip Rx, Overcooling, Overfeed, and Loss of MUPs

Time	Position	Applicant's Actions or Behavior
	CREW	Implement any necessary Symptom Mitigation Sections <ul style="list-style-type: none"> <li>• Lack of Adequate Subcooling Margin</li> <li>• Lack of Heat Transfer</li> <li>• Overcooling</li> <li>• Steam Generator Tube Rupture</li> </ul>
	ATC	Check for all Group 1-7 Control Rods fully inserted
	ATC	Perform Attachment 1, Primary Inventory Control Actions.
	ATC	<ol style="list-style-type: none"> <li>1. Transfer MU Pump suction to the BWST position AND press OFF for each switch. <ul style="list-style-type: none"> <li>• MU 6405</li> <li>• MU3971</li> </ul> </li> <li>2. Set Pressurizer Level Controller to 100 inches</li> </ol>
	ATC	Recognize MUP 1 tripped <ul style="list-style-type: none"> <li>• Check Component Cooling water is available to the RCPs.</li> <li>• Close MU19.</li> <li>• Close MU32</li> <li>• Attempt to Start the STBY MUP</li> </ul>
	ATC	<ol style="list-style-type: none"> <li>1. Perform Attachment 8, Place HPI/LPI/MU in service to start HPI and LPI.</li> <li>2. Notify the CSRO to reduce RCS pressure using heaters AND spray to 1700 to 1800 psig to allow HPI injection to maintain PZR level.</li> </ol>
	ATC	Verify both HPI Trains are in service as follows: <ul style="list-style-type: none"> <li>• Verify both CCW Trains are in service</li> <li>• Verify both HPI Pumps are running</li> <li>• Verify all HPI Injection valves are open (HP2C HP2D HP2A HP2B)</li> </ul>

Op Test No.: 2020 Scenario # 5 Event # 5, 6, 7, 8 Page 3 of 4

Event Description: Turbine Vibration - Trip Rx, Overcooling, Overfeed, and Loss of MUPs

Time	Position	Applicant's Actions or Behavior
	ATC	Verify both LPI Trains are in service as follows: <ul style="list-style-type: none"> <li>• Verify both LPI Pumps are running</li> <li>• Open both piggyback valves (DH64 DH63)</li> </ul>
<b>NOTE: May use guidance in DB-OP-02512, Makeup and Purification System Malfunctions Attachment 6, RCS Pressure Control After Reactor Trip</b>		
	*Critical Task (CT-30) ATC	Maintain Pressurizer Level <ul style="list-style-type: none"> <li>• Turn off all PZR Heaters.</li> <li>• *Reduce RCS pressure to between 1700 and 1800 psig using RC 2, PZR SPRAY VALVE.</li> <li>• *Throttle HPI flow to maintain Pressurizer level</li> </ul>
	BOP	Perform Attachment 2: SG Inventory and Pressure Control Actions
	BOP	Verify Steam Generator Levels are being controlled per Specific Rule 4, Steam Generator Control.
	BOP	Verify Steam Generator Pressures are being controlled by automatic operation of the TBVs
	BOP	Identify Overcooling
	SRO	Route to Section 7.0 Overcooling
	ATC	Verify Attachment 8, Place HPI/LPI/MU in service
	SRO	Implement Attachment 20, Isolate or Control Potential Source of Overcooling
	BOP	Identify MSR Second Stage Reheat Steam Valves are failed open <ul style="list-style-type: none"> <li>• <b>MS199, MSR 1 REHEAT STEAM SOURCE</b></li> <li>• <b>MS195B, MSR 1 REHEAT STEAM HIGH LOAD</b></li> </ul>



## **Justification for Critical Tasks**

The term "Critical Task", is defined in NUREG-1021, OPERATOR LICENSING EXAMINER STANDARDS FOR POWER REACTORS. The listed critical tasks were compiled based on a review of Areva Technical Document 47-1229003-06, EOP Technical Bases Document, and additional CTs were added based on established DB Operations expectations and standards for previously identified Critical Task.

### CT-17: Isolate Overcooling SG

1. Safety Significance:  
The MSR Second Stage Reheat Valves fail to auto close which causes an overcooling
2. Cues:
  - SG Pressure lowering to less than post trip expected value
  - Turbine Bypass Valves modulate closed
  - DB-OP-02000 Section 7, Overcooling
3. Measured by:  
Manually I&I SFRCS or align valves per Table 1 DB-OP-02000 to isolate overcooling within  $\leq 10$  minutes of SG(s) pressure  $\leq 630$  psig
4. Feedback:
  - SG Pressure
  - Valve indication aligned per Table 1 of DB-OP-02000 such that MSIV of affected SG is closed.

### CT-16: FW Flow Control

1. Safety Significance:  
Control FW to mitigate excessive Pri/Sec heat transfer
2. Cues:
  - SG2 above level setpoint with full Aux Feedwater flow
  - DB-OP-02000 Specific Rule 4
3. Measured by:  
FW flow to the affected SG(s) must be controlled within  $\leq 10$  minutes of SG(s) pressure  $\leq 630$  psig
4. Feedback:
  - Lowering Aux Feedwater flow to SG 2
  - Reduce AFPT 2 speed or AF599 indicating Closed

## **Justification for Critical Tasks**

The term "Critical Task", is defined in NUREG-1021, OPERATOR LICENSING EXAMINER STANDARDS FOR POWER REACTORS. The listed critical tasks were compiled based on a review of Areva Technical Document 47-1229003-06, EOP Technical Bases Document, and additional CTs were added based on established DB Operations expectations and standards for previously identified Critical Task.

CT-30: Control RCS Inventory

1. Safety Significance:  
Control RCS Pressure, HPI, and Letdown such that Pressurizer Level is being maintained to Prevent Degradation of Mitigative Capability of the Plant
2. Cues:
  - Makeup Pump Status
  - DB-OP-02000 Attachments 1, 8 & 13, and Specific Rule 3
3. Measured by:  
Lowering RCS Pressure to allow High Pressure Injection flow into the RCS
4. Feedback:
  - Rising Pressurizer level
  - High Pressure Injection flow into the RCS

## SIMULATOR SETUP INFORMATION

1. Simulator Setup
  - 100% Power
  - 1 and 3 TPCW Pumps in service
  - SFRCS disabled
  - MUP 1 in service
  
2. Procedures
  - DB-OP-02515, Nuclear Instrument Failures Abnormal
  - DB-OP-02526, Primary to Secondary Heat Transfer Upset
  - DB-OP-06403, Reactor Protective System (RPS) and Nuclear Instrumentation
  - DB-OP-06401, Integrated Control System
  - DB-OP-02002, Letdown/Makeup Alarm Panel
  - DB-OP-02512, Makeup and Purification System Malfunctions
  - DB-OP-02504, Rapid Shutdown
  - DB-OP-02000, RPS, SFAS, SFRCS Trip or SG Tube Rupture

**SHIFT MGR / UNIT/FIELD SUPERVISOR/ SHIFT ENGINEER TURNOVER CHECKLIST**

<b>DATE:</b> Today	<b>SHIFT:</b> <u>NIGHTS</u>	<b>MODE:</b> <u>1</u>	<b>POWER:</b> <u>100</u> %
<b>PROTECTED TRAIN:</b> <u>2</u>			
<b>PLANT RISK:</b> <u>GREEN</u>	<b>SECURITY RISK:</b> <u>YELLOW</u>	<b>GRID RISK:</b> <u>GREEN</u>	

**LICENSE REQUIREMENTS:****CONTINGENCY PLANS IN EFFECT:****OUTSTANDING OPERABILITY EVALUATIONS:****ALARM STATUS:****AT THE CONTROLS RO / ZONE 3 EO****CONTROL ROOM LEVEL 1 WORK AROUNDS****CONTROL ROOM LEVEL 2 WORK AROUNDS****CTRM DEFICIENCIES****GENERAL STATUS**

Maintain 100% power  
Shift Routines

**ZONE 3 – LEVEL 1 WORKAROUNDS****ZONE 3 – LEVEL 2 WORKAROUNDS****GENERAL NOTES****BALANCE OF PLANT RO / ZONE 1 EO / ZONE 2 EO****GENERAL STATUS****ZONE 1 – LEVEL 1 WORKAROUNDS****ZONE 1 – LEVEL 2 WORKAROUNDS****ZONE 2 – LEVEL 1 WORKAROUNDS****ZONE 2 – LEVEL 2 WORKAROUNDS****GENERAL NOTES**

CCW 1 – 85 °F   CCW 2 – 85 °F   CCW 3 – 110 °F

**Command SRO / Field Supervisor / Shift Engineer Input****CHEMISTRY – STATUS**

Intake Chlorination – Bays 2 & 3   Circwater Chlorination – 1 & 3   Circwater Dynacool – I/S   Sodium Bisulfite – I/S  
MSD Skid ⇒ I/S   MSR Drains: #1 ⇒ Forward   #2 ⇒ Forward   Polishers I/S – 1,2,3,4

**Evolutions in Progress****Follow-up Items****M&TE Issued for Testing- NOP-WM-5002 Compliance:**



**SHIFT MGR / UNIT/FIELD SUPERVISOR/ SHIFT ENGINEER TURNOVER CHECKLIST**

Specification	Equipment Affected	Date & Time Entered	Action Required	Issue Owner/ Test Leader	Next Action Due/ Responsible Individual