

Facility: ANO-2		Scenario No.: 1		OpTest: 1	
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Examiners:				Operators:	
<p>Objectives:</p> <p>Evaluate NOP usage for plant shutdown. Evaluate AOP usage for charging header flow instrument failure, steam generator level instrument failure, and tornado warning. Evaluate EOP usage for stuck CEAs, loss of offsite power, and a SGTR.</p>					
<p>Initial Conditions:</p> <p>80% MOL Group 6 at 129 inches. Emergency feedwater pump 2P7B tagged out.</p>					
<p>Turnover::</p> <p>Continue plant shutdown due to EFW Pump Operability Tech Spec action 3.7.1.2a. Need to be in HOT SHUTDOWN (200 – 300 degrees) in 8 hours. Must expedite to complete the shutdown and Cooldown within the LCO. The AAC DG out of service to replace main lube oil pump suction filter.</p>					
Event No.	Malf. No.	Event Type*	Event Description		
1 T = 0	None	N (CBOT) R (CBOR)	Continue plant shutdown.		
2 T = 10	2FIS-4863-1	I (CBOR)	Charging header flow instrument fails low.		
3 T = 30	XSG2LT10312	I (CBOT)	Steam generator level instrument fails low.		
T = 35	None		Tornado warning.		
4 T = 40	500LOSE161 500LOSE500 CEA02STUCK CEA66STUCK	M (ALL) C (CBOR)	Loss of offsite power Two CEAs fail to insert on reactor trip.		
5 T = 40	SGBTUBE EFW2P7AESF (New Malf)	M (ALL) C (CBOT)	200 gpm SGTR B SG 2P7A EFW pump fails to autostart on EFAS.		

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

Simulator Instructions for Scenario 1

Override green and white lights for 2HS-0710-A1 and place handswitch in Pull-To-Lock.

Event No.	Malf. No.	Value/ Ramp Time	Event Description
1	None		Continue plant shutdown.
2	2FIS-4863-1 (Override) Trigger = T1	0.0	Charging header flow instrument fails low.
3	XSG2LT10312 Trigger = T3	0.0	Steam generator level instrument fails low.
	None		Tornado warning.
4	CEA02STUCK CEA66STUCK Trigger = T1	0.0 0.0	Two CEAs fail to insert on reactor trip.
5	500LOSE161 500LOSE500 Trigger = T4	True True	Lose of offsite power
6	SGBTUBE Trigger = T2	200 TD 2min	200 gpm SGTR
7	EFW2P7AESF Trigger = T1	True	2P7A EFW pump fails to auto start on EFAS.

Op-Test No.: 1 Scenario No.: 1 Event No.: 1,2 Page 3 of 14 Event Description: Continue plant shutdown and charging header flow instrument failure.		
Time	Position	Applicant's Actions or Behavior
	CRS	Direct plant shutdown per 2102.004.
	CBOT/CBOR	Reduce turbine load to maintain Tave within 2° F of Tref.
	CBOR	Borate and insert CEAs to reduce reactor power.

	CBOR	Announce annunciator 2K12-B3 CHARGING HEADER FLOW LO
	CRS	Implement Loss of Charging AOP 2203.036 and direct board operator actions.
	CBOR	Verify suction and discharge flow path. Identify the Charging Flow not available. Isolate Letdown. Stop all running Charging Pumps. Isolate Charging Suction and Discharge Flowpaths. Check for indications of charging header rupture.
	CRS	Contact WCO to check charging pump for gas binding per Attachment B.
Simulator Operator Cue: When contacted as WCO to perform charging pump venting (Attachment B) then delete Transmitter malfunction and report that I & C Technician had inadvertently opened the equalizing valve for the Charging Flow Transmitter. Transmitter has now been restored to normal. No gas binding had occurred.		
	CRS	Direct SS to reference Chg Pump Tech Specs (3.1.2.1, 3.1.2.2, 3.1.2.3, 3.1.2.4)
	CRS	Enter Tech Spec 3.0.3 due to all Chg Pumps in Stop.

	CRS	Directs CBOR to restore Charging System Lineup.
	CBOR	Establishes suction and discharge paths, start the charging pump, verifies charging flow indication.
	CBOR	Restores Letdown System to operation.
	CRS	Exits Tech Specs.

Termination criteria: Plant shutdown in progress, CVCS restored to operation, or at examiner's discretion.

Event Description: Steam generator level instrument fails low and tornado warning.

Time	Position	Applicant's Actions or Behavior
	CBOR	Announce annunciators: 2K04-A4 CH A RPS/ESF/PRETRIP/TRIP 2K04-B3 PPS Channel TRIP 2K12-K7 DEFAS Trouble
	CRS	Implement Annunciator Corrective Action AOP 2203.012D.
	CBOR	Report A SG level low pretrip/trip on PPS insert.
	CBOT	Compare all four channels and report 2LI-1031-2 indicates zero.
	CRS	Inform SS to refer to Tech Spec 3.3.1.1 and 3.3.2.1 .
	CBOT	Place the following channels in bypass on Channel B: A SG level low A SG level high A SG Δ P - EFAS 1
	CBOR	Verify annunciator 2K04-C3 PPS CHANNEL BYPASSED Verify correct channels in bypass.

Event Description: Steam generator level instrument fails low and tornado warning.

	CRS	Contact maintenance/PS liaison.
Simulator Operator Cue: Call as dispatcher of tornado warning issued for Pope, Yell and Johnson Counties for the next 2 hours.		
	CRS	Implement Natural Emergencies AOP 2203.008 and direct board operator actions. Inform SS to refer to EALs and monitor weather conditions.
	CBOT	Verify at least one EDG not tied to grid and capable of auto start.

Termination criteria: Affected channels placed in bypass, Natural Emergencies AOP implemented, or at examiners discretion.

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. Both HPSI pumps fail to auto start on SIAS.

Time	Position	Applicant's Actions or Behavior
	CBOT	Announce loss of offsite power.
	CBOR	Announce reactor trip.
	CRS	Implement Standard Post Trip Actions, notify operators to monitor Exhibit 7 CBO Reactor Trip Checklist, track safety functions, and direct board operator actions.
	CBOR	<p>Check reactivity control:</p> <p>Reactor power decreasing.</p> <p>Reports CEAs 02 and 66 not inserted.</p> <p>*Perform Emergency Boration per Exhibit 1.*</p>
	CBOT	<p>Check maintenance of vital auxiliaries:</p> <p>Main turbine tripped.</p> <p>Generator output and exciter breakers open.</p> <p>Report no non-vital 4160v and 6900 v buses energized.</p> <p>Both 4160v and 480v vital AC bus energized by DGs.</p> <p>DG SW outlet valves open.</p> <p>Both 125v vital DC bus energized.</p>

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CBOR	<p>Check inventory control: PZR level 16 to 80%. Trend from setpoint. Report SIAS actuated or manually actuates and verify all PZR heaters off when PZR level less than 29%.</p>
	CBOR	<p>Check RCS pressure control: RCS pressure 1800 to 2250 psia. Trend from setpoint Verify SIAS when pressure less than 1717.4 psia.</p>
	CBOR	<p>Check core heat removal by forced circulation: RCP status (All RCPs secured)</p>
	CBOT	<p>Check RCS Heat Removal: Report SG levels and 2P7A failure to start. *Manually opens 2CV-0340-2 to start 2P7A.* Verify MFW in reactor trip override (Both MFPs tripped) Report feedwater line intact. *Report SG pressures (Close MSIVs due to steaming through MSRs)* Use upstream ADVs to control SG pressure.</p>

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Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CBOR	RCS Tcold 540 to 555° F.
	CBOR	<p>Check CNTMT parameters:</p> <p>Temperature less than 140° F.</p> <p>Pressure less than 16 psia.</p> <p>Status of radiation alarms and trends:</p> <ul style="list-style-type: none"> CAMS (2K10-B6) Area radiation (2K11-B10) Process liquid (2K11-C10) Secondary Sys Radiation Hi (2K11-A10) in alarm.
	CBOT	Locally check Secondary Systems Radiation Monitors and report indication of B SG.
	CRS	<p>Notify SS to perform the following:</p> <p>SE report to control room.</p> <p>Announce reactor trip on plant page.</p> <p>Refer to Tech Specs and EALs.</p> <p>Chemist samples SGs for activity and monitor RDACS for offsite dose.</p> <p>Tech Spec 3.8.1.1, 3.0.3, 3.1.1.1 and in Alert Emergency Class</p>
	CRS	<p>Direct CBOs to acknowledge all control room annunciators and announce all significant alarms.</p> <p>Diagnose Steam Generator Tube Rupture.</p>

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CRS	Implement Steam Generator Tube Rupture EOP, open place keeping page, and direct board operator's actions.
	ALL	Perform crew brief and review floating steps.
	CBOR	Verify SIAS and CCAS actuated on PPS.
	CBOR	Check CCW not aligned to RCPs and perform Attachment 6. <ul style="list-style-type: none"> • Verify RCPs secured with spray valves in manual closed. • Close RCP Bleedoff to VCT (2CV-4846-1) • Close RCP Bleedoff to VCT (2CV-4847-2) • Close RCP Bleedoff Relief to Quench Tank (2CV-4856)
	CRS	Contact support operators to complete rest of Attachment 6.
	CBOT	Restore ESF/Non-ESF systems: (Floating Step) <ul style="list-style-type: none"> • SW pump running on each loop. • DG SW outlet valves open. • SW pump suction aligned to Lake. • Report all non-vital buses not energized.

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CBOT	Verify Safety Injection flow to RCS: <ul style="list-style-type: none"> • Check HPSI flow using Exhibit 2. • Check LPSI flow using Exhibit 3.
	CBOR	Check RCS pressure greater than 1400 psia. All RCPs off due to loss of power.
	CBOT	Check IA greater than 65 psig. Unit 1 has no IA for cross connecting.
	CBOT CBOR	Commence RCS cooldown to less than 520° F Thot. (Floating Step) <ul style="list-style-type: none"> • Reset low SG pressure setpoints during cooldown. • Commence Aux Spray to maintain 30 to 45° F MTS. • Monitor and plot cooldown on Attachments 1 and 8. • Initiate cooldown using upstream ADVs. • Close ALL MFW block valves.
	CBOR	Minimize primary to secondary break flow. <ul style="list-style-type: none"> • Maintain RCS MTS 30 to 45° F. • Maintain RCS pressure within 50 psia above B SG pressure. • Depressurize RCS to less than 1000 psia (Continue aux spray and throttle HPSI if criteria met OR cycle PZR high point vents).

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR leak occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CBOT	Determine B SG ruptured by main steam line monitors and SG levels.
	CRS	Contact AO to perform local actions of Attachment 10 and 19 to minimize secondary contamination.
	CBOT	Isolate B SG main steam supply to 2P7A by closing (2CV-1050-2).
	CBOT	Align feedwater and SG blowdown: <ul style="list-style-type: none"> •Close SG blowdown valves (2CV-1016-1) and (2CV-1066-1). •Verify 2P75 secured. (No power available)
	CBOT	Check SG levels greater than 23%. (Floating Step)
	CBOT	Isolate B SG: <ul style="list-style-type: none"> •Monitor RCS Thot. •When Thot less than 520° F, then perform Attachment 10. •Maintain B SG pressure less than 1050 psia using upstream ADV.

Event Description: Tornado strikes 500 KV and 161 KV lines. Two CEAs fail to insert on reactor trip and a 200 gpm SGTR occurs. EFW pump 2P7A fails to auto start on EFAS.

Time	Position	Applicant's Actions or Behavior
	CBOR CBOT	Override HPSI when termination criteria met: (Floating Step) <ul style="list-style-type: none"> • RCS MTS 30° F or greater. • PZR level greater than 29% and controlled. • RVLMS LVL 03 or higher indicates WET. • At least one SG available – Level 10 to 90% with FW available OR level being restored with FW flow greater than 485 gpm. Throttle HPSI flow OR place HPSI pump in PTL as needed to control RCS pressure, inventory, and heat removal.

Termination criteria: B SG isolated, cooldown in progress with HPSI throttled or at examiner's discretion.