SIMULATOR
EXAMINATION SCENARIO GUIDE

SCENARIO TITLE:	ESG-5 [AB.PZR-1, AB.NIS-1, AB.CN-1, TRIP-2, FRHS-1 with SGFP Recovery]
SCENARIO NUMBER:	17-01 NRC-4
EFFECTIVE DATE:	See Approval Dates Below
EXPECTED DURATION:	60 minutes
REVISION NUMBER:	06
PROGRAM:	[ ] **L.O. REQUAL**
	[X] **INITIAL LICENSE**
	[ ] **STA**
	[ ] **OTHER** _____

Revision Summary:

- Rev. 04 (5-30-18) (formerly ESG-1708) Updated for 2018 Annual Exam. Modified malfunctions to include 21 SG NR level channel failure to exercise Tech Specs and 23 AFW pump fails to auto start and then subsequently trips for loss of all AFW flow. Incorporated comments from validation.
- Rev. 05 (10-4-18) Modified ESG-1814 for 17-01 NRC Exam. Deleted the following: CCW pump trip and SG NR level failure. Added PZR PORV leak, 2N41 fails high, Loss of 2A 4KV Vital Bus, and 23 AFW pump auto start failure with subsequent trip on overpseed.
- Rev. 06 (12-4-18) Incorporated NRC prep week comments. Added step & note that AFD deviation penalty minutes may be accrued, added role play for 2SW26, added NRC ES-D-1 form to Attach 4, minor editorial changes.

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APPROVED BY:	McHugh **Operations Training Manager**	12/11/18 **Date**
APPROVED BY:	MEN S **Facility Representative**	12/7/18 **Date**

SCAN OF SIGNED SCENARIO COVER SHEET

I. OBJECTIVES

1. Given the indications of a PZR PORV leak, perform actions as the the nuclear control operator to RESPOND to the malfunction in accordance with approved station procedures.
2. Given the indication of a PZR PORV leak, DIRECT the response to the PZR PORV malfunction in accordance with approved station procedures.
3. Given the indications of a NIS control malfunction, perform actions as the the nuclear control operator to RESPOND to the malfunction in accordance with approved station procedures.
4. Given the indication of a NIS control malfunction, DIRECT the response to the NIS malfunction in accordance with approved station procedures
5. Given the unit at power and a trip of an operating main feedwater pump, take corrective action IAW S2.OP-AB.CN-0001.
6. Given the order or indications of a feedwater or condensate system malfunction, perform actions as the nuclear control operator to RESPOND to the malfunction in accordance with the approved station procedures.
7. Given indication of a feedwater or condensate system malfunction, DIRECT the response to the malfunction in accordance with the approved station procedures.
8. Given the order or indications of a reactor trip, perform actions as the nuclear control operator to RESPOND to the reactor trip in accordance with the approved station procedures.
9. Given indication of a reactor trip, DIRECT the response to the reactor trip in accordance with the approved station procedures.
10. Given the order or indications of a reactor trip, perform actions as the shift technical advisor to RESPOND to the reactor trip in accordance with the approved station procedures.
11. Given the order or indications of a loss of secondary heat sink, perform actions as the nuclear control operator to RESPOND to the loss of heat sink in accordance with the approved station procedures.
12. Given indication of a loss of secondary heat sink, DIRECT the response to the heat sink loss in accordance with the approved station procedures.
13. During performance of emergency operating procedures, monitor the critical safety function status trees in accordance the EOP in effect.

II. MAJOR EVENTS

1. PZR PORV (2PR2) leaks (TS)
2. 2N41 Power Range channel fails high (TS)
3. 21 SGFP trip with failure of Auto MT runback
4. Main Turbine inadvertent trip and failure of Automatic Rx Trip
5. Loss of 2B 4KV Vital Bus (loss of 22 AFW pump)
6. Loss of All AFW Flow using SGFP Prompt Recovery

III. SCENARIO SUMMARY

1. The crew assumes the watch with the unit at 88% power, MOL. 23 Charging pump in service. 21 AFW pump C/T for oil bubbler leak repairs, 21 SI pump C/T for coupling inspection and alignment checks.
2. Shortly after taking the watch, 2PR2 PZR PORV will leak. The crew will recognize elevated PORV tailpipe temperatures and enter **S2.OP-AB.PZR-0001**, Pressurizer Pressure Malfunctions. The crew will isolate the PORVs and identify that 2PR2 is leaking. The crew will isolate 2PR2 by closing 2PR7 block valve. CRS evaluates Tech Specs. (TS)
3. After the crew addresses the leaking PORV; 2N41 Power Range channel will fail high. The operator will recognize rods are stepping in with no turbine runback in progress and respond by placing rods in Manual. The crew will enter **S2.OP-AB.NIS-0001**, NIS Malfunction. The crew will remove the failed NIS channel from service, withdraw rods to restore Tavg to progam, and place rods to Auto. CRS evaluates Tech Specs. (TS)
4. Following the 2N41 channel failure, 21 SGFP develops a high Thrust Bearing Oil pressure condition and automatically trips. The crew recognizes a trip of a main feedpump and responds by performing immediate actions IAW **S2.OP-AB.CN-0001**, Main Feedwater/Condensate Abnormality. The operator recognizes that the Main Turbine failed to runback automatically and responds by manually initiating the turbine runback. The crew will stabilize the unit around 66% by boration and rods.
5. After SG NR levels have returned to > 44%, an inadvertent Main Turbine trip will occur. The crew will recognize that the reactor did not automatically trip. The crew will respond by manually tripping the reactor. **[Critical Task #1]**
6. The crew performs immediate actions in **2-EOP-TRIP-1** and transition to **2-EOP-TRIP-2** with no SI required. After stopping the remaining 22 SGFP, 22 AFW will trip shortly after the reactor was tripped. The operator recognizes no AFW pumps are running and responds by manyally starting 23 AFW pump. After a time delay (30 seconds) the 23 AFW pump will trip resulting in loss of all AFW flow capability. The crew recognizes a total loss of AFW flow and initiates **S2.OP-SO.CN-0007**, Prompt SGFP Recovery, procedure as the crew validates for CFST RED path conditions for Heat Sink to occur. Once the crew validates RED path for Heat Sink, the crew will transition to **2-EOP-FRHS-1,** Loss of Secondary Heat Sink.

7. The crew will perform a **Prompt SGFP Recovery using 22 SGFP** (21 SGFP has trip signal present) while in EOP-FRHS-1 and establish main feed flow to at least one (1) SG to raise Wide Range level. **[Critical Task #2]**
8. The scenario will terminate once main feed flow is established and Wide Range levels is rising in at least one SG.

IV. INITIAL CONDITIONS

____ **IC- 260 (10-10-18)**

PREP FOR TRAINING (i.e. computer setpoints, procedures, bezel covers ,tagged equipment)

Initial	Description
___	1 VC1and VC4 C/T
___	2 RCPs (SELF CHECK)
___	3 RTBs (SELF CHECK)
___	4 MS167s (SELF CHECK)
___	5 500 KV SWYD (SELF CHECK)
___	6 SGFP Trip (SELF CHECK)
___	7 23 CV PP (SELF CHECK)
___	8 **21 SI pump C/T**
___	9 **21 AFW Pump C/T**
___	10 **Examination Team determine appropriate Protected Equipment.**
___	11 Complete Attachment 2 "Simulator Ready-for-Training/Examination Checklist."

Note: Tables with blue headings may be populated by external program, do not change column name without consulting Simulator Support group

EVENT TRIGGERS:

Initial	ET #	Description	
	1	EVENT ACTION: COMMAND: PURPOSE:	MONP254 < 10. //CONT ROD BANK C < 10 (RX TRIP) <update as needed>
	2	EVENT ACTION: COMMAND: PURPOSE:	kb610pbp //23 AUX FEED PUMP-START <update as needed>

MALFUNCTIONS:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Severity
_____ 01	PR0018B PZR PORV 2PR2 DEVELOPS LEAK	N/A	N/A	N/A	RT-1	15000
_____ 02	NI0193A PR CH N41 FAILS HI/LO	N/A	N/A	N/A	RT-2	200
_____ 03	BF0105A 21 STM GEN FEED PUMP TRIP	N/A	N/A	N/A	RT-3	THRUST BEARING PRESSURE HIGH
_____ 04	EH0327 TURBINE FAILS TO RUNBACK ON SGFP TRIP	N/A	N/A	N/A	N/A	
_____ 05	TU0066 MN TURBINE INADVERTENTLY TRIPS	N/A	N/A	N/A	RT-4	
_____ 06	RP0058 FAILURE OF AUTOMATIC RX TRIP	N/A	N/A	N/A	N/A	
_____ 07	RP0059B FAILURE OF MANUAL SI/RX TRIP	N/A	N/A	N/A	N/A	
_____ 08	EL0145 LOSS OF 2B 4160V VITAL BUS	N/A	N/A	N/A	ET-1	
_____ 09	AF0353C 23 AFP FAILURE TO AUTO START ON ANY (ALL) SIGNALS	N/A	N/A	N/A	N/A	
_____ 10	AF0183 23 AUX FW PMP OVERSPEED TRIP	00:00:30	N/A	N/A	ET-2	

REMOTES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition
_____ 01	SJ13D 21 SI PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
_____ 02	SJ14D 21 SI PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED
_____ 03	WD11A 22 GAS DECAY TANK PRESSURE	N/A	N/A	N/A	N/A	20
_____ 04	AF20D 21 AFW PUMP BKR CONTROL POWER	N/A	N/A	N/A	N/A	OFF
_____ 05	AF21D 21 AF PUMP RACK OUT	N/A	N/A	N/A	N/A	TAGGED

OVERRIDES:

SELF-CHECK	Description	Delay Time	Initial Value	Ramp Time	Trigger	Condition/ Severity

OTHER CONDITIONS:

	Description
____	1. None

V. SEQUENCE OF EVENTS

1. State shift job assignments.
2. Hold a shift briefing, detailing instruction to the shift: (provide crew members a copy of the shift turnover sheet).
3. Inform the crew "The simulator is running. You may commence panel walkdowns at this time. SM please inform me when your crew is ready to assume the shift".
4. Allow sufficient time for panel walk-downs. When informed by the SM that the crew is ready to assume the shift, ensure the simulator is cleared of unauthorized personnel.

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
1. PZR PORV 2PR2 leak			
Simulator Operator: Insert **RT-1** on direction from Lead Evaluator. **MALF: PR0018B PZR PORV 2PR2 DEVELOPS LEAK SEVERITY : 15000**			
	RO reports either one of the following parameter changes: lowering PZR pressure, or PORV tailpipe temp has risen, or charging flow rising, or lower spray valve demand, or PRT indications of a 2PR2 leak.		
Evaluator's Note: S2.OP-AB.RC-0001 may be entered if PORV leak is not promptly identified, but AB.PZR should be entered when PORV leak is identified.			
	CRS enters S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction.		
	CRS directs initiation of Attachment 1 CAS.		
	RO reports POPS not in service.		
	RO reports PZR Pressure Control channel has NOT failed.		
	RO reports Master Pressure Controller has NOT failed.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports a spray valve has NOT failed.		
	RO reports a PORV is NOT failed.		
PORV tailpipe temps elevated:			
	RO reports PORV tailpipe temp is elevated.		
	RO closes 2PR6 and 2PR7 and reports tailpipe temp is lowering.		
	RO opens 2PR6 and reports tailpipe temps are lowering or stable.		
	RO opens 2PR7 and reports tailpipe temp is rising.		
2PR2 PORV is isolated:			
	RO closes 2PR7, and reports lowering PORV tailpipe temperature.		
	CRS directs placing 2PR2 in Manual.		
TS evaluation #1:			
	CRS enters TSAS 3.4.5 action a (1 hour LCO). IF RCS pressure < 2185 psig THEN TSAS 3.2.5.b (2 hour LCO) is applicable.		
Evaluator's Note: Tech Specs does not require power removed			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
from PZR Block Valve for excessive seat leakage.			
Proceed to next event after Tech Specs is evaluated or by direction from Lead Evaluator.			
2. 2N41 Power Range Channel fails high			
Simulator Operator: Enter **RT-2** on direction of Lead Evaluator. **MALF: NI0193A PR CH41 Fails High** **Severity: 200**			
	RO reports rods stepping in and no runback in progress		
	RO places rod control in Manual		
	CRS enters S2.OP-AB.NIS-0001, NIS Malfunction. (see Evaluator's Note)		
Evaluator's Note: The crew may enter S2.OP-AB.ROD-0003 which will transition you to AB.NIS-0001			
	RO reports rod control is in Manual		
	PO reports no turbine load change in progess		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports that 2N41 channel is failed high		
	RO reports the following OHA alarms are in: ▪ E-15 PR HI RNG FLUX HI ▪ E-31 PR OVRPWR ROD STOP ▪ E-39 PR CH DEV ▪ E-47 PR NEUT FLUX RATE HI		
	CRS directs PO to remove PR channel from service IAW S2.OP-SO.RPS-0001, NI Channel Trip/Restoration		
Evaluator's Note: Depending how far rods stepped in, the crew may collect penalty deviation minutes for AFD being outside the target band.			
	Crew records AFD penalty deviation minutes IF AFD is outside the target band. [reference TS 3.2.1 surveillance requirement 4.2.1.2]		
Placing 2N41 in Tripped Condition IAW S2.OPSO.RPS-0001, Steps 5.1.1 to 5.1.5:			
	PO ensures that tripping of associated bistable(s) will NOT result in an ESF OR RPS actuation		
	PO ensures 2N41 Channel is NOT selected on NIS Recorder 2NR45		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO ensures Rod Control is in Manual		
TS evaluation #2:			
	CRS enters TSAS 3.3.1.1, Actions 2 and 6 (6 hour LCO) Reactor Trip System Instrumentation for 2N41		
Evaluator's Note: The following steps to remove the NI channel from service are performed in the back rack room area.			
	At NI Rack No. 81, PO performs the following:		
	PO places DETECTOR CURRENT COMPARATOR, UPPER SECTION, switch in PRN41 position AND ENSURE the following: ___ CHANNEL DEFEAT lamp illuminates. ___OHA E-38, UPPER SECT DEV ABV 50% PWR, clears. Note: E-38 was not in.		
	PO places DETECTOR CURRENT COMPARATOR, LOWER SECTION, switch in PRN41 position AND ENSURE the following: ___CHANNEL DEFEAT lamp illuminates.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	___OHA E-46, LOWER SECT DEV ABV 50% PWR, clears. Note E-46 was not in.		
	PO places POWER MISMATCH BYPASS switch in BYPASS PR N41. (Defeats input to Rod Control)		
	PO places ROD STOP BYPASS switch in BYPASS PR N41AND ENSURE the following: ___ 2RP4 - OVER POWER ROD STOP MANUAL BYPASS, CH I is illuminated. ___ OHA E-31, PR OVERPWR ROD STOP, is clear		
	PO places COMPARATOR CHANNEL DEFEAT switch in N41 AND ENSURE the following: ___COMPARATOR DEFEAT lamp is illuminated. ___ OHA E-39, PR CH DEV, is clear		
Evaluator's Note: After the above steps are complete Maintenance support is needed to complete the rest of the procedure for tripping bistables.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Rod control can be placed in Auto at this time if the CRS directs. IF the CRS directs leaving Rods in Manual, then the operator will have to insert rods in Manual or place them Auto following the SGFP trip event coming next.			
Note: S2.OP-SO.RPS-0001 Steps 5.1.6 and 5.1.7 needs Maintenance support			
	CRS directs Maintenance to remove 2N41 channel from service IAW S2.OP-SO.RPS-0001.		
Evaluator's Note: The crew may reset the NI rate Trip for 2N41 to clear OHA for E-47.			
	RO withdraws rods to the ARO position.		
	CRS may elect to restore rod control to Auto or leave in Manual until the bistables are tripped.		
Proceed to next event after rods are withdrawn to ARO or by direction from Lead Evaluator.			
3. 21 SGFP trip with failure of Auto Main Turbine Runback			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Simulator Operator: Insert **RT-3** on direction from Lead Evaluator. **MALF: BF0105A 21 SGFP Trip Final = Thrust Bearing Pressure High**			
	PO reports unexpected console alarm TURB THRUST BEARING OIL PRESSURE HI for 21 SGFP		
Evaluator's Note: The SGFP will auto trip ≈ 1 minute.			
	Crew dispatches NEO to investigate		
	CRS may brief immediate actions of S2.OP-AB.CN-0001 in anticipation of SGFP trip.		
Auto Turbine Runback fails to actuate:			
	PO reports 21 SGFP tripped, and the Main Turbine auto runback has not occurred.		
	CRS directs operators to perform immediate actions of S2.OP-AB.CN-0001.		
Manual initiation of Turbine Runback:			
	PO depresses GO PB on Digital EHC, and reports turbine load reduction in progress.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evaluator's Note: IF rods are in Manual at this point, the CRS may direct rods to be placed in Auto or direct the operator to manually insert rods to restore Tavg to Tref.			
	RO ensures control rods are in Auto and inserts when expected or inserts rods in Manual to restore Tavg to Tref.		
	CRS directs PO to initiate Attachment 1 CAS.		
	PO reports 21 SGFP tripped.		
Role Play: IF an operator was dispatched to investigate why 21 SGFP trip, then report the following after 1-2 minutes; ***21 SGFP has a trip up for SGFP Thrust Bearing Oil Pressure Hi and alarm will not reset.***			
	RO reports Rx power >P-10.		
	RO initiates RCS boration.		
Evaluator's Note: The crew may perform a Rapid Boration in anticipation of receiving RIL Lo-Lo.			
Evaluator's Note: Rapid Boration can be performed using either "Hard Card" Attachments 2 or 3 of			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
S2.OP.SO.CVC-0008.			
	PO ensures 22 SGFP speed rises.		
During validation, SG NR levels turned around 28-29%.			
	PO ensures 21-23 CN108s are open.		
	PO ensures 2CN47 open and ensures 21-24GB4 and 21-24GB185 are closed.		
	PO depresses 21 SGFP TURBINE TRIP bezel pushbutton and verifies AFP AUTO ARMED bezel lit.		
	Crew identifies AFD outside normal band. **Note:** Crew should expect OHA E-16, RIL Lo-Lo, and perform Rapid Boraton IAW S2.OP-SO.CVC-0008.		
	RO energizes all PZR heaters.		
	Crew monitors and maintains AFD within limits.		
	Crew monitors for stable plant conditions.		
Proceed to next event after crew has stabilized the unit <u>and</u> SG NR levels are resotred to >44% or at Lead Evaluators direction.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
4. Main Turbine Trip, Auto Rx Trip Fails, and Loss of 2B 4KV Vital Bus (loss of 22 AFW pump)			
Simulator Operator: Insert **RT-4** at Lead Evaluators direction to initiate Main Turbine Trip. **MALF: TU0066 MN Turbine Inadvertently Trips**			
	RO reports valid demand for Rx trip has occurred with No AUTO Rx trip		
Critical Task #1 (CT-1): Manually trip the Rx from the control room prior to a transition to FRSM-1 being required. **SAT_____ UNSAT_____**			
Manually trips the reactor:			
	RO manually trips the reactor by using either one of the reactor trip pistol grip switches. [Critical Task #1]		
	RO reports the reactor is tripped		
	RO performs Immediate Actions of TRIP-1: -Confirms the Rx trip. -Reports the Main Turbine is tripped and		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	backs up Main Turbine trip. -Reports all 4KV vital busses energized. -Reports SI has not been initiated, reports no demand on 2RP4 or First Out Overhead for a SI, and board indications do not require SI initiation.		
	CRS and RO verify Immediate Actions complete.		
	CRS and RO report that SI is not required		
	CRS transitions to 2-EOP-TRIP-2.		
	RO announces Rx trip on station PA.		
23 AFW pump fails to auto start:			
Simulator Operator: Ensure **ET-1** is TRUE when the Rx is tripped. This will insert MALF for loss of 2B 4KV Vital Bus resulting in loss of 22 AFW pump **MALF: EL0145 Loss of 2B Vital Bus**			
	PO reports that 22 AFW pump did not start due to loss of power and 23 AFW pump did not Auto start.		
Simulator Operator: IF directed, use Remote **AF25D** to remove control power for 22 AFW pump.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Manually start 23 AFW pump:			
	PO manually starts 23 AFW pump.		
Simulator Operator: Ensure **ET-2** is TRUE when the operator starts 23 AFW pump. This will insert malfunction for 23 AFW overspeed trip after time delay. **MALF: AF0183, 23 AFP Overspeed Trip** **Delay = 30 seconds**			
Loss of All AFW Flow capability:			
	PO reports 23 AFW pump started but tripped moments later.		
	PO reports NO AFW pumps are running and total AFW flow is NOT >22E4 lbm/hr.		
Evaluator's Note: During validation time to reach RED path on Heat Sink was ≈ 2-3 minutes from Rx Trip. **EOP-FRHS-1 starts on page 24.**			
	PO reports all BF19's and BF40's are closed		
	PO reports that Tavg is < 554 F and **resets**		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	FW interlock		
Evaluator's Note: IF crew initiates **S2.OP-SO.CN-0007** here then **GO TO page 26** for steps:			
	PO stops 22 SGFP if not tripped (Note: 22 SGFP tripped post Rx Trip during validation on high discharge pressure)		
Evaluator's Note: SGFP high discharge trip will auto clear when the high pressure conditions clears post Rx Trip.			
	PO maintains total AFW flow >22E4 lbm/hr until at least one SG NR level is > 9% (15% adverse), then maintains SG NR levels between 19% and 33%.		
	RO reports all RCPs are running, and RCS Tavg is trending to 547°F.		
	RO reports both Reactor Trip Breakers are open.		
Evaluator's Note: Due to loss of 2B Vital Bus, there will be no power to operate the 21 & 22 BF22's.			
	PO verifies Tavg < 554°F, and closes 21-24BF19, 21-24BF40, and 21-24BF22		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evaluator's Note: Some of the following EOP-TRIP-2 actions may not be performed prior to the transition to FRHS-1 based on scenario timing.			
	RO reports all rods inserted on Rx trip.		
	RO reports PZR level > 17%.		
	RO reports charging is in service and maintains PZR level at 22%.		
	CRS determines no fire on Unit 1.		
	RO reports letdown status.		
	RO reports PZR pressure status.		
	Crew reports when a valid RED path on Heat Sink is present when SG NR levels are <9% with <22E4 lbm/hr AFW flow.		
EOP-FRHS-1 steps here:			
	CRS transitions to 2-EOP-FRHS-1, Loss of Secondary Heat Sink.		
	PO reports it was not operator action which caused total AFW flow to lower < 22E4 lbm/hr.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	RO reports RCS pressure is > all SGs and RCS Thots are > 350°F.		
	CRS reads Bleed and Feed transition criteria.		
Evaluator's Note: Bleed and Feed criteria is 3 WR levels < 20% (25% Adverse)			
	PO closes 21-24GB4 and 21-24SS94 valves are closed.		
	PO reports NO AFW pumps can be started.		
	CRS dispatches operators to investigate cause of AFW pump failures.		
Role Play: IF requested to investigate the status of the AFW pumps, give the following info as applicable, after 2-3 minutes: ***23 AFW pump tripped on overspeed and trip lever can not be reset; 21 AFW pump will take 1 hour to backout of the maintenance.***			
	RO stops all RCPs.		
	CRS dispatches operator to start the MSPI AFW pump IAW SC.OP-SO.AF-0001.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Role Play: After 1-2 minutes, call back to control room to state the following: ***the MSPI AFW Diesel started but tripped moments later on overspeed.***			
	PO reports condensate system is in operation.		
EOP-FRHS-1 SGFP Prompt Recovery actions start here:			
	PO reports 22 SGFP is available.		
	RO reports SI has not actuated.		
Evaluator's Note: To expedite this task, the operator can request permission from the CRS to use two hands to adjust the BF19 & BF40 demands or use of two operators.			
	PO sets all BF19 and BF40 demands to zero.		
	RO resets FW interlock (if not previously performed).		
Evaluator's Note: Due to loss of 2B Vital Bus, there will be no OPEN indication for 21 & 22 BF13's.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
These valves have not been closed and remain in their last known position which is OPEN.			
	PO reports all BF13s are open. (see Note)		
Evaluator's Note: Due to the loss of 2B Vital Bus, there will be no indication for 23 & 24 BF22's. Since the BF22's were not closed, the last known position is in the RELEASE position.			
	PO releases selected BF22s (see Note)		
Role Play: IF directed to check the local position of 2SW26, SW to Turbine Area Header Isolation Valve, **THEN *report that the 2SW26 valve is fully open.***			
S2.OP-SO.CN-0007 Prompt Recovery Steps start here using 22 SGFP only:			
	PO starts 22 SGFP IAW S2.OP-SO.CN-0007, Prompt Recovery From SGFP Trip.		
	PO verifies prerequisites are met. (this should include dispatching an operator to check for alarms locally at the the feedpump)		
	PO determines that section 4.1, Reset SGFPs Trips from the Ovation Controller Station on		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	Panel 2RP7 is NOT required based on no indications of Overspeed, Rate or Silent Trips.		
Role Play: If dispatched by control room, report that no alarms or trip signals are present on the local alarm panel for 22 SGFP and walk around looks good for a start.			
Relatching SGFP section 4.2:			
	PO reports all SGFP trip signals are clear.		
	PO reports that SGFP suction pressure > 350 psig.		
	PO reports 21 and 22 SGFP SPEED CONTROLLERs are in MANUAL and Output is set to 0%		
	PO reports 21 and 22 SGFP SPEED CONTROLLER Speed setpoint is set to 0 rpm.		
	PO reports no trip signals present for 22 SGFP. (**see previous Role Play if needed**)		
	PO reports that 22 SGFP MODE is selected to 22 SGFP SPEED SETTER on the MASTER SGFP SPEED CONTROLLER.		
	PO opens 22TD24 and verifies 22CN36 is open.		
	PO determines casing DT is < 40 F.		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
	PO depresses MODULATE RECIRC VALVE pushbutton and reports 22BF32 RECIRC is open		
	PO reports all permissives to latch SGFP are met.		
	PO depresses TURBINE LATCH pushbutton and reports 22 SGFP is latched.		
	PO ensures 22 SGFP SPEED CONTROLLER Speed setpoint is set to 0 rpm		
	PO places 22 SGFP SPEED CONTROLLER in AUTO		
	PO adjusts 22 SGFP SPEED CONTROLLER Speed setpoint to 1100 rpm		
	PO dispatches field operator to MONITOR pump during warmup for rubbing, vibration and unusual noises		
Role Play: When dispatched to monitor 22 SGFP, report after 1 minute no rubbing, vibration or unusual noises from 22 SGFP.			
Feeding SGs with 22 SGFP section 4.3:			
	PO ensures 21 and 22 CN48s are closed		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evalautor's Note: Due to the loss of power, the 21 & 22 BF13's and BF22's have no indications. These remain in their last known position and feed flow path is available.			
	PO reports 21-24 BF13s are open		
	PO reports 21-24 BF22's are open		
	PO slowly adjusts 22 SGFP PUMP SPEED controller to 3960-3980 rpm and verifies differential pressure is > 50 psid.		
	PO places BF19 or BF40 controllers to MANUAL AND ensures 0% demand.		
	RO resets FW INTERLOCK on Train A and B		
	PO adjusts the demand on the selected BF19 or BF40 AND feeds at the desired rate.		
Evaluator's Note: Approx. 40% demand on a BF40 will result in ≈ 6 % main feed flow. **6% main feedflow is ≥ 22E4 lbm/hr.**			
	PO closes 22TD24.		
	PO reports SG NR levels all less than 9% (15% adverse).		

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment
Evaluator's Note: There is no specific direction on how many SGs to establish feed to. Crew can feed all SGs to a rate < 10% feed flow. Use of BF40s is preferred for better flow control.			
Critical Task #2 (CT-43): Establish main feedwater or condensate flow to SG(s) before Bleed and Feed is required. **SAT_____ UNSAT_____**			
	PO reports indications of main feed flow <u>AND</u> SG WR level(s) rising. [Critical Task #2]		
	With Bleed and Feed having NOT been established, CRS returns to procedure in effect (EOP-TRIP-2)		
Lead Evaluator Terminate scenario when crew has established feed flow <u>and</u> SG WR levels are rising <u>or</u> at direction by Lead Evaluator.			

Evaluator/Instructor Activity	Expected Plant/Student Response	SBT LOG	Comment

VI. SCENARIO REFERENCES

1. Alarm Response Procedures (Various)
2. Technical Specifications
3. Emergency Plan (ECG)
4. OP-AA-101-111-1003, Use of Procedures
5. S2.OP-AB.PZR-0001, Pressurizer Pressure Malfunction
6. S2.OP-AB.NIS-0001, NIS Malfunction
7. S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality
8. S2.OP-SO.CN-0007, Prompt Recovery from SGFP Trip
9. 2-EOP-TRIP-1, Rx Trip or Safety Injection
10. 2-EOP-TRIP-2, Rx Trip Response
11. 2-EOP-FRHS-1, Loss of Secondary Heat Sink

ATTACHMENT 1
UNIT TWO PLANT STATUS
TODAY

MODE: 1 POWER: 89.6% RCS BORON: 725 MWe 1080

SHUTDOWN SAFETY SYSTEM STATUS (5, 6 & DEFUELED):

NA

REACTIVITY PARAMETERS

- Power was reduced last shift in preparation for Main Turbine valve testing.
- Control Bank D is at 180 steps.

MOST LIMITING LCO AND DATE/TIME OF EXPIRATION:

- 3.7.1.2.a Action a, 21 AFW pump, 60 hours remain.
- 3.5.2.b Action a, 21 SI pump, 68 hours remain

EVOLUTIONS/PROCEDURES/SURVEILLANCES IN PROGRESS:

- Preparation for Main Turbine valve testing to be performed next shift.

ABNORMAL PLANT CONFIGURATIONS:

CONTROL ROOM:

Unit 1 and Hope Creek at 100% power.
No penalty minutes in the last 24 hrs.

PRIMARY:

- 21 SI pump C/T for coupling inspection and alignment checks

SECONDARY:

- Polisher in service
- Blowdown 35K per loop to 23 Condenser / Flashtank.
- 21 AFW pump C/T for oil bubbler repair.

RADWASTE:

No discharges in progress

CIRCULATING WATER/SERVICE WATER:

ATTACHMENT 2

SIMULATOR READY FOR TRAINING CHECKLIST

____ 1. Verify simulator is in "TRAIN" Load

____ 2. Simulator is in RUN

____ 3. Overhead Annunciator Horns ON

____ 4. All required computer terminals in operation

____ 5. Simulator clocks synchronized

____ 6. All tagged equipment properly secured and documented

____ 7. TSAS Status Board up-to-date

____ 8. Shift manning sheet available

____ 9. Procedures in progress open and signed-off to proper step

____ 10. All OHA lamps operating (OHA Test) and burned out lamps replaced

____ 11. Required chart recorders advanced and ON (proper paper installed)

____ 12. All printers have adequate paper AND functional ribbon

13. Required procedures clean

____ 14. Multiple color procedure pens available

____ 15. Required keys available

____ 16. Simulator cleared of unauthorized material/personnel

____ 17. All charts advanced to clean traces and chart recorders are on.

____ 18. Rod step counters correct (channel check) and reset as necessary

____ 19. Exam security set for simulator

____ 20. Ensure a current RCS Leak Rate Worksheet is placed by Aux Alarm Typewriter

____ With Baseline Data filled out

____ 21. Shift logs available if required

____ 22. Recording Media available (if applicable)

____ 23. Ensure ECG classification is correct

____ 24. Reference verification performed with required documents available

____ 25. Verify phones disconnected from plant after drill.

____ 26. Verify EGC paperwork is marked "Training Use Only" and is current revision.

____ 27. Ensure sufficient copies of ECG paperwork are available.

ATTACHMENT 3

CRITICAL TASK METHODOLOGY

In reviewing each proposed CT, the examination team assesses the task to ensure, that it is essential to safety. A task is essential to safety if, in the judgment of the examination team, the improper *performance or omission of this task by a licensee will result in direct adverse consequences or in* significant degradation in the mitigative capability of the plant.
The examination team determines if an automatically actuated plant system would have been required to mitigate the consequences of an individual's incorrect performance. If incorrect performance of a task by an individual necessitates the crew taking compensatory action that would complicate the event mitigation strategy, the task is safety significant.

I. Examples of CTs involving essential safety actions include those for which operation or correct performance prevents...

- degradation of any barrier to fission product release
- degraded emergency core cooling system (ECCS) or emergency power capacity
- a violation of a safety limit
- a violation of the facility license condition
- incorrect reactivity control (such as failure to initiate Emergency Boration or Standby Liquid Control, or manually insert control rods)
- a significant reduction of safety margin beyond that irreparably introduced by the scenario

II. Examples of CTs involving essential safety actions include those for which a crew demonstrates the ability to...

- effectively direct or manipulate engineered safety feature (ESF) controls that would prevent any condition described in the previous paragraph.
- recognize a failure or an incorrect automatic actuation of an ESF system or component.
- take one or more actions that would prevent a challenge to plant safety.
- prevent inappropriate actions that create a challenge to plant safety (such as an unintentional Reactor Protection System (RPS) or ESF actuation.

ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

SCENARIO IDENTIFIER: 17-01 NRC-4 **REVIEWER:**

Initials	Qualitative Attributes
	1. The scenario has clearly stated objectives in the scenario.
	2. The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue crew into expected events.
	3. The scenario consists mostly of related events.
	4. Each event description consists of: • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point
	5. No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.
	6. The events are valid with regard to physics and thermodynamics.
	7. Sequencing/timing of events is reasonable, and allows for the examination team to obtain complete evaluation results commensurate with the scenario objectives.
	8. The simulator modeling is not altered.
	9. All crew competencies can be evaluated.
	10. The scenario has been validated.
	11. If the sampling plan indicates that the scenario was used for training during the requalification cycle, evaluate the need to modify or replace the scenario.
	12. ESG-PSA Evaluation Form is completed for the scenario at the applicable facility.

ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

Scenario No.: 4 (ESG-5)

Target Quantitative Attributes per Scenario (NRC Form ES-D-1)

Initial Conditions: IC-260: 88% power, MOL; 23 Charging Pump is in service. The following equipment is out of service: 21 AFW pump C/T for oil bubbler leak repair, 21 SI pump C/T for coupling inspection and alignment checks.

Turnover: Reactor power was lowered for preparation for main turbine valve testing. Testing will commence next shift.

Critical Tasks:

1. Manually trip the reactor (see WOG CT-1)
2. Establish main feed water flow to SGs before bleed and feed is required (see WOG CT-43)

Event No.	Malf. No.	Event Type*	Event Description
1	PR0018B	RO (C) SRO (C,TS)	2PR2 PZR PORV leaks (TS exercised)
2	NI0193A	RO (I) SRO (I,TS)	2N41 Power Range channel fails high (TS exercised)
3	BF0105A EH0327	ALL (C)	▪ 21 SGFP trips on turbine thrust pressure high ▪ Failure of Turbine Runback following SGFP trip. Operator can manually initiate runback from control room. ▪ Load reduction to 66% power per AB.CN-0001
4	TU0066	ALL (M)	Inadvertent Main Turbine trip signal
5	RP0058 RP0059B	RO (I) SRO (I)	Reactor fails to auto trip. Operator can manually trip the reactor from control room.
6	EL0145 AF0353C AF0183	PO (I) SRO (I)	▪ Loss of 2B 4K Vital Bus (loss of 22 AFW pump) ▪ 23 AFW pump fails to auto start. Operator can manually start, but will trip shortly after time delay. (loss of all AFW flow)
		ABs	AB.PZR-1 → AB.NIS-1 → AB.CN-1
		EOPs	TRIP-1 → FRHS-1 with prompt SGFP recovery

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

Notes: None

ATTACHMENT 4

SIMULATOR SCENARIO REVIEW CHECKLIST

Scenario No.: 4 (ESG-5)

Target Quantitative Attributes per Scenario (See Section D.5.d)	Actual Attributes	Event No.
1. Total malfunctions (5-8)	5	-
2. Malfunctions after EOP entry (1-2)	1	6
3. Abnormal events (2-4)	3	1,2,3
4. Major transients (1-2)	1	4
5. EOPs entered/requiring substantive actions (1-2)	1	FRHS-1
6. Entry into a contingency EOP with substantive actions (≥ 1 per scenario set)	1	FRHS-1
7. Preidentified critical tasks (≥2)	2	CT-1, CT-43
8. Tech Specs exercised (≥ 2)	2	1,2

ATTACHMENT 5
ESG CRITICAL TASKS

17-01 NRC-4

CT-1 (CT-1):

Critical Task: Trip the Rx prior to a transition to FRSM-1 being required.

BASIS: See WOG Rev. 2

CT-2 (CT-43):

Critical Task: Establish main feedwater or condensate flow to SG(s) before Bleed and Feed is required.

BASIS: See WOG Rev. 2

ATTACHMENT 6

ESG-PRA RELATIONSHIP EVALUATION

EVENTS LEADING TO CORE DAMAGE

Y/N	Event	Y/N	Event
N	TRANSIENTS with PCS Unavailable	N	Loss of Service Water
N	Steam Generator Tube Rupture	N	Loss of CCW
N	Loss of Offsite Power	N	Loss of Control Air
N	Loss of Switchgear and Pen Area Ventilation	N	Station Black Out
N	LOCA		

COMPONENT/TRAIN/SYSTEM UNAVAILABILITY THAT INCREASES CORE DAMAGE FREQUENCY

Y/N	COMPONENT, SYSTEM, OR TRAIN	Y/N	COMPONENT, SYSTEM, OR TRAIN
N	Containment Sump Strainers	N	Gas Turbine
N	SSWS Valves to Turbine Generator Area	N	Any Diesel Generator
N	RHR Suction Line valves from Hot Leg	Y	Auxiliary Feed Pump
N	CVCS Letdown line Control and Isolation Valves	N	SBO Air Compressor

OPERATOR ACTIONS IMPORTANT IN PREVENTING CORE DAMAGE

Y/N	OPERATOR ACTION
N	Restore AC power during SBO
N	Connect to gas turbine
N	Trip Reactor and RCPs after loss of component cooling system
N	Re-align RHR system for re-circulation
N	Un-isolate the available CCW Heat Exchanger
N	Isolate the CVCS letdown path and transfer charging suction to RWST
N	Cooldown the RCS and depressurize the system
N	Isolate the affected Steam Generator that has the tube rupture(s)
N	Early depressurize the RCS
N	Initiate feed and bleed

Complete this evaluation form for each ESG.