

All portions of the operating exam except the Scenarios were given as approved in the final versions. The as-given exam contains only a few operator actions for one or two events in Scenario's 1 and 2 that the crews did not get to perform because the scenario was advanced to the next event and because they were not important to the event credit. Scenario 4 was the spare and was not used.

Facility: <u>San Onofre</u> Examiners: _____ _____ _____	Scenario No.: <u>1</u> Op Test No.: <u>2007 NRC</u> Operators: _____ _____ _____		
Initial Conditions: <ul style="list-style-type: none"> 99.2% power MOC - RCS Boron is 883 ppm (by sample) Train A Component Cooling Water Pump (P025) in service Train A Auxiliary Feedwater Pump (P141) OOS Train A Saltwater Cooling Pump (P307) OOS Condenser Air Ejector Low Range Radiation Monitor (RM-7818) OOS Fire Computer OOS 			
Turnover: Maintain steady-state power conditions			
Critical Tasks: <ul style="list-style-type: none"> Manually trip the Reactor due to Reactor Protection System failure Energize Vital AC Buses A04 and B04 with EDG 2G002 			
Event No.	Malf. No.	Event Type*	Event Description
1 +0 min	RC16B	I (RO, CRS) TS (CRS)	Pressurizer Level Control Channel (LT-0110-2) fails low
2 +10 min	SG05G	I (BOP, CRS) TS (CRS)	Steam Generator E089 NR Level Transmitter (LT-1113-3) fails low
3 +20 min	CV22B	C (RO, CRS)	Charging Pump (P191) trip
4 +25 min	CV02B CV03B RC07B	C (RO, CRS)	Reactor Coolant Pump (P002) lower and middle seal failures, followed by a seized shaft
5 +45 min	RP15	C (ALL)	Automatic Reactor trip failure, manual trip required
6 +50 min	PG24	M (ALL)	Loss of Offsite Power upon Reactor trip
7 +55 min	EG08B	C (BOP)	Diesel Generator (2G003) mechanical failure
8 +55 min	EG07A	C (BOP)	Diesel Generator (2G002) Automatic Voltage Regulator failure
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications			

SCENARIO SUMMARY #1

The crew will assume the watch and maintain steady-state conditions per SO23-5-1.7, Power Operations.

The first event is a Pressurizer Level instrument failure that requires crew actions per the Annunciator Response Procedures (ARPs) and AOI SO23-13-27, Pressurizer Pressure and Level Malfuction. The CRS will evaluate Technical Specifications.

When the CRS completes the evaluation of Technical Specifications, a narrow range level transmitter will fail low on Steam Generator E-089. The crew will diagnose a level transmitter failure per the ARPs and AOI SO23-13-18, Reactor Protection System Failure/Loss of Vital Bus, and are required to bypass the effected Functional Units using SO23-3-2.12, Reactor Protective System Operation. The CRS will evaluate Technical Specifications.

When appropriate Functional Units are bypassed, Charging Pump P191 will trip and the operator should start Charging Pump P192 before Letdown isolates. RO actions are addressed per the ARPs and SO23-3-2.1, Chemical and Volume Control System Operations.

When plant conditions are stable, Reactor Coolant Pump P002 will sustain a failure of the lower and middle seals, requiring entry into AOI SO23-13-6, Reactor Coolant Pump Seal Failure. Once the diagnosis is made the RCP shaft will seize. The RO will diagnose the seized shaft and determine that a Reactor trip is required. The automatic Reactor trip failure will require a manual trip by the crew.

A Loss of Offsite Power will occur following the manual trip. The crew will respond per EOI SO23-12-1, Standard Post Trip Actions. Following the trip a mechanical failure of Emergency Diesel Generator 2G003 will occur and a voltage regulator setpoint failure of Emergency Diesel Generator 2G002 will also occur. The ACO must adjust 2G002 voltage in order for the output breaker to close and reenergize Bus 2A04. When SPTAs are complete, the crew will transition to EOI SO23-12-7, Loss of Forced Circulation / Loss of Offsite Power.

Event termination will occur once the crew commences recovery of offsite power.

Risk Significance:

- | | |
|---|---|
| • Risk important components out of service: | AFW Pump P141; SWC Pump P307 |
| • Failure of risk important system prior to trip: | Loss of two Charging Pumps |
| • Risk significant core damage sequence: | Failure to recover from LOOP |
| • Risk significant operator actions: | Station Blackout due to EDG voltage regulator failure |

SONGS
2007 Facility NRC Initial License Examination
Simulator Scenario Setup
Scenario #1

MACHINE OPERATOR'S INSTRUCTIONS

SETUP

Machine Operator: - RESTORE to IC-176

- EXECUTE NRC Scenario #1 SETUP file to align components
- ENSURE Control Board Tags are hung on 2P307 and 2P141
- ENSURE both Pressurizer Spray Valves are in Automatic, with setpoint at 2250
- ENSURE Train A Bypass Panel Manual PB is depressed for Emer. Feedwater
- ENSURE CVOL is set within 10% above Turbine Governor Reference Demand
- ENSURE the following procedures are on the CO desk:
 - SO23-5-1.7, open to Step 6.4

Control Room Annunciators in Alarm at 100%:

57A58 - EMERGENCY FEEDWATER SYS TRAIN A INOPERABLE

Insert copy of Event File printout here

Procedures Used

SO23-5-1.7

SO23-3-2.1

SO23-3-2.12

AOIs

SO23-13-6

SO23-13-18

SO23-13-27

EOIs

SO23-12-1

SO23-12-7

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>1</u>	Page	<u>4</u>	of	<u>19</u>
Event Description:		Pressurizer Level Control Channel (LT-0110-2) Fails Low							
Time	Position	Applicant's Actions or Behavior							

Machine Operator: When directed, EXECUTE Event 1
RC16B (LT-0110-2 PZR Level Controlling Channel Y fails low)

Indications available:

50A03 - PZR LVL LO-LO

50A23 - PZR LVL ERROR LO

Letdown flow DECREASING

Charging Pumps auto start

	CO	Refer to Annunciator Response Procedures.
	CO	Observe maximum Charging flow and minimum Letdown flow.
	CO	Observe all Pressurizer heaters de-energized.
	CO	Determine Letdown and Charging systems are NOT responding as desired and perform the following:
		<ul style="list-style-type: none"> Depress the A/M button on LIC-0110, PZR Level Controller, to place PZR level control in MANUAL.
		<ul style="list-style-type: none"> STOP Charging Pumps to match Letdown flow as closely as possible.
		<ul style="list-style-type: none"> Adjust LIC-0110, PZR Level Controller, to match Letdown and Charging flows.
		<ul style="list-style-type: none"> Monitor PZR level and maintain stable.
	CO	Determine that PZR Level Channel Y (LI-0110A2) is cause of failure and INFORM the CRS AOI SO23-13-27 entry required.

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>1</u>	Page	<u>5</u>	of	<u>19</u>
Event Description:		Pressurizer Level Control Channel (LT-0110-2) Fails Low							
Time	Position	Applicant's Actions or Behavior							

	CRS	Direct performance of AOI SO23-13-27, Pressurizer Pressure and Level Malfunction, to transfer PZR Level Control to the operable transmitter.
	CO	Verify Level Channel X (LI-0110X) is operable.
	CO	Ensure LIC-0110 is in MANUAL with stable Letdown flow.
	CO	Position HS-0110, PZR Level Channel Select switch, to Channel X.
	CO	On LIC-0110 (page 1), match actual level (middle column) with the Pressurizer Level setpoint (left column) by adjusting the output (right column) to within 2%.
	CO	Transfer LIC-0110 PZR Level Controller to AUTO by depressing the A/M pushbutton.
	CO	Depress HS-0100C, PZR Lo-Lo Level Heater Cutout Channel selector, selecting operable Level Transmitter X.
	CO	Reset PZR heaters by depressing OFF, then AUTO.
	CO	Restore Backup Charging Pumps to AUTO.

Op Test No.:	<u>NRC</u>	Scenario #	<u>1</u>	Event #	<u>1</u>	Page	<u>6</u>	of	<u>19</u>
Event Description:		Pressurizer Level Control Channel (LT-0110-2) Fails Low							
Time	Position	Applicant's Actions or Behavior							

	CRS	Evaluate Technical Specifications
		<ul style="list-style-type: none"> 3.3.11 Post Accident Monitoring Instrumentation
		<ul style="list-style-type: none"> ACTION A - Restore required channel to OPERABLE status within 30 days
		<ul style="list-style-type: none"> 3.4.9 Pressurizer Heaters
		<ul style="list-style-type: none"> ACTION B - Restore required group of Pressurizer Heaters to OPERABLE status within 72 hours
<p><i>When Technical Specifications have been addressed, or at Lead Evaluator's discretion, proceed to Event 2.</i></p>		

Op Test No.: NRC Scenario # 1 Event # 2 Page 7 of 19

Event Description: Steam Generator E089 NR Level Transmitter (LT-1113-3) Fails Low

Time	Position	Applicant's Actions or Behavior
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Machine Operator: When directed, EXECUTE Event 2
SG05G (LT-1113-3 S/G E089 Level Instrument fails low)

Indications Available:**52A06 - SG1 E089 LEVEL HI/LO****52A07 - FWCS SG1 E089 LEVEL DEVIATION**

	ACO	REFER to Annunciator Response Procedures.
	ACO	IDENTIFY failed transmitter is E089 NR Level Transmitter Channel "C", 2LT-1113-3.
	CRS	DIRECT performance of AOI SO23-13-18, Reactor Protection System Failure.
	CRS	IDENTIFY a Single PPS Channel failed.
	CRS	IDENTIFY Affected Functional Units for Channel "C", using Attachment 5 of AOI SO23-13-18.
		• S/G 1 Level - Low (RPS)
		• S/G 1 Level - High (RPS)
		• S/G 1 Level - High (DEFAS-1)
		• S/G 1 Delta-P (EFAS 1)
	CRS	DIRECT placing the affected Functional Unit in BYPASS per SO23-3-2.12, Section for Bypass Operation of Trip Channels.

Op Test No.: NRC Scenario # 1 Event # 2 Page 8 of 19

Event Description: Steam Generator E089 NR Level Transmitter (LT-1113-3) Fails Low

Time	Position	Applicant's Actions or Behavior
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	CO	CONTACT an outside operator to place the Affected Functional Units in Bypass per SO23-3-2.12, Reactor Protective System Operation.
M.O. Cue: When outside operator is contacted to bypass the associated trips, wait 3 minutes and then call when ready to begin. When directed, EXECUTE individual events for Bypassing RPS Trips.		
	CRS	CONFIRM failure does NOT affect RPS/ESFAS matrix or logic.
	CRS	CONFIRM failure does affect Feedwater Digital Control System
	ACO	<ul style="list-style-type: none"> BYPASS 2LT-1113-3 per SO23-3-2.38, Section for Bypassing Selected Feedwater Control Signals.
	CRS	Evaluate Technical Specifications.
		<ul style="list-style-type: none"> LCO 3.3.1 RPS Instrumentation - Operating
		<ul style="list-style-type: none"> ACTION A - Place channel in Bypass or Trip within 1 hour
		<ul style="list-style-type: none"> LCO 3.3.5 ESFAS Instrumentation - Operating
		<ul style="list-style-type: none"> ACTION A - Place channel in Bypass or Trip within 1 hour
<i>When Technical Specifications have been addressed, or at Lead Evaluator's discretion, proceed to Event 3.</i>		

Op Test No.: NRC Scenario # 1 Event # 3 Page 9 of 19

Event Description: Charging Pump P191 Failure

Time	Position	Applicant's Actions or Behavior
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Machine Operator: When directed, EXECUTE Event 3
CV22B (Charging Pump P191 Trip)

Indications Available:

	CO	REFER to Annunciator Response Procedures
	CO	DETERMINE Charging Pump P191 is tripped and INFORM the CRS
	CRS	DIRECT placing a Standby Charging Pump P190 (or P192) in service
	CO	START Charging Pump P190 (or P192)
	CO	PLACE Charging Pump P191 in MANUAL and STOP
	CRS	DISPATCH a PEO to the 50' Control Building to determine the cause of the trip and DIRECT performance of SO23-3-2.1, CVCS Operations to align systems to normal

M.O. Cue: When directed to check Charging Pump 2P191, WAIT 3 minutes, then REPORT that the motor is hot and has an odor of burnt insulation.

Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> 3 </u> Page <u> 10 </u> of <u> 19 </u>		
Event Description: Charging Pump P191 Failure		
Time	Position	Applicant's Actions or Behavior

	CRS	CONTACT Maintenance to investigate Charging Pump P191
M.O. Cue:	If Maintenance is called to directed to investigate P191, WAIT 3 minutes and then call back and recommend racking out the breaker.	
M.O. Cue:	When directed to rack out Charging Pump 2P191 breaker (2B0405), WAIT 2 minutes, then EXECUTE Event for racking out the breaker (CV77B, DC power on Train A and CV78B, P191 Breaker), and REPORT that P191 breaker is racked out.	
<i>When systems are re-aligned to normal and Technical Specifications have been addressed, or at the Lead Evaluator's discretion, PROCEED to Event 4.</i>		

Op Test No.: NRC Scenario # 1 Event # 4 Page 11 of 19

Event Description: RCP P002 Seal Failures / Seized Shaft

Time	Position	Applicant's Actions or Behavior
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Machine Operator: When directed, EXECUTE Event 4
 CV02B (P002 Lower Seal Failure at 100%)
 CV03B (P002 Middle Seal Failure at 100%, 2 minute delay)
 RC07B (P002 Seized Shaft, 5 minute delay)

Indications available:
 56C30 - RCP P002 SEAL PRESSURE HI/LO (after Lower Seal Failure)
 56B57 - RCP BLEED-OFF FLOW HI/LO (after Middle Seal Failure)

	CO	REFER to Annunciator Response Procedures.
	CRS	DIRECT performance of AOI SO23-13-6, Reactor Pump Seal Failure.
	CO	DETERMINE RCP P002 Lower Seal failure using AOI SO23-13-6, Attachment 1.
	CRS	CONTACT Maintenance Engineering for evaluation
	CRS	DIRECT monitoring of RCP P002 indications
M.O. Cue: Ensure RCP P002 Middle Seal Failure (CV03B) automatically occurs 2 minutes after Event 5 initiation.		
	CRS	RETURN to AOI SO23-13-6, step 1, to re-diagnose failure.
	CO	DETERMINE RCP P002 Lower and Middle Seal failures using AOI SO23-13-6, Attachment 1.
	CRS	DIRECT initiation of a plant shutdown per SO23-5-1.7, Power Operations.

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 12 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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Machine Operator: Ensure Events 5, 6, 7, and 8 actuate

	ANY	RECOGNIZE that a Reactor Trip condition exists, and a trip did not occur.
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Note: A Loss of Edison Grid will occur 2 minutes after the Reactor Trip.

	ANY	RECOGNIZE that a Reactor Trip condition exists, and a trip did not occur.
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Critical Task Statement

Manually trip the Reactor due to Reactor Protection System failure, within 1 minute of reactor trip criteria being exceeded.
Elapsed Time: _____

Critical TaskCO/
ACO

MANUALLY TRIP the Reactor.

Note: The operators will need to depress all four Reactor Trip pushbuttons to cause all 8 RTCBs to open.

	CRS	ENTER EOI SO23-12-1, Standard Post Trip Actions.
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Note: A Loss of Edison Grid will occur 2 minutes after the Reactor Trip.**Note: The operators will need to depress all four Reactor Trip pushbuttons to cause all 8 RTCBs to open.**

	CO	VERIFY Reactor Trip:
		<ul style="list-style-type: none"> • VERIFY Reactor Trip Circuit Breakers (8) - open • VERIFY Reactor Power <ul style="list-style-type: none"> ○ Lowering
		AND

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 13 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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		<ul style="list-style-type: none"> ○ Startup Rate - negative
		<ul style="list-style-type: none"> • VERIFY maximum of one full length CEA - NOT fully inserted
	ACO	VERIFY Turbine trip:
		<ul style="list-style-type: none"> • VERIFY Main Turbine tripped
		<ul style="list-style-type: none"> ○ HP and LP Stop and Governor valves - closed
		<ul style="list-style-type: none"> • VERIFY both Unit Output Breakers - open
		<ul style="list-style-type: none"> • VERIFY Main Turbine speed
		<ul style="list-style-type: none"> ○ Less than 2000 RPM
		OR
		<ul style="list-style-type: none"> ○ Lowering
	CRS	INITIATE Administrative Actions:
		<ul style="list-style-type: none"> • ANNOUNCE Reactor trip via PA system
		<ul style="list-style-type: none"> • INITIATE Attachment 4, WORKSHEET
		<ul style="list-style-type: none"> • INITIATE Attachment 5, ADMINISTRATIVE ACTIONS

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 14 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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	ACO	DETERMINE that Vital Auxiliaries are NOT functioning properly:
		<ul style="list-style-type: none"> DETERMINE that both 1E 4kV Buses are NOT energized
Critical Task Statement		Energize Vital AC Buses A04 and B04 with EDG 2G002, prior to 2G002 automatically tripping.
Critical Task		<ul style="list-style-type: none"> [RNO] DETERMINE that 2G002 is running and ADJUST 2G002 Voltage Regulator to ~4.36kV and ENSURE output breaker closes
		<ul style="list-style-type: none"> [RNO] DETERMINE that 2G003 is tripped and has a mechanical failure
		<ul style="list-style-type: none"> [RNO] Place 2G003 in Maintenance Lockout
		<ul style="list-style-type: none"> [RNO] INITIATE Attachment 2, Diesel Generator Failure Follow-up Actions, for EDG 2G003.
		<ul style="list-style-type: none"> DETERMINE that 1E 480V Bus 2B06 is NOT energized (RNO actions already initiated)
		<ul style="list-style-type: none"> VERIFY all Class 1E DC Buses - energized
		<ul style="list-style-type: none"> DETERMINE that all Non-1E 4kV buses are de-energized
		<ul style="list-style-type: none"> [RNO] DETERMINE that all Circulating Water Pumps are off <ul style="list-style-type: none"> [RNO] CLOSE MSIVs [RNO] OPERATE ADVs at 1000 PSIA in Auto/Modulate
		<ul style="list-style-type: none"> DETERMINE that NO CCW Train is operating
		<ul style="list-style-type: none"> [RNO] START CCW Pump P025, and ENSURE aligned to Non-Critical Loop and Letdown Heat Exchanger
M.O. Cue: If directed to investigate 2G003, wait 3 minutes and report that the diesel is NOT running and that there is a large amount of oil on the diesel room floor.		

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Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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	CO	VERIFY RCS Inventory Control criteria satisfied:
		<ul style="list-style-type: none"> VERIFY PZR level
		<ul style="list-style-type: none"> Between 10% and 70%
		AND
		<ul style="list-style-type: none"> Trending to between 30% and 60%
		<ul style="list-style-type: none"> VERIFY Core Exit Saturation Margin - greater than or equal to 20°F
		<ul style="list-style-type: none"> QSPDS page 611
		<ul style="list-style-type: none"> CFMS page 311
	CO	VERIFY RCS Pressure Control criteria satisfied:
		<ul style="list-style-type: none"> VERIFY PZR pressure (WR and NR)
		<ul style="list-style-type: none"> Between 1740 PSIA and 2380 PSIA
		AND
		<ul style="list-style-type: none"> Trending to between 2025 PSIA and 2275 PSIA
	CO	DETERMINE that Core Heat Removal criteria is NOT satisfied:
		<ul style="list-style-type: none"> DETERMINE that NO RCPs are operating
		<ul style="list-style-type: none"> VERIFY Core Exit Saturation Margin - greater than or equal to 20°F
		<ul style="list-style-type: none"> QSPDS page 611
		<ul style="list-style-type: none"> CFMS page 311

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 16 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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	ACO	VERIFY RCS Heat Removal criteria satisfied:
		<ul style="list-style-type: none"> Verify at least one SG level
		<ul style="list-style-type: none"> Between 21% NR and 80% NR
		AND
		<ul style="list-style-type: none"> Feedwater available
		<ul style="list-style-type: none"> [RNO] ENSURE EFAS actuated
		<ul style="list-style-type: none"> VERIFY heat removal adequate
		<ul style="list-style-type: none"> RCS Tc - trending to between 545°F and 555°F
		<ul style="list-style-type: none"> VERIFY S/G Pressures - approximately 1000 PSIA
	CO	VERIFY Containment Isolation criteria satisfied:
		<ul style="list-style-type: none"> VERIFY Containment pressure - less than 1.5 PSIG
		<ul style="list-style-type: none"> VERIFY Containment Area Radiation Monitors
		<ul style="list-style-type: none"> Energized
		AND
		<ul style="list-style-type: none"> Not alarming or trending to alarm
		<ul style="list-style-type: none"> VERIFY Secondary Plant Radiation Monitors
		<ul style="list-style-type: none"> Energized
		AND
		<ul style="list-style-type: none"> Not alarming or trending to alarm
	CO	VERIFY Containment Temperature, Pressure and Combustible Gas Control criteria satisfied:
		<ul style="list-style-type: none"> VERIFY Containment average temperature - less than 120°F
		<ul style="list-style-type: none"> VERIFY Containment pressure - less than 1.5 PSIG

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 17 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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	CRS	DIAGNOSE event in progress:
	CRS	<ul style="list-style-type: none"> DETERMINE that NOT all safety function criteria per Attachment 4, Worksheet - recovered
	CRS	<ul style="list-style-type: none"> [RNO] COMPLETE Attachment 1, Recovery Diagnostics
	CRS	<ul style="list-style-type: none"> [RNO] DIAGNOSE event as Loss of Forced Circulation/Loss of Offsite Power
	CRS	<ul style="list-style-type: none"> DETERMINE that Reactor Trip Recovery is NOT diagnosed
	CRS	<ul style="list-style-type: none"> [RNO] DETERMINE all RCPs stopped
	CRS	<ul style="list-style-type: none"> DIRECT initiating steps 12 through 15
	ACO	<ul style="list-style-type: none"> INITIATE steps 12 through 15
M.O. Cue: If GCC is contacted for grid status, report that cause of grid loss is unknown and field crews are investigating. No estimate on time to restore a line.		
M.O. Cue: If Unit 3 status is requested, report that Bus 3A04 is energized from EDG 3G002. Bus 3A06 is de-energized and has an electrical fault.		
	CRS	DIRECT performance of EOI SO23-12-7, LOFC/LOOP
M.O. Cue: When foldout page for EOI SO23-12-7 is initiated, call as SDG&E GCC and report that SONGS Switchyard appears to have no faults. SDG&E GCC can energize Encina (also known as San Luis Rey) line to SONGS when SONGS is ready. SONGS may restore power per Station Emergency Orders.		

Op Test No.: NRC Scenario # 1 Event # 5, 6, 7, 8 Page 18 of 19

Event Description: ATWS, and Loss of Off-Site Power and EDG Failures

Time	Position	Applicant's Actions or Behavior
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	CRS	RECORD time of EOI entry
	CRS	VERIFY LOFC/LOOP diagnosis:
		<ul style="list-style-type: none"> INITIATE EOI SO23-12-10, Safety Function Status Checks
		<ul style="list-style-type: none"> INITIATE Foldout Page
		<ul style="list-style-type: none"> DIRECT performance of FS-3, Monitor Natural Circulation
		<ul style="list-style-type: none"> DIRECT transferring Q0612 to Emergency Source
M.O. Cue: If directed to transfer 2Q0612 to Emergency, WAIT 2 minutes, then EXECUTE event ED81, Transfer Q0612 to Emergency.		
		<ul style="list-style-type: none"> DIRECT performance of FS-18, Secondary Plant Protection
		<ul style="list-style-type: none"> EVALUATE 4kV Bus cross tie per EOI SO23-12-11, Attachment 24 (Cannot perform)
		<ul style="list-style-type: none"> DIRECT performance of EOI SO23-12-11, Attachment 6, Diesel Generator Failure Follow-up Actions
		<ul style="list-style-type: none"> DIRECT initiation EOI SO23-12-11, Attachment 8, Restoration of Off-Site Power

Op Test No.: <u> NRC </u> Scenario # <u> 1 </u> Event # <u> 5, 6, 7, 8 </u> Page <u> 19 </u> of <u> 19 </u>		
Event Description: <u> ATWS, and Loss of Off-Site Power and EDG Failures </u>		
Time	Position	Applicant's Actions or Behavior

<i>After the crew begins restoration of offsite power, or at the Lead Evaluator's discretion, TERMINATE the scenario.</i>		

Facility: <u>San Onofre</u>	Scenario No.: <u>2</u>	Op Test No.: <u>2007 NRC</u>	
Examiners: _____	Operators: _____		
_____	_____		
_____	_____		
Initial Conditions: <ul style="list-style-type: none"> 69% power - RCS Boron is 956 ppm (by sample) Train A Component Cooling Water Pump (P025) in service Train A Auxiliary Feedwater Pump (P141) OOS Train A Saltwater Cooling Pump (P307) OOS Condenser Air Ejector Low Range Radiation Monitor (RM-7818) OOS Fire Computer OOS 			
Turnover: Maintain steady-state power conditions			
Critical Tasks: <ul style="list-style-type: none"> Trip any RCP not satisfying RCP operating limits Restore feedwater flow to at least one Steam Generator 			
Event No.	Malf. No.	Event Type*	Event Description
1 +0 min	CS05C	I (RO, CRS) TS (CRS)	RWST Level Indication (LI-0305-3) fails low
2 +10 min	RC10B	I (RO, CRS)	RCS Loop 1 Tcold (TT-0111AY) fails low
3 +15 min	ED03B	C (BOP, CRS) TS (CRS)	Bus 2A06 Overcurrent trip and lockout
4 +25 min		R (RO) N (BOP, CRS)	Perform a rapid power reduction per Operations Management directive
5 +30 min	Override	C (BOP, CRS)	Uncontrolled Turbine Load Decrease
6 +35 min	RC03	M (ALL)	Small break LOCA @1200 gpm
7 +35 min	FW23		Total loss of Condenser vacuum
8 +45 min	FW25	C (BOP)	Loss of Turbine Driven Auxiliary Feedwater Pump (P140) due to overspeed trip
9 +45 min		M (ALL)	Loss of all Feedwater
10 +45 min	RP01D	C (RO)	LPSI Pump (P015) fails to start
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specifications			

SCENARIO SUMMARY NRC #2

The crew will assume the watch and maintain steady-state conditions per SO23-5-1.7, Power Operations.

When turnover is complete an RWST level indicator will fail low. The CRS will evaluate Technical Specifications. There are no other required actions.

When Technical Specifications have been addressed, a Tcold instrument fails low and will require crew actions per the ARPs and AOI SO23-13-27, Pressurizer Pressure and Level Malfunction. The failed instrument provides input to the Pressurizer level program. The CRS will need to evaluate Technical Specifications if RCS pressure rises above 2275 PSIA.

When Pressurizer level control is restored to normal, a bus fault and lockout will occur on 1E 4kV Bus 2A06. The crew will refer to AOI SO23-13-26, Loss of Power to an AC Bus. The BOP will perform actions to preserve the Train B Emergency Diesel Generator. The CRS will evaluate Technical Specifications and determine that a plant shutdown is required. When the CRS has determined that a Technical Specification LCO 3.0.3 condition exists, Operations Management will direct the crew to commence a rapid downpower per SO23-5-1.7, Power Operations.

During the downpower the Turbine Load Lower pushbutton will stick "IN", causing an uncontrolled turbine load decrease. The crew should manually trip the plant. It is possible to minimize the effects of the stuck pushbutton by reducing the ramp rate to minimum (0.1 MW/min), but it is not an optimal operating condition.

Following the trip a 1200 gpm Loss of Coolant Accident and Loss of all Feedwater will occur. A total loss of Condenser vacuum will cause a loss of the Main Feedwater Pumps. An overspeed trip of the Steam Driven AFW Pump 30 seconds after start, combined with P141 being OOS and the loss of 2A06, will cause a total loss of AFW. The crew performs SO23-12-1, Standard Post Trip Actions, diagnoses a LOCA and a LOFW and transitions to SO23-12-9, Functional Recovery.

Following the trip, a LPSI Pump fails to start and the RO will be required to manually start the pump. This may not occur until the crew is in SO23-12-9. The scenario is terminated when the Steam Driven AFW Pump overspeed trip is reset and RCS temperature and pressure are stabilized while in the Functional Recovery procedure and associated Floating Steps.

Risk Significance:

- | | |
|---|---|
| • Risk important components out of service: | AFW Pump P141
SWC Pump P307 |
| • Failure of risk important system prior to trip: | Loss of Bus 2A06 |
| • Risk significant core damage sequence: | LOCA and LOFW |
| • Risk significant operator actions: | Failure to manually start LPSI
Failure to supply feedwater |

SONGS
2007 Facility NRC Initial License Examination
Simulator Scenario Setup
Scenario #2

MACHINE OPERATOR'S INSTRUCTIONS

SETUP

<u>Machine Operator:</u> - RESTORE to IC-177 - EXECUTE NRC Scenario #2 SETUP file to align components - ENSURE Control Board Tags are hung on 2P307 and 2P141 - ENSURE both Pressurizer Spray Valves are in Automatic, with setpoint at 2250 - ENSURE Train A Bypass Panel Manual PB is depressed for Emer. Feedwater - ENSURE CVOL is set within 10% above Turbine Governor Reference Demand - ENSURE the following procedures are on the CO desk: - SO23-5-1.7, open to Step 6.4
--

<u>Control Room Annunciators in Alarm at 70%:</u> 57A58 - EMERGENCY FEEDWATER SYS TRAIN A INOPERABLE

Insert copy of Event File printout here

Procedures Used

SO23-5-1.7

SO23-6-9

AOIs

SO23-13-26

SO23-13-27

EOIs

SO23-12-1

SO23-12-9

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>4</u>	of	<u>26</u>
Event Description:		RWST Level indication fails a Low							
Time	Position	Applicant's Actions or Behavior							

**Machine Operator: When directed, EXECUTE Event 1
CS05C (RWST Level Indication, LI-0305-3, fails low)**

Indications available:

56A27 - RWST LEVEL LO ESFAS CHANNEL TRIP

56A37 - RWST LEVEL LO PRETRIP

56B26 - PPS CHANNEL 3 TROUBLE

ROM Channel 3 LO RWT LEVEL trip and pre-trip lights illuminated

	ACO	REFER to Annunciator Response Procedures.
	ACO	IDENTIFY failed transmitter is RWT 2T006 Level, 2LI-0305-3.
	CRS	DIRECT performance of AOI SO23-13-18, Reactor Protection System Failure.
	CRS	IDENTIFY a Single PPS Channel failed.
	CRS	IDENTIFY Affected Functional Units for Channel "C", using Attachment 5 of AOI SO23-13-18.
		<ul style="list-style-type: none"> Refueling Water Storage Tank Level - Low (RAS)
	CRS	DIRECT placing the affected Functional Unit in BYPASS per SO23-3-2.12, Section for Bypass Operation of Trip Channels.
	CO	REFER to Annunciator Response Procedures

Op Test No.:	<u>NRC</u>	Scenario #	<u>2</u>	Event #	<u>1</u>	Page	<u>5</u>	of	<u>26</u>
Event Description:		RWST Level indication failsa Low							
Time	Position	Applicant's Actions or Behavior							

	CO	CONTACT an outside operator to place the Affected Functional Units in Bypass per SO23-3-2.12, Reactor Protective System Operation.
M.O. Cue: When outside operator is contacted to bypass the associated trips, WAIT 3 minutes, and then CALL when ready to begin. When directed, EXECUTE individual events for Bypassing RPS Trips.		
	CRS	CONFIRM failure does NOT affect RPS/ESFAS matrix or logic.
	CRS	CONFIRM failure does NOT affect Feedwater Digital Control System
	CRS	Evaluate Technical Specifications.
		<ul style="list-style-type: none"> LCO 3.3.5 ESFAS Instrumentation - Operating
		<ul style="list-style-type: none"> ACTION B - Place Functional Unit in Bypass or Trip within 1 hour
<i>When the affected Functional Unit is in Bypass and Technical Specifications have been addressed, or at Lead Evaluator's discretion, proceed to Event 2.</i>		

Op Test No.: NRC Scenario # 2 Event # 2 Page 6 of 26

Event Description: RCS Loop 1 Tcold (TT-0111AY) Fails Low

Time	Position	Applicant's Actions or Behavior
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**Machine Operator: When directed, EXECUTE Event 2
RC10B (TT-0111Y1 RCS Cold Leg 1A fails low)**

Indications available:**50A22 - PZR LVL ERROR HI****50A12 - PZR LVL HI-HI****Letdown flow INCREASING**

	CO	REFER to Annunciator Response Procedures
	CO	OBSERVE minimum Charging flow and maximum Letdown flow
	CO	DETERMINE Letdown and Charging systems are NOT responding as desired and perform the following:
		<ul style="list-style-type: none"> • DEPRESS the A/M button on LIC-0110, PZR Level Controller, to place PZR level control in MANUAL
		<ul style="list-style-type: none"> • START Charging Pumps to match Letdown flow
		<ul style="list-style-type: none"> • ADJUST LIC-0110, PZR Level Controller, to match Letdown and Charging flows
		<ul style="list-style-type: none"> • MONITOR PZR level and maintain stable
	CO	DETERMINE that PZR Level Channel Y (LI-0110A2) is cause of failure and INFORM the CRS AOI SO23-13-27 entry required
	CRS	DIRECT performance of AOI SO23-13-27, Pressurizer Pressure and Level Malfunction, to transfer PZR Level Control to the operable transmitter
	CO	VERIFY level indicators LI-0110A1, LI-0110A2 and LI-0103 are reading approximately the same

Op Test No.: NRC Scenario # 2 Event # 2 Page 7 of 26

Event Description: RCS Loop 1 Tcold (TT-0111AY) Fails Low

Time	Position	Applicant's Actions or Behavior
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	CO	VERIFY Pressurizer level is NOT lowering due to a valid RCS leak
	CO	TRANSFER Remote Pressurizer Level setpoint (IN1-IN2):
		• ENSURE controller alarms are acknowledged
		• SELECT (TAG) page 2 and OBSERVE IN1 displayed
		• NOTE the displayed PZR level
		• DEPRESS SEL button to display IN2
		• NOTE the displayed PZR level
		• DETERMINE input IN2 is reading correctly
		• DISPLAY current Pressurizer level remote setpoint
		• SELECT IN1
		• SELECT (TAG) page 1
		• ADJUST LIC-0110 to match actual level with setpoint by adjusting the output
		• TRANSFER LIC-0110 to AUTO when level is within 2% of setpoint
		• OBSERVE letdown flow for oscillations
		• RESTORE Pressurizer heaters to service
		• OPERATE Charging Pumps as directed
<i>When plant conditions are stable, or at Lead Evaluator's discretion, proceed to Event 3.</i>		

Op Test No.: NRC Scenario # 2 Event # 3 Page 8 of 26

Event Description: 1E 4.16kV Bus 2A06 Overcurrent Trip and Lockout

Time	Position	Applicant's Actions or Behavior
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**Machine Operator: When directed, EXECUTE Event 3
ED03B (2A06 overcurrent trip and lockout)**

Indications available:**63C05 - 2A06 VOLTAGE LO****63C06 - 2B06 VOLTAGE LO****63C07 - DIESEL GEN 2G003 LOCKOUT RELAY TRIPPED**

	ACO	REFER to Annunciator Response Procedure
	ACO	VERIFY 2A06 voltage is less than 3796 volts
	ACO	STOP 2G003 by selecting 2HS-1770-2, Maintenance Lockout Switch, to LOCKOUT
	ACO	NOTIFY CRS to perform AOI SO23-13-26, Loss of Power to an A. C. Bus, Attachment 1, Loss of a 1E 4kV Bus
	CRS	DIRECT performance of AOI SO23-13-26, Loss of Power to an A. C. Bus, Attachment 1, Loss of a 1E 4kV Bus
	ACO	ENSURE CCW Non-Critical Loop (NCL) aligned to an Train A CCW
	ACO	ENSURE CCW NCL aligned to an Train A CCW
	ACO	ENSURE Letdown Heat Exchanger aligned to an Train A CCW
	CRS	DETERMINE that loss of 2A06 is NOT due to fire

Op Test No.: NRC Scenario # 2 Event # 3 Page 9 of 26

Event Description: 1E 4.16kV Bus 2A06 Overcurrent Trip and Lockout

Time	Position	Applicant's Actions or Behavior
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	ACO	DETERMINE that annunciator 63C25 is in alarm
	ACO	INITIATE SO23-6-9, to return 2A06 to service
	CRS	INITIATE Equipment Actions for Loss of 2A06 in Attachment 5
	ACO	ENSURE Train A SWC pump running
	CRS	Within 1 hour, PERFORM SO23-3-3.23, Attachment for AC Sources Verification, for both units
		<ul style="list-style-type: none"> 3.8.1 AC Sources - Operating
		<ul style="list-style-type: none"> ACTION B - Perform SR 3.8.1.1 for the OPERABLE remaining offsite circuits within 1 hour
	CRS	DIRECT crew to make preparations for taking the unit offline
	CRS	ENTER Tech Spec 3.0.3 for loss of two 1E Battery Chargers
		<ul style="list-style-type: none"> 3.0.3 LCO Applicability
		<ul style="list-style-type: none"> Action shall be initiated within 1 hour to place the unit in MODE 3 within 7 hours
Examiner Cue:		As the Shift Manager, DIRECT the CRS to perform a Rapid Power Reduction to take the unit offline at a rate of 15% per hour, and that this is not a planned power change.

Op Test No.: <u> NRC </u> Scenario # <u> 2 </u> Event # <u> 3 </u> Page <u> 10 </u> of <u> 26 </u>		
Event Description: 1E 4.16kV Bus 2A06 Overcurrent Trip and Lockout		
Time	Position	Applicant's Actions or Behavior

	CRS	CONTACT Maintenance to install temporary chargers on Battery D2 and then Battery D4
M.O. Cue: When contacted to install temporary chargers n Batteries D2 and D4, REPORT that a team will begin making preparations immediately.		

Op Test No.: <u> NRC </u> Scenario # <u> 2 </u> Event # <u> 3 </u> Page <u> 11 </u> of <u> 26 </u>		
Event Description: <u> 1E 4.16kV Bus 2A06 Overcurrent Trip and Lockout </u>		
Time	Position	Applicant's Actions or Behavior

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Op Test No.: NRC Scenario # 2 Event # 4 Page 12 of 26

Event Description: Rapid Power Reduction

Time	Position	Applicant's Actions or Behavior
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Event 4 (Rapid Power Reduction)

	CRS	DIRECT the crew to take the unit offline at a rate of 15% per hour
	CO	IMPLEMENT SO23-5-1.7, Attachment 8 to determine amount of Boration and CEAs to be used
	CO	INITIATE Boration to the Charging Pump Suction (Borate Mode)
	CO	USE CEAs for power reduction and ASI control
	ACO	COMMENCE Turbine load reduction to establish desired unloading rate (use DCS MWe indication)
<i>When crew has reduced power by 3-5%, or at Lead Evaluator's discretion, proceed to Event 5.</i>		

Op Test No.: NRC Scenario # 2 Event # 5 Page 13 of 26

Event Description: Uncontrolled Turbine Load Decrease

Time	Position	Applicant's Actions or Behavior
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**Machine Operator: When directed, EXECUTE Event 5
Override (Speed / Load LOWER pushbutton - IN)**

Indications:

**MWe continues decreasing after pushbutton is released
Turbine HP Governor Valves continue to ramp closed
RCS Tcold continues to rise after pushbutton is released**

	ACO	DETERMINE that Turbine load indication continues decreasing, and that RCS Tcold continues increasing, after the Speed or Load LOWER pushbutton is released
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	ACO	INFORM the CRS of the uncontrolled load reduction
--	-----	---

Examiner Note: The uncontrolled load decrease can be stopped by depressing the HOLD pushbutton on the DCS panel. The examinee may also attempt to stop the uncontrolled load reduction by depressing and holding the Speed / Load RAISE pushbutton, and/or by adjusting the DCS ramp rate to a minimal value (i.e., ~0.1 MWe per minute). If the crew does NOT stop the load decrease, they may elect to trip the reactor.

	CRS	DIRECT Reactor Trip
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	CO/ ACO	Depress the Reactor Trip pushbuttons
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The next event (Small Break LOCA) will automatically execute on the trip. If necessary, due to actions taken by the crew, or at the Lead Evaluator's discretion, manually EXECUTE Event 6.

Op Test No.: NRC Scenario # 2 Event # 6 Page 14 of 26

Event Description: Small Break LOCA (1200 GPM)

Time

Position

Applicant's Actions or Behavior

**Machine Operator: If directed, EXECUTE Event 6
RC03 (Small Break LOCA, ~1200 GPM)**

Indications available:**Lowering Pressurizer Level****Lowering Pressurizer Pressure****All 3 Charging Pumps are running****Letdown flow is lowering****Charging flow > Letdown flow****VCT level lowering**

CO

Recognize PZR level is decreasing

CRS

DIRECT starting third charging pump

CO

START third Charging Pump

CO

DETERMINE PZR level continues to decrease

CRS

DIRECT isolation of Letdown

CO

ISOLATE Letdown

CO

DETERMINE PZR level continues to decrease

CRS

RECOGNIZE that an RCS leak greater than available charging capacity exists, and DIRECT the crew to trip the Reactor and perform the actions of EOI SO23-12-1, Standard Post Trip Actions

CO/
ACO

Trip the Reactor

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 15 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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Examiner Note: Events 7, 8, 9, and 10

	CO	VERIFY Reactor Trip:
		<ul style="list-style-type: none"> VERIFY Reactor Trip Circuit Breakers (8) - open
		<ul style="list-style-type: none"> VERIFY Reactor Power
		<ul style="list-style-type: none"> Lowering
		AND
		<ul style="list-style-type: none"> Startup Rate - negative
		<ul style="list-style-type: none"> VERIFY maximum of one full length CEA - NOT fully inserted
	ACO	VERIFY Turbine trip:
		<ul style="list-style-type: none"> HP and LP Stop and Governor valves - closed
		<ul style="list-style-type: none"> VERIFY both Unit Output Breakers - open
		<ul style="list-style-type: none"> VERIFY Main Turbine speed
		<ul style="list-style-type: none"> Less than 2000 RPM
		OR
		<ul style="list-style-type: none"> Lowering
	CRS	INITIATE Administrative Actions:
		<ul style="list-style-type: none"> ANNOUNCE Reactor trip via PA system
		<ul style="list-style-type: none"> INITIATE Attachment 4, WORKSHEET
		<ul style="list-style-type: none"> INITIATE Attachment 5, ADMINISTRATIVE ACTIONS

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 16 of 26
 Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	ACO	VERIFY Vital Auxiliaries functioning properly:
		<ul style="list-style-type: none"> DETERMINE 1E 4kV Bus 2A06 is NOT energized
		<ul style="list-style-type: none"> [RNO] DETERMINE overcurrent 2A06 annunciator NOT reset
		<ul style="list-style-type: none"> [RNO] VERIFY 2G003 in Maintenance Lockout
		<ul style="list-style-type: none"> [RNO] INITIATE Attachment 2, Diesel Generator Failure Follow-up Actions
		<ul style="list-style-type: none"> DETERMINE 1E 480V Bus 2B06 is NOT energized
		<ul style="list-style-type: none"> VERIFY all Class 1E DC Buses - energized
		<ul style="list-style-type: none"> VERIFY all Non-1E 4kV buses - energized
		<ul style="list-style-type: none"> VERIFY one CCW Train
		<ul style="list-style-type: none"> Operating
		AND
		<ul style="list-style-type: none"> Aligned to Non-Critical Loop (NCL) and Letdown Heat Exchanger
	CO	DETERMINE RCS Inventory Control criteria is NOT satisfied:
		<ul style="list-style-type: none"> DETERMINE PZR level is less than 10% and lowering
		<ul style="list-style-type: none"> [RNO] DETERMINE PZR Level Control System is NOT restoring PZR level
		<ul style="list-style-type: none"> VERIFY Core Exit Saturation Margin - greater than or equal to 20°F
		<ul style="list-style-type: none"> QSPDS page 611
		<ul style="list-style-type: none"> CFMS page 311

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 17 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	CO	DETERMINE RCS Pressure Control criteria is NOT satisfied:
		<ul style="list-style-type: none"> DETERMINE PZR pressure is less than 1740 PSIA and lowering
		<ul style="list-style-type: none"> [RNO] DETERMINE PZR Pressure Control System is NOT restoring PZR pressure
		<ul style="list-style-type: none"> [RNO] ENSURE Normal and Aux Spray valves - closed
		<ul style="list-style-type: none"> [RNO] ENSURE SIAS, CCAS, and CRIS - actuated
	CO	DETERMINE that LPSI Pump 2P015 has not started, and START 2P015.
		<ul style="list-style-type: none"> [RNO] If PZR pressure is less than 1430 PSIA, then ENSURE at least one RCP in each loop - stopped
Critical Task Statement		Stop all RCPs on loss of NPSH, within 5 minutes of receipt of loss of subcooling alarm. Elapsed Time: _____
CRITICAL TASK	CO	<ul style="list-style-type: none"> [RNO] If RCP NPSH requirements NOT satisfied, then ENSURE all RCPs - stopped
	CO	VERIFY Core Heat Removal criteria satisfied:
		<ul style="list-style-type: none"> VERIFY at least one RCP - operating
		<ul style="list-style-type: none"> VERIFY core loop delta T (Th - Tc) - less than 10°F
		<ul style="list-style-type: none"> VERIFY Core Exit Saturation Margin - greater than or equal to 20°F
		<ul style="list-style-type: none"> QSPDS page 611
		<ul style="list-style-type: none"> CFMS page 311

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 18 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	ACO	DETERMINE RCS Heat Removal criteria is NOT satisfied:
		<ul style="list-style-type: none"> Verify at least one SG level
		<ul style="list-style-type: none"> Between 21% NR and 80% NR
		AND
		<ul style="list-style-type: none"> DETERMINE Feedwater is NOT available
		<ul style="list-style-type: none"> [RNO] ENSURE EFAS - actuated
		<ul style="list-style-type: none"> DETERMINE heat removal is excessive
		<ul style="list-style-type: none"> [RNO] DETERMINE RCS Tcold is less than 545°F
		<ul style="list-style-type: none"> [RNO] ENSURE SBSCS valves - closed
		<ul style="list-style-type: none"> [RNO] ENSURE ADVs - closed
		<ul style="list-style-type: none"> [RNO] ENSURE SG Blowdown valves - closed
		<ul style="list-style-type: none"> [RNO] ENSURE Main Steam to Reheaters valves - closed
		<ul style="list-style-type: none"> VERIFY S/G Pressures - approximately 1000 PSIA
Examiner Note: Steam Driven Auxiliary Feedwater Pump, 2P140, will trip on overspeed 30 seconds after start. Both Main Feedwater Pumps should already have tripped on low condenser vacuum.		
	ACO	RECOGNIZE Steam Driven Aux Feedwater Pump has tripped by observing annunciator 52A53, TURBINE AUX FW PUMP GOVERNOR OVERSPEED/OOS
M.O. Cue: When contacted to investigate the status of 2P140, WAIT 3 minutes, and then REPORT that the linkage is in the trip position.		

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 19 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	CRS	DIRECT the ACO to override and close 2HV-4716, AFWP Trip Throttle valve
	ACO	OVERRIDE and CLOSE 2HV-4716, AFWP Trip Throttle valve
M.O. Cue: When directed to reset the trip linkage for 2P140, WAIT 3 minutes and REPORT that you are unable to reset the linkage, but will continue trying.		
	CO	DETERMINE Containment Isolation criteria is NOT satisfied:
		<ul style="list-style-type: none"> DETERMINE Containment pressure is greater than 1.5 PSIG
		<ul style="list-style-type: none"> DETERMINE Containment Area Radiation Monitors R7820-1 and R7820-2 are trending to alarm
		<ul style="list-style-type: none"> VERIFY Secondary Plant Radiation Monitors
		<ul style="list-style-type: none"> Energized
		AND
		<ul style="list-style-type: none"> Not alarming or trending to alarm

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 20 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	CO	DETERMINE Containment Temperature, Pressure and Combustible Gas Control criteria is NOT satisfied:
		<ul style="list-style-type: none"> DETERMINE Containment average temperature is greater than 120°F
		<ul style="list-style-type: none"> DETERMINE Containment pressure is greater than 1.5 PSIG
		<ul style="list-style-type: none"> [RNO] ENSURE proper functioning of Normal Containment Cooling
		<ul style="list-style-type: none"> [RNO] ENSURE at least one Dome Air Circulator - operating
		<ul style="list-style-type: none"> [RNO] If Containment pressure is greater than 3.4 PSIG, then:
		<ul style="list-style-type: none"> [RNO] ENSURE SIAS, CIAS, CCAS, CRIS - actuated
		<ul style="list-style-type: none"> [RNO] ENSURE all RCPs - stopped
		<ul style="list-style-type: none"> [RNO] ENSURE all available Containment Emergency Cooling Units - operating
		<ul style="list-style-type: none"> [RNO] If Containment pressure is greater than 14 PSIG, then:
		<ul style="list-style-type: none"> [RNO] ENSURE CSAS - actuated
		<ul style="list-style-type: none"> [RNO] ENSURE all - greater than 1600 GPM

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 21 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	CRS	DIAGNOSE event in progress:
	CRS	<ul style="list-style-type: none"> DETERMINE that NOT all safety function criteria per Attachment 4, Worksheet - recovered
	CRS	<ul style="list-style-type: none"> COMPLETE Attachment 1, Recovery Diagnostics
	CRS	<ul style="list-style-type: none"> DIAGNOSE event as Loss of Feedwater and Loss of Coolant Accident
	CRS	<ul style="list-style-type: none"> DETERMINE that Reactor Trip Recovery is NOT diagnosed
	CRS	<ul style="list-style-type: none"> ENSURE all RCPs stopped
	CRS	<ul style="list-style-type: none"> DIRECT initiating steps 12 through 15
	ACO	<ul style="list-style-type: none"> INITIATE steps 12 through 15
	CRS	DIRECT performance of EOI SO23-12-9, Functional Recovery
	CRS	RECORD time of EOI entry.
Examiner Note: If an outside operator has been sent to reset the overspeed trip on the Steam Driven Auxiliary Feedwater Pump, then DIRECT the Machine Operator to provide the following cue.		
M.O. Cue: After the crew enters EOI SO23-12-9, REMOVE malfunction FW25 and REPORT as the Primary Operator that the overspeed trip on 2P140 has been reset.		

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 22 of 26
 Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
	CRS	VERIFY LOFW and LOCA diagnosis:
		• INITIATE EOI SO23-12-10, Safety Function Status Checks
		• INITIATE Foldout Page
		• SI Throttle/Stop Criteria
		• RCP Stop Criteria
		• Monitor Electrical Power
		• Restore Non-Qualified Loads
		• Establish Secondary Plant Protection
	CRS	INTIATE Administrative Actions:
		• NOTIFY Shift Manager of entry into EOI SO23-12-9
		• ENSURE Emergency Plan is initiated
		• IMPLEMENT Placekeeper
	CO	VERIFY SIAS Actuation
		• DETERMINE that PZR pressure is less than SIAS setpoint
		• DETERMINE that Containment pressure is greater than 3.4 PSIG
		• DETERMINE that Containment Area Radiation Monitors are in alarm
	CO	ENSURE SIAS, CCAS, CRIS actuated
	CRS	RECORD time of SIAS actuation
	CO	VERIFY CIAS actuated

Op Test No.: NRC Scenario # 2 Event # 7, 8, 9, & 10 Page 23 of 26

Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	ACO	STOP unloaded Diesel Generator 2G002
	CRS	DIRECT initiation of EOI SO23-12-11, Attachment 22, Non-Qualified Loads Restoration
	ACO	INITIATE EOI SO23-12-11, Attachment 22, Non-Qualified Loads Restoration
M.O. Cue: When directed to restore Non-Qualified Loads, wait 3 minutes, then call the Control Room and state that you are ready to restore. When directed, execute Remote Function ED85, Non-Qualified Loads Restoration. When complete, inform the Control Room that you have restored Non-Qualified Loads.		
	CO	DETERMINE that RCP NPSH requirements are NOT met
		<ul style="list-style-type: none"> [RNO] If not already performed, STOP all RCPs and INITIATE FS-3, Monitor Natural Circulation Established
Examiner Note: In the next step, the crew should recognize that LPSI Pump 2P015 did NOT automatically start on the SIAS signal. The pump will start manually. The crew should also recall that 1E 4kV bus 2A06 is not available, and that Train B ECCS Pumps will have no cooling water.		

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Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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	CO	ESTABLISH Two Train SI Operation:
		<ul style="list-style-type: none"> All available Charging Pumps - operating
		<ul style="list-style-type: none"> One HPSI and one LPSI per train - operating
		<ul style="list-style-type: none"> START LPSI Pump 2P015
		<ul style="list-style-type: none"> All Cold Leg flow paths - aligned
		<ul style="list-style-type: none"> VERIFY SI flow required
		<ul style="list-style-type: none"> SI flow - indicated
		OR
		<ul style="list-style-type: none"> RCS pressure - greater than 1250 PSIA
		OR, VERIFY FS-7, SI Throttle/Stop Criteria - satisfied
	CRS	DETERMINE that there are NO safety function recovery attachments indicated by an optimal EOI
	CRS	DIRECT precautionary actions:
	CO	<ul style="list-style-type: none"> INITIATE Boration - greater than 40 GPM
	CO	<ul style="list-style-type: none"> DETERMINES that all RCPs are stopped
	CRS	DETERMINE that ESDE is NOT indicated
	CRS	DETERMINE that SGTR is NOT indicated

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Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
	CRS	DETERMINE that LOFW is indicated due to lowering SG levels and NO feedwater available
		• [RNO] ENSURE EFAS - actuated
		• [RNO] DETERMINES that all RCPs are stopped
		• [RNO] ENSURE SG Blowdown and Sample valves - closed
		• [RNO] INITIATE Attachment FR-5, RECOVERY - HEAT REMOVAL Success Path HR-1, step 4
	CRS	ESTABLISH Auxiliary Feedwater flow to available SGs
	ACO	VERIFY AFW - NOT operating
	ACO	DETERMINE that 2P140 is tripped on overspeed
	CRS	DETERMINE FS-11, Reset P-140 Overspeed Trip, completed
	ACO	CLOSE AFW Pump Discharge valves 2HV-4705 and 2HV-4706
	ACO	START AFW Pump 2P140

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Event Description: Loss of Vacuum, AFW P140 O/S Trip, Loss of All Feed, LPSI P015 Fails to Start

Time	Position	Applicant's Actions or Behavior
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Critical Task Statement		Restore feedwater flow to at least one Steam Generator prior to complete loss of secondary inventory in both steam generators.
CRITICAL TASK	ACO	ENSURE at least one AFW to SG Isolation valve to each SG open
		<ul style="list-style-type: none"> 2E088 - either 2HV-4714 or 2HV-4730
		<ul style="list-style-type: none"> 2E089 - either 2HV-4715 or 2HV-4731
M.O. Cue: When directed, THROTTLE OPEN feedwater using Remote Function FW103, P-140 Throttle Valve MU122 (S21305MU122).		
	ACO	If SG levels are less than 40% NR, then THROTTLE 2HV-4705 and 2HV-4706 to maintain AFW flow between 130 and 150 GPM, and MAINTAIN reduced AFW flow for 5 minutes
	ACO	RAISE total AFW flow to greater than 400 gpm
<i>When feedwater is restored to both Steam Generators, or at Lead Evaluator's discretion, terminate the scenario.</i>		