

Final Submittal

(Blue Paper)

1. As Given Simulator Scenario Operator Actions ES-D-2

CRYSTAL RIVER EXAM 50-302/2002-301

JAN. 28 - FEB. 6, 2002

Facility: CR-3Scenario No.: 1

Op-Test No.: _____

Examiners: _____

_____Operators: _____

Initial Conditions: 23% power with the Turbine at 1800 rpm, (set turbine 1st stage temperature to 376°F)

The following is Out of Service:

MUP-1A

SWP-1C

FWP- 7

EDG-'B'

Turnover: Bring the Turbine on-line in accordance with OP-203

Event No.	Malfunction No.	Event Type*	Event Description
1		N	Turbine startup IAW OP-203 (BOP/SRO)
2	8	I	Fail RMA-6 high [Fail sample pump](SRO ITS call)
3	11	C	Trip CDP-1B (BOP) before MT
4	7	I / R	Fail Neutron Error, Man Rx control (OAC React man)
5	12	C	Trip AHF-17A (BOP) before MT
6	4	C	Pzr small Steam space leak (19.5 gpm) (OAC)
7	3	C	RCV-13 fails to close (OAC) RCP/Rx trip
8	2	M	Large steam space leak (160 gpm)
9	1	C	MUP-1B shaft failure on ES (BOP)
10	1	C	DCP-1B fails to start on ES (BOP)
11	1	C	RCP-1D breaker will not trip (OAC)

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

Facility: CR-3

Scenario No.: 2

Op-Test No.: _____

Examiners: _____

Operators: _____

Initial Conditions: 100% power,
The following is Out of Service:

MUP-1A

SWP-1C

FWP- 7

EDG-'B'

SETUP: Start SWP-1A, Secure SWP-1C

Turnover: On coming shift align RB ventilation to SW cooling

Event No.	Malfunction No.	Event Type*	Event Description
1		N	Align RB ventilation to SW cooling (BOP/SRO)
2	12	C	Trip ARP-1A (BOP) prior to MT or LOOP
3	2/3	C	LOOP to "A" ES bus (SRO ITS/BOP AP-770)
4	4	I	RCS press fail high (OAC)
5	5	C	"B" OTSG 40 gpm tube leak (OAC)
6	6	I / R	ULD failure (OAC react man) down power
7	7	M	"B" OTSG 350 gpm tube rupture
8	8	C	MSLI / MFLI fail to actuate (OAC)
9	9	C	Turbine fails to trip (OAC)
10	10	C	"B" side MSSV fails open (BOP)

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

Facility: CR-3Scenario No.: 3

Op-Test No.: _____

Examiners: _____

_____Operators: _____

Initial Conditions: 100% power,

The following is Out of Service:

MUP-1A

SWP-1C

FWP- 7

SETUP: RCV -8 is weeping, RCDT level just below High alarm.

Turnover: Continue operating

Event No.	Malfunction No.	Event Type*	Event Description
1		N	Pump RCDT IAW OP-407J
2	1	C	DPDP-5A fails (SRO ITS / BOP)
3	2	C	SWV-82 fails closed (BOP)
4	3	I	ICS fails to re-ratio (OAC)
5	4	C / R	"B" MFWP lube oil leak (OAC react man)
6	5	C	"A" MFWP trips (OAC)
7	6	M	ATWAS failure on Rx trip (OAC trip rods at Bkr)
8	7	C	EFP-2 failure (BOP)
9	8	C	Loss of all FW

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

Op-Test No.: 1 Scenario No.: 1 Event No.: 1 Rev.: 01

Event Description: OP-203 rev. 96 will be signed off to step 4.2.18, which is to complete the turbine startup; auto synchronize, and load the generator. (**NORM EVOL**). This will continue until condensate is in automatic and the procedure sends them to OP-204 Power Operation.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Complete the steps in OP-203 section 4.2, step 4.2.18 to parallel and load the generator.</p> <p>Clear the Turbine steam flow low alarm (O-4-2)</p> <p>Close the remaining output breaker manually</p> <p>Step 4.2.25 is a GO TO step 4.2.34</p> <p>Transfer EHC to "ICS AUTO"</p> <p>Load the turbine via the turbine bypass valves (TBVs)</p> <p>Transfer the TBVs to AUTO</p>
	SRO	Monitor the BOP/OAC performing the turbine startup, and power escalation
	OAC	<p>Increase power using the SG/RX master hand/auto station</p> <p>Raise OTSGs off Low Level Limits (K-7-4; K-8-4) (LLL) via increasing SG/RX master demand.</p> <p>Once LLL is clear place SG/RX master in "AUTO"</p> <p>Select Delta Tc to "AUTO".</p>

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Rev.: 01

Event Description: While the OAC is getting ICS into automatic, the RMA-6 sample pump fails, indicating a high flow condition. This is an SRO call for ITS 3.4.14 Condition B for RCS leak rate

Time	Position	Applicant's Actions or Behavior
	SRO	ITS 3.4.14 RCS leak rate Condition B for the radiation monitoring portion of the RCS leak rate
	BOP	Acknowledge alarm Atmospheric Monitor Warning (H-2-2) and inform SRO of high flow indication.

Op-Test No.: 1 Scenario No.: 1 Event No.: 3 Rev.: 01

Event Description: Once the ICS stations are in automatic trip CDP-1B (**MALF**).

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose loss of CDP-1B Breaker closed red light "OFF" Deaerator level normal light "OFF" Alarm "Condensate Pump B Trip" (N-3-1) Refer to Alarm Response (AR) Use OP-603 Condensate Section 4.15 and OP-203 for starting CDP-1A and placing it in AUTO. This will complete OP-203 and send the crew to OP-204 Power Operations
	SRO	Monitor and supervise the CDP-1B trip and start of CDP-1A.

Op-Test No.: 1 Scenario No.: 1 Event No.: 4 Rev.: 01

Event Description: Once ICS stations are in automatic the ITS call made and CDP-1B event is stable then Neutron error fails (**MALF**) and requires manual control of reactor Diamond and Bailey stations. This will lead to the reactivity manipulation in manual control.

Time	Position	Applicant's Actions or Behavior
	OAC	<p>Observe the erratic swings of the neutron error indication, positive and then negative, getting larger until it is about 2 units in each direction causing rod motion.</p> <p>The excessive rod motion would exceed the continuous run time limit and precaution in OP-502 for control rod drive.</p> <p>Take manual control of the reactor diamond panel and the reactor bailey station to stop rod motion and lock neutron error at zero. This will result in the Unit Master in TRACK alarm (K-6-2).</p> <p>May take feedwater loop masters to hand if they do not want Tave controlled by the feedwater subsystem. This is arbitrary to the crew and how comfortable they are with feedwater controlling Tave.</p>
	SRO	<p>Monitor and supervise the control rod drive system.</p> <p>Call for maintenance to investigate problem.</p> <p>Have the OAC continue the power escalation in manual (MAY HAVE TO PROMPT FOR MEGAWATTS)</p>

Op-Test No.: 1 Scenario No.: 1 Event No.: 5 Rev.: 01

Event Description: Once power is about 30%, then trip AHF-17A (**MALF**) the BOP will need to reconfigure the ventilation to the "B" side. This is prior to the major transient.

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose the trip of AHF-17A Alarm Control Complex fan trip (F-1-1) Alarm Control Complex air flow low (F-1-2) Breaker closed light (red) is "OFF" Align ventilation to the "B" side with OP-409 section 4.18
	SRO	Direct BOP to transfer ventilation in accordance with OP-409 section 4.18

Op-Test No.: 1 Scenario No.: 1 Event No.: 6 Rev.: 01

Event Description: Once above 30% power then insert pressurizer small steam leak (**MALF**) (19.5 gpm). This is a small continuous pressure decrease that will send the operator into AP-520 and slow enough to take actions prior to protective functions actuation.

Time	Position	Applicant's Actions or Behavior
	OAC	Diagnose RCS leak Slow pressure decrease No atmospheric monitor (RMA-6 is OOS) All heaters energized with pressure decreasing and level very slowly decreasing RB fan condensate high alarms (B-2-5 and E-2-5) will alarm but much later into the malfunction.
	SRO	Directs OAC to quantify the leakage and enters AP-520 Loss of RCS coolant or pressure.
	OAC	Commence Leak isolation

Op-Test No.: 1 Scenario No.: 1 Event No.: 7 Rev.: 01

Event Description: RCV-13 (Spray valve block valve fails to close) (**MALF**) during AP-520, this requires tripping of the “B” RCP and then the Reactor.

Time	Position	Applicant's Actions or Behavior
	OAC	During leak isolation RCV-13 fails to close, the red light remains “LIT” and the valve does not indicate movement. RCS pressure continues to decrease.
	SRO	Directs the OAC to trip the “B” RCP if RCV-13 is not closed.
	OAC	Secures “B” RCP and monitors RCS flow and main feedwater flow indications based on Delta Tc. RCS low flow alarm (J-3-3) Pressure continues to decrease.
	SRO	Directs the OAC to trip the reactor and concurrently perform EOP-2
	OAC	Depresses the manual trip pushbutton Perform Immediate Actions for EOP-2 Vital System Status Verification If feedwater loop masters left in manual may fill OTSGs to high level limits

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Rev.: 01

Event Description: Large steam space leak from the pressurizer (**MAJOR TRANSIENT**) (160 gpm). This is triggered from the reactor trip

Time	Position	Applicant's Actions or Behavior
	SRO OAC BOP	This will depressurize the RCS outside the post trip window. It will decrease RCS pressure to the ES actuation at 1625 psig EFW actuation A loss of SCM will occur
	SRO	Direct actions from EOP-2, and EOP-3 Loss of SCM
	OAC	Monitor RCS parameters core cooling and RCS inventory Trip all RCPs within 2 minutes of loss of SCM (CT)
	BOP	Ensure ES equipment is properly aligned.

Op-Test No.: 1 Scenario No.: 1 Event No.: 9 Rev.: 01

Event Description: When ES actuates MUP-1B shaft fails (**MALF after MT**) leaving only 1 MUP supplying water to the core.

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose MUP-1B failure Amps indicate 25 % Breaker indicates closed (red light lit) May or may not see this however this is the set up for the potential loss of core cooling with the failure of the other side MUP cooling water pump.
	SRO	Directs the BOP to ensure all ES equipment is properly aligned.
	BOP	Verifies all ES components are operating via the actuation light indications (green) for ES actuated equipment.

Op-Test No.: 1 Scenario No.: 1 Event No.: 10 Rev.: 01

Event Description: When ES actuates DCP-1B fails to start (**MALF after MT**). This must be identified and started or the crew has lost all HPI capabilities (**CT**).

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose DCP-1B failure Breaker light is green (open) ES status light is amber No amps indicated Start pump using the breaker handle Breaker close light is "LIT" (red) Amps indicated ES status light is green
	SRO	Supervise the operation of DCP-1B and cooling to the one remaining HPI pump.

Op-Test No.: 1 Scenario No.: 1 Event No.: 11 Rev.: 01

Event Description: RCP-1D will not trip (**MALF after MT**) on the loss of SCM must de-energize the bus.

Time	Position	Applicant's Actions or Behavior
	OAC	Loss of SCM Trip all RCPs RCP-1D will not trip Breaker closed light "LIT" (red)
	SRO	May direct the OAC to perform actions to stop RCP-1D
	OAC	Open breaker 3104 to de-energize the 6900 V Aux Bus 3B. RCP-1D de-energizes. Trip all RCPs within 2 minutes (CT).

Narrative Summary:

The plant is at 23% power preparing to place the turbine on line. The BOP is to auto synchronize and load the generator (OP-203).

Once the turbine is on and the ICS stations are in automatic CDP-1B will trip due to a level switch problem. The BOP will refer to the AR procedure and OP-603, start CDP-1A and continue with the startup.

When the plant is stable RMA-6 sample pump will fail indicating a high flow condition. This will require an ITS call for 3.4.14 Condition B for RCS leakage detection instrumentation.

During the power ascension the neutron error indication becomes erratic causing excessive rod motion. The OAC must take manual control of the reactor and perform all reactivity manipulations via manual control. He may also place the feedwater loop masters in manual to prevent feedwater from controlling Tave.

A control complex ventilation alarm will indicate that AHF-17A has tripped. The BOP will respond to the back of the control board to diagnose and shift ventilation for the control complex to the "B" train (OP-409).

At about 30% power a small pressurizer steam leak will occur (19.5 gpm) that will reduce RCS pressure. The SRO will enter AP-520 and commence diagnosis of the pressure decrease. A complicating factor will be the RCS spray valve block valve will not close. Therefore, RCP-1B will be tripped and then the reactor.

The reactor trip will result in the major transient of a large steam space leak from the pressurizer (160 gpm). This will further decrease RCS pressure to the ES actuation set point. When ES actuates MUP-1B will experience a shaft shear, leaving only 1 MUP in service (MUP-1C). In addition to the MUP shaft problem, DCP-1B just did not start. The BOP must identify this failure and start DCP-1B because it is the source of cooling water to the remaining MUP (CT).

The pressure will continue to decrease even with the ES until a loss of SCM occurs. The OAC must trip the remaining RCPs within 2 minutes. RCP-1D will not trip and the operator must de-energize the 6900V Aux Bus 3B at the breakers (open Breaker 3104) to secure RCP-1D (CT).

Once the plant is in EOP-3 and the RCPs are secured this scenario can be terminated.

Procedures used: (ARs not listed)

OP-203	AP-520	EOP-2
OP-204		EOP-3
OP-409	AI-505	EOP-13
OP-501		

SHIFT TURNOVER

A. Give the following for initial conditions selected:

1. Time in core life – 300 EFPD
2. Shift: ☒ Day ☐ Swing ☐ Mid
3. Rx power and power history – 23%, shutdown for 3 days
4. Boron concentration – 1088 PPMB
5. Xenon – Increasing
6. RCS Activity - See Status Board

B. Tech. Spec. Action requirement(s) in effect:

- T.S. 3.8.1 Condition “B” for EDG-1B; SP-321 was completed 1 hour ago, due again within the next 7 hours.

C. Clearances in effect:

- EDG-1B for Governor replacement
- MUP-1A shaft replacement due to high vibration
- SWP-1C for impellor replacement
- FWP-7 motor bearing replacement

D. Significant problems/abnormalities:

- An emergency need for power exist due to other generating facilities being unavailable.

E. Evolutions/maintenance for the on-coming shift:

- Continue with turbine startup IAW OP-203 at step 4.2.18
- Auto Synch is the preferred method for closing output breakers
- Continue power escalation IAW OP-204
- Maneuvering rate limits are: Normal plant maneuvering rates

F. ROs walk down the main control boards and provide the crew with the following data:

RCS Average Temperature	_____	Make-up Tank Level	_____
RCS Pressure	_____	Turbine Load	_____
Pressurizer Level	_____	Turbine Reference	_____

G. Required Emergency Plan Implementation

- ☐ Full Implementation, including all required notifications.
☐ Initial/upgrade classifications - internal notifications.
☒ None

Target Quantitative Attributes – Scenario 1	Actual Attributes
1. Total Malfunctions (5-8)	7
2. Malfunctions after EOP entry (1-2)	2
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

SCENARIO OBJECTIVES:

- The operating crew will be evaluated on their ability to diagnose a pressurizer steam space leak in the Reactor Building.
- The BOP will be evaluated on his ability to respond to an engineered safeguards actuation.
- The operating crew will be evaluated on their ability to respond to a reactor trip and a loss of subcooling margin.
- The BOP and SRO will be evaluated on their ability to diagnose a tripped CDP, and a control complex fan.
- The crew will be evaluated on their ability to perform Emergency and Abnormal Operating Procedures.
- The OAC and SRO will be evaluated on their ability to diagnose the neutron error instrument failure and take corrective actions.
- The BOP and SRO will be evaluated on their ability to perform OP-203, Plant Startup.
- The SRO will be evaluated on his ability to apply ITS to the Radiation Monitoring system as it applies to the RCS leakage detection instrumentation.

**Examination Setup/Execution
Scenario 1**

Scenario Setup

1. ☐ Initialize the simulator to IC # 61 and UNFREEZE the simulator
2. ☐ In the NRCEXAM directory for LESSON PLAN, start lesson plan # 14
3. ☐ Trigger Lesson Plan Step #10
4. Place the following Red Tags on the main control panel:
 - ☐ MUP- 1,2,3,4,5 A
 - ☐ SWP-1C
 - ☐ FWP-7
 - ☐ EDG "B" Pushbutton
 - ☐ BKR 3210
5. Perform the following setup actions:
 - ☐ SPDS Normal (left) and Imbalance (right)
 - ☐ Ensure PPC group 59 on the right overhead CRT and group 108 on left overhead CRT
 - ☐
6. Ensure clean copies of the following consumable procedures are available.
 - ☐ OP-203, 204, 409, 501,
 - ☐ EOP-2 , 3
 - ☐ AP-520
7. ☐ Advance all MCB recorders.
8. ☐ FREEZE the simulator and notify the lead examiner that the simulator is ready to begin

Scenario Execute

1. When directed by the lead examiner UNFREEZE the simulator.
2. Complete OP-203 for the Turbine S/U, once the ICS station are in AUTO (per step 4.2.40) [When Delta Tc is put into AUTO] then insert STEP #8 (RMA-6 pump failure)
3. Once the ITS call has been made for the RMA-6 failure, then actuate STEP #11 (trip of CDP-1B)
{CDV-40 is closed on the simulator schematic when called by procedure}
{FW/OTSG chemistry is satisfactory for transition to OP-204}
4. STEP #7 (Neutron Error failure) when ~ 28% power ROLE PLAY: this is a control signal and I&C will work on this problem.
5. In OP-204 step 4.1.17 the heat balance is done SAT for time compression;
PROMPT FOR POWER INCREASE.
6. Once power is > 30% insert STEP #12 (trip of AHF-17A) BOP gets OP-409 and performs the ventilation lineup change.
7. When prompted insert STEP # 4 (small pzs steam space leak) must also trigger STEPS #'s 1,2,and 3 (they are conditional triggers from the event)

The steam space leak with no operator actions takes about 11 minutes to get the RB fan condensate alarms

Op-Test No.: 1 Scenario No.: 2 Event No.: 1 Rev.: 01

Event Description: Align RB ventilation to SW cooling OP-417 (Normal Evolution)

Time	Position	Applicant's Actions or Behavior
	BOP	Perform OP-417 Step 4.12.3 to swap RB fans cooling medium from Industrial Cooling (CI) to Service Water (SW).
	SRO	Supervise evolution for ventilation, may review ITS 3.6.6 for RB spray and Containment Cooling Systems as indicated in OP-417, this however, is not the ITS call for this scenario.

Op-Test No.: 1 Scenario No.: 2 Event No.: 2 Rev.: 01

Event Description: Once the ventilation is swapped and prior to the LOOP trip ARP-1A (MALF).

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose the ARP trip and potential loss of vacuum Alarm Condenser vacuum pump trip (N-1-2) Alarm Condenser vacuum pump trouble (N-1-3) ARP-1A breaker indicates open (green) lights "LIT"
	SRO	Direct BOP to Alarm Response and supervise the vacuum pump transfer to the standby pump.
	BOP	Alarm Procedure directs starting the standby vacuum pump (ARP-1B) Start ARP-1B, breaker indicates closed (red) is "LIT" Monitor condenser vacuum on main control board.

Op-Test No.: 1 Scenario No.: 2 Event No.: 3 Rev.: 01

Event Description: Once the vacuum pumps are swapped a LOOP on the "A" ES bus (**MALF**) will occur with the "B" EDG unavailable (AP-770), once the BOP enters AP-770, the breaker for "A" EDG (**MALF**) (brk 3209) will fail. This will result in the SRO making the ITS call for 3.8.1 condition A & D.

Time	Position	Applicant's Actions or Behavior
	SRO	Enter AP-770 and have BOP complete the steps for the condition of UV on an ES bus.
	BOP	Perform AP-770 steps as per plant conditions Notify personnel Isolate Letdown Restore SW/RW
	SRO	Enters ITS 3.8.1 AC-Sources operating Condition A- One required offsite circuit inoperable Condition D- One required offsite circuit inoperable AND one EDG inoperable
	BOP	When the "A" EDG breaker trips; enter AP-770 starting at the beginning step 3.1 (AI-505).

Op-Test No.: 1 Scenario No.: 2 Event No.: 4 Rev.: 01

Event Description: While the BOP is performing AP-770 then RCS pressure instrument (RC-3B-PT1) fails high (**MALF**)

Time	Position	Applicant's Actions or Behavior
	OAC	Diagnose the RCS pressure instrument failure. Alarm SASS mismatch (K-3-2) Alarm RCS Press High (J-3-1) RC-003A PIR1 recorder has pressure increasing Pressurizer heater demand goes to zero At 2355 "B" RPS channel will trip Alarm RPS channel "B" trip (J-6-1) Alarm RPS channel "B" trouble (J-6-4)
	SRO	Direct the OAC to close the PORV prior to pressure reaching 2450, the spray valve is de-energized so it will not open on the pressure failure
	OAC	Close the PORV The Spray valve, spray valve block valve, and the PORV block valve are all de-energized.
	SRO	Direct the BOP to swap the RCS pressure instruments in the SASS cabinet OP-501.
	BOP	Swap the RCS pressure input to the "A" instrument in the SASS cabinet per OP-501. May use computer point "B" R-224 to compare.

Op-Test No.: 1 Scenario No.: 2 Event No.: 5 Rev.: 01

Event Description: When the RCS is stable from the Pressure instrument failure then a “B” OTSG tube leak occurs. (40 gpm) (MALF)

Time	Position	Applicant's Actions or Behavior
	OAC	Diagnose OTSG Tube leak Alarm Main steam line A/B high rad monitor fail (H-1-5) Monitor Pressurizer level for change
	BOP	Verify “B” OTSG leak Check RMG-26/27 A1 indicates B OTSG (B1 MS line)
	SRO	Directs the OAC to quantify the OTSG leakage Enters EOP-6 once validated that leakage is > 1 gpm

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 Rev.: 01

Event Description: From EOP-6 enter AP-510 for power reduction the ULD fails to respond (**MALF**) need to decrease power in manual using the SG/RX master hand/auto station.
(Reactivity manipulation)

Time	Position	Applicant's Actions or Behavior
	SRO	Direct the OAC to decrease power in accordance with AP-510
	OAC	While depressing the ULD toggle no motion on the meter or plant response will occur. Notify the SRO and take hand control of the SG/RX master to decrease power in manual.
	SRO	Directs OAC on manual power reduction due to ICS malfunction.

Op-Test No.: 1 Scenario No.: 2 Event No.: 7 Rev.: 01

Event Description: During the rapid power reduction (approximately 85% power) the OTSG tube ruptures (**MALF**) (350 gpm) (**MAJOR TRANSIENT**)

Time	Position	Applicant's Actions or Behavior
	OAC	Diagnose the increase leakage as a factor of pressurizer level decreasing at a faster rate.
	SRO	<p>Follow in EOP-6 step 3.4 IF at any time Pressurizer level is <100 inches THEN trip the reactor and go to EOP-2.</p> <p>May direct BOP to open additional HPI valves, isolate letdown, start additional MUPs, and close MUP recirculation valves.</p> <p>When pressurizer level is < 100 “ then direct the OAC to trip the reactor.</p>
	OAC	<p>Manually trip the reactor</p> <p>Complete Immediate actions of EOP-2</p>

Op-Test No.: 1 Scenario No.: 2 Event No.: 8 Rev.: 01

Event Description: As a result of the overcooling (when turbine failed to trip and “B” MSSV failed open) the MSLI/MFLI fails, (**MALF**) the operator must isolate the “B” OTSG manually. (CT)

Time	Position	Applicant’s Actions or Behavior
	BOP	When directed by EOP-5 to actuate MSLI/MFLI pushing the buttons for the “B” OTSG has no effect the lights do not actuate and the isolation does not occur. Manually isolate the “B” OTSG per EOP-5 step 3.6
	SRO	Direct the BOP in isolation of the “B” OTSG per EOP-5 step 3.6

Op-Test No.: 1 Scenario No.: 2 Event No.: 9 Rev.: 01

Event Description: When the reactor is tripped the turbine fails to trip (**MALF**) EOP-2 contingency removes the turbine by closing the MSIVs. (**CT**)

Time	Position	Applicant's Actions or Behavior
	OAC	During the Immediate actions of EOP-2 the TVs and GVs are NOT closed. Must perform the contingency step 2.5
	SRO	Monitor the plant and operator actions, when the symptom scan is done or when the symptom is present after the symptoms scan was completed. Will direct transition to EOP-5 for Overcooling.

Op-Test No.: 1 Scenario No.: 2 Event No.: 10 Rev.: 01

Event Description: When the reactor tripped “B” OTSG MSSV fails open (**MALF**) this provides a release path from the leaking OTSG to the environment.

Time	Position	Applicant's Actions or Behavior
	CREW	Monitor the Control board camera of the MSSV and identify that one MSSV is open on the “B” side.
	SRO	This will have a more severe consequence if the “B” OTSG is not manually isolated. The OTSG should indicate dry, the leakage into the OTSG is steaming out the MSSV

NARRATIVE SUMMARY:

The plant is at 100% power; per the turnover sheet the RB ventilation needs to be transferred to the Service Water system for maintenance on the Industrial Cooling System. (OP-417)

When the ventilation transfer is completed ARP-1A will trip. The BOP will refer to the AR, will start ARP-1B, and monitor condenser vacuum.

Once the plant is stable a loss of offsite power to the "A" ES bus will occur. The "A" EDG will start and load onto the bus. When the operator has entered AP-770 and progressing then the "A" EDG breaker (3209) will fail open. This will leave the plant with only the "B" ES bus energized from its offsite source. The BOP will return to the first step of AP-770 and start the recovery of plant systems again. (AP-770)

The SRO will identify that he is in ITS 3.8.1 AC-sources operating; Condition A – One required offsite circuit inoperable, and Condition D – One required offsite circuit inoperable AND one EDG inoperable.

RCS pressure instrument "B" fails high over 5 minutes, this affects pressurizer heaters, spray and the PORV operation. Due to the loss of power the spray valve does not respond, however the heater demand will go to zero. The operator will need to identify that the PORV will open when pressure reaches 2450. They should swap to a good instrument in the SASS cabinet, or close the PORV and its block valve prior to it opening. (OP-501)

A 40 gpm tube leak will initiate annunciator and radiation monitor alarms. The OAC should quantify the leakage as greater than 1 gpm in the "B" OTSG. This will prompt the SRO to enter EOP-6, OTSG Tube Rupture. The crew will need to start a plant shutdown (AP-510).

When the OAC depresses the ULD toggle to decrease power there is no response, he will need to take manual control of the SG/RX master control station and reduce power manually. When power is decreased to around 85%, the initial tube leak will become a tube rupture of approximately 350 gpm.

The MUP should have been started by now from the loss of power but the crew will not be able to keep the plant on line and will need to trip the reactor by procedure. When the reactor trips the turbine fails to trip, a contingency action will have the operator close the MSIVs (CT). At this time the "B" MSSV will stick open. This results in a plant overcooling, along with a release to the environment from the leaking OTSG. Because the turbine does not trip the operator will have to remember to open the turbine output breakers, or the procedure will identify it later.

The MSLI/MFLI does not automatically actuate, the operator must manually isolate feedwater to the "B" OTSG to minimize the overcooling (CT).

With the plant in EOP-5 and the "B" OTSG isolated except for the primary to secondary leakage steaming out the MSSV this scenario may be terminated.

Procedures used:

OP-417	AP-510	EOP-2
OP-501	AP-770	EOP-5
	AI-505	EOP-6

SHIFT TURNOVER

A. Give the following for initial conditions selected:

1. Time in core life – 300 EFPD
2. Shift: ☒ Day ☐ Swing ☐ Mid
3. Rx power and power history – 100%
4. Boron concentration – 1088 PPMB
5. Xenon – Equilibrium
6. RCS Activity - See Status Board

B. Tech. Spec. Action requirement(s) in effect:

- T.S. 3.8.1 Condition “B” for EDG-1B; SP-321 was completed 1 hour ago, due again within the next 7 hours.

C. Clearances in effect:

- EDG-1B for Governor replacement
- MUP-1A shaft replacement due to high vibration
- SWP-1C for impellor replacement
- FWP-7 motor bearing replacement

D. Significant problems/abnormalities:

- None

E. Evolutions/maintenance for the on-coming shift:

- Align RB ventilation to SW cooling

F. ROs walk down the main control boards and provide the crew with the following data:

RCS Average Temperature	_____	Make-up Tank Level	_____
RCS Pressure	_____	Turbine Load	_____
Pressurizer Level	_____	Turbine Reference	_____

G. Required Emergency Plan Implementation

- ☐ Full Implementation, including all required notifications.
☐ Initial/upgrade classifications - internal notifications.
☒ None

Target Quantitative Attributes – Scenario 1	Actual Attributes
1. Total Malfunctions (5-8)	6
2. Malfunctions after EOP entry (1-2)	3
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	3
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

SCENARIO OBJECTIVES:

- The BOP will be evaluated on his ability to isolate an OTSG when main feedwater isolation circuitry fails.
- The SRO will be evaluated on his ability to apply ITS to the electrical system.
- The OAC and SRO will be evaluated on their ability to diagnose a RCS pressure instrument failure and take corrective actions.
- The OAC and SRO will be evaluated on their ability to diagnose a failure of the ULD and reduce power using manual ICS control.
- The BOP will be evaluated on their ability to diagnose a potential loss of condenser vacuum and to take corrective actions.
- The crew will be evaluated on their ability to perform Emergency and Abnormal Operating Procedures.
- The crew will be evaluated on their ability to diagnose an OTSG tube leak and to take appropriate actions.

**Examination Setup/Execution
Scenario 2**

Scenario Setup

1. ☐ Initialize the simulator to IC # 11 and UNFREEZE the simulator, START SWP-1A, STOP SWP-1C.
2. ☐ In the NRCEXAM directory for LESSON PLAN, start lesson plan # 15
3. ☐ Trigger Lesson Plan Step #1
4. Place the following Red Tags on the main control panel:
 - ☐ MUP- 1,2,3,4,5 A
 - ☐ SWP-1C
 - ☐ FWP-7
 - ☐ EDG "B" Pushbutton
 - ☐ BKR 3210
5. Perform the following setup actions:
 - ☐ SPDS Normal (left) and Imbalance (right)
 - ☐ Ensure PPC group 59 on the right overhead CRT and group 108 on left overhead CRT
 - ☐
6. Ensure clean copies of the following consumable procedures are available.
 - ☐ OP-417, 501
 - ☐ EOP-2, 5, and 6
 - ☐ AP-510, 770
7. ☐ Advance all MCB recorders.
8. ☐ FREEZE the simulator and notify the lead examiner that the simulator is ready to begin

Scenario Execute

1. When directed by the lead examiner, UNFREEZE the simulator.
2. When directed after the normal evolution is complete, trigger STEP # 12 (trip ARP-1A)
3. When the ARPs are swapped: STEP #2 (LOOP to the "A" ES BUS)
4. Once the BOP has started in AP-770 STEP #3 ("A" EDG Breaker failure OPEN)
5. Once the plant is stable STEP #4 (RCS NR pressure failure)
6. When directed STEP # 5 (40 gpm Tube Leak) #6 (ULD failure is linked to trigger from #5),
7. Trigger STEP #7(Leak increases to 350 gpm) once power is approximately 85%. This will then activate the MSLI/MFLI isolation and the turbine trip failure, along with the stuck MSSV.

The reactor may trip due to LOW PRESSURE! Prior to PZR level < 100"

Op-Test No.: 1 Scenario No.: 3 Event No.: 1 Rev.: 01

Event Description: Turnover sheet identifies this task to pump the RCDT to the MWST
(NORMAL EVOLUTION)

Time	Position	Applicant's Actions or Behavior
	BOP	Pump the RCDT in accordance with OP-407J, section 4.1
	SRO	Monitor the evolution performed by the BOP operator.

Op-Test No.: 1 Scenario No.: 3 Event No.: 2 Rev.: 01

Event Description: When the plant is stable then DPDP-5A fails (**MALF**) and the SRO makes the call for ITS 3.8.9 Condition C.

Time	Position	Applicant's Actions or Behavior
	CREW	Diagnose the loss of DPDP-5A ALARMS: RB Spray Actuation A (B-1-1) Chill Water (F-1-7) CRD AC DC brk shunt trip loss of power (J-2-6) Lockout relay DC power loss (O-3-9) Cross-tie blocked loss of DC (Q-4-3) Breaker 1662 Trip (R-2-1)
	SRO	Declares ITS 3.8.9 Condition C - One DC electrical power distribution subsystem inoperable Identifies affected components from OP-700E for DPDP-5A This identifies that EFV-57 and 58 are failed open with no DC power. Effectively making EFP-3 unavailable (EFP-1 also).

Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Rev.: 01

Event Description: Once the loss of DC power is addressed then SWV-82 fails closed (**MALF**) this removes cooling water to the RCP-1C. Need to reduce power and secure RCP-1C.

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose that SWV-82 is closed Alarm RC Pump C cooling water flow low (I-3-3) Valve indicates green light lit (valve closed) Attempt to re-open SWV-82, the valve will not reposition. May call the PPO to try to manually open the valve.
	SRO	Start 5 minute time limit to secure RCP-1C Enter AP-510 Rapid Power Reduction When power is less than 75%, or 5 minutes has elapsed, direct the OAC to trip RCP-1C
	OAC	Commence power reduction in accordance with AP-510 direction from the SRO When directed secure RCP-1C Monitor plant parameters for re-ratio of feedwater

Op-Test No.: 1 Scenario No.: 3 Event No.: 4 Rev.: 01

Event Description: When RCP-1C is tripped ICS fails to re-ratio (**MALF**) this requires manual feedwater control with both MFW loop masters.

Time	Position	Applicant's Actions or Behavior
	SRO	Monitor the re-ratio of feedwater flows. Supervise the control of MFW. May direct the BOP to control RCS pressure using pressurizer spray.
	OAC	Take manual control of both Feedwater loop master controls Delta Tc indicates A is hotter than B Feed more to A, less to B Stabilize plant and fine tune total feedwater flow using delta Tc indication.
	BOP	Monitor RCS pressure, may have to open the spray valve in manual for more flow. Once pressure is stable if manually opened spray valve must re-close valve.
	SRO	Review AP-545 for loss of RCP runback parameters

Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Rev.: 01

Event Description: When the plant is stable from the RCP trip then the “B” MFW pump has an oil leak (**MALF**) and must be secured. With ICS in manual this is the reactivity manipulation.

Time	Position	Applicant’s Actions or Behavior
	OAC	Diagnose the oil leak on the “B” MFW pump Alarm FWP B Emergency oil pump auto start (L-2-5) May call SPO to investigate
	SRO	Direct the OAC to commence down power due to the oil leak on the B MFW pump refer to AP-545, however, ICS is in manual.
	OAC	Decrease power using the loop master to reduce feedwater flow and wait for the plant to track the decrease.

Op-Test No.: 1 Scenario No.: 3 Event No.: 6 Rev.: 01

Event Description: When the “B” MFWP is tripped the “A” MFWP trips (**MALF**) also causing a loss of all MFW.

Time	Position	Applicant’s Actions or Behavior
	OAC	Once power is low enough or if directed trip the “B” MFW pump. Diagnose that the “A” MFW pump also tripped and that the Reactor should have tripped from the loss of all feedwater
	SRO	Direct the OAC to take the Immediate Actions of EOP-2

Op-Test No.: 1 Scenario No.: 3 Event No.: 7 Rev.: 01

Event Description: The loss of MFW should trip the reactor, however, all the rods do not fall. An ATWAS (**MALF**) condition, therefore the operator must trip the rods by de-energizing the bus.

Time	Position	Applicant's Actions or Behavior
	OAC	Opens breakers 3305 and 3312, then re-closes breaker 3305 and 3312. Contingency action of EOP-2 step 2.2 {ENSURE 3 second delay between open and re-close of breakers} Diagnose the following: No trip confirm No bias on the TBVs SPDS displays do not go to the post trip window
	SRO	Complete EOP-2 Immediate actions and perform Symptom Scan Identify Inadequate Heat Transfer, transition to EOP-4

Op-Test No.: 1 Scenario No.: 3 Event No.: 8 Rev.: 01

Event Description: This is triggered off the EFIC actuation, where EFP-2 trips on actuation (MALF) leaving no feedwater.

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose the loss of EFP-2 Alarm EF Pump 2 trips (H-7-4) No EFW flow on EFP-2 flow indicator
	SRO	Verify no Feedwater capabilities Both MFW pumps are tripped EFP-3 and EFP-1 are not available due to the loss of DC power EFP-2 is tripped AFW pump 7 is OOS and tagged Direct actions in EOP-4

Op-Test No.: 1 Scenario No.: 3 Event No.: 9 Rev.: 01

Event Description: Total loss of feedwater has occurred and HPI/PORV cooling is the success path in EOP-4.

Time	Position	Applicant's Actions or Behavior
	BOP	Monitor RCS incore temperatures increase RCS pressure increase As directed actuate manual HPI, identify that the "A" side HPI manual actuation will not work due to the loss of DC power.
	SRO	Direct actions in EOP-4

NARRATIVE SUMMARY:

The plant is at 100% power, RCV-8 pressurizer code safety valve is leaking. The BOP needs to pump the RCDT back to normal operating level (OP-407J).

The disconnect switch 22 is damaged by movement of new battery cells on a skid and results in tripping which de-energizes DPDP-5A. The loss of DPDP-5A will provide multiple alarms, and renders the emergency feedwater valves on EFP-3/1 inoperable (failed open) (OP-700E). This will require the SRO to make the ITS call 3.8.9 Condition C – One DC electrical power distribution subsystem inoperable.

Once the plant is stable then SWV-82 fails closed, it will not open and the plant power must be reduced to <75% (AP-510). RCP-1C must be tripped within 5 minutes due to the loss of cooling water (AP-545).

When RCP-1C is tripped main feedwater does not re-ratio, the OAC needs to take manual control of the feedwater loop masters. The BOP should monitor and control RCS pressure using the spray valve as necessary during the manual control of feedwater.

An oil leak develops on the “B” MFW pump; the plant will need to reduce power to less than 45% per AP-545. This power reduction will be in manual due to the feedwater control. When the “B” MFW pump is tripped the “A” pump also trips. A total loss of main feedwater provides an RPS trip signal.

The RPS trips, however the rods do not trip (ATWAS), the OAC must take contingency actions from EOP-2 to de-energize the control rods (CT).

EFIC will actuate and EFP-2 will trip on the actuation signal. This is now a complete loss of all feedwater (EOP-4).

This drill will terminate when the operators have established HPI/PORV cooling of the RCS (CT).

Procedures used:

OP-407J	AP-510	EOP-2
OP-700E	AP-545	EOP-4
		EOP-14

SHIFT TURNOVER

A. Give the following for initial conditions selected:

1. Time in core life – 300 EFPD
2. Shift: ☒ Day ☐ Swing ☐ Mid
3. Rx power and power history – 100%
4. Boron concentration – 1088 PPMB
5. Xenon – Equilibrium
6. RCS Activity - See Status Board

B. Tech. Spec. Action requirement(s) in effect:

- None

C. Clearances in effect:

- MUP-1A shaft replacement due to high vibration
- SWP-1C for impellor replacement
- FWP-7 motor bearing replacement

D. Significant problems/abnormalities:

- RCV-8 weeping

E. Evolutions/maintenance for the on-coming shift:

- RCDT high level conditions exist from last shift, pump RCDT level to 105". Transfer the water to the MWST.

F. ROs walk down the main control boards and provide the crew with the following data:

RCS Average Temperature	_____	Make-up Tank Level	_____
RCS Pressure	_____	Turbine Load	_____
Pressurizer Level	_____	Turbine Reference	_____

G. Required Emergency Plan Implementation

- ☐ Full Implementation, including all required notifications.
☐ Initial/upgrade classifications - internal notifications.
☒ None

Target Quantitative Attributes – Scenario 1	Actual Attributes
1. Total Malfunctions (5-8)	6
2. Malfunctions after EOP entry (1-2)	1
3. Abnormal Events (2-4)	2
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

SCENARIO OBJECTIVES:

- The crew will be evaluated on their ability to reduce power to within the capacity of one feedwater pump, and conduct a manual runback.
- The OAC will diagnose that an ATWAS has occurred and take appropriate corrective actions.
- The SRO will be evaluated on his ability to apply ITS to the loss of DC power condition.
- The crew will be evaluated on their ability to diagnose a failure of feedwater to re-ratio following removal of the reactor coolant pump from service and compensate for this failure.
- The crew will be evaluated on their ability to diagnose a loss of cooling to an RCP and remove the pump from service.
- The crew will be evaluated on their ability to respond to a loss of all feedwater and initiate HPI/PORV cooling.

**Examination Setup/Execution
Scenario 3**

Scenario Setup

1. ☐ Initialize the simulator to IC # 62 and UNFREEZE the simulator
2. ☐ In the NRCEXAM directory for LESSON PLAN, start lesson plan # 16
3. ☐ Trigger Lesson Plan Step #1
4. Place the following Red Tags on the main control panel:
 - ☐ MUP- 1,2,3,4,5 A
 - ☐ SWP-1C
 - ☐ FWP-7
5. Perform the following setup actions:
 - ☐ SPDS Normal (left) and Imbalance (right)
 - ☐ Ensure PPC group 59 on the right overhead CRT and group 108 on left overhead CRT
 - ☐
6. Ensure clean copies of the following consumable procedures are available.
 - ☐ OP-407J, 700E
 - ☐ EOP-2 , 4
 - ☐ AP-510, 545
7. ☐ Advance all MCB recorders.
8. ☐ FREEZE the simulator and notify the lead examiner that the simulator is ready to begin

Scenario Execute

1. When directed by the lead examiner UNFREEZE the simulator.
2. When directed Insert STEP #3 (DPDP-5A disconnect opens)
ROLE PLAY: as electricians moving a skid with new battery cells the disconnect was damaged and is open. It appears that it can be repaired in about 1 to 1.5 hours.
3. Insert STEP #4 (SWV-82 fails closed) must manually trip RCP-1C within 5 minutes, this will also trigger the ICS re-ratio failure.
4. Once stable insert STEP #6(Lube oil leak on "B" MFWP) also trigger STEP #7 conditional for MFWP trips when "B" is tripped this will also activate STEPS #8(ATWAS) and #9(Loss of EFP-2).

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 1

Event Description: Shutdown EGDG-1A following its monthly functional test. (SP-354A).

Time	Position	Applicant's Actions or Behavior
	SRO	Directs BOP to complete SP-354A
	BOP	Perform SP-354A section 4.6

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 2

Event Description: RCS Thot, RC-3A-TE1, fails high (gradual failure) (**MALF**). The OAC takes manual control of the reactor and feedwater ICS stations. Then transfers to good channel. (OP-501)

Time	Position	Applicant's Actions or Behavior
	OAC	Diagnoses RC-3A-TE1 failure
	SRO	Directs OAC to stabilize plant. ITS call 3.3.17 Post Accident Monitoring Instrumentation.
	OAC	Stabilizes the plant
	SRO	Directs OAC to transfer to a good instrument per OP-501
	BOP	Executes the actions to select alternate RCS Thot per OP-501.

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 3

Event Description: The annunciator for “B” main feedwater pump high vibration alarms. The “B” main feedwater pump trips due to high vibration (**MALF**). No automatic runback occurs, the crew runs the plant back to 55%. (AP-510, AP-545)

Time	Position	Applicant's Actions or Behavior
	OAC BOP	Diagnoses FWP-2B vibration problems
	SRO	Enters AP-510, Rapid Power Reduction, and directs control board operators.
	OAC BOP	Performs AP-510
	OAC	Prior to 55% FWP-2B trips; OAC diagnoses no runback present and takes manual control.
	SRO	Enters AP-545 and directs control board operators.
	OAC BOP	Performs AP-545
	SRO	Following runback, directs OAC to place ICS station(s) back in automatic.
	OAC	Places ICS station(s) back in automatic.

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 4

Event Description: Neutron error fails high, IC-25-NEI (**MALF**). The OAC diagnoses the failure and takes manual control of both feedwater and the reactor to stabilize the plant. (OP-504)

Time	Position	Applicant's Actions or Behavior
	OAC SRO	Diagnose neutron error failure
	SRO	Direct OAC to stop plant movement and stabilize the plant
	OAC	Stops plant movement <ul style="list-style-type: none"> - Places reactor diamond and master in hand - Place feedwater loop masters in hand - Adjusts ICS stations as required to stabilize the plant

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 5

Event Description: Shortly after the Primary Plant Operator trips EDG-1A's fuel rack (post run action) breaker 3211 trips (**MALF**). Makeup is reestablished. (AP-770)

Time	Position	Applicant's Actions or Behavior
	SRO BOP	Diagnose the loss of power to the "A" 4160V ES bus
	SRO	Enters AP-770 and directs the BOP.
	BOP	Performs AP-770

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 6

Event Description: An unisolable steam leak develops in the reactor building on the "B" OTSG. Reactor does not trip on reactor building pressure (only one channel of RPS trips, AR-502) (**MALF**). OAC must trip the reactor (**CT**). (EOP-02)

Time	Position	Applicant's Actions or Behavior
	BOP OAC SRO	Diagnoses steam leak in reactor building
	OAC	Diagnoses ATWAS and trips reactor
	SRO	Enters EOP-2
	OAC BOP	Performs EOP-2

Op-Test No.: 1 Scenario No.: 4 (spare) Event No.: 7

Event Description: Once the "B" OTSG is determined to be the generator with the leak the BOP is directed to isolate the generator. The MFWI does not actuate in manual or automatic (**MALF**). The BOP performs the isolation by manually closing the appropriate valves (**CT**). (EOP-05)

Time	Position	Applicant's Actions or Behavior
	SRO	Enters EOP-5, Excessive Heat Transfer
	OAC BOP	Performs EOP-5

NARRATIVE SUMMARY:

SP-354A, Monthly Functional Test of the Emergency Diesel Generator, EGDG-1A is in progress. The step to shut the diesel down has just been reached and the BOP will perform these actions (SP-354A).

While the BOP is performing actions of SP-354A, selected RCS Thot gradually fails high. The OAC and SRO will diagnose this failure and stabilize the plant and transfer to a good channel (OP-501). The SRO will make the ITS 3.3.17 Post Accident Instrumentation notification.

The “B” main feedwater pump’s high vibration annunciator, L-02-02, will alarm (AR-504). During the subsequent power reduction, the feedwater pump will trip and no automatic runback will occur. The crew will perform a plant runback manually (AP-545).

Following the runback (with ICS returned to automatic control) IC-25-NEI fails high. The OAC and the SRO diagnose the failure and the OAC takes manual control of both feedwater and the reactor to stabilize the plant (OP-504).

One of the auxiliary building operator’s actions after a diesel is shutdown is to trip the fuel racks. Shortly after this action is taken breaker 3211, the normal supply breaker for the “A” 4160 V ES bus trips due to a control circuit failure. The BOP and SRO will restore plant configuration including restarting a makeup pump (AP-770).

An unisolable steam leak develops in the reactor building on the “B” OTSG. An RBIC (4 psig in the reactor building) actuation is caused by the steam leak. The BOP will verify proper ES actuation. Because of an RPS failure only one (1) channel of RPS trips (AR-502; J-08-01 and J-08-04) on the 4 psig in the reactor building. The OAC recognizes an ATWAS and trips the reactor (EOP-02) (CT).

Once the crew determines the leaking OTSG, that steam generator will be isolated. The MFWI does not actuate in manual or automatic. The BOP (OAC) performs the isolation by manually closing the feedwater valves. (EOP-05) If the feedwater is not isolated the overcooling will continue (CT).

The exercise is terminated when a safe steaming path is established on the “A” OTSG and the cooldown rate is acceptable.

Procedures used:

OP-501	AP-510	EOP-2
OP-504	AP-545	EOP-5
	AP-770	EOP-13
SP-354A		EOP-14

SHIFT TURNOVER

A. Give the following for initial conditions selected:

1. Time in core life – 300 EFPD
2. Shift: ☒ Day ☐ Swing ☐ Mid
3. Rx power and power history – 100%
4. Boron concentration – 1088 PPMB
5. Xenon – Equilibrium
6. RCS Activity - See Status Board

B. Tech. Spec. Action requirement(s) in effect:

- T.S. 3.8.1 Condition “B” for EDG-1A

C. Clearances in effect:

- DHP-1A for shaft replacement

D. Significant problems/abnormalities:

- None

E. Evolutions/maintenance for the on-coming shift:

- Complete SP-354A

F. ROs walk down the main control boards and provide the crew with the following data:

RCS Average Temperature	_____	Make-up Tank Level	_____
RCS Pressure	_____	Turbine Load	_____
Pressurizer Level	_____	Turbine Reference	_____

G. Required Emergency Plan Implementation

- ☐ Full Implementation, including all required notifications.
☐ Initial/upgrade classifications - internal notifications.
☒ None

Target Quantitative Attributes – Scenario 3	Actual Attributes
1. Total Malfunctions (5-8)	6
2. Malfunctions after EOP entry (1-2)	1
3. Abnormal Events (2-4)	3
4. Major Transients (1-2)	1
5. EOPs entered requiring substantive actions (1-2)	2
6. EOP contingencies requiring substantive actions (0-2)	1
7. Critical Task (2-3)	2

SCENARIO OBJECTIVES:

- The BOP will be evaluated on his ability to shutdown an emergency diesel generator using the surveillance procedure.
- The OAC and SRO will be evaluated on their ability to diagnose a selected RCS Thot instrument failure and take corrective actions.
- The SRO will be evaluated on their ability to apply ITS to the post accident instrumentation condition.
- The crew will be evaluated on their ability to reduce power to within the capacity of one feedwater pump, recognize an automatic runback is not occurring and conduct a manual runback.
- The OAC and SRO will be evaluated on their ability to diagnose the neutron error instrument failure and take corrective actions.
- The BOP and SRO will be evaluated on their ability to restore power to an Engineered Safeguards bus and restore normal plant configuration.
- The crew will be evaluated on their response to a reactor building isolation and cooling actuation.
- The OAC will diagnose that an ATWAS has occurred and take appropriate corrective actions.
- The crew will be evaluated on their ability to diagnose location of a steam leak and isolate the effected steam generator.
- The BOP will be evaluated on his ability to isolate an OTSG when main feedwater isolation circuitry fails.

**Examination Setup/Execution
Scenario 4**

Scenario Setup

1. ☐ Initialize the simulator to IC # 63 and UNFREEZE the simulator
2. ☐ In the NRCEXAM directory for LESSON PLAN, start lesson plan # 17
3. ☐ Trigger Lesson Plan Step #1
4. Place the following Red Tags on the main control panel:
 - ☐ DHP-1A
 - ☐ EFP-3
 - ☐
5. Perform the following setup actions:
 - ☐ SPDS Normal (left) and Imbalance (right)
 - ☐ Ensure PPC group 59 on the right overhead CRT and group 108 on left overhead CRT
 - ☐
6. Ensure clean copies of the following consumable procedures are available.
 - ☐ OP- 501, 504
 - ☐ EOP-2 , 5
 - ☐ AP-510, 545, and 770
7. ☐ Advance all MCB recorders.
8. ☐ FREEZE the simulator and notify the lead examiner that the simulator is ready to begin

Scenario Execute

1. When directed by the lead examiner, UNFREEZE the simulator.
2. Insert STEP # 3(Thot fails high)
3. Activate STEP # 4(FWP-2B trip with no runback)
4. Before plant reaches 55% power STEP #5(FWP-2B trip)
5. Once below 55% and ICS is normal insert STEP #6(Neutron error)
6. When directed STEP #7(EDG restore) trips breaker 3211, must enter AP-770.
7. STEP #8(Steam leak in RB) also triggers STEP #9(MFWI fails)