



SIMULATOR EXERCISE GUIDE

SEG

SITE: DAEC

Revision #: 0

LMS ID: PDA OPS ESG 203

LMS Rev. Date: N/A

SEG TITLE: NRC INITIAL LICENSE EXAM, SCENARIO #1

SEG TYPE: ☐ Training

☒ Evaluation

PROGRAM: ☐ LOCT ☒ LOIT ☐ Other:

DURATION: ~90 minutes

Developed by:

Instructor/Developer

Date

Reviewed by:

Instructor (Instructional Review)

Date

Validated by:

SME (Technical Review)

Date

Approved by:

Training Supervision

Date

Approved by:

Training Program Owner (Line)

Date

SIMULATOR EXERCISE GUIDE REQUIREMENTS

Terminal Objective:	This Evaluation Scenario Guide evaluates the Operators' ability to: "Given the malfunctions presented in this ESG, the students will protect the public, protect plant personnel, and protect plant equipment, in accordance with plant procedures."
Enabling Objectives:	Evaluation Guide, no tasks are trained. Evaluated tasks are listed on page 3.
Prerequisites:	None
Training Resources:	<ul style="list-style-type: none"> A. Simulator B. Evaluation team C. Operations Management Representative D. Simulator Driver E. Phone Talker F. Exam Proctor for custody of the crew between scenarios G. Simulator Video recording equipment
References:	<ul style="list-style-type: none"> A. ARP 1C05A Rev. 82 B. ARP 1C08B Rev. 113 C. AOP 410 Rev. 29 D. ARP 1C08A Rev. 90 E. ARP 1C23A Rev. 19 F. ARP 1C23B Rev. 23 G. OI 734 Rev. 59 H. AOP 644, Rev. 17 I. AOP 255.1, Rev. 46 J. AOP 255.2, Rev. 43 K. EOP 2 Rev. 18 L. EOP 1 Rev. 20 M. ED Rev. 11 N. OP-AA-102-1003 Rev. 18 O. IPOI 3 Rev. 152 P. OI 856.1, Rev. 48 Q. OI 304.1, Rev. 84 R. OI 304.2, Rev. 96 S. OI 304.2 QRC 1, Rev. 0
Protected Content:	None
Evaluation Method:	Dynamic Scenario graded in accordance with NUREG 1021 guidance.
Operating Experience:	None
Risk Significant Operator Actions:	

TASKS ASSOCIATED WITH SIMULATOR EXERCISE GUIDE	
Task #	Task Title
Reactor Operator	
14.16	Remove the Startup Transformer (1X3) from service
15.10	Transfer Essential Bus from Startup to Standby Transformer
45.21	Reset A/B or Startup Feed Regulating Valve Lockup
93.22	Perform the Immediate Operator Responses to a Reactor Scram
94.15	Respond to Loss of River Water Supply
95.21	Perform Defeat 11
95.44	Perform actions of RC/L of EOP 1
95.45	Perform initial EOP 1 actions (RC)
95.46	Perform actions of RC/P of EOP 1
95.63	Perform DW/T leg of EOP 2
95.64	Perform PC/P leg of EOP 2
95.74	Perform ALC leg of EOP 1 when Injection Systems are lined up and available
95.76	Perform ALC with 1 Core Spray and 1 other ECCS pump available.
95.80	Perform an Emergency Depressurization Using SRVs.
Senior Reactor Operator	
1.02	Determine operability for TS required components
4.21	Direct Crew Actions to Perform the Immediate Operator Responses to a Reactor Scram
5.04	Direct Crew Responses to Loss of 1A3
5.08	Direct Crew Response to Loss of 4160V Nonessential Power Condition
5.15	Direct Crew Response to Loss of River Water Supply
6.21	Direct Crew Response to Perform EOP Defeat 11
6.44	Direct Crew Response for performance of the RC/L leg of EOP 1
6.45	Direct Crew Response for performance of initial EOP 1 actions (RC)
6.46	Direct Crew Response for performance of RC/P leg of EOP 1
6.63	Direct Crew Response for performance of the DW/T leg of EOP 2
6.64	Direct Crew Response for performance of the PC/P leg of EOP 2
6.74	Direct Crew Response to Perform ALC leg of EOP 1 when Injection Systems are lined up
6.76	Direct Crew Response to Perform ALC with 1 core spray and 1 other ECCS pump available
6.78	Direct Crew Response for performance of Emergency Depressurization

UPDATE LOG: Indicate in the following table any minor changes or major revisions (as defined in TR-AA-230-1003) made to the material after initial approval. Or use separate Update Log form TR-AA-230-1003-F16.

#	DESCRIPTION OF CHANGE	REASON FOR CHANGE	AR/TWR#	PREPARER	DATE
				REVIEWER	DATE
Rev. 0	Initial development for 2017 NRC LOIT Examination	Initial development for 2017 NRC LOIT Examination	N/A	See Cover	
				See Cover	

OVERVIEW / SEQUENCE OF EVENTS

Event #	Description
	When the crew assumes the shift reactor power is approximately 80% following 'A' Feed pump vibration analysis. On the last shift, repairs were made to the 'B' FRV due to internal fault that caused the 'B' FRV to lock.
1.	Once the crew takes the shift they will be required to reset the 'B' FRV lockup using ARP 1C05A (F-1) section 4.
2.	RE will request the crew to raise Reactor Power by 5% using control rods and hold prior to continuing raising power to 100%.
3.	Once the crew has reset the 'B' FRV lockup and raised power to approximately 85%, the crew will respond to 'B' FRV failing downscale. The crew will enter AOP 644 and AOP 255.2 due to the feedwater transient and subsequent power fluctuation.
4.	The crew will then respond to control rod 14-15 drifting out. The crew will have to disarm the rod in order for rod motion to stop. AOP 255.1 will be entered to address the drifting rod. The crew will enter LCO 3.1.3 Condition C .
5.	<p>Startup Transformer Trouble annunciator will be received and the crew will respond via ARP 1C08A (A-7), "Startup XFMR 1X3 Trouble". In-plant personnel will be dispatched to the S/U Transformer to investigate and upon investigation; it will reveal a Sudden Internal Pressure Trip. The crew will take 1X3 out of service per OI 304.2. The crew will enter and exit the appropriate Tech Specs for the Startup Transformer OOS:</p> <ul style="list-style-type: none"> • T.S. 3.8.1 Condition B for associated SBDG • T.S. 3.8.1 Condition C for both Offsite Circuits inoperable • T.S. 3.8.1 Condition F (three AC sources inoperable) • T.S. 3.0.3 (per 3.8.1F) <p>The crew will enter, and remain in, the appropriate Tech Spec for the Startup Transformer OOS:</p> <ul style="list-style-type: none"> • T.S. 3.8.1 Condition A for Startup XFMR Offsite Circuit
6.	<p>A small steam leak will occur in the Drywell. The crew will enter EOP 2, Primary Containment Control. The crew will enter AOP 573 to address rising Drywell pressure. The crew will eventually enter EOP 1, Reactor Control and insert a manual scram prior to exceeding 2# in the Drywell.</p> <p>After the scram is inserted and after Drywell pressure exceeds 2#, HPCI will fail to start due to the HPCI aux oil pump tripping. At the same time a lockout of 1A3 will occur causing the loss of "A" Core Spray pump and "A" and "C" RHR pumps. The leak in the drywell will require the crew to initiate sprays to prevent drywell air temperature from exceeding 280°F. (CRITICAL)</p>
7.	As RPV water level continues to lower, the crew will enter EOP 1 ALC leg. The crew will ensure the appropriate injection subsystems and systems are available and lined up as

	RPV level lowers.
8.	The crew will enter ED after RPV level reaches 15" and prior to -25" in the RPV. (CRITICAL)
9.	The crew will recognize that the LPCI inject valve MO-1905 will not automatically open with a 450 psig signal. Operator action at 1C03 will open MO-1905 and RHR will be used to restore and maintain RPV level in the directed control band. (CRITICAL) When RPV level is being restored 170-211" the scenario will be terminated.

Facility: Duane Arnold Energy Center Scenario No.: 1 Op-Test No.: 17-1

Examiners: Chuck Zoia

Operators: SRO-U (2), SRO-I (7), RO (3)

Mike Bielby

Randy Baker

Initial Conditions/Turnover:

When the crew assumes the shift reactor power is approximately 80% following 'A' Feed pump vibration analysis. On the last shift, repairs were made to the 'B' FRV due to internal fault that caused the 'B' FRV to lock.

Once the crew takes the shift they will be required to reset the 'B' FRV lockup using ARP 1C05A (F-1) section 4.

RE will request the crew to raise Reactor Power by 5% using control rods and hold prior to continuing raising power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1		N ATC N SRO	Reset 'B' FRV
2		R ATC R SRO	Raise power with rods
3	FW12B	I ATC I SRO	'B' FRV fails downscale
4	RD0602 19	C ATC TS SRO	Control Rod drift out Tech Spec (3.1.3)
5	AN1C08 A(7)	C BOP TS SRO	Remove S/U Transformer from service Tech Spec Entry (3.8.1)
6	RR15A	M ALL	LOCA in Drywell
7		M ALL	Alternate Level Control
8		M ALL	Emergency Depressurization required
9	STRH0 1, STRH0 2	C BOP C SRO	MO-1905 fails to open

SIMULATOR SET UP INSTRUCTIONS

1. Set NRC Exam Security for the Simulator per QF-1071-08
2. Perform simulator set up per TDAP 1839 Attachment 2, Simulator Setup Checklist.
3. Load the saved IC (in folder with this ESG) to a SNAPSHOT _____
 - a. Reset to that SNAPSHOT.
 - b. Place the Simulator in **RUN**
- OR**
4. Reset to IC 23, place the simulator in **RUN** and perform the following:
 - a. Raise power to approximately 80%
 - b. Insert fw16b and remove to lockup FRV 'B'
 - c. Insert event triggers, malfunctions, overrides and remotes per the tables below.
5. RUN Schedule File "ESG_1.sch" and LEAVE IT RUNNING
6. Verify Malfunctions
7. Verify Remotes
8. Verify Overrides
9. Ensure MOL pull sheet is in the 1C05B hanging file.
10. Ensure EOOS has the same system status lineup as the start of the simulator scenario.
11. Setup control panel including equipment clearance tags, information tags, caution tags or other site-specific devices used as an aid to the operator.
12. After going to run, to insert the 'B' FRV lockup perform the following:
 - a. Insert fw16b to lockup FRV 'B'
 - b. Remove fw16b in order to allow for the crew to reset
13. Provide appropriate shift turnover documentation.
 - a. Markup ARP 1C05A (F-1) as follows:
 - (1) Circle/slash the following sections/steps:
 - a) Section 1.0 – Step 1.4
 - b) Section 2.0 – Step 2.1
 - c) Section 3.0 – Steps 3.1, 3.2 (a), Note, 3.7, 3.10
 - (2) ONLY circle the following sections/steps:
 - a) Section 3.0 – 3.3, 4.1
 - (3) N/A the following sections/steps:
 - a) Section 3.0 – 3.4, 3.5, 3.6, 3.8, 3.9
 - b. Place a maintenance and testing border around 1C05A (F-1)
 - c. Mark up MOL insert/withdrawal sheet to appropriate step

EVENT TRIGGER DEFINITIONS:

Trigger No.	Trigger Logic Statement	Trigger Word Description
1,7,9,13	Manually Activated	Manually Activated
5	ZLOHPHS2256(2) == 1	HS-2256(2) AUX OIL PUMP 1P-218 LITES (RED) TO ON
11	ZLOCSHS2103(4) == 1	Pump 1P-211A (Red) to Red
15	ZLOPCHS4310(2) == 1	CV-4310 open

MALFUNCTIONS:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	AN1C08A(7)	1C08A (A-07) STARTUP XFMR 1X3 TROUBLE	1			CRYWOLF	ON
Setup	RR15A	RECIRC LOOP RUPT – DESIGN BASES LOCA AT 100% - LOOP A	9		15:00	0	0.05
Setup	ED08C	4.16 KV/480V BUS FAULT – BUS 1A3	11	2 SEC		INACTIVE	ACTIVE
Setup	STRH01	LPCI A INJECT VALVE FAILS TO AUTO OPEN - MO-2003				ACTIVE	ACTIVE
Setup	STRH02	LPCI B INJECT VALVE FAILS TO AUTO OPEN - MO-1905				ACTIVE	ACTIVE
Setup	HP12	HPCI Aux Oil Pump 1P218 Trip	5			INACTIVE	ACTIVE
Setup	FW12B	FW REG VALVE CONTROLLER FAILURE (AUTO)- FWRV B	7		7:00	AS IS	0
Setup	RD011415	CONTROL ROD DRIVES OUT- ROD 14-15	13			INACTIVE	ACTIVE

REMOTES:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	DO-HP-032	HS-2256(1) AUX OIL PUMP 1P-218 LITES (GREEN)	5			INACTIVE	ACTIVE
Setup	DO-HP-033	HS-2256(2) AUX OIL PUMP 1P-218 LITES (RED)	5			INACTIVE	ACTIVE

SCHEDULE FILES:

ESG_1			
@Time	Event	Action	Description
Setup	15	Modify malfunction rr15a to 2.0 in 900	RECIRC LOOP RUPT – DESIGN BASES LOCA AT 100% - LOOP A

Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.

If surrogate operators are to be used, brief them using TR-AA-230-1007-F11, Surrogate Brief Checklist

SHIFT TURNOVER INFORMATION

- Monday, Day Shift
- Warm summer day, 77 degrees F, Severe Weather possibility later today
- Approx. 80% Rx Pwr with corresponding MWe, MWth and core flow.
- Protected train- "A"
- Technical Specification Action statements in effect.
 - DAEC is in compliance with all LCO's
- Plant PRA/PSA Status including CDF/LERF & color
 - **CDF: 1.32×10^{-6} , GREEN, 1 Year to Yellow ICDP**
 - **LERF 3.27×10^{-7} , GREEN, 1 Year to Yellow ILERP**
- Evolutions in progress or planned for upcoming shift:
 - Repairs to an internal fault of the 'B' FRV controller are complete. Upon conclusion of turnover, the ATC operator is to reset the lockup on 'B' FRV.
 - Power was lowered to perform 'A' feed pump vibration analysis. 'A' feed pump vibration analysis was completed on the last shift. The crew has been instructed to raise power.
 - RE's have requested the crew to raise Reactor Power by 5% using control rods and hold prior to continuing raising power to 100%.
- Comments, problems, operator workarounds, etc.
 - NSPEO's available for the shift include:
 - Aux Operator and Second Assistant
 - One extra NSPEO available in Work Control
 - Radwaste Operator


SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 1</u></p> <p>After the crew has assumed the shift:</p> <p>If/when contacted as inplant operator for 'B' FRV lockup reset:</p> <p>After 'B' FRV is reset and when contacted:</p>	<p>Booth Communicator</p> <p>Respond as plant personnel and respond as necessary</p> <p>Booth Communicator</p> <p>Inform the control room that you are standing by at the 'B' FRV</p> <p>Booth Communicator</p> <p>Inform the control room that nothing abnormal to report at the 'B' FRV</p>	<p>CREW</p> <ul style="list-style-type: none"> Reset the 'B' FRV lockup <p>CRS</p> <ul style="list-style-type: none"> Direct crew to reset the 'B' FRV IAW the ARP <p>ATC (1C05)</p> <ul style="list-style-type: none"> Resets the 'B' FRV using ARP 1C05A (F-1) section 4 as follows: <ul style="list-style-type: none"> When the cause of the lockout has been corrected, perform the following: <ul style="list-style-type: none"> Verify that the controller LED displays for the locked Feed Reg Valve are lit. Verify the Feedwater Lockout Relay amber light above the associated Lockout Relay is dim. Reset a locked Feed Reg Valve as follows: <ul style="list-style-type: none"> At HC-1621 B FEED REG VALVE MANUAL/AUTO TRANSFER for the locked Feed Reg Valve, perform the following: <ul style="list-style-type: none"> Verify or place in MANUAL ('M' is selected on the A/M pushbutton). Select 'Y' on the display. Adjust the 'Y' bias setting to zero. Obtain the current Feed Reg Valve position using ZI-1621 for the locked Feed Reg Valve. Using Attachment 1, determine the appropriate M/A station controller output signal 'V'. At HC-1621, perform the following: <ul style="list-style-type: none"> Select 'V' on the display to indicate controller output.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS


TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 1</u>		<p>ATC (1C05) Cont.</p> <ul style="list-style-type: none"> ▪ Adjust 'V' to the value obtained from Attachment 1. ▪ Reset the lockout using HSS-1621. ▪ Verify the Feedwater Lockout Relay amber light is no longer lit. ○ Transfer CV-1621 to AUTO as follows: <ul style="list-style-type: none"> ▪ Verify the B FEED REG VALVE CONTROLLER HC-1621 is in MANUAL. ▪ Select 'V' on the display for B FEED REG VALVE CONTROLLER, HC-1621. ▪ Select 'V' on the display for MASTER FEED REG VALVE CONTROLLER, LC-4577. ▪ Match the Feedwater Reg Valve controller top meter display with the MASTER FEED REG VALVE CONTROLLER top meter display by adjusting the potentiometer on HC-1621. ▪ Verify proper response of the Feedwater Regulating valve by monitoring ZI-1621. ▪ Select AUTO on HC-1621. ▪ Select 'S' on the display for B FEED REG VALVE CONTROLLER, HC1621. ▪ Select 'S' on the display for MASTER FEED REG VALVE CONTROLLER, LC-4577.

<p>EVENT 2 Raise power</p> <p>If contacted as organization for assistance:</p> <p>Prior to the next event, if the BOP is in the vicinity of the 1C05 panel and at the direction of the floor instructor:</p>	<p>Simulator Operator (NOTE: Insert Override NM02 at approximately 1 minute intervals during the power change) This will ensure that APRM GAFs will maintain constant through the power change.</p> <p>Booth Communicator Respond as plant personnel and respond as necessary</p> <p>Booth Communicator Contact the control room as the Aux Operator informing them that you are doing “outside-outs.”</p>	<p>CREW</p> <ul style="list-style-type: none"> • Raise reactor power by 5% <p>CRS</p> <ul style="list-style-type: none"> • Direct and observe reactivity manipulations to achieve a 5% raise in reactor power <p>ATC (1C05)</p> <ul style="list-style-type: none"> • Raises reactor power by 5% IAW IPOI 3 and OI 856.1 as follows: <ul style="list-style-type: none"> ○ Monitor neutron monitoring instrumentation during control rod movements. ○ Verifies the following indications: <ul style="list-style-type: none"> • White backlight on the Rod Select pushbutton turns ON • On the Full Core Display, the white “XX-XX” select light corresponding to the rod selected turns ON • On the Four Rod Group Display, the white SELECT light turns ON denoting the position display for the selected rod. ○ Momentarily places the ROD MOVEMENT CONTROL in the OUT-NOTCH position and verifies: <ul style="list-style-type: none"> • The green ROD IN light turns ON momentarily and then turns OFF • The red ROD OUT light turns ON after the green ROD IN light turns OFF. • The red ROD OUT light turns OFF • The amber ROD SETTLE light turns ON and then turns OFF • The rod has been withdrawn as indicated on the Four Rod Group Display
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<p>EVENT 3 FRV Failure</p> <p>After the crew has raised power, reset the 'B' FRV, and at the direction of the Floor Instructor:</p> <p>If contacted as organization for assistance:</p> <p>If contacted as operators to inspect the 'B' FRV locally:</p> <p>Two minutes after being sent to investigate 'B' FRV:</p>	<p>Simulator Operator Activate ET 7. This will activate FW12B for failure of 'B' FRV</p> <p>Booth Communicator Respond as plant personnel and respond as necessary</p> <p>Booth Communicator Acknowledge communication</p> <p>Booth Communicator Inform control room that nothing abnormal is seen at the FRV</p>	<p>CREW</p> <ul style="list-style-type: none"> Respond to 'B' FRV failure downscale <p>CRS</p> <ul style="list-style-type: none"> Establish critical parameter monitoring of RPV Water Level Direct entering AOP 644 May direct entering AOP 255.2 <p>ATC (1C05)</p> <ul style="list-style-type: none"> Assuming manual control of a malfunctioning system <ul style="list-style-type: none"> 'B' FEED REG VALVE MANUAL/AUTO TRANSFER HC-1621 Take manual control of the 'B' Feedwater controller HC-1621 to restore reactor water level May perform the following actions: (if entered AOP 255.2) <ul style="list-style-type: none"> Place one APRM recorder in each trip system to fast speed to monitor for APRM undamped oscillations greater than normal. Verify proper operation/indication of other systems and/or indications Verify control rod positions are correct for the established sequence, by using Rod Position Log. Verify thermal limits on the Official 3D Case. When power is stabilized, plot location on the Stability Power / Flow Map.
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<p>EVENT 4 Rod Drift</p> <p>If contacted as organization for assistance:</p> <p>Two minutes after contacted as RE:</p> <p>Two minutes after sent to HCU:</p> <p>One minute after contacted to isolate rod 14-15:</p>	<p>Simulator Operator Activate ET 13. This will activate RD011415 with will cause control rod 14-15 to drift out.</p> <p>Booth Communicator Respond as plant personnel and respond as necessary</p> <p>Booth Communicator Inform control room that further analysis is required and will contact control room when have more information</p> <p>Booth Communicator Inform control room that nothing abnormal is seen at the HCU</p> <p>Simulator Operator DELETE MALF. RD011415 AND</p> <p>Booth Communicator Inform the control room that time compression has been used and that the Insert and Withdrawal Isolations for rod 14-15 are closed.</p>	<p>CREW</p> <ul style="list-style-type: none"> Respond to control rod 14-15 drifting in IAW ARP 1C05A (D-6). <p>CRS</p> <ul style="list-style-type: none"> Direct entering AOP 255.1 May direct (re-)entering AOP 255.2 Notify the Reactor Engineer of the abnormal rod pattern. Comply with the Technical Specification requirements for Control Rod Operability LCO 3.1.3 Condition C <p>ATC (1C05)</p> <ul style="list-style-type: none"> Place the C11A-S3 EMERG IN/NOTCH OVERRIDE SELECT switch on 1C05 in the EMERG ROD IN position momentarily to abort the rod sequence timer. If any control rod still indicates movement, place and hold the C11A-S3 EMERG IN/NOTCH OVERRIDE SELECT switch on 1C05 in the EMERG ROD IN position. Run an OFFICIAL 3D CASE for abnormal reactor power/control rod distributions. Verify control rod positions are correct for the established sequence, by using Rod Position Log. When power is stabilized, plot location on the Stability Power / Flow Map. When Rod motion has been stopped and/or position indication has been restored clear the alarm by momentarily taking C11A-S7 Rod Drift Alarm Reset/Test switch to RESET. <p>BOP</p> <ul style="list-style-type: none"> Contact in-plant operator to close the Insert Isolation (V-18-1008) AND Withdrawal Isolation (V-18-1275) for Rod 14-15.
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<p>EVENT 5 Loss of 1X3</p> <p>When contacted to investigate 1X3 alarm:</p> <p>2 min. after told to investigate 1X3 alarm:</p> <p>When contacted as ITC Midwest:</p> <p>If contacted as the organization for assistance:</p>	<p>Simulator Operator Insert ET1 This inserts AN1C08A(7), S/U Xfmr trouble alarm.</p> <p>Booth Communicator Acknowledge request.</p> <p>Booth Communicator Inform Control Room there is a Sudden Internal Pressure Trip Alarm in and you are leaving the area.</p> <p>Booth Communicator Acknowledge notification.</p> <p>Booth Communicator Acknowledge request.</p>	<p>CREW</p> <ul style="list-style-type: none"> Implement actions of ARP 1C08A (A-7) Startup XFMR 1X3 Trouble. <p>CRS</p> <ul style="list-style-type: none"> Direct taking out 1X3 out of service per OI 304.2 (or OI 304.2 QRC) Using OI 304.2 section "TRANSFERRING ESSENTIAL BUS 1A3[4] FROM STARTUP TO STANDBY TRANSFORMER": <ul style="list-style-type: none"> If in Mode 1,2, or 3, verify the following Tech Spec conditions are entered and exited: <ul style="list-style-type: none"> T.S. 3.8.1 Condition A for Standby XFMR Offsite Circuit T.S. 3.8.1 Condition B for associated SBDG If the Startup XFMR Offsite Circuit is currently inoperable, then enter and exit the following additional Tech Spec conditions: <ul style="list-style-type: none"> T.S. 3.8.1 Condition C for both Offsite Circuits inoperable T.S. 3.8.1 Condition F (three AC sources inoperable) T.S. 3.0.3 (per 3.8.1F) Determine that the final Tech Spec determination: <ul style="list-style-type: none"> T.S. 3.8.1 Condition A Notify ITC Midwest that the Startup Transformer (1X3) has been removed from service. <ul style="list-style-type: none"> Record the time ITC Midwest was notified that the Startup Transformer was removed from service in the Operating Log. <p>BOP (1C08)</p> <ul style="list-style-type: none"> Send an Operator locally to 1X3 Alarm Cubicle to determine the cause of the alarm. With the aid of Table 1, take the appropriate Corrective Action. <ul style="list-style-type: none"> Take 1X3 out of service per OI 304.1 and OI 304.2, (or OI 304.2 QRC)
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<p>EVENT 5</p> <p>One minute after contacted to verify switchgear rooms clear:</p> <p>If/When contacted as organization:</p>	<p>Booth Communicator</p> <p align="center">Inform the control room that the switchgear rooms are clear.</p> <p>Booth Communicator</p> <p align="center">Acknowledge information/requests</p>	<p>BOP (1C08)</p> <ul style="list-style-type: none"> • Using OI 304.2 QRC1: <ul style="list-style-type: none"> • Transfer 1A3 to the Standby Transformer by performing the following: <ul style="list-style-type: none"> • Place BUS 1A3 TRANSFER switch in MANUAL. • Insert the handle in the SYNCHRONIZE switch for 4KV BREAKER 1A301 STANDBY TRANSFORMER TO BUS 1A3, and place in the ON position. • Verify that the synchroscope indicates near 12 o'clock and not moving with both white (differential phase voltage) indicating lights OFF. • Place the control switch 4KV BREAKER 1A301 STNDBY TRANSFORMER TO BUS 1A3 momentarily to the CLOSE position. • Verify BUS 1A3 STANDBY AMPERES greater than zero amps. • Place the control switch 4KV BREAKER 1A302 STARTUP TRANSFORMER TO BUS 1A3 momentarily in the TRIP position. • Place the SYNCHRONIZE switch for 4KV BREAKER 1A301 STANDBY TRANSFORMER TO BUS 1A3 in the OFF position. • Place BUS 1A3 TRANSFER switch in AUTO.
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EVENT 5

BOP (1C08)

- Using OI 304.2 QRC1:
 - Transfer 1A4 to the Standby Transformer by performing the following:
 - Place BUS 1A4 TRANSFER switch in MANUAL.
 - Insert the handle in the SYNCHRONIZE switch for 4KV BREAKER 1A401 STANDBY TRANSFORMER TO BUS 1A4, and place in the ON position.
 - Verify that the synchroscope indicates near 12 o'clock and not moving with both white (differential phase voltage) indicating lights OFF.
 - Place the control switch 4KV BREAKER 1A401 STNDBY TRANSFORMER TO BUS 1A4 momentarily to the CLOSE position.
 - Verify BUS 1A4 STANDBY AMPERES greater than zero amps.
 - Place the control switch 4KV BREAKER 1A402 STARTUP TRANSFORMER TO BUS 1A4 momentarily in the TRIP position.
 - Place the SYNCHRONIZE switch for 4KV BREAKER 1A401 STANDBY TRANSFORMER TO BUS 1A4 in the OFF position.
 - Place BUS 1A4 TRANSFER switch in AUTO.
- Remove Startup Transformer 1X3 from service by performing the following:
 - Place the STARTUP TRANSFORMER J BREAKER (OCB 5550) control switch momentarily in the TRIP position.
 - Place the STARTUP TRANSFORMER K BREAKER (OCB 5560) control switch momentarily in the TRIP position.

<p><u>EVENT 6</u></p> <p>After the crew takes HS-4310 to Auto Open:</p>	<p>Simulator Operator Insert ET 9 This will start a drywell leak.</p> <p>Simulator Operator Verify ET 15 goes ACTIVE This will increase the size of the leak leading the crew to scram.</p>	<p>CREW</p> <ul style="list-style-type: none"> Respond to a coolant leak in containment. <p>CRS</p> <ul style="list-style-type: none"> Directs enter AOP 573 <p>BOP (1C03/1C24)</p> <ul style="list-style-type: none"> Monitor outside barometric pressure utilizing Computer Point M000 to determine if weather conditions are causing a change in indicated drywell pressure. Verify RIM-9184A and RIM-9184B, NW and South Drywell Area Hi Range Rad Monitors, are reading less than 20R/hr. Start one train of the Standby Gas Treatment System. Position switches at 1C03 as follows: <ul style="list-style-type: none"> HS-4303 Outbd Drywell Vent Isol CV-4303 Auto Open HS-4310 Inbd DW Vent Bypass Isol CV-4310 Auto Open HS-4302 Inbd Drywell Vent Isol CV-4302 Auto Open
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EVENT 6

CREW

- Implements EOP 1, RPV Control mitigation strategies.

CRS


- Direct Crew Response to manually Insert a Scram Before Drywell Pressure reaches 2 psig.
 - Directs scrambling the reactor and performing IPOI 5, Scram.
 - Directs RC/L band of 170-211" using the directed control system, RCIC.
 - Directs installation of Defeat 11 - Containment N2 Supply Isolation Defeat
 - Directs RC/P of 800-1055 psig using directed control system
- Direct Crew Response to Establish a Cooldown of the RPV at a Rate of <100F/hr

ATC (1C05)

- Prior to exceeding 2 psig Drywell Pressure, insert and perform Immediate Operator Responses to a Reactor Scram
 - Scrams the reactor and performs IPOI 5, Scram.
 - Restores and maintains RPV level 170-211" using directed control system.
 - Monitors and controls RPV pressure 800-1055 psig using directed control system.

BOP (1C35)

- Installs Defeat 11 - Containment N2 Supply Isolation Defeat

	<p align="center">NRC INITIAL LICENSE EXAM, SCENARIO #1 Rev. 0</p>	<p align="center">SEG</p>
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<p><u>EVENT 6</u></p> <p>After Drywell Pressure exceeds 2 psig:</p> <p>If contacted to investigate 1P-218 breaker (1D41-13):</p> <p>Two minutes after sent to investigate 1D41-13:</p> <p>If contacted to investigate 1A3 Lockout:</p> <p>Two minutes after sent to 1A3:</p>	<p>Simulator Operator Verify ET 5 AND 11 goes active This will insert HP12 to trip the HPCI Aux Oil Pump and ED08C to Lockout Bus 1A3</p> <p>Booth Communicator Acknowledge request.</p> <p>Booth Communicator Inform control room that 1D41-13 HPCI Aux. Oil Pump 1P218 is tripped and has an acrid odor, no smoke or fire.</p> <p>Booth Communicator Acknowledge request.</p> <p>Booth Communicator Inform control room that 1A3 has a ground fault indication.</p>	<p>CREW</p> <ul style="list-style-type: none"> • Implements the mitigation strategies of EOP 2, Primary Containment Control <p>CRS</p> <ul style="list-style-type: none"> • Performs a crew update of entry into EOP 2 due to Drywell Pressure. • Obtains containment parameters. • May direct installation of Defeat 4 – Drywell Cooler Isolation Defeat • Directs spraying the torus after confirmation that torus pressure is greater than 2 psig. • Directs spraying the drywell before drywell temperature reaches 280F. (CRITICAL) <ul style="list-style-type: none"> • Verifies torus water level less than 13.5 ft. • Verifies plot of drywell temperature and drywell pressure on the DWSIL curve allows drywell sprays. • Verifies recirculation pumps are secured. • Directs maximizing torus cooling. • Placekeeps in EOP 2 to the applicable WAIT UNTIL steps in T/L (T/L-3 and T/L 10), T/T (T/T-6), DW/T (DW/T-6) and PC/P (PC/P-7) legs • Directs entering AOP 301 for Loss of 1A3 <p>BOP (1C03/1C08/1C23)</p> <ul style="list-style-type: none"> • Installs Defeat 4 – Drywell Cooler Isolation Defeat • Utilizes OI 149 QRC to spray the torus. • Utilizes OI 149 QRC to spray the drywell. • Utilizes OI 149 QRC to establish torus cooling. • Place 'A' SBDG in Pull-to-Lock
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EVENT 7

ALC

CREW

- Implements the mitigation strategies of the ALC contingency of EOP 1 CRS
- Directs ADS lockout.
- Directs RPV level bands as RPV level lowers
- Directs maximizing injection with CRD in accordance with AIP 407.
- Directs injection with SBLC in accordance with AIP 406.
- Ensures injections subsystems can be lined up for injection.
- Directs to close MSIVs at approximately 100" RPV Water Level
- Waits for RPV level to drop to +15"
- Ensures at least one injection subsystem lined up with a pump running.
- Before RPV level reaches -25" performs an Emergency Depressurization.

BOP (1C03)

- Lockouts ADS.

ATC (1C05)

- Attempts to restore and maintain RPV level above +15"
 - Maximizes injection with CRD in accordance with AIP 407.
 - Injects with SBLC in accordance with AIP 406.
- Shuts MSIVs

EVENT 8/9

Emergency
Depress.:

CREW

- After RPV level reaches +15" enters and implements the mitigation strategies of EOP ED. **(CRITICAL)**
- Places handswitch of the first SRV to OPEN prior to RPV level reaching -25"

CRS

- Direct Crew Response for performance of EOP 1 ALC and ED
 - Verifies all control rods inserted to at least position 00.
 - Verifies torus water level above 4.5 feet
- Direct Crew Response to Perform an Emergency Depressurization Using SRVs
- Directs opening 4 ADS SRVs

ATC (1C03)

- Perform an Emergency Depressurization Using SRVs.
 - Open 4 ADS SRVs

BOP (1C03)

- Recognizes MO-1905 does not automatically open at 450 psig and takes action at 1C03 to open MO-1905. **(CRITICAL)**

EVENT 8

EOP 1
Implementation
after EOP ED:

CREW

- Implements mitigation strategies of EOP 1 after EOP ED to restore adequate core cooling

CRS

- Verifies 1 Core Spray pumps and 1 other ECCS pump available for injection
- Direct Crew Response to Maximize Injection with Table 2 Systems
 - Direct to maximize injection with all available Preferred Injection Systems (Table 1A) and Alternate Injection Systems (Table 2A).
- Determines RPV level can be restored and maintained above +15" and returns to the normal RPV level control leg of EOP 1
- Directs restoring and maintaining RPV level 170"-211" using low pressure ECCS systems

BOP (1C03)

- Verifies low pressure ECCS system (B & D RHR Pumps) start and align to inject into the RPV
- Reports 1 Core Spray pumps is injecting and 1 other ECCS pump is injecting.
- Throttles RHR injection after level has been restored to 90" on Yarway level indication to restore and maintain RPV level 170"-211"

When RPV
level is being
restored and at
the direction of
the Floor
Instructor:

Simulator Operator
Place the simulator in FREEZE.

Floor Instructor
Announce the scenario is complete;
please stand by your stations and do
not discuss the scenario with your
crew.

*** END OF SCENARIO ***

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. 'B' FRV fail downscale
2. Control Rod Drift
3. S/U Xfmr Sudden Internal Pressure Trip

After EOP Entry:

1. HPCI Trip on Startup
2. Loss of 1A3

Abnormal Events:

1. AOP 644
2. AOP 255.1

Major Transients:

1. LOCA in DW
2. ALC
3. ED

Critical Tasks:

1. #22: BEFORE drywell temperature reaches 280°F and WHILE in the safe region of the DWSIL, THEN initiate drywell sprays. {BWROG: N/A}
2. #1: IF the reactor is shutdown under all conditions and RPV level drops to +15", THEN perform Emergency RPV Depressurization before RPV level reaches -25". {BWROG: RPV 1.1}
3. #2: IF the reactor is shutdown under all conditions, THEN crew actions must be taken to restore and maintain RPV level for adequate core cooling. {BWROG: RPV 1.2}

CREW GRADING ATTACHMENT

ESG 1 Rev. 0

Date _____

Operator Name	Position	Evaluator
	OSM	
	CRS	
	STA	
	1C05	
	1C03	
	B.O.P.	

Management Representative/Lead Evaluator _____ / _____

Crew Critical Tasks

Task Statement	SAT	UNSAT
1. BEFORE drywell temperature reaches 280°F and WHILE in the safe region of the DWSIL, THEN initiate drywell sprays.		
2. IF the reactor is shutdown under all conditions and RPV level drops to +15", THEN perform Emergency RPV Depressurization before RPV level reaches -25".		
3. IF the reactor is shutdown under all conditions, THEN crew actions must be taken to restore and maintain RPV level for adequate core cooling.		



SIMULATOR EXERCISE GUIDE

SEG

SITE: DAEC

Revision #: 0

LMS ID: PDA OPS ESG 204

LMS Rev. Date: N/A

SEG TITLE: NRC INITIAL LICENSE EXAM, SCENARIO #2

SEG TYPE: ☐ Training

☒ Evaluation

PROGRAM: ☐ LOCT ☒ LOIT ☐ Other:

DURATION: ~90 minutes

Developed by:

Instructor/Developer

Date

Reviewed by:

Instructor (Instructional Review)

Date

Validated by:

SME (Technical Review)

Date

Approved by:

Training Supervision

Date

Approved by:

Training Program Owner (Line)

Date

SIMULATOR EXERCISE GUIDE REQUIREMENTS

Terminal Objective:	This Evaluation Scenario Guide evaluates the Operators' ability to: "Given the malfunctions presented in this ESG, the students will protect the public, protect plant personnel, and protect plant equipment, in accordance with plant procedures."
Enabling Objectives:	Evaluation Guide, no tasks are trained. Evaluated tasks are listed on page 3.
Prerequisites:	None
Training Resources:	<ul style="list-style-type: none"> A. Simulator B. Evaluation team C. Operations Management Representative D. Simulator Driver E. Phone Talker F. Exam Proctor for custody of the crew between scenarios G. Simulator Video recording equipment
References:	<ul style="list-style-type: none"> A. OI 644, Rev. 172 B. IPOI 2, Rev. 154 C. OI 264, Rev. 138 D. OI 856.1, Rev. 48 E. OI 856.2, Rev. 9 F. OI 878.8, Rev. 27 G. AOP 255.1, Rev. 46 H. ARP 1C03A, Rev. 58 I. ARP 1C04B, Rev. 81 J. ARP 1C08A, Rev. 92 K. EOP 3, Rev. 22 L. EOP Defeat 11, Rev. 5 M. ARP 1C05B, Rev. 105 N. EOP 1, Rev. 20 O. ATWS, Rev. 23 P. OI 644 QRC 2, Rev. 0 Q. OI 149 QRC 4, Rev. 0 R. OI 734 QRC 1, Rev. 0 S. OI 153 QRC 1, Rev. 4
Protected Content:	None
Evaluation Method:	Dynamic Scenario graded in accordance with NUREG 1021 guidance.
Operating Experience:	None
Risk Significant Operator Actions:	

TASKS ASSOCIATED WITH SIMULATOR EXERCISE GUIDE

Task #	Task Title
Reactor Operator	
8.11	Manually Delay or Interrupt ADS Auto Initiation
95.21	Perform EOP Defeat 11
95.42	Inject into the RPV with SBLC from the Boron Tank
95.45	Perform Initial EOP 1 Actions
95.50	Perform /L to Control RPV Level during an ATWS
95.51	Perform Power/Level Control
95.55	Perform Initial ATWS Actions
95.56	Perform /P to Control RPV Pressure During an ATWS
95.57	Perform /Q to Reduced Reactor Power or SCRAM the Reactor
Senior Reactor Operator	
1.02	Determine Operability for Technical Specification Required Components
6.21	Direct Crew Response to Perform EOP Defeat 11
6.42	Direct Crew Response to Inject into the RPV with SBLC from the Boron Tank
6.45	Direct Crew Response for performance of initial EOP 1 actions (RC)
6.50	Direct Crew Response to Perform /L to Control Level During an ATWS
6.51	Direct Crew Response to Perform Power/Level Control
6.55	Direct Crew Response to Perform Initial ATWS Actions
6.56	Direct Crew Response to perform /Q to reduce power/scram the reactor during ATWS
6.57	Direct Crew Response to perform /P to control RPV pressure during an ATWS

UPDATE LOG: Indicate in the following table any minor changes or major revisions (as defined in TR-AA-230-1003) made to the material after initial approval. Or use separate Update Log form TR-AA-230-1003-F16.

#	DESCRIPTION OF CHANGE	REASON FOR CHANGE	AR/TWR#	PREPARER	DATE
				REVIEWER	DATE
Rev. 0	Initial development for 2017 NRC LOIT Examination	Initial development for 2017 NRC LOIT Examination	N/A	See Cover	
				See Cover	

OVERVIEW / SEQUENCE OF EVENTS

ALL TIMES IN THIS SCENARIO ARE APPROXIMATE

Event #	Description
	The crew will assume the shift at approximately at 10% Reactor power with applicable portions of IPOI 2 completed. 'A' CRD pump is OOS due to gearbox inspection.
1.	The crew will be briefed as to the need to withdraw rods through step 17 (approximately 11% reactor power).
2.	The crew will transfer from the Startup FRV to the 'A' FRV, and then continue with the power ascension.
3.	The crew will attempt to continue the power rise when a loss of notch indication for rod 26-19 and an entry into AOP 255.1. The crew will confer with RE and will substitute the rod position IAW OI 878.8 Section 8.2
4.	Following the AOP entry, Annunciator RE-4116B OFFGAS VENT PIPE B DN SC/INOP due to an Electrical Fault. The crew will determine LCO 3.3.6.1 for Function 2c - Offgas Vent Stack - High Radiation - Channel B does not need be entered since not in the mode of applicability.
5.	A grid voltage transient causes 'A' SBDG to spuriously start, and the Voltage Regulator fails to maintain voltage. The crew will place the 'A' SBDG handswitch to PTL, declare the 'A' SBDG inoperable, and enter LCO 3.8.1, Condition B and LCO 3.7.3 Condition A.
6.	A steam leak in the Steam Tunnel causing an entry into EOP 3.
7.	<p>The crew will attempt to insert a manual scram and discover an Electrical ATWS. The 'B' CRD pump will trip shortly after due to high vibrations. Temperatures will continue to rise during the ATWS and cause Group 1 isolation.</p> <p>The crew will lock out ADS (CRITICAL), perform the Electrical ATWS RIPs, and attempt to inject with SBLC only to discover that the inject valve is stuck and SBLC injection is not available.</p> <p>The crew will transition to power level control and Terminate and Prevent injection. (CRITICAL) and establish a level band until all rods are inserted. (CRITICAL)</p> <p>Performance of Electrical RIPs (RPS Fuses) will insert rods to shutdown the Reactor. (CRITICAL)</p>
8.	<p>The crew will notice that RCIC failed to start and start RCIC manually.</p> <p>After all rods are verified to be fully inserted, the crew will transition from EOP ATWS back to EOP 1 and establish an RPV level band of 170 -211" the scenario will be over.</p>

Facility: Duane Arnold Energy Center Scenario No.: 2 Op-Test No.: 17-1

Examiners: Chuck Zoia

Operators: SRO-U (2), SRO-I (7), RO (3)

Mike Bielby

Randy Baker

Initial Conditions/Turnover:

The crew will assume the shift at approximately at 10% Reactor power with applicable portions of IPOI 2 completed. 'A' CRD pump is OOS due to gearbox inspection. The crew will be briefed as to the need to withdraw rods through step 17 (approximately 11% reactor power), transfer from the Startup FRV to the 'A' FRV, and then continue with the power ascension.

Event No.	Malf. No.	Event Type*	Event Description
1		R ATC R SRO	'Pull Control Rods to achieve 10-12% Reactor power
2		N ATC N SRO	Transfer Reactor Feed from the Startup Feed Regulating Valve to the "A" Feed Regulating Valve
3	RD04A1 827	I ATC I SRO	Control Rod Position lost entry to AOP 255.1
4	RM03R E4116B	TS SRO	RE-4116B Inoperable due to electrical power supply fault Tech Spec Inoperable (3.3.6.1 Function 2C)
5	DG07A, DG05A	C BOP TS SRO	"A" SBDG Start with erratic Voltage Control Tech Spec Entry (3.8.1 Condition B / 3.7.3 Condition A)
6	MS04A	M ALL	Steam Leak in the Steam Tunnel (SCRAM prior to Automatic Group 1 isolation)
7a,b,c	RP05A,B ,C,D	a)M ALL b)I BOP c)I BOP	Electrical ATWS (Pulling RPS Fuses is successful) RPS Trip Test Switches Failure Individual Scram Test Switches Failure
8	STRC01	C ATC C SRO	RCIC Failure to Auto Start

SIMULATOR SET UP INSTRUCTIONS

1. Set NRC Exam Security for the Simulator per QF-1071-08
2. Perform simulator set up per TDAP 1839 Attachment 2, Simulator Setup Checklist.
3. Load the saved IC (in folder with this ESG) to a SNAPSHOT _____ reset to that SNAPSHOT and place the Simulator in RUN,
OR
4. Reset to IC 184, place the simulator in RUN and perform the following:
 - a. Insert Event Triggers, Malfunctions, Overrides, and Remotes per the tables below
 - b. Using MOL pull sheets insert control rods to achieve approximately 8% reactor power
 - c. Using InSight bring up ypfastxen and set to -1.0000 three times to burn out Xenon
 - d. Pull rods as necessary to achieve approximately 8% reactor power after the Xenon burn.
 - e. Place Mode Selector switch to the RUN position.
5. RUN Schedule File "Actions.sch" and LEAVE IT RUNNING.
6. Verify Malfunctions.
7. Verify Remotes (Note that environmental remotes will already be timing)
8. Verify Overrides.
9. Ensure MOL pull sheet is in the 1C05B hanging file.
10. Establish EOOS conditions for OOS components and plant conditions
11. Setup control panel including equipment clearance tags, information tags, caution tags or other site-specific devices used as an aid to the operator.
 - a. Place Guarded system tags on 'B' CRD pump
 - b. Place MIP tag on 'A' CRD pump
12. Plant procedures being worked at time of scenario initiation including what steps are completed.
 - a. Remove CRAM group sheets from 1C05
 - b. OI 856.1 Section 4.1.5
 - (1) Place keep the following steps as complete:
 - a) All Notes and Steps 1-7
 - (2) Place keep the following steps as in progress:
 - a) Steps 8-9
 - c. Place OI 856.2 on desk open to Section 4.1
 - d. IPOI 2 section 4.3
 - (1) Place keep the following steps as complete:
 - a) All Notes, CRSs, and Cautions up to step 20
 - b) Steps 1-11a, 12-17, 19-20
 - (2) Place keep the following steps as in progress:
 - a) Steps 11b & c
 - e. Rod sequence sheets
 - (1) Place keep rods as out up to and including Step 16.
 - f. Mark Power/Flow Map as necessary
 - g. Place ROD OUT placard on 1C05
 - h. Have DR up on one turret

EVENT TRIGGER DEFINITIONS:

Trigger No.	Trigger Logic Statement	Trigger Word Description
1,3,5,17	MANUALLY ACTIVATED	MANUALLY ACTIVATED
9	ZDIHVHS6514 == 1	HS-6514 RX BLDG SUPPLY FAN 1V-SF-10C to START
11	RPDIS1RUN(1) != 1	Reactor Mode Switch out of RUN

MALFUNCTIONS:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	MS18A	VALVE CV1158A/B FAILURE – CV1158A				100	100
Setup	MS18B	VALVE CV1158A/B FAILURE – CV1158B				100	100
Setup	RP05A	RPS SCRAM CIRCUIT FAILURE (ATWS)- AUTO SCRAM FAILURE				ACTIVE	ACTIVE
Setup	RP05B	RPS SCRAM CIRCUIT FAILURE (ATWS)- MANUAL SCRAM FAILURE				ACTIVE	ACTIVE
Setup	RP05C	RPS SCRAM CIRCUIT FAILURE (ATWS)- ARI FAILURE				ACTIVE	ACTIVE
Setup	STRC01	TRIP OVRD- RCIC FAILS TO AUTO START				ACTIVE	ACTIVE
Setup	RM03RE4116B	RE-4116B OFFGAS VENT PIPE B	1	3 SEC		INACTIVE	ACTIVE
Setup	AN1C03A(13)	1C03A (B-04) OFFGAS VENT PIPE RM-4116 A/B HI RAD	1	3 SEC		CRYWOLF	CRYWOLF
Setup	DG07A	1G31 'A' DIESEL GENERATOR SPURIOUS START- DG A	3			INACTIVE	ACTIVE
Setup	MS08A	STEAM LEAKAGE IN STEAM TUNNEL LINE A	5		6:00	0	0.35
Setup	RP05E	ALL INDIVIDUAL ROD SCRAM SWITCHES FAIL				ACTIVE	ACTIVE
Setup	RD11A	CRD HYDRAULIC PUMP TRIP – PUMP A				ACTIVE	ACTIVE
Setup	RD26B	CRD PUMP 'B' HIGH VIBRATION	11	1:00		INACTIVE	ACTIVE
Setup	RD11B	CRD HYDRAULIC PUMP TRIP – PUMP B	11	1:30		INACTIVE	ACTIVE
Setup	SL04	SBLC INJECT VALVE V-26-9 STUCK				0	0
Setup	RD04A2619	CR RPIS REED SW FAILURE OPEN- ROD 26-19				8	8
Setup	DG05A	1G31 'A' DIESEL GENERATOR V/R OSCILLATES IN AUTO- DG A	3	5 SEC	30 SEC	0	100
Setup	ED02	POWER GRID FREQUENCY DISTURBANCE (DELETE in 1 SEC)	3			0	45
Setup	ED03	POWER GRID VOLTAGE TRANSIENT (DELETE in 1 SEC)	3			50	45

REMOTES:

Time	Remote No.	Remote Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	MC01	MN COND 1E-7A VACUUM BREAKER V-03-73	17	02:00		CLOSED	OPEN
Setup	MC02	MN COND 1E-7B VACUUM BREAKER V-03-67	17	02:30		CLOSED	OPEN

OVERRIDES:

Time	Remote No.	Remote Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	DO-RD-615	HS-1807A(1) CRD PUMP 1807 BREAKER TRIPPED (GREEN)				OFF	OFF
Setup	DO-RD-616	HS-1807A(2) CRD PUMP 1807 BREAKER TRIPPED (WHITE)				OFF	OFF
Setup	DO-RD-617	HS-1807A(3) CRD PUMP 1807 BREAKER TRIPPED (RED)				OFF	OFF
Setup	DI-RD-187	HS-1807A CRD PUMP 1P-209A				OFF	OFF

SCHEDULE FILES:

Actions.sch			
@ Time	Event	Action	Description
	9	Modify malfunction ms08a to 0.6 in 300	

Conduct simulator crew pre-scenario brief using TR-AA--230-1007-F06, Simulator Instructor Pre-Exercise Checklist.

If surrogate operators are to be used, brief them using TR-AA-230-1007-F11, Surrogate Brief Checklist

SHIFT TURNOVER INFORMATION

- Today, Day Shift
- Warm summer afternoon temperatures in the mid 70's
- Plant power - ~10% with the corresponding MWth and core flow.
- Protected Train – “A”
- Procedures or major maintenance in progress:
 - IPOI 2 startup in progress
 - ‘A’ CRD Pump OOS, gearbox open for inspection
 - Approximate time for restoration is 4 hours
- Technical Specification Action statements in effect:
 - DAEC is in compliance with all LCO's
- Plant PRA Status
 - **CDF: 1.29×10^{-6} , GREEN, 1 year to Yellow ICDP**
 - **LERF 3.05×10^{-7} , GREEN, 1 year to Yellow ILERP**
- Evolutions in progress or planned for upcoming shift:
 - Continue to raise power IAW with IPOI 2 to complete step 17 this will achieve a reactor power approximately 11%;
 - The ATC operator shall transfer feed control from the Startup FRV to the ‘A’ FRV IAW OI 644 Section 3.6
 - Continue to raise power IAW IPOI 2
- Comments, problems, operator workarounds, etc.
 - NSPEO's available for the shift include:
 - Aux Operator and Second Assistant
 - One extra NSPEO available in Work Control
 - Radwaste Operator

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
EVENT 1 IPOI 2	Simulator Operator (NOTE: Insert Override NM02 at approximately 1 minute intervals during the power change) This will ensure that APRM GAFs will maintain constant through the power change.	CREW <ul style="list-style-type: none"> Withdraw control rods IAW IPOI 2 and OI 856.1 to complete step 17 CRS <ul style="list-style-type: none"> Direct and observe reactivity manipulations to achieve step 17 complete ATC (1C05) <ul style="list-style-type: none"> When reactor power reaches approximately 10% power on APRMs or as desired by the CRS/OSM <ul style="list-style-type: none"> Monitor neutron monitoring instrumentation during control rod movements. Verifies the following indications: <ul style="list-style-type: none"> White backlight on the Rod Select pushbutton turns ON On the Full Core Display, the white "XX-XX" select light corresponding to the rod selected turns ON On the Four Rod Group Display, the white SELECT light turns ON denoting the position display for the selected rod.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 1</u> Raise Power Cont.		ATC (1C05) Cont. <ul style="list-style-type: none"> ○ Momentarily places the ROD MOVEMENT CONTROL in the OUT-NOTCH position and verifies: <ul style="list-style-type: none"> • The green ROD IN light turns ON momentarily and then turns OFF • The red ROD OUT light turns ON after the green ROD IN light turns OFF. • The red ROD OUT light turns OFF • The amber ROD SETTLE light turns ON and then turns OFF • The rod has been withdrawn as indicated on the Four Rod Group Display • Continue to raise power with control rod withdrawal until one bypass valve is open and the second bypass valve is approximately 25% open.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
EVENT 2 Shift FRV from S/U to 'A' OI 644 IF called as any DAEC support personnel: If/when contacted for guidance after FRV transfer:	Booth Communicator Acknowledge coordination Booth Communicator Acknowledge communication Booth Communicator Instruct operator to continue the power ascension.	CREW <ul style="list-style-type: none"> Shift FRV from the S/U FRV to the 'A' FRV CRS <ul style="list-style-type: none"> Coordinate shifting feed flow control from the STARTUP FEED REG VALVE to A FEED REG VALVE. ATC (1C05) <ul style="list-style-type: none"> Shift feed flow control from the STARTUP FEED REG VALVE to A FEED REG VALVE as follows: <ul style="list-style-type: none"> Verify the MASTER FEED REG VALVE CONTROLLER, LC-4577, is in AUTO and select 'V' with the D pushbutton on the display. Verify the STARTUP FEED REG VALVE CONTROLLER, HC-1622, is in AUTO. Verify the A FEED REG VALVE CONTROLLER HC-1579 is in MANUAL. Select 'V' on the display for the A FEED REG VALVE CONTROLLER, HC-1579. Slowly open A FEED REG VALVE CV-1579 using the potentiometer on HC-1579. Monitor reactor water level closely and confirm auto operation of FEEDWATER STARTUP FEED REG VALVE CV-1622. When the display on CV-1579 is matching the display on LC-4577, select AUTO on HC-1579. Select MANUAL on STARTUP FEED REG VALVE CONTROLLER HC-1622. Slowly close STARTUP FEED REG VALVE CV-1622 using the potentiometer on HC-1622. Monitor reactor water level closely and verify auto operation of A FEED REG VALVE CV-1579. Close MO-1631, Startup Feedline Block.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
EVENT 3 Position Substitution 878.8		CREW <ul style="list-style-type: none"> Substitute notch position IAW OI 878.8 Section 8.2 CRS <ul style="list-style-type: none"> Direct substituting notch position for rod 26-19 Direct rod 26-19 insertion to position 08 ATC (1C05) <ul style="list-style-type: none"> At 1C05, verify the Rod Worth Minimizer (RWM-OD) keylock mode switch is in the OPERATE position. At 1C05 (RWM-OD), press the ETC soft-key until the SUBSTITUTE OPTIONS menu choice becomes available. Press the appropriate soft-key. Press the INCREMENT POSITION soft-key to select the desired position. Independently verify desired position on RWM Display Press the ENTER SUBSTITUTE soft-key. Verify screen display. Press the EXIT soft-key Insert rod 26-19 to position 08 BOP (1C28) <ul style="list-style-type: none"> At 1C28, verify the Rod Worth Minimizer (RWM-CC) keylock MODE switch in the OPER position.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
EVENT 4 Offgas Vent Pipe RM Downscale After crew has substituted the rod position and/or when directed by the Floor Instructor: If contacted to investigate 1D60: IF called as any DAEC support personnel:	<p>Simulator Operator:</p> <p style="text-align: center;">ACTIVATE ET 1</p> <p>This causes RE-4116B OFFGAS VENT PIPE B to fail.</p> <p>Booth Communicator:</p> <p style="text-align: center;">After 2 minutes, inform control room that Breaker 03 for 1D60 is closed in with no noticeable problems.</p> <p>Booth Communicator:</p> <p style="text-align: center;">Acknowledge Communication</p>	<p>CREW</p> <ul style="list-style-type: none"> Respond to annunciators per ARP 1C03A (C-4) <p>CRS</p> <ul style="list-style-type: none"> Determine affected Tech Spec TS LCO 3.3.6.1 Condition A <ul style="list-style-type: none"> Function 2c Offgas Vent Stack - High Radiation - Channel B Determine NOT in mode of applicability <p>BOP (1C03/1C10)</p> <ul style="list-style-type: none"> At 1C10, monitor OFFGAS STACK VENT PIPE B RAD MONITOR RM-4116B to determine if DOWNSCALE or INOPERATIVE.\ Send an Operator to the following panels to verify the breakers closed/reset: <ul style="list-style-type: none"> RM4116B – 1D60 Breaker 03

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
EVENT 5 <p>If contacted to investigate 'A' SBDG:</p> <p>Three minutes after requested to investigate 'A' SBDG:</p> <p>If contacted to verify operation of 'A' ESW:</p> <p>Two minutes after requested to verify operation 'A' ESW:</p>	<p>Simulator Operator:</p> <p style="text-align: center;">ACTIVATE ET 3</p> <p>This causes a momentary grid disturbance. 'A' SBDG will spuriously start and its voltage regulator fail.</p> <p>Booth Communicator:</p> <p style="text-align: center;">Acknowledge Request</p> <p>Booth Communicator:</p> <p style="text-align: center;">Inform control room that 'A' SBDG appears to be normal and all alarms at 1C93 are as expected.</p> <p>Booth Communicator:</p> <p style="text-align: center;">Acknowledge Request</p> <p>Booth Communicator:</p> <p style="text-align: center;">Inform control room that 'A' ESW is operating SAT.</p>	<p>CREW</p> <ul style="list-style-type: none"> Respond to annunciators per ARP 1C08A (A-10) <p>CRS</p> <ul style="list-style-type: none"> Determine affected Tech Spec LCO 3.8.1 Condition B and 3.7.3 Condition A Request STP 3.8.1-01 and/or STP 3.8.1-02 <p>BOP (1C08)</p> <ul style="list-style-type: none"> Verify that EMERG SERV WATER PUMP 1P-99A is running. Verify 1V-SF-20 Diesel Generator Supply Fan is running. If "A" SBDG 1G-31 was not started for testing and is no longer required for operation, shut down "A" SBDG 1G-31 per OI 324 (Standby Diesel Generator System). <ul style="list-style-type: none"> Place 'A' SBDG handswitch HS-3231A in PTL

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 6</u> EOP 3 Steam Leak in Steam Tunnel After SBDG TS has been declared and/or at the direction of the Floor Instructor: After 1V-SF- 10C is taken to start:	Simulator Operator: ACTIVATE ET 5 This will insert MS08A to start the Steam Tunnel steam leak. (NOTE: Bring up EOPSLD and monitor Steam Tunnel Temperature) Simulator Operator: VERIFY ET 9 ACTIVATES This will modify ms08a to 0.6 to worsen the steam tunnel leak.	CREW <ul style="list-style-type: none"> Respond to annunciators per ARP 1C04B (B-4), STEAM LEAK DET AMBIENT HI TEMP/EOP 3. CRS <ul style="list-style-type: none"> Direct Crew Response for performance of EOP 3 for high area temperatures level including EOP 1 <ul style="list-style-type: none"> Direct Main Plant Supply and Exhaust Fans in a 3-2-3 lineup Determines RPV pressure reduction will lessen the leakage rate. Before steam tunnel temperature reaches the Group 1 setpoint enter EOP 1 and direct inserting manual reactor scram.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 6</u> EOP 3 Cont.:		<p>BOP (1C21/1C23)</p> <ul style="list-style-type: none"> • Go to 1C21 to determine which area has the high temperature condition. • Start 1V-EF-1, 1V-EF-2, and 1V-EF-3 MAIN PLANT EXHAUST FANS by positioning the following handswitches to START and verify their respective dampers indicate OPEN: <ul style="list-style-type: none"> ○ Fan Handswitch Panel Damper ○ 1V-EF-1 HS-7613 1C23A 1V-AD-16U ○ 1V-EF-2 HS-7614 1C23B 1V-AD-16V ○ 1V-EF-3 HS-7615 1C23C 1V-AD-16W ○ Start the Reactor Building Exhaust Fans by positioning the following handswitches to START: <ul style="list-style-type: none"> ○ Fan Handswitch Panel ○ 1V-EF-11A HS-7611A 1C23A ○ 1V-EF-11B HS-7611B 1C23B ○ Start the Reactor Building Supply Fans by positioning the following handswitches to START: <ul style="list-style-type: none"> ○ Fan Handswitch Panel ○ 1V-SF-10A HS-6512 1C23A ○ 1V-SF-10B HS-6513 1C23B ○ 1V-SF-10C HS-6514 1C23C

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 7A</u> EOP 1 Transition to ATWS When the MODE switch is taken out of run:	Simulator Operator: VERIFY ET 11 ACTIVATES This will cause 'B' CRD pump HI Vibes followed by 'B' CRD pump trip	CREW <ul style="list-style-type: none"> Implements the mitigation strategies of EOP 1 and EOP ATWS CRS <ul style="list-style-type: none"> Enters EOP 1, RPV Control based on reactor power is above 5% or unknown after a scram signal is received. Determines that a reactor scram has been initiated Validates isolations, initiations and SBDG initiations that should have occurred but did not. Recognizes and implements the CRS "IF any rod is withdrawn past position AND it has NOT been determined that the reactor will remain shutdown under all conditions without boron THEN exit this procedure and enter ATWS". ATC (1C05) <ul style="list-style-type: none"> Inserts a manual reactor scram. Reports the 'B' CRD pump high vibes and trip Recognizes an electrical ATWS has occurred and reports the type of ATWS and reactor power. Places the master Feedwater level controller to 158.5" in AUTO.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 7A</u> ATWS</p> <p>If directed to vent the scram air header:</p> <p>Two (2) minutes after being directed to vent the scram air header:</p>	<p>Booth Communicator: Acknowledge the request.</p> <p>Booth Communicator: Inform the control room that you cannot vent the scram air header due to the valve being bound.</p>	<p>CREW</p> <ul style="list-style-type: none"> Implements the mitigation strategies of EOP 1 and EOP ATWS <p>CRS</p> <ul style="list-style-type: none"> Directs locking out ADS. Verifies at least one set of inboard and outboard MSIVs are not open. Directs performance of the ATWS QRC Directs installation of Defeat 11– Containment N2 Supply Isolation Defeat Directs initiation of SBLC. Directs electrical ATWS rod insertion procedures Exits the ATWS “Q” leg flowpath and enters “L” leg actions <p>ATC (1C05)</p> <ul style="list-style-type: none"> Performs the ATWS QRC. Reports completion of the ATWS QRC. Determines that ARI was unsuccessful. Reports RPV level and reactor power. Announces failure to scram. Reports SBLC inject pressure high and no flow. Reports Group 1 isolation. <p>BOP (1C03/1C35)</p> <ul style="list-style-type: none"> Locks out ADS (CRITICAL) Installs Defeat 11 – Containment N2 Supply Isolation Defeat

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 7A/8</u> ATWS	<p>EVALUATOR NOTE: Ensure that while level is lowering that the RO acknowledges RCIC failure to auto start and recommends starting RCIC.</p>	<p>CREW</p> <ul style="list-style-type: none"> Implements AOP ATWS power level control actions. <p>CRS</p> <ul style="list-style-type: none"> Directs terminating and preventing injection from CS, RHR and Condensate and Feedwater. Directs starting RCIC manually Directs reporting reactor power at 87" and lowering. Directs continuing to lower RPV level until conditions allow for reinjection. <p>ATC (1C05/1C04)</p> <ul style="list-style-type: none"> Terminates injection: (CRITICAL) <ul style="list-style-type: none"> Condensate and Feed: <ul style="list-style-type: none"> Close Feedwater Regulating Valves CV-1579, CV-1621, CV-1622 as follows: Take MANUAL control of Master Fed Reg Valve Auto/Man Control LC-4577 and dial the controller down until all Feedwater Regulating Valves indicate closed as indicated on: <ul style="list-style-type: none"> HC-1579, A Feed Reg Valve Manual/Auto Transfer HC-1621, B Feed Reg Valve Manual/Auto Transfer HC-1622, Startup Feed Reg Valve Manual/Auto Transfer Recognizes that RCIC did not start automatically and start manually. Reports reactor power when RPV level reaches 87" and lowering. Uses available injection sources to re-inject to desired band. <p>BOP (1C03)</p> <ul style="list-style-type: none"> Verifies or trip/lockout HPCI. (CRITICAL) RHR: (CRITICAL) <ul style="list-style-type: none"> Place MO-2004 and/or MO-1904 LPCI OPEN INTLK OVERRIDE HS-2004C and/or HS-1904C to OVERRIDE When 1C03B (B-5) RHR RX LO PRESSURE PERMISSIVE AT 450 PSIG is activated, close MO-2004[MO-1904] by taking HS-2004[HS-1904] to CLOSE

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 7A/B/C</u> ATWS		CREW <ul style="list-style-type: none"> When all rods are in, transition from ATWS to EOP 1 CRS <ul style="list-style-type: none"> Directs securing SBLC injection Directs transition back to EOP 1 Directs RPV level restoration using Condensate and Feedwater. Directs Pressure Control using SRVs ATC (1C05) <ul style="list-style-type: none"> Reports all rods in Secures SBLC injection Restores RPV water level using Condensate and Feedwater (CRITICAL) BOP (Backpanel Area/1C05) <ul style="list-style-type: none"> Reports all RIPS failed to insert rods with exception of RPS Fuses removal. (CRITICAL)
IF directed to break Main Condenser Vacuum:	Simulator Operator: Acknowledge the direction, then ACTIVATE ET 17 This inserts remote functions mc01 and mc02.	

**SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS**

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
When the crew has inserted all control rods, is restoring RPV Water Level and at the direction of the Floor Instructor:	Simulator Operator Place the simulator in FREEZE. Floor Instructor Announce the scenario is complete; please stand by your stations and do not discuss the scenario with your crew.	

***** END OF SCENARIO *****

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. Loss of notch indication
2. RE-4116B Offgas Vent Pipe "B" Failed Downscale
3. "A" SBDG 1G-21 Spurious Start

After EOP Entry:

1. RCIC Fails to Auto Start
2. 'B' CRD Pump Trip
3. SBLC fails to inject

Abnormal Events:

1. AOP 255.1
2. ARP 1C08A

Major Transients:

1. EOP 3 Steam Tunnel Leak
2. Electrical ATWS

Critical Task

1. #4: IF a scram is required and reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: {BWROG RPV 4.1, 5.1, 6.1}
Inserting control rods using RIPS
2. #6: IF a reactor scram is required and the reactor is not shutdown under all conditions, THEN lockout ADS before automatic actuation. {BWROG RPV 4.2, 5.2, 6.2}
3. #10: IF a reactor scram is required, and reactor power is >5%, and Power/Level Control is required, THEN terminate and prevent injection until conditions allow reinjection. {BWROG RPV 6.3}
4. #7: IF performing ATWS Power/Level Control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems. {BWROG RPV 5.5}

CREW GRADING ATTACHMENT

ESG 2 Rev. 0

Date _____

Operator Name	Position	Evaluator
	OSM	
	CRS	
	STA	
	1C05	
	1C03	
	B.O.P.	

Management Representative/Lead Evaluator _____/_____

Crew Critical Tasks

Task Statement	SAT	UNSAT
1. IF a scram is required and reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: <ul style="list-style-type: none"> Inserting control rods using RIPs 		
2. IF a reactor scram is required and the reactor is <u>not</u> shutdown under all conditions, THEN lockout ADS before automatic actuation.		
3. IF a reactor scram is required, and reactor power is >5%, and Power/Level Control is required, THEN terminate and prevent injection until conditions allow reinjection.		
4. IF performing ATWS Power/Level Control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems.		



SIMULATOR EXERCISE GUIDE

SEG

SITE: DAEC

Revision #: 0

LMS ID: PDA OPS ESG 206

LMS Rev. Date: N/A

SEG TITLE: NRC INITIAL LICENSE EXAM, SCENARIO #ALT

SEG TYPE: ☐ Training

☒ Evaluation

PROGRAM: ☐ LOCT ☒ LOIT ☐ Other:

DURATION: ~90 minutes

Developed by:

Instructor/Developer

Date

Reviewed by:

Instructor (Instructional Review)

Date

Validated by:

SME (Technical Review)

Date

Approved by:

Training Supervision

Date

Approved by:

Training Program Owner (Line)

Date

SIMULATOR EXERCISE GUIDE REQUIREMENTS

Terminal Objective:	This Evaluation Scenario Guide evaluates the Operators' ability to: "Given the malfunctions presented in this ESG, the students will protect the public, protect plant personnel, and protect plant equipment, in accordance with plant procedures."
Enabling Objectives:	Evaluation Guide, no tasks are trained. Evaluated tasks are listed on page 3.
Prerequisites:	Enrolled in Licensed Operator Continuing Training, License Operator Initial Training, Senior Reactor Operator- Certification Training
Training Resources:	<ul style="list-style-type: none"> A. Simulator B. Evaluation team C. Operations Management Representative D. Simulator Driver E. Phone Talker F. Exam Proctor for custody of the crew between scenarios G. Simulator Video recording equipment
References:	<ul style="list-style-type: none"> A. OI 693.2, Rev. 51 B. AOP 646 Rev. 23 C. AOP 255.2 Rev. 43 D. AOP 264 Rev. 14 E. AOP 573 Rev. 6 F. EOP 2 Rev. 18 G. EOP 1 Rev. 20 H. ATWS Rev. 23 I. ED Rev. 11 J. ATWS Rev. 23 K. IPOI 4 Rev. 133 L. IPOI 3 Rev. 152 M. ARP 1C04B Rev. 81 N. ARP 1C04A Rev. 62 O. ARP 1C05A Rev. 82 P. OP-AA-102-1003 Rev. 11 Q. OI 644 QRC 2, Rev. 0 R. OI 149 QRC 4, Rev. 0 S. OI 153 QRC 1, Rev. 4
Protected Content:	None
Evaluation Method:	Dynamic Scenario graded in accordance with NUREG 1021 guidance.
Operating Experience:	None
Risk Significant Operator Actions:	

TASKS ASSOCIATED WITH SIMULATOR EXERCISE GUIDE	
Task #	Task Title
	Reactor Operator
1.04	Respond to Annunciators
10.03	Alternate CRD Pumps
72.02	Insert Control Rods using Single Notch
93.22	Perform the Immediate Operator Responses to a Reactor Scram
94.03	Respond to Power/Reactivity Abnormal Change Condition.
94.19	Respond to Loss of Feedwater Heating Condition.
94.53	Respond to Primary Containment Control Abnormal Situation
94.58	Respond to Loss of Reactor Recirculation Pump(s)
95.00	Respond to Emergency Situations
95.21	Perform EOP Defeat 11.
95.25	Perform Defeat 15
95.44	Perform actions of RC/L of EOP 1
95.45	Perform initial EOP 1 actions (RC)
95.46	Perform actions of RC/P of EOP 1
95.50	Perform /L to Control RPV Level during an ATWS.
95.52	Control RPV Injections prior to, during, and subsequent to ED during ATWS.
95.55	Perform initial ATWS actions (/).
95.56	Perform /P to Control RPV Pressure During an ATWS.
95.57	Perform /Q to Reduce Reactor Power or Scram the Reactor.
95.63	Perform DW/T leg of EOP 2
95.64	Perform PC/P leg of EOP 2
	Senior Reactor Operator
1.02	Determine operability for TS required components
4.21	Direct Crew Actions to Perform the Immediate Operator Responses to a Reactor Scram
5.03	Direct Crew Responses to Power/Reactivity Abnormal Change Condition
5.19	Direct Crew Response to Loss of Feedwater Heating Condition
5.53	Direct Crew response to a Primary Containment Control Abnormal Situation
5.58	Direct Crew response to Loss of Reactor Recirculation Pump(s)
6.21	Direct Crew Response to Perform EOP Defeat 11
6.25	Direct Crew Response for performance of Defeat 15
6.44	Direct Crew Response for performance of the RC/L leg of EOP 1
6.45	Direct Crew Response for performance of initial EOP 1 actions (RC)
6.46	Direct Crew Response for performance of RC/P leg of EOP 1
6.50	Direct Crew Response to Perform /L to Control Level During an ATWS
6.52	Direct Crew Response to Control RPV Injection prior to, during and subsequent to Emergency Depressurization during ATWS
6.55	Direct Crew Response to Perform Initial ATWS Actions (/)
6.56	Direct Crew Response to perform /Q to reduce power/scram the reactor during ATWS
6.57	Direct Crew Response to perform /P to control RPV pressure during an ATWS
6.63	Direct Crew Response for performance of the DW/T leg of EOP 2
6.64	Direct Crew Response for performance of the PC/P leg of EOP 2



NRC INITIAL LICENSE EXAM, SCENARIO #ALT Rev.0

SEG

UPDATE LOG: Indicate in the following table any minor changes or major revisions (as defined in TR-AA-230-1003) made to the material after initial approval. Or use separate Update Log form TR-AA-230-1003-F16.

#	DESCRIPTION OF CHANGE	REASON FOR CHANGE	AR/TWR#	PREPARER	DATE
				REVIEWER	DATE
Rev. 0	Initial development for 2017 NRC LOIT Examination	Initial development for 2017 NRC LOIT Examination	N/A	See Cover	
				See Cover	

OVERVIEW / SEQUENCE OF EVENTS

ALL TIMES IN THIS SCENARIO ARE APPROXIMATE

Event #	Description
	When the crew assumes the shift reactor power is approximately 100%. The 'B' RHR Pump is inoperable due to breaker refurbishment; return time is approximately three days. After crew turnover, maintenance has requested immediately swapping running EHC pumps.
1.	The crew will swap running EHC pumps IAW OI 693.2 Section 6.2.
2.	Once the EHC pump swap is completed, the 'B' Recirc Pump will experience a 20% runback. The crew will check Recirc pump limits of OI 264; the crew may enter Tech Spec LCO 3.4.1 Condition C .
3.	The 'B' Recirc Pump will experience erratic parameters and will trip and the crew will enter Tech Spec LCO 3.4.1 Condition D .
4.	The crew will lower power IAW IPOI 3 and OI 255.2.
5.	Then the 'B' CRD pump will trip on overcurrent and three CRD accumulators alarm on low pressure. Permission is given to start standby pump IAW OI 255. After the 'A' CRD Pump is returned to service the CRD Accumulators remain in alarm on low pressure. The crew will enter LCO 3.1.5 Condition A (3 times) and B .
6.	A small leak in the drywell and rising drywell pressure. As temperature rises in the Drywell, the crew will insert a manual scram prior to Drywell temperature reaching 280F.
7.	The crew will determine that there is a hydraulic ATWS and transition to EOP ATWS. The crew will lockout ADS (CRITICAL), perform the ATWS QRC, inject SBLC, Terminate and Prevent injection (CRITICAL) and establish a level band until all rods are inserted (CRITICAL), and insert the control rods with the RIPS. (CRITICAL)
8.	As Primary Containment pressures and temperatures rise HS-1903C, 'B' Enable Containment Spray Valves, will not function.
9.	MO-2000, 'A' INBD DRYWELL SPRAY, will not open causing Drywell temperature to rise past 280F. MO-2000, 'A' INBD DRYWELL SPRAY, will be able to be opened through manual operations if an individual is sent to open the valve. The scenario may be terminated after all rods are in and RPV level is being restored

Facility: Duane Arnold Energy Center Scenario No.: ALT Op-Test No.: 17-1

Examiners: Chuck Zoia

Operators: _____

Mike Bielby

Randy Baker

Initial Conditions/Turnover:

When the crew assumes the shift reactor power is approximately 100%. The 'B' RHR Pump is inoperable due to breaker refurbishment; return time is approximately three days. After crew turnover, maintenance has requested immediately securing the "B" CRD Pump for a GE Service Bulletin that directs replacing the oil in the gear box.

Event No.	Malf. No.	Event Type*	Event Description
1	None	N BOP N SRO	Swap running EHC pumps
2	RR36B	C ATC C SRO	'B' Recirc pump runback (20%)
3	RR05B RR06B	C BOP TS SRO	'B' Recirc pump trip Tech Spec Entry (3.4.1)
4	None	R ATC R SRO	Reduce power below MELLLA with rods
5	RD11A, RD0706 15, RD0734 35, RD0738 19	C ATC TS SRO	'B' CRD pump trip with accumulator lights Tech Spec Entry (3.1.5)
6	RR15B	M ALL	Coolant leak from steam line in containment
7	RP05G	M ALL	Hydraulic ATWS
8	DI-RH-014	I BOP I SRO	Containment enable switch for 'B' side inoperable
9	DI-RH-076	C BOP C SRO	MO-2000 Inboard Drywell Spray valve fails to open
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

SIMULATOR SET UP INSTRUCTIONS

1. Set NRC Exam Security for the Simulator per QF-1071-08 _____
2. Perform simulator set up per TDAP 1839 Attachment 2, Simulator Setup Checklist. _____
3. Load the saved IC (in folder with this ESG) to a SNAPSHOT _____
 - a. Reset to that SNAPSHOT. _____
 - b. Place the Simulator in **RUN** _____
- OR**
4. Reset to IC 20, place the simulator in **RUN** and perform the following:
- a. Insert event triggers, malfunctions, overrides and remotes per the tables below.
5. Have a second instructor verify that the auto triggers are setup as indicated below and evaluate to "FALSE" _____
6. Verify Malfunctions _____
7. Verify Remotes (Note that environmental remotes will already be timing) _____
8. Verify Overrides _____
9. Ensure MOL pull sheet is in the 1C05B hanging file. _____
10. Ensure EOOS has the same system status lineup as the start of the simulator scenario.
11. Setup control panel including equipment clearance tags, information tags, caution tags or other site-specific devices used as an aid to the operator.
 - a. Place a Testing and Maintenance border on 1C03B (A-8) "B" RHR Pump 1P-229B Trip or Motor Overload
 - b. Hang MIP tags on the following:
 - (1) HS-1915, B RHR PUMP 1P-228B
 - c. Hang Guarded System tags on the following:
 - (1) "A" ESW
 - (2) "A" RHRSW
 - (3) "A" DG
 - (4) 1A3
 - (5) 1B3
 - (6) 1B34
11. Provide appropriate shift turnover documentation.
 - a. Have STP 3.4.2-01 Jet Pump Operability Test available upon request.
12. RUN Schedule File "ESG_alt.sch" and LEAVE IT RUNNING.
13. Mark up withdrawal/pull sheet up to completed step

EVENT TRIGGER DEFINITIONS:

Trigger No.	Trigger Logic Statement	Trigger Word Description
1,3,5,13, 21,23,27	Manually Activated	Manually Activated
11	ZDIRDHS1807A(4) == 1	'A' CRD PUMP HS TO START

MALFUNCTIONS:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	RD070615	Control Rod Accumulator Trouble - Rod 06-15	5		1 min	Inactive	Active
Setup	RD073435	Control Rod Accumulator Trouble - Rod 34-35	5		1 min 10 sec	Inactive	Active
Setup	RD073819	Control Rod Accumulator Trouble - Rod 38-19	5		1 min 30 sec	Inactive	Active
Setup	rr15b	RECIRC LOOP RUPT – DESIGN BASES LOCA AT 100% - LOOP B	13		15 min.	0	1.5
Setup	AN1C03B(8)	1C03B (A-08) 'B' RHR Pump 1P-229B Trip Or Motor Overload				ON	ON
Setup	rp05g	HYDRAULIC LOCK SCRAM DISCHARGE VOLUME (VARIABLE)				75	75
Setup	rd11b	CRD HYDRAULIC PUMP TRIP- PUMP B	5			Inactive	Active
Setup	RR06B	RECIRC M-G DRIVE MOTOR BREAKER TRIP – M-G B	3	2:00		INACTIVE	ACTIVE
Setup	rr05b	RECIRC PUMP SHAFT SEIZURE- PMP B	3		5:00	0	100
Setup	rr36b	Spurious 20% Recirc Runback B Train	1			INACTIVE	ACTIVE
Setup	rh01b	RHR PUMP TRIP – PUMP B				ACTIVE	ACTIVE
Setup	rh10b	RHR B PUMP FAIL TO AUTO-ACTUATE				ACTIVE	ACTIVE

OVERRIDES:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	DI-RH-014	HS-1903C CONT SPRAY VLV CTRL				OFF	OFF
Setup	DI-RH-076	HS-2000 CONTAINMENT SPRAY MOV-2000				CLOSE	CLOSE
Setup	DO-RH-063	HS-1915(2) RHR PUMP 1P-229B LITES - (WHITE)				On	Off
Setup	DO-RH-064	HS-1915(3) RHR PUMP 1P-229B LITES - (RED)				On	Off
Setup	DO-RH-065	HS-1915(4) RHR PUMP 1P-229B LITES - (AMBER)				On	Off
Setup	DO-RH-062	HS-1915(1) RHR PUMP 1P-229B LITES - (GREEN)				On	Off
Setup	DO-RH-132	HS-2000(1) CONTAINMENT SPRAY MOV-2000 (GREEN)	21	1:00		ON	OFF
Setup	DO-RH-133	HS-2000(2) CONTAINMENT SPRAY MOV-2000 (RED)	21	1:00		ON	OFF
Setup	DI-RH-076 (NEW)	HS-2000 CONTAINMENT SPRAY MOV-2000	27			CLOSE	OPEN
Setup	DI-RH-033	HS-1915 RHR PUMP 1P-229B				STOP	STOP



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REMOTES:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	RH10	MAN OPER OF 'B' RHR PUMP (1P229B BREAKER)				Norm	Open
Setup	rp02	ATWS TEST SWITCH (AKA DEFEAT 12) HS-1863A	23	2:30		RUN	TEST
Setup	rp03	ATWS TEST SWITCH (AKA DEFEAT 12) HS-1864A (RUN,TEST)	23	2:00		RUN	TEST

SCHEDULE FILES:

ESG_alt			
@Time	Event	Action	Description
Setup	11	Delete malfunction rd073819	CONTROL ROD ACCUMULATOR TROUBLE- ROD 38-19

Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.

If surrogate operators are to be used, brief them using TR-AA-230-1007-F11, Surrogate Brief Checklist

SHIFT TURNOVER INFORMATION

- Today, Dayshift
- Warm, summer day, temperatures in the high 70's. No inclement weather expected.
- Plant power - ~100% Rx Pwr with corresponding MWe, MWth and core flow.
- Protected train – “A”
- Procedures or major maintenance in progress:
 - “B” RHR Pump is inoperable because of a fault in the motor winding. Maintenance expects repairs to be completed in 3 days.
- Technical Specification Action statements in effect
 - TS 3.5.1 Condition A, Day 1 of 30 day LCO, due to “B” RHR Pump inoperative
 - TS 3.6.2.3, Condition A, Residual Heat Removal (RHR) Suppression Pool Cooling, Day 1 of 30 day LCO, due to “B” RHR Pump inoperative
- Plant PRA/PSA Status including CDF/LERF & color
 - **CDF : GREEN 1.35 E-6, 1 YR TO YELLOW ICDP**
 - **LERF: GREEN 3.32E-7, 1 YR TO YELLOW ILERP**
- Evolutions in progress or planned for upcoming shift
 - Maintenance has requested swapping running EHC pumps to allow for checks on the running pump.
- Comments, problems, operator workarounds, etc.
 - NSPEO's available for the shift include:
 - Aux Operator and Second Assistant
 - One extra NSPEO available in Work Control
 - Radwaste Operator

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 1</u></p> <p>After the crew has taken the shift:</p> <p>When contacted as organization personnel:</p> <p>One minute after contacted to perform EHC pump checks:</p>	<p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Inform control room that EHC pump checks are SAT.</p>	<p>Crew</p> <ul style="list-style-type: none"> Switch running EHC pumps <p>CRS</p> <ul style="list-style-type: none"> Direct switching running EHC pumps <p>BOP (1C07)</p> <ul style="list-style-type: none"> At 1C07, start standby EHC pump 1P-97B by momentarily placing handswitch HS-3665B in the START position. Verify annunciator EHC PUMPS 1P97A/B BOTH RUNNING (1C07A, C-4) is activated Verify both EHC pump 1P-97A/B amps have stabilized Stop EHC Pump 1P-97A by momentarily placing handswitch HS-3665A in the STOP position Verify annunciators EHC PUMPS 1P-97A/B BOTH RUNNING and EHC PUMP 1P-97A/B HS NOT IN AUTO are reset

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS


TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p>EVENT 2</p> <p>Recirc Runback After EHC pumps are swapped and at the direction of the floor instructor:</p> <p>When contacted as organization personnel:</p> <p>When contacted as plant personnel to investigate 'B' Recirc Pump:</p>	<p>Simulator Operator Insert ET 1 This will cause 'B' Recirc Pump 20% runback</p> <p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Wait 2 minutes and inform Control Room that there is nothing abnormal about the 'B' Recirc Pump, but will continue to investigate.</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to a 'B' Recirc Pump 20% Runback <p>CRS</p> <ul style="list-style-type: none"> Enter and direct actions of AOP 255.2 Comply with Tech Specs and OI 264, Appendix 1 May enter Tech Spec LCO 3.4.1 Condition C (depending scoop tube position based on time of scoop tube lock) Direct and supervise reducing power with rods <p>ATC (1C04/1C05)</p> <ul style="list-style-type: none"> Attempt to lock 'B' Recirc Pump Scoop Tube. Stabilize Reactor water level. Place one APRM recorder in each trip system to fast speed Verify thermal limits on the 3D Monicore Report. When power is stabilized, plot location on the Stability Power / Flow Map Determine Recirc Pump Speed mismatch is outside of acceptable limits Reduce core power by inserting control rods to bellow MELLLA limits.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<u>EVENT 3/4</u> AOP 264 After power has been reduced below MELLLA and at the floor instructors direction: When sent to either 1C149 or 1C113B: Two minutes after sent to 1C113B: Two minutes after sent to 1C149: When contacted as support personnel:	<p>Simulator Operator Insert ET 3 This will insert "B" Recirc Pump shaft seizure and, after a 2:00 delay, trip the drive motor breaker for the 'B' Recirc pump.</p> <p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Inform Control Room that the 'B' Recirc MG Drive Motor breaker is tripped with indication of a ground fault Relay B31-K3B active. No smoke, smell, or fire.</p> <p>Booth Communicator Inform Control Room that 1V-SF-12 handswitch is in AUTO</p> <p>Booth Communicator Acknowledge Request</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to 'B' Recirc Pump trip <p>CRS</p> <ul style="list-style-type: none"> Directs entering AOP 264 and reentering AOP 255.2. Directs and supervises reactivity manipulation to lower power below 60%. Comply with the Technical Specification LCO 3.4.1 Condition D ATC (1C05/1C04) <ul style="list-style-type: none"> Verify the AUTOMATIC ACTIONS have occurred: <ul style="list-style-type: none"> B RECIRC MG SET MOTOR BREAKER 1A204 is OPEN. B GENERATOR FIELD BREAKER is OPEN. Momentarily place B RECIRC MG SET MOTOR BREAKER 1A204 handswitch in the STOP position to achieve GREEN FLAG status. Stabilize reactor water level between 186" and 195". Verify open B RECIRC PUMP DISCH BYP valve MO-4630. Close B RECIRC PUMP DISCHARGE valve MO-4628. Re-perform appropriate steps in AOP 255.2 concurrently. After 5 minutes, reopen B RECIRC PUMP DISCHARGE valve MO-4628. Insert control rods per the Control Rod Withdrawal Sequence Sheets to maintain power less than or equal to (\leq) 60.0%. <p>BOP</p> <ul style="list-style-type: none"> Send operator to 1C149 and verify that Recirculation Pump MG Set Room Supply fan 1V-SF-11 has its respective handswitch HS-6534A in AUTO or START. Send an Operator to 1C113B in the MG Set Room to monitor relays.


SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p>EVENT 5</p> <p>CRD pump trip/accumulator TS</p> <p>When contacted to investigate CRD pump and breaker:</p> <p>Two minutes after request for CRD pump and breaker status:</p> <p>When contacted to investigate the accumulators:</p> <p>Two minutes after request for accumulator pressures:</p>	<p>Simulator Operator</p> <p>ACTIVATE ET 5</p> <p>This will cause the 'B' CRD pump to trip and accumulator lights to illuminate after a time delay</p> <p>Booth Communicator</p> <p>Acknowledge Request</p> <p>Booth Communicator</p> <p>Inform Control Room that CRD pump is warm to the touch/ CRD breaker 1A410 has tripped on time delay overcurrent</p> <p>Booth Communicator</p> <p>Acknowledge Request</p> <p>Booth Communicator</p> <p>Inform the control room 06-15, 34-35, 38-19 accumulator pressures:</p> <p>06-15 – 915 psig, 34-35 – 890 psig, 38-19 – 935 psig</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to 'B' CRD pump trip and corresponding accumulator lights <p>CRS</p> <ul style="list-style-type: none"> Directs starting the 'A' CRD Pump Comply with the Technical Specification requirements for Control Rod Scram Accumulators (3.1.5 Condition A(3 times) and Condition B) <p>ATC (1C05)</p> <ul style="list-style-type: none"> Send operator to check 1P-209B breaker and to the pump for fault indications. Start CRD Pump 1P-209A per OI 255 or OI 255 QRC1. <ul style="list-style-type: none"> Verify adequate oil level in CRD Pump 1P-209A motor and speed changer. Adjust CRD SYSTEM FLOW CONTROL FC-1814 to 0 gpm in MANUAL. Verify MO-1833, INLET TO CRD RETURN LINE, is fully open. Start CRD PUMP 1P-209A Vent both CRD Discharge Filters 1F-201A and B, using the following Vent Valves:

	<p align="center">NRC INITIAL LICENSE EXAM, SCENARIO #ALT Rev.0</p>	<p align="center">SEG</p>
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<p><u>EVENT 5</u> CRD pump trip/accumulator TS Cont.:</p> <p>When contacted to verify switchgear rooms cleared for CRD pump start:</p> <p>When contacted to investigate the accumulators after CRD pump is started:</p> <p>One minute after request for accumulator pressures:</p> <p>If contacted as RE to verify slow rods:</p>	<p>Booth Communicator Wait one minute and report that the switchgear rooms are clear.</p> <p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Inform the control room 06-15, 34-35, 38-19 accumulator pressures: 06-15 – 925 psig, 34-35 – 900 psig, 38-19 – 1100 psig</p> <p>Booth Communicator Inform control room that there are currently no slow rods.</p>	<p>Crew</p> <ul style="list-style-type: none"> • Respond to 'B' CRD pump trip and corresponding accumulator lights ATC (1C05) • Start CRD Pump 1P-209A per OI 255 or OI 255 QRC1. (Cont.) <ul style="list-style-type: none"> ○ Verify charging header pressurized > 1200 psig on PI-1816A CHARGING WATER PRESSURE. ○ Slowly adjust CRD SYSTEM FLOW CONTROL FC-1814 to obtain approximately 40 gpm on FI-1814 CRD SYSTEM FLOW. ○ When FC-1814 is properly controlling flow, then shift to AUTO. ○ Slowly adjust DRIVE WATER dP CONTROL MO-1830 to obtain approximately 260 psid on PDI-1825A DRIVE WATER ΔP.
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EVENT 6/8/9	Simulator Operator INSERT ET 13 This inserts a leak from the 'B' Recirc Loop.	Crew • Implements the mitigation strategies of EOP 2, Primary Containment Control
EOP 2 Coolant Rupture		
If contacted as plant personnel to deenergize MO-2000:	Booth Communicator Acknowledge Request	CRS • Enters into EOP 2 due to Drywell Pressure. • Obtains containment parameters. • May directs installation of Defeat 4 – Drywell Cooler Isolation Defeat. • Directs spraying the torus after confirmation that torus pressure is greater than 2 psig. • Directs spraying the drywell before drywell temperature reaches 280F. • Directs inserting a manual reactor scram • Placekeeps in EOP 2 to the applicable WAIT UNTIL steps in the PC/P (PC/P-7) leg
One minute after ET 21 is activated:	Simulator Operator ACTIVATE ET 21 This will turn off the lights on 1C03 for MO-2000 after a one minute delay. AND Booth Communicator Contact the Control Room and inform them that the breaker for MO-2000 (1B34-19) is open.	BOP (1C03) • May install Defeat 4 – Drywell Cooler Isolation Defeat. • Utilizes OI 149 QRC to spray the torus using 'A' side Torus Sprays. • Realizes that MO-2000 INBD DRYWELL SPRAY valve will not open and HS-1903C ENABLE CONTAINMENT SPRAY VALVES will not function. • Sends operator to open breaker for MO-2000 and open MO-2000.
If contacted to open locally open MO-2000:	Booth Communicator Acknowledge Request	
TWO minutes after contacted to locally open MO-2000:	Simulator Operator ACTIVATE ET 27 AND Booth Communicator Contact the Control Room and inform them that MO-2000 is open.	

	<p align="center">NRC INITIAL LICENSE EXAM, SCENARIO #ALT Rev.0</p>	<p align="center">SEG</p>
<p><u>EVENT 7</u> EOP 1 Transition to ATWS</p>		<p>Crew</p> <ul style="list-style-type: none"> • Implements the mitigation strategies of EOP 1, RPV Control. <p>CRS</p> <ul style="list-style-type: none"> • Enters EOP 1, RPV Control based on reactor power is above 5% or unknown after a scram signal is received. • Determines that a reactor scram has been initiated • Validates isolations, initiations and SBDG initiations that should have occurred but did not. • Recognizes and implements the CRS “IF any rod is withdrawn past position AND it has NOT been determined that the reactor will remain shutdown under all conditions without boron THEN exit this procedure and enter ATWS”. <p>ATC (1C05)</p> <ul style="list-style-type: none"> • Inserts a manual reactor scram • Recognizes a hydraulic ATWS has occurred and reports the type of ATWS and reactor power. • Places the master feedwater level controller to 158.5” in AUTO.

EVENT 7

ATWS Cont.:
When directed to install Defeat 12 (Reset of ARI):

Simulator Operator
ACTIVATE ET 23

This will place Remote Functions RP02 in TEST after a time delay; to install Defeat 12.

When RP02 is inserted, call the control room and inform them that Defeat 12 is complete.

Crew

- Implements the actions of ATWS.

CRS

- Directs locking out ADS.
- Directs Defeat 15 – MSIV and MSL Drain RX LO-LO-LO Level Isolation Defeat
- Directs the ATWS QRC be completed.
- Directs Defeat 11 - Containment N2 Supply Isolation Defeat installation.
- Directs injection of SBLC.
- Directs performance of Hydraulic RIPS including installation of Defeat 12 - Reset of ARI.
- Directs power level control mitigation strategies.
- May direct inserting Defeat 4 – Drywell Cooler Isolation Defeat.
- Directs Terminate/prevent injection from HPCI, Condensate/Feedwater, Core Spray and RHR. **(CRITICAL)**
- Directs reporting reactor power at 87" and lowering.
- Directs RPV level continues to be lowered until reactor power is less than 5% or RPV level reaches 15".
- Directs RPV level control band of -25" to either 15" or the RPV level when reactor power was 5% with condensate and feedwater.

EVENT 7
ATWS

Crew

- Implements the actions of ATWS.
- ATC (1C05)
- Terminates injection: **(CRITICAL)**
 - Condensate and Feed:
 - Close Feedwater Regulating Valves CV-1579, CV-1621, CV-1622 as follows:
 - Take MANUAL control of Master Fed Reg Valve Auto/Man Control LC-4577 and dial the controller down until all Feedwater Regulating Valves indicate closed as indicated on:
 - HC-1579, A Feed Reg Valve Manual/Auto Transfer
 - HC-1621, B Feed Reg Valve Manual/Auto Transfer
 - HC-1622, Startup Feed Reg Valve Manual/Auto Transfer
- Completes the ATWS QRC. Reports completion and includes SBLC availability, ARI failure, reactor power and RPV level.
- Injects SBLC. **(CRITICAL)**
- Reports reactor power at 87" and lowering.
- Reports RPV level when reactor power is less than 5% or when 15" is reached.
- Secures RCIC when RPV level is under control.
- Directs RPV level control band of -25" to either 15" or the RPV level when reactor power was 5% with condensate and feedwater. **(CRITICAL)**
- Performs the front panel RIPs after RPV level is under control. **(CRITICAL)**

<p><u>EVENT 7</u> ATWS</p>		<p>BOP (1C03/1C35)</p> <ul style="list-style-type: none"> • Locks out ADS. (CRITICAL) • Installs Defeat 15 – MSIV and MSL Drain RX LO-LO-LO Level Isolation Defeat • Installs Defeat 11 - Containment N2 Supply Isolation Defeat installation. • Coordinates performance of the Hydraulic ATWS RIPs • Installs Defeat 4 – Drywell Cooler Isolation Defeat. • Terminates injection: (CRITICAL) <ul style="list-style-type: none"> • Verifies or trip/lockout HPCI. • RHR: <ul style="list-style-type: none"> • Place MO-2004 and/or MO-1904 LPCI OPEN INTLK OVERRIDE HS-2004C and/or HS-1904C to OVERRIDE • When 1C03B (B-5) RHR RX LO PRESSURE PERMISSIVE AT 450 PSIG is activated, close MO-2004[MO-1904] by taking HS-2004[HS-1904] to CLOSE.
<p><u>EVENT 7</u> ATWS Transition to EOP 1</p> <p>After all rods have inserted:</p>	<p>Floor Instructor</p> <p>Monitor and ensure that crew monitors pressure during re-flood of the RPV. Crew should limit injection to ensure cooldown limits are not violated</p>	<p>Crew</p> <ul style="list-style-type: none"> • When all rods are in, transition from ATWS to EOP 1 <p>CRS</p> <ul style="list-style-type: none"> • Directs securing SBLC injection • Directs re-entry into EOP 1 • Directs RPV level 170”-211” using Condensate and Feedwater. <p>ATC (1C05)</p> <ul style="list-style-type: none"> • Reports that all rods in after performing Hydraulic RIPs • Secures SBLC • Controls level 170”-211” using Condensate and Feedwater



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When RPV level is being restored and at the direction of the Floor Instructor:

Simulator Operator

Place the simulator in FREEZE.

Floor Instructor

Announce the scenario is complete; please stand by your stations and do not discuss the scenario with your crew.

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. 'B' Recirc Pump 20% runback
2. Recirculation pump trip
3. CRD pump trip
4. Accumulator fails to recharge

After EOP Entry:

1. 'B' side containment enable switch fails to operate
2. 'A' side Inboard Drywell Spray valve (MO-2000) fails to open

Abnormal Events:

1. AOP 255.2
2. AOP 264

Major Transients:

1. LOCA
2. ATWS

Critical Tasks:

#4: IF a scram is required and Reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: {BWROG RPV 4.1, 5.1, 6.1}

Inserting control rods using RIPs Injection of Boron

#6: IF a reactor scram is required and the reactor is not shutdown under all conditions, THEN lockout ADS before automatic actuation. {BWROG RPV 4.2, 5.2, 6.2}

#10: IF a reactor scram is required, and reactor power is >5%, and Power/level control is required, THEN terminate and prevent injection until conditions allow reinjection. {BWROG RPV 6.3}

#11 IF performing ATWS Power/level control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems. {BWROG RPV 6.4}

CREW GRADING ATTACHMENT

ESG ALT Rev. 0

Date _____

Operator Name	Position	Evaluator
	OSM	
	CRS	
	STA	
	1C05	
	1C03	
	B.O.P.	

Management Representative/Lead Evaluator _____/_____

Crew Critical Tasks

Task Statement	SAT	UNSAT
1. IF a scram is required and Reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: Injection of Boron Inserting control rods using RIPs		
2. IF a reactor scram is required and the reactor is not shutdown under all conditions, THEN lockout ADS before automatic actuation.		
3. IF a reactor scram is required, and reactor power is >5%, and Power/level control is required, THEN terminate and prevent injection until conditions allow reinjection.		
4. IF performing ATWS Power/level control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems.		



SIMULATOR EXERCISE GUIDE

SEG

SITE: DAEC

Revision #: 0

LMS ID: PDA OPS ESG 206

LMS Rev. Date: N/A

SEG TITLE: NRC INITIAL LICENSE EXAM, SCENARIO #ALT (1B)

SEG TYPE: ☐ Training

☒ Evaluation

PROGRAM: ☐ LOCT ☒ LOIT ☐ Other:

DURATION: ~90 minutes

Developed by:

Instructor/Developer

Date

Reviewed by:

Instructor (Instructional Review)

Date

Validated by:

SME (Technical Review)

Date

Approved by:

Training Supervision

Date

Approved by:

Training Program Owner (Line)

Date

SIMULATOR EXERCISE GUIDE REQUIREMENTS

Terminal Objective:	This Evaluation Scenario Guide evaluates the Operators' ability to: "Given the malfunctions presented in this ESG, the students will protect the public, protect plant personnel, and protect plant equipment, in accordance with plant procedures."
Enabling Objectives:	Evaluation Guide, no tasks are trained. Evaluated tasks are listed on page 3.
Prerequisites:	Enrolled in Licensed Operator Continuing Training, License Operator Initial Training, Senior Reactor Operator- Certification Training
Training Resources:	<ul style="list-style-type: none"> A. Simulator B. Evaluation team C. Operations Management Representative D. Simulator Driver E. Phone Talker F. Exam Proctor for custody of the crew between scenarios G. Simulator Video recording equipment
References:	<ul style="list-style-type: none"> A. OI 693.2, Rev. 51 B. AOP 646 Rev. 23 C. AOP 255.2 Rev. 43 D. AOP 264 Rev. 14 E. AOP 573 Rev. 6 F. EOP 2 Rev. 18 G. EOP 1 Rev. 20 H. ATWS Rev. 23 I. ED Rev. 11 J. ATWS Rev. 23 K. IPOI 4 Rev. 133 L. IPOI 3 Rev. 152 M. ARP 1C04B Rev. 81 N. ARP 1C04A Rev. 62 O. ARP 1C05A Rev. 82 P. OP-AA-102-1003 Rev. 11 Q. OI 644 QRC 2, Rev. 0 R. OI 149 QRC 4, Rev. 0 S. OI 153 QRC 1, Rev. 4
Protected Content:	None
Evaluation Method:	Dynamic Scenario graded in accordance with NUREG 1021 guidance.
Operating Experience:	None
Risk Significant Operator Actions:	

TASKS ASSOCIATED WITH SIMULATOR EXERCISE GUIDE	
Task #	Task Title
Reactor Operator	
1.04	Respond to Annunciators
10.03	Alternate CRD Pumps
72.02	Insert Control Rods using Single Notch
93.22	Perform the Immediate Operator Responses to a Reactor Scram
94.03	Respond to Power/Reactivity Abnormal Change Condition.
94.19	Respond to Loss of Feedwater Heating Condition.
94.53	Respond to Primary Containment Control Abnormal Situation
94.58	Respond to Loss of Reactor Recirculation Pump(s)
95.00	Respond to Emergency Situations
95.21	Perform EOP Defeat 11.
95.25	Perform Defeat 15
95.44	Perform actions of RC/L of EOP 1
95.45	Perform initial EOP 1 actions (RC)
95.46	Perform actions of RC/P of EOP 1
95.50	Perform /L to Control RPV Level during an ATWS.
95.52	Control RPV Injections prior to, during, and subsequent to ED during ATWS.
95.55	Perform initial ATWS actions (/).
95.56	Perform /P to Control RPV Pressure During an ATWS.
95.57	Perform /Q to Reduce Reactor Power or Scram the Reactor.
95.63	Perform DW/T leg of EOP 2
95.64	Perform PC/P leg of EOP 2
Senior Reactor Operator	
1.02	Determine operability for TS required components
4.21	Direct Crew Actions to Perform the Immediate Operator Responses to a Reactor Scram
5.03	Direct Crew Responses to Power/Reactivity Abnormal Change Condition
5.19	Direct Crew Response to Loss of Feedwater Heating Condition
5.53	Direct Crew response to a Primary Containment Control Abnormal Situation
5.58	Direct Crew response to Loss of Reactor Recirculation Pump(s)
6.21	Direct Crew Response to Perform EOP Defeat 11
6.25	Direct Crew Response for performance of Defeat 15
6.44	Direct Crew Response for performance of the RC/L leg of EOP 1
6.45	Direct Crew Response for performance of initial EOP 1 actions (RC)
6.46	Direct Crew Response for performance of RC/P leg of EOP 1
6.50	Direct Crew Response to Perform /L to Control Level During an ATWS
6.52	Direct Crew Response to Control RPV Injection prior to, during and subsequent to Emergency Depressurization during ATWS
6.55	Direct Crew Response to Perform Initial ATWS Actions (/)
6.56	Direct Crew Response to perform /Q to reduce power/scram the reactor during ATWS
6.57	Direct Crew Response to perform /P to control RPV pressure during an ATWS
6.63	Direct Crew Response for performance of the DW/T leg of EOP 2
6.64	Direct Crew Response for performance of the PC/P leg of EOP 2



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UPDATE LOG: Indicate in the following table any minor changes or major revisions (as defined in TR-AA-230-1003) made to the material after initial approval. Or use separate Update Log form TR-AA-230-1003-F16.

#	DESCRIPTION OF CHANGE	REASON FOR CHANGE	AR/TWR#	PREPARER	DATE
				REVIEWER	DATE
Rev. 0	Initial development for 2017 NRC LOIT Examination	Initial development for 2017 NRC LOIT Examination	N/A	See Cover	
				See Cover	

OVERVIEW / SEQUENCE OF EVENTS

ALL TIMES IN THIS SCENARIO ARE APPROXIMATE

Event #	Description
	When the crew assumes the shift reactor power is approximately 100%. The 'B' RHR Pump is inoperable due to breaker refurbishment; return time is approximately three days. After crew turnover, maintenance has requested immediately swapping running EHC pumps.
1.	The crew will swap running EHC pumps IAW OI 693.2 Section 6.2.
2.	Once the EHC pump swap is completed, the 'B' Recirc Pump will experience a 20% runback. The crew will check Recirc pump limits of OI 264; the crew may enter Tech Spec LCO 3.4.1 Condition C .
3.	The crew will lower power IAW IPOI 3 and OI 255.2.
4.	Then the 'B' CRD pump will trip on overcurrent and three CRD accumulators alarm on low pressure. Permission is given to start standby pump IAW OI 255. After the 'A' CRD Pump is returned to service the CRD Accumulators remain in alarm on low pressure. The crew will enter LCO 3.1.5 Condition A (3 times) and B .
5.	The 'B' Recirc Pump will experience erratic parameters and will trip and the crew will enter Tech Spec LCO 3.4.1 Condition D .
6.	A small leak in the drywell and rising drywell pressure. As temperature rises in the Drywell, the crew will insert a manual scram prior to Drywell temperature reaching 280F.
7.	The crew will determine that there is a hydraulic ATWS and transition to EOP ATWS. The crew will lockout ADS (CRITICAL), perform the ATWS QRC, inject SBLC, Terminate and Prevent injection (CRITICAL) and establish a level band until all rods are inserted (CRITICAL), and insert the control rods with the RIPS. (CRITICAL)
8.	As Primary Containment pressures and temperatures rise HS-1903C, 'B' Enable Containment Spray Valves, will not function.
9.	MO-2000, 'A' INBD DRYWELL SPRAY, will not open causing Drywell temperature to rise past 280F. MO-2000, 'A' INBD DRYWELL SPRAY, will be able to be opened through manual operations if an individual is sent to open the valve. The scenario may be terminated after all rods are in and RPV level is being restored

Facility: Duane Arnold Energy Center Scenario No.: ALT Op-Test No.: 17-1

Examiners: Chuck Zoia

Operators: _____

Mike Bielby

Randy Baker

Initial Conditions/Turnover:

When the crew assumes the shift reactor power is approximately 100%. The 'B' RHR Pump is inoperable due to breaker refurbishment; return time is approximately three days. After crew turnover, maintenance has requested immediately securing the "B" CRD Pump for a GE Service Bulletin that directs replacing the oil in the gear box.

Event No.	Mal. No.	Event Type*	Event Description
1	None	N BOP N SRO	Swap running EHC pumps
2	RR36B	C ATC C SRO	'B' Recirc pump runback (20%)
3	None	R ATC R SRO	Reduce power below MELLLA with rods
4	RD11A, RD0706 15, RD0734 35, RD0738 19	C ATC TS SRO	'B' CRD pump trip with accumulator lights Tech Spec Entry (3.1.5)
5	RR05B RR06B	C BOP TS SRO	'B' Recirc pump trip Tech Spec Entry (3.4.1)
6	RR15B	M ALL	Coolant leak from steam line in containment
7	RP05G	M ALL	Hydraulic ATWS
8	DI-RH-014	I BOP I SRO	Containment enable switch for 'B' side inoperable
9	DI-RH-076	C BOP C SRO	MO-2000 Inboard Drywell Spray valve fails to open

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

SIMULATOR SET UP INSTRUCTIONS

1. Set NRC Exam Security for the Simulator per QF-1071-08 _____
2. Perform simulator set up per TDAP 1839 Attachment 2, Simulator Setup Checklist. _____
3. Load the saved IC (in folder with this ESG) to a SNAPSHOT _____
 - a. Reset to that SNAPSHOT. _____
 - b. Place the Simulator in **RUN** _____
- OR**
4. Reset to IC 20, place the simulator in **RUN** and perform the following:
- a. Insert event triggers, malfunctions, overrides and remotes per the tables below.
5. Have a second instructor verify that the auto triggers are setup as indicated below and evaluate to "FALSE" _____
6. Verify Malfunctions _____
7. Verify Remotes (Note that environmental remotes will already be timing) _____
8. Verify Overrides _____
9. Ensure MOL pull sheet is in the 1C05B hanging file. _____
10. Ensure EOOS has the same system status lineup as the start of the simulator scenario.
11. Setup control panel including equipment clearance tags, information tags, caution tags or other site-specific devices used as an aid to the operator.
 - a. Place a Testing and Maintenance border on 1C03B (A-8) "B" RHR Pump 1P-229B Trip or Motor Overload
 - b. Hang MIP tags on the following:
 - (1) HS-1915, B RHR PUMP 1P-228B
 - c. Hang Guarded System tags on the following:
 - (1) "A" ESW
 - (2) "A" RHRSW
 - (3) "A" DG
 - (4) 1A3
 - (5) 1B3
 - (6) 1B34
11. Provide appropriate shift turnover documentation.
 - a. Have STP 3.4.2-01 Jet Pump Operability Test available upon request.
12. RUN Schedule File "ESG_alt.sch" and LEAVE IT RUNNING.
13. Mark up withdrawal/pull sheet up to completed step

EVENT TRIGGER DEFINITIONS:

Trigger No.	Trigger Logic Statement	Trigger Word Description
1,3,5,13, 21,23,27	Manually Activated	Manually Activated
11	ZDIRDHS1807A(4) == 1	'A' CRD PUMP HS TO START

MALFUNCTIONS:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	RD070615	Control Rod Accumulator Trouble - Rod 06-15	5		1 min	Inactive	Active
Setup	RD073435	Control Rod Accumulator Trouble - Rod 34-35	5		1 min 10 sec	Inactive	Active
Setup	RD073819	Control Rod Accumulator Trouble - Rod 38-19	5		1 min 30 sec	Inactive	Active
Setup	rr15b	RECIRC LOOP RUPT – DESIGN BASES LOCA AT 100% - LOOP B	13		15 min.	0	1.5
Setup	AN1C03B(8)	1C03B (A-08) 'B' RHR Pump 1P-229B Trip Or Motor Overload				ON	ON
Setup	rp05g	HYDRAULIC LOCK SCRAM DISCHARGE VOLUME (VARIABLE)				75	75
Setup	rd11b	CRD HYDRAULIC PUMP TRIP- PUMP B	5			Inactive	Active
Setup	RR06B	RECIRC M-G DRIVE MOTOR BREAKER TRIP – M-G B	3	2:00		INACTIVE	ACTIVE
Setup	rr05b	RECIRC PUMP SHAFT SEIZURE- PMP B	3		5:00	0	100
Setup	rr36b	Spurious 20% Recirc Runback B Train	1			INACTIVE	ACTIVE
Setup	rh01b	RHR PUMP TRIP – PUMP B				ACTIVE	ACTIVE
Setup	rh10b	RHR B PUMP FAIL TO AUTO-ACTUATE				ACTIVE	ACTIVE

OVERRIDES:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	DI-RH-014	HS-1903C CONT SPRAY VLV CTRL				OFF	OFF
Setup	DI-RH-076	HS-2000 CONTAINMENT SPRAY MOV-2000				CLOSE	CLOSE
Setup	DO-RH-063	HS-1915(2) RHR PUMP 1P-229B LITES - (WHITE)				On	Off
Setup	DO-RH-064	HS-1915(3) RHR PUMP 1P-229B LITES - (RED)				On	Off
Setup	DO-RH-065	HS-1915(4) RHR PUMP 1P-229B LITES - (AMBER)				On	Off
Setup	DO-RH-062	HS-1915(1) RHR PUMP 1P-229B LITES - (GREEN)				On	Off
Setup	DO-RH-132	HS-2000(1) CONTAINMENT SPRAY MOV-2000 (GREEN)	21	1:00		ON	OFF
Setup	DO-RH-133	HS-2000(2) CONTAINMENT SPRAY MOV-2000 (RED)	21	1:00		ON	OFF
Setup	DI-RH-076 (NEW)	HS-2000 CONTAINMENT SPRAY MOV-2000	27			CLOSE	OPEN
Setup	DI-RH-033	HS-1915 RHR PUMP 1P-229B				STOP	STOP



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REMOTES:

Time	Malf. No.	Malfunction Title	ET	Delay	Ramp	Initial Value	Final Value
Setup	RH10	MAN OPER OF 'B' RHR PUMP (1P229B BREAKER)				Norm	Open
Setup	rp02	ATWS TEST SWITCH (AKA DEFEAT 12) HS-1863A	23	2:30		RUN	TEST
Setup	rp03	ATWS TEST SWITCH (AKA DEFEAT 12) HS-1864A (RUN,TEST)	23	2:00		RUN	TEST

SCHEDULE FILES:

ESG_alt			
@Time	Event	Action	Description
Setup	11	Delete malfunction rd073819	CONTROL ROD ACCUMULATOR TROUBLE- ROD 38-19

Conduct simulator crew pre-scenario brief using TR-AA-230-1007-F06, Simulator Instructor Pre-Exercise Checklist.

If surrogate operators are to be used, brief them using TR-AA-230-1007-F11, Surrogate Brief Checklist

SHIFT TURNOVER INFORMATION

- Today, Dayshift
- Warm, summer day, temperatures in the high 70's. No inclement weather expected.
- Plant power - ~100% Rx Pwr with corresponding MWe, MWth and core flow.
- Protected train – “A”
- Procedures or major maintenance in progress:
 - “B” RHR Pump is inoperable because of a fault in the motor winding. Maintenance expects repairs to be completed in 3 days.
- Technical Specification Action statements in effect
 - TS 3.5.1 Condition A, Day 1 of 30 day LCO, due to “B” RHR Pump inoperative
 - TS 3.6.2.3, Condition A, Residual Heat Removal (RHR) Suppression Pool Cooling, Day 1 of 30 day LCO, due to “B” RHR Pump inoperative
- Plant PRA/PSA Status including CDF/LERF & color
 - **CDF : GREEN 1.35 E-6, 1 YR TO YELLOW ICDP**
 - **LERF: GREEN 3.32E-7, 1 YR TO YELLOW ILERP**
- Evolutions in progress or planned for upcoming shift
 - Maintenance has requested swapping running EHC pumps to allow for checks on the running pump.
- Comments, problems, operator workarounds, etc.
 - NSPEO's available for the shift include:
 - Aux Operator and Second Assistant
 - One extra NSPEO available in Work Control
 - Radwaste Operator

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 1</u></p> <p>After the crew has taken the shift:</p> <p>When contacted as organization personnel:</p> <p>One minute after contacted to perform EHC pump checks:</p>	<p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Inform control room that EHC pump checks are SAT.</p>	<p>Crew</p> <ul style="list-style-type: none"> Switch running EHC pumps <p>CRS</p> <ul style="list-style-type: none"> Direct switching running EHC pumps <p>BOP (1C07)</p> <ul style="list-style-type: none"> At 1C07, start standby EHC pump 1P-97B by momentarily placing handswitch HS-3665B in the START position. Verify annunciator EHC PUMPS 1P97A/B BOTH RUNNING (1C07A, C-4) is activated Verify both EHC pump 1P-97A/B amps have stabilized Stop EHC Pump 1P-97A by momentarily placing handswitch HS-3665A in the STOP position Verify annunciators EHC PUMPS 1P-97A/B BOTH RUNNING and EHC PUMP 1P-97A/B HS NOT IN AUTO are reset

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 2/3</u></p> <p>Recirc Runback After EHC pumps are swapped and at the direction of the floor instructor:</p> <p>When contacted as organization personnel:</p> <p>When contacted as plant personnel to investigate 'B' Recirc Pump:</p>	<p>Simulator Operator Insert ET 1 This will cause 'B' Recirc Pump 20% runback</p> <p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Wait 2 minutes and inform Control Room that there is nothing abnormal about the 'B' Recirc Pump, but will continue to investigate.</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to a 'B' Recirc Pump 20% Runback <p>CRS</p> <ul style="list-style-type: none"> Enter and direct actions of AOP 255.2 Comply with Tech Specs and OI 264, Appendix 1 May enter Tech Spec LCO 3.4.1 Condition C (depending scoop tube position based on time of scoop tube lock) Direct and supervise reducing power with rods <p>ATC (1C04/1C05)</p> <ul style="list-style-type: none"> Attempt to lock 'B' Recirc Pump Scoop Tube. Stabilize Reactor water level. Place one APRM recorder in each trip system to fast speed Verify thermal limits on the 3D Monicore Report. When power is stabilized, plot location on the Stability Power / Flow Map Determine Recirc Pump Speed mismatch is outside of acceptable limits Reduce core power by inserting control rods to bellow MELLLA limits.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p>EVENT 4</p> <p>CRD pump trip/accumulator TS</p> <p>When contacted to investigate CRD pump and breaker:</p> <p>Two minutes after request for CRD pump and breaker status:</p> <p>When contacted to investigate the accumulators:</p> <p>Two minutes after request for accumulator pressures:</p>	<p>Simulator Operator</p> <p>ACTIVATE ET 5</p> <p>This will cause the 'B' CRD pump to trip and accumulator lights to illuminate after a time delay</p> <p>Booth Communicator</p> <p>Acknowledge Request</p> <p>Booth Communicator</p> <p>Inform Control Room that CRD pump is warm to the touch/ CRD breaker 1A410 has tripped on time delay overcurrent</p> <p>Booth Communicator</p> <p>Acknowledge Request</p> <p>Booth Communicator</p> <p>Inform the control room 06-15, 34-35, 38-19 accumulator pressures:</p> <p>06-15 – 915 psig, 34-35 – 890 psig, 38-19 – 935 psig</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to 'B' CRD pump trip and corresponding accumulator lights <p>CRS</p> <ul style="list-style-type: none"> Directs starting the 'A' CRD Pump Comply with the Technical Specification requirements for Control Rod Scram Accumulators (3.1.5 Condition A(3 times) and Condition B) <p>ATC (1C05)</p> <ul style="list-style-type: none"> Send operator to check 1P-209B breaker and to the pump for fault indications. Start CRD Pump 1P-209A per OI 255 or OI 255 QRC1. <ul style="list-style-type: none"> Verify adequate oil level in CRD Pump 1P-209A motor and speed changer. Adjust CRD SYSTEM FLOW CONTROL FC-1814 to 0 gpm in MANUAL. Verify MO-1833, INLET TO CRD RETURN LINE, is fully open. Start CRD PUMP 1P-209A Vent both CRD Discharge Filters 1F-201A and B, using the following Vent Valves:


SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS


TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 4</u> CRD pump trip/accumulator TS Cont.:</p> <p>When contacted to verify switchgear rooms cleared for CRD pump start:</p> <p>When contacted to investigate the accumulators after CRD pump is started:</p> <p>One minute after request for accumulator pressures:</p> <p>If contacted as RE to verify slow rods:</p>	<p>Booth Communicator Wait one minute and report that the switchgear rooms are clear.</p> <p>Booth Communicator Acknowledge Request</p> <p>Booth Communicator Inform the control room 06-15, 34-35, 38-19 accumulator pressures: 06-15 – 925 psig, 34-35 – 900 psig, 38-19 – 1100 psig</p> <p>Booth Communicator Inform control room that there are currently no slow rods.</p>	<p>Crew</p> <ul style="list-style-type: none"> • Respond to 'B' CRD pump trip and corresponding accumulator lights ATC (1C05) • Start CRD Pump 1P-209A per OI 255 or OI 255 QRC1. (Cont.) <ul style="list-style-type: none"> ○ Verify charging header pressurized > 1200 psig on PI-1816A CHARGING WATER PRESSURE. ○ Slowly adjust CRD SYSTEM FLOW CONTROL FC-1814 to obtain approximately 40 gpm on FI-1814 CRD SYSTEM FLOW. ○ When FC-1814 is properly controlling flow, then shift to AUTO. ○ Slowly adjust DRIVE WATER dP CONTROL MO-1830 to obtain approximately 260 psid on PDI-1825A DRIVE WATER ΔP.

SIMULATOR EXERCISE GUIDE SCENARIO INSTRUCTIONS

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED STUDENT RESPONSE
<p><u>EVENT 5</u></p> <p>AOP 264</p> <p>After power has been reduced below MELLLA and at the floor instructors direction:</p> <p>When sent to either 1C149 or 1C113B:</p> <p>Two minutes after sent to 1C113B:</p> <p>Two minutes after sent to 1C149:</p> <p>When contacted as support personnel:</p>	<p>Simulator Operator</p> <p style="text-align: center;">Insert ET 3</p> <p>This will insert "B" Recirc Pump shaft seizure and, after a 2:00 delay, trip the drive motor breaker for the 'B' Recirc pump.</p> <p>Booth Communicator</p> <p style="text-align: center;">Acknowledge Request</p> <p>Booth Communicator</p> <p>Inform Control Room that the 'B' Recirc MG Drive Motor breaker is tripped with indication of a ground fault Relay B31-K3B active. No smoke, smell, or fire.</p> <p>Booth Communicator</p> <p>Inform Control Room that 1V-SF-12 handswitch is in AUTO</p> <p>Booth Communicator</p> <p style="text-align: center;">Acknowledge Request</p>	<p>Crew</p> <ul style="list-style-type: none"> Respond to 'B' Recirc Pump trip <p>CRS</p> <ul style="list-style-type: none"> Directs entering AOP 264 and reentering AOP 255.2. Directs and supervises reactivity manipulation to lower power below 60%. Comply with the Technical Specification LCO 3.4.1 Condition D <p>ATC (1C05/1C04)</p> <ul style="list-style-type: none"> Verify the AUTOMATIC ACTIONS have occurred: <ul style="list-style-type: none"> B RECIRC MG SET MOTOR BREAKER 1A204 is OPEN. B GENERATOR FIELD BREAKER is OPEN. Momentarily place B RECIRC MG SET MOTOR BREAKER 1A204 handswitch in the STOP position to achieve GREEN FLAG status. Stabilize reactor water level between 186" and 195". Verify open B RECIRC PUMP DISCH BYP valve MO-4630. Close B RECIRC PUMP DISCHARGE valve MO-4628. Re-perform appropriate steps in AOP 255.2 concurrently. After 5 minutes, reopen B RECIRC PUMP DISCHARGE valve MO-4628. Insert control rods per the Control Rod Withdrawal Sequence Sheets to maintain power less than or equal to (\leq) 60.0%. <p>BOP</p> <ul style="list-style-type: none"> Send operator to 1C149 and verify that Recirculation Pump MG Set Room Supply fan 1V-SF-11 has its respective handswitch HS-6534A in AUTO or START. Send an Operator to 1C113B in the MG Set Room to monitor relays.

EVENT 6/8/9	Simulator Operator INSERT ET 13	Crew
EOP 2 Coolant Rupture	This inserts a leak from the 'B' Recirc Loop.	<ul style="list-style-type: none"> Implements the mitigation strategies of EOP 2, Primary Containment Control
If contacted as plant personnel to deenergize MO-2000:	Booth Communicator Acknowledge Request	CRS
One minute after ET 21 is activated:	Simulator Operator ACTIVATE ET 21 This will turn off the lights on 1C03 for MO-2000 after a one minute delay.	<ul style="list-style-type: none"> Enters into EOP 2 due to Drywell Pressure. Obtains containment parameters. May directs installation of Defeat 4 – Drywell Cooler Isolation Defeat. Directs spraying the torus after confirmation that torus pressure is greater than 2 psig. Directs spraying the drywell before drywell temperature reaches 280F. Directs inserting a manual reactor scram Placekeeps in EOP 2 to the applicable WAIT UNTIL steps in the PC/P (PC/P-7) leg
If contacted to open locally open MO-2000:	AND Booth Communicator Contact the Control Room and inform them that the breaker for MO-2000 (1B34-19) is open.	BOP (1C03)
TWO minutes after contacted to locally open MO-2000:	Booth Communicator Acknowledge Request	<ul style="list-style-type: none"> May install Defeat 4 – Drywell Cooler Isolation Defeat. Utilizes OI 149 QRC to spray the torus using 'A' side Torus Sprays. Realizes that MO-2000 INBD DRYWELL SPRAY valve will not open and HS-1903C ENABLE CONTAINMENT SPRAY VALVES will not function. Sends operator to open breaker for MO-2000 and open MO-2000.
	Simulator Operator ACTIVATE ET 27 AND	
	Booth Communicator Contact the Control Room and inform them that MO-2000 is open.	

	<p align="center">NRC INITIAL LICENSE EXAM, SCENARIO #ALT Rev.0</p>	<p align="center">SEG</p>
<p><u>EVENT 7</u> EOP 1 Transition to ATWS</p>		<p>Crew</p> <ul style="list-style-type: none"> • Implements the mitigation strategies of EOP 1, RPV Control. <p>CRS</p> <ul style="list-style-type: none"> • Enters EOP 1, RPV Control based on reactor power is above 5% or unknown after a scram signal is received. • Determines that a reactor scram has been initiated • Validates isolations, initiations and SBDG initiations that should have occurred but did not. • Recognizes and implements the CRS “IF any rod is withdrawn past position AND it has NOT been determined that the reactor will remain shutdown under all conditions without boron THEN exit this procedure and enter ATWS”. <p>ATC (1C05)</p> <ul style="list-style-type: none"> • Inserts a manual reactor scram • Recognizes a hydraulic ATWS has occurred and reports the type of ATWS and reactor power. • Places the master feedwater level controller to 158.5” in AUTO.

	<p align="center">NRC INITIAL LICENSE EXAM, SCENARIO #ALT Rev.0</p>	<p align="center">SEG</p>
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<p><u>EVENT 7</u> ATWS Cont.: When directed to install Defeat 12 (Reset of ARI):</p>	<p>Simulator Operator ACTIVATE ET 23 This will place Remote Functions RP02 in TEST after a time delay; to install Defeat 12. When RP02 is inserted, call the control room and inform them that Defeat 12 is complete.</p>	<p>Crew</p> <ul style="list-style-type: none"> • Implements the actions of ATWS. <p>CRS</p> <ul style="list-style-type: none"> • Directs locking out ADS. • Directs Defeat 15 – MSIV and MSL Drain RX LO-LO-LO Level Isolation Defeat • Directs the ATWS QRC be completed. • Directs Defeat 11 - Containment N2 Supply Isolation Defeat installation. • Directs injection of SBLC. • Directs performance of Hydraulic RIPS including installation of Defeat 12 - Reset of ARI. • Directs power level control mitigation strategies. • May direct inserting Defeat 4 – Drywell Cooler Isolation Defeat. • Directs Terminate/prevent injection from HPCI, Condensate/Feedwater, Core Spray and RHR. (CRITICAL) • Directs reporting reactor power at 87” and lowering. • Directs RPV level continues to be lowered until reactor power is less than 5% or RPV level reaches 15”. • Directs RPV level control band of -25” to either 15” or the RPV level when reactor power was 5% with condensate and feedwater.
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EVENT 7
ATWS

Crew

- Implements the actions of ATWS.
- ATC (1C05)
- Terminates injection: **(CRITICAL)**
 - Condensate and Feed:
 - Close Feedwater Regulating Valves CV-1579, CV-1621, CV-1622 as follows:
 - Take MANUAL control of Master Fed Reg Valve Auto/Man Control LC-4577 and dial the controller down until all Feedwater Regulating Valves indicate closed as indicated on:
 - HC-1579, A Feed Reg Valve Manual/Auto Transfer
 - HC-1621, B Feed Reg Valve Manual/Auto Transfer
 - HC-1622, Startup Feed Reg Valve Manual/Auto Transfer
- Completes the ATWS QRC. Reports completion and includes SBLC availability, ARI failure, reactor power and RPV level.
- Injects SBLC. **(CRITICAL)**
- Reports reactor power at 87" and lowering.
- Reports RPV level when reactor power is less than 5% or when 15" is reached.
- Secures RCIC when RPV level is under control.
- Directs RPV level control band of -25" to either 15" or the RPV level when reactor power was 5% with condensate and feedwater. **(CRITICAL)**
- Performs the front panel RIPS after RPV level is under control. **(CRITICAL)**

EVENT 7 ATWS		BOP (1C03/1C35) <ul style="list-style-type: none"> • Locks out ADS. (CRITICAL) • Installs Defeat 15 – MSIV and MSL Drain RX LO-LO-LO Level Isolation Defeat • Installs Defeat 11 - Containment N2 Supply Isolation Defeat installation. • Coordinates performance of the Hydraulic ATWS RIPs • Installs Defeat 4 – Drywell Cooler Isolation Defeat. • Terminates injection: (CRITICAL) <ul style="list-style-type: none"> • Verifies or trip/lockout HPCI. • RHR: <ul style="list-style-type: none"> • Place MO-2004 and/or MO-1904 LPCI OPEN INTLK OVERRIDE HS-2004C and/or HS-1904C to OVERRIDE • When 1C03B (B-5) RHR RX LO PRESSURE PERMISSIVE AT 450 PSIG is activated, close MO-2004[MO-1904] by taking HS-2004[HS-1904] to CLOSE.
EVENT 7 ATWS Transition to EOP 1 After all rods have inserted:	Floor Instructor Monitor and ensure that crew monitors pressure during re-flood of the RPV. Crew should limit injection to ensure cooldown limits are not violated	Crew <ul style="list-style-type: none"> • When all rods are in, transition from ATWS to EOP 1 CRS • Directs securing SBLC injection • Directs re-entry into EOP 1 • Directs RPV level 170”-211” using Condensate and Feedwater. ATC (1C05) • Reports that all rods in after performing Hydraulic RIPs • Secures SBLC • Controls level 170”-211” using Condensate and Feedwater



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When RPV level is being restored and at the direction of the Floor Instructor:

Simulator Operator

Place the simulator in FREEZE.

Floor Instructor

Announce the scenario is complete; please stand by your stations and do not discuss the scenario with your crew.

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. 'B' Recirc Pump 20% runback
2. Recirculation pump trip
3. CRD pump trip
4. Accumulator fails to recharge

After EOP Entry:

1. 'B' side containment enable switch fails to operate
2. 'A' side Inboard Drywell Spray valve (MO-2000) fails to open

Abnormal Events:

1. AOP 255.2
2. AOP 264

Major Transients:

1. LOCA
2. ATWS

Critical Tasks:

#4: IF a scram is required and Reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: {BWROG RPV 4.1, 5.1, 6.1}

Inserting control rods using RIPs Injection of Boron

#6: IF a reactor scram is required and the reactor is not shutdown under all conditions, THEN lockout ADS before automatic actuation. {BWROG RPV 4.2, 5.2, 6.2}

#10: IF a reactor scram is required, and reactor power is >5%, and Power/level control is required, THEN terminate and prevent injection until conditions allow reinjection. {BWROG RPV 6.3}

#11 IF performing ATWS Power/level control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems. {BWROG RPV 6.4}

CREW GRADING ATTACHMENT

ESG ALT Rev. 0

Date _____

Operator Name	Position	Evaluator
	OSM	
	CRS	
	STA	
	1C05	
	1C03	
	B.O.P.	

Management Representative/Lead Evaluator _____/_____

Crew Critical Tasks

Task Statement	SAT	UNSAT
1. IF a scram is required and Reactor power is above 5%, THEN reduce power below 5% using one or more of the following methods: Injection of Boron Inserting control rods using RIPs		
2. IF a reactor scram is required and the reactor is not shutdown under all conditions, THEN lockout ADS before automatic actuation.		
3. IF a reactor scram is required, and reactor power is >5%, and Power/level control is required, THEN terminate and prevent injection until conditions allow reinjection.		
4. IF performing ATWS Power/level control and Conditions are met to allow reinjection, THEN crew actions are taken to maintain RPV level above -25" by injecting using Table 1B systems.		