

Facility: <u>ANO-1</u>		Date of Examination: <u>3-8-2010</u>
Examination Level: RO <input checked="" type="checkbox"/> SRO <input type="checkbox"/>		Operating Test Number: <u>2010-1</u>
Administrative Topic (see Note)	Type Code*	Describe activity to be performed
Conduct of Operations A1. 2.1.25 (Imp 3.9)	N/R	A1JPM-NRC-ADMINCURV Ability to interpret rod insertion limits per COLR for operability
Conduct of Operations A2. 2.1.29 (Imp 4.1)	N/R	A1JPM-NRC-ADMINDWG1 Identify isolation boundaries for "A" Makeup Pump P-36A (including breaker)
Equipment Control A3. 2.2.12 (Imp 3.7)	N/R	A1JPM-NRC-ADMINSURV5 Identify errors in a completed surveillance for the "A" RB Spray Pump P35-A
Radiation Control A4. 2.3.7 (Imp 3.6)	N/R	A1JPM-NRC-ADMINRWP1 Determine stay time in T-36 valve gallery using RWP information
Emergency Procedures/Plan A5.	N/A	N/A
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1; randomly selected)		

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Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1. Conduct of Operations 2.1.23 (Imp 4.3)	N/R	A1JPM-NRC-ADMINSFPMU1 Review spent fuel pool makeup calculation
A2. Conduct of Operations 2.1.34 (Imp 3.5)	D/P/R	A1JPM-NRC-ADMINCHEM1 Review secondary chemistry package for out of specification feedwater chlorides and respond
A3. Equipment Control 2.2.12 (Imp 3.7)	N/R	A1JPM-NRC-ADMINSURV6 Identify errors in a completed surveillance for the "A" RB Spray Pump P35-A; determine operability
A4. Radiation Control 2.3.7 (Imp 3.6)	N/R	A1JPM-NRC-ADMINRWP1 Determine stay time in T-36 valve gallery using RWP information
A5. Emergency Procedures/Plan 2.4.41 (Imp 4.6)	N/S	A1JPM-NRC-ADMINEAL14 Determine Emergency Action level
NOTE: All items (5 total) are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when all 5 are required.		
* Type Codes & Criteria: (C)ontrol room, (S)imulator, or Class(R)oom (D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes) (N)ew or (M)odified from bank (≥ 1) (P)revious 2 exams (≤ 1 ; randomly selected)		

Facility: <u>ANO-1</u>	Date of Examination: <u>3-8-2010</u>	
Exam Level: RO <input checked="" type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>	Operating Test No.: <u>2010-1</u>	
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. A1JPM-RO-EOP26 Emergency Boration 024 AK3.01 (RO 4.1/SRO 4.4)	N/E/A/S	1 Reactivity Control
b. A1JPM-RO-EOP25 Start Standby HPI pump after OP HPI trip 006 A4.02 (RO 4.0/SRO 3.8)	N/EN/A/S	2 Reactor Coolant System Inventory Control
c. A1JPM-RO-LTOP1 Establish LTOP Protection during cool down of the RCS 006 A4.11 (RO 4.2/SRO 4.3)	M/L/S	3 Reactor Pressure Control
d. A1JPM-RO-HYD04, Initiate RB Hydrogen Sampling B&W E14 EA1.1 (RO 3.8/SRO 3.6)	C/D/EN/P/S	5 Containment Integrity
e. A1JPM-RO-EOP23 Re-energize A1, A2, H1, and H2 during Degraded power 062 A2.05 (RO 2.9/SRO 3.3)	A/D/P/S	6 Electrical
f. A1-JPM-RO-ARM01, Respond to Area Radiation Monitor alarm 072 A4.01 (RO 3.0/SRO 3.3)	C/D/S	7 Instrumentation

g. A1JPM-RO-AOP28 Respond to lo-lo Instrument Air pressure 065 AK3.08 (RO 3.7/SRO 3.9)	D/S	8 Plant Service Systems
h. A1JPM-RO-AOP19 Loss of Decay Heat Removal 025 AA1.02 (RO 3.8/SRO 3.9)	D/L/S	4 Heat Removal From Reactor Core (Primary)
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. A1JPM-RO-EFW01 Reset EFW pump after over speed trip 061 A2.04 (RO 3.4/SRO 3.8)	D/E/R/EN	4 Heat Removal From Reactor Core (Secondary)
j. A1JPM-RO-EDO30, Place battery charger D-03B in service. 2.1.30 (RO 4.4/SRO 4.0)	D/A/EN	6 Electrical
k. A1JPM-RO- LRW01 Liquid Radiation waste release 2.3.11 (RO 3.8/SRO 4.3)	N/A/R	9 Radioactivity Release
<p>[@] All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.</p>		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path (C)ontrol room (D)irect from bank (E)mergency or abnormal in-plant (EN)gineered safety feature (L)ow-Power / Shutdown (N)ew or (M)odified from bank including 1(A) (P)revious 2 exams (R)CA (S)imulator	4-6 / 4-6 / 2-3 $\leq 9 / \leq 8 / \leq 4$ $\geq 1 / \geq 1 / \geq 1$ - / - / ≥ 1 (control room system) $\geq 1 / \geq 1 / \geq 1$ $\geq 2 / \geq 2 / \geq 1$ $\leq 3 / \leq 3 / \leq 2$ (randomly selected) $\geq 1 / \geq 1 / \geq 1$	

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Control Room Systems [®] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
a. A1JPM-RO-EOP26 Emergency Boration 024 AK3.01 (RO 4.1/SRO 4.4)	N/E/A/S	1 Reactivity Control
b. A1JPM-RO-EOP25 Start Standby HPI pump after OP HPI trip 006 A4.02 (RO 4.0/SRO 3.8)	N/EN/A/S	2 Reactor Coolant System Inventory Control
c. A1JPM-RO-LTOP1 Establish LTOP Protection during cool down of the RCS 006 A4.11 (RO 4.2/SRO 4.3)	M/L/S	3 Reactor Pressure Control
d. A1JPM-RO-HYD04, Initiate RB Hydrogen Sampling B&W E14 EA1.1 (RO 3.8/SRO 3.6)	C/D/EN/P/S	5 Containment Integrity
e. A1JPM-RO-EOP23 Re-energize A1, A2, H1, and H2 during Degraded power 062 A2.05 (RO 2.9/SRO 3.3)	A/D/P/S	6 Electrical
f. A1-JPM-RO-ARM01, Respond to Area Rad Monitor alarm 072 A4.01 (RO 3.0/SRO 3.3)	C/D/S	7 Instrumentation
g. A1JPM-RO-AOP28 Respond to lo-lo Instrument Air pressure 065 AK3.08 (RO 3.7/SRO 3.9)	D/S	8 Plant Service Systems

In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)			
i.	A1JPM-RO-EFW01 Reset EFW pump after over speed trip 061 A2.04 (RO 3.4/SRO 3.8)	D/E/R/EN	4 Heat Removal From Reactor Core (Secondary)
j.	A1JPM-RO-EDO30, Place battery charger D-03B in service. 2.1.30 (RO 4.4/SRO 4.0)	D/A/EN	6 Electrical
k.	A1JPM-RO- LRW01 Liquid Radiation waste release 2.3.11 (RO 3.8/SRO 4.3)	N/A/R	9 Radioactivity Release
@	All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		
* Type Codes	Criteria for RO / SRO-I / SRO-U		
(A)lternate path	4-6 / 4-6 / 2-3		
(C)ontrol room	≤ 9 / ≤ 8 / ≤ 4		
(D)irect from bank	≥ 1 / ≥ 1 / ≥ 1		
(E)mergency or abnormal in-plant	- / - / ≥1 (control room system)		
(EN)gineered safety feature	≥ 1 / ≥ 1 / ≥ 1		
(L)ow-Power / Shutdown	≥ 2 / ≥ 2 / ≥ 1		
(N)ew or (M)odified from bank including 1(A)	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)		
(P)revious 2 exams	≥ 1 / ≥ 1 / ≥ 1		
(R)CA			
(S)imulator			

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Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input checked="" type="checkbox"/>	Operating Test No.: <u>2010-1</u>	
Control Room Systems [@] (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)		
System / JPM Title	Type Code*	Safety Function
b. A1JPM-RO-EOP25 Start Standby HPI pump after OP HPI trip 006 A4.02 (RO 4.0/SRO 3.8)	N/EN/A/S	2 Reactor Coolant System Inventory Control
c. A1JPM-RO-LTOP1 Establish LTOP Protection during cool down of the RCS 006 A4.11 (RO 4.2/SRO 4.3)	M/L/S	3 Reactor Pressure Control
d. A1JPM-RO-HYD04, Initiate RB Hydrogen Sampling B&W E14 EA1.1 (RO 3.8/SRO 3.6)	C/D/EN/P/S	5 Containment Integrity
In-Plant Systems [@] (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i. A1JPM-RO-EFW01 Reset EFW pump after over speed trip 061 A2.04 (RO 3.4/SRO 3.8)	D/E/R/EN	4 Heat Removal From Reactor Core (Secondary)
j. A1JPM-RO-EDO30, Place battery charger D-03B in service. 2.1.30 (RO 4.4/SRO 4.0)	D/A/EN	6 Electrical
@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / ≥ 1 (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Facility: ANO-1	Scenario No.: 1	Op-Test No.: 2010-1	
Examiners: _____	Operators: _____	_____	
_____	_____	_____	
_____	_____	_____	
Initial Conditions:			
<ul style="list-style-type: none"> • Recall 30% IC • C28A IA compressor is out of service for overhaul. • EFIC failed (IMF FW621) • A1/2 and H1/2 powered from Unit Aux transformer • A2 and H1/2 SU2 handswitches in P-T-L • Caution tag P26B, P27B, P28B, 'B' MFP turning gear 			
Turnover:			
<ul style="list-style-type: none"> • 30% Power (Power reduced for TV/GV testing) • Rod index ~182% with equilibrium Xenon • RCS boron 680 ppm • 'A' MFP I/S • 'B' MFP repairs in progress • C28A IA compressor is out of service for overhaul. • Perform add N2 to 'B' CFT to ~585# per 1104.001 step 11.0. • Escalate power to ~35% following N2 add and hold till 'B' MFP available per 1102.004 Power Operations step 7.5. (Procedure in progress) 			
Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-(SRO) N-(BOP)	Add N2 to 'B' CFT to raise pressure to ~585#
2	N/A	R-(ATC) N-(SRO) N-(BOP)	Following N2 add commence raising power to ~35%
3	TR458	I-(ATC) I-(SRO)	'A' RCS Pressure transmitter PT-1021 fails low (TS)
4	SW121	C-(SRO) C-(BOP)	SW pump P4A bearing heatup and trip
5	DO_K2AA DO_K2AW K06F2	C-(SRO)	'A' MFP oil reservoir leak
6	FW074	C-(ALL)	'A' MFP loss of lube oil and trip

SCENARIO OUTLINE CONTINUED

Facility: ANO-1		Scenario No.: 1-R2		Op-Test No.: 2010-1	
Scenario Outline Continued					
Event No.	Malf. No.	Event Type*	Event Description		
7	FW621	C-(ATC) C-(SRO)	EFIC fails to actuate (TS) (ATC-CT)		
8	N/A	M-(ALL)	RX trip		
9	MS134	M-(ALL)	'B' SG steam leak in pent house up stream of the MSIV (ATC-CT) (CBO-CT)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

Scenario #1-R2 Objectives

- 1) Evaluate individual ability to add N2 to the CFT per 1104.001 step 11.0.
- 2) Evaluate individual ability to raise RX power with ICS in automatic.
- 3) Evaluate individual ability to recognize and respond to 'A' RCS Pressure transmitter PT-1021 fails low.
- 4) Evaluate individual ability to recognize and respond to a SW pump bearing heatup and trip.
- 5) Evaluate individual ability to swap operating SW pumps.
- 6) Evaluate individual ability to recognize and respond to an oil leak from the 'A' MFP oil reservoir.
- 7) Evaluate individual ability to recognize and respond to the loss of all feedwater and the need to trip the reactor.
- 8) Evaluate individual ability to recognize and respond to EFIC failing to actuate EFW.
- 9) Evaluate individual ability to recognize and respond to a main steam line rupture up stream of the MSIV and outside the reactor building.

SCENARIO #1-R2 NARRATIVE

The crew will assume responsibility for the plant at ~30% power. Power is low following TV/GV testing and awaiting thrust bearing repairs to the 'B' MFP. The MFP is expected back later today. The plant has been at 30% for 2 days and xenon is at equilibrium. C28A IA compressor is OOS for motor cleaning and is not expected back till 8pm today.

The crew will be allowed time to brief adding N2 to the 'B' CFT and raising power to ~35% prior to entering the control room. Power Operations procedure will be in progress. Rx engineering direction is to use control rods to raise power.

The CRS will direct adding N2 to the 'B' CFT as soon as they have responsibility for the plant. The CBO will perform 1104.001 Core Flood System Operating Procedure to raise CFT pressure ~10 psig.

As soon as the CFT pressure is raised the CRS should direct the power escalation. The ATC will use the ULD and raise to ~315 Mwe at $\leq 30\%/Hr$.

At ~35% power controlling RCS pressure transmitter PT-1021 will fail low resulting in a SASS mismatch and RCS low pressure alarms. All PZR heaters will fail on and the Spray Valve will remain closed. The CRS will use 1203.012F for SASS Mismatch and direct the 'Y' instrument be selected for control.

(TS) LCO 3.3.1.A Four channels of RPS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

The 'A' SW pump bearing will overheat bring in K10-C4 SW PUMP BRG WDG TEMP HI. The CRS will enter 1203.012I ANNUNCIATOR K10 CORRECTIVE ACTION and direct starting the 'B SW pump. The 'A' SW pump may trip before the standby pump is started.

The 'A' MFP lube oil system will develop a leak on the common pump discharge piping. Alarm K06-F2 T34 A/B LEVEL HI/LO will occur and the CRS should reference 1202.012E ANNUNCIATOR K06 CORRECTIVE ACTION. The AO will report the leak is quite large. The pump will trip ~2 minutes after the initial alarm on loss of lube oil or prior to the crew manually tripping the RX. The crew may elect to manually trip the RX and the MFP.

After the RX trip the crew should recognize EFIC failure to actuate EFW upon the second MFP trip. The ATC should manually actuate EFW **(ATC-CT) (TS)**.

(CT-EFW should be actuated before RCS That reaches 580°F)

A main steam line leak will occur in the pent house upstream of the MSIV. The CRS should direct operation per the overcooling EOP. The crew should manually actuate MSLI to stop the overcooling. Once over cooling is terminated the crew should stabilize RCS temperature and pressure. **(ANY-CT)**

(CT-MSLI should be actuated before RCS temperature reaches 430°F)

(TS) LCO 3.3.11 The EFIC System instrumentation channels for each function in Table 3.3.11-1 shall be OPERABLE:

- **Loss of MFW Pumps**
- **SG Pressure - Low**

- (TS) LCO 3.3.13 Trains A and B of each Logic Function shown below shall be OPERABLE:**
- a. Main Steam Line Isolation; and**
 - b. Emergency Feedwater (EFW) Initiation.**

The scenario can be terminated when RCS pressure and temperature are stabilized.

Simulator Instructions for Scenario 1-R2				
Event No.	Time	Malf. No.	Value/ Ramp Time	Event Description
Recall 30% IC <ul style="list-style-type: none"> Recall 30% IC C28A IA compressor is out of service for overhaul EFIC failed (IMF FW621) A1/2 and H1/2 powered from Unit Aux transformer A2 and H1/2 SU2 handswitches in P-T-L Caution tag P26B, P27B, P28B, 'B' MFP turning gear 				
1	0	IRF N2_5 (T1)	0.08	Add N2 to 'B' CFT per 1104.001
2	T~10	N/A	N/A	Following N2 add commence raising power to ~35%
3	T~20	IMF TR458 (T2)	1700 20	'A' RCS Pressure transmitter PT-1021 fails low (TS)
4	T~30	IMF SW121 (T3)	N/A	SW pump bearing heatup and trip (TS)
5	T~40	IOR DO_K2AR (T4) IOR DO_K2AW (T4) IRF K06F2 (T4)	ON OFF ON	'A' MFP oil reservoir leak
6	T~42 OR Prior to Man RX trip	IMF FW074 (T5)	N/A	'A' MFP loss of lube oil and trip
7	IC	IMF FW621	N/A	EFIC fails to actuate (TS) (ATC-CT)
8	N/A	N/A	N/A	RX trip
9	50	MS134 (T6)	.7	Main steam line break (ATC-CT)

Facility: ANO-1

Scenario No.: 2

Op-Test No.: 2010-1

Examiners: _____ Operators: _____

Initial Conditions:

- Recall 80% IC
- C28A IA compressor is out of service for overhaul
- A1/2 and H1/2 powered from Unit Aux transformer
- A2 and H1/2 SU2 handswitches in P-T-L
- C03 Rx trip P/B is failed
- P7B fails to auto start
- EFW Flow control valve CV-2645 failed open

Turnover:

- 80% Power due to grid disturbances
- RCS Boron 680 ppm, PZR 685 ppm
- C28A IA compressor is out of service for overhaul.
- Engineering requests operations perform Generator Field Ground Test per Power Operations 1102.004 step 8.11
- Zinc injection system is secured

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-(SRO) N-(BOP)	Perform Generator Field Ground test
2	CO_264A K04C6	C-(SRO) C-(BOP)	Generator Field Ground alarm
3	B5148 B5122	R-(ATC) N-(SRO)	Loss of 500Kv line and Dispatcher directs power reduction to 600Mw net
4	CO_C5A	C-(BOP) C-(SRO)	C5A Vacuum Pump Trip
5	TR592	I-(SRO) I-(ATC)	'A' EFIC pressure transmitter for 'A' SG fails low. (TS)
6	K02C4 CO_P32A	C-(ALL)	H1 Neg Seq Overvoltage alarm 'A' RCP Trip
7	RC466 DI_ICC0020	M-(ALL) C-(ATC)	Reverse Rotation Reactor Trip Shunt trip P/B (TS) (ATC-CT)
8	FW617 CV2645	C-(ATC) C-(SRO)	Manual control of CV2627 (P7A to feed of 'A' SG) (ATC-CT)
9	N/A	N-(ATC) N-(SRO)	Natural Circulation Cooling

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

Scenario #2-R2 Objectives

- 1) Evaluate individual ability to perform Generator Field Ground Test per Power Operations 1102.004 step 8.11.
- 2) Evaluate individual ability to recognize and respond to Generator Field Ground alarm.
- 3) Evaluate individual ability to perform a controlled power reduction.
- 4) Evaluate individual ability to recognize and respond to a condenser vacuum pump trip.
- 5) Evaluate individual ability to recognize and respond to a 'A' EFIC pressure transmitter to 'A' SG fails low.
- 6) Evaluate individual ability to recognize and respond to an H1 Neg Seq Overvoltage alarm and 'A' RCP Trip.
- 7) Evaluate individual ability to recognize and respond to RCP reverse rotation.
- 8) Evaluate individual ability to recognize the failure of the RX trip P/B.
- 9) Evaluate individual ability to perform a manual RX trip.
- 10) Evaluate individual ability to recognize the need to manually feed 'A' SG.
- 11) Evaluate individual ability to perform a natural circulation cool down.

SCENARIO #2-R2 NARRATIVE

The crew will assume responsibility for the plant at ~80% power due to dispatcher ordered power reduction as a result of grid disturbances caused by severe weather in Tennessee. RX Engineering directs allowing rods to withdraw to compensate for Xenon addition.

The crew will be allowed to brief performing a Generator Field Ground Test prior to entering the control room.

The CRS will direct the CBO to perform 1102.004 step 8.11 Generator Field Ground Test per the request of system engineering. The initial test will bring in a generator ground alarm and associated light on C02. The CRS will enter 1203.012 C Annunciator Corrective Actions for the ground alarm and direct the alarm be reset and a second test conducted. The second test will produce an alarm. The crew will check for other ground indications and inform relay and Operations Manager of the alarm. The CRS may direct resetting the alarm.

After the Generator Field Ground Test two switchyard breakers will open resulting in a loss of the Mablevale 500Kv line. The dispatcher should be called and he will direct a power reduction to 600Mw net in 10 minutes. Power should be lowered using the ULD in manual per 1203.045 Rapid Plant Shutdown. The crew may decide to leave the Heater Drain Pumps in service.

During the power reduction the operating condenser vacuum pump will trip due to a motor fault. Vacuum will begin to lower. The CRS should enter 1203.012 Annunciator Corrective Actions for Vacuum Pump Trip and 1203.016 Loss of Condenser Vacuum AOP if vacuum continues to lower. The standby vacuum pump should be started and vacuum monitored for recovery. Plant power should be stabilized at ~600Mwe or when vacuum recovers.

The 'A' EFIC Pressure transmitter to 'A' SG (PT-2618A) will fail low resulting in a half trip of EFW and MSLI for the 'A' SG. The crew should recognize the half trip is due to an instrument failure. The CRS should enter 1203.012K ANNUNCIATOR CORRECTIVE ACTION for EFIC System Trouble. The crew may reference 1105.005 Emergency Feedwater Initiation and Control.

(TS) LCO 3.3.11 The EFIC System instrumentation channels for each Function in Table 3.3.11-1 shall be OPERABLE.

An alarm will be received on the H1 bus for Neg Seq Overvoltage. The CRS should direct operations per 1203.012B ANNUNCIATOR CORRECTIVE ACTION and direct an AO to the H1 bus. The AO will report RCP amps to the CRS and the crew should determine the need to secure the 'A' RCP.

The 'A' RCP will experience a reverse rotation as indicated on PMS. The CRS should direct operations per 1203.031 Reactor Coolant Pump and Motor Emergencies "Reverse Rotation Section". The crew should trip the reactor and trip the remaining running RCP's. The ATC should recognize a failure of the RX trip push button and trip the reactor using the shunt trip push buttons. The CRS will enter 1202.001 Reactor Trip EOP.

(CT- Recognize a failure of the RX trip push button and trip the reactor using the shunt trip push buttons.)

(TS) LCO 3.3.2.A The RPS Manual Reactor Trip Function shall be OPERABLE.

CONTINUED

The ATC should use 1202.012 Repetitive Task 5 to control EFW system. The crew should recognize P7B failed to auto start and attempt to start P7B. The EFW flow control valve for P7B to 'A' SG CV-2646 will be Vector Closed as a result of the EFIC SG Pressure Instrument failure. CV-2645 P7A to 'A' SG is failed open requiring the crew to manually control EFW flow to the 'A' SG by throttling CV-2627 in manual.

(CT-Manual control of EFW with CV-2627 in hand before SG level reaches 410".)

The scenario is complete when the crew establishes natural circulation core cooling and stabilizes RCS temperature and pressure.

Simulator Instructions for Scenario 2-R2				
Event No.	Time	Malf. No.	Value/ Ramp Time	Event Description
Recall 80% IC IMF FW617 (P7B fails to auto start) IMF CV2645 1 (P7A to 'A' SG) IOR DI_ICC0020 false (RX trip P/B)				
1	0	N/A	N/A	Perform Generator Field Ground test
2	HS to test +10 secs	IOR CO_264A (T1) IRF K04C6 (T1)	True On	Generator Field Ground alarm
	HS to reset	DOR CO_264A IRF K04C6	False Off	Clear Generator Field Ground alarm
	HS to test +10 secs	IOR CO_264A (T1) IRF K04C6 (T1)	True On	Generator Field Ground alarm
	If reset after 2 nd alarm	DOR CO_264A IRF K04C6	False Off	Clear Generator Field Ground alarm
3	T~15	IRF B5148 (T2) IRF B5122 (T2)	Open Open	Loss of 500Kv line and Dispatcher directs power reduction to 600Mw net
4	T~20	IMF CO_C5A (T3)	Off	C5A Vacuum Pump Trip
5	T~28	IMF TR592 (T4)	0 20	'A' EFIC presure transmitter to 'A' SG fails low. (TS)
6	T~35	IOR K02C4 (T5)	On	H1 Neg Seq Overvoltage alarm
7	RX Trip	IMF RC466 (T6) IOR DI_ICC0020	N/A False	Reverse Rotation Reactor Trip Shunt trip P/B (TS) (ATC-CT)
8	N/A	N/A	N/A	Manual feed of 'A' SG (ATC-CT)
9	N/A	N/A	N/A	Natural Circulation Cooling

Facility: ANO-1

Scenario No.: 3

Op-Test No.: 2010-1

Examiners: _____ Operators: _____

Initial Conditions:

- Recall 100% IC 110
- C28A IA compressor is out of service for overhaul
- #2 EDG OOS for starting air motor replacement

Turnover:

- 100% power
- C28A IA compressor is out of service for overhaul
- #2 EDG OOS for starting air motor replacement

Event No.	Malf. No.	Event Type*	Event Description
1a	IMF CO_P6A IRF K12C1	N-(BOP) N-(SRO)	Place Electric Fire Pump (P-6A) into service to support fire brigade training.
1b	IMF TR 622	TS-(SRO)	BWST Level Transmitter LT-1411 fails to ~10 feet indicated level
2	IMF TR631	I-(ATC) I-(SRO)	RCP total seal injection flow transmitter (PDT-1239) fails to full scale.
3	IA170	R-(ATC)	IA Leak will occur resulting in IA pressure lowering to between 45# and 60# requiring a power reduction.
4	Delete IA170	N-(SRO, ATC)	At ~70% the IA leak will be patched. IA pressure will recover and plant power should be stabilized.
5	RD304 RD279	M-(ALL)	Two group 7 rods will drop into the core requiring a manual reactor trip. (ATC-CT) (TS)
6	ED183	M-(ALL)	A loss of off site power will occur resulting in a blackout with #1 EDG running with its output breaker not auto closing. (Possible BOP-CT)
7	DI_A308C	C-(BOP) C-(SRO)	#1 EDG auto start with output breaker not auto closing.
8 & 9	N/A	N-(BOP) N-(SRO) C-(ATC) C-(SRO)	U2 will report the AAC Generator is available. The WCO will report an oil leak on P7A EFW pump and is expected to lose oil in ~10 minutes. (Possible BOP-CT) (TS)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario #3-R3 Objectives

- 1) Evaluate individual ability to Place Electric Fire Pump (P6A) into Service.
- 2) Evaluate individual ability to recognize and respond to an electrical fault on P6A.
- 3) Evaluate individual ability to recognize and respond to an IA Leak requiring a power reduction.
- 4) Evaluate individual ability to stop the power reduction and stabilize the plant.
- 5) Evaluate individual ability to recognize and respond to two group 7 rods dropping into the core requiring a manual reactor trip.
- 6) Evaluate individual ability to recognize and respond to a loss of off site power resulting in a blackout condition with #1 EDG running but not tied on.
- 7) Evaluate individual ability to recognize and respond to an oil leak on P7A EFW pump.
- 8) Evaluate individual ability to recognize and respond to a failure of an EDG output breaker to close.
- 9) Evaluate individual ability to recognize and respond to input signal failures to the pressurizer level control system.
- 10) Evaluate individual ability to perform a rapid power reduction in accordance with plant abnormal operating procedures.
- 11) Evaluate individual ability to recognize and respond to abnormal conditions associated a loss of oil to P7A Turbine Driven EFW pump and to regain power to A3 for P7B Motor Driven EFW pump.
- 12) Evaluate individual ability to energize the vital A4 bus from the Alternate AC Generator.
- 13) Evaluate individual ability to start P7B EFW pump and secure P7A EFW pump.

SCENARIO #3-R3 NARRATIVE

The crew will assume responsibility for the plant at 100% power and ICS in full automatic. The #2 EDG is OOS for air start motor replacement. C28A IA compressor is OOS for overhaul. The crew will place Electric Fire Pump (P6A) into service per 1104.032 Fire Protection System step 7.5. When the pump is started its supply breaker will trip on over current.

After the Electric fire pump trips a BWST level transmitter LT-1411 will fail to ~10 feet indicated level due to an internal failure and a small leak (~1 drop per minute). The Crew should recognize and report K09-B6 BWST LEVEL HI/LO alarm. The CRS should refer dispatch an operator to inspect the level transmitter and refer to 1202.012H ANNUNCIATOR K09 CORRECTIVE ACTION. The WCO will report a small ~1 drop per minute leak on the transmitter.

(TS 3.3.15 The PAM instrumentation for each Function in Table 3.3.15-1 shall be OPERABLE)

The RCP total seal injection flow transmitter PDT1239 will fail upward full scale. This will cause seal injection control valve CV-1207 to go closed. Annunciator K08-A7 Seal Injection Flow LO alarm will come into alarm. The CRS should direct operations per 1203.012G Annunciator K08 Corrective actions and direct manual control of CV-1207 to restore seal injection flow.

An Instrument Air (IA) header leak will develop on the main IA header in the turbine building basement. The leak will result in a lowering IA pressure to between 45# – 60#. The operators should enter 1203.024 Loss of Instrument Air and commence a rapid plant shutdown. At ~70% power the field operators and/or maintenance will be successful in temporarily patching the leak resulting in IA pressure recovering to normal. The crew should stop the power reduction and stabilize plant power.

Two control rods will drop. The crew should recognize two dropped control rods and the ATC operator should trip the reactor **(CT – Reactor should be tripped before Tcold reaches 540°F)**.

(TS 3.1.4.C More than one CONTROL ROD inoperable, or not aligned within 6.5% of its group average height, or both.)

~10 minutes after the trip a grid disturbance created by the trip will result in a loss of offsite power. The #1 EDG will automatically start but with its output breaker failing to close. The CBO should manually close the A308 EDG output breaker by taking the HS to P-T-L to clear the breaker anti-pump feature to energize the A3. **(Possible CT-Energize A3 with EDG#1)**

Unit 2 should be contacted to start the AACG and supply the Unit1 vital bus. The crew should power A4 from the AACG. Emergency Feedwater (EFW) using the turbine driven EFW will supply both SGs and provide decay heat removal capability until A3 is energized.

(TS Possible 3.0.3 for both EDG's inoperable.)

~15 minutes post trip the WCO will call the control room and report EFW pump P7A has an oil leak on its inboard pump bearing and is expected to run out of oil in ~10 minutes.

The AACG will be available to supply the U1 cross tie bus. The CBO should energize A3 (if #1 EDG output breaker is open) or A4 (if #1 EDG supplying A3) from the AACG. **(Possible CT-Energize A3 with the AAC Generator)**

P7B should be started or allowed to start and P7A secured.

(TS LCO 3.7.5.B Two EFW trains shall be OPERABLE)

The scenario can be terminated after P7B is supplying both SGs and P7A is secured or as directed by the lead evaluator.

Simulator Instructions for Scenario 3-R3				
Event No.	Time	Malf. No.	Value/ Ramp Time	Event Description
Recall 100% IC 110 IOR DI_A308T				
1a	0	IOR DI_HS3602T IRF K12C1	T ON	Place Electric Fire Pump (P-6A) into service to support fire brigade training.
1b	10	IMF TR 622	10 5	BWST Level Transmitter LT-1411 fails to ~10 feet indicated level.
2	15	IMF TR631 (T2)	80 20	RCP total seal injection flow transmitter (PDT-1239) fails to full scale.
3	25	IMF IA170 (T3)	1	IA Leak will occur resulting in IA pressure lowering to between 45# and 60# requiring a power reduction.
4	~70%	DMF IA170	N/A	At ~70% the IA leak will be patched. IA pressure will recover and plant power should be stabilized.
5	35	IMF RD304(T4) IMF RD279(T4)	0 0	Two group 7 rods will drop into the core requiring a manual reactor trip.
6	45	IMF ED183(T5)		A loss of off site power will occur resulting in a blackout with #1 EDG running with its output breaker not auto closing.
	After ED183	DOR DI_A308T	N/A	
7 & 8	55	IRF A901	T	AAC Generator is available for loading The WCO will report an oil leak on P7A EFW pump and is expected to lose oil in ~10 minutes. P7B should be started.
N/A	10 min after P7A call	IMF FW076	N/A	P7A Trip.

Facility: ANO-1

Scenario No.: 4-R2-Spare

Op-Test No.: 2010-1

Examiners: _____ Operators: _____

Initial Conditions:

- Recall 100% IC
- C28A IA compressor is out of service for overhaul.
- RPS is failed

Turnover:

- 100% power
- C28A IA compressor is out of service for overhaul.
- Swap operating EH oil pumps following maintenance on the standby pump for a 30 min run PMT. The AO has been briefed and is standing by the EH pump.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (BOP, SRO)	Swap the operating EH oil pumps (P14A on, P14B off)
2 & 3	FW086	C (SRO, BOP)	P8A heater drain pump winding failure and trip
	N/A	N (SRO) R (ATC)	Power reduction
4	TR580	I (ALL)	Controlling Turbine Header Pressure Instrument (PT-2683) Fails Low
	N/A	N (ATC, BOP)	Return ICS to automatic
5	CO_P14B CO_P14A DI_PB9201	C (BOP)	Operating EH oil pump will trip Turbine trip >43%
6	RP246,7,8,9	C (SRO, ATC)	RPS is failed (TS)
		M (ALL)	Manual reactor trip (ATC-CT)
7 & 8	RC002	M (ALL)	~210 GPM tube rupture in the 'B' SG (TS) (Possible BOP-CT)
	N/A	N (ATC)	Plant cooldown and depressurization
9	IMF CV061	C (ALL)	Operating HPI pump trip (BOP-CT)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario #4-R2 Objectives

- 1) Evaluate individual ability to swap running EH oil pumps.
- 2) Evaluate individual ability to recognize and respond to a heater drain pump trip.
- 3) Evaluate individual ability to perform a rapid plant power reduction.
- 4) Evaluate individual ability to recognize and respond to a turbine header pressure instrument failing low.
- 5) Evaluate individual ability to recognize and respond to the loss of the operating EH oil pump and resultant turbine trip.
- 6) Evaluate individual ability to recognize and respond to a reactor protection system failure to complete an automatic trip.
- 7) Evaluate individual ability to recognize and respond to a steam generator tube rupture.
- 8) Evaluate individual ability to commence a reactor coolant system cool down and depressurization.
- 9) Evaluate individual ability to recognize and respond to the operating HPI pump trip.

SCENARIO #4-R2 NARRATIVE

The crew will assume the watch with the plant at 100% power. C28A IA compressor is out of service for overhaul.

The turn over sheet will direct the crew to swap to P14A operating turbine electro-hydraulic pump per 1106.012 Electro-Hydraulic Oil System Operation Section 14 for a 30 minute run PMT. **(SRO-N) (BOP-N)**.

P8A heater drain pump will experience a winding failure causing a high temperature alarm and P8A trip **(SRO-C) (BOP-C)**. The CRS should reference 1203.012E Annunciator Corrective Action P8A/P8B FLOW LO and/or CONDENSATE PUMP AUTOSTART.

A plant power reduction is required to maintain suction pressure. The CRS should direct the power reduction per 1203.012E Annunciator Corrective action and 1203.045 Rapid Plant Shutdown **(ATC-R) (SRO-N)**.

The Controlling Turbine Header Pressure Instrument (PT-2683) will fail low. **(ALL-I)** This will result in the turbine lowering demand to raise header pressure. The reactor and feedwater will rise as a result of the header pressure error. A SASS mismatch alarm will be received. The CRS will direct operations per 1203.012F Annunciator Corrective actions for SASS mismatch alarm and 1203.001 ICS Abnormal Operation. The crew should verify the turbine control, SG/RX master, and both turbine bypass valves in manual. Once the plant is stable the crew will verify the alternate instrument is good and select the good instrument on C03.

The crew should return ICS to automatic.

After the power reduction the operating EH oil will trip. The standby pump will not start **(BOP-C)**. The loss of both EH pumps will result in a turbine trip. (Crew may complete a manual RX trip prior to the turbine trip) The reactor will fail to trip do to a failure of RPS **(ATC-C) (SRO-C) (TS)**. The ATC should manually trip the reactor using the Rx trip push button **(ATC-CT) (ATC-M) (BOP-M) (SRO-M)**.

TS 3.3.1 Condition C**TS 3.3.2 Condition A**

(CT– The reactor should be manually tripped before the pressurizer indicates off scale high >320”.)

EAL ALERT 6.2 RPS Failure to Complete an Automatic Trip

A ~210 gpm tube rupture will occur in the ‘B’ SG **(ATC-M) (BOP-M) (SRO-M) (TS)**. The CRS should direct operation per 1202.006 Tube Rupture. The rupture will be large enough to require HPI be initiated **(Possible BOP-CT)**. A RCS depressurization and cooldown should be started **(ATC-N)**.

TS 3.4.13 Condition B

(Possible CT– HPI should be initiated before SCM is lost.)

EAL NUE 3.2 S/G Tube Leak > Tech. Spec. Limits**EAL ALERT 2.2 RCS Leakage > Normal Makeup Capacity**

The Operating HPI pump breaker trips due to a motor fault. **(SRO-C) (ATC-C) (BOP-C)** The CRS should direct operations per 1203.026 Loss of Reactor Coolant Makeup section 1 Loss of HPI Pump or RT2 to establish HPI. The crew should diagnose the pump trip as a breaker fault and start the ES standby HPI pump. HPI should be restarted using the standby pump or by using the ES pump Using RT2. **(BOP-CT)**

(CT– HPI should be started or raised on the ES pump before SCM is lost.)

The scenario may be terminated when HPI has been restarted or at the direction of the lead evaluator.

