

Facility: Vogtle Scenario No.: 2 Op-Test No.: 2013-301

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power, MOL, steady state operations.
 (Base IC #14, snapped to IC #171 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B)

Turnover: Maintain 100% power. Spent fuel movement in progress in the spent fuel pool. Mike Chance is Fuel Handling Coordinator. Containment mini-purge is in service for a Containment entry on the next shift.

Preloaded Malfunctions:

RM008 – FHB Area High Radiation
 RM2532A/B – FHB Effluent Radiogas
 RM2533A/B – FHB Effluent Radiogas
 ES21A – FHB HVAC Train A Auto Actuation Failure
 ES21B – FHB HVAC Train B Auto Actuation Failure
 CV05 – Letdown HX Tube Rupture
 PR02A – Pzr Pressure Trans Fails (Cont & Prot): PT-455
 TU11 – Main Turbine Hydraulic Fluid Pump A Trip
 TU10B Main Turbine EHC Pump B Auto Start Failure
 SG01B - #2 Steam Generator Tube Rupture - Inlet
 CV16A Block Auto Start on CCP A
 CV16B Block Auto Start on CCP B

Overrides

HS-5132A to OPEN (this will prevent closure of valve from QMCB)
 HS-9378A to CLOSE (cause HV-9378A/B to close)

Event No.	Malf. No.	Event Type*	Event Description
T1	RM-008, 2532A/B, 2533A/B @ 20%	I-UO I-SS TS-SS	Dropped Fuel Assembly during fuel shuffle for impending outage on Unit 2. TR 13.3.6 Fuel Handling Building Post Accident Ventilation Actuation Instrumentation (Common System), Condition A TR 13.9.5 Fuel Handling Building Post Accident Ventilation System Condition A
T2	CV05 @ 50%	C-OATC C-SS TS-SS	CVCS Letdown Hx Tube Leak. LCO 3.4.13 Reactor Coolant System Leakage, Condition A

Event No.	Malf. No.	Event Type*	Event Description
T5	SG03A1 0%	I-SS TS-SS	SG PT-514 fails low. LCO 3.3.2, Condition A, FU 1e, Condition D, Fu 4d(1) Condition D ILCO 3.3.3, Condition A, FU 8 LCO 3.3.4, FU 13, Condition A
T6	New malf (12)=TRUE then 455 prcv to 0.6	C-OATC C-SS TS-SS	Pressurizer Spray Valve 1PV-455C fails open LCO 3.4.1, Condition A
T7	EL07A	C-All TS-SS	Loss of 1AA02 due to faulted bus LCO 3.8.1, Condition A, B, & E LCO 3.8.9, Condition A LCO 3.7.5, Condition B (already in effect)
T8	Ovation DFW	C-UO C-SS	#3 BFRV fails closed. SGWL may reach the Lo-Lo Reactor Trip setpoint unless a pre-emptive reactor trip performed.
T8	FW15A 60 sec delay	C-UO C-SS	A shaft shear of the only operating MFP will require the crew to manually trip the reactor. SGWL will reach the Lo-Lo Reactor Trip setpoint unless a pre-emptive reactor trip is performed.
9 Pre- loaded	ES01	C-OATC C-SS	If the SGWL Lo-Lo Reactor Trip setpoint is reached for event 8, the reactor will not automatically trip requiring the crew to perform a manual reactor trip
Pre- loaded	HS-40007 Neutral	C-OATC C-SS	The first reactor trip handswitch used by the OATC will fail to trip the reactor, the second handswitch will perform a reactor trip
T10	FW06C @ 20-30%	M-All	#3 SG Faulted (FLB, IRC) followed by High Containment Pressure
11 Pre- loaded	ES10 ES11	C-UO C-SS	Train 'A' Main Steam Line Auto Isolation Failure Train 'B' Main Steam Line Auto Isolation Failure
12 Pre- loaded	CS01B Critical	C-OATC C-SS	Containment Spray Pump B fails to auto start
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

Reactor power is approximately 22%. Power must be raised to 25% in order to synchronize the Main Generator to the grid per 12004DF-1 (Power Operation, Mode 1).

Verifiable Actions:

OATC – withdraw control rods and/or dilute to establish a positive SUR and raise power to 25% as read on the Power Range Nuclear Instrumentation.

Technical Specifications:

None

Event 2:

At 25% reactor power, the main generator is synchronized to the grid per 12004DF-1, and 13830-1, Main Generator Operation.

Verifiable Actions:

UO – synchronizes the main generator to the power grid.

Technical Specifications:

None

Event 3:

Main generator excitation is lost causing the generator to trip when the UO raises turbine load per 13800-1. The turbine will fail to automatically trip on the generator trip.

Verifiable Actions:

UO – Manually trip turbine.

CREW – control reactor response per AOP 18011-C, Turbine Trip Below P9.

Technical Specifications:

None

Event 4:

The reactor coolant pump seal injection filter becomes clogged/blocked reducing seal injection flow below the minimum acceptable value.

Verifiable Actions:

OATC – operate charging flow and seal injection flow control valves to restore seal injection flow to required operating band.

Technical Specifications:

None

Event 5:

Steam Generator # 1 Pressure Channel PT-514 fails low.

Verifiable Actions:

None

Technical Specifications:

LCO 3.3.2, ESFAS, Condition A, FU 1e, Condition D, LCO 3.3.2, ESFAS, FU 4d(1), Condition D, ILCO 3.3.3, PAMS, Condition A, FU 8, LCO 3.3.4, Remote Shutdown Instrumentation FU 13, Condition A

Event 6:

Pressurizer spray valve (1PV-455C) fails partially (approximately 60%) open causing an uncontrolled drop in pressurizer pressure.

Verifiable Actions:

OATC – perform IOA of AOP 18000-C and close PV-455C.

OATC – takes manual control of pressurizer heaters to restore pressure normal operating band.

Technical Specifications:

LCO 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits
– the crew may respond quickly enough to prevent violating this LCO.

Event 7:

Fault on 1E switchgear results in loss of power to 1AA02. This fault will prevent automatic and manual actuation of all Train A ECCS components. AOP 18031-C, Section A.

Verifiable Actions:

UO – Emergency trips DG-1A, reduces TDAFW pump flow, reduces turbine load as necessary.

OATC – Verifies reactor power stays below license limit by using Control Rods and RCS boron as necessary.

UO – Aligns Containment HVAC to Train B.

Technical Specifications:

LCO 3.8.1 AC Electrical Sources, Conditions A, B and E, 3.8.9 Distribution Systems Operating, Condition A & 3.7.5 Auxiliary Feedwater, Condition B.

Event 8:

#3 BFRV fails closed. SGWL may lower to the Lo-Lo Reactor Trip setpoint. If the SGWL Lo-Lo Reactor Trip setpoint is reached, the reactor will fail to automatically trip. Additionally, when the reactor is attempted to be tripped manually, the first reactor trip handswitch used will fail to cause a reactor trip.

Shaft shear of the only operating MFP causes a complete loss of feedwater flow to all steam generators. SGWL may lower to the Lo-Lo Reactor Trip setpoint. If the SGWL Lo-Lo Reactor Trip setpoint is reached, the reactor will fail to automatically trip. Additionally, when the reactor is attempted to be tripped manually, the first reactor trip handswitch used will fail to cause a reactor trip.

Verifiable Actions:

UO – Perform IOA of AOP 18016-C to restore and control feedwater flow and SGWL.

OATC – Recognize the need for a manual reactor trip, if required

OATC – Perform IOA of EOP 19000-C

UO – Perform IOA of EOP 19000-C

Technical Specifications:

None

Events 9, 10, 11, 12:

A fault occurs on Steam Generator # 3 Feed Line, IRC. The fault is non-isolable resulting in the SG blowing down into containment and rising containment pressure. Rising containment pressure will result in automatic SI, SLI, and Containment Spray actuations; additionally, CVI & CIA actuations will occur. The crew must also isolate #3 SG. Furthermore, Train A & B Auto SLI will fail to initiate and Containment Spray Pump B will fail to automatically start on Train B Containment Spray actuation.

Verifiable Actions:

OATC – Verifies proper actuation of SI, CVI and CIA functions.

UO – Manually actuate SLI.

UO – Isolate all influent sources to (MFW & AFW) and effluent loads from (Blowdown, Sampling, Main Steam, ARVs) #3 SG.

OATC – manually start Containment Spray Pump B.

Technical Specifications:

None

The scenario may be stopped after the crew transitions to E-1 or ES1.1 as required with NRC Chief Examiner approval.

CRITICAL TASKS:

1) Isolates Main Steam Lines, ARVs, Blowdown and Sampling from SG # 3 in E-0 and/or E-2 to limit Reactor power excursion, RCS uncontrolled cool down to limit positive reactivity addition and limit PTS concerns prior to receiving an Orange path on CSFST Integrity Status Tree. Automatic isolation of Main Steam Lines will NOT occur requiring an operator action to prevent a PTS condition.

- Close Main & Bypass SIVs from SG#3 (step 3 of 19020-C)
- Close ARV from SG#3 (step 9 of 19020-C)
- Close Blowdown & Sampling valves from SG#3 (step 10 of 19020-C)

2) Isolates Main and Auxiliary Feedwater to #3 SG to limit Containment Pressure rise prior to receiving an Orange path on CSFST Containment Status Tree.

- Close Main & Bypass FIVs to SG#3 (step 5 of 19020-C)
- Close Motor & Turbine DAFW pump throttle valves to SG#3 (step 6 of 19020-C)

3) Manually start Containment Spray Pump B (no later than step 5.c RNO of 19251-C.) With the failure of AA02, no Train A components will start. Leaving only one train of containment coolers operating in slow speed to mitigate the rising containment pressure. Containment Spray Pump B is required to ensure heat & iodine removal capability for Containment atmosphere in an adverse environment. Automatic isolation of Main Steam Lines will NOT occur requiring an operator action to prevent a Containment overpressure condition.

Facility: Vogtle Scenario No.: 3 Op-Test No.: 2013-301

Examiners: _____ Operators: _____

Initial Conditions: The plant is at approximately 22% power, EOL, start-up in progress.
(Base IC #17, snapped to IC # 172 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B)

Turnover: Raise reactor power and synchronize the main generator to the grid per 12004DF-1 (Power Operation, Mode 1), Section 4.1; Surveillance 14901 was completed 21 days ago. Containment mini-purge is in service in preparation for a containment entry next shift.

Preloaded Malfunctions:

TU18 – Auto Turbine Trip Failure
dfw_078a LV-5245_DOP BFRVC Primary
ES01 – Reactor Fails to Auto Trip
ES10 – Train A MSL Auto Isolation Failure
ES11 – Train B MSL Auto Isolation Failure
CS01B – Containment Spray Pump B Fails to Auto Start

Overrides:

HS-40007 Neutral ("C" panel Rx. Trip hand switch)

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R-OATC R-SS	Raise reactor power to 25% in preparation for synchronizing Main Generator with the Grid per 12004DF-1
2	N/A	N-UO N-SS	Synchronize Main Generator with Grid per 12004DF-1 and 13830-1
T3	GE03		Main Generator Exciter fails when UO raises load after synchronizing causing a Main Generator trip
Pre-loaded	TU18	C-UO C-SS	Turbine fails to auto trip on generator trip
T4	CV20 @ 90%	C-OATC C-SS	Seal Injection Filter Blockage requires OATC to manually adjust charging and injection flow

Facility: Vogtle Scenario No.: 4 Op-Test No.: 2013-301

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power, BOL, steady state operations.
 (Base IC # 10, snapped to IC # 173 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B)

Turnover: Maintain power operations per 12004DF-1 (Power Operation, Mode 1) section 4.3.
 Containment Mini-Purge in service for containment entry next shift.

Preloaded Malfunctions:

ES01 – Failure of Automatic Reactor Trip
ES02 – Failure of Manual Reactor Trip
TU18 – Auto Turbine Trip Failure
SI08A/B – RWST Sludge Mixing Valve 10957/10958 Failure
CV19A – CVI Train A Auto Actuation Failure
CV19B – CVI Train B Auto Actuation Failure

Overrides

HS0456A – 'B' Train PORV – CLOSE
HV-8104 – Emergency Borate valve to CLOSE

Event No.	Malf. No.	Event Type*	Event Description
T1	NI10B @ 100%	I-OATC I-SS N-UO TS-SS	PRNI-42 fails high causing automatic inward rod motion. Following completion of IOA, switches are repositioned at NI Cab to remove failed detector from service. LCO 3.3.1-1, Condition A (immediately); Function 2.a, Condition D; Function 2.b, Condition E; Function 3, Condition E; Function 6, Condition E; Function 16.b/c/d, Condition S (1 hour); Function 16.e, Condition R (1 hour).
T2	CV13 @ 100%	I-OATC I-SS	CVCS VCT level transmitter LV-112 fails high
T3	RFTK02 (95%-88% 20 minute ramp)	C-UO C-SS TS-SS	RWST sludge mixing line pipe break with valve auto closure failure LCO 3.5.4, Condition 'B' & Condition 'D' (1 hour) TR 13.1.7, Condition 'D' (Immediate)

Event No.	Malf. No.	Event Type*	Event Description
T4 Pre Load	RM0002 CV19A CV19B	C-UO C-SS TS-SS	Cnmt Area Lo Range – RE-0002 fails to 100%, CVI fails to actuate. LCO 3.3.6, FU3.d, Condition 'A'
5	MFP A hi vib=TRUE MFP A Hi Vibes=6.0	R-OATC N-UO R-SS	Power reduction due to MFPT A high vibrations
T6 7 8 Pre-loaded	EL06A RD07 (1:10 min delay)	M-ALL C-OATC C-SS Critical C-UO C-SS	Loss of 13.8kV bus 1NAB resulting in loss of 2 RCPs, 2 Condensate Pumps, and 1 Circ Water Pump – ATWT ATWT – Auto rod motion fails after ~ 1 minute (Manual rod insertion or establishment of Emergency Boration flow is a critical step). Turbine Auto Trip failure requiring Manual Trip
T9 T9	AF02A AF03B	NOTE M M	These malfunctions are to force crew to LOHS and are part of the overall MAJOR event. TDAFW trips on overspeed 'B' MDAFW pump coupling shears
10 Pre load	HS0456A	C-OATC C-SS Critical	'B' Train PORV fails to open automatically or manually, requires use of Reactor Vessel Head Vents during Feed and Bleed of LOHS.
11	Delete AF02A	C-UO C-SS	TDAFW mechanical over speed trip is repaired allowing restart of the pump to feed the SGs.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

PRNI-42 fails high causing automatic inward rod motion. Following completion of IOA, switches are repositioned at NI Cab to remove failed detector from service.

Verifiable Actions:

OATC – Recognize failure of PRNI

OATC – Perform IOA of AOP 18002-C.

UO – Perform subsequent operator actions for failed PRNI at NI Cabinet

Technical Specifications:

3.3.1-1, Condition A (immediately); Function 2.a, Condition D; Function 2.b, Condition E; Function 3, Condition E; Function 6, Condition E; Function 16.b/c/d, Condition S (1 hour); Function 16.e, Condition R (1 hour).

Event 2:

CVCS VCT level transmitter LV-112 fails high.

Verifiable Actions:

OATC – Manually places VCT divert valve LV-112A in the VCT position to stop letdown diversion to the RHUT and loss of VCT inventory.

OATC – Aligns VCT for manual makeup to maintain VCT level when makeup is necessary.

Technical Specifications:

None

Event 3:

An RWST sludge mixing line pipe break will occur with auto closure failure of the sludge mixing line isolation valves LV-10957/LV-10958.

Verifiable Actions:

UO – Manually closes either LV-10957 or LV-10958 to isolate the sludge mixing line break. The valve hand switches are located on the QPCP.

Technical Specifications:

LCO 3.5.4, ECCS, Condition B and Condition D (1 hour action)
TL LCO 13.1.7, (Condition D – Immediate Action)

Event 4:

Containment High Range Radiation monitor RE-002 fails high.

Verifiable Actions:

UO – Manually closes CVI dampers and starts the Piping Penetration Area Filtration Units.

Technical Specifications:

LCO 3.3.6, FU3.d, Condition A

Event 5:

MFPT "A" will develop high vibrations requiring a rapid power reduction to < 70% power to remove MFPT "A" from service.

Verifiable Actions:

OATC – Inserts control rods and adjusts RCS boron concentration to facilitate the down power.

UO – Reduces Turbine load per direction of 18013-C, Rapid Power Reduction.

Technical Specifications:

None

Event 6, 7, 8:

A loss of 13.8 kV bus 1NAB will result in the loss of 2 RCPs, 2 Condensate pumps, and 1 circulating water pump which places the plant in an ATWT condition due to the trip of 2 RCPs while at power.

Verifiable Actions:

OATC – Initiates a rapid control rod insertion to reduce reactor power. After about 1 minute, auto rod motion will fail requiring the OATC to manually insert control rods.

OATC – Initiates an emergency boration of the RCS through LV-110A and LV-110B since HV-8104 Emergency Boration valve will not open.

UO – Manually trips the turbine which will not automatically trip. This will preserve SG levels during the ATWT event.

Technical Specifications:

None

Event 9, 10

TDAFW will trip on over speed coincident with a coupling shear of B MDAFW pump. MDAFW pump A is tagged out and no AFW flow will be available, leading to a Loss of Secondary Heat Sink condition. PORV 456 will fail to open in auto or manual requiring the UO to open the reactor vessel head vents for improved heat removal capability.

Verifiable Actions:

OATC – Stops all running RCPs.

OATC – Manually actuates SI (if not actuated on the Turbine Trip failure)

OATC – Manually arms COPS and opens PORV-455.

UO – Manually opens all Reactor Vessel Head Vent Isolation and Throttle valves.

Technical Specifications:

None

Event 11:

A report from the field will indicate the TDAFW mechanical overspeed trip linkage has been repaired and the TDAFW pump may be used to regain AFW flow.

Verifiable Actions:

UO – Closes TDAFW pump discharge throttle valves.

UO – Holds HV-5106 TDAFW Steam Admission valve closed to reset governor ramp circuit while closing HV-15129 the TDAFW Trip and Throttle Valve.

UO – Opens HV-15129 and HV-5106 to start the TDAFW pump.

UO – Opens desired TDAFW throttle valves to re-establish AFW flow.

The scenario may be stopped after the TDAFW pump is started and AFW flow is established with NRC Chief Examiner approval.

CRITICAL TASKS:**1) Either of the following:**

- a. Manually insert control rods following automatic & manual reactor trip per step 1 RNO of 19211-C, or
- b. Emergency borate the RCS per step 4 of 19211-C

2) Arms COPS and opens PORV-455 to establish bleed path.**3) Establishment of reactor vessel head vent path for reactor bleed on loss of heat sink per step 38 RNO of 19231-C.**

Facility: Vogtle Scenario No.: 5Op-Test No.: 2013-301

Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power, MOL, steady state operations.
 (Base IC # 14, snapped to IC # 174 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B)

Turnover: None**Preloaded Malfunctions:****ES11 – Train 'B' MSL Auto Isolation Failure**

9001a op sig = TRUE

9001A FAIL = TRUE

9001b op sig = TRUE

9001B FAIL = TRUE

C CLR A LO FAIL = TRUE

C CLR B LO FAIL = TRUE

IA09b – Instrument Air Compressor # 2 auto start failure.

IA09d – Instrument Air Compressor # 4 auto start failure.

RH04B – Failure of RHR pump B to auto start

Overrides

HS3007B – Train 'B' SLI Handswitch Failure – NORMAL

HS13006A – Train 'A' SG#1 BSIV Fail to Close on SLI or Manually - OPEN

Event No.	Malf. No.	Event Type*	Event Description
T1	ALB05-E04	N/A	Spurious AMSAC TROUBLE annunciator actuates.
T2	RC10A @100%	I-OATC I-SS TS-SS	NR Tc Loop # 1 fails high. LCO 3.3.1-1, Function 6, 7 Condition E, LCO 3.3.2, FU5b, Condition I
T3	TU07	C-UO C-SS R-OATC R-SS	Inadvertent Main Turbine Runback. Decreasing reactor power from the turbine runback

Event No.	Malf. No.	Event Type*	Event Description
T4 5	CV07	C-OATC C-SS TS-SS N-OATC N-SS	Normal Charging Pump (NCP) trips. INFO LCOs TR 13.1.5 Condition 'A' and LCO TR 13.1.3 Condition 'A' Restore normal charging & letdown
T6	RC09C @0%	I-SS TS-SS	Wide range Tc on loop 3 fails low. LCO 3.3.3, PAMS, Condition A, FU 13, Condition D LCO 3.3.4, Remote Shutdown, Condition A, FU 3, Condition D
T7	AC 3 TRIP = TRUE	C-UO C-SS	Air compressor # 3 trips with failure of AC # 2 and AC # 4 to automatically start.
T8	ES07	N/A	Spurious AMSAC Actuation due to technician error while investigating spurious AMSAC TROUBLE annunciator. This will result in a reactor turbine trip.
T9	RC03C	M-All	DBA LOCA on RCS Loop # 3
10 Pre-loaded	ES11 HS3007B HS13006A	C-UO C-SS	Train 'B' MSL Auto Isolation Failure. Train 'B' SLI Hand switch Fails to operate Train 'A' Bypass Steam Line Isolation Valve fail to close on SLI or from QMCB
11 Pre-loaded	RH04B	C-OATC C-SS Critical	RHR pump Train B fails to automatically start on an SI signal.
12 Pre-loaded	Cnmt Spray Discharge valves auto open failures	C-OATC C-SS Critical	Both Containment Spray discharge valves fail to open automatically on CS signal.

13 Pre-loaded	Cnmt Coolers fail to auto start on LOW speed	C-UO C-SS Critical	All Containment Coolers fail to automatically start on LOW speed on an SI signal.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

A spurious AMSAC TROUBLE annunciator is received.

Verifiable Actions:

None- The crew will ask C & T and/or engineering to investigate the trouble alarm.

Technical Specifications:

None

Event 2:

Loop # 1 NR Tcold fails high.

Verifiable Actions:

OATC – Perform IOA of AOP 18001-C and places control rods in manual.
Defeats the failed channel using the Tave and Delta T defeat switches.

Technical Specifications:

LCO 3.3.1-1, Function 6, Condition E
LCO 3.3.1-1, Function 7, Condition E
LCO 3.3.1-1, Function 5b, Condition I

Event 3:

Inadvertent Main Turbine Runback occurs.

Verifiable Actions:

OATC – Perform IOA of AOP 18012-C.

UO – Perform IOA of AOP 18012-C.

Technical Specifications:

None

Event 4,5:

The Normal Charging Pump will trip. CVCS Charging and Letdown will be returned to service. (**NOTE:** The Chief Examiner may decide to go to the next event after a charging pump is started and prior to placing Letdown in service).

Verifiable Actions:

OATC – Manually closes the Letdown Orifices and the Letdown Isolation valves to stop flashing in the Letdown system.

OATC / UO – Trends the RCP operating parameters on the IPC computer.

OATC – Adjusts HC-182 Seal Flow Controller to maximum seal flow and adjusts Charging Flow Controller FC-121 to minimum.

OATC – Starts a charging pump. (CCP)

OATC - Adjusts HC-182 to obtain 8 -13 gpm seal injection and adjusts Charging Flow Controller FC-121 to obtain desired charging flow.

NOTE: The next malfunction may be entered at this point with NRC Chief Examiner discretion. The following steps may not be completed in its entirety prior to subsequent events and completion of scenario.

OATC – Places Letdown Pressure Controller PIC-131 to 50 – 75% demand.

OATC – Places Letdown Temperature Controller TIC-130 in manual and adjusts to the recorded control room rounds position.

OATC – Opens letdown isolations and letdown orifices.

OATC – Adjusts PIC-131 and places in AUTO and places TIC-130 in AUTO.

OATC – Adjusts FIC-121, HC-182 to maintain PRZR level and seal injection.

Technical Specifications:

LCO TR 13.1.5 – Charging Pumps – Operating

LCO TR 13.1.3 – Boration Flow Paths - Operating

Event 6:

The WR Tcold for loop # 3 will fail low. This will require a Tech Spec entry by the SS but no operator actions are required.

Verifiable Actions:

None

Technical Specifications:

LCO 3.3.3, PAMS, Condition A, FU 3, Condition D

LCO 3.3.4, Remote Shutdown, Condition A, FU 3, Condition D

Event 7:

Air compressor # 3 trips with failure of Air compressors # 2 and # 4 to automatically start.

Verifiable actions:

UO – Manually starts Instrument Air compressor # 2 or # 4.

Technical Specifications:

None

Event 8:

Spurious AMSAC Actuation due to technician error while investigating spurious AMSAC TROUBLE annunciator. Reactor trips on Turbine Trip.

Verifiable Actions:

OATC – Performs IOAs of E-0.

UO – Performs IOAs of E-0.

SS-Performs IOAs of E-0, transitions to ES-0.1 and directs crew in actions to stabilize the plant.

Technical Specifications:

None

Event 9, 11, 12, 13:

RCS DBA LOCA.

Verifiable Actions:

OATC – Manually starts RHR pump B which fails to automatically start.

OATC – Manually opens Containment Spray discharge isolation valves which fail to automatically open.

UO – Manually starts Containment Coolers in LOW speed which fail to automatically start in LOW speed.

Technical Specifications:

None

Event 10:

Train 'B' MSL Auto Isolation Failure.

Verifiable Actions:

UO – Recognizes Train 'B' SLI auto actuation failure.

UO – Manually actuates SLI.

Technical Specifications:

None

The scenario may be stopped during the performance of 19010-C, E-1 Response to Reactor or Secondary Coolant Leakage

CRITICAL TASKS:

- 1) Manually starts RHR pump B to provide ECCS injection flow to prevent an inadequate core cooling event. RHR pump B is required to be started by the end of the OATC Initial Operator Actions.
- 2) Manually opens CS Pump A and B discharge isolation valves which fail to automatically start on a CS actuation signal to provide adequate Containment cooling and depressurization.
- 3) Manually starts both trains of Containment Coolers in LOW speed to provide for adequate Containment cooling and depressurization.

Facility: Vogtle Scenario No.: 6Op-Test No.: 2013-301Examiners: _____ Operators: _____

Initial Conditions: The plant is at 100% power, EOL, steady state operations.
(Base IC # 19, snapped to IC # 175 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B)

Turnover: Shifting NSCW Train 'A' pumps preparing for DTO of NSCW pump # 5 later today for scheduled maintenance. Containment Mini-Purge is in service in preparation for a containment entry next shift.

Preloaded Malfunctions:

CV23 – NCP Fails to Auto Trip on SI
ES20A/B – CIA 'A'/'B' Actuation Failure
GE12B – PCB 161810 Auto Trip Failure

Overrides

None

Event No.	Malf. No.	Event Type*	Event Description
1	NA	N-UO N-SS	Shift NSCW pumps from 3 & 5 to 1 & 3
T2	test.uvl UCAUTO ROD	C-OATC C-SS	Uncontrolled rod motion
T3	CO01 @ 20% (120 sec ramp)	C-UO C-SS	<p>Loss of condenser vacuum</p> <p>Lowering turbine load and reactor power in response to rising condenser pressure <i>1) is this operationally valid?</i> <i>2) manual action by both operators? Subjectivity possible</i></p> <p>Note to Sim Instr: severity of malfunction should be reduced as crew actions are taken. Final severity should be 10-12% with load lowered ~ 10 MWe and vacuum pumps running. Vacuum should be targeted to stabilize about 25.5" Hg.</p>
T4	AC02A, AC03B	C-UO C-SS	In-service ACCW pump trips with stand-by pump auto start failure

CRITICAL TASKS:

- 1) Manually actuating CIA to prevent discharging contaminated containment atmosphere to the environment no later than completion of OATC INITIAL ACTIONS of EOP 19000-C.
- 2) Tripping RCPs per Foldout page of either 19000-C, E-0 or 19001-C, ES-1.1 within 10 minutes of RCS pressure lowering to < 1375 psig.

Event No.	Malf. No.	Event Type*	Event Description
T5	RC16 @ 0.05% (240 sec ramp)	C-OATC C-SS TS-SS	Reactor vessel head leak develops within the capacity of the charging system. This severity level results in approximately 30-35 gpm leak rate. LCO 3.4.13, Condition 'A'
T6	RD13K	C-OATC C-SS TS-SS	RCCA M2 (SDA) drops LCO 3.1.4, Condition 'B'
T7		R-OATC N-UO R-SS	Power reduction to < 75% within 1 hour per AOP direction.
8	RC16 @ 5% (240 second ramp)	M-ALL Critical	LOCA - Reactor head leak severity worsens leading to SI actuation and exceeding RCP trip criteria.
9 Pre-loaded	ES20A/B	C-OATC C-UO C-SS Critical	CIA 'A'/'B' Fail to Auto Actuate, requires manual closure of CIA valves by both the OATC on front panels and UO on back panels.
10 Pre-loaded	CV23	C-OATC C-SS	NCP fails to auto trip on SI
11 Pre-loaded	GE12B	C-UO C-SS	PCB 161810 Auto Trip Failure
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

Shift NSCW pumps from 3 & 5 to 1 & 3 per SOP 13150A-1, section 4.2.1 for scheduled maintenance of NSCW pump # 5 later today.

Verifiable Actions:

UO – Reads NOTES for section 4.2.1 of SOP 13150A-1.

UO – Performs steps of section 4.2.1.1 of SOP 13150A-1.

UO – Reports completion of procedure to SS.

Technical Specifications:

None

Event 2:

A rod control system failure causes uncontrolled rod motion requiring entry into AOP 18003-C. No annunciators are received for this malfunction. The OATC will need to take manual rod control in order to stop rod motion. Failure to properly take manual rod control will result in a continuous rod insertion ultimately lowering temperature below the minimum for criticality requiring a reactor trip.

Verifiable Actions:

OATC – Perform IOA of AOP 18003-C, Section B

UO – Restore Tav_g to program by adjusting turbine load

OATC – Adjust RCS boron concentration to restore Tav_g to program (if necessary)

OATC – Maintain power distribution

Technical Specifications (while not expected to meet the requirements to implement the following Technical Specifications, the listed TS will ONLY be applicable at the RNO of specific procedural steps)

Step B3 RNO - LCO 3.1.5, Condition 'A' (1 hour); LCO 3.1.6, Condition 'A' (1 hour)

Step B5.a RNO - LCO 3.2.3, Condition 'A' (30 minutes)

Step B5.b RNO - LCO 3.2.4, Condition 'A'

Event 3:

Air in-leakage into the condenser causes vacuum to slowly lower prompting entry into ARP 17019-1 and/or AOP 18040-C. TURB CONDSR LO VAC (ALB19-B04) will be received at 25"Hg of condenser vacuum. The crew will be required to take action to restore vacuum including reducing turbine load and reactor power. Failure to properly mitigate the effects of rising condenser pressure will result in a Main Turbine trip and a >P9 reactor trip.

Verifiable Actions:

UO – May refer to ARP 17019-1 if annunciator received, however, the crew may go directly to AOP 18040-C.

UO / OATC – Initiate AOP 18040-C

OATC – Maintain Tave/Tref matched

OATC / UO – Reduce power using AOP 18013-C

Technical Specifications:

None

Event 4:

A complete loss of ACCW occurs when the operating pump trips and the stand-by pump fails to automatically start requiring entry into AOP 18022-C. The UO will be required to manually start the stand-by ACCW pump in order to restore ACCW flow. Failure to restore flow in a timely manner (within 10 minutes) will require a reactor trip and securing of all RCPs due to loss of thermal barrier cooling.

Verifiable Actions:

UO – May refer to ARP 17004-1

UO – Initiate AOP 18022-C

UO – Start standby ACCW pump

Technical Specifications:

None

Event 5:

Reactor vessel head develops a leak within the capacity of the charging system requiring entry into AOP 18004-C. The OATC will be required to take action to maintain pressurizer level and calculate a leak rate. Failure to properly mitigate the effects of the loss of reactor coolant will result in higher than normal make up rates, increasing containment radiation, temperature, pressure, and moisture, and increased pressurizer heater operation to maintain normal RCS & pressurizer pressure.

Verifiable Actions:

OATC – Identify loss of reactor coolant occurring and report to SS.

OATC – Maintain PRZR level

- a. maximize charging flow
- b. isolate letdown
- c. start an additional charging pump

OATC – Maintain VCT level

OATC – Verify PRZR PORVs & Safety Valves are closed

UO – Stop any load changes in progress

OATC / UO – Monitor CNMT pressure

OATC / UO – Initiate RCS Leakage Calculation

OATC / UO – Locate & isolate the leak

OATC / UO – Restore normal charging & letdown if possible

Technical Specifications:

LCO 3.4.13, Condition 'A'

Event 6, 7:

RCCA M2 (SDA) drops requiring entry into AOP 18003-C. The crew will be required to implement actions of the AOP including reducing power and turbine load to less than 75% within 1 hour from time of rod drop. This will be the reactivity manipulation for this scenario. Failure to effectively mitigate adverse effects of the rod drop will result in uneven fuel burnout (power distribution), and potential for exceeding local power and heat flux limitations.

Verifiable Actions:

OATC – Recognize dropped rod and report to SS.

UO – Stop turbine loading changes

OATC – Check DRPI available and only one rod dropped

OATC – Check rod misaligned > 110 steps

OATC / UO – Maintain Tav_g at program by adjusting turbine load

OATC – Maintain Tav_g at program by dilution/boration or manual rod control

OATC – Maintain power distribution

OATC – Check ALB10-F02 is clear

OATC / UO – Reduce Thermal Power to less than 75% within 1 hour from time of rod drop using 12004DF-1, Power Operation (Mode 1)

OATC/UO – Maintain reduced power level until rod recovery is initiated

Technical Specifications:

LCO 3.1.4, Condition 'B' (1 hour)

Event 8:

The severity of the reactor vessel head leak worsens. The OATC recognizes that the leak exceeds the capacity of the charging system and that pressurizer level can no longer be maintained. The OATC will initiate a manual reactor trip and safety injection. Failure to perform the appropriate actions will result in depressurizing the RCS and subsequent automatic reactor trip and safety injection.

Verifiable Actions:

OATC – Recognize inability to maintain pressurizer level and report same to the SS.

OATC / UO – Perform IOA of EOP 19000-C

OATC / UO – Perform initial operator actions of EOP 19000-C

Technical Specifications:

None

Event 9:

CIA 'A' & 'B' fail to actuate automatically on SI or manually requiring the OATC & UO to manually align CIA at the QMCB & QHVC. Failure to perform this action could result in a discharge of the contaminated containment atmosphere to the environment.

Verifiable Actions:

OATC – Recognize CIA did not automatically actually

OATC – Attempt to manually actuate CIA using panel handswitches no later than the end of the OATC INITIAL ACTIONS, of 19000-C.

OATC / UO – Manually align CIA at the QMCB and QHVC no later than the end of the OATC INITIAL ACTIONS, of 19000-C.

Technical Specifications:

None

Event 10:

NCP fails to auto trip on SI requiring the OATC to manually trip the NCP. Failure to perform this action could result in overheating and subsequent loss of CCPs due to insufficient miniflows for the operating centrifugal charging pumps.

Verifiable Actions:

OATC – Recognize NCP failed to trip on SI

OATC – Manually trip NCP no later than step 3.d, OATC INITIAL ACTIONS, of 19000-C.

Technical Specifications:

None

Event 11:

PCB 161810 (Main Generator Output Breaker) will fail to automatically open on the trip of the Main Turbine.

Verifiable Actions:

The UO will have to depress the TURB SEQ TRIP OVERRIDE pushbutton (1PB-161810A) and then manually open the PCB breaker using HS-161810 to prevent motoring of the Main Turbine.

Technical Specifications:

None

The scenario may be stopped any time after the RCPs are stopped in E-0 or E-1 at the NRC Chief Examiner's discretion.

Facility: Vogtle Scenario No.: 7 Op-Test No.: 2013-301

Examiners: _____ Operators: _____

Initial Conditions: The plant is at approximately 50% power, BOL, power ascension in progress.
(Base IC # 11, snapped to IC # 176 for HL18 NRC Exam)

Equipment OOS: 'A' RHR Pump for motor repair (TS 3.5.2, Condition A), 'A' MDAFW Pump for bearing replacement (TS 3.7.5, Condition B).

Turnover: Currently at step 4.1.4.31 of 13615-1 placing MFPT "B" in service as directed by step 4.1.46b of 12004DF-1 (Power Operation – Mode 1). Place 2nd MFP in service and continue power ascent to 100% per 12004DF-1. Containment Mini-Purge is in service for containment entry on next shift.

Preloaded Malfunctions:

CV22 – Boric Acid Flow Deviation Failure
EL19B – EDG 1B Fail to Auto Start
AF05C – TDAFW Auto Start Failure

Overrides

RD17H – RCCA D4 (CBD) inserts to 110 steps on reactor trip
RD17M – RCCA C11 (SDC) inserts to 10 steps on reactor trip
HS3009 - 1HV-3009, #1SG Steam Supply to TDAFW Pump – OPEN
HS276A-STOP on Trigger 4 (Boric Acid Pump # 006, Train A)
HS276A-Amber light ON on Trigger 4.
ALB3636-D01-ON on Trigger 4 (480V MCC 1ABD TROUBLE)

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-OATC	Raise Power to 100%
2		R-SS N-UO N-SS	Place 2 nd MFP on-line
T3	PR03A	I-OATC I-SS TS-SS	Controlling Pressurizer Level Channel Fails Low LCO 3.3.1, Fu 9, Condition M
T4	BA Transfer Pump "A" trips	C-OATC C-SS	Boric Acid Transfer Pump "A" will trip during auto makeup with Boric Acid Flow Deviation failing to stop an inadvertent dilution. INFO TR LCO 13.1.3 Boration Flow Paths – Operating.
Pre-load	CV22		Boric Acid Flow Deviation failure does NOT stop inadvertent dilution.

Event No.	Malf. No.	Event Type*	Event Description
T5	NS03	C-UO C-SS TS-SS	A Train NSCW leak. LCO 3.7.8, Condition A LCO 3.7.9, Condition A may be entered if basin level is pumped too low due to the leak LCO 3.8.1, Condition B
T6	EL02 EL03	C-All	LOSP, reactor trip required due to both 1E Emergency Buses have no power.
7 Pre-load	EL19B	C-UO C-SS	1B EDG fails to auto start on LOSP. Can be started manually
T8	SG06A @ 30% Ramp 120 seconds	M-All	SGTR on SG #1 (~300 gpm) @ the top of the Steam Generator U-Tubes
9 Pre-load	AF05C	C-UO C-SS	TDAFW pump fails to start. Can be started manually
10 Pre-load	RD17H RD17M	C-OATC C-SS Critical	RCCA D4 (CBD) inserts to 110 steps on reactor trip RCCA C11 (SDC) inserts to 10 steps on reactor trip. Emergency Boration required due to 2+ stuck rods.
11 Pre-load	HS3009	C-UO C-SS Critical	HV-3009 (#1SG Steam Supply to TDAFW Pump) fails to shut from QMCB. UO has to use alternate method in E-3 to isolate SG # 1.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1, 2:

Power is approximately 50%. Crew will take the shift with a plant power ascension in progress. Beginning at step 4.1.4.31 of 13615-1, as directed by 4.1.46.b of 12004DF-1, the crew will be expected to continue power ascension including placing second MFP in service.

Verifiable Actions:

OATC – Withdraw control rods and/or dilute to establish a positive SUR and raise power.

UO – Place 2nd MFP online.

Technical Specifications:

None

Event 3:

Pressurizer level transmitter LT-459 fails low causing a letdown isolation.

Verifiable Actions:

OATC – Recognize pressurizer level failure and letdown isolated

OATC – Perform IOA of AOP 18001-C, Section D

OATC – Take manual control of FV-121. Adjust FV-121 and HV-182 to control RCP seal injection and pressurizer level

OATC – Place pressurizer level channel selector switches to unaffected channel(s)

Possibly UO? **OATC** – Restore normal charging and letdown

Technical Specifications:

LCO 3.3.1, Function 9, Condition M

Event 4:

Boric Acid Transfer Pump "A" trips during automatic makeup, a boric acid flow deviation failure requires the OATC to manually stop automatic makeup using HS-40001B to prevent an uncontrolled dilution. Once this has been addressed, the OATC may restart the makeup using the other BA Transfer Pump and place HS-40001B to START to restart the makeup.

Verifiable Actions:

OATC – Manually controls boric acid make-up flow.

Technical Specifications:

TR ILCO 13.1.3 for Boric Acid Flow Paths – Operating.

Event 5:

NSCW leak on Train A requires entry into AOP 18021-C.

Verifiable Actions:

UO – Place affected train (Train A) NSCW pump handswitches in PULL-TO-LOCK.

UO – Depress both Emergency Stop pushbuttons for the affected (Train A) DG.

UO – Place the affected train (Train A) components in PULL-TO-LOCK (CCP, SIP, RHR Pump, CS Pump, CCW Pump, CREFS, ESF Chiller-stop position).

Technical Specifications:

LCO 3.7.8, Condition A

LCO 3.7.9, Condition A may be entered if basin level is pumped too low due to leak

LCO 3.8.1, Condition B

Event 6, 7:

A loss of off-site power occurs coincident with an auto-start failure of 1B EDG resulting in a loss power to both 1AA02 and 1BA03. 1B EDG may be manually started by the UO at step 3 of 19000-C thereby preventing entry into EOP 19100-C (Loss of All AC).

Verifiable Actions:

UO – Manually starts 1B EDG per step 3 RNO of 19000-C.

Technical Specifications:

None

Event 8, 9, 10, 11:

A SGTR will occur on SG #1. ^{Con}Current with the reactor trip, two RCCAs fail to fully insert. Additionally, the TDAFW pump fails to auto start and 1HV-3009 will fail to close from the QMCB.

Verifiable Actions:

OATC – Manually actuates safety injection.

UO – Places SGBD hand switches in hard closed to prevent water hammer to SGBD system.

UO – Throttles AFW flow to maintain SG levels 10 – 65%. The UO may perform an early operator action and isolate AFW flow to SG #1 once SG #1 level is > 10% NR with SS permission.

UO – Manually starts TDAFW pump no later than step 3 of 19001-C or step 4 of 19100-C depending on the manual start of 1B EDG.

UO – Isolates ruptured SG #1 by performing the following.

- Adjusts SG #1 ARV potentiometer set point to 7.73 (to control at 1160 psig).
- Trips TDAFW pump (HV3009, #1SG Steam Supply to TDAFW Pump, fails to close from QMCB) as long as at least one MDAFW pump is running
- Closes SG #1 MSIV and Bypass valves – these valves may be shut earlier on cooldown step in 19001
- Isolates FW flow to SG #1 (MFIV, MFRV, BFIV, BFRV, TDAFW, MDAFW valves all shut)

UO – Blocks Low Steam Line Pressure SI and SLI when RCS pressure < 2000 psig (P-11) and then places the steam dumps in Steam Pressure Mode and opens the 3 cool down steam dumps for a maximum rate Cooldown. If main steam lines are isolated, ARVs (SG's 2, 3, and/or 4) will need to be used for cooldown.

UO – Closes the steam dumps (or ARVs) after selected CETC is reached and controls CETC below this temperature (usually this is 518°F or 506°F depending on ruptured SG pressure).

OATC – Initiates emergency boration to account for two RCCAs not fully inserted per step 7 RNO of 19001-C.

NOTE to examiners and Simbooth: Post trip there will be no instrument air, IF the OATC establishes Emergency Boration via the blender, these valves will fail on the loss of air. The only maintainable boration flow path will be through LV-112E through the normal charging path or LV-112E to the BIT. Allow time for air to fail so the OATC can adjust his emergency boration flow path if required prior to the insertion of the SGTR.

what does this mean in practice?

OATC – Depressurizes RCS with a PRZR PORV flow to refill the pressurizer since no air will be available with the LOSP to the non-1E buses and PRZR Sprays will NOT be available.

Technical Specifications:

None

The scenario may be stopped after completion of step # 41 to stop appropriate ECCS pumps or earlier with NRC Chief Examiner concurrence.

CRITICAL TASKS:

1) Isolates SG #1 to limit secondary contamination and potential release environment by performing the following actions no later than the 19030-C procedure steps. These are steps 6 through 11 of 19030-C.

- Adjusts SG #1 ARV potentiometer set point to 7.73 (to control at 1160 psig)
- Trips TDAFW (HV-3009, #1 SG Steam Supply to TDAFW pump, fails to close from QMCB), if at least one MDAFW pump is running
- Closes SG #1 MSIV and Bypass valves
- Isolates FW flow to SG #1 (MFIV, MFRV, BFIV, BFRV, TDAFW, MDAFW, and SGBD and Sample valves all shut)

2) Initiates Emergency Boration for two stuck control rods per step 7 RNO of 19001-C.

3) Depressurizes PRZR to refill the PRZR using ECCS injection to limit break flow by using PRZR PORV to meet conditions of step 37 of 19030-C.

4) UO manually starts the 1B EDG at step 3 of 19000-C to restore 1E electrical power and AFW flow

- If the UO fails to start 1B EDG, then starting the TDAFW Pump to restore AFW flow becomes a critical[^] no later than step 4 of 19100-C.

task

Event No.	Malf. No.	Event Type*	Event Description
3	N/ A	N-OATC N-SS	Places Excess Letdown in service.
T4	PR02A @ 100%.	I-OATC I-SS TS-SS	Controlling PRZR Pressure channel PT-455 fails high. LCO 3.3.1 Condition A, FU 6 Condition E, LCO 3.3.1 FU 8a Condition M, LCO 3.3.1 FU 8b Condition E, LCO 3.3.2 Condition A, FU 1d Condition D, LCO 3.3.2 FU 8b Condition L (One hour action), LCO 3.4.1.a Condition A
T5	TU11	C-UO C-SS	Main Turbine EHC Pump A trips with failure of standby EHC pump to automatically start.
T6	SG01B @3%	R-OATC N-UO R-SS TS-SS	Steam Generator # 2, 30 gpm SGTL requiring a rapid down power. LCO 3.4.13 Reactor Coolant System Leakage, Condition B
7	SG01B @ 45% Ramp 180 seconds	M-ALL	DBA SGTR on SG # 2 (~450 gpm)
T8	CV06A Or CV06B Critical	C-OATC C-SS	One CCP trips on SI, the other CCP fails to auto start. NOTE to simbooth operator. The CCP that is placed on the trigger to trip will have to be done after the crew decides which CCP to start in response to the SGTR, the pump will need to trip on SI sequence.
9	Preload Critical	C-UO C-SS	MDAFW discharge throttle valve to SG # 2 will not shut from QMCB.
T10	Insert Trigger on SI actuation Critical	C-OATC C-SS	HV-9378A & B to Containment fail shut on SI (this will prevent opening of PRZR sprays or Auxiliary Spray to force using PORVs for depressurization to refill PRZR during 19030-C, E-3 performance).
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event 1:

Dropped fuel assembly results in FHB High Radiation with failure of FHB HVAC to auto actuate.

Verifiable Actions:

UO – Manually actuates FHB Isolation using 13320-C using AHS-2532A or AHS-2533A.

UO – Resets FHB Actuation using AHS-2532B or AHS-2533B.

UO – Shuts down the desired Post Accident Filter Unit by placing either AHS-2540 or AHS-2541 to STOP.

Technical Specifications:

TR 13.3.6 Fuel Handling Building Post Accident Ventilation Actuation Instrumentation (Common System), Condition A

TR 13.9.5 Fuel Handling Building Post Accident Ventilation System Condition A

Event 2:

CVCS Letdown Hx Tube leak rupture requiring isolation of CVCS letdown due to high radiation on 1RE-1950 as directed per ARP-17100-C.

Verifiable Actions:

OATC – Closes Letdown Orifices HV-8149A, B, C and Letdown Isolations LV-459 and LV-460 to isolate the letdown leak to the ACCW Hx.

OATC – Isolates letdown by closing Letdown Containment Isolations HV-8152 and HV-8160.

OATC – Adjust PV-0131, sets to max pressure. Adjust TV-0130, sets to max. temperature.

CREW – Direct closing of Letdown Heat Exchanger of manual valves as follows:

- (AB-A08) 1-1208-U6-041
- (AB-A17) 1-1217-U4-126
- (AB-108) 1-1217-U4-129.

Technical Specifications:

LCO 3.4.13, Condition A (Note: Leakage is isolated after OATC closes the Letdown Orifices and Isolations)

Event 3:

Excess Letdown will be placed in service to the seal return header to control PRZR level.

Verifiable Actions:

OATC – Sets 1HC-123 to closed. (0% demand).

OATC – Opens Excess Letdown Isolation valves 1-HV-8153 / 1-HV-8154.

OATC – Adjusts 1HC-123 to establish maximum allowable Excess Letdown flow (~30 gpm).

OATC – Adjusts 1FIC-121 and 1HC-182 to control charging and seal injection flows.

Event 4:

Controlling PRZR Pressure channel PT-455 fails high resulting in PORV 455A opening and both PRZR sprays fully open, RCS pressure will be lowering rapidly.

Verifiable Actions:

OATC – Perform IOAs of 18001-C by closing PRZR sprays, closing PORV 455A, and operating heaters as necessary to control PRZR pressure.

OATC – Manually closes PORV Block Valve 1HV-8000A to stop LOCA to PRT.

OATC – Controls PRZR heaters and sprays to control PRZR pressure.

OATC – Sets PRZR Master Controller to 25% demand.

OATC – Selects channel 457 / 456 on PRZR Pressure control switch PS-455F.

OATC – Places PRZR heaters and PORV 455A in AUTO and ensures proper operation.

OATC – Places PRZR Pressure Master Controller in AUTO and verifies proper operation.

OATC – Selects channel PT-457 as controlling channel on pressure recorder PS-455G.

Technical Specifications:

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation Condition A

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 6, Condition E

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 8a, Condition M

LCO 3.3.1 Reactor Trip System (RTS) Instrumentation FU 8b, Condition E

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) Condition A

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) FU 1d, Condition D

LCO 3.3.2 Engineered Safety Features Actuation System (ESFAS) FU 8b Condition L (one hour)

LCO 3.4.1.a RCS Pressure, Temperature, & Flow Departure from Nucleate Boiling (DNB) Limits

Event 5:

Main Turbine EHC Pump A trips with failure of the standby pump to automatically start.

Verifiable Actions:

UO – Starts EHC pump B prior to Main Turbine / Reactor trip on low EHC pressure of 1100 psig. This will prevent an unnecessary Turbine / Reactor trip and transient on the plant.

Technical Specifications:

None

Event 6:

A 30 gpm SGTL will occur on SG # 2 requiring a rapid down power per 18013-C, this is to preclude the tube leak from propagating into a SGTR per the EPRI Guidelines.

Verifiable Actions:

OATC – Borates as necessary for rapid down power to maintain Tavg – Tref matched.

UO – Reduces Turbine load at < 5% per minute to maintain Tavg – Tref matched.

Technical Specifications:

LCO 3.4.13, RCS Operational Leakage, Condition 'B'

Event 7, 8, 9, 10:

A DBA SGTR will occur on SG # 2 requiring a plant trip and safety injection.

Verifiable Actions:

OATC – Manually trips the reactor using either QMCB hand switch, manually actuates safety injection, and adjusts seal injection to RCPs between 8 to 13 gpm after the SI.

OATC – Manually starts CCP “B” which will not auto start on the Safety Injection signal.
Note: CCP “B” may already be running as a mitigation measure for the SGT. If so, this action will not be performed other than verifying that the pump is still running & providing flow.

UO – Places SGBD hand switches in hard closed to prevent water hammer to SGBD system.

UO – Throttles AFW flow to maintain SG levels 10 – 65%. The UO may perform an early operator action and isolate AFW flow to SG # 2 once SG # 2 level is > 10% NR with SS permission.

UO – Isolates ruptured SG # 2 by performing the following.

- Adjusts SG # 2 ARV potentiometer set point to 7.73 (to control at 1160 psig)
- Closes 1HV-3019, SG # 2 steam supply to TDAFW pump
- Closes SG # 2 MSIV and Bypass valves
- Isolates FW flow to SG # 2 (MFIV, MFRV, BFIV, BFRV, TDAFW, MDAFW valves all shut)

UO – Blocks Low Steam line Pressure SI and SLI when RCS pressure < 2000 psig (P-11) and then places the steam dumps in Steam Pressure Mode and opens the 3 cool down steam dumps for a maximum rate Cooldown.

UO – Closes the steam dumps after selected CETC is reached and controls CETC below this temperature (usually this is 518°F or 506°F depending on ruptured SG pressure).

OATC – Arms COPS and depressurizes RCS a PORV to refill the pressurizer.

The scenario may be stopped after step # 41 with chief examiner approval.

CRITICAL TASKS:

- 1) Starts CCP which will NOT start on the SI actuation signal, with the other CCP tripping on the SI actuation signal, High Head Safety Injection will NOT be available unless the CCP is manually started no later than step 2.b RNO of AOP 18009-C, or step 3.a RNO, OATC INITIAL ACTIONS, of EOP 19000-C.
- 2) Isolates SG # 2 to limit secondary contamination and potential release environment by performing the following actions no later than the 19030-C procedure steps. These are steps 6 through 11 of 19030-C.
 - Adjusts SG # 2 ARV potentiometer set point to 7.73 (to control at 1160 psig).
 - Closes 1HV-3019, SG # 2 Steam Supply to TDAFW pump
 - Closes SG # 2 MSIV and Bypass valves.
 - Isolates FW flow to SG # 2 (MFIV, MFRV, BFIV, BFRV, TDAFW, MDAFW, and SGBD and Sample valves all shut)
 - MDAFW pump "B" discharge valve HV-5132 will NOT shut, the crew will have to either place MDADW pump "B" in PTL or dispatch personnel to manually close HV-5132 OR direct an operator to manually isolate HV-5132 using a local manual isolation valve.
- 3) Depressurizes PRZR to refill the PRZR with ECCS injection and to limit break flow using a single PRZR PORV to meet conditions of step 37 of 19030-C.