

Final Submittal
(Blue Paper)

HATCH OCTOBER/NOVEMBER 2005 EXAM

05000321/2005301 & 05000366/2005301

**OCTOBER 28, 2005, (WRITTEN) AND
OCTOBER 31 - NOVEMBER 4, 2005**

FINAL SIMULATOR SCENARIOS

Southern Nuclear E. I. Hatch Nuclear Plant

Initial License NRC Simulator Evaluation

NRC 2005 SCENARIO # 2		
CHARLIE EDMUND	LT-NRC-2005-002	2.0 HOURS
<i>Ed Edmund</i>	<i>R. Edmund</i>	<i>10/21/05</i>



FINAL**Facility:** E. I Hatch**Scenario No.:** 2**Op-Test No.:****Examiners:** Ron Aiello**Operators:**

Tim Kolb

Gerry Laska

Initial Conditions: Unit 2 is at 29% RTP, shutting down due to a gas build up in phase 3 of the Main Transformer. 2D11-K615B ,OffGas Post treatment radiation monitor, failed Downscale. RAS written. RWM is Inoperable and bypassed. The National Weather Service has predicted Severe Thunderstorms for Appling and surrounding counties.

Turnover: Continue to shutdown to the plant per 34GO-OPS-013-2. Start with Transferring Station Service busses from Normal to Alternate. Continue Control Rod insertion per the Rod Movement Sheet at Step 44, Rod 22-15 to decrease Rx power. The Shutdown plan is to manually Scram the Rx after decreasing below 15% power.

Event No.	Malf. No.	Event Type*	Event Description
1		N(BOP)	Transfer house loads from normal to alternate.
2		C (CBO)	System Operator reports Condensate Booster pump "A" has an oil leak, "B" must be started, "A" shutdown.
3		R (CBO)	Insert Rods to Reduce Rx power.
4	diC11A-S2	C (CBO) (SRO TS)	Rod movement timer malfunction causes continual rod insertion. Rod is recovered after time compressed repair.
5	mfN33_154	C(BOP)	Main Turbine Steam seal regulator fails closed. Manual bypass must be opened to prevent loss of vacuum.
6	mfB31_39A mfB31_45A aoB31-603A	C (BOP) (SRO TS)	Recirc Pump "A" seal leakage causes DW leakage. Pump is secured and isolated.
7**	mfC11_31a	C (CBO)	**OPTIONAL – use if needed. No effect on scenario. CRD Flow Control Valve fails closed, standby placed in-service
8	mfr25_238B mf60221220		Loss of DC Bus "2R25-S002", Recirc "2B" to be locally Tripped due to low oil pressure. Recirc hi vibration will occur while waiting for local pump trip.
9A	mfB31_210B	M (All)	"B" Recirc suction piping ruptures causing a LOCA. The Rx Scrams and the operators respond to the LOCA.
9B	mfE11_202B	I (ALL)	RHR Logic Failure occurs and RHR pumps must be manually started.
10A	diE11-F021A diE11-F021B	C (BOP)	DW spray valve failed closed on first loop tried, must use other loop to spray. (Must delete other loop when first loop is tried.)
10B		M (All)	DW spray required due to high torus pressure.
			Scenario is terminated after the Drywell is sprayed.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Op-Test No.: _____ Scenario No.: 2 Event No.: 1 Page 1 of 3

Event Description: Transfer house loads from Normal to Alternate.

Time	Position	Applicant's Actions or Behavior
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	SRO	<ul style="list-style-type: none"> Directs Operator to transfer Station Service Busses from Normal to Alternate
	BOP	<ul style="list-style-type: none"> Enters 34SO-R22-001-2, 4160 VAC System Verifies voltage on SUT 2C Verifies that an Emergency Bus is not being powered from SUT 2C by confirming Open ACBs 135544, 135564 <u>and</u> 135584 (2H11-P652). Performs the following steps for each 4160 VAC Station Service Bus (2A, 2B, 2C, 2D). (Buses can be transferred in any order.)
		<ul style="list-style-type: none"> Places the Station Svc Interlock Cutout switch in OFF- (DOWN position)
		<ul style="list-style-type: none"> 4160 VAC "A" - 135434/135454
		<ul style="list-style-type: none"> 4160 VAC "B" - 135444/135464
		<ul style="list-style-type: none"> 4160 VAC "C" - 135474/135494
		<ul style="list-style-type: none"> 4160 VAC "D" - 135484/135534
		<ul style="list-style-type: none"> Places the Sync Switch (SSW) for the Bus's alternate supply breaker in ON.
		<ul style="list-style-type: none"> 4160 VAC "A" - ACB 135454
		<ul style="list-style-type: none"> 4160 VAC "B" - ACB 135464
		<ul style="list-style-type: none"> 4160 VAC "C" - ACB 135494
		<ul style="list-style-type: none"> 4160 VAC "D" - ACB 135534

Op-Test No.: _____ Scenario No.: 2 Event No.: 1Page 2 of 3

Event Description: Transfer house loads from Normal to Alternate.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Confirms the sources of power to the 4160V Bus are synchronized and voltage is normal on: <ul style="list-style-type: none"> 4160 VAC "A" - Startup Aux XFmr 2C 4160 VAC "B" - Startup Aux XFmr 2C 4160 VAC "C" - Startup Aux XFmr 2D 4160 VAC "D" - Startup Aux XFmr 2D
		<ul style="list-style-type: none"> Closes the ACB for the bus's Alternate Supply, AND confirms that current increases from the applicable Startup Auxiliary Transformer. <ul style="list-style-type: none"> 4160 VAC "A" - ACB 135454 - SUT 2C 4160 VAC "B" - ACB 135464 - SUT 2C 4160 VAC "C" - ACB 135494 - SUT 2D 4160 VAC "D" - ACB 135534 - SUT 2D
		<ul style="list-style-type: none"> Trips the Normal Supply breaker to the Bus <ul style="list-style-type: none"> 4160 VAC "A" - ACB 135434 4160 VAC "B" - ACB 135444 4160 VAC "C" - ACB 135474 4160 VAC "D" - ACB 135484

Op-Test No.: _____ Scenario No.: 2 Event No.: 1 Page 3 of 3

Event Description: Transfer house loads from Normal to Alternate.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Places the Sync Switch for the alternate supply breaker for the Bus in OFF.
		<ul style="list-style-type: none"> 4160 VAC "A" - ACB 135454
		<ul style="list-style-type: none"> 4160 VAC "B" - ACB 135464
		<ul style="list-style-type: none"> 4160 VAC "C" - ACB 135494
		<ul style="list-style-type: none"> 4160 VAC "D" - ACB 135534
		<ul style="list-style-type: none"> Places Station Svc Interlock Cutout switch in Normal-(Up position)
		<ul style="list-style-type: none"> 4160 VAC "A" - 135434/135454
		<ul style="list-style-type: none"> 4160 VAC "B" - 135444/135464
		<ul style="list-style-type: none"> 4160 VAC "C" - 135474/135494
		<ul style="list-style-type: none"> 4160 VAC "D" - 135484/135534
		<ul style="list-style-type: none"> Repeats above steps until 4160VAC Bus 2A-2D are on alternate supply. (Busses can be transferred in any order.)
		<ul style="list-style-type: none"> Notifies the SS when all the Buses have been transferred.

Op-Test No.: _____ Scenario No.: 2 Event No.: 2 Page 1 of 3

Event Description: System Operator reports Condensate Booster pump "C" has an oil leak. "A" or "B" must be started, "C" shutdown.

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator notifies the Control Room, as a System Operator (SO), that he is on rounds and has discovered that the 2C Condensate Booster pump has an oil leak. When questioned about the size of the oil leak, report as the SO that the CBP still has ample oil to operate, but should be shutdown as soon as possible.</i>
	SS	<ul style="list-style-type: none"> Directs Operator to place 2A or 2B Condensate Booster pump (CBP) in service and shutdown the 2C Condensate Booster pump.
	CBO	<ul style="list-style-type: none"> Enters 34SO-N21-007-2 and performs the following actions: <ul style="list-style-type: none"> Verifies that the Hydrogen injection system is removed from service. Has SO: <ul style="list-style-type: none"> Verify that 2A or 2B CBP Oil Reservoir and motor bearing oil levels are WITHIN normal level marks. Throttle 2P41-F364A or B, outlet valve as necessary to maintain the oil temperature between 50°F and 115°F. Confirm / Place CBP 2A or 2B Oil Pump control switch in Auto and Confirm pump is running. Confirm Closed/Close 2N21-F020A or B, Standby CBP Discharge Valve.
		<p><i>Simulator Operator does NOT have to enter the remote function for closing the discharge valve for the CBP, because it has to be throttled prior to pump start and we do not have throttle capability.</i></p> <p><i>Simulator Operator, as SO, reports that CBP 2A or 2B oil levels are normal, oil temperature is at 95°F, the oil pump is running in Auto and that the 2N21-F020A or B is closed.</i></p>

Op-Test No.: _____ Scenario No.: 2 Event No.: 2 Page 2 of 3

Event Description: System Operator reports Condensate Booster pump "C" has an oil leak. "A" or "B" must be started, "C" shutdown.

Time	Position	Applicant's Actions or Behavior
	CBO	<ul style="list-style-type: none"> • Directs SO to: <ul style="list-style-type: none"> • Throttle Open 2N21-F020A or B, CBP Discharge Valve, for 15 seconds • Observe for indication of a stuck open / leaking discharge check valve as evidenced by increasing pressure on the pump side of the discharge check valve.
		<i>Simulator Operator, as SO, reports that the 2N21-F020A or B is opened 15 seconds and the discharge check valve does NOT indicate leakage. (Verify that rfN21_60A or B is in Open.)</i>
	CBO	<ul style="list-style-type: none"> • Starts Condensate Booster Pump 2A or 2B, by placing the control switch to Start. • Has SO throttle open the Discharge valve and maintain oil temp by throttling PSW to the oil cooler.
		<i>Simulator Operator, as SO, reports that the discharge valve is now full open for CBP 2A or 2B, and that oil temp is being maintained at 95°F</i>
	CBO	<ul style="list-style-type: none"> • When condensate and feedwater flows and pressures have stabilized, directs the SO to close 2N21-F020C
		<i>Simulator Operator, enters rfN21_62 (CBP "C" disch valve close), then as the SO, reports that the discharge valve for CBP 2C is started closed.</i>

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Time	Position	Applicant's Actions or Behavior
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Op-Test No.: _____ Scenario No.: 2 Event No.: 3 Page 1 of 2

Event Description: Insert Rods to Reduce Rx power.

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none"> Directs operator to continue the power reduction to 15% by inserting control rods.
		<i>Simulator Operator, as STA, will inform operators that continuous-in rod movement is desired for the upcoming rod movements. (Operator may notch 1 or 2 notches to get a feel for nuclear response.)</i>
	CBO	<ul style="list-style-type: none"> Gets other operator to be second verifier since RWM is inoperable. Inserts control rods per 34GO-OPS-065-0, starting with control rod 22-15 in Step 44 from position 30-12. <ul style="list-style-type: none"> Selects Rod 22-15 Gets concurrence from 2nd operator that the correct rod is selected. Places Control Rod movement switch to the IN position Verifies Rod moves using Rod display information and Rx and Generator power decreasing. <p>Note: RBM Downscale alarm will alarm during this movement due to the significant rod worth of these rods.</p> <ul style="list-style-type: none"> Releases Rod movement switch so that the control rod stops at position 14 Inserts Rod to position 12 Initials Rod movement Sheet. Verifier Initials Rod movement sheet
		<i>Simulator Operator inserts diC11A-S2 when the operator starts moving the next Control Rod (14-31). Go to continuous rod insertion operator action sheet, then return here after the rod is recovered.</i>

Page 2 of 2

Time	Position	Applicant's Actions or Behavior
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[illegible]

Op-Test No.: _____ Scenario No.: 2 Event No.: 4 Page 1 of 3

Event Description: Rod movement timer malfunction causes continual rod insertion. Rod is recovered after time compressed repair. (diC11A-S2)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator inserts diC11A-S2 when the operator starts moving the second Control Rod.</i>
	CBO	<ul style="list-style-type: none"> • Alarm RMCS/RWM Rod Block or SYS Trouble is received • Recognizes that Control Rod 14-31 inserts to position 00 • Recognizes that Rod 14-31 has a continuous insert signal • Stops Rod Movement and Notifies the SS and STA. • Enters ARP 34AR-603-239-2
	SS	<ul style="list-style-type: none"> • Directs operator to enter 34AB-C11-004-2, Mispositioned Control Rod • Contacts Maint to investigate the continuous insert signal on Rod 14-31. • May enter a tracking RAS for LCO 3.1.6
	CBO	<ul style="list-style-type: none"> • Enters 34AB-C11-004-2, Mispositioned Control Rod and determines that section 4.6 should be performed, including: <ul style="list-style-type: none"> • Turns off Rod Select Power • Confirm cooling water differential pressure, drive water pressure, and CRD system flow are <u>WITHIN</u> the limits • Enters section 4.7 of the procedure • Performs Attachment 1 • Has STA/Rx Engineering verify that no thermal limits have been exceeded. • Performs Attachment 2 for recovery actions and documentation of the problem.

Op-Test No.: _____ Scenario No.: 2 Event No.: 4 Page 2 of 3

Event Description: Rod movement timer malfunction causes continual rod insertion. Rod is recovered after time compressed repair. (diC11A-S2)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator</i> , after the crew has had time to work through the first part of the AB procedure, deletes diC11A-S2 AND as I&C, notifies the SS that there was a stuck relay in the RMCS system Insert Bus. It's 1 hour later (time compression used), the Relay has been replaced and the RMCS insert logic should work properly now.
		<p><i>Simulator Operator, as Rx Engineering, notifies the Control Room that NO thermal limits have been exceeded.</i></p> <p><i>Also Notify the crew, as requested, that: (This information is needed to complete Attachment 2)</i></p> <ul style="list-style-type: none"> • The Rod can be recovered at the current power level. • Use single Notch withdrawal to position 12. • No other rods will have to be move to recover 14-31 • The Rod will not be bypassed in the RWM since RWM is already inoperable • A RBM upscale alarm may be received. If so deselect and reselect the rod and continue withdrawal. • If requested, provide a special Rod Movement sheet for withdrawing rod 14-31 to position 12. (Attachment 2 can be used instead of the special movement sheet.)
	SS	<ul style="list-style-type: none"> • Directs operator to withdraw Control Rod 14-31 to position 12.
	CBO	<ul style="list-style-type: none"> • Turns Select power on. • Ensures all procedural requirements for rod movement that were checked earlier, (including verifier) still exist. • Notches Rod 14-31 from position 00 to position 12 • Completes data sheet in Attachment 2 for Rod Recovery actions. • Notifies SS that Rod recovery has been completed.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 4 **Page** 3 **of** 3 **Event Description:** Rod movement timer malfunction causes continual rod insertion. Rod is recovered after time compressed repair. (diC11A-S2)

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none">• Directs operator to continue rod insertion for the planned shutdown.
		<i>Simulator Operator go back to reactivity manipulation action sheet.</i>

Op-Test No.: _____ Scenario No.: 2 Event No.: 5 Page 1 of 2

Event Description: Main Turbine Steam seal regulator fails closed. Manual bypass must be opened to prevent loss of vacuum. (mfN33_154)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator intermittently enters mfN33_154 until the N33-F004 is opened, then completely fails the regulator. Use intermittently to start with or the Turbine and RFPT will trip on low vacuum before the team has ample time to respond.</i>
	BOP	<ul style="list-style-type: none"> • Responds to the Steam Seal Low pressure alarm and determines that steam seal pressure is low • Notifies SS that Steam Seal pressure is low.
	SS	<ul style="list-style-type: none"> • Directs the operator to enter and perform the actions of the ARP.
	BOP	<ul style="list-style-type: none"> • Enters ARP 34AR-650-125-2 <ul style="list-style-type: none"> • Confirms 2N33-R601A, Steam Seal Hdr Pressure Indicator, is below 1.5 PSIG panel 2H11-P650. • Confirms Open 2N33-F003, Steam Seal Main Steam Feed Vlv. • Confirms Closed 2N33-F005, Unloading Bypass Vlv. • Confirms Closed 2N33-F008, Aux Steam Feed Vlv. • Opens 2N33-F004, Steam Seal Feed Vlv Bypass, to bring steam seal pressure to between 2.5 PSIG and 4.5 PSIG. • Dispatches SO to 2N33-R301, Steam Seal Feed Valve Controller, to confirm > 20 # Air Inlet Pressure <u>AND</u> < 15 # Air Outlet Pressure. • Notifies SS that Steam seal pressure has been re-established and being controlled with the bypass valve. • May dispatch SO to check 7 piping temperatures downstream of 2N33-N006, N007A, and F007B, Relief Valves, to determine <u>IF</u> they are stuck open. Pipe temperatures are expected to be ambient.

Event Description: Main Turbine Steam seal regulator fails closed. Manual bypass must be opened to prevent loss of vacuum. (mfN33_154)

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Op-Test No.: _____ Scenario No.: 2 Event No.: 6 Page 1 of 3

Event Description: Recirc Pump "A" seal leakage causes DW leakage. Pump is secured and isolated. (mfB31_39A (20/10), mfB31_45A (90/100), aoB31-603A (50/10))

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator enters mfB31_39A (20/10), mfB31_45A (90/100), and aoB31-603A (50/10)</i>
	BOP	<ul style="list-style-type: none"> • Receives Outer Seal A Leak Detection Flow High alarm, 34AR-602-116-2 • Observes and compares 2B31-R603A, Seal A No. 1 pressure indicator, AND 2B31-R602A, Seal A No. 2 pressure indicator, to determine the outer seal has failed and that the inner seal may have some failure. • Notifies SS that the Outer Seal on Recirc A has failed • Has an Operator perform 34SV-SUV-019-2, Surveillance Checks, to determine magnitude of leak. • Monitors 2D11-R630, Fission Products Monitor recorder, to determine IF primary system coolant is leaking from seals. • Monitors Drywell pressure
	SS	<ul style="list-style-type: none"> • Directs Operator Check DW Leakage • May direct the Operator To Enter 34AB-T23-002-2, Small Pipe Break in Primary Containment. • May direct the operator to vent the DW with SBTG, if DW pressure approaches 0.65 psig.
		<i>Simulator Operator, as the operator checking DW leakage, reports that DW Equipment drain leakage is stable at 1.7 gpm and that Floor drain leakage has increased from 0.8 gpm to 12.1 gpm.</i>

Event Description: Recirc Pump “A” seal leakage causes DW leakage. Pump is secured and isolated. (mfB31_39A (20/10), mfB31_45A (90/100), aoB31-603A (50/10))

[illegible]

Op-Test No.: _____ Scenario No.: 2 Event No.: 6 Page 3 of 3

Event Description: Recirc Pump "A" seal leakage causes DW leakage. Pump is secured and isolated. (mfB31_39A (20/10), mfB31_45A (90/100), aoB31-603A (50/10))

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> Per 34AR-602-116-2 and 34SO-B31-001-2, Recirc System,:
		<ul style="list-style-type: none"> Places Recirc MG Set A control switch to Stop Acknowledges Recirc Loop A Out of Service alarm Closes 2B31-F031A, Reactor Recirc A Pump Disch Vlv Closes 2B31-F023A, Reactor Recirc A Pump Suction Vlv Dispatches SO to close Seal Injection To Pump A Header Isolation Valve, 2B31-F008A. <p>(Critical Task - isolate Recirc)</p>
		<p>Simulator Operator:</p> <ul style="list-style-type: none"> When requested to close 2B31-F008, Enter rfB31_29, Recirc mini purge B31-F016A to close (This simulates B31-F008A being closed) <p>and</p> <ul style="list-style-type: none"> <i>MODIFY aoB31-603A to 10 @ 40</i> <i>Proceed to the next I/C failure at the Chief Examiner's direction.</i>
		Note: To determine core flow, jet pump flows must be added together per 34SO-B31-001-2.

Op-Test No.: _____ Scenario No.: 2 Event No.: 7 Page 1 of 3

Event Description: CRD Flow Control Valve fails closed, standby placed in-service.
(mfC11_31a)

Time	Position	Applicant's Actions or Behavior
		<p><i>This component failure is OPTIONAL. The Chief Examiner will determine if this Event should be used.</i></p> <p><i>Simulator Operator enters mfC11_31a</i></p>
	CBO	<ul style="list-style-type: none"> • Receives Charging Water Pressure High alarm • Will also receive CRD Hydraulic Temp High alarm a short time later • Determines that the CRD Flow Control Valve A has failed closed. • Notifies SS that the CRD Flow Control Valve A has failed closed. • Enters <ul style="list-style-type: none"> • 34AR-603-139-2, Charging Water pressure High • 34AR-603-140-2, CRD Hydraulic Temp High • 34AB-C11-001-2, Loss of CRD System
	SS	<ul style="list-style-type: none"> • SS/CBO dispatches a SO/Maint to investigate the cause of the FCV failing closed. • SS/CBO dispatches a SO to Monitor CRD drive temperatures • Directs the operator to perform actions per the ARPs and 34AB-C11-001-2, Loss of CRD system. • May direct operator to swap Flow Control Valves at this time, or may wait for report from SO, before ordering the swap.

Op-Test No.: _____ Scenario No.: 2 Event No.: 7 Page 2 of 3

Event Description: CRD Flow Control Valve fails closed, standby placed in-service.
(mfC11_31a)

Time	Position	Applicant's Actions or Behavior
		<p><i>Simulator Operator reports, as SO at the FCV, that the FCV has failed closed due to an air leak on the supply line, and that you have isolated the air line and stopped the leak.</i></p> <p><i>If/When requested and if the CRD High Temp alarm is illuminated, Simulator Operator, as SO checking CRD Temps, reports that 2 CRD drives are >250°F. 30-11 at 260°F, 22-35 at 265°F and some others are slowly increasing.</i></p>
	SS	Directs operator to swap Flow Control Valves
	CBO	<p>Enters:</p> <ul style="list-style-type: none"> • 34SO-C11-005-2, CRD System, to swap Flow Control valves • Places 2C11-R600 to Manual • Directs SO to locally shift CRD FCV
		<p><i>Simulator Operator, if the operator does not place 2C11-R600 to manual with the output at "0", tell him as the SO that the system flow is matched at "0" gpm and tell him that you are ready for him to take control of the system from the Control Room.</i></p>
		<p><i>Simulator Operator enter rfC11_24 to "B", then as the SO, report that the CRD FCV's have been shifted locally and that control room actions to complete the shift can be taken.</i></p>

Op-Test No.: _____ Scenario No.: 2 Event No.: 7 Page 3 of 3

Event Description: CRD Flow Control Valve fails closed, standby placed in-service.
(mfC11_31a)

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Returns CRD System to normal configuration by: <ul style="list-style-type: none"> • Adjusting 2C11-R600 to desired flow • Places 2C11-R600 to AUTO • Confirms system parameters are normal • "Charging Water Pressure High" alarm clears • "CRD Hydraulic Temp High" alarm clears • Reports to SRO that CRD flow control valves have been shifted and the CRD System has been restored to normal configuration
	SS	<ul style="list-style-type: none"> • Acknowledges operator and directs operator to continue shutting down
		<i>Simulator Operator Proceed to the next I/C failure at the Chief Examiner's direction.</i>

Op-Test No.: _____ Scenario No.: 2 Event No.: 8 Page 1 of 1

Event Description: Loss of DC Bus "2R25-S002", Recirc "2B" to be locally Tripped due to low oil pressure. Recirc hi vibration (mfR25_238B, mf60221220)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator enters mfR25_238B and 1 minute later, enters mf60221220, Pump Motor B vibration High</i>
	All	<ul style="list-style-type: none"> Determines that DC Buss R25-S002 has been lost by receiving several alarms, including Station Service SWGR DC Off and Fluid Drive B Oil Press Low. Should also notice that the top row of DC power lights are off for the DC power indication on 2H11-P651 panel.
	SS	<ul style="list-style-type: none"> Directs operator to enter 34AB-R22-001-2, Loss of DC Busses. Dispatches SO/Maint to investigate the cause of the trip.
	BOP	<ul style="list-style-type: none"> Enters 34AB-R22-001-2, Loss of DC Busses <ul style="list-style-type: none"> Dispatches a SO to locally trip the breaker for the 2B Recirc pump Enter 34AB-B31-001-2, Trip of One or Both Reactor Recirculation Pumps If time allows, Dispatches a SO to locally trip the exciter field breaker 2B31-CB1B to allow the core flow summing circuit to give proper indication of core flow
		<i>The SS may order the Rx Scrammed prior to tripping the Recirc Pump. 2 minutes after being dispatched, Simulator Operator enters rfB31_182, Recirc "B" Local breaker trip and reports this to the Control Room. Immediately go to the Major Event</i>

Op-Test No.: _____ Scenario No.: 2 Event No.: 9A Page 1 of 2

Event Description: B" Recirc suction piping ruptures causing a LOCA. (mfB31_210B)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator enters mfB31_210B, Recirc Loop B suction rupture(0.2/0.02)</i>
	All	Determines that DW pressure is increasing.
	SS	<ul style="list-style-type: none"> • Orders the Rx manually scrammed (may not have time to insert manual scram before the Rx auto scrams). • Enters RC EOP Flowchart • Directs CBO to perform RC-1 placard • Directs BOP to perform RC-2 and RC-3 placards • Enters Primary Containment Control Flowchart
	CBO	<ul style="list-style-type: none"> • Manually SCRAMs the Reactor using the SCRAM pushbuttons • Places Rx Mode Switch in S/D. • Verifies and reports all rods inserted past position 02. • Inserts IRMs and SRMs. • Places SDV Isol Vlv Switch to "ISOL" and verifies closed.
	BOP	<p>Performs actions of RC-2 and RC-3 after Reactor SCRAM.</p> <ul style="list-style-type: none"> • Confirms proper operation of the Feedwater Level Control System to restore and maintain RPV level. <ul style="list-style-type: none"> • Ensures FW Master Controller setpoint reduces to 9 inches and output reduces to 25% of previous value. (This won't happen due to low initial power.)

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 9A **Page** 2 **of** 2

Event Description: B" Recirc suction piping ruptures causing a LOCA. (mfB31_210B)

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • IF NOT needed to restore RPV level, • Trips One RFPT. • Confirms OPEN 2N21-F125. • Places 2C32-R619, FW S/U LVL CONTROL VLV Controller, in AUTO, set at approximately 9 inches. • Closes 2N21-F110. • Checks ECCS Injection Systems and secures as necessary. (HPCI will not start due to loss of S002 DC bus.
	BOP	<ul style="list-style-type: none"> • Monitors RPV pressure. • Confirms proper operation of pressure control system (TBV, LLS, etc.). • If necessary, allows RPV pressure to exceed 1074 psig then cycles any SRV to initiate LLS. • Maintains RPV pressure between 1074 and 800 psig. (Pressure will slowly decrease outside the band throughout the scenario due the leak.) • Notifies SS of pressure control system operation.
	SS	<ul style="list-style-type: none"> • Assigns a RWL band between 3" and 50"

Event Description: B" Recirc suction piping ruptures causing a LOCA. RHR fails to start. (mfE11_202B)

Time	Position	Applicant's Actions or Behavior
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		<i>Simulator Operator verifies that mfE11_202B is already entered.</i>
	All	<ul style="list-style-type: none"> Recognizes that the RHR pumps did not start on a high DW pressure LOCA Signal.
	CBO	<ul style="list-style-type: none"> Starts RHR pumps and verifies that the Core Spray pumps are running.
	BOP	<ul style="list-style-type: none"> Controls RWL with the RFPTs. Notifies SS if RWL gets outside assigned band. Re-opens 2P41-F316s due to high oil temp on the RFPTs per 34AB-P41-001-2, Loss of PSW, Placard. <ul style="list-style-type: none"> Places the "A" and "B" Isolation Override switches on the 2H11-P652 panel to Override Fully opens 2P41-F316A or C and 2P41-F316B or D Throttles 2P41-F316C or A and 2P41-F316D or B to open while monitoring PSW division 1 and 2 pressure on 2H11-P650 panel ensuring that PSW pressure remains above 80 psig.

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 10A **Page** 1 **of** 2

Event Description: B" Recirc suction piping ruptures causing a LOCA. 1 Loop of DW spray Inop. (diE11-F021A, and diE11-F021B)

Time	Position	Applicant's Actions or Behavior
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	SS	<ul style="list-style-type: none"> Per the PC flowchart, verifies torus level is <285 inches and directs an operator to place Torus Sprays in service
	CBO	<ul style="list-style-type: none"> Sprays the Torus per 34SO-E11-010-2 placard on the 2H11-P601 Panel as follows: <ul style="list-style-type: none"> Places Cnmt Spray Vlv Cntl switch in the MANUAL position. Starts RHR pump(s) in loop A (B), if not already running. Opens 2E11-F028A(B) Throttles Open 2E11-F027A(B) Notifies SS that RHR is in Torus Sprays <p>(One or Both loops of RHR may be placed in Torus Sprays. The flow is only 700gpm, so it may be difficult to see flow indication from a distance.)</p>
	SS	<ul style="list-style-type: none"> When Torus pressure exceeds 11 psig, verifies that Torus Level is <215 inches, in the safe area of Graph 8 (DWSIL) and Directs an operator to: <ul style="list-style-type: none"> Place the DW cooling fans to Off Spray the DW

Op-Test No.: **Scenario No.: 2** **Event No.: 10A** **Page 2 of 2**

Event Description: B" Recirc suction piping ruptures causing a LOCA. 1 Loop of DW spray Inop. (diE11-F021A, and diE11-F021B)

[illegible]

Op-Test No.: _____ **Scenario No.:** 2 **Event No.:** 10B **Page** 1 **of** 3

Event Description: B" Recirc suction piping ruptures causing a LOCA. Spray the Drywell

Time	Position	Applicant's Actions or Behavior
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	SS	Directs the operator to use the other loop of RHR for DW Sprays.
		The operator may temporarily secure torus sprays or swap torus sprays to the other loop so that Drywell Sprays and Torus sprays are not operating in the same loop. This is allowable, but not required. It is not allowed to have both loops in Drywell and Torus sprays simultaneously.
	CBO	<ul style="list-style-type: none"> Sprays the Drywell using the other Loop of RHR <ul style="list-style-type: none"> Places Cnmt Spray (A or B) Vlv Cntl switch in the MANUAL position. Starts RHR pump(s) in loop A (B), if not already running. Opens 2E11-F021A or B Throttles Open 2E11-F016A or B
	SS	<ul style="list-style-type: none"> Directs operator to terminate DW Sprays prior to 0 psig in the DW.
		<i>Simulator Operator delete mfr25_238B and inform the control room as an Electrician that a blown fuse was replaced.</i>
	BOP	<ul style="list-style-type: none"> Recognizes that 2R25-S002 has been returned to service and that HPCI has auto started. Takes manual control of HPCI to control RWL.

Op-Test No.: _____ Scenario No.: 2 Event No.: 10B Page 2 of 3

Event Description: B" Recirc suction piping ruptures causing a LOCA. Spray the Drywell

Time	Position	Applicant's Actions or Behavior
		<i>Reducing DW pressure to a point of termination of DW sprays is not required to complete this Scenario. The scenario can be terminated at any time after DW sprays have been initiated and Drywell pressure is decreasing or at the Chief Examiner's direction.</i>
		The following actions may be performed while DW pressure is decreasing or earlier based on available man power and time.
	CBO	<ul style="list-style-type: none"> Monitors DW pressure and secures DW Sprays prior to 0 psig in the DW by Closing 2E11-F016A or B Secures Torus sprays prior to 0 psig in the Torus by Closing 2E11-F027A or B
	SS	<ul style="list-style-type: none"> May Direct MSIVs to be closed to help reduce the cool down rate. May direct the operator to perform 31EO-EOP-114-2 to uncontrolled prevent low pressure ECCS injection. As time allows, reduces Rx pressure using SRVs, not to exceed the cooldown rate.

Op-Test No.: _____ Scenario No.: 2 Event No.: 10B Page 3 of 3

Event Description: B" Recirc suction piping ruptures causing a LOCA. Spray the Drywell

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> • If directed to close the MSIVs, places 2B21-F022A-D and 2B21-F028A-D control switches to the close position and verifies that the valves close. • Reports to the SS that the valves are closed.
	CBO	<ul style="list-style-type: none"> • If directed to perform 31EO-EOP-114-2, the operator: <ul style="list-style-type: none"> • Closes 2E21-F005A and B • Trips Core Spray Pump 2A and 2B • Closes 2E11-F017A and B • Calls the SSS to OPEN the following LINKS to Override LOCA Open interlocks for RHR Outbd Inj Vlvs, 2E11-F017A/B
		<i>If requested to perform 31EO-EOP-114-2 actions for opening 2E11-F017 links, Simulator Operator enter rfE11_167 with a 4 minute delay. After 4 minutes inform the operator that the 2E11-F017A and B links have been opened per 31EO-EOP-114-2.</i>
		<i>Simulator Operator will terminate the scenario after DW sprays have been initiated and Drywell pressure is decreasing or at the Chief Examiner's direction.</i>

Southern Nuclear E. I. Hatch Nuclear Plant

Initial License NRC Simulator Evaluation

NRC 2005 SCENARIO # 4

CHARLIE EDMUND

LT-NRC-2005-004

2.0 HOURS

Ed Jones

R. Smith

10/21/05



Energy to Serve Your WorldSM

FINAL**Facility:** E. I Hatch**Scenario No.:** 4**Op-Test No.:** _____**Examiners:** Ron Aiello**Operators:** _____

Tim Kolb

Gerry Laska

Initial Conditions: Unit 2 is at 60% RTP returning to 100% following repair and return to service of the "2B" Rx feed pump. The National Weather Service has predicted Severe Thunderstorms for Appling and surrounding counties.

Turnover: Continue RFPT "2B" start-up at step 7.1.11.9 of 34SO-N21-007-2. Increase Reactor Power to 100% RTP using Rx Recirc system and Control Rods.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP)	Continue RFPT Start-Up
2		R (CBO)	Raise Power with Recirc
3	mfE41_213	I (BOP) (SRO TS)	HPCI Suction swap to Torus due to inoperable torus level transmitter, time compressed repair and re-aligned to CST.
4	mf60211148	C (CBO)	Recirc Pump "A" high vibration, power increase will be stopped and decrease started. Decreasing to about 62% power will correct condition.
5	mfP42_71A mfP42_72C loP42_C001 AR2, AG1, and AA3	C (BOP)	2A RBCCW Pump shaft shears, 2C RBCCW pump fails to auto start, must be manually started
6	mfE51_114	C (CBO) (SRO TS)	RCIC inadvertent Start
7	mfB21_130K		SRV "K" intermittently cycles open and closed until the fuses are pulled.
8A	svoT48140 svoT48142 svoT48143 svoT48144 svoT48147 svoT48148 svoT48149	M (All)	Torus level decreases due to un-isolable leak from the torus caused by fatigue from repeated SRV cycling. Rx Scram required.
8B	mfN21_99	C (BOP)	Feedwater Level Cntrl valve fails closed. Must use bypass.
8C	mfS22_270A mfS22_270B	C (CBO)	Main Generator PCBs fail to open on Main Generator trip. Must be manually opened.
9		M (All)	Emergency Depress due to low Torus Level.
			Scenario is terminated after reactor is emergency depressed.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Page 1 of 1

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none">• Directs an operator to start the "2B" RFPT
	BOP	<ul style="list-style-type: none">• Enters 34SO-N21-007-2 at step 7.1.11.9<ul style="list-style-type: none">• Increases speed with Speed Setter switch to 2100 rpm• Verifies M/A station permissive light illuminates and that the M/A station is following the Speed Setter.• Places the TMR Mode switch to M/A.• Confirms the M/A Station green light illuminates.
		<ul style="list-style-type: none">• Slowly increases the M/A station to match input and output while monitoring RWL, RFPT B discharge pressure and RFPT A & B speed.
		<ul style="list-style-type: none">• Places M/A station for RFPT B in auto• As required, adjust RFP B Speed Control Bias Setting to maintain RFPT 2A and 2B speed within 100 RPM.
		<ul style="list-style-type: none">• Informs SS that the B RFPT is in service in automatic control
	SS	<ul style="list-style-type: none">• Informs CBO to increase power with Recirc to 75% power.

Op-Test No.: _____ Scenario No.: 4 Event No.: 2Page 1 of 1

Event Description: Raise Power with Recirc

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> Directs RO to increase reactor power to 75% by increasing Recirc flow. Power increases should be made as recommended by the STA/Reactor Engineering at a rate not to exceed 10 MWe/min.
	CBO	Enters the following procedures <ul style="list-style-type: none"> 34GO-OPS-005-2S, "Power Changes" 34SO-B31-001-2S, "Recirculation System"
		<ul style="list-style-type: none"> Increases reactor power with Recirc flow increase per 34SO-B31-001-2S by slowly adjusting Recirc Master Flow Controller. Monitors power increase by observing APRM and generator output indications.
		May get the RBM Upscale and Rod Out Block alarm, if a peripheral control rod is not selected. This is expected and the operator may select a peripheral rod at this time. May get some Feedwater heater level alarms. This is expected at this power level.
		<i>Simulator Operator enters the next event after power has been increased by 5% or at the Chief Examiner's request.</i>

Op-Test No.: _____ Scenario No.: 4 Event No.: 3 Page 1 of 2

Event Description: HPCI Suction swap to Torus due to inoperable torus level transmitter, time compressed repair and re-aligned to CST. (mfE41_213)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator enters mfE41_213</i>
	All	<ul style="list-style-type: none"> Torus level high alarm received on 2H11-P601, 34AR-601-127-2
	SS	<ul style="list-style-type: none"> Directs an operator to enter 34AR-601-127-2
	BOP	<ul style="list-style-type: none"> Enters 34AR-601-127-2 <ul style="list-style-type: none"> Determines that HPCI Suction has aligned to the torus Verifies 2E41-F041, 2E41-F042 and 2E41-F051 are open. Verifies that 2E41-F004 is closed. Determines that Torus level is not high. Determines that RCIC should not have auto swapped to the torus. (It didn't) Notifies SS that HPCI has automatically aligned to the Torus, but torus level is normal.
	SS	<ul style="list-style-type: none"> Dispatches RO/Maint to the ATTS panel Has the operator monitor suction pressure on HPCI.
		<i>Simulator Operator, as RO sent to ATTS, notifies the control room that 2E41-LS-N662B is reading upscale.</i>
	BOP	<ul style="list-style-type: none"> Reports to the SS that 2E41-LS-N662B is indicating upscale

Event Description: HPCI Suction swap to Torus due to inoperable torus level transmitter, time compressed repair and re-aligned to CST. (mfE41_213)

[illegible]

Event Description: Recirc Pump "A" high vibration (mf60211148)

[illegible]

Op-Test No.: _____ Scenario No.: 4 Event No.: 4 Page 2 of 3

Event Description: Recirc Pump "A" high vibration (mf60211148)

Time	Position	Applicant's Actions or Behavior
	CBO	<ul style="list-style-type: none"> Enters the following procedures <ul style="list-style-type: none"> 34GO-OPS-005-2S, "Power Changes" 34SO-B31-001-2S, "Recirculation System"
		<ul style="list-style-type: none"> Decreases reactor power with Recirc flow decrease per 34SO-B31-001-2S by slowly adjusting Recirc Master Flow Controller. Monitors power decrease by observing APRM and generator output indications.
	CBO	<ul style="list-style-type: none"> Stops power reduction periodically and depresses the High vibration reset pushbutton. <ul style="list-style-type: none"> The alarm will not clear until after power is reduced by at least 2%.
		<i>Simulator Operator, DELETE mf60211148 after power has been reduced by 2%.</i>
	CBO	<ul style="list-style-type: none"> Depresses the Hi vibration reset pushbutton and determines that the alarm does clear. Notifies the SS that the vibration alarm is clear after reducing Recirc pump speed.
		<i>Simulator Operator, If power is increased again, enter the high vibration malfunction again and delete it again when power is decreased.</i>

Event Description: Recirc Pump "A" high vibration (mf60211148)

[illegible]

Op-Test No.: _____ Scenario No.: 4 Event No.: 5 Page 1 of 2

Event Description: 2A RBCCW Pump shaft shears, 2C RBCCW pump fails to auto start, must be manually started (mfP42_71A, mfP42_72C, loP42_C001AR2, loP42_C001AG1, loP42_C001AA3)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator operator enters:</i> <ul style="list-style-type: none"> mfP42_71A mfP42_72C, loP42_C001AR2 (On), loP42_C001AG1 (Off), loP42_C001AA3 (Off) Should be entered at Time 00
	All	<ul style="list-style-type: none"> When RBCCW pump 2A is tripped, responds to "RBCCW Pumps Disch Press Low" alarm.
	BOP	<ul style="list-style-type: none"> Acknowledges the alarms and informs the SS that the RBCCW system pressure is low and that the "2C" RBCCW pump did not auto start. (2C RBCCW may be started manually prior to recognizing failure to auto start.) (There is not an obvious reason for the pressure being low.)
	SS	<ul style="list-style-type: none"> Directs an Operator to start the 2C RBCCW pump.
	BOP	<ul style="list-style-type: none"> Manually starts the "2C" RBCCW pump per 34AR-650-239-2 or 34AB-P42-001-2, "Loss of RBCCW". (May not pull procedures until after the pump has been started. Monitors for increasing system pressure (>90psig).

Op-Test No.: _____ Scenario No.: 4 Event No.: 5 Page 2 of 2

Event Description: 2A RBCCW Pump shaft shears, 2C RBCCW pump fails to auto start, must be manually started (mfP42_71A, mfP42_72C, loP42_C001AR2, loP42_C001AG1, loP42_C001AA3)

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Dispatches SO/Maint to investigate the cause of the RBCCW Low system pressure.
	SRO	<ul style="list-style-type: none"> Confirms/sends SO/Maint to investigate RBCCW Low system pressure.
		<p><i>Simulator Operator ensures the RBCCW TRIGGER is entered, then</i></p> <p><i>After 4 minutes of being sent to investigate the RBCCW system low pressure, the Simulator Operator reports that the "2A" RBCCW pump motor is running, but the pump shaft is not turning.</i></p>
	SRO	<ul style="list-style-type: none"> Directs the operator to place the RBCCW Pump "2A" pump to PTL off.
	BOP	<ul style="list-style-type: none"> Places 2P42-C001A control switch to PTL OFF position and reports this to the SS
		<i>Proceed to the next event at the Chief Examiner's direction</i>

Op-Test No.: _____ Scenario No.: 4 Event No.: 6 Page 1 of 1

Event Description: RCIC inadvertent Start (mfE51_114)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator enters mfE51_114</i>
	All	<ul style="list-style-type: none"> • Receives SEC System Auto Initiation Signal Present Alarm • Recognizes that RCIC has started.
	CBO	<ul style="list-style-type: none"> • Determines RCIC has auto started and that RWL is normal.
	SS	<ul style="list-style-type: none"> • Tells operator that RWL is normal • Directs operator to trip RCIC
	CBO	<ul style="list-style-type: none"> • Trips RCIC by depressing the RCIC Trip pushbutton. (This is IAW 34SO-E51-001-2, RCIC System, but will not enter the procedure prior to performing the step.) (Critical Task)
		<ul style="list-style-type: none"> • Enters 34AB-E10-001-2, Inadvertent Initiation of ECCS/RCIC • Enters 34SO-E51-001-2, RCIC System • Dispatches RO/Maint to determine cause of initiation signal • May attempt to reset the Initiation signal • May Close 2E51-F524, Trip and Throttle Vlv
	SS	<ul style="list-style-type: none"> • May have the operator run the Trip and Throttle Valve down to re-latch in case RCIC is needed later. • Enters TS for RCIC 3.5.3.A, 14 days for RCIC inoperable.
		<i>If requested, Simulator Operator will report that I & C is still investigating the cause of the RCIC Initiation signal, but have not identified the cause at this time. (Continue to the next event.)</i>

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 1 of 3

Event Description: SRV "K" intermittently cycles open and closed until the fuses are pulled (mfB21_130K)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator intermittently cycles SRV "K" open and closed until the fuses are pulled, mfB21_130K</i>
	All	<ul style="list-style-type: none"> Receives Safety Blowdown pressure High 34AR-602-311-2 and Safety Blowdown Valves leaking 34AR-603-122-2 alarms
	CBO	<ul style="list-style-type: none"> Determines that SRV "K" is opening and closing intermittently. May attempt to reset ADS as follows: <ul style="list-style-type: none"> Depresses the ADS Logic A Timer Reset pushbutton. Depresses the ADS Logic B Timer Reset pushbutton. May cycle the SRV Control Switch several times in an attempt to close the SRV Informs SS that the "K" SRV is cycling open and closed.
	SS	<ul style="list-style-type: none"> Directs operator to enter 34AB-B21-003-2, Failure of Safety/Relief valves, and to dispatch an operator to pull the fuses for SRV "K".
	CBO	<ul style="list-style-type: none"> Enters 34AB-B21-003-2, Failure of Safety/Relief valves <ul style="list-style-type: none"> Dispatches an operator to pull the fuses for SRV "K".

Op-Test No.: _____ Scenario No.: 4 Event No.: 7 Page 2 of 3

Event Description: SRV "K" intermittently cycles open and closed until the fuses are pulled (mfB21_130K)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator – after cycling SRV "K" 5 times at about 20 seconds apart, enter the next event and continue to cycle the SRV about every 30 seconds until after 3 minutes, enter rfb21_308 to simulate pulling the fuses for SRV K. Then, Notify the crew that the fuses have been pulled for SRV "K".</i>
		<u>The remainder of this event, except for verifying the SRV is closed, will only be performed as time allows, due to the leak in the Torus taking priority.</u>
	SS	<ul style="list-style-type: none"> Enters a Tracking RAS for TS LCO 3.5.1.E Directs operators to verify that the "K" SRV is closed, after the fuses are pulled.
	CBO	<ul style="list-style-type: none"> Confirms that SRV "K" is closed by monitoring: <ul style="list-style-type: none"> SRV tailpipe temperature decrease Torus Temp stabilizing Rx and Generator power returns to the pre-event level
	CBO	<ul style="list-style-type: none"> Resets the SRV leak detection by placing the Leak Detection Logic A Reset keylock switch and/or Leak Detection Logic B Reset keylock switch to Reset position and back to Normal position and confirm that the Amber SRV indicating lights have Extinguished. Informs the SS that SRV "K" is closed.

Page 3 of 3

Time	Position	Applicant's Actions or Behavior
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[illegible]

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 1 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator Enters:</i> svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10) <i>3 Minutes later enter:</i> svoT48144 (200/15), svoT48149 (200/15)
	ALL	<ul style="list-style-type: none"> Receives Panel 2H11-P657 System Trouble alarm
	SS	<ul style="list-style-type: none"> Directs operator to investigate 2H11-P657 Trouble alarm.
	BOP	<ul style="list-style-type: none"> Determines that several Torus Area Sump Level High, High-High, and High-High-High alarms are annunciating, including the S-W, N-W, N-E, and S-E areas. Notifies the SS of the alarms and enters the ARPs for the alarms. May notice that the Torus level is decreasing.
	SS	<ul style="list-style-type: none"> Directs BOP operator to enter and follow the ARPs for the Torus Area High Sump Levels.
	CBO	<ul style="list-style-type: none"> During this time, Receives the Torus Water Level High/Low alarm. Determines that Torus Level is decreasing. Notifies the SS that the Torus Level is decreasing.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 2 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none"> • Directs the operator to investigate the cause of the Torus level decrease. • Enters the: <ul style="list-style-type: none"> • Primary Containment Control EOP Flowchart (PC Chart) when Torus level reaches 146 inches. • Secondary Containment Control EOP Flowchart (SC Chart) due to the Sump High-High-High level alarms. • The SS may decide not to add water to the Torus until the leak can be identified/isolated. (This will decrease the chance of flooding multiple areas and will preserve the CST level for use if needed later for RPV injection.)
	SS/CBO	<ul style="list-style-type: none"> • Using SPDS and STA, determines that torus level is decreasing at about 2 inches a minute.
	CBO	<ul style="list-style-type: none"> • Enters 34AB-T23-001-2, Loss of Primary Containment Integrity and 34AB-T22-003-2, Secondary Containment Control. • Dispatches SOs to determine the source of leak and level of water in the Rx bldg. Torus Area
	BOP	<ul style="list-style-type: none"> • IAW with RB S-E and RB S-W Diagonal Floor Drain Sump Level High annunciators, closes 2T45-F001, 2T45-F002, 2T45-F003, 2T45-F004, and 2T45-F005 by placing the control switch to close on 2H11-P654 panel.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 3 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Actions may not be performed in sequence.</p> <p>When notified by the SO that the leak is un-isolable, actions for isolating ECCS/RCIC suction valves will be stopped and any isolated systems suction valves opened.</p> <ul style="list-style-type: none"> As directed by high sump level ARPs, and 34AB-T22-003-2, enters 34SO-G11-009-2 to attempt to isolate the leak, by performing the following steps: Notifies the SS that "B" Loop ECCS pumps suction to the Torus will be isolated.
		<ul style="list-style-type: none"> Places the control switches for the following valves to Close. <ul style="list-style-type: none"> 2E21-F019B, Torus Suction Vlv 2E11-F065B, Torus Suction Vlv 2E11-F065D, Torus Suction Vlv Determines that Torus Water level is still decreasing at the same rate. Notifies the SS that Torus level is still decreasing.
	SS	<ul style="list-style-type: none"> Directs the operator to re-open the suction valves for the "B" loop of ECCS.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 4 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Places the control switches for the following valves to Open. <ul style="list-style-type: none"> 2E21-F019B, Torus Suction Vlv 2E11-F065B, Torus Suction Vlv 2E11-F065D, Torus Suction Vlv Notifies the SS that the "B" loop of ECCS suction is re-aligned to the Torus.
	BOP	<ul style="list-style-type: none"> Notifies the SS that "A" Loop ECCS pumps suction to the Torus will be isolated.
		<ul style="list-style-type: none"> Places the control switches for the following valves to Close. <ul style="list-style-type: none"> 2E21-F019A, Torus Suction Vlv 2E11-F065A, Torus Suction Vlv 2E11-F065C, Torus Suction Vlv Determines that Torus Water level is still decreasing at the same rate. Notifies the SS that Torus level is still decreasing.
	SS	<ul style="list-style-type: none"> Directs the operator to re-open the suction valves for the "A" loop of ECCS.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 5 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Places the control switches for the following valves to Open. 2E21-F019A, Torus Suction Vlv 2E11-F065A, Torus Suction Vlv 2E11-F065C, Torus Suction Vlv Notifies the SS that the "A" loop of ECCS suction is re-aligned to the Torus.
	BOP	<ul style="list-style-type: none"> Notifies the SS that RCIC suction to the Torus will be isolated.
		<ul style="list-style-type: none"> Places the control switch for the following valve to Close. 2E51-F003, Torus Suction Vlv Determines that Torus Water level is still decreasing at the same rate. Notifies the SS that Torus level is still decreasing.
	SS	<ul style="list-style-type: none"> Directs the operator to re-open the suction valve for RCIC.
		<ul style="list-style-type: none"> Places the control switch for the following valve to Open. 2E51-F003, Torus Suction Vlv Notifies the SS that the RCIC suction is re-aligned to the Torus.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 6 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
		<p><i>Simulator Operator, as the SO sent to look for a leak in the Torus, reports that:</i></p> <ul style="list-style-type: none"> <i>There is a leak on the Core Spray pump "B" suction line. The break is between the suction valve and the Torus and that there is no way to isolate the leak.</i> <i>The SO also reports that water level in the torus area is 12 inches deep on the EOP measuring stick.</i>
	SS	<ul style="list-style-type: none"> Determines that water level in the Torus area is above Max Safe in one area per the SC flowchart. Determines that Torus level cannot be maintained above 98 inches due to an un-isolable leak in the Torus. IAW the PC flowchart path SP/L, enters the RPV Control flowchart (RC Chart) at point A.
	SS	<ul style="list-style-type: none"> Enters RC EOP Flowchart Orders the Rx scrambled Directs CBO to perform RC-1 placard Directs BOP to perform RC-2 and RC-3 placards

Op-Test No.: _____ Scenario No.: 4 Event No.: 8A Page 7 of 7

Event Description: Torus level decreases due to un-isolable leak from the torus (svoT48140 (70/2), svoT48142 (50/10), svoT48143 (50/10), svoT48147 (50/10), svoT48148 (50/10), svoT48144 (200/15), svoT48149 (200/15))

Time	Position	Applicant's Actions or Behavior
	CBO	<ul style="list-style-type: none"> Manually SCRAMs the Reactor using the SCRAM pushbuttons Places Rx Mode Switch in S/D. Verifies and reports all rods inserted past position 02. Inserts IRMs and SRMs. Places SDV Isol Vlv Switch to "ISOL" and verifies closed. If not tripped, places Recirc to minimum speed.
	BOP	<p>Performs actions of RC-2 and RC-3 after Reactor SCRAM.</p> <ul style="list-style-type: none"> Confirms proper operation of the Feedwater Level Control System to restore and maintain RPV level. <ul style="list-style-type: none"> Ensures FW Master Controller setpoint reduces to 9 inches and output reduces to 25% of previous value.
		<ul style="list-style-type: none"> IF NOT needed to restore RPV level, <ul style="list-style-type: none"> Trips One RFPT. Confirms OPEN 2N21-F125. Places 2C32-R619, FW S/U LVL CONTROL VLV Controller, in AUTO, set at approximately 9 inches. Closes 2N21-F110. Checks ECCS Injection Systems and secures as necessary.

Op-Test No.: _____ Scenario No.: 4 Event No.: 8B Page 1 of 2

Event Description: Torus level decreases due to un-isolable leak from the torus, SULCV fails Closed (mfN21_99)

Time	Position	Applicant's Actions or Behavior
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	BOP	<ul style="list-style-type: none"> Monitors RPV pressure. Confirms proper operation of pressure control system (TBV, LLS, etc.). If necessary, allows RPV pressure to exceed 1074 psig then cycles any SRV to initiate LLS. Maintains RPV pressure between 1074 and 800 psig. Notifies SS of pressure control system operation.
	SS	<ul style="list-style-type: none"> Assigns a RWL band between 3" and 50"
		<i>Simulator Operator enters mfN21_99, Start-up level control valve (SULCV) fails closed.</i>
	BOP	<ul style="list-style-type: none"> Controls RWL using the Feedwater system. Notifies SS if RWL gets outside assigned band. Determines that the SULCV has failed. Throttles open 2N21-F110 as needed to control Feedwater flow. (RWL control will be difficult due to the size of the bypass valve and lack of a finesse control system for the valve.) May choose to use HPCI or RCIC for level control. As time allows, notifies SS that the SULCV has failed and dispatches Maint to investigate the problem with the valve.

Event Description: Torus level decreases due to un-isolable leak from the torus, SULCV fails Closed (mfN21_99)

[illegible]

Op-Test No.: _____ Scenario No.: 4 Event No.: 8C Page 1 of 1

Event Description: Torus level decreases due to un-isolable leak from the torus, Main Generator PCBs fail to Open (mfS22_270A, mfS22_270B)

Time	Position	Applicant's Actions or Behavior
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	CBO	<p>The PCBs will not be open due to malfunctions entered during scenario setup.</p> <ul style="list-style-type: none"> • Determines that the Main Generator PCBs did not open. • Opens PCB 179740 by placing the control switch to Trip. • Opens PCB 179750 by placing the control switch to Trip. • As time allows, notifies the SS that the Main Generator PCBs did not Open automatically.
	CBO	<ul style="list-style-type: none"> • Continues TC – 1 actions: <ul style="list-style-type: none"> • Confirms House Loads Swap to SUT'S. • Confirms or Places TGM in Auto. • Starts: <ul style="list-style-type: none"> • TG Oil Pump • Motor Suction Pump • Lift Pumps • Closes the RSSV'S, 2N11-F004A and F004B. • Notifies the SS when actions are complete.
	SS	<ul style="list-style-type: none"> • Directs an Operator to Place HPCI Aux Oil Pump in pull-to-lock (PTL) Off, prior to reaching a 110 inches in the torus.
	BOP	<ul style="list-style-type: none"> • Confirms that HPCI is not operating • Places HPCI Aux Oil Pump in PTL Off. (Critical Task) • Notifies SS that HPCI Aux Oil Pump is in PTL Off.

Op-Test No.: _____ Scenario No.: 4 Event No.: 9 Page 1 of 5

Event Description: Torus level decreases due to un-isolable leak from the torus, Emergency Depress required

Time	Position	Applicant's Actions or Behavior
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	SS	<ul style="list-style-type: none"> If time allows, may Anticipate Emergency Depress due to low Torus level Directs an operator to decrease Rx pressure using the bypass valves to Anticipate Emergency Depress, exceeding 100°F/hr.
	CBO	<ul style="list-style-type: none"> If directed to Anticipate Emergency Depress, depresses the Bypass Valve Opening Jack Selector Increase pushbutton until all three bypass valves are open. (This may complicate RWL control and the RWL control operator should be made aware of the bypass valve manipulation.)
	SS	<ul style="list-style-type: none"> Prior to Torus Level decreasing below 98 inches, IAW the PC flow chart, transitions from RC pressure path to CP-1 flow chart, point G, for Emergency Depress. Confirms Torus level is >57.5 inches. Directs the Operator to Open 7 ADS valves.
	CBO	<ul style="list-style-type: none"> Opens 6 ADS valves by placing their control switches to Open. Operator informs the SS that one ADS valve (SRV "K") is inoperable due to pulled fuses.

Op-Test No.: _____ Scenario No.: 4 Event No.: 9 Page 2 of 5

Event Description: Torus level decreases due to un-isolable leak from the torus, Emergency Depress required

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none"> Directs operator to Open one additional SRV.
	CBO	<ul style="list-style-type: none"> Places one more SRV control switch to Open Notifies the SS that 7 SRVs are Open. (Critical Task) Verifies that Rx pressure is decreasing.
	SS	<ul style="list-style-type: none"> Directs the operator to monitor the Rx pressure decrease and maintain Rx pressure <50psig above Torus pressure.
	BOP	<ul style="list-style-type: none"> Transitions from high pressure Feedwater to low pressure injection as Rx pressure decreases by tripping the RFPT and adjusting the 2N21-F110 valve position to maintain RWL with the Condensate Booster pumps. (During the Emergency Depress will not be able to maintain inside the RWL band, but should restore RWL to within the band at some point after the Emergency Depress.)
	BOP/CBO	<ul style="list-style-type: none"> Verifies that HPCI isolates when Rx pressure decreases to 128 psig. (2E41-F002 and F003 close)
	BOP/CBO	<ul style="list-style-type: none"> Verifies that RCIC isolates when Rx pressure decreases to 95 psig. (2E51-F007 and F008 close)

Op-Test No.: _____ Scenario No.: 4 Event No.: 9 Page 3 of 5

Event Description: Torus level decreases due to un-isolable leak from the torus, Emergency Depress required

Time	Position	Applicant's Actions or Behavior
	BOP/CBO	<ul style="list-style-type: none"> Verifies that the MSIVs isolate when Main Condenser vacuum decreases to 10 inches Vac. Places the control Switches to close for 2B21-F022A-D and 2B21-F028A-D Verifies that 2B31-F019 and 2B31-F020 closes.
		<i>Simulator Operator – The scenario can be stopped at any time after Rx pressure is within 50 psig of Torus pressure or as directed by the Chief Examiner. Placing Torus cooling in service is not a required part of this scenario.</i>
	SS	<ul style="list-style-type: none"> If time allows, Prior to Scenario Termination (Rx pressure <50 psig above Torus Pressure), the SS Directs an Operator to place torus cooling in service, per the PC flow chart, due to high Torus temperature caused by the emergency depress.
	CBO	<ul style="list-style-type: none"> If directed and time allows, Places Torus cooling in service by performing the following actions per 34SO-E11-010-2, RHR System, using the placard

Op-Test No.: _____ Scenario No.: 4 Event No.: 9 Page 4 of 5

Event Description: Torus level decreases due to un-isolable leak from the torus, Emergency Depress required

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> Place RHRSW in operation per 34SO-E11-010-2 by performing the following: <ul style="list-style-type: none"> Prelube RHRSW pump. Override 2E11-F068A(B) Low Discharge Pressure Interlock. Position 2E11-F068A(B) to 45% OPEN Start RHRSW pump. Place 2E11-F068A(B) Low Discharge Pressure Interlock switch to NORMAL position. Position 2E11-F068A(B) to obtain ≤ 4400 GPM <u>AND</u> ≤ 450 PSIG. IF desired to start SECOND pump, Throttle 2E11-F068A(B) to achieve max flow rate (not to exceed 4400 GPM). Open 2E11-F068A(B) an additional 5%. Start Second RHRSW Pump. Position 2E11-F068A(B) to obtain ≤ 8800 GPM <u>AND</u> ≤ 450 PSIG.
		<ul style="list-style-type: none"> Open 2E11-F048A(B). Open 2E11-F003A(B). Start RHR Loop A(B) pump(s). Open 2E11-F028A(B).

Event Description:	Torus level decreases due to un-isolable leak from the torus, Emergency Depress required
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Southern Nuclear E. I. Hatch Nuclear Plant

Initial License NRC Simulator Evaluation

NRC 2005 SCENARIO # 1		
CHARLIE EDMUND	LT-NRC-2005-001	2.0 HOURS
Ed Jones	RJ Smith	10/21/05



FINAL

Facility: E. I Hatch **Scenario No.:** 1 **Op-Test No.:** _____

Examiners: Ron Aiello **Operators:** _____
Tim Kolb _____
Gerry Laska _____

Initial Conditions: Unit 2 is at 90% RTP following Turbine Control Valve testing. RCIC is isolated following repair of the outboard isolation valve breaker. System restoration to standby per 34SO-E51-001-2, RCIC System, is in progress at step 7.1.1.36. The functional test for the Valve has been performed. The National Weather Service has predicted Severe Thunderstorms for Appling and surrounding counties.

Turnover: Continue 34SO-E51-001-2, RCIC System, to return RCIC to Standby, at step 7.1.1.36. Increase Reactor Power to 100% RTP using Rx Recirc system and 34GO-OPS-005-2, Power Changes.

Event No.	Malf. No.	Event Type*	Event Description
1	mf60111042 diE41A-S20 loE41A-S20G1	(SRO TS)	HPCI Aux Oil Pump Breaker Trip due to Electricians working on Unit 1 (Wrong Unit), Return after RCIC unisolated
2		N (BOP)	Un-isolate RCIC and return to standby.
3		R (CBO)	Increase Rx Power with Recirc to 95%
4	rfC11-141 mf60311307	(SRO TS)	Scram Discharge Volume outboard isolation valves close, with leaking drive. (Time compressed repair.)
5	mfC11_30B mf60311335	I (CBO)	CRD B trips due to low suction pressure instrument failure. Must start "A".
6	mfP51_222C	C (BOP)	Station Service Air Compressor "C" trip. Must manual start "A".
7A	rfC71_279 mfE51_250 svoE51074 svoE51075 mfE51_113 mfE51_113B	M (All)	RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. SRO directs crew to manually SCRAM the Rx and close Group 1 valves due to Group 1 isolation failure.
7B	mfE41_106	I (BOP)	HPCI Flow control fails and HPCI must be manually controlled after MSIVs close on high temp. from RCIC leak.
8A		M (All)	Emergency Depress Due to Secondary Containment leak.
8B	mfB21_129A mfB21_129E mfB21_129L	C (CBO)	Three ADS valves fail to open for Emergency Depress

Facility: E. I Hatch **Scenario No.:** 1 **Op-Test No.:** _____

Examiners: Ron Aiello **Operators:** _____
 Tim Kolb _____
 Gerry Laska _____

Initial Conditions: Unit 2 is at 90% RTP following Turbine Control Valve testing. RCIC is isolated following repair of the outboard isolation valve breaker. System restoration to standby per 34SO-E51-001-2, RCIC System, is in progress at step 7.1.1.36. The functional test for the Valve has been performed. The National Weather Service has predicted Severe Thunderstorms for Appling and surrounding counties.

Turnover: Continue 34SO-E51-001-2, RCIC System, to return RCIC to Standby, at step 7.1.1.36. Increase Reactor Power to 100% RTP using Rx Recirc system and 34GO-OPS-005-2, Power Changes.

Event No.	Malf. No.	Event Type*	Event Description
			Scenario is terminated after reactor is emergency depressed.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Event Description: HPCI Aux Oil Pump Trip on motor overload.
(mf60111042, diE41A-S20, loE41A-S20G1)

		Simulator Operator enters mf60111042, diE41A-S20, and loE41A-S20GI
	All	<ul style="list-style-type: none"> • “HPCI Aux Oil Pump Motor Overload” alarm is received. • Recognize the trip of the HPCI Aux Oil Pump
	BOP	<ul style="list-style-type: none"> • Acknowledges alarm and enters 34AR-601-106-2. • Determines HPCI Aux Oil pump has no light indications and is inoperable. • Notifies the SS of HPCI oil pump status. • Dispatches SO to HPCI Aux oil pump breaker to investigate • HPCI Aux Oil pump may be placed in PTL OFF.
	SS	<ul style="list-style-type: none"> • Verifies or sends an SO to the HPCI Aux Oil Pump Breaker. • Enters Tech Specs for HPCI and RCIC being Inoperable. • Determines that LCO 3.5.1, required action statement (RAS) 3.5.1.C and E are applicable. <ul style="list-style-type: none"> • 3.5.1.C – Verify RCIC operable in 1 hour and 14 days to restore HPCI. • 3.5.1.E and 3.5.3.C- Mode 3 in 12 hrs and reduce Rx press to <150 psig in 36 hrs.

Op-Test No.: _____ Scenario No.: 1 Event No.: 2 Page 1 of 1

Event Description: Un-isolate RCIC and return to standby

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none"> Directs the operator to continue with RCIC return to standby per the Initial Condition sheet.
	BOP	<ul style="list-style-type: none"> Un-isolates RCIC per 34SO-E51-001-2, RCIC System, starting at step 7.1.1.36 to return RCIC to standby
		<ul style="list-style-type: none"> Warms and Pressurizes the RCIC Steam Line by performing the following steps: <ul style="list-style-type: none"> Confirms closed 2E51-F008, Steam Supply Line Isol Vlv. Confirms Closed 2E51-F007, Steam Supply Isol Vlv. Confirms Open/Opens 2E51-F054, Steam Line Drain Vlv.
		<ul style="list-style-type: none"> Opens 2E51-F008, Steam Supply Line Isol Vlv. Slowly Throttles Open 2E51-F007, Steam Supply Isol Vlv. When turbine steam inlet pressure is WITHIN 50 PSIG of reactor pressure as monitored on 2B21-R623A(B), Rx Water Level/Rx Press, on panel 2H11-P601, verify 2E51-F007, Steam Supply Isol Vlv, is FULLY OPEN. When RCIC Turbine Inlet Drain Pot Level High (602-308), clears, confirm Closed/Close 2E51-F054, Steam Line Drain Vlv. (Alarm may not come in.) Has other operator perform independent verification for RCIC Standby lineup. Notifies SS when RCIC is returned to Standby.
	SRO	<ul style="list-style-type: none"> Declares RCIC Operable

Op-Test No.: _____	Scenario No.: <u>1</u>	Event No.: <u>3</u>	Page <u>1</u> of <u>1</u>
Event Description: Increase Rx Power with Recirc			
Time	Position	Applicant's Actions or Behavior	
	SRO	<ul style="list-style-type: none"> Directs RO to increase reactor power to RTP by increasing Recirc flow. Power increases should be made as recommended by the STA/Reactor Engineering at a rate not to exceed 10 MWe/min. 	
	CBO	Enters the following procedures <ul style="list-style-type: none"> 34GO-OPS-005-2S, "Power Changes" 34SO-B31-001-2S, "Recirculation System" 	
		<ul style="list-style-type: none"> Increases reactor power with Recirc flow increase per 34SO-B31-001-2S by slowly adjusting Recirc Master Flow Controller. Monitors power increase by observing APRM and generator output indications. May stop power increase before 95% and increase Rx pressure to 1025 psig by depressing the increase pushbutton on pressure set on the Main Turbine EHC panel. 	
		<i>Simulator Operator enters the next event after power has been increased by 5% or at the Chief Examiner's request.</i>	

Op-Test No.: _____ Scenario No.: 1 Event No.: 4 Page 1 of 2

Event Description: Scram Discharge Volume outboard isolation valves close, with leaking drive. (rfC11_141, mf60311307)

Time	Position	Applicant's Actions or Behavior
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		<p><i>Simulator Operator enters:</i></p> <ul style="list-style-type: none"> • rfC11_141 (SDV outboard valves close) and • 3 minutes later enter mf60311307 (SDV Not Drained alarm)
	All	When the "SDV Not Drained" alarm is received, recognizes that the SDV outboard valves have closed. (May recognize prior to alarm by scanning the control panels.)
	CBO	<ul style="list-style-type: none"> • Acknowledges the "SDV Not Drained" alarm and enters ARP 34AR-603-119-2
		<ul style="list-style-type: none"> • Determines that 2C11-F035A, 2C11-F035B, and 2C11-F037 have closed.
		<ul style="list-style-type: none"> • Dispatches a SO to the CRD drives to check for leaking scram outlet valves
		<ul style="list-style-type: none"> • Dispatches a SO/Maint to determine if an air leak exists on the SDV valves piping, to verify that 2C11-F094, F095, F088 and F089 are open, and may request that electrical power to the solenoids be checked.
		<p><i>If a SO was sent to the solenoid power switches, 2 minutes later, the Simulator Operator will report as the SO, that the Power supply switches in the RPS M/G set room for 2C11-F040 solenoids are turned to "ON".</i></p>

Op-Test No.: _____ Scenario No.: 1 Event No.: 4 Page 2 of 2

Event Description: Scram Discharge Volume outboard isolation valves close, with leaking drive. (rfC11_141, mf60311307)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator Operator will, 3 minutes later, as a SO that's been dispatched to check for air leaks, report that there is an air leak on the piping from 2C11-F040 on the 130' Rx bldg. It appears that the copper piping was bumped by someone or something, causing a crimp and small leak in the piping.</i>
	CBO	<ul style="list-style-type: none"> • Reports to the SS that there is an air leak and crimped piping at 2C11-F040.
	SRO	<ul style="list-style-type: none"> • Enters Tech Spec 3.1.8.A requiring Isolation of the valves within 7 days.
		<p><i>Simulator Operator, as the SO at 2C11-F040, informs the Control Room it is 1 hour later (Time Compression) and that maintenance has repaired the section of damaged air piping at 2C11-F040.</i></p> <p><i>Simulator Operator DELETES:</i></p> <ul style="list-style-type: none"> • <i>rfC11_141 (SDV outboard valves close) and</i> • <i>3 minutes later deletes mf60311307 (SDV Not Drained alarm)</i>
	CBO	<ul style="list-style-type: none"> • Verifies that all the SDV Vent and Drain valves are open. • Informs SS that the leak is repaired and the SDV vent and drain valves are now open.
	SRO	<ul style="list-style-type: none"> • Declares TS LCO 3.1.8 is met, after the valves are re-opened.
		<i>Simulator Operator, if requested, informs the control room that a specific leaking CRD scram valve has not been confirmed, and that you are going to get a temperature gun from the tool room and continue looking.</i>

Op-Test No.: _____ Scenario No.: 1 Event No.: 5 Page 1 of 2

Event Description: CRD B trips due to low suction pressure instrument failure. Must start "A". (mfC11_30B and mf60311335)

Time	Position	Applicant's Actions or Behavior
		<i>Simulator operator enters:</i> <ul style="list-style-type: none"> • mfC11_30B, CRD Pump A Trip and • mf60311335, CRD B Suction Pressure Low alarm
	All	<ul style="list-style-type: none"> • Recognizes that "CRD Pump B Suction Pressure Low " and "CRD pump "2B" Breaker Trip" alarms annunciate
	SS/CBO	<ul style="list-style-type: none"> • Dispatches a SO/Maint to determine the cause of the low suction pressure condition for CRD pump "B".
	SS	<ul style="list-style-type: none"> • Directs the CBO to Place CRD Pump "A" in service.
	CBO	<ul style="list-style-type: none"> • Enters 34AB-C11-001-2, "Loss of CRD System" procedure
		<ul style="list-style-type: none"> • Places 2C11-R600, CRD Flow Control, in Manual and Decreases the output to zero.
		<ul style="list-style-type: none"> • Manually starts "A" CRD pump.
		<ul style="list-style-type: none"> • Increases system flow to ≈50 GPM
		<ul style="list-style-type: none"> • Transfers 2C11-R600, CRD Flow Control to AUTO.
	SRO/CBO	<ul style="list-style-type: none"> • Dispatches a SO to check CRD temperatures locally and Accumulator pressures.

Op-Test No.: _____ Scenario No.: 1 Event No.: 5 Page 2 of 2

Event Description: CRD B trips due to low suction pressure instrument failure. Must start "A". (mfC11_30B and mf60311335)

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> If CRD Pump "A" is NOT recovered prior to an accumulator becoming inoperable (940 psig as reported by the SO checking the pressures), the SS will declare the accumulator inoperable and enter Tech Spec 3.1.5.A (8 hours to declare the rod slow or inop) for one inop accumulator or 3.1.5.B (restore in 20 minutes or place mode in Shutdown) for two or more inop accumulators.
		<p><i>If CRD pump "A" is not started within 3 minutes of receiving the CRD Accumulator alarm, the Simulator operator reports that 3 CRD accumulators are at 935psig.</i></p> <p><i>If it is started prior to sufficient time to check pressures, report that all accumulators are >980psig.</i></p>
		<p><i>Simulator Operator reports that:</i></p> <ul style="list-style-type: none"> <i>If the CRD High Temp Alarm is still lit, report that 2 CRD drives are > 250°F, 26-35 is 275°F and 14-31 is 285°F</i> <i>If the CRD High Temp Alarm is NOT lit, report that all temps are <250°F and the highest 2 were 26-35 at 275°F and 14-31 at 285°F</i> <i>Suction pressure for the "B" CRD pump is 25psig and there is no apparent problem with suction line-up or filter.</i>
	SS	<ul style="list-style-type: none"> May call maintenance to determine why the CRD Pump B Suction pressure low alarm is still annunciated.

Op-Test No.: _____ Scenario No.: 1 Event No.: 6 Page 1 of 1

Event Description: Station Service Air Compressor "C" trip. Must manual start "A".
(mfP51_222C)

Time	Position	Applicant's Actions or Behavior
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		<i>Simulator Operator enters mfP51_222C, SSAC 2C Trip.</i>
	All	<ul style="list-style-type: none"> Recognizes that SSAC 2C has tripped when "Panel 2H11-P700 System Trouble" and "Air Cmpsr 2C tripped/Shutdown" alarms annunciate.
	BOP	<ul style="list-style-type: none"> Verifies or starts 2B SSAC by placing the control switch to "Start".
	SS	<ul style="list-style-type: none"> Directs operator to start SSAC 2B and/or SSAC 2A Dispatches SO/Maint to investigate the cause of the SSAC trip.
	BOP	<ul style="list-style-type: none"> Enters 34AR-700-233-2 (SSAC 2C Trip) or 34AB-P51-001-2 (Loss of Air) <ul style="list-style-type: none"> If started by 34AR-700-233-2, Notifies HP of Start of 2B SSAC (may be before or after start.) Starts the 2A SSAC by taking the Control Switch from "Stop PTL" and placing it to "Start". Places the 2C SSAC switch to "Stop PTL". Confirms/Dispatches SO/Maint to investigate the cause of the SSAC trip and verify proper operation of the 2B and 2A SSACs Notifies SS that the 2A and 2B SSAC are running or setup for Auto Start.
		<i>Simulator Operator – Continue with the next event at the Chief Examiners request.</i>

Op-Test No.: _____ Scenario No.: 1 Event No.: 7A Page 1 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. Auto Scram Failed, Group 1 failed. (rfC71_279, mfE51_250, svoE51074, svoE51075, mfE51_113, mfE51_113B)

Time	Position	Applicant's Actions or Behavior
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		<i>Simulator Operator enters: mfE51_250 (RCIC Steam Line break in Rx Bldg. 10% Ramp 0.5) svoE51074 and svoE51075 (RCIC Isolation valves failed Open) rfC71_279 (Group 1 Isolation Override Jumpers – Installed)</i>
	BOP	<ul style="list-style-type: none"> Enters 34AR-657-006-2, "Stm Chase SEC Clr Auto Started" alarm, and starts investigating the cause of the cooler auto start.
	CBO	<ul style="list-style-type: none"> Acknowledges "Leak Det Diff Temp High" and reports to SS.
	SS	<ul style="list-style-type: none"> Enters the Secondary Containment EOP Flowchart on Secondary Containment High Differential Temperature. Has an operator monitor Sec Cont. Temps. Has operators monitor systems for source of the leak.
	BOP	<ul style="list-style-type: none"> Reports Sec Cont. temps are increasing If time allows, enters 34AB-T22-001-2, Primary Coolant Break Rx Bldg.
	All	<ul style="list-style-type: none"> Recognizes that a Group 1 isolation signal has occurred, with a failure of the MSIVs to close. (May not occur until after the scram if a manual scram is initiated first.)

Op-Test No.: _____ Scenario No.: 1 Event No.: 7A Page 2 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. Auto Scram Failed, Group 1 failed. (rfC71_279, mfE51_250, svoE51074, svoE51075, mfE51_113, mfE51_113B)

Time	Position	Applicant's Actions or Behavior
	SS	<ul style="list-style-type: none"> Orders the Rx scrambled or if a group 1 isolation occurs before the manual scram, recognizes failure of Group 1 isolation valves to close and orders manual scram of the Rx., then a manual isolation of the Group 1 isolation valves. (Inboard and Outboard MSIVs and small bore sample line.)
	SS	<ul style="list-style-type: none"> Enters RC EOP Flowchart Directs CBO to perform RC-1 placard Directs BOP to perform RC-2 and RC-3 placards
	CBO	<ul style="list-style-type: none"> Manually SCRAMs the Reactor using the SCRAM pushbuttons (Critical Task) Places Rx Mode Switch in S/D. Closes the Group 1 isolation valves (inboard and outboard MSIVs and small bore sample line.) (Critical Task) Verifies and reports all rods inserted past position 02. Inserts IRMs and SRMs. Places SDV Isol Vlv Switch to "ISOL" and verifies closed. If not tripped, places Recirc to minimum speed.
	BOP	<ul style="list-style-type: none"> Performs actions of RC-2 and RC-3 after Reactor SCRAM. <ul style="list-style-type: none"> Confirms proper operation of the Feedwater Level Control System to restore and maintain RPV level. Ensures FW Master Controller setpoint reduces to 9 inches and output reduces to 25% of previous value.

Op-Test No.: _____ Scenario No.: 1 Event No.: 7A Page 3 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. Auto Scram Failed, Group 1 failed. (rfC71_279, mfE51_250, svoE51074, svoE51075, mfE51_113, mfE51_113B)

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • IF NOT needed to restore RPV level, <ul style="list-style-type: none"> • Trips One RFPT. • Confirms OPEN 2N21-F125. • Places 2C32-R619, FW S/U LVL CONTROL VLV Controller, in AUTO, set at approximately 9 inches. • Closes 2N21-F110. • Checks ECCS Injection Systems and secures as necessary.
	SS	<ul style="list-style-type: none"> • The SS may direct 1 operator to perform Rx Power, Level, and Pressure control, so that the other operator can monitor secondary Containment parameters.
	BOP	<ul style="list-style-type: none"> • Monitors RPV pressure. • Confirms proper operation of pressure control system (TBV, LLS, etc.). • If necessary, allows RPV pressure to exceed 1074 psig then cycles any SRV to initiate LLS. • Maintains RPV pressure between 1074 and 800 psig. (This will not be possible for the during the whole scenario due to the leak.) • Notifies SS of pressure control system operation.

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. Auto Scram Failed, Group 1 failed. (rfC71_279, mfE51_250, svoE51074, svoE51075, mfE51_113, mfE51_113B)

[illegible]

Op-Test No.: _____ Scenario No.: 1 Event No.: 7B Page 1 of 3

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. HPCI controller failed. (mfE41_106)

Time	Position	Applicant's Actions or Behavior
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	BOP	<ul style="list-style-type: none"> When LLS is initiated to control Rx pressure, RWL may go above 52", if so, the HPCI high water level trip will have to be reset to inject with HPCI prior to -35".)
		<i>Simulator Operator enters mfE41_106, HPCI flow controller fails prior to HPCI injecting.</i>
	BOP	<ul style="list-style-type: none"> Recognizes that HPCI flow controller has failed and takes manual control of HPCI to maintain RWL.
	CBO	<ul style="list-style-type: none"> Informs SS that temperatures and radiation levels in the Rx Bldg are still increasing.
	SRO	<ul style="list-style-type: none"> Directs Operator to evacuate the Rx Bldg. due to high temperatures and or radiation.
	CBO/BOP	<ul style="list-style-type: none"> Makes page announcement to Evacuate the Rx Bldg. (Timing of announcement could vary based on Plant conditions)
		<i>Simulator Operator enters mfE51_113 and mfE51_113B approximately 5 minutes after the Scram</i>

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. HPCI controller failed. (mfE41_106)

[illegible]

Op-Test No.: _____ Scenario No.: 1 Event No.: 8A&B Page 1 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. ED with failed SRVs. (mfB21_129E, and mfB21_129L)

Time	Position	Applicant's Actions or Behavior
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		<i>Prior to the Emergency Depress, but after LLS has been initiated, Simulator Operator enters: mfB21_129A, mfB21_129E, and mfB21_129L (Failure of SRVs A, E, and L to Open.)</i>
	CBO	<ul style="list-style-type: none"> Places 7 ADS valves control switches to Open. Determines that three ADS valves did not open. (May initially only discover 2 failed valves, if one of the failed valves has lifted earlier in the scenario and the amber light is still lit, but SPDS will show only 4 valves open.) Either informs SS or continues opening SRVs until 7 SRVs are open, then notifies SS of 7 SRVs open and failure of 3 SRVs to open. (Critical Task)
	SS	<ul style="list-style-type: none"> If Operator notifies the SS that 3 SRVs will not open and that only 4 are open, the SS directs the operator to open 3 more SRVs or Open SRVs until 7 are open.
	CBO	<ul style="list-style-type: none"> Opens more SRVs, until 7 SRVs are open Verifies that Rx pressure is decreasing

Op-Test No.: _____ Scenario No.: 1 Event No.: 8A&B Page 2 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. ED with failed SRVs. (mfB21_129E, and mfB21_129L)

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> Starts controlling RWL with low pressure systems (LPCI, Core Spray, or condensate) as Rx pressure decreases. During the Emergency Depress will not be able to maintain inside the RWL band, but should restore RWL to within the band at some point after the Emergency Depress.
	BOP/CBO	<ul style="list-style-type: none"> Verifies that HPCI isolates when Rx pressure decreases to 128 psig. (2E41-F002 and F003 close)
	SS	<ul style="list-style-type: none"> Enters the Primary Containment Control flowchart for either High Torus temperature or High Torus level Directs the operator to place Torus Cooling in service as man power becomes available.
		<i>Simulator Operator – The scenario can be stopped at any time after Rx pressure is within 50 psig of Torus pressure or as directed by the Chief Examiner. Placing Torus cooling in service is not a required part of this scenario.</i>
	CBO	<ul style="list-style-type: none"> If time and man power allows, places torus cooling in service per 34SO-E11-010-2, RHR System, using the placard
		<ul style="list-style-type: none"> Place RHRSW in operation per 34SO-E11-010-2 by performing the following:

Op-Test No.: _____ Scenario No.: 1 Event No.: 8A&B Page 3 of 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. ED with failed SRVs. (mfB21_129E, and mfB21_129L)

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> • Prelube RHRSW pump. • Override 2E11-F068A(B) Low Discharge Pressure Interlock. • Position 2E11-F068A(B) to 45% OPEN • Start RHRSW pump. • Place 2E11-F068A(B) Low Discharge Pressure Interlock switch to NORMAL position. • Position 2E11-F068A(B) to obtain ≤ 4400 GPM <u>AND</u> ≤ 450 PSIG. • IF desired to start SECOND pump, • Throttle 2E11-F068A(B) to achieve max flow rate (not to exceed 4400 GPM). • Open 2E11-F068A(B) an additional 5%. • Start Second RHRSW Pump. • Position 2E11-F068A(B) to obtain ≤ 8800 GPM <u>AND</u> ≤ 450 PSIG.
		<ul style="list-style-type: none"> • Open 2E11-F048A(B). • Open 2E11-F003A(B). • Start RHR Loop A(B) pump(s). • Open 2E11-F028A(B).
		<p>NOTE:RHR system rated flow is 7700 gpm with one pump or 17,000 gpm with two pumps.</p> <p>IF the Hx Bypass Vlv, 2E11-F048A(B) is NOT full OPEN, RHR Flow is limited to $\leq 11,500$ gpm.</p>

Op-Test No.: _____ **Scenario No.:** 1 **Event No.:** 8A&B **Page** 4 **of** 4

Event Description: RCIC Steam line break in the Rx bldg. RCIC isolation valves fail to close. ED with failed SRVs. (mfB21_129E, and mfB21_129L)

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