Draft Submittal

BROWNS FERRY EXAM
50-259, 50-260, &
50-296/2004-301

April 23 - 30, 2004

1. Operating Test Simulator Scenarios

Draft Scenarios

(Browns Ferry 2004-301)

Appendix D Scenario Outline Form ES-D-1

Facility: BFN Scenario Number: HLT0212#3 Op-Test Number:

Examiners: Tim Kolb _____ Operators: _____
Ron Aiello _____
_____

Initial Conditions: IC 27, 90% power

Turnover: 2B EHC pump tagged for motor repair, raise power to 100% at 10MWe/min. DW inleakage has risen from 0.7 gpm to 1.5 gpm in last 24 hours. Investigation of source in progress.

Event Number	Malfunction Number	Event Type*	Event Description
1	2xa555b20 alarm_on zlohs63a11 off	C-SRO C-RO	SLC squib valve failure. TS entry for SRO
2	Th03a	C-all	2A Recirc pump trip, entry into Region 2 of P/F map. TS entry for SRO
3	Cr02a 40 3:00	R-all	Power oscillations
4	Atws95east	M-all	95% ATWS east side when Rx is scrammed due to power oscillations. EOI-1 and C-5 entry required. Level lowered for power control.
5	Th32c	M-all	Steam leak outside containment resulting in closure of MSIV's
6	Zdihs7347a Zaific7136aa1	M-all	Failure of HPCI to restart and RCIC failure resulting in loss of high pressure makeup.
7	Sl01b	C-RO C-SRO	SLC pump 2B failure, RO must go to A SLC pump.

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

SIMULATOR EVALUATION GUIDE

TITLE : RAISE POWER WITH RECIRC, RPS LOW LEVEL INSTRUMENT FAILURE, RFP FAILURES, RPIS FAILURE FOR A ROD, FUEL FAILURE, MAIN STEAM LEAK, MSRV FAILS OPEN, HPCI INVERTER FAILURE, RCIC TRIP, CRD PUMP FAILURE, CONTINGENCY C1, EMERGENCY DEPRESSURIZE BEFORE LEVEL REACHES -185"

REVISION : 0

DATE : February 20, 2004

PROGRAM : BFN Operator Training

PREPARED BY: _____ \ _____
(Operations Instructor) Date

REVIEWED BY: _____ \ _____
(Lead Examiner or Designee) Date

REVIEWED BY: _____ \ _____
(Operations Training Manager or Designee) Date

CONCURRED: _____ \ _____
(Operations Superintendent or Designee) Date

VALIDATION BY: _____ \ _____
(Operations US) (Required for Exam Scenarios only) Date

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF CHANGES	DATE	PAGES AFFECTED	REVIEWED/REVISED BY
0	INITIAL	02/02/18	All	JT

I. Program: BFN Operator Training

II. Course: Examination Guide

III. Title: RAISE POWER WITH RECIRC, RPS LOW LEVEL INSTRUMENT FAILURE, RFP FAILURES, RPIS FAILURE FOR A ROD, FUEL FAILURE, MAIN STEAM LEAK, MSRV FAILS OPEN, HPCI INVERTER FAILURE, RCIC TRIP, CRD PUMP FAILURE, CONTINGENCY C1, EMERGENCY DEPRESSURIZE BEFORE LEVEL REACHES -185"

IV. Length of Scenario: 11/2 hours

V. Examination Objectives:

A. Terminal Objective

1. Perform routine shift turnover, plant assessment and routine shift operation in accordance with BFN procedures.

2. Given abnormal conditions, the operating crew will place the unit in a stabilized condition per normal, abnormal, annunciator and emergency procedures.

3. Use step text procedural compliance (WANO).

B. Enabling Objectives:

1. The operating crew will raise power with recirc IAW GOI-100-12.

2. The operating crew will recognize and respond to an inadvertent half scram due to instrument failure in accordance with ARPs and Technical Specifications.

3. The operating crew will respond to a failure of RFP A per 2-AOI-3-1.

4. The operating crew will respond to a control rod reed switch failure and move the rod to a position with an operable detector per technical specifications.

5. The operating crew will recognize and respond to fuel failure in accordance with ARPs.

6. The operating crew will recognize and respond to a Main Steam line break and failure of MSIVs to auto isolate per EOI-3.

7. The operating crew will recognize and respond to a stuck open SRV in accordance with AOI-1-1 and EOI-2.

8. The operating crew will respond to RPV low water level due to HPCI, RCIC and CRD pump failure in accordance with EOI-1, RC/L C1, and C2.

VI. References: The procedures used in the simulator are controlled copies and are used in development and performance of simulator scenarios. Scenarios are validated prior to use, and any procedure differences will be corrected using the procedure revision level present in the simulator. Any procedure differences noted during presentation will be corrected in the same manner. As such, it is expected that the references listed in this section need only contain the reference material which is not available in the simulator.

A. SOER 94-01

B. SOER 96-01

VII. Training Materials:

A. Calculator (If required)

B. Control Rod Insertion Sheet (If required)

C. Stopwatch (If required)

D. Hold Order / Caution tags (If required)

E. Annunciator window covers (If required)

F. Steam tables (If required)

F. LCO/Appendix R Tracking Log

G. Calculator

H. Spray Cleaner

I. Rags

J. Markers

VIII. Scenario Summary

Unit two is at 90% power following turbine valve testing. One loop of RHRSW is tagged for repair of FCV 23-34. The crew will raise power with recirc. An inadvertent half scram will occur due to an instrument failure. The crew will respond per ARPs and Tech. Specs.

A RFP governor failure will run RFP A to minimum speed. The crew will reduce power per AOI-3-1 to within the capacity of the running RFPs.

A control rod reed switch will fail and the crew will reposition the rod to restore tech spec compliance.

Loose objects in the vessel cause fuel failure, main steam line leak, and Group 1 isolation signal. The MSIVs fail to auto close and must be manually closed.

When SRVs are cycled to maintain reactor pressure, PCV 1-179 will stick open resulting in decreasing RPV inventory and pressure. When an attempt to use HPCI is made a power failure occurs, resulting in system failure. When RCIC is operated, it will trip locally and radiation levels will preclude immediate restoration. 2A CRD pump trips. SLC should be lined to the test tank.

The scenario is terminated when the RPV level is depressurized due to inability to maintain level above – 185".

IX. Console Operator Instructions

A. Scenario File Summary

1. File: bat NRC/04NRC3

	MF/RF/IOR#	Description
a.	trg e1 HPCI trg e2 MODESW trg e3 RCIC trg e4 1-179	Sets triggers for HPCI start, Mode Switch out of Run RCIC start MSRV 1-179 HS to open
b.	imf sw03b imf swo3h ior zlohs235a[1] off ior zlohs2312a[1] off ior zlozi2331 off ior zlozi2337 off ior ypovfcv2334 fail_power ior ypovfcv2340 fail_power ior zaopi234 0 ior zaopi2311 0	Tagout of A2, C2 RHRSW pumps for repair of FCV 23-34.
c.	ior zdihs719d normal	RCIC trip appears to also be mechanical
d.	imf rp15a imf rp15b	Failure of MSIV closure on group 1 isolation
e.	imf hp07 (el 0)	Loss of HPCI 120V AC power
f.	imf ad01m (e4 0) 100	Stuck open SRV
g.	imf rc03 (e3 0)	RCIC trip
h.	imf rd01a (e2 0)	CRD pump trip
i.	imf rd01b ior zlohs852a[1] off	Tagout of 1B CRD pump
j.	mrf sw07 aligned	Aligns RHRSW pump to EECW
k.	imf fw13c (e2 :2)	Common mode failure of RFPs
L	imf fw13b (e2 2)	
m.	trg e2 = bat NRC/04NRC3-2	Raise fuel failure amount
n.	mrf hwo1 fast	Advance recorders

2. File bat NRC/04NRC3-1

	MF/RF/IOR#	Description
a.	Imf th23 5 10:00	Fuel failure
b.	Imf th35a (none 6:00) 8 6:00	MSL break

3. File bat NRC/04NRC3-2

	MF/RF/IOR#	Description
a.	mmf th23 20 1:00	Fuel rupture

4. File bat NRC/04NRC3-3

	MF/RF/IOR#	Description
a.	dor zdihs719d normal dmf rc03	Fix RCIC

IX. Console Operator Instructions

B. Console Operator Manipulations

ELAPSED TIME	IC/MF/RF/PFK	DESCRIPTION/ACTION
Sim. Setup	rst 27	90% power MOC
Sim. Setup	restorepref NRC/04NRC3	Establishes Preference Keys
Sim. Setup	Setup	Verify Preference Keys
Sim. Setup	Esc	Clears Popup Window
Sim. Setup	manual	Reduce power to 90% with recirc. (NA if IC is at 90% power)
Sim. Setup	F3	See scenario summary (bat NRC/04NRC3)
Sim. Setup	Manual	Place hold order tags on FCV 23-34, 40; A2, C2 RHRSW pumps; zi-23-37/31 vlv pos. ind.; CRD pump 1B. Place Caution Tags:
After power rise of 5%	F4	Fails LIS 3-203B downscale (imf th30v 0)

ROLE PLAY: Wait 2 min, report LIS 3-203B about 0 inches in Aux. Inst. Room

5 min after Tech specs addressed	F5	imf fw30a
When the plant is stable	F6	imf rd25

ROLE PLAY: If the failed position is not noticed in 5 minutes, call as reactor engineer and report powerplex won't run because the program can't tell where rod 14-35 is. Ask, "Is there a problem with the position indication?"

5 min after the rod is repositioned	F7	5% fuel failure and MSL leak(bat NRC/04NRC3-1)
When requested to open breaker for PCV 1-179, wait 3 min	F8	Opens breaker for PCV 1-179 (mrf ad01m out)
If requested to close breaker for PCV 1-179	F9	Closes breaker for PCV 1-179 (mrf ad01m in)
If requested to shutdown HWC	F10	Removes HWC from service (mrf OG09 shutdown)

MORE FOLLOWS ↓

IX. Console Operator Instructions

B. Console Operator Manipulations

ROLE PLAY: If asked to check RWCU Temp ATU's in Aux Inst. Room, Report 69-835 A-D Reading 120°F.

ROLE PLAY: When asked to check on HPCI, the fuse was replaced and blew again. It smells like there is a burned transformer in the inverter. A FINN team member is here and thinks they can replace the inverter in 30 to 45 minutes if there is one in the warehouse. (updates on status may be provided as requested with progress toward success indicated)

ROLE PLAY: As the RB AUO, when directed to investigate RCIC, wait 1 minute then report back that your alarming dosimeter went off and you saw a CAM in alarm when you entered the building. You are going to get Radcon to help see if you can safely get to the RCIC Room.

ELAPSED TIME	IC/MF/RF/PEK	DESCRIPTION/ACTION
At about 450 psig prior to ED. Leave open if ED is initiated earlier	F11	Closes PCV-1-179 (dmf ad01m)
If requested to perform Appendix 16F & 16G wait 5 min	F12	Bypasses LPCI timers (bat app16fg)
If requested to perform Appendix 7B, wait 20 min.	<shift>F1	Aligns SLC to Test Tank (bat app07b)

Terminate the scenario when the following conditions have been satisfied or upon request of the Lead Examiner.

-RPV water level restored to + 2 to + 51" (Lead examiner may desire to terminate when satisfactory progress to achieve this standard is observed)

-Reporting requirements have been made

X. Information to Evaluators:

A. Ensure recorders are inking and recording and ICS is active and updating.

B. Assign Crew Positions based on evaluation needs.

1. SRO : Unit Supervisor/Shift Manager _____
2. BUO : Board Unit Operator _____
3. DUO : Desk Unit Operator _____

C. Conduct a shift turnover with the Shift Manager and provide the Shift Manager with a copy of the Shift Turnover.

D. Direct the shift crew to review the control board and take note of present conditions, alarms, etc.

E. Terminate the scenario when the following conditions as satisfied or at the request of the Lead Evaluator:

1. RPV level being maintained + 2 to + 51 "

2. Reporting requirements have been met

XI. Simulator Event Guide

Event 1: **RAISE POWER WITH RECIRC**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
SRO	Notifies ODS of power ascension	
	Directs BUO to raise power at 10 MWE/min per 2-GOI-100-12	
BUO	Raises power to rated IAW 2-GOI-100-12 and OI-68 Section 6.2 with Recirc	

XI. Simulator Event Guide

Event 2: **RPS LEVEL INSTRUMENT FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Announces half scram	_____
	Reports half scram due to level from 2-XA-55-4A-2	_____
	Verifies RPV level normal	_____
	Refers to 2-9-4 ARP	_____
SRO	Dispatches individual to Auxiliary Instrument Room to check LIS 3-203 B and D	_____
	Consults Tech Specs, 3.3.1.1, 3.3.6.1, 3.3.6.2, 3.3.7.1 determines Required actions are to place in trip in 12 hrs. which is met at this time.	_____
	Directs IMs to troubleshoot and repair.	_____
	Conducts briefing on loss of instrumentation.	_____

XI. Simulator Event Guide

Event 3: **RFP A FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Responds to RFP A ABN and RFP DISCH FLOW LOW annunciators (may attempt manual control of RFP A)	_____
SRO	Directs power reduction per AOI-3-1	_____
BUO	Lowers power with flow to lower running RFP rpm to < 5050 (~85% power)	_____
SRO	Directs entry into AOI-68-1B	_____
	Contacts Maintenance	_____
	Notifies ODS of power reduction	_____
BUO/DUO	Performs 2-SR-3.3.1.1.I Directs verification that breakers 105,106, 107 are closed	_____

XI. Simulator Event Guide

Event 4: **ROD POSITION FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Identifies rod 14-35 has no position indication	_____
SRO	Enters LCO 3.1.3 and directs insertion of the rod to an operable position indication (46)	_____
BUO	Inserts rod 14-35 to position 46 and reports indication is restored	_____
SRO	Exits LCO 3.1.3	_____
	Notifies Reactor Engineer	_____
	Directs initiation of WR	_____

XI. Simulator Event Guide

Event 5: **FUEL DAMAGE/MSL LEAK**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
DUO	Announces alarms as follows: - OG Pre Trt. Rad High	
	• Checks off-gas flow	
SRO	• Notifies Chem Lab to Sample • Declares NOUE (1.4-U)	
DUO	Announce - Turbine Bldg area radiation high	
	• Check instruments as follows, reporting increase in radiation RR-90-157 (OG Pretrt) RR-90-135 (MSL Rad)	
SRO	• Evacuates Turbine Building per ARP • Notifies Rad. Con.	
DUO	Announce - Reactor Building Radiation High • Checks RB instruments to determine affected areas	
SRO	• Evacuates Reactor Building per ARP • Notifies Rad Con	
SRO	Enters 2-EOI-3 (may direct power reduction with recirc flow)	
DUO	Recognize and announce Group 6 isolation on high radiation	
DUO	Reports alarm "Main Steam Tunnel Temp High" and verifies on TI 1-60A	
SRO	Renters 2-EOI-3	
	Enters EOI-1 and Directs manual scram	
BUO	Manually scrams and verifies all rods inserted	
SRO	Directs BUO to carry out actions of 2-AOI-100-1	

XI. Simulator Event Guide

Event 5: **FUEL DAMAGE/MSL LEAK** (continued)

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Carries out 2-AOI-100-1 actions - Mode switch in S/D - Trips main turbine - Verify recirc pumps at minimum - Verifies Gp 2, 3, 6 and 8 isolations	_____
DUO	Closes MSIVs prior to isolation Or Reports MSIVs not closed on MSL high temp (189 F) on panel 9-5 alarms.	_____ _____
SRO	Directs MSIV closure, if not already directed	_____
DUO	Closes MSIVs	_____
BUO	Announces CRD Pump Trip and loss of RFPs	_____
SRO	Directs pressure control 800 to 1000 psig	_____
	Directs level control + 2" to + 51" using - RCIC(5D) - HPCI (5C)	_____
DUO	Controls pressure as directed using SRVs; (11A)	_____
	Attempts to control level as directed using HPCI (5C) and RCIC (5D)	_____

XI. Simulator Event Guide

Event 6: **STUCK OPEN SRV, HPCI/RCIC/CRD FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
DUO	Reports HPCI failure (120V Power Alarm)	
DUO	Reports RCIC TRIP	
	Reports failure of RCIC to reset	
SRO	Dispatches AUO to reset RCIC	
	Dispatches OS-US to replace HPCI power supply fuses	
DUO	Reports PCV 1-179 failure to close after use	
	Cycles PCV 1-179 per AOI-1-1 and reports valve remains open	
SRO	Directs actions to close PCV 1-179 per AOI-1-1 outside control room	
DUO	Reports PCV 1-179 does not close	
	Monitors torus temperature	
SRO	Enters EOI-2 at 95 degrees F	
	Directs available RHR placed in suppression pool cooling.	
DUO	Places all available Torus Cooling I/S	
SRO	Requests appendices 16F and 16G	
	Directs Appendix 8G	
SRO	Directs Appendix 7B	
BUO	Performs Appendix 7B Verifies recirc pumps trip at -45"	

XI. Simulator Event Guide

Event 6: **STUCK OPEN SRV, HPCI/RCIC/CRD FAILURE** (continued)

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
SRO	Directs preventing flooding vessel via Condensate system by closing RFP discharge valves	
BUO	Closes RFP discharge valves	
DUO	Performs Appendix 8G	
SRO	Enters C1, Directs ADS inhibited	
DUO	Inhibits ADS	
DUO	Reports DG starts; Dispatches AUO to monitor	
SRO	When level decreases to TAF determines/verifies that sufficient injection sources are available to not enter steam cooling and continues to wait for system restoration until RPV level approaches -185" before entering C2	
SRO	Directs opening 6 ADS valves	
DUO	Opens 6 ADS valves as directed	
SRO	Directs DUO to inject with ECCS until level is above -122" then secure systems to not exceed + 51"	
DUO	Operates and secures ECCS injection as directed	
SRO	Directs BUO to restore level + 2" to + 51" with Condensate	
BUO	Injects with Condensate to restore level +2 " to + 51"	
SRO	Classifies event as Site Area Emergency (1.1-S1)	

XII. Crew Critical Tasks

	Task	SAT/UNSAT
1.	Isolates MSIVs prior to 2 2-EOI-3 Area Radiations/Temperatures reaching Max Safe	_____
2.	Inhibits ADS	_____
3.	Emergency Depressurizes when below TAF and before level drops to -185"	
4.	Commences Level restoration + 2 to + 51".	_____

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER 04NRC3

9 Total Malfunctions Inserted; List: (4-8)
1) LT failure
2) RFP failure
3) RPIS failure
4) Fuel Failure
5) MSL Leak with MSIV Auto Close Failure
6) Stuck Open SRV
7) HPCI Inverter Failure
8) RCIC Trip
9) CRD Pump Trip

6 Malfunctions That Occur After EOI Entry; List: (1-4)
1) MSIV Auto Close Failure
2) Stuck open SRV
3) HPCI Failure
4) RCIC Trip
5) CRD Trip

2 Abnormal Events; List: (1-3)
1) Fuel Failure
2) Stuck open SRV

3 Major Transients; List: (1-2)
1) Fuel Failure
2) MSL Leak

3 EOIs used; List: (1-3)
1) EOI-3
2) EOI-1
3) EOI-2

2 EOI Contingencies Used; List: (0-3)
1) C1, C2

80 Run Time (minutes)

35 EOI Run Time (minutes); 46 % of Scenario EOI Run Time

4 Crew Critical Tasks (2-5)

Yes Technical Specifications Exercised (yes/no)

SHIFT TURNOVER SHEET

Equipment Out of Service/LCOs FCV 23-34 repair underway, clearance has both 2A & 2C RHR Hx inop for containment cooling. Out of service 6 hours, expected back in 12 hours. 7 day LCO entered per T.S. 3.7.1, 3.6.2.3, 3.6.2.4, 3.6.2.5. All Appendix R, T.S. LCO's have been addressed. 1B CRD pump is tagged for breaker maintenance.

Operations/Maintenance For the Shift Raise Unit 2 to 100% power at 10MWe/min. Support maintenance on RHRSW valve.

Power was reduced for turbine valve testing which has been completed.

Unusual Conditions/Problem Areas Thunderstorm warning in effect next 2 hours in Limestone County.

Appendix D Scenario Outline Form ES-D-1

Facility: BFN Scenario Number: HLT0212#2 Op-Test Number:

Examiners: Tim Kolb _____ Operators: _____
Ron Aiello _____ _____
_____ _____

Initial Conditions: IC 28, 100% pwr

Turnover: D/G C OOS for cooler repair. Reduce power to 80% and remove 2B RFP from service for maintenance.

Event Number	Malfunction Number	Event Type*	Event Description
1	Ed14a	C-all	Normal feeder breaker trip for D/G Aux Bd A. TS for SRO, Transfer board for RO
2	Hp01	C-all	Inadvertant HPCI start. TS for SRO, BOP secure HPCI.
3	Cs06b align	M-all	Opens CS condensate suction valves and starts rise in Torus level, eventually forces EOI-2 entry on hi Torus water level.
4	Bat atws95 east	M-all	95% ATWS on east side rods, EOI-1 and C-5 entry, forces lower level for power control
5	Tc02 0	C-all	Bypass valves fail closed requiring use of alternate pressure control systems
6	Th23 20	C-all	Fuel failure
7	Zdihs8546 off	C-Ro C-SRO	Rod select power failure removes ability to drive rods.

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

I. Program: BFN Operator Training

II. Course: Examination Guide

III. Lesson Title: REDUCE REACTOR POWER TO 80% AND REMOVE RFP 2B FROM SERVICE, LOSS OF 4KV SHUTDOWN BOARD A, CONTROL ROD ACCUMULATOR MALFUNCTION, FAILURE OF BOTH SEALS ON THE 2A RECIRC PUMP, EHC PUMP LEAK/SCRAM, ATWS/FUEL FAILURE, BPV FAIL CLOSED.

IV. Length of Lesson: 1.5 hour

V. Examination Objectives

A. Terminal Objectives

1. Perform routine shift turnover, plant assessment, and routine shift operation in accordance with BFN procedures.

2. Given uncertain or degrading conditions, the operating crew will use team skills to conduct proper diagnostics and make conservative operational decisions to remove equipment/unit from operation. (SOER 94-1 and SOER 96-01)

3. Given abnormal conditions, the operating crew will place the unit in a stabilized condition per normal, abnormal, annunciator and emergency procedures.

4. Use step text procedural compliance (WANO).

B. Enabling Objectives

1. The operating crew will reduce power and remove the 2B RFP from service.

2. The operating crew will recognize and respond to a Loss of 4KV Shutdown Board A, (Loss of CRD Pump 1B).

3. The operating crew will recognize and respond to a Low Control Rod Accumulator Pressure Alarm.

4. The Operating Crew will recognize and respond to a dual Recirc seal failure on the 2A Recirc Pump. Trip/Isolate the Pump and enter into Single Loop Operation.

5. The Operating Crew will respond to an unisolable EHC Leak and manually scram the reactor.

6. The Crew will respond to a Hydraulic ATWS and Fuel Failure without bypass valves by inserting control rods and lowering level.

VI. References: The procedures used in the simulator are controlled copies and are used in development and performance of simulator scenarios. Scenarios are validated prior to use, and any procedure differences will be corrected using the procedure revision level present in the simulator. Any procedure differences noted during presentation will be corrected in the same manner. As such, it is expected that the references listed in this section need only contain the reference material which is not available in the simulator.

VII. Training Materials: **(If needed, otherwise disregard)**

A. Calculator

B. Control Rod Insertion Sheet

C. Stopwatch

D. Hold Order / Caution tags

E. Annunciator window covers

F. Steam tables

VIII. Console Operators Instructions

A. Scenario File Summary

1. File: bat NRC/04NRC2

	MF/RF/IOR#	Description
a.	bat atws90east	ATWS
b.	bat atws90west	
c.	imf th23 (e1 7:00) 20 4:00	Fuel failure
d.	trg e1 MODESW	
e.	trg e1= Bat SDV	Restores SDV Level Switches

2. File bat NRC/04NRC2-1

a.	imf ed09a	Loss of 4 KV Shutdown Board A
b.	imf rd08r3055(none :20) 0	Accum Low Press Rod 30-55
c.	mrf pc01b start	ensure SGT starts on trip

3. File bat NRC/04NRC2-2

a.	imf th10a 100 1:00	Recirc 2A Inbd Seal Failure
b.	imf th11a (none 4:00) 100 15:00	Recirc 2A Outbd Seal Failure

4. File bat NRC/04NRC2-3

a.	mrf dg01a open	Open A DG logic breaker
b.	mrf dg04a stop	locally stop A DG

VIII. Console Operators Instructions

B. Console Operators Manipulations

ELAP TIME	IC/MF/RF/PK#	DESCRIPTION/ACTION
Sim. Setup	pwrst 40	87% power MOC, First two groups of rods in the shove sheet are inserted
Sim. Setup	mrf hw01 fast	Advances all charts
Sim. Setup	restorepref NRC/04NRC2	Establishes Function Keys
Sim. Setup	setup	Verify Function Keys
Sim. Setup	esc	Clears Function Key Popup
Sim. Setup	F3	trg e1 MODESW (assigns trigger e1 to mode switch)
Sim. Setup	F4	See Scenario Summary (bat NRC/04NRC2)
Sim. Setup	manual	Initial for insertion of the first two emergency rod groups for the shove sheet.
When power is 80% or when directed by lead examiner	F5	Loss of 4KV Shutdown Bd. A (bat NRC/04NRC2-1)

ROLE PLAY: Plant AUO reports that 4KV Shutdown Board indicates that the feeder breaker Overcurrent flag is up and the bus is locked out.

ROLE PLAY; AUO reports back to the Control Room that the 2A CRD pump is operating normally if requested to by Control Room operators.

Delete CR Malfunction 5 minutes after the AUO was sent to gas the 30-55 HCU.	F6	Dmf rd08r3055

ROLE PLAY: AUO reports that Control Rod 30-55 has low N2 Pressure (900psig). AUO reports 6 minutes later that the HCU has been recharged with N2 per procedure. AUO will write the WO.

Insert Recirc Pump dual Seal Malfunction	F7	Fails both Recirc pump seals over 15 minutes. (bat NRC/04NRC2-2)

ROLE PLAY: AUO reports that the seal purge valve has been closed to the 2A Recirc pump 5 minutes after the control room orders the valve closed.

ROLE PLAY: Reactor Engineer will report that he has performed all the necessary actions to allow the plant to operate in Single Loop Operation (2SR 3.4.1) and 2-TI-248.

Insert EHC Leak	F8	Imf TC07 100 (High pressure EHC leak)

VIII. Console Operators Instructions

B. Console Operators Manipulations

ROLE PLAY: AUO sent to respond to the EHC leak reports that a weld has blown out on the common discharge piping of the EHC system. EHC high pressure fluid is spraying on the EHC skid. System isolation is not possible.

ELAP TIME	IC/MF/RF/PK	DESCRIPTION/ACTION
When requested to perform App. 1F and 2, wait 5 minutes	F9 F10	Bypasses scrams and ARI (bat app01f) (bat app02)
When scram is reset	F11	Deletes ATWS (bat atws-1)
When requested to close 2-85-586, wait 5 minutes	F12	Closes 2-85-586 (mrf rd06 close)

ROLE PLAY: AUO Reports that the 285-586 is closed

When requested to perform App. 8A,C,E, wait 2 minutes	< shift >F1	Bypasses low level interlocks on MSIVs, DW control Air, Reactor Bldg. Ventilation (bat app08ace)
When requested to perform App. 16F&G wait 5 minutes	<shift> F2	Bypasses LPCI injection valve timers (bat app16fg)
When requested to open 2-85-586 then:	<shift>F3	Opens 2-85-586 (mrf rd06 open)
If AUO is requested to Shutdown DG Locally	<shift>F4	Bat NRC/04NRC2-3
If requested to transfer 480VAC S/D board to alternate	<shift>F5	mrf ed25 alt

ROLE PLAY: AUO Reports that the 285-586 is open

Terminates the scenario when the following conditions are satisfied or upon request of Lead Evaluator:

1. All rods inserted
2. Water level restored + 2" to + 51" with feedwater
3 Cooldown begun

IX. Scenario Summary

The unit is at 87% power with the 2A CRD Pump in standby and ready for a PMT this shift. The crew will reduce power and shutdown 2B RFP for visual inspection.

The crew will experience a trip of the normal feeder breaker to the "A" 4KV Shutdown Board (Bus lockout). The 1B CRD Pump will trip and 2A CRD pump will be placed in-service.

The crew will respond to an HCU Low Gas Pressure Condition for Control Rod 30-55.

The Crew will respond to a dual seal failure of the 2A Recirc Pump. The pump will be isolated and the Crew will take the necessary actions to enter single loop operation. The Reactor may enter Region 2 of the Power/Flow map and the crew will insert rods to stay within Operating Requirements. The SRO will address actions required for Single Loop Operation.

An EHC high pressure leak will require the crew to manually scram the Reactor. An ATWS and subsequent fuel failure also occur. Turbine Bypass Valve accumulators bleed down and cause the Bypass Valves to close.

The crew will control RPV pressure using alternate pressure control systems.

The crew will lower RPV level and control level between – 50" and TAF using feedwater and condensate.

X. Information to Evaluators:

A. Ensure recorders are inking and recording and ICS is active and updating.

B. Assign Crew Positions based on the required rotation.

1. SRO: Shift Manager/Unit Supv. _____
2. BUO: Board Unit Operator _____
3. DUO: Desk Unit Operator _____

C. Conduct a shift turnover with the Shift Manager and provide the Shift Manager with a copy of the Shift Turnover.

D. Direct the shift crew to review the control board and take note of present conditions, alarms, etc.

E. Terminate the scenario when the following conditions are satisfied are at the request of the floor/lead instructor/evaluator.

1. All rods inserted

2. Water level restored +2" - +51" with feedwater.

3. Cooldown started on SRVs and/or alternate pressure control systems

XI. Simulator Event Guide

EVENT 1: **Reduce Reactor Power to 80% and Remove the 2B RFP from service.**

POSITION	EXPECTED ACTION(S)	SAT/UNSAT/COMMENTS
SRO	Notifies ODS of power reduction	
BUO	Begins power drop with recirculation flow per GOI-100-12 • Utilizes Medium/Slow Decrease PB • Verifies both RECIRC Pumps decrease speed at the same rates per GOI-100-12 • Stops Power decrease at 80% • Monitors Power/Flow Map • Direrets AUO to monitor Condensate Demins	
DUO	Performs peer check of power decrease Performs 2-SR-3.3.1.1.I	
BUO	Removes the 2B RFP from service per OI -3, Section • Reduces RFP speed per OI-3 • Verifies other Feed Pumps increase speed to maintain a constant Reactor Water Level • Trips 2B RFP per OI-3 (Section 7.1.4)	

XI. Simulator Event Guide

EVENT 2: **Loss of 4KV Shutdown Board " A" (Bus Lockout)**

POSITION	EXPECTED ACTION(S)	SAT/UNSAT/COMMENTS
CREW	Identifies/Reports a loss of 4KV S/D Board "A"	_____
DUO	Recognizes A D/G starts and fails to load	_____
BUO	Recognizes 1B CRD pump trip	_____
SRO	Directs placing 2A CRD pump in service per AOI- 85-3	_____
DUO	Dispatches AUO to 4KV SD Bd A	_____
SRO	Directs A D/G shutdown per OI-82 and AUO to monitor while running	_____
SRO	Directs Diesel Aux Board A and 480 VAC shutdown board transfer to alternate per OI-57B	_____
SRO	Contacts Electrical Maintenance to trouble shoot the 4KV SD Bd	_____
DUO	Identifies loss of power to RHR 2A, CS 2A, and RHRSW A1.	_____
SRO	Enters T.S. LCO 3.8.7 and verifies no loss of safety function exists per OPDP-8 Enters Appendix R LCOs for:	_____
BUO	Places 2A CRD pump in service per AOI-85-3	_____
DUO	Transfers Diesel Aux Board A per OI-57B step 8.10	_____
DUO	Verifies all SGT starts and Refuel Ventilation isolates	_____
DUO	Directs AUO to Shut down DG "A" per OI-82	_____

XI. Simulator Event Guide

EVENT 3: **Control Rod HCU Low Gas Pressure**

POSITION	EXPECTED ACTIONS	COMMENTS
BUO	Reports alarm "CRD Accum Press Low/Level High", identifies HCU as 30-55	
BUO	Refers to ARP, dispatches AUO to CRD module	
SRO	Refers to Tech Spec 3.1.5 Declares CR 30-55 slow within 8 hrs	
SRO	Determines no further actions required by T.S.	
BUO	Directs AUO to recharge accumulator per OI-85	
SRO	Exits LCO 3.1.5	

XI. Simulator Event Guide

EVENT 4: **Failure of both Recirc Seals on the 2A Recirc Pump**

POSITION	EXPECTED ACTIONS	COMMENTS
BUO	Recognizes and responds to 2A Recirc pump inboard seal failure per ARP 2-FA-68-62 and reports it to the SRO	
SRO	Directs DUO to monitor 2A Recirc.pump seal and record data per ARP 2-FA-68-62	
DUO	Recognizes increase in drywell temperature and pressure and reports it to the SRO	
SRO	SRO directs DUO to vent Drywell per AOI 64-1	
DUO	Vents Drywell per 2-AOI-64-1step 4.2.2.3 Request CB AUO to perform SI-4.8.1.1.b.a.1	
BUO	Recognizes failure of the outboard seal on the 2A Recirc pump and reports it to the SRO (Both seals fail)	
SRO	Directs 2A Recirc Pump tripped and isolated	
BUO	Trips and isolates the 2A Recirc pump per 2-ARP-9-4A • Depresses RECIRC DRIVE SHUTDOWN • Verifies Alternate and Normal Feeder Breakers trip • Closes Recirc pump 2A suction and discharge valves • Directs AUO to close CRD seal purge to the Recirc Pump	
SRO	Directs the following actions per AOI-68-1B, • Maintain operating Recirc Pump less than 46,600 gpm • Notifies Reactor Engineer • Ensures Recirc Pump suction and discharge valve closed	

XI. Simulator Event Guide

EVENT 4: **Failure of both Recirc Seals on the 2A Recirc Pump (Continued)**

POSITION	EXPECTED ACTIONS	COMMENTS
SRO	Directs Control Rods inserted to comply with Power/Flow requirements (Emergency Shove Sheet)	
BUO	Ensures/maintains operating Recirc pump speed less than 46,600 gpm	
BUO	Inserts Control Rods per the Emergency Shove Sheet to exit region 2 of the Power/Flow Map	
SRO	Directs Reactor Engineer to perform surveillances/actions necessary to support Single Loop Operation • 2-SR-3.4.1 (Single Loop Operation) • 2-TI-248 (Core Flow Determination in Single Loop Operation)	
SRO	Notifies ODS	
SRO	Enters GOI-100-12A for plant control	

XI. Simulator Event Guide

EVENT 5: **EHC LEAK / SCRAM**

POSITION	EXPECTED ACTION(S)	SAT/UNSAT/COMMENTS
DUO	Recognizes and reports "EHC Reservoir Level Low Alarm"	
DUO	Responds per ARP 2-XA-55-7B	
DUO	Monitors EHC pump for fluctuations in amperage and pressure	
SRO	Dispatches AUO's to add fluid and find leak	
SRO	Contact Environmental to help contain EHC fluid	
SRO	Directs radwaste to lockout floor and equipment drain sumps	
BUO/DUO	Reports low EHC pressure	
SRO	Directs RO to insert manual Scram and enter AOI-100-1	
BUO	Inserts Manual Scram per AOI-100-1	

XI. Simulator Event Guide

EVENT 6 **ATWS/ FUEL FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Reports all rods not in and performs the following: • Mode Switch to SHUTDOWN • Initiates ARI • Recognizes and reports power is greater than 5% and Recirc Pumps NOT tripped • Inserts SRMs/IRMs	_____
SRO	Enters EOI-1 and C5 and directs/ensures the following: • Mode Switch to SHUTDOWN • ARI Initiated • Recirc Pumps tripped	_____
SRO	Directs ADS inhibited	_____
DUO	Inhibits ADS	_____
SRO	Declares SAE, EAL 1.2-S	_____
SRO	Directs appendix 4 to lower water level until level < -50"	_____
BUO	Maintains reactor water level -50" to -100" with RFPs, RCIC, HPCI	_____
DUO	Performs Appendix 4, locks out HPCI	_____
SRO	Directs Appendix 1F, 2, and 1D be performed	_____
SRO	Directs 8A, 8C, 8E, & 8G be performed	_____
BUO/DUO	Recognizes turbine trip and loss of Bypass valves as accumulators depressurize	_____
SRO	Directs reactor pressure maintained less than 1073 psig with one or more of the following: - MSRV's - Main steam line drains - RFP's	_____
DUO	Reports OG Pretreatment Rad High Alarm	_____

XI. Simulator Event Guide

Event 6: **ATWS / FUEL FAILURE (continued)**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
DUO	Maintains reactor pressure less than 1073 with one or more of the following: - MSRV's - Main Steam Line drains (App 11D) - RFP (App 11F)	
BUO	Directs AUO to close 2-85-586 per Appendix 1F	
SRO	Directs Suppression Pool Cooling be placed in service per Appendix 17A	
SRO	Directs SLC injection before Torus Temperature reaches 110 degF	
DUO	Recognizes and Reports the Reactor Building Area Radiation monitors are in alarm and Rad levels in the Rx Building are increasing.	
SRO	Orders evacuation of the Reactor Building, Notifies Rad Con, Ensures announcements are made.	
DUO	Places suppression pool cooling in service per appendix 17A	
BUO	When 2- 85-586 closed, Bypasses RWM, Drives rods utilizing EMERGENCY IN in a spiral manner per Appendix 1D	
SRO	After Appendix 1F and 2 are competed from the field the SRO directs BUO to insert a manual scram per Appendix 1F	
BUO	Resets scram, Verifies SDV vents and drains open, Monitors SDV High level alarms	

XI. Simulator Event Guide

Event 6: **ATWS / FUEL FAILURE (continued)**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	After SDV drained the BUO directs the 2-85-586 valve closed, and inserts another manual scram after all the accumulators have recharged per appendix 1F	
BUO	Verifies rod motion and reports that all control rods are fully inserted	
SRO	Exits EOI-1, RC/Q	
DUO	Performs Appendix 8G	
DUO	Directs OSUS to perform Appendix 16F and 16G	
SRO	Directs RPV level restored and maintained + 2" to + 51" RWL	
SRO	Directs termination of SLC injection if the system was initiated	
BUO	Maintains RPV level within band as directed by SRO	

XI. Simulator Event Guide

XII. Crew Critical Tasks

	TASK	SAT/UNSAT
1.	Inhibits ADS	_____
2.	Inserts control rods	_____
3.	Lowers RPV Water Level to -50" To control Inlet subcooling	_____

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER

6 Total Malfunctions Inserted; List: (4-8)
1. Loss of 4KV Shutdown Board
2. Control Rod Accumulator Malfunction
3. Failure of Both Recirc Pump seals on the 2A Recirc Pump
4. EHC Leak
5. ATWS/Fuel Failure

2 Malfunctions That Occur After EOI Entry; List: (1-4)
1. BPV Failure
2. Fuel failure

2 Abnormal Events; List: (1-3)
1) Loss of 4KV Shutdown Board (CRD Pump)
2) Recirc Seal Failure

1 Major Transients; List: (1-2)
1) ATWS

1 EOIs used; List: (1-3)
1) EOI-1

1 EOI Contingencies Used; List: (0-3)
1) C5

75 Run Time (minutes)

35 EOI Run Time (minutes); 46.6 % of Scenario EOI Run Time

3 Crew Critical Tasks

Yes Technical Specifications Exercised (yes/no)

SHIFT TURNOVER SHEET

Equipment Out of Service/LCOs 2A CRD Pump ready for PMT after speed increaser inspection, Mechanical Maintenance due to perform this shift.

Operations/Maintenance For the Shift

The Reactor is at 87% Power because Recirc Pump 2A VFD tripped last night due to a logic card Failure. The first two groups of the emergency shove sheet were inserted to exit region 2 of the P/F Map. The rods were scheduled to be withdrawn when an oil leak developed on the 2B RFP. The 2B RFP is leaking at approximately 1 gallon every 30 minutes. Maintenance is standing by and the leak Is being contained. Plans are to lower reactor power to 80% with Recirc. and remove the 2B RFP from service for repairs. Contact Reactor Engineering for instructions when 2B RFP has been repaired and subsequent power ascension is planned.

Unusual Conditions/Problem Areas A severe weather warning predicts an Ice Storm Today.

Facility: BFN Scenario Number: HLT0212#1 Op-Test Number:

Examiners: Tim Kolb
Ron Aiello

Operators: _____
_____

Initial Conditions: IC-45, 80% power

Turnover: Equipment OOS/LCO's-Unit at 80% power awaiting oil leak repairs to 2B CBP. 2-FCV-74-100 tagged out for maintenance, 2A RHR pump tagged 2 hours ago due to breaker malfunction. 7 day LCO (3.5.1) and 30 day LCO (3.6.2, 3, 4 and 5). Maintain power at 80% till CBP is repaired.

Event Number	Malfunction Number	Event Type*	Event Description
1	Ad01n 100	C-all	SRV 1-180 fails open, AOI actions are taken and valve closes when control power fuses are pulled. SRO must reference TS for SRV and containment
2	Fw02a	M-all	Trip of 2A CBP with loss of Rx level, RO inserts manual scram at SRO direction. BOP attempts to recover level.
3	Ed08c	C-all	Trips 2C 4kv Unit Bd which results in loss of last CBP. RO trips/verifies turbine trip and performs Scram AOI, also places 1B CRD pump in service after loss of 2A CRD pump. BOP attempts level recovery with HPCI/RCIC. SRO enters EOI-1 and directs level recovery efforts.
4	Hp07 Hp08 Hp09	C-all	HPCI steam leak on startup with failure to isolate. SRO enters EOI -3 on HI Rad/Temp, directs manual isolation of HPCI. BOP manually isolates HPCI
5	Th33a 5 20	M-all	Steam leak from A MS line inside Drywell. SRO directs cooldown with bypass valves and venting of containment. RO commences cooldown, BOP vents containment
6	Rh01c Zdihs7474a close Zdihs7475a close	C-all	Drywell pressure/ temp continue to rise due to leak, when DW sprays are attempted 2C RHR pump will not start and the Loop II spray valves will not open. DW temp approaches 280 requiring either rapid depressurization or ED.
7	Pc03a-k	C-all	Drywell blower failure.

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

SIMULATOR EVALUATION GUIDE

TITLE : CONTROL ROD ADJUSTMENT, CONTROL ROD DRIFT OUT, SRV STICKS OPEN, APRM # 3 FAILS, LOSS OF NORMAL FEEDWATER, HPCI LEAK WITH FAILURE TO AUTOMATICALLY ISOLATE,SMALL BREAK LOCA INSIDE PRIMARY CONTAINMENT, LOSS OF DW SPRAYS, RAPID DEPRESSURIZATION AND/OR EMERGENCY DEPRESSURIZATION

REVISION : 0

DATE : February 14, 2004

PROGRAM : BFN Operator Training

PREPARED BY: _____ \ _____
(Operations Instructor) Date

REVIEWED BY: _____ \ _____
(BFN Lead Examiner or Designee) Date

REVIEWED BY: _____ \ _____
(Operations Training Manager or Designee) Date

CONCURRED: _____ \ _____
(Operations Superintendent or Designee) Date

VALIDATION BY: _____ \ _____
(Operations US) (Required for Exam Scenarios only) Date

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF CHANGES	DATE	PAGES AFFECTED	REVIEWED/REVISED BY
0	INITIAL	02/13/04	All	JT

I. Program: BFN Operator Training

II. Course: Examination Guide

III. Title: CONTROL ROD ADJUSTMENT, CONTROL ROD DRIFT OUT, SRV STICKS OPEN, APRM # 3 FAILS, LOSS OF NORMAL FEEDWATER, HPCI LEAK WITH FAILURE TO AUTOMATICALLY ISOLATE,SMALL BREAK LOCA INSIDE PRIMARY CONTAINMENT, LOSS OF DW SPRAYS, RAPID DEPRESSURIZATION AND/OR EMERGENCY DEPRESSURIZATION

.

IV. Length of Lesson: 1.5 hours

V. Examination Objectives:

A. Terminal Objective

1. Perform routine shift turnover, plant assessment and routine shift operation in accordance with BFN procedures.

2. Given uncertain or degrading conditions, the operating crew will use team skills to conduct proper diagnostics and make conservative operational decisions to remove equipment/unit from operation. (SOER 94-1)

3. Given abnormal conditions, the operating crew will place the unit in a stabilized condition per normal, abnormal, annunciator and emergency procedures.

4. Use step text procedural compliance (WANO).

B. Enabling Objectives:

1. The operating crew will raise power with control rods per RE instructions.

2. The operating crew will respond to a control rod drifting out due to a stuck withdraw valve.

3. The operating crew will respond to a stuck open MSRV.

4. The operating crew will recognize and respond to a failure of APRM # 3.

5. The operating crew will recognize and respond to a loss of feedwater per 2-EOI-1.

6. The operating crew will recognize and respond to a small LOCA per 2-EOI-1 and 2.

7. The operating crew will recognize and respond to a HPCI leak with failure to automatically isolate per EOI-3 and AOI-64-2B.

8. The operating crew will respond to failure of drywell sprays and enter C2 to emergency depressurize when drywell temperature cannot be maintained below 280 degrees.

VI. References: The procedures used in the simulator are controlled copies and are used in development and performance of simulator scenarios. Scenarios are validated prior to use, and any procedure differences will be corrected using the procedure revision level present in the simulator. Any procedure differences noted during presentation will be corrected in the same manner. As such, it is expected that the references listed in this section need only contain the reference material which is not available in the simulator.

A. SOER 94-01

B. SOER 96-01

VII. Training Materials:

A. Calculator (If required)

B. Control Rod Insertion Sheet (If required)

C. Stopwatch (If required)

D. Hold Order / Caution tags (If required)

E. Annunciator window covers (If required)

F. Steam tables (If required)

F. LCO/Appendix R Tracking Log

G. Calculator

H. Spray Cleaner

I. Rags

J. Markers

VIII. Console Operator Instructions

A. Scenario File Summary

1 File bat NRC/04NRC1

	MF/RF/IOR#	Description
a)	trg e1 MODESW	Assigns trigger
b)	trg e2 7316open	Assigns trigger
c)	imf fw02b	2B Condensate Booster Pump Trip
d)	ior zlohs0262a[1] off	Green light off for 2B Condensate Booster Pump
e)	ior zlohs0262a[2] off	White light off for 2B Condensate Booster Pump
f)	imf rh01a	2A RHR Pump tag out
g)	ior ypobkrpmparh fail_power	
h)	ior zlohs745a[1] off	Green light off for 2A RHR Pump
i)	trg e7 withdraw1827	Set rod movement out trigger
j)	Imf rd04r1827 (e7 0)	Drift rod 18-27 out when withdrawn
k)	imf rh01c	2C RHR Pump trip
l)	imf th33a (e1 5:00) 5 20:00	Leak in Drywell
m)	ior ypovfcv74100 fail_power_now	FCV 74-100 tag out
n)	ior zdihs7474a close	FCV 74-74 stays closed
o)	ior zdihs7475a close	FCV 74-75 stays closed
p)	mrf hw01 fast	Advance recorders

VIII. Console Operator Instructions

B. Scenario File Summary

2. File: bat NRC/04NRC1-1

	MF/RF/IOR#	Description
a)	imf ed08c (none 1:00)	Trips unit Board C 1 minute after file triggered
b)	imf fw02a (none 0:20)	Trips 2A Condensate Booster pump
c)	ior an:2xa556a19 alarm_on	Low Condensate Booster Pump Suction alarm
d)	trg e5 false	
e)	imf hp07 (e5 3:00)	Loss of HPCI 120 VAC
f)	imf hp08 (e2 0) 80 20:00	HPCI steam leak
g)	imf hp09	HPCI failes to isolate

3. File: bat app16fg

	MF/RF/IOR#	Description
a)	mrf rh14 byp	Loop I LPCI timers bypassed
b)	mrf rh15 byp	Loop II LPCI timers bypassed

4. File: bat NRC/04NRC1-2

	MF/RF/IOR#	Description
a)	mrf ad01n out dmf ad01n	Pulls fuse closes SRV

5. File: bat NRC/04NRC1-3

	MF/RF/IOR#	Description
a)	imf pc03a-k	Trips all drywell blowers

6. File: bat NRC/04NRC1-4

	MF/RF/IOR#	Description
a)	imf rd08r1827 0	simulate valving out rod
b)	Imf rd06r1827	
c)	dmf rd04r1827	Delete rod drift

VIII. Console Operator Instructions

B. Console Operator Manipulations

ELAPSED TIME	PEK	DESCRIPTION/ACTION
Sim. Setup	pwrst 45	75% power, SU
Sim. Setup	restorepref NRC/04NRC1	Establishes Preference Keys
Sim. Setup	setup	Verify Preference Keys
Sim. Setup	esc	Clears Popup Window
Sim. Setup	F3	Trigger e1 on mode switch (trg e1 MODESW)
Sim. Setup	manual	Trip 2B Condensate Booster Pump.
Sim. Setup	F4	See scenario summary (bat NRC/NRC1)
Sim Setup	manual	a. Tag 2A RHR Pump, b. Tag 2B CBP c. Clear alarms, d. Tag FCV 74-100
Instructor	manual	Provide turnover sheet and pull sheet to crew
While rod 18-27 is being driven to full in	F5	dmf rd04r1827; removes rod drift
When requested to valve out rod 18-27	F6	Valve out rod 18-27 (bat NRC/04NRC1-4)

ROLE PLAY: When requested as Reactor Engineer, the rod will have to be tagged out for troubleshooting, so a new movement sheet is being prepared to restore symmetry. Maintain power until the new sheet is ready.

1 minute after rod 18-27 is valved out and TS addressed	F7	Stuck open SRV (imf ad01n 100)
After DUO has reported trip of C RHR pump or placed loop II in SP cooling	F8	pulls fuse, closes SRV (bat NRC/04NRC1-2)

ROLE PLAY: As OS-US report the fuses for MSRV 1-180 have been removed.

ROLE PLAY: When sent to investigate RHR pump 2C, report it has tripped on overcurrent and maintenance has been called and are on their way.

MORE FOLLOWS ↓

VIII. Console Operator Instructions

B. Console Operator Manipulations

ELAPSED TIME	PEK	DESCRIPTION/ACTION
If requested to start A/B SBGT	F9	Start A / B SBGT (bat sgt_start)
At the direction of Floor Inst.	F10	imf nm16c (APRM 3 fails INOP)
At the direction of Floor Inst.	F11	Loss of feed (See Scenario summary bat NRC/04NRC1-1)
If Requested to perform app 08e, wait 3 minutes	F11	Bypasses GP6 Isol. on Rx Level & DWP (bat app08e)

ROLE PLAY: RadCon calls the Control Room and reports a significant steam leak on 2-FCV-73-16.

ROLE PLAY: If Requested to check RWCU temperatures in Aux. Inst. Rm. wait 3 minutes and report TIS-69-834 A-D reading 185°F

ROLE PLAY: If needed, 5 minutes after dispatched for HPCI 120V blown fuse, replaced blown again.

5 minutes after dispatched report 2C unit board 86 locked out; Electricians are on the way. Investigating 2A Condensate Booster Pump

When asked to perform appendix 8e, wait 5 minutes	F12	Bat app08e
If needed to exceed 280 degrees	<shift>F1	Trip drywell cooling fans (bat NRC/04NC1-3)
If asked to execute Appendix 16F and 16G wait 5 minutes	<shift> F2	LPCI timers bypassed (bat app16fg)
If requested to pump down the torus	<shift> F3 or <shift> F4	Lines up and starts RHR drain pump A (bat app18rhra) Lines up and starts RHR drain pump B (bat app18rhrb)
If asked as fire protection to close the HPCI spray valve, wait 10 minutes	<shift> F5	mrf fp02 close

ROLE PLAY: If asked to investigate FCV-74-74 or 74-75 breaker on 480V RMOV, wait 10 minutes and report fuses blown will attempt to replace.

B. Console Operator Manipulations

Terminate the scenario when the following conditions are satisfied or when requested by Lead Evaluator:

-Reactor rapidly depressurized, and/or emergency depressurized
-Reactor level stable between + 2" and + 51"

IX. Scenario Summary

The unit is operating at 70% power. The 2B Condensate Booster Pump is out of service for repair of an oil leak. The 2A RHR pump is out of service for preventive maintenance. Currently in a 7 day LCO via Tech Spec 3.5.1. FCV 74-100 is tagged out for maintenance.

The crew will commence to raise power by pulling control rods and rod 18-27 will drift out requiring the crew to fully insert it and isolate it.

An MSRV fails open, but closes when the fuses are pulled or breaker opened.

An APRM fails requiring the crew to bypass it

A spurious low suction pressure signal will cause a loss of condensate booster pump 2A. The reactor will scram and condensate booster pump 2C will trip due to a overcurrent lockout of 2C unit board. A loss of normal feedwater will occur. A leak develops on the HPCI steam line which fails to automatically isolate and the crew will have to manually isolate the steam line.

A small steam leak occurs on "A" main steam line inside the drywell, requiring venting, suppression pool sprays, and drywell sprays per EOI-2. The crew may cooldown to lessen the effects of the Main Steam Line leak.

When drywell sprays are attempted, the drywell spray valves fail to open on Loop 2, and the available pump on Loop 1 will not start. Spray failure and drywell cooler failure allows drywell temperature to approach (or exceed) 280 degrees F, necessitating rapid depressurization and/or emergency depressurization.

X. Floor Instructor Instructions

A. Assign crew positions (assign positions based on evaluation requirements for personnel).

1. SRO : Unit Supervisor/Shift Manager _____
2. BUO : Board Unit Operator _____
3. DUO : Desk Unit Operator _____

B. Review the shift briefing information with the operating crew. Provide SRO with a copy of Shift Turnover Sheet, Reactivity Plan, and pull sheet for scenario.

C. Direct the shift crew to review the control boards and take note of present conditions, alarms, etc.

D. Ensure recorders are inking and recording and ICS is active and updating. Note any deficiencies during shift briefing.

E. Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner:

1. Rapid Depressurization and/or ED has been performed

2. RPV level at + 2" to + 51"

XI. Simulator Event Guide

Event 1: **RAISE POWER USING CONTROL RODS**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
CREW	Accepts shift turnover	
SRO	Directs BUO to withdraw rods per movement sheet	_____
BUO	Withdraws rods per movement sheet	_____
DUO	Peer Checks rod withdrawals	_____

Event 2: **ROD DRIFT OUT**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Responds to rod drift annunciator; - identifies rod; - informs SRO; - selects rod and applies insert signal per 2-AOI-85-6 (CR 18-27)	_____
SRO	Enters 2-AOI-85-6 and directs actions	_____
	Checks TS 3.1.3.C (not INOP until maintenance begins)	
	Consults with reactor engineer (and system engineer)	_____
	Directs isolation of HCU (enters LCO 3.1.5 or 3.1.3)	_____
BUO	drives rod to 00 releases insert signal and determines rod settles at 00	_____
DUO	Coordinates isolation of HCU	_____

Event 3: **FAILED OPEN MSRV**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
Crew	Reports "Main Steam Relief Valve Open" alarm (ARP), enters 2-AOI-1-1	
DUO	Identifies open MSRV (1-180)	
	Cycles MSRV and reports still open	
	Places 2-XS-1-202 in Inhibit, identifies valve does not close, returns to Auto	
SRO	Directs outside US to pull fuses/open breaker	
DUO	Report DW-Torus DP ABN LOW	
SRO	Determines 8 hours to restore DP per TS 3.6.2.6	
DUO	Report torus level at -1 inch, EOI-2 entry condition.	
SRO	Enters EOI-2, directs appendix 18 be performed. Also directs all SP cooling be placed in service for open SRV .	
	Determines 2 hr limit to restore SP level per T.S. 3.6.2.2	
DUO	Places all RHR in SP cooling, reports 2C RHR pump trip.	
SRO	Determines 7 day LCO by TS 3.6.2.3, 4, 5, due to 2C RHR pump.	
DUO	Report MSRV closed when fuses pulled or breaker opened	
SRO	Directs leaving fuses pulled or breaker opened	
SRO	Check T.S. 3.4.3, determines no action required	
	Check Appendix R, determines fire watch required after 7 days on SRV and RHR 2C	
SRO	Directs maintenance on relief valve	

XI. Simulator Event Guide (continued)

Event 4: **APRM FAILURE**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Responds to Neutron Monitoring annunciator; reports APRM 3 is upscale and other APRMs are reading normal	_____
SRO	Directs Bypass of APRM 3	_____
	Verifies no entry required into LCO 3.3.1.1 or TRM 3.3.4 due to 3 required operable APRMs	
	Contacts IMs to troubleshoot and repair	_____
BUO	Bypasses APRM 3	_____

XI. Simulator Event Guide (continued)

Event 5: **LOSS OF FEEDWATER**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
DUO	Announces "Cnds Bstr Pump "2A" Suct Press Low" Alarm	
	Announces Condensate Booster Pump 2A trip	
BUO	Announces loss of RFP's	
SRO	Directs manual scram	
BUO	Inserts a manual scram; Places mode switch in shutdown verifies all rods in makes scram report	
Crew	Identifies loss of 2C unit board	
DUO	Trips main turbine	
SRO	Enters EOI-1 on low level and directs:	
	• Verifications of group isolations • Directs/verifies RCIC or HPCI started for level control • Directs entry into AOI-100-1 • Directs/verifies Turbine Bypass valves controlling pressure	
DUO	Verifies Group isolations (2, 3, 6, & 8)	
SRO	Directs 1B CRD pump placed in service IAW 2-AOI-85-3	
BUO	Places 1B CRD pump in service	
DUO	Starts/verifies started RCIC	
	Starts/Verifies started HPCI	
BUO	inserts SRMs & IRMs and follows power down verifies Recirc pumps run back/trip shutdown H_2 water chemistry	

XI. Simulator Event Guide (continued)

Event 5: **LOSS OF FEEDWATER**

SRO	Directs maintenance on 2A Cnd Booster Pump	_____
DUO	Removes unnecessary equipment	_____
SRO	Dispatches US/AUO to check status of 2C unit Board	_____

XI. Simulator Event Guide

Event 6: **HPCI STEAM LEAK**

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
DUO	Identifies R.B high radiation/leak detection annunciator	
SRO	Determines R.B high rad alarm due to HPCI area & Enters EOI-3	
	Evacuates HPCI area	
	Directs HPCI isolated	
DUO	Isolates HPCI	
SRO	Notifies RadCon of HPCI area high radiation	
DUO	Recognizes Fire Pumps are running	
SRO	Directs Fire Protection to coordinate with Rad Con and secure the HPCI Deluge/Spray valve in the HPCI Room	
DUO	Monitors area rad and determines no max safe rad levels exist and rad level/temperature are lowering.	
SRO	Directs Appendix 8E	
SRO	Directs RB ventilation (IAW 8F) be restored	

XI. Simulator Event Guide

Event 7: **DRYWELL STEAM LEAK/ DRYWELL BLOWER FAILURE**

Crew	Identifies drywell pressure/temperature rise	_____
SRO	Enters EOI-2 and re-enters EOI-1 when drywell pressure exceeds 2.45 psig or on Torus level.	_____
DUO	Verifies Diesel generators start	_____
	Directs AUO to monitor D/G	_____
SRO	Directs the following: • All available drywell cooling in service • Venting per App 12 • H_2/O_2 Analyzers placed in service • Directs Appendix 8G	_____ _____ _____ _____ _____
DUO	Verifies all drywell blowers in service	_____
DUO	Vents per Appendix 12	_____
DUO	Places H_2/O_2 Analyzers in service using keylock bypass switches	_____
DUO	Performs App 8G	_____
SRO	Directs cooldown using Bypass valves at 100 F/hr	_____
BUO	Commences cooldown of reactor <100 degrees F/hr	_____
SRO	Directs Appendix 5B from CRD	_____
BUO	Performs Appendix 5B	_____
DUO	Monitors containment parameters and reports rate of rise of suppression chamber pressure and drywell temperature	_____
SRO	Determines venting and plant cooldown will not maintain suppression chamber pressure <12 psig and:	_____
SRO	Directs PSC Sprays be placed in service per 17C	_____
DUO	Places PSC sprays in service per 17C	_____

XI. Simulator Event Guide

Event 7: **DRYWELL STEAM LEAK/ DRYWELL BLOWER FAILURE** (continued)

DUO	Announces trip of RHR pump 2C (if not previously identified)	_____
SRO	When PSC pressure exceeds 12 psig or if determines drywell temperature to exceed 280 degrees F	_____
	• verifies in Safe Region of DW spray curve	_____
	• verifies SP level <18 feet	_____
SRO	Directs drywell blowers removed from service	_____
SRO	Directs drywell sprays initiated	_____
SRO	Directs drywell sprays stopped before drywell pressure drops below 0 psig	_____
SRO	Directs LPCI timers bypassed per Appendix 16F and 16G	_____
DUO	Trips/verifies Recirc pumps tripped	_____
DUO	Removes drywell blowers from service or reports trips of blowers	_____
DUO	Initiates drywell sprays	
	Announces that Loop II DW Spray valves will not open	_____
Crew	Continues to monitor containment parameters	_____
SRO	Direct OS/US to check breaker on FCV-74-74/75	_____
	Directs AUOs to manually open FCV-74-74/75	_____
Crew	Monitors PC temp and pressure	_____
SRO	Determines that cannot maintain DWT < 280 degrees F, and enters C2, Emergency Depressurization (may anticipate ED)	_____

XI. Simulator Event Guide (continued)

Event 7: **DRYWELL STEAM LEAK/ DRYWELL BLOWER FAILURE** (continued)

POSITION	EXPECTED ACTIONS	SAT/UNSAT/COMMENTS
BUO	Opens all BPVs, if directed	
SRO	Directs emergency Depressurization before DWT >280 deg. F	
DUO	Open/verifies 6 ADS valves open	
SRO	Directs level be maintained above -162 using availabie systems	
DUO	Maintains level above -162 using Core Spray, LPCI, RCIC	
SRO	Classifies event as an ALERT (2.1-A)	

XII. Crew Critical Tasks

	TASK	SAT/UNSAT
1.	Rapidly depressurizes RPV with BPV's (if less than 280 F) **or** If drywell temperature cannot be maintained below 280 deg. F emergency depressurizes at 280°F.	_____
2.	Maintain RPV water level above TAF	_____
3.	Isolates HPCI before 2 areas exceeds Max Safe Rad or Temp.	_____

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER ~~HLT0212#1~~

~~8~~ Total Malfunctions Inserted; List: (4-8)
1) Loss of 2A Condensate Booster Pump
2) HPCI steam leak
3) Steam Leak in Drywell
4) Failure of DW Spray Valves
5) Stuck Open SRV
6) Drywell Blower Failures
7) HPCI Fails to isolate
8) Control Rod drifts out

~~4~~ Malfunctions That Occur After EOI Entry; List: (1-4)
1) HPCI failure
2) Steam Leak in Drywell
3) Failure of DW Spray Valves
4) Drywell Blower Failures

~~2~~ Abnormal Events; List: (1-3)
1) Stuck Open SRV
2) Control Rod Drifts Out

~~2~~ Major Transients; List: (1-2)
1) Loss of Normal Feedwater
2) Drywell Leak

~~3~~ EOIs used; List: (1-3)
1) EOI-1
2) EOI-2
3) EOI-3

~~1~~ EOI Contingencies Used; List: (0-3)
1) Rapid Depressurization or C2 Emergency Depressurization

~~80~~ Run Time (minutes)

~~35~~ EOI Run Time (minutes); ~~44~~ % of Scenario EOI Run Time

~~3~~ Crew Critical Tasks (2-5)

~~Yes~~ Technical Specifications Exercised (yes/no)

SHIFT TURNOVER SHEET

Equipment Out of Service/LCOs Unit at 70% power due to 2B Condensate Booster Pump out of service for oil leak. 2B Condensate pump secured per GOI.

2-FCV-74-100 tagged out for maintenance on the actuator, valve has a mechanical locking device installed and is closed. Actuator is removed.

2A RHR pump was found 2 hours ago with no oil in the upper sight glass. Dual Unit matrix addressed and a priority 2 work order has been initiated. The system engineer is evaluating compensatory measures. A 7 day LCO (TS 3.5.1) and 30 day LCO (TS 3.6.2 ,3, 4, & 5) has been entered and the pump has been tagged. Mech maint estimates 3 hours to repair a leaking oil fitting which was found damaged.

Operations/Maintenance For the Shift: withdraw rods per RE instructions to establish rod pattern. Do not exceed 80% power until 2B Condensate Booster Pump is repaired (expected late this shift).

When 2B CBP is restored, return to rated power.

Unusual Conditions/Problem Areas Reactor Engineer Expects Xenon to build-in over next few hours.

Reactivity Control Plan	Issued	Expires
Unit 2 Power Ascension	Today	Next Month

	Name	Office Ext.	Home Phone	Pager
On-Call	IM ENG			
Back-Up	YOUM ENG			

Check	Activity	RE Supt (app)
☐	Startup or Shutdown (circle one)	
☐	Sequence Exchange (describe in purpose)	
☒	Control Rod Pattern Adjustment (describe in purpose	:IMS
☐	Surveillance Testing (describe in purpose)	
☐	Maintenance/Modification (describe in purpose)	
☐	Other (describe in purpose)	

Purpose:

Withdraw rods per attached pull sheet to establish rod pattern for power ascension.
When CBP is returned to service and rods are withdrawn, raise power to rated with flow

Assumptions/Hold Points:

Conduct control rod withdrawals per pull sheet. DO NOT exceed 80% power.
No flow adjustment is anticipated.
Restore 2A CBP to service
Raise power to rated with flow at 10 MWE/min– Notify Reactor Engineer of start.
RE will monitor power ascension.

Critical Parameters/Precautions:

OPRM is inoperable, use Power Flow Map (OPRM INOPERABLE).
DO NOT ENTER REGION I or II OF THE POWER / FLOW MAP.

Power Maneuvering Instructions:

Conduct control rod withdrawals per pull sheet. DO NOT exceed 80% power.
No flow adjustment is anticipated.
Restore 2A CBP to service
Raise power to rated with flow at 10 MWE/min– Notify Reactor Engineer of start.
RE will monitor power ascension.
No PC restrictions are expected for this evolution.

Special Instructions:

Approvals:

Reactor Engineer (Preparer)	IMRE	Date	today
Reactor Engineer (Reviewer)	YOUMRE	Date	today
Reactor Engineer Supervisor		Date	

Implementation Approval:

Operation Manager / Plant Manager	IMMGR	Date	today

Date today

A2 STARTUP SEQUENCE
CONTROL ROD MOVEMENT DATA SHEET

RWM GP	ROD NUMBER	FROM	TO	Rod Movement Completed INITIALS	
				UO (AC)[1]	2nd(AC) / Peer Check [2]
52	14-15	36	48		
52	14-47	36	48		
52	46-47	36	48		
52	46-15	36	48		
49	18-27	24	36		
49	42-27	24	36		
49	34-19	24	36		
49	26-19	24	36		

REMARKS[3]: _____

NOTES:

(1) For all rod moves to position "48," this signoff verifies coupling integrity was checked in accordance with 2-OI-85.

(2) Second party verification by a second UO, RE, or STA is required ONLY when the RWM is inoperable or bypassed while CTP is ≤ 10%. A Peer Checker (not required in emergencies) may initial when second party is not required. "N/A" if not applicable.

(3) Record the rod number and any problems encountered, as applicable.

Reviewed By IMUS today Issued IMRE today
Unit Supervisor Date Reactor Engineer Date

SIMULATOR EVALUATION GUIDE

TITLE REDUCE REACTOR POWER TO 80% AND REMOVE RFP 2B FROM SERVICE, LOSS OF 4KV SHUTDOWN BOARD A, CONTROL ROD ACCUMULATOR MALFUNCTION, FAILURE OF BOTH SEALS ON THE 2A RECIRC PUMP, EHC PUMP LEAK/SCRAM, ATWS/FUEL FAILURE, BPV FAIL CLOSED.

REVISION : 0

DATE : February 16, 2004

PROGRAM : BFN Operator Training

PREPARED BY: _____ / _____
(Operations Instructor) Date

REVIEWED BY: _____ / _____
(Lead Examiner or Designee) Date

REVIEWED BY: _____ / _____
(Operations Training Manager or Designee) Date

CONCURRED : _____ / _____
(Operations Superintendent or Designee) Date

VALIDATION BY : _____ / _____
(Operations SRO: Required for Exam Scenarios Only) Date

NUCLEAR TRAINING

REVISION/USAGE LOG

REVISION NUMBER	DESCRIPTION OF REVISION	DATE	PAGES AFFECTED	REVIEWED BY
0	INITIAL	2/16/04		