FINAL AS-ADMINISTERED SCENARIOS

FOR THE PERRY INITIAL EXAMINATION - MARCH 2002

PERRY

INITIAL LICENSE EXAM

MARCH 5 THRU 13, 2002

The ***as-given scenarios*** including Forms ES-D-1, "Scenario Outline," and ES-D-2, "Operator Actions"

Facility: Perry Scenario No.: 1 Op-Test No.: 2002-01

Examiners: _____ Operators: _____

Initial Conditions: A Reactor startup is in progress following a brief outage. Reactor power is being held at 65% power per SCC request. A xenon transient is in progress. The MFP is in secured status to support recirc valve actuator work. SRV F041E is weeping and causing the Suppression Pool to slowly heatup. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3. Required Action A.3 has been implemented.

Turnover: 1. BOP operator place RHR A in suppression pool cooling mode and lower Suppression Pool temperature to 75 F. ESW A and ECC A are in operation. 2. Maintain 65% power.

Target Critical Tasks: Emergency Depressurization, Restore RPV water level

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Startup RHR A in Suppression Pool cooling mode (TS 3.5.1.A)
2	 ZD1B33K0603A INC	R (RO) I (RO) I (SRO)	Raise reactor power to 70% using recirc flow Recirc Loop A flow controller manual switch failure (slow in open direction)
3	Various ZL1N27R0425A	C (BOP/RO) C (SRO) R (RO)	Reactor Feed Pump A bearing failure / trip RFPT A Lower reactor power to 63% using recirc flow
4	FW02 - 50% CP01: 1E22C0001 MV04: 1E51F0013 / RC03	M (All) C (BOP/RO) C (SRO)	Feedwater System Pipe Break inside Drywell / Reactor Scram HPCS Pump shaft breaks RCIC Injection Valve (F013) failure to Auto open / RCIC Turbine mechanical trip latch failure
5	TH02C 75% ZD1B21S34B	 C (BOP/RO) C (SRO)	Recirc Bottom Head Drain pipe break (5 minute ramp) ADS B Inhibit Switch failure in Normal position
6		M (All)	RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling

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

Objectives:

The BOP operator places RHR A in Suppression Pool Cooling mode to lower Suppression Pool temperature to 75 F.

SCC will request a power increase. While raising recirc flow, Recirc Loop A flow controller manual slide switch will fail in the open direction (slow increase) causing an unplanned increase in reactor power. The crew will recognize the Recirc FCV problem and enter ONI-C51, Unplanned Change in Reactor Power or Reactivity. When the crew identifies the Recirc FCV is opening; its HPU will be shutdown (in order to stop any further opening).

After a plan is implemented to troubleshoot the Recirc Loop A flow controller, RFP A will experience sustained high bearing vibration which will require the RFPT to be tripped. Reactor power to be lowered (final value will be equivalent to a RFP B suction flow of 23.1 Kgpm) using recirc flow to allow the RFPT to be tripped. When RFP A is tripped, a feedwater pipe breaks in the Drywell resulting in a reactor scram.

Following the scram, the HPCS pump will be unavailable due to a shaft break. When RCIC is initiated for level control, the RCIC injection valve will fail to open automatically requiring operator action to manually open the injection valve. After injection is established with RCIC, the RCIC Turbine mechanical trip latch will fail making RCIC unavailable for injection,

A small Recirc pipe break in the Drywell will develop and slowly increase in severity resulting in rising drywell temperature and pressure and lowering RPV water level. As reactor level continues to lower, the crew will place alternate injection systems in service, emergency depressurize the RPV, and maintain adequate core cooling with low pressure ECCS systems in accordance with PEI-B13, RPV Control (Non-ATWS). However, when ADS is inhibited, the ADS Inhibit Switch B will fail which may require the crew to take action to prevent an unintended ADS blowdown.

Discussion of Safety Significance for scenario 1

The BOP operator will place RHR in Suppression Pool Cooling. The SRO will consult Tech Specs because RHR must be declared inoperable for the LPCI mode when RHR is operated in a secondary mode.

SCC will request a power increase. While raising recirc flow, Recirc Loop A flow controller manual slide switch will fail in the open direction (slow increase) causing an unplanned increase in reactor power. The crew will recognize the unplanned change in reactor power and enter ONI-C51, Unplanned Change in Reactor Power or Reactivity. When the crew identifies that Recirc FCV A is opening, it's HPU will be shutdown (in order to stop any further opening).

After a plan is implemented to troubleshoot Recirc Flow Controller A, RFP A will experience sustained high bearing vibration. This is safety significant because it will require the operators to lower reactor power in a controlled manner and then trip the RFPT. Removing the RFP from service is safety significant because the operation directly affects RPV water level control. The trip of the RFPT will directly lead to a Feedwater System pipe break in the Drywell and a reactor scram.

Following the scram, the HPCS pump will be unavailable due to a shaft break. When RCIC is initiated for level control, the RCIC injection valve will fail to open automatically. The RCIC injection valve failure is safety significant because RCIC is the only normal high-pressure injection system available. Operator action will be required to manually open the injection valve allowing RCIC injection. After manual flow control is established with RCIC, the RCIC Turbine mechanical trip latch will fail making RCIC unavailable for injection.

A small Recirc pipe break in the Drywell will develop and slowly increase in severity resulting in rising Drywell temperature and pressure and lowering RPV water level. The Recirc pipe break is safety significant because it directly contributes to the loss of coolant inventory requiring the crew to place alternate injection systems in service and prepare for RPV emergency depressurization to allow injection with low pressure ECCS systems. As RPV level continues to lower and ADS is inhibited, ADS Inhibit Switch B will fail. Failure of the capability to inhibit ADS is safety significant because it places the crew in a condition not anticipated by PEI-B13, RPV Control (Non-ATWS), requiring the crew to take action to prevent unintended RPV emergency depressurization.

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 1 Page 1 of 2

Event Description: Place RHR A in Suppression Pool Cooling

Time	Position	Applicant's Actions or Behavior
		Note: Due to the weeping SRV, Suppression Pool high level
		Alarms may occur due to the heatup of the Suppression Pool
	SRO	Direct BOP to place RHR A in Suppression Pool Cooling
		in accordance with SOI-E12, Section 4.4
	SRO	Declares RHR A inoperable in the LPCI mode due to operating
		RHR A in a secondary mode of operation (SOI-E12, P&L #24)
		References Tech Specs, enters LCO 3.5.1, Condition A
	BOP	Places RHR A in Suppression Pool Cooling.
		Notify HP that a Suppression Pool evolution will be conducted
		Verifies ESW in operation
		Verifies ECC System in operation
		Places RHR A OUT OF SERVICE switch in INOP
		Expected Alarm – H13-P601-20 (A6), RHR A OUT OF
		SERVICE
		Verifies RHR A HX's Outlet Valve, 1E12-F03A is open
		Close RHR A HX's Bypass Valve, 1E12-F048A
		Throttle closed RHR A HX's Outlet Valve, 1E12-F003A
		for 18 to 20 seconds
		Place RHR Pump A control switch to start
		Observes rising amps on RHR Pump A
		Expected Alarm – H13-P601-19 (F9), ADS A
		PERMISSIVE LPCS/RHR A RUN
		Take RHR A Test Valve to Supr Pool, 1E12-F024A to open

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 1 Page 2 of 2

Event Description: Place RHR A in Suppression Pool Cooling

Time	Position	Applicant's Actions or Behavior
		Verifies RHR PUMP A MIN FLOW VALVE, 1E12-F064A, closes
		when RHR A PUMP FLOW, 1E12-R603A, IS > 1650 gpm
		Throttles RHR A HX'S OUTLET VALVE, 1E12-F003A, until RHR A
		PUMP Flow, 1E12-R603A, is 7100-7300 gpm when the RHR A
		TEST VALVE TO SUPR POOL, 1E12-F024A, is full open

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 2 Page 1 of 1

Event Description: Raise reactor power with recirc flow / Recirc Loop A flow controller manual slide switch fails in the open direction (causes slow reactor power increase)

Time	Position	Applicant's Actions or Behavior
	SRO	Provides SRO oversight for power increase
	SRO	Contacts Rx Engineer for power increase recommendation
	RO	Increases reactor power using Recirc Loop Flow Control
		Maintains Recirc loop flows matched within 10%
	RO	Reports an unplanned change in reactor power (increasing)
		Recognizes Recirc FCV A is slowly opening with no operator action
		Arms and depresses the HPU A Shutdown in order to stop further
		movement of Recirc FCV A
	SRO	Enter ONI-C51, Unplanned Change in Reactor Power or Reactivity
		Direct RO/BOP to evaluate subsequent actions
		Notify Reactor Engineering to determine if any power
		distribution limits have been exceeded
	SRO/BOP	Requests Responsible System Engineer and I&C assistance in
		The Control Room to support troubleshooting
	SRO	Notify Operations Management and NRC Resident of ONI-C51
		entry due to drifting Recirc FCV A

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 3 Page 1 of 1

Event Description: Feedwater Pump A Bearing Failure / Manual trip of RFPT A

Time	Position	Applicant's Actions or Behavior
	RO	Respond to alarm - Review ARI 1H13-P680-3 (C6) RFP A VIB
		Monitor RFPT A vibration level
		Dispatch an NLO to RFPT A
		Contact Responsible System Engineer (RSE)
	RO/BOP/SRO	NLO at RFPT A reports squealing noise from RFP end
	RO	Reports requirement to trip RFPT A when vibration level has
		exceeded 4 mils for greater than 3 minutes
	SRO	References ONI-N27 or SOI-N27 (63% power or 23.1 Kgpm limit)
		Direct RO to reduce power with Recirc Flow to 63% power or
		< 23.1Kgpm flow RFP B
		Direct RFPT A to be tripped
	RO	Lowers power with Recirc Flow to 63% (or a RFP B flow of 23.1
		Kgpm)
		Trips RFPT A

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 4 Page 1 of 2

Event Description: Feedwater System Pipe Break Inside Drywell / Reactor Scram / HPCS shaft break / RCIC Injection Valve (F013) failure to Auto open / RCIC Turbine mechanical trip latch failure.

Time	Position	Applicant's Actions or Behavior
	RO	Inform SRO/BOP of reactor scram
		Performs ONI-C71-1, Reactor Scram, immediate actions
	RO/BOP	Report that RPV water level is less than Level 3
	RO/BOP	Verifies RCIC automatic initiation at Level 2 (130 inches)
		Note: RCIC Injection Valve E51-F013 will fail to auto open
	SRO	Enters PEI-B13, RPV Control (Non-ATWS) due to RPV < L3
		or Drywell pressure > 1.68 psig
		- Verifies reactor is scrammed
		- Confirms Reactor Mode Switch is in SHUTDOWN
		- Start Hydrogen Analyzers
		- Verifies reactor shutdown under all condition without boron
		- Verifies SRMs and IRMs inserted
		- Directs pressure control 800 to 1000 psig using BPVs
		Enters PEI-T23, Containment Control
		- Operate all available Drywell Cooling
		- Restore Drywell Cooling per PEI-SPI 2.1
	RO/BOP	(May) report indications of Feedwater line break

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Event Description: Feedwater System Pipe Break Inside Drywell / Reactor Scram / HPCS shaft break / RCIC Injection Valve (F013) failure to Auto open / RCIC Turbine mechanical trip latch failure.

Time	Position	Applicant's Actions or Behavior
	SRO	RPV Level Control
		- Direct restore and maintain RPV level between 185
		and 215 inches
		- Direct level control with RCIC and HPCS
		- Direct RO/BOP to isolate Feedwater line break (if recognized)
	RO/BOP	Report failure of RCIC Injection Valve E51-F013 to open
		Manually opens RCIC Injection Valve E51-F013
	RO/BOP	Determine RCIC has tripped
		Direct NLO to investigate RCIC trip
		Report RCIC trip to SRO
	RO/BOP	Determine HPCS is not operating properly
		Direct NLO to investigate HPCS failure (pump)
		Report HPCS pump failure to SRO
	SRO	Determine RPV level cannot be maintained between
		185 and 215 inches
		Direct restore and maintain RPV level between 0 and 215 inches
		using SLC Demin Water Alternate Injection per PEI-SPI 4.5
	BOP/RO	When directed, line up and inject SLC per PEI-SPI 4.5

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Event Description: Recirc Bottom Head Drain pipe break / ADS B Inhibit Switch failure in Normal position

Time	Position	Applicant's Actions or Behavior
	SRO	Determine RPV level cannot be maintained > 0 inches
		Direct maximum injection with CRD per PEI-SPI 4.1
		Direct start of available low pressure ECCS pumps
	SRO	Determines Containment Spray required at 2.25 psig.
		Maintains Containment pressure below PSP
	BOP/RO	Lineup and inject CRD per PEI-SPI 4.1
		When directed, start available low pressure ECCS pumps
	BOP/RO	Report MSIVs closed when RPV level reaches L1 (16.5")
	SRO	When RPV level reaches L1 (16.5")
		- Executes PEI-M51/56, Hydrogen Control
		Directs energization of Hydrogen Igniters
		- Direct Inhibit ADS
		- Directs pressure control 700 to 900 psig using SRVs
	BOP/RO	When directed, inhibit ADS
		Identify and report failure of ADS B Inhibit switch to SRO
		Report Alarm H13-P601-19 (D10), ADS LOGIC B TIME DELAY
		LOGIC TIMER RUNNING
	SRO	Acknowledge failure of ADS B Inhibit switch
		Direct delay of ADS actuation in accordance with SOI-B21,
		Section 7.4 or direct RO and BOP to prepare for an automatic
		ADS actuation

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Event Description: RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Energize Hydrogen Igniters
	RO/BOP	Delay ADS actuation in accordance with SOI-B21 as directed
	SRO	When RPV level reaches 0 inches, confirm injection subsystem
		lined up with pump running
		When RPV level reaches – 25 inches, PEI-B13 Emergency
		Depressurization is entered and executed concurrently with
		PEI-B13, RPV Control (Non-ATWS), exit Pressure Control Leg
	SRO	Directs BOP/RO actions per PEI-B13 Emergency Depressurization
		- Confirm Reactor shutdown under all conditions without boron
		- Determines Drywell pressure > 1.68 psig and low press ECCS
		required for adequate core cooling.
		- Verifies eight or more SRVs are not open
		- Verifies Suppression Pool level is > 5.25 feet
		- Direct all ADS valves opened to rapidly depressurize the RPV
	BOP/RO	When directed, open all ADS valves or verify automatic ADS
		actuation occurs when expected and all ADS valves open
	SRO	Confirms all ADS valves are open
		Direct maximum injection flow with all available systems
	BOP/RO	Maximize injection flow with available injection system until
		adequate core cooling is assured

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. All Control Rods are fully inserted
		2. The reactor has been emergency depressurized
		3. Low pressure ECCS Systems are being used to restore RPV
		level above TAF (normal level band is 185 to 215 inches)
		4. Containment and Drywell parameters are being restored per
		PEI-T23, Containment Control

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Event Description: Critical Task #1

Time	Position	Applicant's Actions or Behavior
		*** This critical task does not apply if ADS actuation occurs**
		automatically
		Critical Task #1 – When RPV water level cannot be maintained
		greater than zero inches, initiate Emergency Depressurization
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering without adequate high pressure
		injection available
		3. Measured by:
		- Observation – at least 5 SRVs open
		4. Feedback:
		- Reactor pressure trend
		- Suppression Pool temperature trend

Op-Test No.: 2002-01 Scenario No.: 1 Event No.: 6 Page 1 of 1

Event Description: Critical Task #2

Time	Position	Applicant's Actions or Behavior
		Critical Task #2 – When RPV water level cannot be maintained
		greater than zero inches and RPV depressurization is in progress,
		increase and control injection into the RPV to restore and maintain
		RPV level greater than zero inches.
		1. Safety Significance:
		- Establish adequate core cooling
		2. Cues:
		- RPV pressure trend
		- Procedural compliance
		3. Measured by:
		- RPV injection is established and level is above the
		TAF and rising
		4. Feedback:
		- Lowering Suppression Pool level
		- Lack of Hydrogen generation
		- RPV level and pressure indications

PERRY OPERATIONS MANUAL

Off-Normal Instruction

UNPLANNED CHANGE IN REACTOR POWER OR REACTIVITY

EFFECTIVE DATE: 3-14-01

EFFECTIVE PIC's

PIC No.	Type of Change	Effective Date
1	Non-Intent	12-18-01

1.0 SYMPTOMS

Operating in the MANUAL SCRAM REQUIRED or IMMEDIATE EXIT (and unintentional operation in the INCREASED AWARENESS) Regions of the Power to Flow Map with less than the minimum required number of OPRMs to maintain trip capability constitutes an entry condition to this instruction. Unplanned changes in reactor power, and recirculation loop jet pump flow mismatch exceeding Technical Specification limits also constitute entry conditions to this instruction.

NOTE

The actions, notes, and cautions in this ONI are not applicable to intentional operation in the INCREASED AWARENESS Region such as occurs during plant startup per IOI-3.

NOTE

All actions in this ONI are based on the Two Loop Power to Flow Map, Attachment 2. Actions directed by other ONIs and IOIs are based on the appropriate Power to Flow Map in PDB-A0006.

1.1 Alarms

1. SRM PERIOD SHORT
2. ROD BLOCK SRM UPSC/INOP
3. ROD BLOCK SRM DOWNSCALE
4. ROD BLOCK IRM UPSCALE
5. IRM A/E [(B/F), (C/G), (D/H)] UPSC TRIP/INOP
6. ROD BLOCK IRM DOWNSCALE

7. LPRM UPSCALE

8. LPRM DOWNSCALE

9. ROD BLOCK APRM UPSCALE

10. APRM A/E [(B/F), (C/G), (D/H)] UPSC INOP/TRIP OPRM A/E TRIP

11. ROD BLOCK APRM DOWNSCALE

12. RCIRC A(B) MOTOR LOCKOUT

13. RCIRC A(B) AUTO XFER INCOMPLETE

14. RCIRC A(B) MG SET LOCKOUT

15. MAST/FLUX CONT TROUBLE

16. FCV A(B) MOTION INHIBITED

17. FCV A(B) HPU INOP

18. RECIRC A(B) FCV RUNBACK

19. ROD BLOCK APRM RCIRC FLOW HI

1.2 Parameters

1. Reactor power changes.

2. Reactor level changes.

3. MAIN GEN MWATTS changes.

4. FEEDWATER FLOW & MAIN STEAM FLOW change.

5. Recirculation loop flows mismatched.

2.0 AUTOMATIC ACTIONS

1. Possible rod block or reactor scram due to high flux level.

2. Possible rod block due to low flux level.

3.0 IMMEDIATE ACTIONS

NOTE

Attachment 1 includes a discussion of some of the items below.

1. If any of the following conditions is met, perform the following actions: <B00052>

   Conditions

   - A portion of the control rods have scrammed

   or

   - Power oscillations are observed

   or

   - An unexplained power increase has occurred which cannot be quickly terminated (Operator judgment)

   a. Arm and depress the RPS MANUAL SCRAM CH A, B, C, and D pushbuttons.
   b. Exit this instruction and enter ONI-C71-1, Reactor Scram.

2. If less than the minimum required number of OPRMs to maintain trip capability are operable and any of the following conditions is met, perform the following actions: <B00052>

Conditions
- The current loadline is > the 95.2% loadline and core flow is less than 42 Mlbm/hour. or - The REACTOR MODE SWITCH is in RUN and no Recirculation Pump is operating (in fast or slow speed).

   a. Arm and depress the RPS MANUAL SCRAM CH A, B, C, and D pushbuttons.
   b. Exit this instruction and enter ONI-C71-1, Reactor Scram.

3. For an unexplained increase in reactor power, restore power to less than or equal to the power level prior to the increase.

4. If the flow cannot be controlled to maintain reactor power less than the desired level, arm and depress the HPU A(B) SHUTDOWN.

4.0 SUBSEQUENT ACTIONS

NOTE
Operating with a reduced feedwater temperature (e.g., without all feedwater heaters in service) will increase the likelihood of power oscillations. Increased caution is warranted when operating within the INCREASED AWARENESS Region of the Two Loop Power to Flow Map, Attachment 2. <B00916>

CAUTION
Minimum Critical Power Ratio (MCPR) is undefined for reactor power levels between 23.8% and 90% thermal power when one Steam Bypass and Pressure Regulator (SB&PR) System pressure regulator is out of service. (T.S. 3.2.2)

1. For unintentional entries into the IMMEDIATE EXIT or INCREASED AWARENESS Regions of the Two Loop Power to Flow Map, Attachment 2 with less than the minimum required number of OPRMs to maintain trip capability operable:

NOTE

Core flow decreases, feedwater temperature decreases, and control rod withdrawals increase the likelihood of power oscillations. <B00916>

a. Monitor APRMs, LPRMs, and SRM PERIOD meters.

NOTE

The preferred method for exit is opposite to the operation which caused entry (e.g., if a decrease in recirculation flow caused entry, exit by increasing recirculation flow). Exit from the IMMEDIATE EXIT Region should not be delayed to start additional equipment (e.g., HPUs, RFPTs). Both recirculation flow increase and control rod insertion may be used to exit in which case recirculation flow increase should precede control rod insertion.

b. If increasing reactor recirculation flow is desired to exit the IMMEDIATE EXIT or the INCREASED AWARENESS Regions, observe the following limitations:

Limitations -
- Do not start a Reactor Recirculation Pump or shift a Reactor Recirculation Pump from slow to fast speed while operating within the IMMEDIATE EXIT Region,

and
- Do not start a Reactor Recirculation Pump or shift a Reactor Recirculation Pump from slow to fast speed without Reactor Engineering concurrence while operating in the INCREASED AWARENESS Region,

and
- Do not increase core flow if:
  - Only one Reactor Recirculation Loop is in operation,

  and
  -
    - Reactor thermal power is ≤ 30 %,

    or
    - JP LOOP TOT FLOW, 1B33-R612B(A), is ≤ 52 Mlbm/hr.
- Do not increase recirculation loop flow > 103% on RCIRC LOOP B(A), C51-R614 red(blue) pen

c. If control rod insertion is required to exit the IMMEDIATE EXIT Region, insert Cram Rods per FTI-B02.

CAUTION

Control rod insertion below the 61.9% load line may result in Reactor Recirculation Pump(s) downshifting to slow speed due to feedwater flow venturi inaccuracies. This may result in a RCIS lockup due to control rods out-of-pattern.

d. Contact Reactor Engineering to determine if operation in the INCREASED AWARENESS Region may continue or if control rod insertion is required to exit.

e. If unable to exit the IMMEDIATE EXIT Region, refer to PTI-B33-P0003.

2. When operating ≥ 23.8% power, perform the following:

   a. Direct STA to gather data from the ICS and evaluate the power excursion to determine if the licensed power level limitations of IOI-3 have been exceeded.
   b. Notify Reactor Engineering to determine if any local/gross power limits or power distribution limits have been exceeded.
   c. If required during performance of the following step, perform SVI-C11-T1022 prior to control rod withdrawal.
   d. If a local power peak is indicated, flatten the flux distribution using control rods as directed by a Reactor Engineer.
   e. When time permits, forward the data gathered from ICS to Reactor Engineering

3. When operating < 23.8% power, notify Reactor Engineering.

4. If an unexplained change in reactivity or flux level occurs during refueling operations:

   a. Suspend core alterations.
   b. Fully insert all insertable control rods.

NOTE

Designated individuals for Containment Closure may be utilized to assist in closing Containment Airlock Doors per SOI-P53.

   c. Evacuate the Containment and evaluate need to establish Containment Integrity or to implement the Containment Closure plan.
   d. Contact Health Physics and request initiation of surveys.
   e. If a reactor scram occurs, reset the scram and continue in this instruction. Do not enter ONI-C71-1, Reactor Scram.

5. The following steps list possible causes for unplanned power changes along with guidance for each case. Each case must be evaluated individually by shift personnel to determine which corrective actions are appropriate.

a. Recirculation Flow Change:

1) If one or both Reactor Recirculation Pumps have tripped, perform Section 4.1, Reactor Recirculation Pump Trip.

2) If both Reactor Recirculation Pumps are operating, perform Section 4.2, Reactor Recirculation Flow Control Malfunction.

3) If a Recirc FCV Runback has occurred, perform the following:

a) If the Runback was caused by an RFPT trip, enter ONI-N27, Feedwater Pump Trip.
b) If the Runback was caused by a loss of Main Condenser Vacuum, enter ONI-N62, Loss of Main Condenser Vacuum.

b. Rod Drop:

1) Enter ONI-C11-3, Control Rod Drop.

c. Nuclear Instrumentation failure:

1) Verify channel malfunction by observing other instrument channels.

2) If possible, bypass the failed channel per SOI-C51(APRM), SOI-C51(IRM), or SOI-C51(SRM), as applicable.

3) If required, reset RPS A(B) per SOI-C71.

4) Refer to Technical Specifications 3.3.1.1, Reactor Protection System (RPS) Instrumentation.

d. Loss of Feedwater Heating:

NOTE
A loss of feedwater heating will result in increased inlet subcooling and hence a reactor power increase.

1) Enter ONI-N36, Loss of Feedwater Heating.

e. Feedwater Level Control Failure:

NOTE
A change in feed flow will cause a corresponding change in reactor power.

1) Enter ONI-C34, Feedwater Flow Control Malfunction.

f. Reactor Recirculation System Vortexing:

NOTE
Operation at high Loadlines with conservatively adjusted APRMs will increase the probability of APRM upscales due to Reactor Recirculation System Vortexing.

1) If Reactor Recirculation System Vortexing is suspected, confirm vortexing to be the cause of the power change per the following:

a) Using the ICS, plot the following parameters of the event:

- Total Core Flow
- Recirc Drive Flow
- Recirc Flow Control Valve Position
- APRM Flux

NOTE

An increase in Recirc Drive Flow and Total Core Flow with no corresponding change in Recirc Flow Control Valve position or Recirc Pump speed, is indicative of a vortexing event.

b) Direct the Shift Technical Advisor to confirm the existence of a vortexing event.

2) If existence of a vortexing event is confirmed, perform the following:

a) Confirm that the Maximum Thermal Power during the event did not exceed 102% (3833 MWth).

NOTE

This step may be performed by monitoring the 3DMONICORE alarm typer and verifying that point ID B21MD003 did not receive a HI-HI alarm.

b) Forward the ICS point plots of the vortexing event to Reactor Engineering.

c) If confirmed that the reactor power change was caused only by a vortexing event, exit this ONI.

g. Steam Bypass and Pressure Control Failure:

1) Enter ONI-C85-1 or ONI-C85-2, Pressure Regulator Failure Closed (Open).

h. Initiation of ECCS:

1) Enter ONI-E12-1, Inadvertent Initiation of ECCS/RCIC.

c. When the Reactor Recirculation Pump(s) have been restarted, verify the following RWCU lineup:

Valve	MPL	Position
RWCU INLET THROTTLE FM RECIRC	1G33-F102	Open
RWCU SUCT VLV FM RCIRC LOOP A	1G33-F100	Open
RWCU SUCT VLV FM RCIRC LOOP B	1G33-F106	Open

d. Exit this instruction and operate per the appropriate IOI.

5. If the tripped Reactor Recirculation Pump(s) have not been restarted, perform the following:

   a. If the plant is in Mode 1 or 2, perform SVI-B33-T1169, Establishing Limits for Single Loop Operation, within 24 hours of the pump trip.
   b. When SVI-B33-T1169, Establishing Limits for Single Loop Operation, has been completed, exit this instruction and operate per the appropriate IOI.

6. Refer to Technical Specifications:

   a. 3.4.1, Recirculation Loops Operating
   b. 3.4.11, RCS Pressure and Temperature (P/T) Limits

4.2 Reactor Recirculation Flow Control Malfunction

1. If the reactor power cannot be reduced to less than the desired value with recirculation flow, perform the following:

   a. If possible, balance RCIRC LOOP A and B flows.
   b. Insert Cram Rods per FTI-B02, Control Rod Movements.

2. If the flow control malfunction was due to a Reactor Recirculation Pump downshifting from fast to slow speed, perform the following:

CAUTION

If less than the minimum required number of OPRMs to maintain trip capability are operable:

- Do not shift a Reactor Recirculation Pump from slow to fast speed while operating within the IMMEDIATE EXIT Region of the Two Loop Power to Flow Map, Attachment 2.
- In the INCREASED AWARENESS Region, do not shift a Reactor Recirculation Pump from slow to fast without Reactor Engineering concurrence.

a. When allowed by plant conditions, shift the affected pump(s) to fast per SOI-B33.

NOTE

Recirculation loop jet pump flow mismatch is:
JP LOOP TOT FLOW, 1B33-R612A - JP LOOP TOT FLOW, 1B33-R612B

Total core flow is:
JP LOOP TOT FLOW, 1B33-R612A + JP LOOP TOT FLOW, 1B33-R612B

3. If recirculation loop jet pump flow mismatch exceeds 5.2 Mlbm/hr with total core flow ≥ 72.8 Mlbm/hr or 10.4 Mlbm/hr with total core flow < 72.8 Mlbm/hr, perform the following:

   a. If possible, balance RCIRC LOOP A and B flows.

NOTE

Operation of one recirculation loop with drive flow < ½ of the drive flow in the other loop may result in the need to track fatigue usage on the jet pumps. Drive flow is read on RCIRC LOOP A FLOW, C51-R614 (blue pen) and RCIRC LOOP B FLOW, C51-R614 (red pen).

b. Record the following in the narrative log:

- RCIRC LOOP A FLOW, C51-R614 (blue pen)
- RCIRC LOOP B FLOW, C51-R614 (red pen)
- JP LOOP TOT FLOW, 1B33-R612A
- JP LOOP TOT FLOW, 1B33-R612B
- Time when delta flow started
- Time when delta flow ended

NOTE

Recirculation loop jet pump flow mismatch is:
JP LOOP TOT FLOW, 1B33-R612A - JP LOOP TOT FLOW, 1B33-R612B

Total core flow is:
JP LOOP TOT FLOW, 1B33-R612A + JP LOOP TOT FLOW, 1B33-R612B

c. If RCIRC LOOP A and B flow recirculation loop jet pump flow mismatch exceeds 5.2 Mlbm/hr with total core flow $\geq$ 72.8 Mlbm/hr or 10.4 Mlbm/hr with total core flow < 72.8 Mlbm/hr for greater than 2 hours, then perform the following:

1) Contact Reactor Engineering to assist in establishing a loadline less than or equal to the 100% loadline.

NOTE

Cram Rods, control rods per the Control Rod Movement Sheet, or a Special Maneuver Sheet may be used to establish the loadline.

2) Declare the Reactor Recirculation Pump with the lower flow to be NOT IN OPERATION.

3) If the running pump is in fast, reduce the running pump's flow as necessary to maintain the following limits:

Parameter	Indicator	Limit
RCIRC PUMP A AMPS	B33-R609A	≤ 307 amps
RCIRC LOOP A FLOW	C51-R614 (blue pen)	greater than 45% and less than 103%
RCIRC PUMP A STATOR TEMP	1B33-R601 pts 5, 6 & 7 computer point B33BA001	≤ 248°F

Parameter	Indicator	Limit
RCIRC PUMP B AMPS	B33-R609B	≤ 307 amps
RCIRC LOOP B FLOW	C51-R614 (red pen)	greater than 45% and less than 103%
RCIRC PUMP B STATOR TEMP	1B33-R601 pts 17, 18 & 19 computer point B33BA006	≤ 248°F

NOTE

The following two steps must be completed within one hour of the Reactor Recirculation Pump being declared to be NOT IN OPERATION. (T.S. 3.4.1 and ORM 6.3.3)

4) Insert control rods per FTI-B02 as necessary to reduce reactor power to ≤ 66.5% (2500 MWt).

5) Record the following in the Plant Narrative Log:

a) Running loop's flow, RCIRC LOOP B(A) FLOW, C51-R614 red(blue) pen
b) Reactor thermal power (in MWt)
c) Both pump's recirculation loop flow control mode

4. If AFDL IN CONTROL, 1H13-P680-4 window E9, is in alarm, refer to ARI-H13-P680-4.

5. If HPU failure is indicated, shift HPU sub-loops per SOI-B33.

6. Refer to Technical Specifications:

a. 3.4.1, Recirculation Loops Operating
b. 3.4.2, Flow Control Valves (FCV)
c. 3.4.11, RCS Pressure and Temperature (P/T) Limits

7. When the malfunction is corrected:

a. If MAST/FLUX CONTROL TROUBLE alarm was received, reset the appropriate channel at Recirculation Flow Control Instrumentation Panel, 1H13-P634, Rack 1, Nest 10, Card 7.
b. Return the Reactor Recirculation Flow Control System to the desired operating mode per SOI-B33.

5.0 RECORDS

5.1 Records Handling

Records completed/generated by this guideline shall be handled in accordance with each plant's established records management program.

Facility: Perry Scenario No.: 2 Op-Test No.: 2002-01

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at 100% power. A xenon transient is in progress. RHR B is in secured status for preventive maintenance on the pump breaker. RHR B was declared inoperable five hours ago per Tech. Spec.3.5.1, Action A; 3.6.1.7, Action A; and 3.6.2.3, Action A. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3. Required Action A.3 has been implemented. HPCS System operation is scheduled to support flow rate testing.

Turnover: 1. BOP operator place HPCS in full flow test mode to the suppression pool. The RSE is standing by to take flow measurements locally. HPCS ESW and HPCS Pump Room Cooler are in operation. 2. Maintain 100% power.

Target Critical Tasks: Initiate action to shutdown the reactor, Inhibit ADS, Terminate and Prevent injection into the RPV, Emergency Depressurization, Restore RPV water level.

Event No.	Malf. No.	Event Type*	Event Description
1	NM04D 100%	I (RO) I (SRO)	APRM D failure upscale (TS 3.3.1.1.A and ORM 6.2.1.B)
2		N (BOP) N (SRO)	Start HPCS in full flow test mode to the Suppression Pool (TS 3.5.1. B and C)
3	CP03: 1E22C0001 100%	C (BOP) C (SRO)	HPCS Pump flow degradation (2 minute ramp)
4	AD01N	C (BOP) C (SRO)	ADS/SRV B21-F047H cycling (TS 3.5.1.E, F and H / TS 3.0.3)
		R (RO)	Lower reactor power to 90% using recirc flow
5	CN03: 1C34R060B 20%	I (RO) I (SRO)	Reactor Feed Pump Controller B oscillations (1 minute ramp)
6	ED06I	C (BOP) C (SRO)	Loss of 480Vac Bus F-1-E
	TC05 10%		Turbine Control EHC leak / Main Turbine trip and reactor scram
7	RD15	M (All)	ATWS (failure of RPS and ARI to automatically shutdown the reactor)
	SL01A SL01B		SLC Squib Valve failures, C41-F004A and C41-F004B
8	CB01: 1N27C0001A CB01: 1N27C0001B CB01: 1N27C0001C CB01: 1N27C0001D	M (All)	Loss of all Feedwater capability (all RFBPs trip)
9		M (All)	RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling
	RV04: 1B21-F0041F	C (BOP)	ADS/SRV B21- F041F failure closed

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

2002 Perry NRC Examination
Scenario Objectives
Safety Significance Discussions
Scenario 2

Objectives:

APRM D fails upscale to cause a control rod withdrawal block and RPS ½ scram signal. Tech Spec 3.3.1.1 (RPS) will be consulted. The RO will bypass APRM D and then reset the RPS 1/2 scram.

The BOP operator will place HPCS in the full flow test mode to support flowrate testing. After HPCS flow is stabilized for the test, HPCS Pump flow will be degraded requiring the HPCS System to be shutdown. HPCS will be declared inoperable.

After Tech. Specs. have been consulted, an ADS/SRV will open and cycle due to shorted switch contacts; the crew will enter ONI-B21-1, SRV Inadvertent Opening/Stuck Open, evacuate the Containment, reduce reactor power to 90% using recirc flow, and de-energize the SRV solenoids by removing control power fuses. After the SRV closes, Tech Specs must again be consulted and the loss of HPCS and ADS will require a Tech. Spec. 3.0.3 entry.

The crew will respond to a RPV level transient due to Feedwater Flow Controller A oscillations that require entry into ONI-C34, Feedwater Flow Control Malfunction, and manual control of feedwater flow.

After conditions have stabilized, a loss of 480 Volt Bus F-1-E will result in a loss of the running EHC Pump B, TBCC Pump C, and CVCW Chiller A (in addition to other loads). Following auto start of standby EHC Pump A, the EHC System will develop a leak which will slowly increase in severity until the reactor is manually scrammed and the Main Turbine is tripped or the Main Turbine trips automatically.

When the reactor scrams, the control rods will fail to fully insert due to blockage in the scram discharge volume. PEI-B13 (RPV Control-ATWS) is entered and executed to stabilize the plant. SLC squib valves will fail to fire.

After PEI ATWS actions are underway and RPV level has reached +100" above TAF), Feedwater System capability is lost and the RCIC system will be unable to provide adequate makeup. Therefore, the crew will emergency depressurize the RPV to allow for low pressure ECCS injection. An additional ADS/SRV will fail to operate during the emergency depressurization.

Discussion of Safety Significance for scenario 2

APRM D fails upscale to cause a control rod withdrawal block and RPS ½ scram signal. Tech Spec 3.3.1.1 (RPS) will be consulted. The RO will bypass APRM D and then reset the RPS 1/2 scram.

The BOP operator will place HPCS in the full flow test mode. After HPCS flow is stabilized for the test, the BOP operator must note that HPCS Pump flow is degraded. This is safety significant because the HPCS System is inoperable and unavailable for core cooling.

Next, an ADS/SRV will open and cycle due to shorted switch contacts; the crew will enter ONI-B21-1, evacuate the Containment, reduce reactor power, and deenergize the SRV solenoids by removing control power fuses. This is safety significant because the cycling SRV directly affects core reactivity and results in a rising Suppression Pool temperature. When SRV fuses are pulled, the crew must determine that the ADS/SRV is inoperable and unavailable. This is safety significant because it further degrades the status of the high-pressure ECCS systems, thus requiring entry into Tech. Spec. 3.0.3.

The crew will then respond to a RPV level transient due to Feedwater Flow Controller A oscillations. This is significant because it requires manual control of RPV water level to terminate the level transient.

After conditions have stabilized, a loss of 480 Volt Bus F-1-E will result in a loss of running EHC Pump B, TBCC Pump C, and CVCW Chiller A (in addition to other loads). This is safety significant because it requires the crew to evaluate plant status and enter the appropriate ONIs for the 480-Volt bus failure and TBCC Pump trip. Following the auto start of the standby EHC Pump A, a turbine control EHC leak will develop. This is safety significant because the crew must recognize the EHC leak, manually scram the reactor, and trip the Main Turbine before the Main Turbine trips automatically.

When the reactor is scrammed, the control rods fail to fully insert due to blockage in the scram discharge volume. The failure of control rods to insert is safety significant because it will require the operators to take PEI ATWS actions to shutdown the reactor, control reactor level, and control reactor pressure.

During ATWS actions, the SLC squib valves will fail to fire. This failure is safety significant because it will lengthen the time required to achieve reactor shutdown.

Following the loss of the Feedwater System, the crew must determine that the RCIC System will be unable to provide adequate makeup, thereby challenging the ability to maintain adequate core cooling. This is safety significant because emergency depressurization will be required to establish controlled injection with low pressure ECCS to assure adequate core cooling. An additional ADS/SRV will fail to operate during the emergency depressurization. Failure of the ADS SRVs to open is safety significant because the crew must recognize the failure and open additional SRVs.

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 1 Page 1 of 1

Event Description: APRM D failure upscale / bypass failed APRM / reset ½ scram

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports APRM D failure upscale
		Recognizes and report RPS half-scram
		Recognizes and reports control rod withdrawal block
		Closely monitors remaining APRMs
	BOP	Assists RO by consulting ARIs:
		- ARI-H13-P680-6 (E5), APRM D/H UPSC INOP/TRIP
		- ARI-H13-P680-5 (B9), ½ SCRAM B/D
		- ARI-H13-P680-5 (B7), RPS NEUTRON MON TRIP
		- ARI-H13-P680-5 (E10), ROD WITHDRAWAL BLOCK
	SRO	Acknowledge report of APRM failure, ½ scram, and rod block
		Directs APRM back panel indications checked
	SRO/BOP	Requests I&C and Responsible System Engineer assistance in the
		Control Room to support troubleshooting
	SRO	Consults Tech Spec 3.3.1.1 and ORM 6.2.1
		Direct RO to bypass APRM D and reset ½ scram
		Notifies Operations Management of APRM failure & actions taken
	RO	Bypass APRM D per SOI-C51 (APRM), Section 7.1
		Reset half-scram B/D per SOI-C71, Section 7.3
		Observes APRM, Rod Block, and RPS alarms clear

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 2 Page 1 of 1

Event Description: Place HPCS in Full Flow Test

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to place HPCS in Full Flow Test per SOI-E22A, Section 7.5
		Declares HPCS inoperable due to operation in a secondary mode
		(SOI-E22A P&L # 17)
		- References Tech Spec 3.5.1.B & C (verifies RCIC is OPERABLE)
	BOP	Places HPCS in Full Flow Test
		- Places HPCS OUT OF SERVICE Switch in INOP
		Expected Alarm H13-P601-16 (D4), HPCS OUT OF SERVICE
		- Notify HP that a Suppression Pool evolution will be conducted
		- Verifies HPCS ESW loop in operation
		- Verifies HPCS Pump Room Cooling in operation
		- Notifies SRO HPCS suction shift to the Supp Pool is required
		- Performs SOI-E22, Section 5.2 as SRO directs
		Note: CST Suction automatically closes when Supp Pool
		Suction Valve opens. No expected alarms
		- Verifies HPCS Supp Pool Suction Valve, 1E22-F015 is open
		- Verifies HPCS CST Suction Valve, 1E22-F001 is closed
		- Place HPCS Pump control switch to start:
		Observes rising pump discharge pressure
		Observes rising pump amps
		Expected Alarm, H13-P601-16 (A5), HPCS PUMP
		START SIGNAL RECEIVED
		Observes HPCS Min Flow Valve opens
		- Hold HPCS Test Valve to Supp Pool, 1E22-F023 in open:
		Flow approximately 6900 gpm on E22-R603 with Test
		Valve fully open
		E22-R616, Pump Amps, approximately 320 amps
		E22-R601, Discharge Press, approximately 300 psig

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 3 Page 1 of 2

Event Description: HPCS Pump flow degradation / shutdown HPCS

Time	Position	Applicant's Actions or Behavior
	BOP	Responds to unexpected alarm H13-P601-16 (H5), HPCS
		WATER LEG PUMP DISCH PRESS LO
		Determines HPCS Pump flow is degrading
		Notify SRO that HPCS Pump flow is degraded, as indicated by
		discharge press slowly going to 0 psig / flow going to 0 gpm
	SRO	**Note: SRO may direct BOP to immediately shutdown HPCS**
	SRO	Acknowledge report of degraded HPCS Pump flow
		Directs BOP to shutdown HPCS per SOI-E22A, Section 7.5
	SRO/BOP/RO	Requests Maintaince and Responsible System Engineer (RSE)
		assistance to support troubleshooting
	SRO/BOP/RO	NLO at HPCS Pump reports HPCS Pump is extremely noisy
	SRO	Notify Operations Management of HPCS inoperability
		Note: Must declare HPCS inoperable per Tech Specs prior
		to receiving following recommendation from RSE
	SRO/BOP/RO	NLO at HPCS Pump recommends placing HPCS in secured status
	SRO	Directs BOP to place HPCS in Secured Status in accordance
		with SOI-E22A, Section 6.2
		Note: May confer with Shift Manager prior to directing
		HPCS be placed in secured status

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 3 Page 2 of 2

Event Description: HPCS Pump flow degradation

Time	Position	Applicant's Actions or Behavior
	BOP	Inform SRO a Procedure Deviation is required because flow
		cannot be lowered to 500 to 600 gpm. (flow indicates 0 gpm)
	SRO	Authorizes a Procedure Deviation as required
		Note: May consult with Shift Manager prior to authorizing
	BOP	Shutdown HPCS per SOI-E22A, Section 7.5
		- Hold HPCS Test Valve to Supp Pool, 1E22-F023 to Close
		and verify valve fully closed:
		Alarm H13-P601-16 (H5), HPCS WATER LEG PUMP
		DISCH PRESS LO clears when 1E22-F023 is closed
		- Take HPCS Pump control switch to Stop:
		Alarm, H13-P601-16 (A5), HPCS PUMP
		START SIGNAL RECEIVED clears
		Places HPCS in Secured Status using SOI-E22A, Section 6.2
		as directed
		Note: Placing HPCS in shutdown instead of secured
		status will not affect the scenario outcome.

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 4 Page 1 of 2

Event Description: ADS/SRV 1B21-F047H cycling / lower reactor power

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Reports unexpected alarms and consults ARIs:
		H13-P601-19: (A7), SRV OPEN
		H13-P601-19: (B7), SRV OPEN SIGNAL RECEIVED
	RO	Monitors RPV level, pressure, and power
	BOP	Informs SRO/RO that ADS/SRV 1B21-F047H is cycling
	BOP	May check SRV tailpipe temperatures on H13-P614 to determine
		which SRV is cycling
	SRO	Enters ONI-B21-1, SRV Inadvertent Opening/Stuck Open
		- Directs RO/BOP to initiate evacuation of Containment
		- Directs RO to reduce reactor power using recirc flow to ≤ 90%
		Note: Must reduce power to < 90% prior to attempting
		To close the SRV
		- Directs BOP to attempt to close the SRV by placing both of its
		control switches from AUTO to OFF
		- Directs BOP to de-energize the SRV solenoids by removing the
		applicable control power fuses
		- Coordinates with RO/BOP to complete applicable Supplemental
		Actions
	RO/BOP	Notifies SCC, Chem and HP of intent to lower reactor power
		(may occur after power reduction has begun)
	SRO	Provides SRO oversight for power reduction

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 4 Page 2 of 2

Event Description: ADS/SRV 1B21-F047H cycling / lower reactor power

Time	Position	Applicant's Actions or Behavior
	RO	Decreases reactor power to 90% using Recirc Loop Flow Control
		Maintain Recirc loop flows matched within 10%
	BOP	Places both SRV control switches to Off:
		Expected Alarm, H13-P601-19: (E7), SRV DIV 1/2
		SWITCH IN OFF and
		Informs SRO/RO that SRV control switches are in Off
		Informs SRO/RO that SRV is still cycling open
	SRO/BOP	Refer to ONI-B21-1 Attachment 1 and Attachment 2 to determine
		SRV fuses that must be pulled
	BOP	Removes SRV control power fuses inside panel H13-P628
		and in H13-P631
		Informs SRO/RO that SRV control power fuses are removed
		Expect Alarms: H13-P601-19 (G9) (G11), ADS OUT OF SERVICE
	SRO	References Tech Specs for a single, inoperable ADS SRV
		- LCO 3.5.1, Enters Condition E, F, and H
		- Enters LCO 3.0.3, due to ADS Valve and HPCS inoperable
	SRO	Notifies OPS Management and NRC Resident of ONI entry
		and reason for entry, and of the various LCO entries and required
		TS 3.0.3 shutdown. Requests RSE and I&C assistance in the
		Control Room to support troubleshooting
		Review IOI-3 for power reduction
		Contacts Rx Engineer for power reduction recommendations
		Begin preparations for required plant (TS 3.0.3) shutdown

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 5 Page 1 of 2

Event Description: Reactor Feed Pump Controller B oscillations

Time	Position	Applicant's Actions or Behavior
	RO	Reports Feed Flow / Steam Flow mismatch
		Reports reactor water level oscillations
		Reports RX LEVEL HI/LO L7/L4 alarm (H13-P680-3 (A9))
	BOP	Supports RO by consulting ARI-H13-P680-3 (A9)
	SRO	Acknowledges receipt of unexpected alarm
		Enters ONI-C34 due to malfunction of feedwater level control
		- Directs RO to transfer control of the affected RFPT(s) to the
		Manual Speed Control Dial and maintain reactor water level
		192 to 200 inches
		- Directs RO to place RFP A(B) FLOW CONTROL for the affected
		RFPT(s) to Manual
		- Coordinates with RO/BOP to complete applicable Supplemental
		Actions
	RO	Transfers control of the affected RFPT(s) to the Manual Speed
		Control Dial and maintains reactor water level 192 to 200 inches
	RO/BOP	Requests Responsible System Engineer and I&C assistance in the
		Control Room to support troubleshooting
	SRO	Notifies OPS Management and NRC Resident of ONI-C34
		entry and reason for entry

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 5 Page 2 of 2

Event Description: Reactor Feed Pump Controller B oscillations

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluates feedwater level control options
	SRO	**Note: If only RFPT B is transferred to the Manual Speed**
		Control Dial, then the following actions will be NA
	SRO	Directs RO to transfer RFPT A (B) from the Manual Speed Control
		Dial to the Startup Level Control per SOI-C34, Section 4.6
		- Provides SRO oversight during feedwater level control shift
		* One RFPT will be on the SULC and the other RFPT will be base
		loaded
	SRO	Directs BOP to monitor reactor power and reactor pressure during
		the feedwater level control shift
	BOP	Monitors reactor power and reactor pressure
	RO	Transfers RFPT A (B) from the Manual Speed Control Dial to the
		Startup Level Control
		- Verifies RFPT B (A) is being controlled by RFPT B (A)
		Manual Speed Control Dial

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 6 Page 1 of 2

Event Description: Loss of 480Vac Bus F-1-E. Turbine Control EHC leak / Main Turbine trip and reactor scram.

Time	Position	Applicant's Actions or Behavior
	SRO/BOP/RO	Recognize and report Alarms H13-P870-1 (E4), 480 VOLT BUS
		UNDERVOLTAGE and H13-P870-1 (E6), BUS F-1-E
		BREAKER TRIP
	SRO	Enters ONI-R23-2, Loss of Non-Essential 480 Volt Bus
		Refers to Plant Data Book for list of affected loads (PDB-H0017):
		CVCW deenergized
		TBCC Pump C deenergized
		Note: TBCC Pump breaker remains closed. No Alarm
		received when BUS F-1-E deenergized.
	RO/BOP	Walk down panels and assess plant status:
		Acknowledge and report alarm H13-P870-9 (G2), EHC STBY
		PUMP START-HEADER PRESSURE LOW; refer to ARI
		Determines EHC Pump B tripped; EHC Pump A auto started
		Note: EHC Pump B breaker remained closed when
		Bus F-1-E deenergized
	SRO	Enters and executes ONI-P44, Loss of Turbine Building
		Closed Cooling
	RO/BOP	Acknowledge alarm H13-P870-9 (F2), EHC SYSTEM
		RESERVOIR HI/LO; refer to ARI and inform SRO
	SRO	Directs reactor scram or enters and direct actions of IOI-14,
		Fast Unload and Trip of Turbine

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 6 Page 2 of 2

Event Description: Loss of 480Vac Bus F-1-E. Turbine Control EHC leak / Main Turbine trip and reactor scram.

Time	Position	Applicant's Actions or Behavior
	RO	As directed, decreases reactor power using Recirc Flow Control
		Maintain Recirc loop flows matched within 10%
	SRO/BOP	Monitor EHC pressure and report lowering pressure trend
	SRO	Direct RO to perform either a fast reactor shutdown or to manually
		scram the reactor prior to trip of the Main Turbine
	RO	Complete reducing core flow to 58 x 10^6 lbm/hr and then arm and
		depress RPS Manual Scram Pushbuttons or arm and depress
		RPS Manual Scram Pushbuttons prior to automatic Main
		Turbine trip

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 7 Page 1 of 3

Event Description: ATWS with SLC squib valve failures

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes incomplete scram and APRMs not downscale and
		informs SRO/BOP
	SRO	Directs RO/BOP actions per PEI-B13, RPV Control (Non-ATWS)
		- Arms and depresses all RPS Manual Scram PBs
		- Places the Reactor Mode Switch in SHUTDOWN
		- Starts Hydrogen Analyzers
		- Verifies ARI Initiated
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO
		direction
	SRO	Determines reactor is still NOT shutdown under all conditions
		without boron
	SRO	Exits PEI-B13, RPV Control (Non-ATWS) and enters PEI-B13,
		RPV Control (ATWS)
		- Directs initiation of Standby Liquid Control and ADS inhibited
		- Directs RO to runback Recirc FCVs to minimum position, then
		trip Recirc Pumps
		- Directs RO to use PEI-SPI 1.3 to insert Control Rods
		- Directs BOP/RO to terminate/ prevent injection of inside the
		shroud systems using PEI-SPI 5.1 (HPCS Injection Prevention)
		& 5.2 (LPCS & LPCI Injection Prevention) (DGs will auto start)
		- Directs RO/BOP to line up at least two outside the shroud
		injection systems using PEI-SPI 6.1 (LPCI A Outside the Shroud)
		& 6.3 (LPCS Runout Injection)
		Note: RHR B is in secured status so PEI-SPI 6.2 is not performed

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 7 Page 2 of 3

Event Description: ATWS with SLC squib valve failures

Time	Position	Applicant's Actions or Behavior
	SRO (cont.)	PEI-B13, RPV Control (ATWS) actions:
		- Directs actions to maintain MSIVs open per PEI-SPI 2.3 and 2.8
		- Directs RPV level stabilized in a band of – 25 to +100"
		- Directs pressure band of 800 to 1000 psig
		Note: RFPTs may trip on L8 following scram. When L8 is
		reset, water level should be stabilized above L2
		* HPCS may be in secured status
		*** Crew should be able to maintain RPV level > -25 inches until**
		loss of feedwater capability. RCIC will auto start at L2 (+130")
		* Crew should maintain RPV level > Level 1 (+16.5 inches) to
		maintain MSIVs open
	RO	Runback Recirc FCVs to minimum position, trips Recirc Pumps
		Insert Control Rods using PEI-SPI 1.3, Manual Insertion
	BOP	Starts Hydrogen Analyzers
		Initiates SLC, reports squib valve failures to SRO/RO
		Inhibits ADS
		Aligns for outside the shroud injection using PEI-SPI 6.1 (bypasses
		E12-F053A) and PEI-SPI 6.3 (bypasses E21-F012)
		Bypasses MSIV L1 per PEI-SPI 2.3 and IA Isolations per
		PEI-SPI 2.8
		Performs terminate/prevent actions per PEI-SPI 5.1 (HPCS
		Injection Prevention) & 5.2 (LPCS & LPCI Injection Prevention)
		Maintains reactor pressure band directed by SRO

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 7 Page 3 of 3

Event Description: ATWS with SLC squib valve failures

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Alternate Boron Injection per PEI-SPI 1.8
	BOP	Coordinates Alternate Boron Injection per PEI-SPI 1.8
	BOP/RO	Maintain level band directed by SRO using Condensate and
		Feedwater, CRD, and RCIC
	SRO/BOP/RO	Monitor for power > 4% and RPV level > 0" and Supr Pool Temp
		> 110°F and any SRV open or Drywell pressure > 1.68 psig
	SRO	If ALL above monitored conditions are met, direct terminate and
		prevent all injection into the RPV except boron and CRD
	BOP/RO	As directed, terminate and prevent injection per
		PEI-SPI 5.1, 5.2, and 5.3
		Depress RCIC Turbine Remote Trip pushbutton
	SRO	When power < 4% or RPV level drops to 0" or all SRVs
		remain closed and Drywell pressure < 1.68 psig, direct RPV level
		band between –25" and the level to which RPV was lowered
	BOP/RO	Maintain level band directed by SRO using Condensate and
		Feedwater, CRD, and RCIC

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 8 Page 1 of 1

Event Description: Loss of Feedwater capability (trip of all RFBPs)

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Report loss of all RFBPs and all Reactor Feed Pumps
	RO/BOP	Monitor and trend reactor water level (decreasing)
	SRO	If not already running, directs RCIC initiation if permitted
	SRO	Note: SRO may direct BOP to perform PEI-SPI 2.5, Bypass of
		RCIC Isolations and Suction Transfer
	BOP/RO	As directed, start and maximize injection with RCIC
	BOP/RO	Maintains reactor water level in the band specified by the SRO
		Using RCIC
	BOP/RO	Notifies SRO of RPV level approach to -25"
		Note: If the crew is able to quickly lower reactor power by
		inserting control rods, then RCIC may be able to maintain
		reactor water level > -25 inches and ED would not be required
	SRO	Determines RPV level cannot be maintained > -25"
		PEI-B13, Emergency Depressurization is entered and executed
		concurrently with PEI-B13, RPV Control (ATWS)

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 9 Page 1 of 2

Event Description: RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling. Two ADS/SRVs fail to open

Time	Position	Applicant's Actions or Behavior
		Note: This Event will be a contingency Event. If the SRO
		determines that reactor water level cannot be maintained > -25
		inches, then ED will be required
	SRO	Directs BOP/RO actions per PEI-B13, Emergency Depressurization
		- Directs terminate and prevent all injection except boron and CRD
		* Must hold here until all injection into the RPV has been
		terminated (except boron and CRD)
	BOP/RO	As directed, terminate and prevent injection per PEI-SPI 5.3
		Depress RCIC Turbine Remote Trip pushbutton
	SRO	Verifies eight or more SRVs are not open
		Verifies Suppression Pool level is > 5.25 feet
		Directs all ADS valves opened to rapidly depressurize the RPV
	BOP/RO	When directed, open all ADS valves
		Determine two ADS/SRVs have failed to open and report to SRO
	SRO	Confirms all ADS valves are NOT open
		Directs additional SRVs be opened to obtain 8 SRVs open
	BOP/RO	Monitor and trend reactor pressure
		*Must hold here until RPV pressure is less than MARFP

Op-Test No.: 2001-01 Scenario No.: 2 Event No.: 9 Page 2 of 2

Event Description: RPV emergency depressurization / Inject with low pressure ECCS to maintain adequate core cooling. Two ADS/SRVs fail to open.

Time	Position	Applicant's Actions or Behavior
	SRO	As soon as RPV pressure is < MARFP, direct injection with
		outside the shroud systems to restore and maintain
		RPV level > -25"
		* LPCI B unavailable for injection outside the shroud
	BOP/RO	Injects into the RPV to systems to restore and maintain RPV level
		using outside the shroud injection systems as directed
		* Must hold here until the reactor is shutdown under all conditions
		without boron

Op-Test No.: 2002-01 Scenario No.: 2 Page 1 of 1

Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are being inserted
		2. RCIC is maintaining RPV level > -25 inches
		Note: If RCIC is not able to maintain RPV level > -25 inches,
		then the remaining termination criteria will be used:
		3. The reactor has been emergency depressurized
		4. Low pressure ECCS Systems are being used to restore RPV
		level above -25 inches

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 7 Page 1 of 1

Event Description: Critical Task #1

Time	Position	Applicant's Actions or Behavior
		Critical Task #1 – With a reactor scram required and the reactor not
		shutdown, initiate action to reduce power by injecting boron and/or
		inserting control rods
		1. Safety Significance:
		- Shutting down the reactor can preclude failure of
		Containment or equipment necessary for the safe
		shutdown of the plant
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- SLC Pump control switches taken to ON and control
		rod insertion before the end of the scenario
		4. Feedback:
		- Reactor power trend

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 7 Page 1 of 1

Event Description: Critical Task #2

Time	Position	Applicant's Actions or Behavior
		Critical Task #2 – With a reactor scram required and the reactor
		not shutdown, to prevent an uncontrolled RPV depressurization
		and subsequent power excursion, inhibit ADS
		1. Safety Significance:
		- Precludes core damage due to an uncontrolled
		reactivity addition
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- ADS logic inhibited prior to an automatic initiation of
		the ADS System unless all required injection
		systems are terminated and prevented
		4. Feedback:
		- RPV pressure and level trends
		- ADS "Out of Service" annunciator status

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 9 Page 1 of 1

Event Description: Critical Task #3

Time	Position	Applicant's Actions or Behavior
		Note: this is a contingent critical task
		Critical Task #3 – When RPV water level cannot be maintained
		> -25" and the reactor is at pressure, initiate Emergency
		Depressurization
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Level lowering without adequate high pressure
		injection available
		3. Measured by:
		- Observation – at least 5 SRVs open prior to
		re-establishing injection after terminate and prevent
		actions are completed
		4. Feedback:
		- Reactor pressure trend
		- Suppression Pool temperature trend

Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 9 Page 1 of 1

Event Description: Critical Task #4

Time	Position	Applicant's Actions or Behavior
		Note: this is a contingent critical task
		Critical Task #4 – During an ATWS with Emergency
		Depressurization required, terminate and prevent injection, with the
		exception of SLC and CRD, into the RPV until reactor pressure is
		below MARFP
		1. Safety Significance:
		- Prevention of fuel damage due to uncontrolled
		feeding
		2. Cues:
		- Procedural compliance
		3. Measured by:
		- Observation – no injection into the RPV except for
		SLC and CRD prior to reaching the MARFP that
		causes a reactor short period alarm or power
		increase to APRM upscale alarms
		4. Feedback:
		- Reactor power trend, power spikes, reactor short
		period alarms

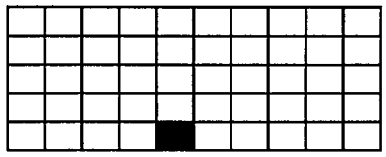
Op-Test No.: 2002-01 Scenario No.: 2 Event No.: 9 Page 1 of 1

Event Description: Critical Task #5

Time	Position	Applicant's Actions or Behavior
		Note: this is a contingent critical task
		Critical Task #5 – When RPV water level cannot be maintained
		during an ATWS, when RPV pressure is below the MARFP, slowly
		increase and control injection into the RPV to restore and maintain
		RPV level above the TAF
		1. Safety Significance:
		- Establish adequate core cooling
		2. Cues:
		- RPV pressure trend
		- Procedural compliance
		3. Measured by:
		- RPV level is established and controlled above the
		TAF
		4. Feedback:
		- Lack of power excursion
		- Lack of Hydrogen generation
		- RPV level and pressure indications

Computer Point ID
C51NC064, C51NC068
C51NC074, C51NC078,
C51NC053

APRM D/H
UPSC INOP/TRIP
OPRM D/H TRIP



E5

1.0 Cause of Alarm

1. Any of the following trip setpoints reached on either channel:

   a. Flow biased thermal power upscale:

      1) >0.628W +60.9% clamped at 111% (two loop)

      2) >0.628W +40.6% (single loop)

   b. Neutron flux greater than 118% of rated thermal power with the REACTOR MODE SWITCH in RUN.
   c. Neutron flux greater than 15% of rated thermal power with the REACTOR MODE SWITCH in other than RUN.

2. Any of the following INOP conditions on either channel:

   a. APRM Channel or flow unit module unplugged.
   b. APRM Switch or Flow Card Operate/Test switch not in OPERATE.
   c. Less than 14 LPRM inputs to APRM.
   d. High/low voltage trips from APRM Regulator and Monitor Card (Z127) and Power Supply Monitor Card (Z422).

3. OPRM D/H counted number of oscillations per unit time exceeded the trip setpoint value with amplitude growth consistent with thermal hydraulic oscillations.

2.0 Automatic Action

1. If due to APRM D(H), a control rod withdrawal block occurs at:

   a. 0.628W + 55.2% RTP clamped at 108% (two loop)
   b. 0.628W + 34.9% RTP (single loop)

2. A half scram will occur.

3. A subsequent trip of one or more RPS channels in the opposite trip system will result in a full reactor scram.

APRM D/H UPSC INOP/TRIP OPRM D/H TRIP

3.0 Immediate Operator Action

1. If a reactor scram occurs, enter ONI-C71-1, Reactor Scram.

2. If the alarm is due to an unexplained change in reactivity or thermal hydraulic oscillations, enter ONI-C51, Unexplained Change in Reactor Power or Reactivity.

4.0 Subsequent Operator Action

1. Reduce reactor power if required.

2. Reset the half scram when the condition has cleared.

3. If due to APRM D(H), reset the lock-in alarm light on the affected APRM drawer(s).

4. If due to OPRM D(H), notify I&C to download the affected OPRM event buffers.

4.1 Technical Specifications

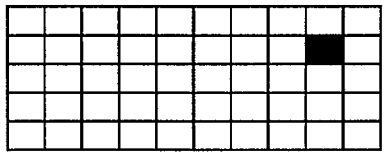
1. 3.3.1.1, Reactor Protection System Instrumentation

2. ORM 6.2.1, APRM Control Rod Block Instrumentation

3. 3.3.1.3, Oscillation Power Range Monitor (OPRM) Instrumentation

Computer Point ID
C71NC010 and
C71NC012

1/2 SCRAM
B/D



B9

1.0 CAUSE OF ALARM

1. De-energization of relays 1C71A-K42B or 1C71A-K42D, by any of the following:

   a. Turbine Stop Valve closure
   b. Turbine Control Valve fast closure
   c. CRD Scram Discharge Volume water level high
   d. Main Steam Line Isolation Valve closure
   e. Drywell Pressure high
   f. Reactor Vessel pressure high
   g. Reactor Vessel Water Level Low - L3
   h. Deleted
   i. Neutron Monitoring System trips

      1) IRM Channel B(D,F,H)
      2) APRM Channel B(D,F,H)

   j. Reactor Vessel high water level - L8
   k. Manual scram
   l. Loss of power to RPS trip logic B(D)

2.0 AUTOMATIC ACTION

1. A half scram occurs on RPS trip system B.
2. A subsequent trip of either of the channels in the opposite RPS trip system will result in a full scram.

3.0 IMMEDIATE OPERATOR ACTION

1. If a reactor scram occurs, enter ONI-C71-1, Reactor Scram.

4.0 SUBSEQUENT OPERATOR ACTION

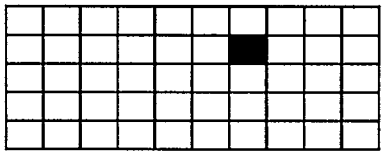
None

4.1 Technical Specifications

1. Technical Specifications could be entered depending upon the cause and the extent of equipment inoperability.

Computer Point ID
C51NC091 thru
C51NC094

RPS
NEUTRON
MON TRIP



B7

1.0 CAUSE OF ALARM

1. Alarm could be caused by:
   a. Any of the following APRM trips (affected APRM is not bypassed):
      1) ≥ 118% with REACTOR MODE SWITCH, 1C71A-S1, in RUN
      2) ≥ 15% with REACTOR MODE SWITCH, 1C71A-S1, not in RUN
      3) Flow biased thermal power upscale
         a) ≥ .66W + 64 {≥ 0.628W + 61%} clamped at 111% (two loop)
         b) ≥ .66W + 42.7 {≥ 0.628W + 40.7%} (single loop)
      4) Inoperable;
         a) Card out of file (APRM/FLOW)
         b) Out of operate (APRM/FLOW)
         c) <14 operable inputs (LPRMs)
         d) Power supply volts too high or too low
   b. Any of the following IRM trips with REACTOR MODE SWITCH, 1C71A-S1, not in RUN (affected IRM is not bypassed):
      1) ≥ 120/125 of scale
      2) Inoperable;
         a) Card out of file
         b) Out of operate
         c) Low volts on high volt power supply
         d) Loss of 20 VDC supply

2.0 AUTOMATIC ACTION

1. The respective scram channel trips causing a half scram.
2. A subsequent trip of either of the scram channels in the opposite RPS trip system will result in a full scram.

3.0 IMMEDIATE OPERATOR ACTION

1. If a reactor scram has occurred, enter ONI-C71-1, Reactor Scram.
2. If an unexplained change in reactor power has occurred, enter ONI-C51, Unexplained Change in Reactor Power or Reactivity.

4.0 SUBSEQUENT OPERATOR ACTION

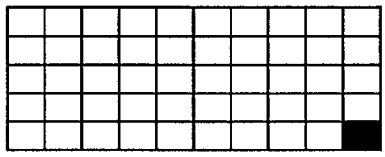
1. Range IRM Channels per SOI-C51 (IRM), if applicable.
2. Bypass any failed APRM or IRM channel.

4.1 Technical Specifications

None

Computer Point ID
C11NC062
C11NC063

ROD
WITHDRAWAL
BLOCK



E10

1.0 CAUSE OF ALARM

1. Loss of rod withdrawal permissive signal from the rod Gang Drive Cabinet, 1H13-P653, due to any of the following:

   a. RPC position violation (below LPSP)
   b. Two notch inhibit (above HPSP)
   c. Four notch inhibit (between LPSP and HPSP)
   d. Refueling bridge over RPV in startup mode
   e. Substitution position violation
   f. Rod timing malfunction
   g. Instrument Volume level greater than 16.6 inches as sensed by 1C11-N017A(B)

   NOTE: The above listed causes are not covered by other annunciators and are not a result of refueling interlocks. Any other rod withdrawal block will be indicated by an alarm for the associated parameter.

2.0 AUTOMATIC ACTION

1. Rod withdrawal inhibited.
2. WITHDRAW BLOCK status light illuminates on the Rod Motion Matrix.
3. WITHDRAW INHIBIT status light illuminates on the Pattern Control Matrix if an unacceptable rod pattern exists as determined by RPC.

3.0 IMMEDIATE OPERATOR ACTION

1. Evaluate entry into ONI-C11-1, Inability to Move Control Rods, when in Modes 1 and 2.
2. Deleted

4.0 SUBSEQUENT OPERATOR ACTION

1. If the cause of the rod block is not apparent from plant conditions, contact I&C to analyze the RGDC at 1H13-P653.
2. If the Rod Withdrawal Block was generated by the RPCS as a result of a control rod mispositioning error, refer to FTI-B02, Out of Position Control Rods for further actions.

4.1 Technical Specifications
None

7.0 OTHER OPERATIONS

7.1 Bypassing an APRM Channel

NOTE: This section is for when instrument failure may require an APRM Channel output to RCIS or RPS to be bypassed.

****

CAUTION

This section shall not be used to bypass a valid APRM upscale trip. Bypassing an APRM channel bypasses all trip and alarm functions initiated from that channel and requires that it be declared inoperable.

****

****

CAUTION

If an APRM is bypassed at 1H13-P680, depressing the Bypass Test pushbutton on the associated APRM drawer will reactivate the channel's trip function and may result in a half scram.

****

NOTE: The normal Flux Level input to the Reactor Recirculation System Flux Controller for power control is from APRM Channel A. When APRM Channel A is bypassed, the input to the Flux Controller is automatically switched to APRM Channel E.

NOTE: Bypassing the APRM does not cause the associated OPRM to be INOPERABLE. The associated OPRM receives Reactor Power and Loop Flow signals from the APRM. The bypassing of the APRM will automatically force the associated OPRM to obtain these signals from the other OPRM in the same cabinet (e.g., A/E, B/F, C/G, D/H). This is an automatic function to maintain OPERABILITY of the OPRM.

1. Refer to Technical Specification Table 3.3.1.1-1 Item 2 for applicability.

2. If APRM Channel A is to be bypassed, verify one of the following conditions to ensure a Rcirc Flow change does not occur:

Conditions

- FCV A MOTION INHIBITED annunciator, H13-P680-4-A5, is alarmed,

and

- FCV B MOTION INHIBITED annunciator, H13-P680-4-A14, is alarmed.

or

- RCIRC AUTOMATIC FLOW DEMAND LIMITER, 1B33-K650, indicates "zero" output,

and

- The AFDL IN CONTROL annunciator is not alarmed,

and

- RCIRC FLUX CONTROL, 1B33-K602, is in MAN,

and

- The AFDL Setpoint on RCIRC AUTOMATIC FLOW DEMAND LIMITER, 1B33-K650, tapeset is higher than the APRM CH E reading.

3. Place the appropriate NEUTRON MONITOR BYPASS, APRM joystick on Unit Control Console, 1H13-P680, in the position for the APRM Channel to be bypassed.

   a. APRM, 1C51B-S3 in CH A, CH E, CH C, or CH G.
   b. APRM, 1C51B-S6 in CH B, CH F, CH D, or CH H.

4. Ensure the following occurs:

   a. The BYPASS half of the APRM's DNSC/BYPASS status lights backlights white on 1H13-P680.
   b. The APRM Bypass status light on the selected APRM's Power Range Neutron Mon Panel, 1H13-P669 (1H13-P670, 1H13-P671, or 1H13-P672) comes on.

NOTE: If the selected APRM channel caused any trips or alarms, those trips and/or alarms clear and may be reset.

35. Startup Containment Vessel and Drywell Purge System per SOI-M14 if required.

36. Startup Combustible Gas Mixing System B per SOI-M51/56 if required.

37. Verify the following reset on 1H13-P670:

    a. MSL Rad Monitor, 1D17-K610B
    b. Cntmt Vent Exhaust Rad Monitor, 1D17-K609B
    c. OPRM B/F (reset button inside APRM panel)

38. Verify the following reset on 1H13-P672:

    a. MSL Rad Monitor, 1D17-K610D
    b. Cntmt Vent Exhaust Rad Monitor, 1D17-K609D
    c. OPRM D/H (reset button inside APRM panel)

39. Reset as required appropriate SRM, IRM, and APRM alarm lights.

40. Perform independent verification of the required components.

7.3 Reset RPS A(B)

1. Verify the condition(s) which caused the full or half scram have cleared and there is a reasonable assurance that another scram signal will not be generated.

2. If the RPS INST VOL HI annunciator on 1H13-P680-5 is in the alarm condition, place the appropriate keylock switches in BYPASS on the Unit Control Console, 1H13-P680:

    a. INST VOL LEVEL HI SCRAM BYPASS CH A(B), 1C71-S4A(B)
    b. INST VOL LEVEL HI SCRAM BYPASS CH C(D), 1C71-S4C(D)

3. Momentarily depress the appropriate pushbuttons on P680:

    a. SCRAM RESET CH A(B), 1C71-S5A(B)
    b. SCRAM RESET CH C(D), 1C71-S5C(D)

4. Verify SCRAM VLV AIR HEADER PRESS LO annunciator on 1H13-P680-5 is cleared.

    NOTE: Failure of SCRAM VLV AIR HEADER PRESS LO annunciator to reset may be indicative of failure of one or more scram pilot solenoid valves to properly reseat.

4a. If an ARI signal is present, then reset per SOI-C22 concurrently with this section.

5. On 1H13-P680, verify the following SCRAM DISCH VOL DRAIN VALVE lights are illuminated:

   a. INSTR VOLUME VENT VLV OPEN
   b. INSTR VOLUME DRAIN VLV OPEN

6. If a Full Scram occurred, then perform the following steps:

   a. Depress ALL RODS and confirm all control rods indicate position "00".

   NOTE: The following actions are taken to prevent an inadvertent control rod withdrawal due to a failed transponder.

      1) If any control rod indicates overtravel in (i.e., green full in LED illuminated and no position indicated), perform a notch insertion per SOI-C11(RCIS).

      2) If the control rod does not settle to position "00" following the notch insertion, disarm the control rod per SOI-C11(HCU).

   b. When the RPS INST VOL LEVEL HI annunciator clears, place the appropriate keylock switches in NORM on P680:

      1) INST VOL LEVEL HI SCRAM BYPASS CH A(B), 1C71-S4A(B)

      2) INST VOL LEVEL HI SCRAM BYPASS CH C(D), 1C71-S4C(D)

7.4 Bypassing Reactor Mode Switch Scram

NOTE: This section temporarily bypasses the Reactor Mode Switch in SHUTDOWN scram signal, until this signal is automatically bypassed after the 10 second time delay. This is not a normal evolution and should only be used to bypass this scram signal when placing the Reactor Mode Switch from REFUEL to SHUTDOWN.

1. Verify the following prerequisites are met:

   a. Shift Supervisor permission to bypass Reactor Mode Switch in SHUTDOWN scram.
   b. Additional Operator stationed to prevent any Control Rod withdrawal during the time the Reactor Mode Switch in SHUTDOWN scram signal is bypassed.
   c. All Control Rods inserted.
   d. No core alterations are in progress.

2. Upon completion of all prerequisites, enter in the Plant Narrative Log that all prerequisites are met for bypassing the Reactor Mode Switch Scram. (T.S. 3.3.1.1 Action C)

Facility: Perry Scenario No.: 3 Op-Test No.: 2002-01

Examiners: _____ Operators: _____

Initial Conditions: Reactor startup is in progress with the plant at 5% of rated power. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3 (PLCO)

Turnover: 1. Plant startup continues: withdraw control rods to 10% power, transfer the Reactor Mode Switch to RUN, and continue power ascension. All required MODE 1 change paperwork has been reviewed and approved. 2. BOP operator shift AEGT System trains from A to B.

Target Critical Tasks: Emergency Depressurization, RPV Flooding to restore and maintain adequate core cooling

Event No.	Malf. No.	Event Type*	Event Description
1	RD01:R1043 8%	R (RO) C (RO) C (SRO)	Increase reactor power to 10% using control rods Control rod 10-43 stuck at position 8
2		N (BOP) N (SRO)	Shift AEGT operating trains from A to B
3	NM02H 100%	I (RO) I (SRO)	IRM H failure upscale (bypass failed IRM) (TS 3.3.1.1 and OR 6.2.3)
4			Verify NI overlap / Transfer Reactor Mode Switch to RUN / Withdraw IRMs
5	RD17A 50% RD05R5443	C (BOP) C (SRO)	CRDH Pump A trip due to loss of lube oil / perform CRD Pump trip recovery Accumulator fault HCU 54-43 (TS 3.1.5) (1 minute time delay)
6	CP02: OP41C001B	C (BOP) C (SRO)	Service Water Pump 'B' trip due to shaft seizure (start standby Service Water Pump)
7	bat or/seismic_2 TH02A / TH02B 100% MV08: OP43F0215	M (All) C (BOP) C(SRO)	Seismic Event (OBE) Recirc Loop pipe rupture (reactor scram on high Drywell pressure) (TH02A - 6 minute time delay & 5 minute ramp) (TH02B - 8 minute time delay & 5 minute ramp) NCC Drywell Isolation Valve P43-F215 failure when valve becomes fully closed
8	bat ms/losslevel2	I (All) M (All)	Loss of all RPV level indication Emergency Depressurization / RPV Flooding to restore and maintain adequate core cooling

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

2002 Perry NRC Examination
Scenario Objectives
Safety Significance Discussion
Scenario 3

Objectives:

The crew will continue the startup. Prior to placing the Reactor Mode Switch in RUN, control rod 10-43 will not withdraw using normal drive water pressure. This will require the crew to take action per ONI-C11, Inability to Move Control Rods, and SOI-C11 (RCIS) to free the stuck control rod.

The BOP operator will AEGT System Trains from A to B.

After the control rod is moving normally, IRM H will fail upscale resulting in a RPS half-scram. The startup will be placed on hold while Tech Specs are referenced, the IRM is bypassed, and the half-scram is reset.

The startup continues and after the Reactor Mode Switch has been placed in RUN, the running CRDH Pump will trip due to a loss of lube oil, requiring the standby CRDH Pump to be started. While performing CRD pump trip recovery, an HCU accumulator fault alarm will be received requiring the crew to monitor for additional accumulator fault alarms.

After the standby CRDH Pump is started, Service Water Pump B will trip. ONI-P41, Loss of Service Water, will be entered requiring manual start of a standby Service Water Pump.

Immediately after a standby Service Water Pump is started, a seismic event occurs which a Recirc Loop pipe break in the Drywell, resulting in rising Drywell pressure and temperature. NCC Drywell Isolation Valve P43-F215 will fail when it is fully closed further degrading the crew's ability to control Drywell temperature.

The reactor will be manually scrammed or will automatically scram.

Following the scram, rising Drywell temperature will result in a loss of all level indication. RPV Flooding and Emergency Depressurization is performed and low-pressure injection systems are used to maintain adequate core cooling.

Discussion of Safety Significance for scenario 3:

As the startup continues, prior to placing the Reactor Mode Switch in RUN, one control rod will not withdraw using normal drive water pressure requiring the crew to take action to get the control rod to move. This is safety significant because the actions directly affect core reactivity.

The BOP operator will shift AEGT System Trains from A to B. This shift, if performed improperly, could result in the automatic start of the AEGT Fan to be shutdown.

After the control rod is unstuck, an IRM will fail upscale. This is safety significant because it will result in a RPS half-scram, require the crew to determine the IRM is inoperable, bypass the IRM, and reset the half-scram.

As the startup continues and the Reactor Mode Switch has been placed in RUN, the running CRDH Pump will trip that requires the standby CRDH Pump to be started. An accumulator fault alarm will also occur. This is safety significant because Tech. Specs. would require a manual reactor scram after 20 minutes if an additional HCU accumulator fault alarm were to be received.

After the standby CRDH Pump is started, a Service Water Pump will trip. This will require a manual start of a standby Service Water Pump to avoid high temperatures on components and systems cooled by the Service Water System.

After a standby Service Water Pump has been started, a seismic event occurs which causes a Recirc pipe break in the Drywell. This is safety significant because the reactor will be manually scrammed or will automatically scram following the seismic event.

Following the scram, conditions in the Drywell will cause a loss of all level indication. This is safety significant because the crew must enter RPV Flooding and emergency depressurize the RPV in order to allow low-pressure injection systems to be used to maintain adequate core cooling.

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Event Description: Power ascension continues. Control Rod 10-43 stuck at position 8.

Time	Position	Applicant's Actions or Behavior
	SRO	Conduct reactivity brief
		Provides SRO oversight for power ascension
	RO	Withdraw control rods as directed in accordance with the approved
		rod withdrawal sequence
	RO/BOP	Recognize Control Rod 10-43 will not move and inform SRO
	SRO	Acknowledge report of immovable Control Rod 10-43
		Enter and execute SOI-C11 (RCIS), Section 7.9.2:
		- Directs RO to raise CRDH drive water differential pressure in
		50 psid increments until control rod motion is achieved
	RO	Raise CRDH drive water d/p as directed, attempts Control Rod
		motion
		Reports Control Rod movement to SRO
	SRO	Directs RO to return CRDH drive water d/p to normal band

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Event Description: Shift AEGTS Operating Trains from A to B

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to shift AEGTS trains from A to B per SOI-M15
	BOP	Shift AEGTS trains from A to B per SOI-M15, Section 5.1
		- Confirms Backup Drywell Purge is not in operation by verifying
		valves M51-F090 and F110 are closed on panel H13-P800.
		- De-energizes AEGT ELEC HT COIL A, 1M15-D001A, by taking
		its control switch to STOP
		- After 5 minutes, start the standby AEGT FAN B, 1M15-C001B, by
		placing the control switch in ON
		- Energizes AEGT ELEC HT COIL B, 1M15-D001B, by taking
		its control switch to START
		- Allows 1 to 2 minutes for the Train B dampers to reposition
		Checks ANNULUS DIFF PRESSURE RECORDERS,
		1M15-R016A and 1M15-R016B, for proper annulus
		pressure
		- Confirms ANNULUS EXH FAN B FLOW LOW annunciator,
		window 1H13-P800-1 (D1), is reset
		- Shutsdown AEGT Fan A as follows:
		Holds AEGT FAN A, 1M15-C001A, control switch in STOP
		After allowing 1 to 2 minutes for the Train B dampers to
		Reposition, checks ANNULUS DIFF PRESSURE
		RECORDER, 1M15-R016A, to ensure annulus pressure
		Is maintained between 0.75 and 1.0' H20 vacuum
		Confirms ANNULUS EXH FAN B FLOW LOW
		Annunciator, window 1H13-P800-1 D1, is reset
		Take AEGT FAN A, 1M15-C001A, control switch to STOP

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 2 Page 2 of 2

Event Description: Shift AEGTS Operating Trains from A to B

Time	Position	Applicant's Actions or Behavior
		Release AEGT FAN A, 1M15-C001A, control switch
		- Performs independent verification of the required components
	BOP	Verifies AEGT System parameters in accordance with SOI-M15,
		Section 5.0

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 3 Page 1 of 1

Event Description: IRM H failure upscale / Bypass failed IRM.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports IRM H failure upscale
		Recognizes and report RPS half-scram
		Recognizes and reports control rod withdrawal block
		Closely monitors remaining IRMs
	BOP	Assists RO by consulting ARIs:
		- ARI-H13-P680-6 (E3), IRM UPSCALE TRIP/INOP
		- ARI-H13-P680-6 (C2), ROD BLOCK IRM UPSCALE
		- ARI-H13-P680-5 (B9), ½ SCRAM B/D
		- ARI-H13-P680-5 (B7), RPS NEUTRON MON TRIP
		- ARI-H13-P680-5 (E10), ROD WITHDRAWAL BLOCK
	SRO	Acknowledge report of IRM failure, ½ scram, and rod block
		Suspends Control Rod withdrawal
		Directs IRM back panel indications checked
	SRO	May enter ONI-C51 if he believes power or reactivity has changed
	SRO/BOP	Requests I&C and Responsible System Engineer assistance in the
		Control Room to support troubleshooting
	SRO	Consults Tech Spec 3.3.1.1 and ORM 6.2.3
		Direct RO to bypass IRM H and reset ½ scram
		Notifies Operations Management of IRM failure and actions taken
	RO	Bypass IRM H per SOI-C51 (IRM), Section 7.1
		Reset half-scram B/D per SOI-C71, Section 7.3
		Observes IRM, Rod Block, and RPS alarms clear

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Event Description: Verify NI overlap / Transfer Reactor Mode Switch to RUN / Withdraw IRMs.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct RO to continue Control Rod withdrawal
		Provides SRO oversight for power ascension
	RO	As directed, continue Control Rod withdrawal in accordance with
		approved Startup Pullsheets
	SRO	Prepare for transfer of the Reactor Mode Switch to RUN:
		- Verify Main Steam pressure > 807 psig, and the MSL ISOL MAIN
		STEAM LINE PRESSURE LOW annunciator has cleared
		- Verify Condenser pressure is less than 21.5 inches HgA and
		the MSL ISOL MAIN CONDENSER VACUUM LOW annunciator
		has cleared
		- Verify APRM ROD BLOCK DOWNSCALE annunciator cleared
		Consults ARI-H13-P601-19 (A7)
		- Verify reactor water level is in the range of 192" to 200"
		- Contacts Chemistry to verify reactor coolant chemistry is within
		ORM limits for MODE 1 and Dose equivalent I-131 is within
		Technical Specification limits.

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Event Description: Verify NI overlap / Transfer Reactor Mode Switch to RUN / Withdraw IRMs.

Time	Position	Applicant's Actions or Behavior
	SRO/RO	Verify IRM/APRM overlap per IOI-1, Section 4.9.3.f
	SRO	When IRM/APRM overlap has been verified, direct transfer of the
		Reactor Mode Switch to the RUN position
	RO	Transfers Reactor Mode Switch to the RUN position
	SRO	Directs transfer of all IRM/APRM Recorder Select Switches to
		APRM
	RO	Transfers all IRM/APRM Recorder Select Switches to APRM
	SRO	Directs verification that APRM rod block setpoints have transferred
		to the flow biased setpoints
	RO/BOP	Verifies APRM rod block setpoints transferred to the flow biased
		setpoints
	SRO	Verify that the MSIV CLOSURE SCRAM BYP annunciator
		H13-P680-5 (A6) cleared
		Direct withdrawal of all IRM detectors to the full out position and
		placement of IRMs on Range 3

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 4 Page 3 of 3

Event Description: Verify NI overlap / Transfer Reactor Mode Switch to RUN / Withdraw IRMs.

Time	Position	Applicant's Actions or Behavior
	RO	Withdraw all IRM detectors to the full out position and place
		on Range 3 per SOI-C51 (IRM), Section 5.1
	SRO	As necessary, direct RO to continue to withdraw Control Rods per
		FTI-B02 to maintain Bypass Valve 1 approximately 75% open
	RO	As directed, re-commences withdraw of Control Rods per FTI-B02

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 5 Page 1 of 2

Event Description: CRDH Pump A trip due to loss of lube oil. Perform CRD Pump trip recovery. Accumulator fault HCU 54-43.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Responds to, reports, and references ARIs for the following alarms:
		H13-P601-22 (C3), CRD SYS CHARGING WATER
		PRESSURE LOW
		H13-P601-22 (D2), CRD PUMP AUTO TRIP
		H13-P601-22 (F2), CRD PUMP A TRIP OIL PRESS LOW
		H13-P877-1 (G3), Bus XH11 BREAKER TRIP
		Recognizes and reports CRDH Pump A trip/ Aux Oil Pump running
	RO/BOP	Dispatches NLOs to CRDH Pump A and breaker to investigate
	RO/BOP/SRO	Receives report from NLO of a lube oil leak on CRDH Pump A
	SRO	May enter ONI-ZZZ-5, Spills and Unauthorized Discharges
	BOP	Recognizes Aux Oil Pump is running and may request permission
		to immediately secure the Aux Oil Pump due to the lube oil leak
	BOP/RO/SRO	Requests Maintenance and Responsible System Engineer
		assistance in the Control Room to support troubleshooting
	RO	Responds to, reports, and references ARIs for alarm
		H13-P601-22 (A3) CRD MECHANISM TEMP HIGH
	SRO	Acknowledges CRDH Pump trip and receipt of unexpected alarms
		Enters ONI-C11-1, Inability to Move Control Rods
		- Directs plant parameters maintained as steady as possible
		- Directs CRD Pump trip recovery per SOI-C11 (CRDH)

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 5 Page 2 of 2

Event Description: CRDH Pump A trip due to loss of lube oil. Perform CRD Pump trip recovery. Accumulator fault HCU 54-43.

Time	Position	Applicant's Actions or Behavior
	SRO (cont.)	- Directs RO to monitor for HCU accumulator fault alarms
	RO	Observes and reports accumulator fault on HCU 54-43
	SRO	Acknowledges accumulator fault on HCU 54-43
		Directs RO to monitor for a second HCU accumulator fault
	BOP	Performs CRD Pump trip recovery per SOI-C11 (CRDH)
		- Take CRD Aux Oil Pump B, 1C11-C002B to Start
		- Place CRD Hydraulics Flow Control, 1C11-R600, in
		Manual
		- Using CRD Hydraulics Flow Control, 1C11-R600, fully close
		Flow Control Valve, 1C11-F002B
		- Take CRD PUMP B, 1C11-C001B, to Start and observes:
		increasing amps for CRD Pump B
		- CHARGING WATER LOW PRESSURE alarm clears
		- Slowly throttle open CRD Flow Control Valve until flow is
		returned to the pre-transient setting on CRD Hydraulics
		Flow Control, 1C11-R600
		Places CRD Hydraulics Flow Control, 1C11-R600, in Auto
		Secures CRD Aux Oil Pump A, 1C11-C002A, (if not previously
		secured)
		- Coordinate with NLO to complete CRD Pump trip recovery
		per SOI-C11 (CRDH)

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 6 Page 1 of 2

Event Description: Service Water Pump B trip due to shaft seizure. / Manual start of standby Service Water Pump.

Time	Position	Applicant's Actions or Behavior
	SRO	Notifies OPS Management and NRC Resident of ONI entry
		and reason for entry
		May direct CRDH Pump A and Aux Oil Pump breakers racked out
	BOP	Responds to, reports, and references ARIs for alarms:
		H13-P970-1 (B8), SW PUMP DISCH HEADER PRESSURE
		LOW
		H13-P877-2 (G3), BUS XH12 BREAKER TRIP
		Recognizes and reports Service Water Pump B trip
	BOP/RO	Dispatches NLOs to Service Water Pump B and pump breaker
	BOP/RO/SRO	Requests Maintenance and Responsible System Engineer
		assistance in the Control Room to support troubleshooting
	SRO	Acknowledges report of Service Water Pump B trip
		Enters ONI-P41, Loss of Service Water
		- Directs BOP to start the standby Service Water Pump
		per SOI-P40/41, Section 5.1
		Notifies OPS Management and NRC Resident of ONI entry
		and reason for entry
		Directs BOP to complete shutdown of the Service Water Pump B
		per SOI-P40/41, Section 6.2

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 6 Page 2 of 2

Event Description: Service Water Pump B Trip due to shaft seizure. / Manual start of standby Service Water Pump.

Time	Position	Applicant's Actions or Behavior
	BOP	Start standby Service Water Pump per SOI-P40/41 Section 5.1,
		Shifting Service Water Pumps
		- Take SW Pump Discharge Valve control switch to Open and
		press the Stop button when the blue light comes on
		- Take SW Pump control switch to START
		- When SW Pump amps stabilize, take Discharge Valve control
		switch to Open
		- Throttle NCC HX SW Bypass Valve, P41-F400, as necessary to
		maintain discharge pressure of all operating SW Pumps at
		55-60 psig
		- Notify Chemistry to place the Service Water Chlorination System
		in operation per SOI-P48
	BOP	Complete shutdown of Service Water Pump B per SOI-P40/41,
		Section 6.2:
		- Take SW Pump Discharge valve control switch to Close and
		press the Stop button when the blue light comes on
		- Take Discharge Valve control switch to Close
		(Note: Section 6.2 may not be performed to facilitate
		troubleshooting of Service Water Pump B trip)

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 7 Page 1 of 4

Event Description: Seismic Event leading to steam leak in Drywell and reactor scram. NCC Drywell Isolation Valve P43-F215 fails closed (loss of position indication).

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Responds to, reports, and references ARIs for alarms:
		H13-P680-8 (B3), SEISMIC ALARM P969
		H13-P680-8 (C3), SEISMIC MOMITOR TROUBLE
		H13-P680-8 (43), LOOSE PARTS TRBL
	SRO	Acknowledges Seismic Monitor alarms
	RO/BOP/SRO	Receive multiple reports of earthquake from plant personnel
	SRO	Enters ONI-D51, Earthquake:
		- Verifies earthquake is greater than OBE by verifying amber and
		red lights on panel H13-P969
		- Directs all Emergency Service Water Pumps started
		- Directs all Plant Underdrain Pumps stopped
		- Directs a walkdown of the M29 System
		- Directs plant personnel to begin walkdown of plant areas
		- Directs RO and BOP to check major plant variables

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 7 Page 2 of 4

Event Description: Seismic Event leading to steam leak in Drywell and reactor scram. NCC Drywell Isolation Valve P43-F215 fails closed (loss of position indication).

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Check and monitor major plant variables
	BOP	Checks panel H13-P969, informs SRO amber and red lights are on
		Starts all ESW Pumps, as directed by the SRO
		Contacts NLOs to secure Plant Underdrain Pumps
	BOP	Responds to, reports, and references ARI for alarm:
		H13-P601-18 (C1) DW UNIDENTIFIED RATE OF CHANGE HIGH
	BOP/RO	Report rising Drywell pressure
	RO/BOP	Monitor and trend rising Drywell pressure
	SRO	Due to rising Drywell pressure orders Rx scram, enters ONI-C71-1
		* If not manually scrammed, reactor automatically scrams at 1.68
		psig (a LOCA signal also occurs at 1.68 psig)
	RO	If directed, arms and depresses RPS Manual Scram Pushbuttons
		prior to 1.68 psig Drywell pressure
	SRO	Enters PEI-B13, RPV Control (Non-ATWS) due to RPV < L3 and
		Drywell pressure > 1.68 psig and enters PEI-T23,
		Containment Control due to Drywell pressure > 1.68 psig

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 7 Page 3 of 4

Event Description: Seismic Event leading to steam leak in Drywell and reactor scram. NCC Drywell Isolation Valve P43-F215 fails closed (loss of position indication).

Time	Position	Applicant's Actions or Behavior
	SRO	Directs PEI-B13, RPV Control (Non-ATWS)
		- Verifies reactor is scrammed
		- Confirms Reactor Mode Switch is in SHUTDOWN
		- Start Hydrogen Analyzers
		- Verifies reactor shutdown under all condition without boron
		- Verifies SRMs and IRMs inserted
		- Directs pressure control band (to be determined by SRO)
	SRO	RPV Level Control
		- Restores and maintains RPV level between 185 and
		215 inches
		* Feedwater - available
		* CRD - available
		* RCIC – available
		* HPCS – available
		RPV Pressure Control
		- Confirms no SRVs are cycling
		- Attempt to maintain RPV pressure band using Bypass Valves
		- Override low pressure ECCS Pumps per PEI-SPI 5.2
		*Condensate and Feedwater will restore RPV level to 185 to 215"
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO
		direction

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 7 Page 4 of 4

Event Description: Seismic Event leading to steam leak in Drywell and reactor scram. NCC Drywell Isolation Valve P43-F215 fails closed (loss of position indication).

Time	Position	Applicant's Actions or Behavior
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell
		pressure reaches 1.68 psig
		Drywell Temperature Control
		- Operates all available DW cooling
		- Restores NCC to the DW per PEI-SPI 2.1
		Drywell & Containment Pressure Control
		- Maintains Containment pressure below PSP
		Containment Temperature Control
		- Operates all available Containment cooling
		- Restores CVCW System per PEI-SPI 2.2
		- Maintains Containment average temperature less than 185°F
		Suppression Pool Level Control
		- Restores and maintains SP level between 17.8 and 18.5 ft
		Suppression Pool Temperature Control
		- Maintains both SP average temperature and RPV pressure
		below HCL
	RO/BOP	Executes PEI-T23 actions per SRO direction
		Reports P43-F215, NCC Containment Return Inboard Isolation
		Valve will NOT open (P43-F215 is failed closed)

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Event Description Loss of all RPV level indication. Emergency Depressurization and Injection systems to restore and maintain adequate core cooling.

Time	Position	Applicant's Actions or Behavior
		Loss of RPV level will be triggered when DW temp is 212°F
	BOP/RO	Recognizes loss of all level indication and informs the SRO
	SRO	Determines that RPV level cannot be determined and transitions to
		PEI-B13, RPV Flooding
		- Verifies all Control Rods inserted
		- Verifies Suppression Pool level greater than 5.25 feet
		- Directs eight (8) ADS SRVs to be opened
	RO/BOP	Open eight (8) ADS SRVs, when directed
	SRO	Directs actions to isolate the reactor vessel
	RO/BOP	Closes MSIV's, MSL drains and RCIC steam valves, when
		directed
	SRO	Directs RO/BOP to inject to establish RPV pressure 60 psig
		greater than Containment pressure and at least five (5) SRVs
		open
	RO/BOP	Operates designated systems and injects to vessel when directed:
		RFBPs (PEI-SPI 2.7) or HPCS (PEI-SPI 2.4) are available
		and low pressure ECCS Systems are available

Op-Test No.: 2002-01 Scenario No.: 3 Event No.: 8 Page 2 of 2

Event Description Loss of all RPV level indication. Emergency Depressurization and Injection systems to restore and maintain adequate core cooling.

Time	Position	Applicant's Actions or Behavior
	BOP	Maintain RPV pressure 60 psig greater than Containment
		pressure and at least five (5) SRVs open
	SRO	Enters PEI-M51/56, Hydrogen Control, due to RPV level unknown
	SRO	Directs PEI-M51/56, Hydrogen Control
		- Start Hydrogen Igniters
	RO/BOP	Execute PEI-M51/56, Hydrogen Control actions per SRO direction
		- Energize Hydrogen Ignites

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are fully inserted
		2. The reactor has been emergency depressurized
		3. Low pressure ECCS Systems are being used to establish RPV
		pressure at least 60 psig above Containment pressure
		4. Containment and Drywell parameters are being restored per
		PEI-T23, Containment Control

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Event Description: Critical Task #1

Time	Position	Applicant's Actions or Behavior
		Critical Task #1 – When RPV water level cannot be determined
		and the reactor is at pressure, initiate Emergency Depressurization
		1. Safety Significance:
		- Maintain adequate core cooling
		2. Cues:
		- Procedural compliance
		- Loss of all water level indication
		3. Measured by:
		- Observation – at least 5 SRVs open prior to
		re-establishing injection after terminate and prevent
		actions are completed
		4. Feedback:
		- Reactor pressure trend
		- Suppression Pool temperature trend

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Event Description: Critical Task #2

Time	Position	Applicant's Actions or Behavior
		Critical Task #2 – When RPV water level cannot be determined
		with RPV pressure below the MRFP, increase and control
		injection into the RPV to restore and maintain RPV pressure
		above the MRFP
		1. Safety Significance:
		- Establish adequate core cooling
		2. Cues:
		- RPV pressure trend
		- Procedural compliance
		3. Measured by:
		- RPV pressure is established and controlled above the
		MRFP
		4. Feedback:
		- Lack of water level indication
		- Lack of Hydrogen generation
		- RPV pressure indications

5.0 SYSTEM OPERATIONS

The AEGT system is normally continuously operated during plant operation. <F01390> <F01592>

Ensure annulus pressure is maintained between 0.75" and 1.0" H_2O vacuum during AEGT system operation. <L01041>

5.1 Shifting Operating Trains from A(B) to B(A)

1. If Backup DW Purge is in operation, then notify the Chemistry Unit to sample per REC-0104.

2. De-energize AEGT ELEC HT COIL A(B), 1M15-D001A(B), by taking control switch to STOP.

3. After five minutes, start the standby AEGT FAN B(A), 1M15-C001B(A), by placing the control switch in ON.

4. Energize the standby AEGT ELEC HT COIL B(A), 1M15-D001B(A), by taking control switch to START.

5. Allow 1 to 2 minutes for the Train B(A) dampers to reposition. Check ANNULUS DIFF PRESSURE RECORDERS, 1M15-R016A and 1M15-R016B, for proper annulus pressure.

6. Confirm ANNULUS EXH FAN B(A) FLOW LOW annunciator, window 1H13-P800-1 D1(A1), is reset. <L01541>

7. Perform the following to shutdown AEGT Fan A(B):

   a. Hold AEGT FAN A(B), 1M15-C001A(B), control switch in STOP.
   b. After allowing 1 to 2 minutes for the Train B(A) dampers to reposition, check ANNULUS DIFF PRESSURE RECORDER, 1M15-R016A(B) to ensure annulus pressure is maintained between 0.75" and 1.0" H_2O vacuum.
   c. Confirm ANNULUS EXH FAN B(A) FLOW LOW annunciator, window 1H13-P800-1 D1(A1), is reset.
   d. Take AEGT FAN A(B), 1M15-C001A(B), control switch to STBY.
   e. Release AEGT FAN A(B), 1M15-C001A(B), control switch.

8. Perform independent verification of the required components.

Facility: Perry Scenario No.: 4 Op-Test No.: 2002-01

Examiners: _____ Operators: _____

Initial Conditions: The plant is operating at 100% power. RHR B is in secured status for preventive maintenance on the pump breaker. RHR B was declared inoperable five hours ago per Tech. Spec.3.5.1, Action A; 3.6.1.7, Action A; and 3.6.2.3, Action A. The OPRMs are functional but are inoperable per Tech. Spec. 3.3.1.3. Required Action A.3 has been implemented.

Turnover: 1. BOP operator shift NCC Pumps (start NCC Pump C and shutdown NCC Pump A).

Target Critical Tasks: Manually start RHR Pump A (failure to auto start), Emergency Depressurization

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Shift NCC Pumps (start NCC Pump C and shutdown NCC Pump A)
2	CN02: 1P44R0450 0%	I (BOP) I (SRO)	RFPT A Lube Oil Temp controller failure in Auto mode
3	PT02: 1C34N0004A 17%	I (RO) I (SRO)	Reactor Narrow Range Level Transmitter N004A Offset (3 minute ramp) (ORM 6.2.1.3)
4	RF FW66 TH12B	C (RO) C (SRO)	RFPT A spurious trip / Reactor Recirculation FCV B runback failure (TS 3.4.1)
5	CP02: 1P44C0001A SW03 25%	 R (RO)	TBCC Pump A trip (start standby TBCC Pump) TBCC System Process Piping Leakage (1 minute time delay and 3 minute ramp) Fast reactor shutdown required Decrease reactor power to 66% using recirc flow (58 Mlbs/hr)
6	TH28 1% PC01A 0% CB04: 1E12C0002A	M (All) C (BOP) C (SRO)	MSL Break in Drywell DW/CNTMT Bypass Leakage (to be modified in Event #7) RHR Pump A fails to auto start on Drywell high pressure (required for Containment Spray mode)
7	CB01: 1E12C0002A 	 M (All)	RHR Pump A trips when flow is aligned to containment spray RPV emergency depressurization to control Containment pressure

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

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Objectives:

With the plant operating at 100% power, the BOP operator will shift NCC Pumps.

After NCC Pump C has been placed in service and NCC pump A has been shutdown, RFPT A Lube Oil Temp controller will fail closed in Auto requiring the crew to place the controller in Manual and restore lube oil temperature to normal.

After lube oil temperature is restored, the Narrow Range level transmitter for the in-service channel fails low (offset). The crew enters ONI-C34, Feedwater Flow Control Malfunction, to select an operable Narrow Range level channel and restore level to normal.

When conditions have stabilized, RFPT A will trip. During the transient, Reactor Recirculation FCV B will fail to automatically runback requiring Technical Specifications to be referenced for a loop flow mismatch.

After level and power are stabilized, TBCC Pump A will trip. ONI-P44, Loss of TBCC, will be entered requiring manual start of the standby TBCC Pump.

Immediately following start of the standby TBCC Pump, a TBCC System piping leak will be initiated and grow progressively worse until a fast reactor shutdown is required.

Following the scram, a MSL pipe break in the Drywell occurs resulting in an MSIV isolation and rising Containment pressure.

When signaled to start on high Drywell pressure, RHR Pump A will not automatically start and must be manually started. When aligned for containment spray, RHR Pump A breaker will trip. Eventually the RPV must be depressurized to control the Containment pressure rise. During emergency depressurization, Reactor Level Transmitter N081C will fail downscale.

Discussion of Safety Significance for scenario 4

After NCC Pump C has been placed in service and NCC Pump A has been shutdown, RFPT A Lube Oil Temp controller will fail closed. This is safety significant because failure to recognize and correct the failure would eventually result in RFP bearing damage and a loss of the RFP, thereby challenging RPV water level control.

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After lube oil temperature is restored, the Narrow range level transmitter for the in-service channel fails low (off set). This is safety significant because it will require manual operation of the Feedwater System to select an operable Narrow Range level channel and return RPV level to normal.

When conditions have stabilized, RFPT A will trip and during the transient, Reactor Recirculation FCV B will fail to automatically runback. The RFPT A trip is safety significant because a reactor scram could result if the expected plant response is not verified. Failure of Reactor Recirculation FCV B to automatically runback is safety significant because Recirc Loop Flows will not be matched as required by Tech. Specs.

After level and power are stabilized, TBCC Pump A will trip and operator action will be required to manual start the standby TBCC Pump to allow for continued plant operation. Manual start of the standby TBCC Pump will also lead to a TBCC System piping leak that will grow progressively worse and require the crew to initiate a fast reactor shutdown.

Following the scram, a MSL pipe break in the Drywell occurs resulting in an MSIV isolation and rising Containment pressure. This is safety significant because PEI-B13, RPV Control (Non-ATWS,) and PEI-T23, Containment Control, must be entered and executed to maintain key Containment and RPV parameters.

When signaled to start on high Drywell pressure, RHR Pump A will not automatically start. This is safety significant because RHR Pump A must be manually started to assure it will perform its LPCI design function if required.

The RHR Pump A trip is safety significant because the crew must determine that RHR flow will be unavailable for containment spray, requiring RPV emergency depressurization to control the Containment pressure rise..

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Event Description: Shift NCC Pumps (start NCC Pump C and shutdown NCC Pump A)

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to place NCC Pump C in service and secure
		NCC Pump A per SOI-P43
	BOP	Shift NCC Pumps per SOI-P43, Section 5.1
		- Directs NLO to throttle NCC Pump C Discharge Vlv, P43-F513C,
		to 10% open
		- Take NCC Pump C control switch to START
		Observes P43-R352, Pump Amps
		Observes P43-R026C, Discharge Pressure
		- Directs NLO to open NCC Pump C Discharge Vlv, P43-F513C
		Observes P43-R352, change in pump amps
		Observes P43-R026C, change in discharge pressure
		- Verify header pressure has stabilized between 94 and 123 psig
		- Directs NLO to throttle NCC Pump A Discharge Vlv closed until it
		Is 2% open
		- Immediately take NCC Pump A control switch to STOP
		- Directs NLO to open NCC Pump A Discharge Vlv, P43-F513A
		- Directs NLO to verify proper discharge check valve operation by
		confirming no reverse pump rotation
	BOP	Verify NCC System parameters in accordance with SOI-P43
		Section 5.0

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Event Description: RFPT A Lube Oil Temperature Controller failure in Auto mode

Time	Position	Applicant's Actions or Behavior
	BOP	Respond to, report, and reference ARI for Alarm H13-P870-8 (A2),
		RFPT A LUBE OIL CLR OUTLET TEMP HIGH
	BOP	Determine RFPT LUBE OIL TEMP CONTROL A, 1P44-R450 has
		failed in Auto mode
	SRO	Acknowledge alarm report and RFPT A Lube Oil Temperature
		Controller failure in the Auto mode
	RO/BOP	May report, respond, and reference ARI for Alarm H13-P680-7
		(B14), RFPT A VIB/TEMP P823
	BOP	Place the RFPT LUBE OIL TEMP CONTROL A, 1P44-R450, in
		Manual and increase cooling water flow
		Inform SRO that 1P44-R450 has been placed in Manual and
		cooling water flow has been increased to RFPT Lube Oil Cooler
	SRO	In accordance with Operations Expectations:
		- Assign BOP operator as clear "owner" to closely monitor RFPT
		Lube Oil temperature
		- Consider placing an Information Tag on RFPT A LUBE OIL TEMP
		CONTROL, 1P44-R450
	BOP	Closely monitor RFPT A Lube Oil temperature
	BOP/RO	Request I&C and Responsible System Engineer assistance
		to support troubleshooting

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Event Description: Reactor Level Transmitter C34-N004A Offset

Time	Position	Applicant's Actions or Behavior
		Crew must be allowed to return RFPT B to the MLC before
		tripping RFPT A in Event 4
	RO/BOP/SRO	Recognizes abnormal water level indication
		Refers to RPV Level Validation Screen on SPDS as necessary
	RO/BOP/SRO	Requests I&C and Responsible System Engineer assistance in the
		Control Room to support troubleshooting
	RO	Responds to and reports Alarm H13-P680-3
		(B6), RX LEVEL CHANNEL ERROR HI
	BOP	Supports RO by attending to alarm(s) and consulting
		ARI-H13-P680-3 (B6) and other ARIs as required
	SRO	Enters ONI-C34, Feedwater Flow Control Malfunction.
		- Directs RO to take manual control of RFPTs and maintain
		RPV level 192 to 200 inches (201" required for Level Program)
		- After crew determines Rx Level Transmitter C34N004A has failed,
		directs RO to select NR Level Channel B
		*** Crew can place RFPTs back on MLC when NR Level Channel**
		B is selected and level is returned to normal
	SRO	- Directs RO to shift both RFPTs from their Manual Speed Control
		Dial to the MLC per SOI-C34, Sections 4.5, 4.9, and 4.10

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Event Description: Reactor Level Transmitter C34-N004A Offset

Time	Position	Applicant's Actions or Behavior
	RO	As directed, takes manual control of feedwater and maintains level
		As directed, selects NR Level Channel B
	SRO	Directs RO to shift both RFPTs from their Manual Speed Control
		Dial to the Master Level Controller (MLC) per SOI-C34
	RO	Transfers RFPT A(B) from the Manual Speed Control Dial to
		Manual Flow Control per SOI-C34, Section 4.5
		- Uses the RFP A(B) Flow Control, 1C34-R601A(B), manual
		Pushbutton, to null the RFP DEV METER A(B), R426A(B)
		- Takes RFPT A(B) GOV MODE Cont, 1N27-S50(S52) to
		AUTO
	RO	Transfers RFPT A(B) from Manual Flow Control to Master Rx Level
		Control per SOI-C34, Section 4.9
		- Uses the MASTER RX LEVEL CONTROL, 1C34-R600,
		tapeset to null the controller deviation
		- Places RFP A(B) on Master Level Control by placing
		RFP A(B) FLOW CONTROL, 1C34-R601A(B), in AUTO
		Note: Alarm H13-P680-3 (A8), MAIN TURB & FEEDPUMP TRIP
		RCIC/L8 may occur as normal RPV water level is restored due to
		the failure of NR Channel A

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Event Description: Reactor Level Transmitter C34-N004A Offset

Time	Position	Applicant's Actions or Behavior
	RO	Places a 2nd Feed Pump in AUTO on Master Level Control per
		SOI-C34, Section 4.10
		- If the 2nd Feed Pump is RFP A(B), then verifies RFP B(A)
		FLOW CONTROL, 1C34-R601B(A), is in MANUAL
		- Places RFP B(A) FLOW CONTROL, 1C34-R601B(A), in
		AUTO
	SRO	Notifies OPS Management and NRC Resident of ONI entry and
		reason for entry
		Refers to ORM 6.2.13, Action B
		Crew must be allowed to return RFPT B to the MLC before
		tripping RFPT A in Event 4

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Event Description: RFPT A trip. Reactor Recirculation FCV B fails to automatically runback

Time	Position	Applicant's Actions or Behavior
	RO	Observes the loss of RFPT A
		Informs SRO/BOP of RFPT A trip
		Verifies expected automatic plant response
		- Starts or verifies auto start of MFP
		- Verifies Reactor Recirculation Flow Control Valves will runback
		to 48% loop flow position
		Informs SRO/BOP of failure of FCV B to runback
		Takes immediate actions per ONI-N27
		- If required, reduce reactor power by reducing recirculation flow
		and/or inserting Cram Rods in accordance with FTI-B02
		to maintain steam flow and feed flow balanced and reactor water
		level within the normal operating range of 192 to 200 inches
	BOP	Assists RO by reviewing ARIs for annunciators received:
		ARI-H13-P680-3 (A9), RX LEVEL HI/LO L7/L4
		ARI-H13-P680-3 (D6), RFPT A TRIP
		ARI-H13-P680-4 (B4), RCIRC A FCV RUNBACK
	SRO	Enters ONI-N27, Feedwater Pump Trip
		- Verifies MFP auto started and shifted to the Master Level
		Controller
		- Directs RO to maintain RPV level 192-200"
		- May direct RFPT A shutdown using SOI-N27 Section 6.6,
		Shutdown to 1100 rpm and Section 6.7, Shutdown from 1100 rpm

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Event Description: RFPT A trip. Reactor Recirculation FCV B fails to automatically runback

Time	Position	Applicant's Actions or Behavior
	SRO	Enters ONI-C51, Unplanned Change in Reactor Power or
		Reactivity and references Section 4.2, Reactor
		Recirculation Flow Control Malfunction
	RO/BOP	Complete ONI immediate and supplemental actions as directed
		Shutdown RFPT A using SOI-N27 if directed
	BOP/SRO	Contact Maintenance and Responsible System Engineer
		Directs NLO investigate RFPT A trip
	RO	Informs SRO that there is a > 5% loop flow mismatch
		Determines Reactor Recirculation FCV B failed to automatically
		runback and informs SRO.
		(Note: RO may manually runback Recirc FCV B)
	SRO	References Tech Specs for a Recirc loop flow mismatch
		- LCO 3.4.1 (Recirc Loops Operating) - Enters Condition A
		*Reactor Engineering should be notified of the loop flow mismatch
	SRO	Notifies OPS Management and NRC Resident of ONI entry and
		reason for entry and of entry into Tech Spec LCOs
		Reviews IOI-3 for power decrease
	SRO/BOP/RO	Notifies Chemistry, HP, and SCC of power change

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Event Description: TBCC Pump A trip / Manual start of standby TBCC Pump / TBCC System Process Piping Leakage / Fast reactor shutdown is required

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports TBCC Pump A trip
		Responds to alarm. Consults ARI-H13-P870-1 (B6)
	BOP	Dispatches NLOs to TBCC Pump A and pump breaker
	BOP/RO/SRO	Requests Maintenance assistance to support troubleshooting
	SRO	Acknowledges report TBCC Pump A trip
		Enters ONI-P44, Loss of Turbine Building Closed Cooling
		- Directs BOP to start the standby TBCC pump
		per SOI-P44
		Notifies OPS Management of ONI entry and reason for entry
	BOP	Starts standby TBCC Pump per SOI-P44, Section 5.1.
		- Take standby TBCC Pump control switch to start
		* May direct NLO to reset overcurrent trip
	BOP/RO	Responds to, reports, and references ARIs for alarms:
		- ARI-H13-P870-2 (H2), TBCC SURGE TANK LEVEL LOW
		- ARI-H13-P870-2 (H4), TBCC PUMP SUCTION FLOW LOW
		May dispatch NLO to open the manual bypass valve around the
		auto makeup valve in order to fill the TBCC surge tank
	BOP/RO	Receives report bypass valve is open and surge tank level is
		continuing to decrease

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Event Description: TBCC Pump A trip / Manual start of standby TBCC Pump / TBCC System Process Piping Leakage / Fast reactor shutdown is required.

Time	Position	Applicant's Actions or Behavior
	BOP/RO	Recognizes and reports loss of TBCC
	SRO	Acknowledges report of loss of TBCC
		Re-enters ONI-P44, Loss of Turbine Building Closed Cooling
		- Orders fast reactor shutdown, enters ONI-C71-1, Rx Scram
		* Will also enter PEI-B13, RPV Control (Non-ATWS) due to < L3
		PEI-B13 RPV Control actions are described in Event six (6)
		- Directs ONI-C71-1 Supplemental Actions
		- Directs ONI-P44 Supplemental Actions as time permits
		* Any component or system served by the TBCC System
		that reaches its temperature limit shall be placed in
		the secured status per its applicable SOI
	SRO/BOP/RO	May direct NLO to walkdown TBCC System
	SRO/BOP/RO	If NLO was directed to perform system walkdown, receives report
		of water in Turbine Building at Elevation 605
	RO/BOP	Respond to, report, and reference ARIs for Alarms:
		H13-P680-9 (D1), ISOPHASE BUS CLG TRBL
		H13-P680-7 (B11), GENERATOR TEMP P811
		H13-P680-7 (D 9), H2 SEAL/STATOR CLG TRBL
	RO/BOP	Carry out ONI-C71-1 actions as SRO directs
	RO/BOP	Carry out ONI-P44 actions as SRO directs

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Event Description: Main Steam Line break in Drywell. RHR Pump A fails to auto start on high Drywell pressure (required for Containment Spray mode) / May be manually started.

Time	Position	Applicant's Actions or Behavior
	SRO/RO/BOP	Recognize rising Drywell Pressure condition
	SRO	Enters PEI-B13 RPV Control (Non-ATWS) due to < L3,
		high RPV press, and Drywell pressure > 1.68 psig.
		Enters PEI-T23, Containment Control due to Drywell pressure
		> 1.68 psig
	SRO	Directs PEI-B13, RPV Control (Non-ATWS)
		- Verifies reactor is scrammed
		- Confirms Reactor Mode Switch is in SHUTDOWN
		- Start Hydrogen Analyzers
		- Verifies reactor shutdown under all condition without boron
		- Verifies SRMs and IRMs inserted
		- Directs pressure control 700 to 900 psig using SRVs
		RPV Pressure Control
		- Stabilizes RPV pressure 800 to 1000 psig
		(Note: As Containment pressure rises, SRO may direct RPV rapidly
		depressurized to the Main Condenser using Main Turbine
		Bypass Valves)

Op-Test No.: 2002-01 Scenario No.: 4 Event No.: 6 Page 2 of 2

Event Description: Main Steam Line break in Drywell. RHR Pump A fails to auto start on high Drywell pressure (required for Containment Spray mode) / May be manually started.

Time	Position	Applicant's Actions or Behavior
	SRO (Cont.)	RPV Level Control
		- Restores and maintains RPV level between 185 and 215 inches
		* CRD - available
		* RCIC – available
		* HPCS – available
		* Reactor Feedwater Booster Pumps and Motor Feed Pump
		Should be unavailable for level control due to loss of TBCC
	RO/BOP	Executes PEI-B13, RPV Control (Non-ATWS) actions per SRO
		direction
	RO/BOP	Verifies automatic plant response is as expected
	BOP	Recognizes failure of RHR Pump A to auto start on high Drywell
		pressure and manually starts RHR Pump A
	BOP	When conditions allow, informs SRO of failure of RHR Pump A
		to auto start and subsequent manual start
	SRO	Acknowledges failure of RHR Pump A to auto start
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell
		press reaches 1.68 psig (described in Event 7)

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Event Description: RHR Pump A trips when flow is aligned to spray Containment / RPV emergency depressurized to control Containment pressure.

Time	Position	Applicant's Actions or Behavior
	SRO	Directs actions per PEI-T23, Containment Control, when Drywell
		pressure reaches 1.68 psig
		Drywell and Containment Temperature Control
		- Operates all available DW cooling
		- Restores NCC to the DW per PEI-SPI 2.1
		- Operates all available Containment cooling
		- Restores CVCW System per PEI-SPI 2.2
		- Attempts to maintain Cont. average temperature less than 185°F
		Drywell & Containment Pressure Control
		- Attempts to maintain Containment pressure below PSP
		- Directs RHR Loop A in the Containment Spray Mode when
		Containment pressure exceeds 2.25 psig per PEI-SPI 3.1
		Suppression Pool Level Control
		- Restores and maintains SP level between 17.8 and 18.5 ft
		Suppression Pool Temperature Control
		- Maintains both SP average temperature and RPV pressure
		below HCL
	RO/BOP	Executes PEI-T23 actions per SRO direction
		Recognizes RHR Pump A trips when flow is aligned to
		Spray Containment and immediately informs SRO

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Event Description: RHR Pump A trips when flow is aligned to spray Containment / RPV emergency depressurized to control Containment pressure.

Time	Position	Applicant's Actions or Behavior
	SRO	Prior to exceeding the Pressure Suppression Pressure (PSP),
		exits PEI-B13, RPV Control (Non-ATWS), RPV Pressure Leg and
		enters PEI-B13, Emergency Depressurization
	SRO	Executes PEI-B13, RPV Control (Non-ATWS), RPV Level Control
		Leg concurrently with PEI-B13, Emergency Depressurization
	SRO	Directs RO/BOP actions per PEI-B13, Emergency Depressurization
		- Confirms that the reactor is shutdown under all
		conditions without boron
		- Verifies Drywell pressure is > 1.68 psig
		- Verifies no low pressure ECCS are required for adequate
		core cooling
		- Prevents injection from LPCS and LPCI
		- Verifies eight or more SRVs are not open
		- Verifies Suppression Pool level is > 5.25 ft
		- Opens all ADS valves to rapidly depressurize the RPV
		* Crew should continue to restore and maintain RPV level 185-215"
		using available injection systems during Emergency
		Depressurization
	RO/BOP	Executes PEI-B13, Emergency Depressurization actions per SRO
		direction

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Event Description: Scenario Termination Criteria

Time	Position	Applicant's Actions or Behavior
		1. Control Rods are fully inserted
		2. The reactor has been emergency depressurized
		3. Feedwater or low pressure ECCS Systems are being used to
		restore RPV level to 185 to 215 inches
		4. Containment and Drywell parameters are being restored per
		PEI-T23, Containment Control

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Event Description: Critical Task #1

Time	Position	Applicant's Actions or Behavior
		Critical Task #1 – With Containment pressure exceeding 2.25 psig,
		and prior to exceeding the Pressure Suppression Pressure, attempt
		to initiate Containment Spray
		1. Safety Significance:
		- Precludes an unrequired Emergency
		Depressurization
		2. Cues:
		- Containment pressure increase
		- Procedural compliance
		3. Measured by:
		- Observation – With Containment pressure at least
		2.25 psig, Containment Spray is manually initiated
		prior to exceeding the Pressure Suppression
		Pressure
		4. Feedback:
		- "Containment Spray Start Signal Received" alarm
		status

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Event Description: Critical Task #2

Time	Position	Applicant's Actions or Behavior
		Critical Task #2 – When Containment pressure cannot be
		maintained below the Pressure Suppression Pressure, initiate
		Emergency depressurization of the RPV prior to exceeding PSP
		1. Safety Significance:
		- Precludes degradation of a fission product barrier
		2. Cues:
		- Increasing Containment pressure
		- Procedural compliance
		3. Measured by:
		- Observation – At least 5 SRVs must be open prior to
		exceeding the Pressure Suppression Pressure
		4. Feedback:
		- RPV pressure decreasing
		- SRV status indications

4.5 Transferring RFPT A(B) from the Manual Speed Control Dial to Manual Flow Control

1. Verify the following:

   a. RFPT A(B) GOV MODE CONT, 1N27-S50(52), is in MANUAL.
   b. STARTUP FDW PUMP SELECT SWITCH, 1C34A-S3, is selected to the MFP or RFP B(A).
   c. RFPT A(B) is warmed up and idling per SOI-N27 or providing flow to the Reactor Vessel on the MANUAL SPEED CONTROL DIAL, 1N27-R425A(B).
   d. RFP A(B) FLOW CONTROL, 1C34-R601A(B), is in MANUAL.

NOTE

RFP A(B) DISCH VALVE, 1N27-F100A(B) may require manual unseating to prevent blowing fuses.

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   e. RFP A(B) DISCH VALVE, 1N27-F100A(B), is open.

2. If total feedwater flow is < 17,400 gpm, verify the setting of RFP A(B) RCIRC FLOW CONTROL, 1N27-R090A(B), tapeset adjusted to 100%.

3. Slowly increase RFPT A(B) speed at a rate ≤ 200 rpm/min. as indicated by RFPT A(B) RPM, 1N27-R411A(B), to a minimum of 3300 rpm using RFPT A(B) MANUAL SPEED CONTROL Dial, 1N27-R425A(B).

4. Use the RFP A(B) FLOW CONTROL, 1C34-R601A(B), manual pushbutton, to null the RFP DEV METER A(B), 1N27-R426A(B).

NOTE

RFPT A(B) control will be shifted to RFP A(B) Flow Control, 1C34-R601A(B).

5. Take RFPT A(B) GOV MODE CONT, 1N27-S50(52), to AUTO.

6. If total feedwater flow is ≥ 17,400 gpm, slowly restore RFP A(B) RCIRC FLOW CONTROL, 1N27-R090A(B), to 0%.

4.6 Transferring RFPT A(B) from the Manual Speed Control Dial to Startup Rx Level Control

1. Verify the following:

   a. RFPT A(B) is being controlled in manual by RFPT A(B) MANUAL SPEED CONTROL Dial, 1N27-R425A(B).
   b. RFPT B(A) and MFP are shutdown or being operated under manual control (Manual Speed Control Dial or Manual Flow Control).
   c. STARTUP RX LEVEL CONTROL, 1C34-R602, is in MANUAL.
   d. RFP A(B,MFP) FLOW CONTROL, 1C34-R601A(B,C) is in MANUAL.

6. Verify STARTUP RX LEVEL CONTROL, 1C34-R602, is in AUTO and the tapeset is at 196".

7. Place the STARTUP FDW PUMP SELECT SWITCH, 1C34A-S3, to MFP and verify all red status lights are off.

8. If total feedwater flow is ≥ 17,400 gpm, slowly adjust any operating feedwater pump RCIRC FLOW CONTROL, 1N27-R080, 1N27-R090A(B), tapeset to 0%.

4.9 Transferring RFPT A(B) from Manual Flow Control to Master Rx Level Control

1. Transfer with the MFP on STARTUP RX LEVEL CONTROL, 1C34-R602, in AUTO:

   a. Verify that RFPT A(B) is running and RFP A(B) FLOW CONTROL, 1C34-R601A(B), is in MANUAL.

NOTE

RFP A(B) DISCH VALVE, 1N27-F100A(B) may require manual unseating to prevent blowing fuses.

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   b. Verify the RFP A(B) DISCH VALVE, 1N27-F100A(B), is open.
   c. If total feedwater flow is < 17,400 gpm, verify the setting of any operating feedwater pump RCIRC FLOW CONTROL, 1N27-R080, 1N27-R090A(B), tapeset adjusted to 100%.

NOTE

Flow rates should be changed slowly to avoid a high reactor water level condition.

   d. Using the manual pushbutton of RFP A(B) FLOW CONTROL, 1C34-R601A(B), adjust the speed of RFPT A(B) at a rate ≤ 200 rpm/min to maintain a constant reactor water level 1 to 2 inches above the tapeset of STARTUP RX LEVEL CONTROL, 1C34-R602.
   e. When RFPT A(B) feed flow has driven the MFP Flow Control Valves, 1N27-F010 / F110, closed, perform the following:

      1) Using the manual pushbuttons of MFP FLOW CONTROL, 1C34-R601C, match its horizontal output meter with the horizontal output meter of STARTUP RX LEVEL CONTROL, 1C34-R602.
      2) Verify the MASTER RX LEVEL CONTROL, 1C34-R600, tapeset is at the applicable level setpoint, normally 196".

   f. Place RFP A(B) FLOW CONTROL, 1C34-R601A(B), in AUTO.
   g. If total feedwater flow is ≥ 17,400 gpm, slowly restore any operating feedwater pump RCIRC FLOW CONTROL,1N27-R080, 1N27-R090A(B), tapeset to 0%.

h. Verify STARTUP RX LEVEL CONTROL, 1C34-R602, is in AUTO and the tapeset is at 196".

NOTE

The following step places RFPT A(B) on Master Rx Level Control, 1C34-R600.

i. Verify the STARTUP FDW PUMP SELECT SWITCH, 1C34A-S3, is selected to MFP and all red status lights are off.
j. Verify MFP FLOW CONTROL, 1C34-R601C, in MANUAL as follows:

NOTE

The Amber Manual light on MFP FLOW CONTROL, 1C34-R601C, will not illuminate. This is per design.

1) Depress the MANUAL pushbutton on MFP FLOW CONTROL, 1C34-R601C.
2) Verify green AUTO status light on for STARTUP RX LEVEL CONTROL, 1C34-R602.

k. When required, refer to SOI-N27 for MFP Shutdown.

2. Transfer with no MFP running:

a. Verify that RFPT A(B) is supplying flow to the RPV and RFP A(B) FLOW CONTROL, 1C34-R601A(B), is in MANUAL.
b. Verify the following:

1) MFP FLOW CONTROL, 1C34-R601C, is in MANUAL as follows:

NOTE

The Amber Manual light on MFP FLOW CONTROL, 1C34-R601C, will not illuminate. This is per design.

a) Depress the MANUAL pushbutton on MFP FLOW CONTROL, 1C34-R601C.
b) Verify green AUTO status light on for STARTUP RX LEVEL CONTROL, 1C34-R602.

2) MFP is selected on the STARTUP FDW PUMP SELECT SWITCH, 1C34A-S3.
3) RFP B(A) FLOW CONTROL, 1C34-R601B(A), is in MANUAL.

c. If total feedwater flow is < 17,400 gpm, verify the setting of any operating feedwater pump RCIRC FLOW CONTROL, 1N27-R090A(B), tapeset adjusted to 100%.
d. Use the MASTER RX LEVEL CONTROL, 1C34-R600, tapeset to null the controller deviation (red arrow in green band).
e. Place RFP A(B) on Master Rx Level Control by placing RFP A(B) FLOW CONTROL, 1C34-R601A(B), in AUTO.

f. Verify the MASTER RX LEVEL CONTROL, 1C34-R600, tapeset is at the applicable level setpoint, normally 196".
g. Verify STARTUP RX LEVEL CONTROL, 1C34-R602, is in AUTO and the tapeset is at 196".
h. If total feedwater flow is ≥ 17,400 gpm, slowly adjust any operating feedwater pump RCIRC FLOW CONTROL, 1N27-R080, 1N27-R090A(B), tapeset to 0%.

4.10 Placing a 2nd Feed Pump in AUTO on Master Rx Level Control

1. If the 2nd Feed Pump is RFP B(A), then verify RFP B(A) is on RFP B(A) FLOW CONTROL, 1C34-R601B(A), in manual.

2. If the 2nd Feed Pump is the MFP, then perform the following:

   a. Start the MFP per Motor Feed Pump Startup in SOI-N27.

NOTE

MFP DISCH VALVE, 1N27-F180 may require manual unseating to prevent blowing fuses.

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   b. Open MFP DISCHARGE VALVE, 1N27-F180.

3. If total feedwater flow is < 17,400 gpm, verify the setting of any operating feedwater pump RCIRC FLOW CONTROL, 1N27-R080, 1N27-R090B(A) tapeset at 100%.

NOTE

As flow increases on the oncoming pump, the flow from the in service pump to the RPV will decrease to compensate. Allow adequate time for the system to reach equilibrium before proceeding.

The vertical meter output indicates Reactor Feed Pump suction flow minus recirc flow, which is actual feed flow to the RPV.

SPDS (OPER AID) FDWLC screen is available and can be used when comparing and balancing controllers. Master Level Control output signal should be < 3% to minimize Reactor Vessel level transients.

4. Adjust the flow of the oncoming pump as follows to achieve a bumpless transfer:

   a. For RFP B(A), slowly adjust the speed of RFPT B(A) using the manual pushbuttons of RFP B(A) FLOW CONTROL, 1C34-R601B(A), to match its vertical output meter with the vertical output meter of RFP A(B) FLOW CONTROL, 1C34-R601A(B).
   b. For the MFP, slowly adjust MFP flow using the manual pushbutton of MFP FLOW CONTROL, 1C34-R601C, to match its vertical output meter with the vertical output meter of RFP A(B) FLOW CONTROL, 1C34-R601A(B).

5. Place RFP B(A)(MFP) FLOW CONTROL, 1C34-R601B(A,C), in AUTO.

6. If total feedwater flow is ≥ 17,400 gpm, slowly restore any operating feedwater pump RCIRC FLOW CONTROL,1N27-R080, 1N27-R090B(A), to 0%.

5.0 SYSTEM OPERATIONS

1. Normal operation is with both RFPTs in AUTO on Master Rx Level Control. The MFP is not running, but is in Standby Readiness, ready to automatically start. Reactor Water Level is set at the applicable level, normally 196".

2. Indicated Reactor Water Level will vary from range to range as a function of RPV Pressure and Temperature, and to a lesser extent, as a function of Drywell and Containment Temperature. For comparison purposes, the Plant Data Book provides approximate readings, which can be expected at various plant conditions. Wide Range Level readings will also vary with Jet Pump Flow; the graphs do not account for this effect.

3. When operating with one RFPT and the MFP in Master Rx Level Control, the vertical output meter of the RFP A(B) Flow Control, 1C34-R601A(B), for the operating RFPT must not be allowed to exceed 82%. Suction flow for the RFPT A(B) should not be allowed to exceed 24.6(24.3) kgpm.

6.0 SHUTDOWN

6.1 Shifting a Feed Pump from Master Rx Level Control to Manual Flow Control

NOTE

More than one Feed Pump should normally be operating in AUTO on Master Rx Level Control.

Master Rx Level Control output signal should be < 3% to ensure a bumpless transfer will occur. SPDS (OPER AID) FDW Level Control screen may be used to monitor this value.

1. Verify sufficient feed flow capacity will be available with the selected pump in Manual Flow Control or reduce reactor power to within the capacity of the remaining feed pump(s) which will be under Master Rx Level Control 68%-5%= 63% power for a RFPT.

2. Verify STARTUP FDW PUMP SELECT SWITCH, 1C34A-S3, is selected to a Feed Pump other than the pump to be placed in manual.