OPERATING TEST No.:1

Applicant Type	Evolution Type	Minimum Number	Scenario Number 1	2		
RO Candidates 1, 3	Reactivity	1	2			
	Normal	1		4		
	Instrument	2	1	2		
	Component	2	5	3		
	Major	1	4	6		
RO 2 Candidates 2, 4	Reactivity	1		4		
	Normal	1	2			
	Instrument	2	3	1		
	Component	2	6	5		
	Major	1	4	6		
SRO-I as RO Candidates A, B, C, D	Reactivity	1				
	Normal	0				
	Instrument	1				
	Component	1				
	Major	1				
SRO-I as SRO Candidates A, B, C, D	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: Fred Nyquist

Chief Examiner: _____

Operating Test 1

Competencies	Applicant #1 (RO)/SRO-I/SRO-U SCENARIO				Applicant #2 (RO)/SRO-I/SRO-U SCENARIO				Applicant #3 RO/SRO-I/SRO-U SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms	1	2			3	1,4						
Diagnose Events and Conditions	1	2			3	1,4						
Understand Plant and System Response	2	2,4 6			2	1,4						
Comply With and Use Procedures (1)	1,2, 4	2,3			1,2 4	1,4 5,6						
Operate Control Boards (2)	1,2 4	2,3			1,2 4	1,4						
Communicate and Interact With the Crew	1,2 4	2,3 5,6			1,3 4	1,4 5,6						
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: Fred L Nyquist

Chief Examiner: _____

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 1

Submitted by:	Fred L Nyggard	6/15/00
	Developer	Date
Reviewed by:	Robert D Cummings	6/15/00
	Technical Reviewer	Date
Reviewed by:	N/A	N/A
	Cognizant Plant Supervisor *(Optional)*	Date
Approved by:		6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:1	Op-Test No.:1 (2)
Examiners:	Operators:	
Objectives: To evaluate the applicants' ability to implement the AOPs for a RCS leak, to reduce power using the AOP for rapid power reduction, and to implement the EOPs to respond to a LOCA and ESDE with conditions that require entry to the Functional Recovery EOPs and contingency actions to be taken within the EOP.		
Initial Conditions: IC 24; 100% power at MOL.		
Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The following equipment is out of service: SJAE Radiation Monitor.		

Event No.	Malf. No.	Event Type*	Event Description
1	RX04B@ 80%	I(RO)	The in-service Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.
2	RC04 @(3%), 120 Sec Ramp	R(RO) N(BOP)	12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.
3	FW10A 95%	I(BOP)	After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. This is a failure of the control circuit which will cause the BOP to diagnose SG level, steam flow, and feed flow to determine need to shift to manual. Power reduction initiated in Event 2 should continue during this event.
4	RC03A @ 0.1% 300 sec ramp MS07A@ 100% BT-1	M(All)	970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand. The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.
5	SI04A SI04C	C(RO)	'A' HPSI and 'C' HPSI pump breakers fail to close at time of SIAS resulting in HPSI not available for injection. After SIAS has initiated the simulator operator will remove SI04C, which will allow the RO to start the 'C' HPSI pump. Alternatively, the RO may start 'B' HPSI pump.
6	FW20B FW30 @70%	C(BOP)	'B' AFW pump trips and 'A' AFW pump is degraded which will require the BOP to take contingency actions to start the turbine driven AFW pump

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

OP-Test No.:	Scenario No.:1 Event No.:N/A	Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.		
IC 24	100% power at MOL. 568 PPM	
SI04A	'A' HPSI pump fails	
SI04C	'C' HPSI pump fails	
FW20B	'B' AFW pump trip	
FW30 @70%	'A' AFW pump degraded performance	
RM02A @ 0%	SJAE failed low.	
MS07A @100% BT-1	MSSV fails open at time of reactor trip	
	Ensure Pressurizer level channel 'Y' is selected.	

OP-Test No.: Scenario No.:1 Event No.:1 Page of

Event Description: RP10A@80% Selected Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert RX04B@80%. Pressurizer level transmitter failure (selected controlling channel)	RO	Acknowledge and Report 'Pressurizer CH Y Level Hi/Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	RO	Reference the ARP for window C04 A-39 and observe and compare actual level and setpoint and determine action to take per ODI form 1.26-05 step 2.a) attached and ARP 2590C window A-39 step 3.4 or 4.4 attached. RO will shift pressurizer level control channels. RO may be directed to force sprays to maintain 2250 psia. Need for this forcing sprays may be dependent on delay in swapping pressurizer level control channels. Guidance for returning HIC 110 is in OP 2304A step 4.6.22
		RO/US	Determine that pressurizer level instrument has malfunctioned.
		US	Refer Technical Specifications 3.3.3.5 and 3.3.3.8
		US	Submit Trouble report (call to I&C)

OP-Test No.: Scenario No.:1 Event No.:2 Page of

Event Description: RC04 12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RC04(3%),Ramp 120 Sec. 12 GPM RCS leak	RO	Provide assistance in recognition of RCS leak. RO may not be the first crew member to recognize symptoms of a leak but should report computer alarm for sump leak rate, charging/letdown flow mismatch or slight lowering of pressurizer level.
		BOP	Provide assistance in recognition of RCS leak. BOP may not be the first crew member to recognize symptoms of a leak but should report rising containment sump level.
	If asked, report Chemistry sample after a 15 minute time delay (If necessary) indicates background. Report as PEO that no leakage is found in auxiliary building.	US	Direct diagnostic process by collecting and analyzing major parameters such as changes in Tave, steam pressure, radiation monitor alarms and containment parameters. Direct entry to AOP 2568 RCS leakage.
		US	Direct RO or BOP to assist in determination of leak rate by using PPC as directed in AOP 2568 step 4.3 (attached). RO may also estimate leak rate by observation of charging/letdown mismatch.
	At direction of the lead examiner, if the crew goes to OP 2204, then as the operations manager direct that power be reduced per AOP 2575.	US	Determine that Technical Specification LCO 3.4.6.2 action statement has been entered and direct entry to AOP 2575 Rapid Downpower. Alternatively, the US could make a judgement call that the leak rate is not rising rapidly and it is conservative to reduce power slowly to minimize the probability of a plant transient causing the leak to get worse.

		US	Direct performance of AOP 2575 attached, and continue implementation of AOP 2568 to determine source of leakage per steps 4.5-4.10. US may call for operator assistance to determine source of leakage while the crew performs the down power.
		All	Maintain plant parameters per AOP 2575 Attachment 1 and 7, attached
	There is some possibility that forcing sprays could have been started in Event 1 of this scenario.	RO	Initiate forcing sprays (AOP 2575 step 4.5). This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). Force spray by: Energizing all 4 Backup Heater Groups and then lower setpoint of the selected Pressurizer controller to obtain 50% output signal and then monitoring Pressurizer pressure. (OP 2204 step 4.3.7, attached).
		RO	Start a second charging pump by placing the 'CHG PP OVERRIDE' switch to 'LEV 1' and balance charging and letdown flow. (AOP 2575 step 4.6 and 4.7) This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). (OP 2304 2304E step 4.4.4 and 4.4.8, attached).
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	US	Make notifications per AOP 2575 step 4.9 and 4.10.
		US/RO	US direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per AOP 2575 step 4.11 and Attachment 2. Note - Attachment 3 steps may be performed from memory but may be referred to if needed.
		BOP	Reduce Turbine Load and maintain Tave on program per AOP 2575 step 4.12 9 (attached).
		US/RO	Select boration Rate per AOP 2575 step 4.13 (attached).
		RO	Borate to the charging pump suction per AOP 2575 step 4.14 per and Attachment 3. Note - Attachment 3 steps may be performed from memory but

			may be referred to if needed. RO/US may make decision to makeup to VCT per step 1.9 in Attachment 3.
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11.
		RO	the RO may align for a heavy blend per AOP 2575 step 4.14
	After approximately a 2% power decrease or at discretion of the lead examiner, insert the next event.		

OP-Test No.: Scenario No.:1 Event No.:3 Page of

Event Description: FW10A @ 95%. After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. Power reduction initiated in Event 2 should continue during this event.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	FW10A @95% oscillation of the main feed regulating	BOP	Recognize and report the feedwater flow oscillation by one or more of the following: observation of the feed flow rate, observation of SG level oscillation, 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16.
		BOP	Place the 'A' FRV in manual control by pressing the 'MSTR LIC-5272 MAN' Button and adjust controller output to stabilize SG level. This action may be taken prior to referring to a procedure per ODI Form 1.26-15 (attached).
		US	Once the plant is stable, refer to the ARP for 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16 to determine additional actions and OP 2385 Feedwater Control Operation section 4.3.1. Operators may prioritize their actions as a result of being in AOP 2575 and 2568 and elect not to refer to the ARP if the have controlled SG level.
			After approximately a 5% power decrease from the initial power level or at discretion of the lead examiner, insert the next event.

OP-Test No.: Scenario No.:1 Event No.:4,5,6 Page of

RC03A @ 0.1% 300 sec ramp and MS07A @100% power: 970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand.
SI04A and SI04C: 'A' and 'C' HPSI pump fails at time of SIAS resulting in HPSI not available for injection. Following the SIAS signal, SI04C is removed which will allow the 'C' HPSI pump to manually started.
FW20B and FW30@70%: 'B' AFW pump trip and 'A' AFW pump degradation will require the secondary RO (BOP) to take contingency actions to start the turbine driven AFW pump
The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.

Time		Position	Applicant's Actions or Behavior
	RC03A @ 0.1% 300 sec ramp 970 GPM Small Break LOCA Verify MS07A @100% activates at time of trip **Remove SI04C after SIAS actuates**	US	Direct that the reactor be tripped and EOP 2525 be commenced when: • RCS leakage exceeds the Chg Pp capacity. Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted

		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero • 8T and 9T are opened • All Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level < 20% and going down

	After SIAS actuates remove malfunction SI04C. If the RO attempts a start of 'C' HPSI pump by turning the HS to start, it will indicate a amber trip light. A restart attempt by turning handswitch to stop and then to start will start the pump. Alternatively, the 'B' pump can be started.	RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure < 1900 psia • Verify spray valves are closed • verify PORVs are closed • If pressure is 1800 psia and trending down, report and initiate SIAS/CIAS/EBFS (per ODI form 1.26-11 and OP 2260 step 1.11.4) • If pressure is 1714 psia and trending down, report and ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated. • If pressure is 1714 psia and SIAS has initiated, ENSURE that one RCP in each loop has been stopped. One RCP in each loop can be stopped at a higher pressure if SIAS has been initiated. • The RO or crew may recognize that there is no HPSI pump operating. If recognized, the RO may report and start the 'C' or 'B'HPSI pump. (EOP Implementation Guidance Document step 5.2.1 and 5.2.6). If not started in during EOP 2525, it must be started in EOP 2540.
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Check that at least one RCP in each loop is operating • Check loop Δt is less than 10°F • Check that T_H subcooling is greater than 30 °F

		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is less than 880 psia • 1 Main Steam Safety Valve is open • If steam generator pressure is less than 800 psia, close the MSIVs. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, report and initiate MSI. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, isolate feed and close the ADV for the most affected SG. • Report that RCS T_C is less than 530°F and that feed flow is not excessive. • SG level is being restored in #2 SG. The BOP should recognize that only one AFW pump is operating and that it is degraded. BOP should start the Turbine Driven AFW Pump. This pump may be started from memory (ODI form 1.26-15) Steps are in EOP Appendix 6 (attached). **CT** EOP Implementation guidance Document step 3.1.3) • RCS subcooling is greater than 30°F

		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment are rising • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is greater than 4.42 psig • Ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated.
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Report containment pressure and Ensure at least two CAR fans operating
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Start both containment aux circ fans in slow • Start both containment post incident circ fans
		RO	Report no subsequent actions were taken on the primary side. (EOP 2525 step 10)
	CT-HR-2 Feedwater must be isolated to #1 SG within 10 minutes of the initial break to limit the reduction of RCS temperature. **CT-HR-3 #2 Atmos. Dump has been opened and feed water has been established to #2 SG to stabilize RCS temperature.**	BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18)

		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. A simultaneous LOCA and ESDE has occurred. Directs entry into EOP 2540.
		Crew	Transition to EOP 2540 Functional Recovery
		US	Open the Safety Function Tracking Page and Enter the EOP Entry time and ensure the master alarm silence switch is in 'normal', per EOP 2540 step 2. US continues to direct operations using EOP 2540.
		RO	As directed, close pressurizer spray valve associated with the stopped RCPs. EOP 2540 step 3.
	When requested, after the appropriate amount of time (~15 min.), inform the crew that frisk results on both SG samples indicate background. If #2 SG is dry, inform crew that sample could not be obtained from #2 SG	BOP	As directed, open SG sample isolation valve EOP 2540. Step 4.
		RO	As directed place Hydrogen Analyzer in service per Appendix 19 (Attached) EOP 2540 step 5.
		US	Identify Success paths to be used by using the RAT and Safety Function Tracking Page EOP 2540 step 6. The most likely success paths to be selected are: RC-1; MVA-DC-1; MVA-AC-1; IC-2; PC-1 or 2; HR-2; CI-1; CTPC-2; CCGC-1
	Other orders may be correct depending on timing of operator actions. Other orders should be verified.	US	Prioritize Safety Functions per EOP 2540 step 7. If a HPSI pump had not started the expected order of priority is: IC-2 SFSC not met; therefore go to IC-2 and start a HPSI pump. Then redo the priority. If the HPSI pump had been stated in EOP 2525, the expected order of priority is: IC-2; PC-2; HR-2, CTPC-2, RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1. If containment spray had been started the expected order of priority is CTPC-3; IC-2, PC-2, HR-2. RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1
		US	Direct the STA to check the SFSC Acceptance criteria EOP 2540. Step 8.

		US	Direct the crew in performing the chosen success paths based on the assigned priority.
		Note	The examinee need to go to the appropriate FR description below based upon the US order of priority.
		All	MVA-DC-1 is expected to be completed for this scenario without the need for making any control board manipulations. MVA-DC-1 steps 1, 2, 6, 7, 8, and 10 verify equipment is operating as expected.
		All	MVA-AC-1 is expected to be completed for this scenario without the need for making any control board manipulations.
		All	IC-2 Step 1 no control board manipulations expected.
	CT- IC-3 Maintain available inventory for long term core and RCS heat removal by starting a HPSI pump.	RO	IC-2 Step 2. If the HPSI pump was not started in EOP 2525, it must be started in the contingency actions for this step.
		RO	IC-2 Steps 3-5 is expected to be completed for this scenario without the need for making any control board manipulations.
		RO	IC-2 Steps 6 and 7. If the HPSI pump was started in EOP 2525 the HPSI Throttle or Stop criteria of these steps may be met and actions taken to throttle or stop the HPSI flow.
		RO	IC-2 Steps 8 HPSI flow and pumps should be controlled to meet the HPSI Throttle or Stop criteria.
		RO	IC-2 Step 10 Stop the LPSI pumps.
		RO	IC-2 step 11 Check containment sump wide range level is rising.
		RO	IC-2 steps 12-16 are not expected to be performed in the time frame of this scenario.

		RO	PC-1 or PC-2. If IC-2 was implemented correctly for this scenario, these procedures are expected to be completed for this scenario without the need for making any control board manipulations. If HPSI Throttle or Stop criteria are reached, steps 3,4 and 5 may be to throttle or stop the HPSI flow.
		RO	HR-2 Steps 1 - 4 If IC-2 was implemented correctly for this scenario, these procedure steps are expected to be completed for this scenario without the need for making any control board manipulations.
		All	HR-2 Step 5 Perform a controlled cooldown using the ADV on the least affected SG.
			HR-3 Step 22 Ensure the least affected SG level is being maintained.
		END	This scenario may be terminated after HPSI flow has been established and a controlled coodown has been established OR at the discretion of the Lead Examiner.

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms												
Diagnose Events and Conditions												
Understand Plant and System Response												
Comply With and Use Procedures (1)												
Operate Control Boards (2)												
Communicate and Interact With the Crew												
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: _____

Chief Examiner: _____

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 2

Submitted by:	Fred L Nyzard	6/15/00
	Developer	Date
Reviewed by:	Robert R Emmum Jr	6/15/00
	Technical Reviewer	Date
Reviewed by:	N/A	N/A
	Cognizant Plant Supervisor *(Optional)*	Date
Approved by:	M L K	6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:2	Op-Test No.: 1
Examiners:	Operators:	

Objectives: Objectives: To evaluate the applicants' abilities to diagnose and take corrective actions for a failed pressurizer pressure control channel and failed main steam flow input to the steam generator level control system. Following the failed instrumentation, a dropped rod will require the plant be stabilized and then power reduced. During the power reduction, a second rod slips in which will require the plant be manually tripped. The initial response will be uncomplicated. However after the initial diagnosis and transition to the reactor trip recovery EOP, a SGTR will occur which will require a rediagnoses and entry to the SGTR EOP. Alternatively functional recovery EOP could be entered. A component failure will require contingency actions to be taken.

Initial Conditions: The plant is at 100% power at MOL.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1. 'A' Service Water Pump is out of service.

Event No.	Malf. No.	Event Type*	Event Description
1	RX03B@ 0% 120sec	I(RO)	Pressurizer pressure control failure results in implementation of ARP to manually control pressure and shift controlling channel.
2	RX11A@ 0% 600 sec	I(BOP)	Failure of a main steam flow transmitter leads to a SG level transient and deselecting the failed transmitter as an input to the steam generator level control system.
3	CW01C	C(BOP)	The 'C' Circulating Water pump trips which results in the BOP cross tying the water boxes.
4	RD0126	R(RO) N(BOP)	Dropped rod results in implementation of AOP for rod Malfunctions and also requires use of the Technical Specifications. Following the initial diagnosis and plant stabilization, a plant power reduction is performed.
5	RD0114 RP04A-D	C(RO)	Second rod drops in leading to a manual reactor trip and implementation of EOP for Standard Post Trip Actions (SPTA). An ATWS occurs which requires the RO to take contingency actions to trip the plant.
6	SG02B@ 15% 120sec	M(All)	After the EOP for SPTA has been completed and crew has entered the EOP for Reactor Trip recovery, a SG tube rupture will occur which will cause the crew to re-diagnose and enter the EOP for SGTR or the functional recovery EOP.

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

Modify instructions to include RP04C

OP-Test No.:	Scenario No.:2 Event No.:N/A Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.	
IC 24	100% power at MOL. 568 PPM
	Secure the 'A' SW pump, and start the 'B' SW pump. Hang yellow tag on 'A' SW pump
SWR27 (RO)	Rack out 'A' SW pump breaker
RP04A-D	Manual reactor trip failure

OP-Test No.: Scenario No.:2 Event No.1: Page of

Event Description: RX03B Pressurizer pressure control failure results in implementation of ARP to manually control pressure and shift controlling channel.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX03B (0)120 sec Insert a malfunction to cause a failure of the Channel "Y" PZR Pressure Transmitter.	RO	Acknowledge and Report 'PRESSURIZER CH Y PRESS HI/LO' alarm and 'PZR PRESSURE SELECTED CHANNEL DEVIATION HI/LO' on C03 per ODI Form 1.26-05 step 1.a) and 1.b) attached.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP for window C03 D37 and D-39 and observe and compare other pressurizer pressure channels per ODI form 1.26-05 step 2.a) attached and ARP 2590B window D-37 step 1 and window D-39 attached. RO may determine the failed channel and shift to Channel Y before referencing the ARP per DC 4 section 1.1 or may shift the controller to manual per ODI Form 1.26-15.
		US/RO	Perform actions per ARP 2590B window D-37 step 1 and window D-39 attached.
	At direction of lead examiner, continue with the next event	US	Determines that Technical Specification action statements are not entered.

OP-Test No.: Scenario No.:2 Event No.:2 Page of

Event Description: RX11A @0% 600 sec ramp. Failure of a main steam flow transmitter leads to a SG level transient and deselecting the failed transmitter as an input to the steam generator level control system.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX11A @0% 600 sec ramp. Failure of a main steam flow transmitter	BOP	May note lowering of indicated steam flow and actual lowering of feed flow and SG level for #1SG. If the trend is not noted, an alarm 'SG LEVEL SETPOINT DEVIATION HI/LO' will alert the RO to the problem.
		BOP	Acknowledge and Report 'SG LEVEL SETPOINT DEVIATION HI/LO' alarm C05 per ODI Form 1.26-05 step 1.a) and 1.b) attached. In event that RO notes trend and take actions before alarm occurs, the ARP can still be referenced for guidance.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		BOP	May shift FRV to manual control prior to referencing the ARP if necessary to stabilize the plant per ODI Form 1.26-15. Shifting to manual may not be necessary if action to shift to the alternate steam flow transmitter is taken early.
		BOP	Shift the transmitter control switch for #1 SG Steam Flow to 'ALT' per ARP 2590D window D-16 attached
		BOP	If desired, refer to OP 2385 and place the Feedwater Control System in Automatic.

OP-Test No.: Scenario No.:2 Event No.:3 Page of

Event Description: CW01C: The 'C' Circulating Water pump trips which results in the BOP cross tying the water boxes.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert CW01C to trip the C CW pump	BOP	Acknowledge and Report 'Circ Water Pump C Overload Trip' alarm on C06/7 per ODI Form 1.26-05 step 1.a) and 1.b) attached.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		BOP	Reference the ARP for window C06/7 C-9 per ODI form 1.26-05 step 2.a). and use OP 2325A (attached)to cross tie the water box. BOP may determine take action to cross tie the water box before referencing the ARP and OP per DC 4 section 1.1.

OP-Test No.: Scenario No.:2 Event No.:4 Page of

Event Description: RD0126 Dropped rod results in implementation of AOP for rod Malfunctions, using the Technical Specifications. Following the initial diagnosis and plant stabilization, a plant power reduction is performed.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RD0126 Drop CEA #26	RO	Observes dropped CEA based on multiple indications including multiple alarms on C04, CEAPDS Monitor, Core mimic Display and makes report to US.
		US	Acknowledge report and ensure AOP 2556 is referenced per ODI form 1.26-05 step 1.c) and 2.c) attached
		All	Diagnoses Dropped CEA based on CEA position indication, annunciators and changes in RCS temperature.
		BOP	Reduce Turbine Load to stabilize power and RCS temperature per AOP 2556 step 4.3.1and 4.3.2. This step may be performed prior to the AOP being opened by the US.
		US	Enters TSAS 3.1.3.1 e and directs crew to begin down power to < 70% power by referring to OP2204 or AOP 2575. AOP 2575 is the preferred choice due to time constraints for the power reduction.
		All	Maintain plant parameters per AOP 2575 Attachment 1 and 7, attached
		RO	Initiate forcing sprays (AOP 2575 step 4.5). This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). Force spray by: Energizing all 4 Backup Heater Groups and then lower setpoint of the selected Pressurizer controller to obtain 50% output signal and then monitoring Pressurizer pressure. (OP 2204 step 4.3.7, attached))

		RO	Start a second charging pump by placing the 'CHG PP OVERRIDE' switch to 'LEV 1' and balance charging and letdown flow. (AOP 2575 step 4.6 and 4.7) . This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). (OP 2304 2304E step 4.4.4 and 4.4.8, attached)
		US	Make notifications per AOP 2575 step 4.9 and 4.10
		US/RO	US may elect not to insert rods due to the initial power reduction from the dropped rod or the US may direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) If directed, RO Insert CEAs per AOP 2575 step 4.11 and Attachment 2. Note - Attachment 2 steps may be performed from memory but may be referred to if needed.
		BOP	Reduce Turbine Load and maintain Tave on program per AOP 2575 step 4.12 9 (attached)
		US/RO	Select boration Rate per AOP 2575 step 4.13 (attached)
		RO	Borate to the charging pump suction per AOP 2575 step 4.14 per and Attachment 3. Note - Attachment 2 steps may be performed from memory but may be referred to if needed.
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11
		Note	After approximately a 5% power decrease or at discretion of the lead examiner, insert the next event.

OP-Test No.: Scenario No.:2 Event No.5 Page of

Event Description: RD0114 Second rod drops leading to a manual reactor trip and implementation of EOP for SPTA

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RDO114 Rod Drop.	All	Determination that a second CEA drops in by observation of CEAPDS.
		US	Directs a reactor and turbine trip and entry to EOP 2525 per AOP 2556 step 4.2
		US	Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
	CT-SPTA-5 Manually shutdown the reactor by opening the MG set output contactors.	RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: RO must perform contingency action to open the MG set output contactors and then report • Power going down • SUR is negative • All CEAs fully inserted
		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero

			• 8T and 9T are opened • All Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level is between 20 and 80% and trending to 35 to 70% • Subcooling is greater than 30°F
		RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure is 1900 to 2350 psia and trending to 2225 to 2300 psia.1900 psia
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Check that at least one RCP in each loop is operating • Check loop Δt is less than 10°F • Check that T_H subcooling is greater than 30 °F
		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is 880 psia to 900 psia • Check that RCS T_C is maintained between 530°F and 535°F. • SG level is being restored in both SGs with level between 10 and 80% and a MFW pump is running

			• RCS subcooling is greater than 30°F
		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment are normal • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Report completion of subsequent actions on the primary side. (EOP 2525 step 10)
		BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18)
		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. Determines an uncomplicated trip has occurred has occurred. Directs entry into EOP 2526.

		US	Transitions to EOP 2526
		NOTE	After crew transitions to EOP 2526 Enter the next event

OP-Test No.: Scenario No.:2 Event No.:6 Page of

Event Description: SG02B @15% 120sec ramp After EOP for SPTA has been completed and crew has entered the EOP for Reactor Trip recovery, a SG tube rupture will occur will cause the crew to re-diagnose and enter the EOP for SGTR

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	SG02B @15% 120sec ramp SGTR #2 SG	All	RO may report lowering letdown flow and pressurizer level prior to first annunciators that will occur as a result of SGTR. BOP may report a rising SG level. One of the first annunciators may be Rad Monitor low flow on C02/3. SJAE rad monitor may alarm. Upon receipt of annunciators crew members should make announcements per per ODI Form 1.26-05 step 1.a) and 1.b) attached
		US	Rediagnose the event and transition to EOP 2534 SGTR
	When directed as chemistry, delay obtaining a sample for about 30 minutes.	BOP	When directed, opens S/G sample valves and directs chemistry to sample S/Gs
		RO	Perform EOP 2534 Step 4 as directed • If pressure is 1800 psia and trending down, or earlier if the transient is considered fast moving, report and initiate SIAS/CIAS/EBFS (per ODI form 1.26-11 and OP 2260 step 1.11.4) • If pressure is 1714 psia and trending down, report and ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated. If pressure is 1714 psia and SIAS has initiated, ENSURE that one RCP in each loop has been stopped. One RCP in each loop can be stopped at a higher pressure if SIAS has been initiated.
		RO	Perform EOP 2534 Step 5 as directed by checking:

			• SIAS, CIAS, and EBFAS has properly actuated by checking CO1X • adequate safety injection flow • all charging pumps are operating • vital switch gear cooling is operating per step 5d.
	CT-SGTR-9 for RCP trip may be successfully completed only if RCP are tripped following violation if RCP NPSH curve. (CT ONLY if NPSH cure is violated)	RO	Perform EOP 2534 Step 6 as directed by: • Tripping one RCP in each loop and closing the associated spray valve. • Monitors RCP NPSH. • Trips RCPs if NPSH criteria is NOT met and Closes spray valves and Shifts Tavg controller to manual
		BOP	Perform EOP 2534 Step 7 as directed by Aligning Condenser Air removal to Unit 2 stack as per step 7
		US	Directs crew to initiate plant cooldown until TH < 515°Fper step 8.
		BOP	As directed, dumps steam to the condenser by using PIC 4216 in manual to cooldown rapidly as possible until T_H is < 515°F without causing pressurizer pressure to go below RCP NPSH limit if possible. In this scenario, most likely, the NPSH will be exceeded and the RO should carry out appropriate actions as described for step 6 above and the cooldown continued. After 515°F is reached the cooldown rate should be slowed.
		RO	Perform EOP 2534 Step 9 as directed to depressurize the RCS. During the initial cooldown, little action is required. However as the scenario continues, the RO will need to perform this continuously applicable step.
		RO	Perform EOP 2534 Step 10 as directed by Blocking MSI (on facility) when S/G pressure is < 600 psi. As directed, will initiate MSI after #2 SG is isolated.
	Report SG sample results (**#2 S/G sample frisk 250 cpm above background/ #1 S/G sample frisks clean**) only after crew has determined	Crew	Perform EOP 2534 Step 13 as directed to Identify the #2 S/G as the ruptured S/G based on S/G level and feed response

	the rupture is in the #2 S/G based on level and feed response.		
	As PEO install closing coils and report.: MSR 13 (RI) MS-202 CC coil installed MSR 18 (RI) MS65A OC installed.	US	Directs SPO to isolate the Number 2 S/G and to maintain isolated S/G pressure < 920 per step 14
		BOP	Perform EOP 2534 Step 14 as directed to Isolate the # 2 SG Maintains isolated SG pressure < 920 psi
		Crew	Per EOP 2534 step 16 Verifies correct S/G has been isolated
		US	Direct crew to monitor for HPSI throttle and stop criteria per step 17, 18 and 19.
		RO	As cooldown and depressurization continues the pressurizer will refill and the RO will throttle and or stop HPSI.
		US	May direct crew to begin RCS pressure reduction to S/G pressure and to continue RCS cooldown
	CT-SGTR-2 may be successfully completed by the use heaters, spray, charging or letdown to establish the desired RCS pressure conditions. RCS pressure must be maintained within the limits of the PT curve (Figure 3.2)	RO	Begins or continues to reduce RCS pressure as had been directed in step 9 o Maintains 30°F subcooling o Maintains RCP NPSH (if RCPs are still running)
		BOP	Continues cooldown of RCS at < 80°F/Hr
		BOP	Maintains Least Affected SG level as directed per EOP 2534 step 22
		Note	This Scenario may be terminated when the RCS pressure is lowering towards SG pressure and the cooldown has been established or at the discretion of the lead examiner

OPERATING TEST No.:2

Applicant Type	Evolution Type	Minimum Number	Scenario Number 1	3		
RO Candidates 5, 7	Reactivity	1	2			
	Normal	1		1		
	Instrument	2	1	3		
	Component	2	5	5		
	Major	1	4	5		
RO 2 Candidates 6, 8	Reactivity	1		1		
	Normal	1	2			
	Instrument	2	3	2		
	Component	2	6	4,5		
	Major	1	4	5		
SRO-I as RO Candidates A, B, C, D	Reactivity	1				
	Normal	0				
	Instrument	1				
	Component	1				
	Major	1				
SRO-I as SRO Candidates A, B, C, D	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: Fred A Nyland

Chief Examiner: _____

OPERATING TEST 2

Competencies	Applicant #1 RO/SRO-I/SRO-U SCENARIO				Applicant #2 RO/SRO-I/SRO-U SCENARIO				Applicant #3 RO/SRO-I/SRO-U SCENARIO			
	RO 1	2	RDP 3	4	BDP 1	2	RO 3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms	1		3		3		2,4					
Diagnose Events and Conditions	1		3,5		3		2,4 5					
Understand Plant and System Response	2		1,3 5		2		1,2					
Comply With and Use Procedures (1)	1,2 4		1,3 5		1,2 4		1,2					
Operate Control Boards (2)	1,2 4		1,3 5		1,2 4		1,2 4					
Communicate and Interact With the Crew	1,2 4		1,3 5		1,3 4		1,2 4,5					
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: Fred L Nyzaard

Chief Examiner: _____

Exam Title: Millstone Unit 2 NRC Operating Exam

Duplicate from Op. Test 1

Revision: 0

ID Number: Scenario 1

Submitted by:	Fred L Nyggard	6/15/00
	Developer	Date
Reviewed by:	Robert D Cummings	6/15/00
	Technical Reviewer	Date
Reviewed by:	N/A	N/A
	Cognizant Plant Supervisor *(Optional)*	Date
Approved by:	[signature]	6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:1	Op-Test No.:1 (2)
Examiners:	Operators:	

Objectives: To evaluate the applicants' ability to implement the AOPs for a RCS leak, to reduce power using the AOP for rapid power reduction, and to implement the EOPs to respond to a LOCA and ESDE with conditions that require entry to the Functional Recovery EOPs and contingency actions to be taken within the EOP.

Initial Conditions: IC 24; 100% power at MOL.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The following equipment is out of service: SJAE Radiation Monitor.

Event No.	Malf. No.	Event Type*	Event Description
1	RX04B@ 80%	I(RO)	The in-service Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.
2	RC04 @(3%), 120 Sec Ramp	R(RO) N(BOP)	12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.
3	FW10A 95%	I(BOP)	After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. This is a failure of the control circuit which will cause the BOP to diagnose SG level, steam flow, and feed flow to determine need to shift to manual. Power reduction initiated in Event 2 should continue during this event.
4	RC03A @ 0.1% 300 sec ramp MS07A@ 100% BT-1	M(All)	970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand. The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.
5	SI04A SI04C	C(RO)	'A' HPSI and 'C' HPSI pump breakers fail to close at time of SIAS resulting in HPSI not available for injection. After SIAS has initiated the simulator operator will remove SI04C, which will allow the RO to start the 'C' HPSI pump. Alternatively, the RO may start 'B' HPSI pump.
6	FW20B FW30 @70%	C(BOP)	'B' AFW pump trips and 'A' AFW pump is degraded which will require the BOP to take contingency actions to start the turbine driven AFW pump

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

OP-Test No.:	Scenario No.:1 Event No.:N/A	Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.		
IC 24	100% power at MOL. 568 PPM	
SI04A	'A' HPSI pump fails	
SI04C	'C' HPSI pump fails	
FW20B	'B' AFW pump trip	
FW30 @70%	'A' AFW pump degraded performance	
RM02A @ 0%	SJAE failed low.	
MS07A @100% BT-1	MSSV fails open at time of reactor trip	
	Ensure Pressurizer level channel 'Y' is selected.	

OP-Test No.: Scenario No.:1 Event No.:1 Page of

Event Description: RP10A@80% Selected Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert RX04B@80%. Pressurizer level transmitter failure (selected controlling channel)	RO	Acknowledge and Report 'Pressurizer CH Y Level Hi/Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	RO	Reference the ARP for window C04 A-39 and observe and compare actual level and setpoint and determine action to take per ODI form 1.26-05 step 2.a) attached and ARP 2590C window A-39 step 3.4 or 4.4 attached. RO will shift pressurizer level control channels. RO may be directed to force sprays to maintain 2250 psia. Need for this forcing sprays may be dependent on delay in swapping pressurizer level control channels. Guidance for returning HIC 110 is in OP 2304A step 4.6.22
		RO/US	Determine that pressurizer level instrument has malfunctioned.
		US	Refer Technical Specifications 3.3.3.5 and 3.3.3.8
		US	Submit Trouble report (call to I&C)

OP-Test No.: Scenario No.:1 Event No.:2 Page of

Event Description: RC04 12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RC04(3%),Ramp 120 Sec. 12 GPM RCS leak	RO	Provide assistance in recognition of RCS leak. RO may not be the first crew member to recognize symptoms of a leak but should report computer alarm for sump leak rate, charging/letdown flow mismatch or slight lowering of pressurizer level.
		BOP	Provide assistance in recognition of RCS leak. BOP may not be the first crew member to recognize symptoms of a leak but should report rising containment sump level.
	If asked, report Chemistry sample after a 15 minute time delay (If necessary) indicates background. Report as PEO that no leakage is found in auxiliary building.	US	Direct diagnostic process by collecting and analyzing major parameters such as changes in Tave, steam pressure, radiation monitor alarms and containment parameters. Direct entry to AOP 2568 RCS leakage.
		US	Direct RO or BOP to assist in determination of leak rate by using PPC as directed in AOP 2568 step 4.3 (attached). RO may also estimate leak rate by observation of charging/letdown mismatch.
	At direction of the lead examiner, if the crew goes to OP 2204, then as the operations manager direct that power be reduced per AOP 2575.	US	Determine that Technical Specification LCO 3.4.6.2 action statement has been entered and direct entry to AOP 2575 Rapid Downpower. Alternatively, the US could make a judgement call that the leak rate is not rising rapidly and it is conservative to reduce power slowly to minimize the probability of a plant transient causing the leak to get worse.

		US	Direct performance of AOP 2575 attached, and continue implementation of AOP 2568 to determine source of leakage per steps 4.5-4.10. US may call for operator assistance to determine source of leakage while the crew performs the down power.
		All	Maintain plant parameters per AOP 2575 Attachment 1 and 7, attached
	There is some possibility that forcing sprays could have been started in Event 1 of this scenario.	RO	Initiate forcing sprays (AOP 2575 step 4.5). This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). Force spray by: Energizing all 4 Backup Heater Groups and then lower setpoint of the selected Pressurizer controller to obtain 50% output signal and then monitoring Pressurizer pressure. (OP 2204 step 4.3.7, attached).
		RO	Start a second charging pump by placing the 'CHG PP OVERRIDE' switch to 'LEV 1' and balance charging and letdown flow. (AOP 2575 step 4.6 and 4.7) This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). (OP 2304 2304E step 4.4.4 and 4.4.8, attached).
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	US	Make notifications per AOP 2575 step 4.9 and 4.10.
		US/RO	US direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per AOP 2575 step 4.11 and Attachment 2. Note - Attachment 3 steps may be performed from memory but may be referred to if needed.
		BOP	Reduce Turbine Load and maintain Tave on program per AOP 2575 step 4.12 9 (attached).
		US/RO	Select boration Rate per AOP 2575 step 4.13 (attached).
		RO	Borate to the charging pump suction per AOP 2575 step 4.14 per and Attachment 3. Note - Attachment 3 steps may be performed from memory but

			may be referred to if needed. RO/US may make decision to makeup to VCT per step 1.9 in Attachment 3.
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11.
		RO	the RO may align for a heavy blend per AOP 2575 step 4.14
	After approximately a 2% power decrease or at discretion of the lead examiner, insert the next event.		

OP-Test No.: Scenario No.:1 Event No.:3 Page of

Event Description: FW10A @ 95%. After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. Power reduction initiated in Event 2 should continue during this event.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	FW10A @95% oscillation of the main feed regulating	BOP	Recognize and report the feedwater flow oscillation by one or more of the following: observation of the feed flow rate, observation of SG level oscillation, 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16.
		BOP	Place the 'A' FRV in manual control by pressing the 'MSTR LIC-5272 MAN' Button and adjust controller output to stabilize SG level. This action may be taken prior to referring to a procedure per ODI Form 1.26-15 (attached).
		US	Once the plant is stable, refer to the ARP for 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16 to determine additional actions and OP 2385 Feedwater Control Operation section 4.3.1. Operators may prioritize their actions as a result of being in AOP 2575 and 2568 and elect not to refer to the ARP if the have controlled SG level.
			After approximately a 5% power decrease from the initial power level or at discretion of the lead examiner, insert the next event.

OP-Test No.: Scenario No.:1 Event No.:4,5,6 Page of

RC03A @ 0.1% 300 sec ramp and MS07A @100% power: 970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand.
SI04A and SI04C: 'A' and 'C' HPSI pump fails at time of SIAS resulting in HPSI not available for injection. Following the SIAS signal, SI04C is removed which will allow the 'C' HPSI pump to manually started.
FW20B and FW30@70%: 'B' AFW pump trip and 'A' AFW pump degradation will require the secondary RO (BOP) to take contingency actions to start the turbine driven AFW pump
The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.

Time		Position	Applicant's Actions or Behavior
	RC03A @ 0.1% 300 sec ramp 970 GPM Small Break LOCA Verify MS07A @100% activates at time of trip **Remove SI04C after SIAS actuates**	US	Direct that the reactor be tripped and EOP 2525 be commenced when: • RCS leakage exceeds the Chg Pp capacity. Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted

		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero • 8T and 9T are opened • All Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level < 20% and going down

	After SIAS actuates remove malfunction SI04C. If the RO attempts a start of 'C' HPSI pump by turning the HS to start, it will indicate a amber trip light. A restart attempt by turning handswitch to stop and then to start will start the pump. Alternatively, the 'B' pump can be started.	RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure < 1900 psia • Verify spray valves are closed • verify PORVs are closed • If pressure is 1800 psia and trending down, report and initiate SIAS/CIAS/EBFS (per ODI form 1.26-11 and OP 2260 step 1.11.4) • If pressure is 1714 psia and trending down, report and ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated. • If pressure is 1714 psia and SIAS has initiated, ENSURE that one RCP in each loop has been stopped. One RCP in each loop can be stopped at a higher pressure if SIAS has been initiated. • The RO or crew may recognize that there is no HPSI pump operating. If recognized, the RO may report and start the 'C' or 'B'HPSI pump. (EOP Implementation Guidance Document step 5.2.1 and 5.2.6). If not started in during EOP 2525, it must be started in EOP 2540.
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Check that at least one RCP in each loop is operating • Check loop Δt is less than 10°F • Check that T_H subcooling is greater than 30 °F

		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is less than 880 psia • 1 Main Steam Safety Valve is open • If steam generator pressure is less than 800 psia, close the MSIVs. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, report and initiate MSI. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, isolate feed and close the ADV for the most affected SG. • Report that RCS T_C is less than 530°F and that feed flow is not excessive. • SG level is being restored in #2 SG. The BOP should recognize that only one AFW pump is operating and that it is degraded. BOP should start the Turbine Driven AFW Pump. This pump may be started from memory (ODI form 1.26-15) Steps are in EOP Appendix 6 (attached). **CT** EOP Implementation guidance Document step 3.1.3) • RCS subcooling is greater than 30°F

		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment are rising • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is greater than 4.42 psig • Ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated.
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Report containment pressure and Ensure at least two CAR fans operating
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Start both containment aux circ fans in slow • Start both containment post incident circ fans
		RO	Report no subsequent actions were taken on the primary side. (EOP 2525 step 10)
	CT-HR-2 Feedwater must be isolated to #1 SG within 10 minutes of the initial break to limit the reduction of RCS temperature. **CT-HR-3 #2 Atmos. Dump has been opened and feed water has been established to #2 SG to stabilize RCS temperature.**	BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18)

		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. A simultaneous LOCA and ESDE has occurred. Directs entry into EOP 2540.
		Crew	Transition to EOP 2540 Functional Recovery
		US	Open the Safety Function Tracking Page and Enter the EOP Entry time and ensure the master alarm silence switch is in 'normal', per EOP 2540 step 2. US continues to direct operations using EOP 2540.
		RO	As directed, close pressurizer spray valve associated with the stopped RCPs. EOP 2540 step 3.
	When requested, after the appropriate amount of time (~15 min.), inform the crew that frisk results on both SG samples indicate background. If #2 SG is dry, inform crew that sample could not be obtained from #2 SG	BOP	As directed, open SG sample isolation valve EOP 2540. Step 4.
		RO	As directed place Hydrogen Analyzer in service per Appendix 19 (Attached) EOP 2540 step 5.
		US	Identify Success paths to be used by using the RAT and Safety Function Tracking Page EOP 2540 step 6. The most likely success paths to be selected are: RC-1; MVA-DC-1; MVA-AC-1; IC-2; PC-1 or 2; HR-2; CI-1; CTPC-2; CCGC-1
	Other orders may be correct depending on timing of operator actions. Other orders should be verified.	US	Prioritize Safety Functions per EOP 2540 step 7. If a HPSI pump had not started the expected order of priority is: IC-2 SFSC not met; therefore go to IC-2 and start a HPSI pump. Then redo the priority. If the HPSI pump had been stated in EOP 2525, the expected order of priority is: IC-2; PC-2; HR-2, CTPC-2, RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1. If containment spray had been started the expected order of priority is CTPC-3; IC-2, PC-2, HR-2. RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1
		US	Direct the STA to check the SFSC Acceptance criteria EOP 2540. Step 8.

		US	Direct the crew in performing the chosen success paths based on the assigned priority.
		Note	The examinee need to go to the appropriate FR description below based upon the US order of priority.
		All	MVA-DC-1 is expected to be completed for this scenario without the need for making any control board manipulations. MVA-DC-1 steps 1, 2, 6, 7, 8, and 10 verify equipment is operating as expected.
		All	MVA-AC-1 is expected to be completed for this scenario without the need for making any control board manipulations.
		All	IC-2 Step 1 no control board manipulations expected.
	CT- IC-3 Maintain available inventory for long term core and RCS heat removal by starting a HPSI pump.	RO	IC-2 Step 2. If the HPSI pump was not started in EOP 2525, it must be started in the contingency actions for this step.
		RO	IC-2 Steps 3-5 is expected to be completed for this scenario without the need for making any control board manipulations.
		RO	IC-2 Steps 6 and 7. If the HPSI pump was started in EOP 2525 the HPSI Throttle or Stop criteria of these steps may be met and actions taken to throttle or stop the HPSI flow.
		RO	IC-2 Steps 8 HPSI flow and pumps should be controlled to meet the HPSI Throttle or Stop criteria.
		RO	IC-2 Step 10 Stop the LPSI pumps.
		RO	IC-2 step 11 Check containment sump wide range level is rising.
		RO	IC-2 steps 12-16 are not expected to be performed in the time frame of this scenario.

		RO	PC-1 or PC-2. If IC-2 was implemented correctly for this scenario, these procedures are expected to be completed for this scenario without the need for making any control board manipulations. If HPSI Throttle or Stop criteria are reached, steps 3,4 and 5 may be to throttle or stop the HPSI flow.
		RO	HR-2 Steps 1 - 4 If IC-2 was implemented correctly for this scenario, these procedure steps are expected to be completed for this scenario without the need for making any control board manipulations.
		All	HR-2 Step 5 Perform a controlled cooldown using the ADV on the least affected SG.
			HR-3 Step 22 Ensure the least affected SG level is being maintained.
		END	This scenario may be terminated after HPSI flow has been established and a controlled coodown has been established OR at the discretion of the Lead Examiner.

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 3

Submitted by:	Fred L Nygaard	6/15/00
	Developer	Date
Reviewed by:	Robert R Cummings Jr	6/15/00
	Technical Reviewer	Date
Reviewed by:	N/A	N/A
	Cognizant Plant Supervisor *(Optional)*	Date
Approved by:	M L B	6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:3	Op-Test No.: 2
Examiners:	Operators:	

Objectives: To evaluate the applicants' ability to reduce plant power while implementing alarm response procedures and AOPs related to pressurizer pressure control instrumentation, a leaking PORV and a tripped SW pump. After a 5% downpower has been completed, a non-recoverable MFW pump trip will occur which will lead to a plant trip and implementation of the Standard Post Trip Actions (SPTA) EOP. At time of trip, the RSST will fail, causing a loss of off site power. One of the EDGs output breaker will fail to automatically close onto the bus, which requires operator action. When AFW is initiated, a non-isolable rupture of the AFW system occurs, leading to a LOAF. The failure of one of the PORVs to open (its block valve is failed closed after it had been shut to isolate the leaking PORV) will lead to a decision to initiate once through cooling (OTC) early.

Initial Conditions: 100% Power MOL .4 gpm unidentified leakage.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The Engineering Department has determined that we are very subject to stress corrosion cracking of the Control Element Drive Motor (CEDM) housing due to a combination of the CEDM housing manufacturing process and recently identified long term RCS chemistry problems. Management has decided to shutdown the plant power at 25% per hour so that the CEDM housings can be examined. There is an identified RCS leak of .4 GPM on the PORV isolation valve RC-403. Use OP 2204 for the shutdown. AOP for RCS leak has been completed. Ready to commence a downpower. SP 2610E "MSIV Closure and Mainsteam Valve Operational Readiness Testing" is available.

Event No.	Malf. No.	Event Type*	Event Description
1		R(RO) N(BOP)	Management decision to shutdown at 25%/hour
2	RX04A@ 0% 120 sec	I(RO)	The non-selected pressurizer level transmitter slowly fails in the low direction which requires ARP implementation and diagnosis that the RCS leak rate has not risen. Action must be taken to de-select the low level heater cutout.
3	RX12C@ 0% 300sec ramp	I(BOP)	Failure of a SG #2 level transmitter leads to a SG level transient and deselecting the failed transmitter as an input to the steam generator level control system.
4	RC06A @ 2%	C(RO)	Leaking Pressurizer PORV requires diagnosis and isolation of PORV and use of Technical Specifications. After the block valve is closed, a circuit failure will prevent the valve from being reopened.
5	FW06A	M(All)	Trip of 'A' MFW pump leads to a plant trip. Upon the plant trip, the RSST fails, causing a loss of off-site power.
	ED02 EG09B	C(BOP)	Failure of the 'B' EDG output breaker to close will require BOP to take contingency action to manually closing the output breaker.
	ES03G	C(RO)	Failure of Boric acid valves to reposition will require RO to recognize and take contingency action to manually position valves.
	FW36A & FW36B@ 100%	C(BOP)	An AFW non-isolable leak leads to a total loss of all feed and transition from the SPTA to the EOP for LOAF and subsequent transition to the Functional Recovery procedures.
	FW20C		Turbine Driven AFW pump trip inserted after it is started to ensure that pump capacity cannot overcome leak flow rate enough to provide adequate AFW flow at low SG pressures.

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

OP-Test No.:	Scenario No.:3 Event No.:N/A Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.	
IC 24	100% power at MOL. 568 PPM
FW-44 IO override	C05 HS 5275A CLS OFF. Prevent FW-44 from being closed.
RC04 @ 0.1%	**0.**4 gpm leak rate
ES03G	Actuation module failure causes failure of boric acid valves to reposition on SIAS
FW36A @100% BT1 FW36B, @100 BT1	Large pipe rupture in AFW causes loss of AFW flow
EG09B	Failure of the 'B' EDG output breaker
ED02 BT1	Upon the plant trip, the RSST fails

OP-Test No.: Scenario No.:3 Event No.:1 Page of

Event Description: Management decision to shutdown at 30%/hour

Time		Position	Applicant's Actions or Behavior
		All	Management decision to shutdown at 30%/hour
		US	Direct performance of OP 2204 attached
	To compress time, Degassing operations will not be performed during this scenario	US	Conduct shift briefing per OP 2204 step 4.3.2.
		All	Maintain plant parameters per OP 2204 Attachment 1, attached
	To compress time, SP 2610E will not be preformed during this scenario	US	Direct the performance of SP 2610E and OP 2323C. SP2610E is performed by PEOs and 2323C will not be performed during this scenario because it is normally performed well after the power reduction commences.
		US/RO	US may direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per Op 2302A section 4.4 attached.
	To compress time, and at discretion of lead examiner, provide boration calculations for this scenario.	RO	Determine required boration and commence boration per OP 2304C (attached) OP 2204 step 4.3.6 • Perform initial conditions per OP 2304C steps 4.3.1 and 4.3.2 • Determine quantity of boric acid to add by using OP 2208 or the PPC. Boric acid addition volume may be determined using the thumbrules in OP 2204 section 1.2 and then using the PPC program to determine gallons, or may be determined using the thumbrules in OP 2208 attachment 5 and then using the PPC program to determine gallons or

			may be determined using OP 2208 Section 4.3and then using the PPC program to determine gallons. • Add the boric acid per OP 2304C steps 4.3.3 - 4.3.14 • Start additional charging pumps per OP 2304E section 4.4 attached
		RO	Start forcing pressurizer sprays per OP 2204 step 4.3.7
		BOP	Reduce Turbine Load and maintain Tave on program per OP 2304C step 4.3.9 (attached)
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11
		Note	After the power reduction has been started or at discretion of the lead examiner, insert the next even and continue the down power.

OP-Test No.: Scenario No.:3 Event No.:2 Page of

Event Description: RX04A The non-selected pressurizer level transmitter slowly fails in the low direction which requires ARP implementation and diagnosis that the RCS leak rate has not risen. Action must be taken to de-select the low level heater cutout.

Time		Position	Applicant's Actions or Behavior
	RX04A @ 0% 120 sec ramp non-selected pressurizer level transmitter	RO	Acknowledge and Report 'PRESSURIZER CH X LEVEL HI/LO' alarm and 'PRESSURIZER CH X LEVEL LO LO' on C03 per ODI Form 1.26-05 step 1.a) and 1.b) attached.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP for window C03 A39 and C-39 and observe and compare other pressurizer level and pressure channels per ODI form 1.26-05 step 2.a) attached
		US/RO	Perform actions per ARP 2590B C03 A39 and C-39 attached. The only actions that must be performed are to submit a Trouble report (at simulator call the simulator operator) and select channel 'X' on the pressurizer heater control switch.
		US	Refer to the TRM: Section3.0 'Appendix R' item 58F
			After the actions have been completed, insert the next event and continue the down power.

OP-Test No.: Scenario No.:3 Event No.:3 Page of

Event Description: RX12C @0% 300 sec ramp. Failure of a SG #2 level transmitter leads to a SG level transient and deselecting the failed transmitter as an input to the steam generator level control system.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX12C @0% 300 sec ramp. Failure of a main steam flow transmitter	BOP	May note lowering of indicated SG Level on the failed channel and actual rising of SG level for #2SG. If the trend is not noted, an alarm 'SG LEVEL SETPOINT DEVIATION HI/LO' will alert the RO to the problem.
		BOP	Acknowledge and Report 'SG LEVEL SETPOINT DEVIATION HI/LO' alarm C05 per ODI Form 1.26-05 step 1.a) and 1.b) attached. In event that RO notes trend before alarm occurs the ARP can still be referenced for guidance.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		BOP	May shift FRV to manual control prior to referencing the ARP if necessary to stabilize the plant per ODI Form 1.26-15.
		BOP	Shift the transmitter control switch for #2 SG level to 'ALT' per ARP 2590D window D-16 attached
		BOP	If desired, refer to OP 2385 and place the Feedwater Control System in Automatic.

OP-Test No.:	Scenario No.:3 Event No.:4		Page of
Event Description: RC06A @ 2% Leaking Pressurizer PORV requires diagnosis and isolation of PORV. After the block valve is closed, a circuit failure will prevent the valve from being reopened.			
Time		Position	Applicant's Actions or Behavior
	Insert RC06A @ 2%	RO	Acknowledge and Report 'Pressurizer Relief Valves Discharge Temperature High' alarm and on C02/3 per ODI Form 1.26-05 step 1.a) and 1.b) attached.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP for window C02/3 C-42 per ODI form 1.26-05 step 2.a) attached
	After the leaking PORV has been isolated, IO override the isolation valve so it will not open C03 HS-1403 RC403 OPN OFF	US/RO	Perform actions per ARP 2590B C02/3 C-42 attached. Expected actions include: • Observe Quench Tank parameters, PORV Discharge Temperatures and RCs pressures • close the PORV isolation valve • Reset the AVMS • Refer to Technical Specifications LCOs 3.4.3, 3.4.6.2 and (3.4.9.3 which does not apply) • Submit a trouble report.
			After the actions have been completed and the total downpower is greater than approximately 5%, insert the next event.

OP-Test No.: Scenario No.:3 Event No.:5 Page of

Event Description: FW06A ED02 EG09B FW36A&B. Trip of 'A' MFW pump leads to a plant trip. Upon the plant trip, the RSST fails, causing a loss of off-site power. Failure of the 'B' EDG output breaker to close will require BOP to take contingency action to check containment pressure before manually closing the output breaker.

Be prepared to insert FW20C trip of turbine driven AFW pump immediately after the BOP starts the pump.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert FW06A to trip the 'A' MFW pump.	BOP	Acknowledge and Report 'SGFP 'A' TURBINE TRIIP' alarm and on C05 per ODI Form 1.26-05 step 1.a) and 1.b) attached.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		BOP/RO	BOP may take immediate action, without opening the ARP, to start the 'A' SGFP per ODI Form 1.26-15. Actions taken should be per ARP 2590D A-4. Typically, the RO assists the BOP on the initial response for this event.
		US	Go to AOP 2565 and ensure actions are completed per section 4.1
		US	Reference the ARP for window C05 A-4 and determine that actions have been completed ARP 2590E A-4 per ODI form 1.26-05 step 2.a) attached
		US SPO	Directs restart attempt of 'A' SGFP Restart attempt fails
	Ensure that ED02, FW36A and FW36B go active at time of trip.	US	Directs a reactor and turbine trip and entry to EOP 2525 per 2590E A-4 step 7.7
		US	Open EOP 2525 and commence query of both control board operators to

			identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted
		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero • 8T and 9T are opened • Performs Contingency Action to determine that containment pressure is less than 20 psig and manually close the 'B' EDG Output breaker. • Reports that the 6.9 kV buses are deenergized, 4 kV buses 24A and 24B are deenergized, and 24C and 24D are energized from the EDGs. Reports manual closure of 'B' EDG output breaker. Also reports status of 201A, 201B VA-10 and VA-20 • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level is between 20 and 80% and trending to 35 to 70%

			• Subcooling is greater than 30°F
		RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure is 1900 to 2350 psia and trending to 2225 to 2300 psia.1900 psia
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Perform contingency action to place HIC-4165 steam dump Tavg controller in manual and closed.
	CT-LOAF-4 Task satisfied by identifying loss of all feed and starting AFW pumps. **I/O ANN C06/7 CB-23 ON.** AFW-MD Room Sump level high. **After BOP starts the turbine driven AFW pump, insert FW20C.** If asked to investigate, as PEO report that you can not enter the turbine driven AFW pump room because of flooding. **About 2 minutes after reporting flooding, insert FW20A and FW20B to trip AFW pumps.** If sent to investigate AFW problems, report back that there is flooding in the AFW pump room.	BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is 880 psia to 900 psia • Check that RCS T_C is maintained between 530°F and 535°F. • Takes contingency action in attempt to restore SG level. Starts both motor driven feed pumps. May recognize low AFW header flow and start the Turbine driven AFW pump. Reports contingency actions and inability to restore SG level. May dispatch PEO to investigate AFW pump status. • After determining a large AFW leak exists, stop both AFW pumps. • RCS subcooling is greater than 30°F
		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried:

			• Radiation monitors in the containment are normal • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Report completion of subsequent actions on the primary side. (EOP 2525 step 10)
		BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18) • Takes action to close both MSIVs and open AR-17 the condenser vacuum breaker per step 11. • Takes action to align instrument air from Unit 1 per step 18.1
		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. Determines a LOAF has occurred has occurred. Directs entry into EOP 2537

		US	Transitions to EOP 2537
		US	Enters EOP 2537 and directs the crew
		US	Opens the placekeeper and Enters the EOP entry time
		RO	Perform EOP 2537 Step 4 as directed. • RCPs and HIC 4165 should have already been positioned as required in EOP 2525. • Place the pressurizer spray controllers in manual and close.
	CT-HR-1 Establish Once-Through-Cooling	US	Makes determination that once through cooling should be initiated prior to SG WR level reaching 70 inches based on determination that feedwater will not be restored and that one PORV may not be available. US may collect data from PEOs and maintenance that indicates the AFW rupture is not repairable within a time frame that allows SG level to be restored.
		RO	Perform EOP 2537 Step 5.1 a., b. as directed to deenergize Pressurizer heaters
		BOP	Perform EOP 2537 Step 5.1 c. as directed to fully open both ADVs
		RO	Perform EOP 2537 Step 5.1 e., f, g., and as directed to establish makeup flow for OTC.
		RO	Perform EOP 2537 Step 5.1 i.. as directed and report that the closed block valve will not open.
		US	Determines to proceed with only one PORV
		RO	Perform EOP 2537 Step 5.1 j. as directed to open both PORVs.
		US	Transitions to EOP 2540

		US	Open the Safety Function Tracking Page and Enter the EOP Entry time and ensure the master alarm silence switch is in 'normal', per EOP 2540 step 2. US continues to direct operations using EOP 2540.
		RO	As directed, reverify actions associated with RCPs. EOP 2540 step 3.
		BOP	As directed, open SG sample isolation valve EOP 2540. Step 4.
		RO	As directed place Hydrogen Analyzer in service per Appendix 19 (Attached) EOP 2540 step 5.
		US	Identify Success paths to be used by using the RAT and Safety Function Tracking Page EOP 2540 step 6. The most likely success paths to be selected are: RC-1; MVA-DC-1; MVA-AC-2; IC-2; PC-2 or 3; HR-3; CI-1; CTPC-2; CCGC-1
		US	Prioritize Safety Functions per EOP 2540 step 7. The expected order of priority is: HR-3, MVA-AC-2, IC-2, PC-2, CTPC-2, RC-1; MVA-DC-1, CI-1;; CCGC-1.
		US	Direct the STA to check the SFSC Acceptance criteria EOP 2540. Step 8.
		US	Direct the crew in performing the chosen success paths based on the assigned priority.
		Note	The examiners need to go to the appropriate FR description below based upon the US order of priority.
		All	MVA-DC-1 is expected to be completed for this scenario without the need for making any control board manipulations. MVA-DC-1 steps 1, 2, 6, 7, 8, and 10 verify equipment is operating as expected.
		All	MVA-AC-2 actions that should be completed for this scenario are: step 5 refer to Appendix 39 attached.; step 7 check EDG.is expected to be completed for this scenario without the need for making any control board manipulations.

		RO	IC-2 Step 2. No control board manipulations are expected
		RO	IC-2 Steps 3-5 is expected to be completed for this scenario without the need for making any control board manipulations.
		RO	IC-2 Steps 6 and 7. If the HPSI pump was started in EOP 2525 the HPSI Throttle or Stop criteria of these steps may be met and actions taken to throttle or stop the HPSI flow.
		RO	IC-2 Steps 8 HPSI flow and pumps should be controlled to meet the HPSI Throttle or Stop criteria.
		RO	IC-2 Step 10 Stop the LPSI pumps.
		RO	IC-2 step 11 Check containment sump wide range level is rising.
		RO	IC-2 steps 12-16 are not expected to be performed in the time frame of this scenario.
		RO	PC-2.. If HPSI Throttle or Stop criteria are reached, steps 3,4 and 5 may be to throttle or stop the HPSI flow.
		RO	HR-3 no additional control board manipulations are expected
		END	This scenario may be terminated after HPSI flow has been established and a controlled coodown has been established OR at the discretion of the Lead Examiner.

OPERATING TEST No.: 3

Applicant Type	Evolution Type	Minimum Number	Scenario Number 1		4	
RO Candidates none	Reactivity	1				
	Normal	1				
	Instrument	2				
	Component	2				
	Major	1				
RO 2 Candidates none	Reactivity	1				
	Normal	1				
	Instrument	2				
	Component	2				
	Major	1				
SRO-I as RO Candidates A, B, C, D	Reactivity	1		4		
	Normal	0				
	Instrument	1		2		
	Component	1		3		
	Major	1		5		
SRO-I as SRO Candidates A, B, C, D	Reactivity	0	2			
	Normal	1	2			
	Instrument	1	1, 3			
	Component	1	5,6			
	Major	1	4			

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: Fred Nyquist

Chief Examiner: _____

OPERATING TEST 3

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms									1,3			1,3
Diagnose Events and Conditions									1,3			1,3,5
Understand Plant and System Response									2			1,3,4,5
Comply With and Use Procedures (1)									1,2,4			1,3,4,5
Operate Control Boards (2)												1,3,4,5
Communicate and Interact With the Crew									1,2,3,4			1,3,4,5
Demonstrate Supervisory Ability (3)									1,2,3,4			
Comply With and Use Tech. Specs. (3)									1,2			

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.

Author: Fred Nyland

Chief Examiner: _____

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 1

Duplicate from Op. Test 1

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Facility: Millstone Unit 2	Scenario No.:1	Op-Test No.:1 (2)
Examiners:	Operators:	

Objectives: To evaluate the applicants' ability to implement the AOPs for a RCS leak, to reduce power using the AOP for rapid power reduction, and to implement the EOPs to respond to a LOCA and ESDE with conditions that require entry to the Functional Recovery EOPs and contingency actions to be taken within the EOP.

Initial Conditions: IC 24; 100% power at MOL.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The following equipment is out of service: SJAE Radiation Monitor.

Event No.	Malf. No.	Event Type*	Event Description
1	RX04B@ 80%	I(RO)	The in-service Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.
2	RC04 @(3%), 120 Sec Ramp	R(RO) N(BOP)	12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.
3	FW10A 95%	I(BOP)	After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. This is a failure of the control circuit which will cause the BOP to diagnose SG level, steam flow, and feed flow to determine need to shift to manual. Power reduction initiated in Event 2 should continue during this event.
4	RC03A @ 0.1% 300 sec ramp MS07A@ 100% BT-1	M(All)	970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand. The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.
5	SI04A SI04C	C(RO)	'A' HPSI and 'C' HPSI pump breakers fail to close at time of SIAS resulting in HPSI not available for injection. After SIAS has initiated the simulator operator will remove SI04C, which will allow the RO to start the 'C' HPSI pump. Alternatively, the RO may start 'B' HPSI pump.
6	FW20B FW30 @70%	C(BOP)	'B' AFW pump trips and 'A' AFW pump is degraded which will require the BOP to take contingency actions to start the turbine driven AFW pump

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

OP-Test No.:	Scenario No.:1 Event No.:N/A	Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.		
IC 24	100% power at MOL. 568 PPM	
SI04A	'A' HPSI pump fails	
SI04C	'C' HPSI pump fails	
FW20B	'B' AFW pump trip	
FW30 @70%	'A' AFW pump degraded performance	
RM02A @ 0%	SJAE failed low.	
MS07A @100% BT-1	MSSV fails open at time of reactor trip	
	Ensure Pressurizer level channel 'Y' is selected.	

OP-Test No.: Scenario No.:1 Event No.:1 Page of

Event Description: RP10A@80% Selected Pressurizer level transmitter failure results in diagnosis and implementation of ARP to take manual control of letdown and shift to the good level control channel. Technical Specifications will need to be referenced.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert RX04B@80%. Pressurizer level transmitter failure (selected controlling channel)	RO	Acknowledge and Report 'Pressurizer CH Y Level Hi/Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	RO	Reference the ARP for window C04 A-39 and observe and compare actual level and setpoint and determine action to take per ODI form 1.26-05 step 2.a) attached and ARP 2590C window A-39 step 3.4 or 4.4 attached. RO will shift pressurizer level control channels. RO may be directed to force sprays to maintain 2250 psia. Need for this forcing sprays may be dependent on delay in swapping pressurizer level control channels. Guidance for returning HIC 110 is in OP 2304A step 4.6.22
		RO/US	Determine that pressurizer level instrument has malfunctioned.
		US	Refer Technical Specifications 3.3.3.5 and 3.3.3.8
		US	Submit Trouble report (call to I&C)

OP-Test No.: Scenario No.:1 Event No.:2 Page of

Event Description: RC04 12 GPM RCS leak results in implementation of AOP for RCS Leak, use of Technical Specifications, and implementation of AOP for Rapid Downpower.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RC04(3%),Ramp 120 Sec. 12 GPM RCS leak	RO	Provide assistance in recognition of RCS leak. RO may not be the first crew member to recognize symptoms of a leak but should report computer alarm for sump leak rate, charging/letdown flow mismatch or slight lowering of pressurizer level.
		BOP	Provide assistance in recognition of RCS leak. BOP may not be the first crew member to recognize symptoms of a leak but should report rising containment sump level.
	If asked, report Chemistry sample after a 15 minute time delay (If necessary) indicates background. Report as PEO that no leakage is found in auxiliary building.	US	Direct diagnostic process by collecting and analyzing major parameters such as changes in Tave, steam pressure, radiation monitor alarms and containment parameters. Direct entry to AOP 2568 RCS leakage.
		US	Direct RO or BOP to assist in determination of leak rate by using PPC as directed in AOP 2568 step 4.3 (attached). RO may also estimate leak rate by observation of charging/letdown mismatch.
	At direction of the lead examiner, if the crew goes to OP 2204, then as the operations manager direct that power be reduced per AOP 2575.	US	Determine that Technical Specification LCO 3.4.6.2 action statement has been entered and direct entry to AOP 2575 Rapid Downpower. Alternatively, the US could make a judgement call that the leak rate is not rising rapidly and it is conservative to reduce power slowly to minimize the probability of a plant transient causing the leak to get worse.

		US	Direct performance of AOP 2575 attached, and continue implementation of AOP 2568 to determine source of leakage per steps 4.5-4.10. US may call for operator assistance to determine source of leakage while the crew performs the down power.
		All	Maintain plant parameters per AOP 2575 Attachment 1 and 7, attached
	There is some possibility that forcing sprays could have been started in Event 1 of this scenario.	RO	Initiate forcing sprays (AOP 2575 step 4.5). This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). Force spray by: Energizing all 4 Backup Heater Groups and then lower setpoint of the selected Pressurizer controller to obtain 50% output signal and then monitoring Pressurizer pressure. (OP 2204 step 4.3.7, attached).
		RO	Start a second charging pump by placing the 'CHG PP OVERRIDE' switch to 'LEV 1' and balance charging and letdown flow. (AOP 2575 step 4.6 and 4.7) This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). (OP 2304 2304E step 4.4.4 and 4.4.8, attached).
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	US	Make notifications per AOP 2575 step 4.9 and 4.10.
		US/RO	US direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per AOP 2575 step 4.11 and Attachment 2. Note - Attachment 3 steps may be performed from memory but may be referred to if needed.
		BOP	Reduce Turbine Load and maintain Tave on program per AOP 2575 step 4.12 9 (attached).
		US/RO	Select boration Rate per AOP 2575 step 4.13 (attached).
		RO	Borate to the charging pump suction per AOP 2575 step 4.14 per and Attachment 3. Note - Attachment 3 steps may be performed from memory but

			may be referred to if needed. RO/US may make decision to makeup to VCT per step 1.9 in Attachment 3.
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11.
		RO	the RO may align for a heavy blend per AOP 2575 step 4.14
	After approximately a 2% power decrease or at discretion of the lead examiner, insert the next event.		

OP-Test No.: Scenario No.:1 Event No.:3 Page of

Event Description: FW10A @ 95%. After power has been reduced to about 98% power, cause an oscillation of the main feed regulating valve which can be controlled by shifting the valve control to manual. Power reduction initiated in Event 2 should continue during this event.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	FW10A @95% oscillation of the main feed regulating	BOP	Recognize and report the feedwater flow oscillation by one or more of the following: observation of the feed flow rate, observation of SG level oscillation, 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16.
		BOP	Place the 'A' FRV in manual control by pressing the 'MSTR LIC-5272 MAN' Button and adjust controller output to stabilize SG level. This action may be taken prior to referring to a procedure per ODI Form 1.26-15 (attached).
		US	Once the plant is stable, refer to the ARP for 'SG LEVEL SETPOINT DEVIATION' alarm C05 D-16 to determine additional actions and OP 2385 Feedwater Control Operation section 4.3.1. Operators may prioritize their actions as a result of being in AOP 2575 and 2568 and elect not to refer to the ARP if the have controlled SG level.
			After approximately a 5% power decrease from the initial power level or at discretion of the lead examiner, insert the next event.

OP-Test No.: Scenario No.:1 Event No.:4,5,6 Page of

RC03A @ 0.1% 300 sec ramp and MS07A @100% power: 970 GPM Small Break LOCA occurs leading to reactor trip. At time of trip, a main steam safety valve fails open leading to an excess steam demand.
SI04A and SI04C: 'A' and 'C' HPSI pump fails at time of SIAS resulting in HPSI not available for injection. Following the SIAS signal, SI04C is removed which will allow the 'C' HPSI pump to manually started.
FW20B and FW30@70%: 'B' AFW pump trip and 'A' AFW pump degradation will require the secondary RO (BOP) to take contingency actions to start the turbine driven AFW pump
The SPTA diagnostics determines 2 events in progress, which leads to implementation of EOP 2540 Functional Recovery.

Time		Position	Applicant's Actions or Behavior
	RC03A @ 0.1% 300 sec ramp 970 GPM Small Break LOCA Verify MS07A @100% activates at time of trip **Remove SI04C after SIAS actuates**	US	Direct that the reactor be tripped and EOP 2525 be commenced when: • RCS leakage exceeds the Chg Pp capacity. Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted

		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero • 8T and 9T are opened • All Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level < 20% and going down

	After SIAS actuates remove malfunction SI04C. If the RO attempts a start of 'C' HPSI pump by turning the HS to start, it will indicate a amber trip light. A restart attempt by turning handswitch to stop and then to start will start the pump. Alternatively, the 'B' pump can be started.	RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure < 1900 psia • Verify spray valves are closed • verify PORVs are closed • If pressure is 1800 psia and trending down, report and initiate SIAS/CIAS/EBFS (per ODI form 1.26-11 and OP 2260 step 1.11.4) • If pressure is 1714 psia and trending down, report and ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated. • If pressure is 1714 psia and SIAS has initiated, ENSURE that one RCP in each loop has been stopped. One RCP in each loop can be stopped at a higher pressure if SIAS has been initiated. • The RO or crew may recognize that there is no HPSI pump operating. If recognized, the RO may report and start the 'C' or 'B'HPSI pump. (EOP Implementation Guidance Document step 5.2.1 and 5.2.6). If not started in during EOP 2525, it must be started in EOP 2540.
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Check that at least one RCP in each loop is operating • Check loop Δt is less than 10°F • Check that T_H subcooling is greater than 30 °F

		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is less than 880 psia • 1 Main Steam Safety Valve is open • If steam generator pressure is less than 800 psia, close the MSIVs. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, report and initiate MSI. This may be performed before reaching 800 psia per OP 2260 step 1.11.4. • If steam generator pressure is less than 572 psia, isolate feed and close the ADV for the most affected SG. • Report that RCS T_C is less than 530°F and that feed flow is not excessive. • SG level is being restored in #2 SG. The BOP should recognize that only one AFW pump is operating and that it is degraded. BOP should start the Turbine Driven AFW Pump. This pump may be started from memory (ODI form 1.26-15) Steps are in EOP Appendix 6 (attached). **CT** EOP Implementation guidance Document step 3.1.3) • RCS subcooling is greater than 30°F

		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment are rising • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is greater than 4.42 psig • Ensure SIAS/CIAS/EBFS and one complete Facility of CRAC has actuated.
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Report containment pressure and Ensure at least two CAR fans operating
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Start both containment aux circ fans in slow • Start both containment post incident circ fans
		RO	Report no subsequent actions were taken on the primary side. (EOP 2525 step 10)
	CT-HR-2 Feedwater must be isolated to #1 SG within 10 minutes of the initial break to limit the reduction of RCS temperature. **CT-HR-3 #2 Atmos. Dump has been opened and feed water has been established to #2 SG to stabilize RCS temperature.**	BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18)

		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. A simultaneous LOCA and ESDE has occurred. Directs entry into EOP 2540.
		Crew	Transition to EOP 2540 Functional Recovery
		US	Open the Safety Function Tracking Page and Enter the EOP Entry time and ensure the master alarm silence switch is in 'normal', per EOP 2540 step 2. US continues to direct operations using EOP 2540.
		RO	As directed, close pressurizer spray valve associated with the stopped RCPs. EOP 2540 step 3.
	When requested, after the appropriate amount of time (~15 min.), inform the crew that frisk results on both SG samples indicate background. If #2 SG is dry, inform crew that sample could not be obtained from #2 SG	BOP	As directed, open SG sample isolation valve EOP 2540. Step 4.
		RO	As directed place Hydrogen Analyzer in service per Appendix 19 (Attached) EOP 2540 step 5.
		US	Identify Success paths to be used by using the RAT and Safety Function Tracking Page EOP 2540 step 6. The most likely success paths to be selected are: RC-1; MVA-DC-1; MVA-AC-1; IC-2; PC-1 or 2; HR-2; CI-1; CTPC-2; CCGC-1
	Other orders may be correct depending on timing of operator actions. Other orders should be verified.	US	Prioritize Safety Functions per EOP 2540 step 7. If a HPSI pump had not started the expected order of priority is: IC-2 SFSC not met; therefore go to IC-2 and start a HPSI pump. Then redo the priority. If the HPSI pump had been stated in EOP 2525, the expected order of priority is: IC-2; PC-2; HR-2, CTPC-2, RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1. If containment spray had been started the expected order of priority is CTPC-3; IC-2, PC-2, HR-2. RC-1; MVA-DC-1; MVA-AC-1; CI-1; CCGC-1
		US	Direct the STA to check the SFSC Acceptance criteria EOP 2540. Step 8.

		US	Direct the crew in performing the chosen success paths based on the assigned priority.
		Note	The examinee need to go to the appropriate FR description below based upon the US order of priority.
		All	MVA-DC-1 is expected to be completed for this scenario without the need for making any control board manipulations. MVA-DC-1 steps 1, 2, 6, 7, 8, and 10 verify equipment is operating as expected.
		All	MVA-AC-1 is expected to be completed for this scenario without the need for making any control board manipulations.
		All	IC-2 Step 1 no control board manipulations expected.
	CT- IC-3 Maintain available inventory for long term core and RCS heat removal by starting a HPSI pump.	RO	IC-2 Step 2. If the HPSI pump was not started in EOP 2525, it must be started in the contingency actions for this step.
		RO	IC-2 Steps 3-5 is expected to be completed for this scenario without the need for making any control board manipulations.
		RO	IC-2 Steps 6 and 7. If the HPSI pump was started in EOP 2525 the HPSI Throttle or Stop criteria of these steps may be met and actions taken to throttle or stop the HPSI flow.
		RO	IC-2 Steps 8 HPSI flow and pumps should be controlled to meet the HPSI Throttle or Stop criteria.
		RO	IC-2 Step 10 Stop the LPSI pumps.
		RO	IC-2 step 11 Check containment sump wide range level is rising.
		RO	IC-2 steps 12-16 are not expected to be performed in the time frame of this scenario.

		RO	PC-1 or PC-2. If IC-2 was implemented correctly for this scenario, these procedures are expected to be completed for this scenario without the need for making any control board manipulations. If HPSI Throttle or Stop criteria are reached, steps 3,4 and 5 may be to throttle or stop the HPSI flow.
		RO	HR-2 Steps 1 - 4 If IC-2 was implemented correctly for this scenario, these procedure steps are expected to be completed for this scenario without the need for making any control board manipulations.
		All	HR-2 Step 5 Perform a controlled cooldown using the ADV on the least affected SG.
			HR-3 Step 22 Ensure the least affected SG level is being maintained.
		END	This scenario may be terminated after HPSI flow has been established and a controlled coodown has been established OR at the discretion of the Lead Examiner.

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 4

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Approved by:		6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:4	Op-Test No.: Contingency
Examiners:	Operators:	

Objectives:. To evaluate the applicants' ability to implement alarm response procedures for a failure of a temperature input to the reactor regulating system which causes a pressurizer level upset. To evaluate the applicants ability to implement the AOP and use of Technical Specifications for a loss of the 'C' RBCCW pump. Following those malfunctions a feedwater pump problem results in a decision to perform a rapid down power to a power level which can be sustained with one feed pump. After a power reduction of about 5% the feed pump trips and a decision is made to trip the plant. The applicants' ability to execute the EOPs is evaluated by the following events: On the plant trip, the 6.9 kv buses fail to automatically transfer which results in a transition to the Loss of Offsite Power (LOOP) EOP. Just before reenergizing busses 25A and B, a failure of the AFW system occurs which results in a Loss of All Feedwater (LOAF). The crew should transfer to the LOAF EOP and determine that the success path is to depressurize the SG to below condensate pump shutoff head, reenergize bus 25A or B and use a condensate pump for the feed source. An alternate success path is to go to OTC.

Initial Conditions: IC 24 100% power middle of life conditions. The following equipment is out of service: B HPSI pump; Main Steam Flow main transmitter.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The following equipment is out of service: B HPSI pump; The Main-Main Steam Flow main transmitter for #1 SG

Event No.	Malf. No.	Event Type*	Event Description
1	RX07A @10%	I(RO)	RCS Control Channel Hot Leg Temperature Transmittal Failure causes the average calculated temperature within both RRS units to decrease. This decrease will cause a decrease in Pressurizer level setpoint with a resultant change in letdown flow. The RO will take action in accordance with the alarm response procedures to stabilize pressurizer level.
2	CC01C	C(BOP)	The 'C' RBCCW pump will trip which will lead to temperature and flow alarms and a requirement to trip the plant if flow cannot be reestablished. The BOP will be able to restore flow using the 'B' RBCCW pump per the AOP for loss of RBCCW. Technical Specification 3.0.3 is entered.
3	CV04C	C(RO)	Running charging pump trips resulting in the use of alarm response procedures and possible use of operating procedure to restore letdown.
4	**I/O** HS7140A STR True "I/O C06/7*A41	R(RO) N(BOP)	A 'A' SGFP LO leak occurs which will cause the US to make a decision to reduce plant power to 70% so the 'A' SGFP pump may be shutdown. The SGFP LO leak will be simulated by using pump handswitch and annunciator overrides. This will cause an automatic start of the standby lube oil pump and a low oil reservoir level. Investigation reveals a non-isolable oil leak which is wetting the outer insulation on some nearby steam piping.
5	FW06B CC01B BT1 ED08A FW36A & FW36B @100% FW30 @100%	M (All)	After power has been reduced to about 95%, the 'A' MFW pump trips which will lead to a decision to trip the plant. At time of the trip, The 'B' RBCCW pump trips and 6.9 Kv bus 25A fails to transfer to the RSST. This leads to a decision to trip the B and D RCPs, and a loss of the A&C RCPs . After the standard post trip actions have been completed the LOOP EOP will be entered. After the LOOP EOP has been entered and just before the 6.9kV bus 25A is energized, a loss of all AFW flow occurs. This should lead to a transition to the LOAF EOP. The best success path would be to depressurize the SG to allow use of the a condensate pump. However, OTC is also a success path.

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

OP-Test No.:	Scenario No.:4 Event No.:N/A	Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run.		
IC 24	100% power at MOL. 568 PPM	
	Align Bus 24 E to Bus 24D: • Open A305 and use EDR 14 to RO A305 • Use EDR 15 to RI A408 and then close A408 • Align 'B' charging pump to Facility 2 by using CVR11 and change tag at 'B' charging pump.	
SIR 02 OUT	'B' HPSI pump is out of service. Rack out breaker and place a tag on the handswitch.	
RX11A@0%	Select FT4243B (alternate transmitter) and then Fail the main steam flow transmitter for #1 SG low.	
ED08A	At time of the trip 6.9 kV bus 25A fails to auto transfer.	
FW30 @100%	Degraded performance of AFW pump 'A'	
FW36A@100% BT1	AFW Header Failure	
FW-44 IO override	C05 HS 5275A CLS OFF. Prevent FW-44 from being closed.	
CC01B BT1	'B' RBCCW pump trips when the reactor trips	

OP-Test No.: Scenario No.:4 Event No.:1 Page of

Event Description: RX07A@10% RCS Control Channel Hot Leg Temperature Transmittal Failure causes the average calculated temperature within both RRS units to decrease. This decrease will cause a decrease in Pressurizer level setpoint with a resultant change in letdown flow. The RO will take action in accordance with the alarm response procedures to stabilize pressurizer level.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX07A @ 10% Insert malfunction to fail T111X at 100° F.	RO	Acknowledge and Report 'Pressurizer CH Y Level Hi/Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The specified above is the highest priority.
		RO	RO may take immediate action to stabilize pressurizer level by diagnosis that a control problem is occurring and the shifting either the letdown level controller or the pressurizer level controller to manual and taking manual control per ODI form 1.26-15
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
	When directed as I&C, deselect the failed Th instrument input to the Tave caculator. RXR01-OFF RXR03-OFF	RO	Reference the ARP for window C02/3 A-39 and observe and compare other pressurizer level channels and RCS temperature channels to diagnose problem so that proper section of the ARP can be implemented per ODI form 1.26-05 step 2.a) attached. Instruments that may be observed are: • Indication CO3 • Recorder C101 • Recorder Tave/Tref CO3 • Pressurizer Program level on recorder CO3 • Check for Tave/Tref alarm
		RO/US	Determine that malfunction is common to both channels of the Reactor

			Regulating System and perform actions of ARP 2590B window A39 step 3.2 attached.
		RO/US	Take action to return pressure to normal band by operating pressure heaters in manual (put BU heaters in PTL) or by forcing sprays.

OP-Test No.:	Scenario No.:4 Event No.:2		Page of
Event Description: CC01C : The 'C' RBCCW pump will trip which will lead to temperature and flow alarms and a requirement to trip the plant if flow cannot be reestablished. The BOP will be able to restore flow using the 'B' RBCCW pump per the AOP for loss of RBCCW.			
Time		Position	Applicant's Actions or Behavior
	Insert CC01C: 'C' RBCCW pump will trip	BOP	Acknowledge and Report 'RBCCW Pump C Overload/Trip' and 'RBCCW HDR B Pres Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The specified above is the highest priority.
		BOP	BOP may take immediate action to stabilize to start the 'B' RBCCW water pump on the 'B' header per ODI form 1.26-15.
	As I&C, Work Control, Duty Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action.	US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		US	Direct Action per AOP 2564 step 4.5 attached. If RO tool immediate action to restore RBCCW flow, ensure actions are correct per the AOP.

OP-Test No.: Scenario No.:4 Event No.:3 Page of

Event Description: Using Simulator diagram FW11, start A SGFP LO Pp P172A by making HS7140A STR True. Then Then I/O C06/7*A41 On (SGFP Turb A Oil Res. Lo)

Automatic start of standby oil pump for 'A' MFW pump. Investigation reveals a non-isolable oil leak which is wetting the outer insulation on some nearby steam piping. A decision is made to reduce plant power to less than 70% so the 'B' MFW pump may be shutdown.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	• HS7140A STR True Start SGFP LO PP P172A • Then I/O C06/7*a41 On (SGFP Turb A Oil Res. Lo)	BOP	Acknowledge and Report 'SGFP Turb A Oil Rsvr Level Hi/Lo' alarm on C04 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The specified above is the highest priority.
		BOP	RO may notce the standby oil pump running at this time.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
	• PEO report back that level is about 2.5 inches below normal and that there is a leak causing oil to drip out of the cabinet that contains the control linkage. Report that you have a bucket that you are collecting the oil in for now but you need help in getting a bigger bucket and help changing it to prevent the oil from dripping down on to hot piping. • As I&C, Work Control, Duty	US	Direct Action per ARP 2590B Window B41.

	Officer or management respond to request for trouble shooting, TR initiation, AWO preparation and reporting in the affirmative. ie: take the requested action. If necessary, recommend a down power for oil leak repair.		
		US	Direct performance of AOP 2575 attached, and continue implementation of AOP 2568 to determine source of leakage per steps 4.5-4.10
		All	Maintain plant parameters per AOP 2575 Attachment 1 and 7, attached
		RO	Initiate forcing sprays (AOP 2575 step 4.5). This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). Force spray by: Energizing all 4 Backup Heater Groups and then lower setpoint of the selected Pressurizer controller to obtain 50% output signal and then monitoring Pressurizer pressure. (OP 2204 step 4.3.7, attached))
		RO	Start a second charging pump by placing the 'CHG PP OVERRIDE' switch to 'LEV 1' and balance charging and letdown flow. (AOP 2575 step 4.6 and 4.7) . This is skill of craft during AOP 2575 per ODI Form 1.26-15 (attached). (OP 2304 2304E step 4.4.4 and 4.4.8, attached)
		US	Make notifications per AOP 2575 step 4.9 and 4.10
		US/RO	US direct specific amount of rod insertion (typically 5-10 steps) and maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per AOP 2575 step 4.11 and Attachment 2. Note - Attachment 2 steps may be performed from memory but may be referred to if needed.
		BOP	Reduce Turbine Load and maintain Tave on program per AOP 2575 step 4.12 9 (attached)
		US/RO	Select boration Rate per AOP 2575 step 4.13 (attached)

		RO	Borate to the charging pump suction per AOP 2575 step 4.14 per and Attachment 3. Note - Attachment 2 steps may be performed from memory but may be referred to if needed.
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11
		Note	After approximately a 5% power decrease or at discretion of the lead examiner, insert the next event.

OP-Test No.: Scenario No.:4 Event No.:4 Page of

Event Description: FW06B, CC01B BT1, ED08A: After power has been reduced to about 95%, the 'A' MFW pump trips which will lead to a decision to trip the plant. At time of the trip, te 'B' RBCCW pump trips and 6.9 Kv bus 25A fails to transfer to the RSST. The standard post trip actions have been completed.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert FW06A 'A' MFW pump trip	US	Directs a reactor and turbine trip and entry to EOP 2525 per AOP 2556 step 4.2
	Ensure ED08A 6.9 kV bus 25A fails to auto transfer actuates at time of trip. Ensure actuates at time of trip.	US	Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted
		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero

			• 8T and 9T are opened • 25A is deenergized • All other Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Facility 1 of RBCCW and both Facilities of service water are operating Perform Contingency Action to stop the 'B' and 'D' RCPs
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer level is between 20 and 80% and trending to 35 to 70% • Subcooling is greater than 30°F
		RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure is 1900 to 2350 psia and trending to 2225 to 2300 psia.1900 psia
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Perform and report Contingency action to place HIC-4165 in manual and closed.
		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is 880 psia to 900 psia • Check that RCS T_C is maintained between 530°F and 535°F. • SG level is being restored in both SGs with level between 10 and 80%

			and a contingency action is being taken to ensure that AFW pumps have started.is being restored using the • RCS subcooling is greater than 30°F Perform contingency action to close the MSIVs
		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment are normal • Radiation monitors outside the containment are normal • Steam Plant Radiation Monitors are normal • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is less than 120°F • Containment pressure is less than 1.0 psig
		RO	Report completion of subsequent actions on the primary side. (EOP 2525 step 10)
		BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18 including step 15 which places the AFW 'override/man/start' switches in pull to lock.

		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. Determines that no RCPs are running. Directs entry into EOP 2528.
		US	Transitions to EOP 2528
		US	Confirm diagnosis per EOP 2528 step 1
		US	Implement place keeping per EOP 2528 step 3
		RO	Maintain pressurizer level per EOP 2528 step 6
		BOP	Control T_c less than 535°F per EOP 2528 step 7
	CT-LOOP-3 Establish a primary to secondary heat sink by starting the turbine driven AFW pump and reporting subsequent failure.	BOP	Maintain at least one steam generator in the band. This is continuous step which is this scenario will become challenged due to failure of the AFW system. The BOP will determine that the motor driven AFW pumps are inadequate and start the Turbine driven AFW pump.
		Note	Insert the next event anytime between now and prior to energizing bus 25A.

OP-Test No.: Scenario No.:4 Event No.:5 Page of

Event Description: FW36A & FW36B@100%: FW30@100%. After the LOOP EOP has been entered and just before the 6.9kV bus 25A is energized, a loss of all AFW flow occurs. This should lead to a transition to the LOAF EOP. The best success path would be to depressurize the SG to allow use of the a condensate pump. However, OTC is also a success path.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Insert FW36A & FW36B@100%: FW30@100%.. **FW20C to trip turbine driven AFW pump.**	BOP	Report the loss of AFW
		US	Diagnose the event by referring to the Diagnostic flow chart of appendix 1 per EOP 2528 step1
		US	Enters EOP 2537 and directs the crew
		US	Opens the placekeeper and Enters EOP entry time
		RO	Perform EOP 2537 Step 4 as directed. • RCPs and HIC 4165 should have already been positioned as required in EOP 2525. • Place the pressurizer spray controllers in manual and close.
		US	Check for adequate RCS heat removal per EOP 2537 step 5
		Note	**An alternate success path may be OTC. If this path is selected, proceed to the OTC actions below.**
		RO	As directed, conserve SG inventory per EOP 2537 step 5

		US	Ensure at least one condensate pump is running per EOP 2537 step 14
		BOP	As directed, establish flowpath from hotwell to SG per EOP 2537 step 15
		RO	As directed, block MSI and SIAS per EOP 2537 step 16 and 17
		BOP	As directed, depressurize the SG to establish condensate flow per EOP 2537 step 18
	CT-LOAF-4 Establish a primary to secondary heat sing by feeding with the condensate pumps. If not successful, complete LOAF HR-1 Establish once through cooling.	BOP	Manually control feedwater flow.
			End the scenario after feed flow has been established and controlled,
		Note	**Actions below are for OTC if the US elects to use OTC**
		US	Makes determination that once through cooling should be
		RO	Perform EOP 2537 Step 5.1 a., b. as directed to deenergize Pressurizer heaters
		BOP	Perform EOP 2537 Step 5.1 c. as directed to fully open both ADVs
		RO	Perform EOP 2537 Step 5.1 e., f, g., and as directed to establish makeup flow for OTC.
		RO	Perform EOP 2537 Step 5.1 j. as directed to open both PORVs.
	CT-HR-1 Establish once through cooling. Required only if LOAF-4 above was unsuccessful.	US	Transitions to EOP 2540

		US	Open the Safety Function Tracking Page and Enter the EOP Entry time and ensure the master alarm silence switch is in 'normal', per EOP 2540 step 2. US continues to direct operations using EOP 2540.
		RO	As directed, reverify actions associated with RCPs. EOP 2540 step 3.
		BOP	As directed, open SG sample isolation valve EOP 2540. Step 4.
		RO	As directed place Hydrogen Analyzer in service per Appendix 19 (Attached) EOP 2540 step 5.
		US	Identify Success paths to be used by using the RAT and Safety Function Tracking Page EOP 2540 step 6. The most likely success paths to be selected are: RC-1; MVA-DC-1; MVA-AC-2; IC-2; PC-2 or 3; HR-3; CI-1; CTPC-2; CCGC-1
		US	Prioritize Safety Functions per EOP 2540 step 7. The expected order of priority is: RC-1; MVA-DC-1; MVA-AC-2; IC-2; PC-2; HR-3; CI-1; CTPC-2; CCGC-1.
		US	Direct the STA to check the SFSC Acceptance criteria EOP 2540. Step 8.
		US	Direct the crew in performing the chosen success paths based on the assigned priority.
		Note	The examiners need to go to the appropriate FR description below based upon the US order of priority.
		All	MVA-DC-1 is expected to be completed for this scenario without the need for making any control board manipulations. MVA-DC-1 steps 1, 2, 6, 7, 8, and 10 verify equipment is operating as expected.
		All	MVA-AC-2 actions that should be completed for this scenario are: step 5 refer to Appendix 39 attached.; step 7 check EDG.is expected to be completed for this scenario without the need for making any control board manipulations.

		RO	IC-2 Step 2. No control board manipulations are expected
		RO	IC-2 Steps 3-5 is expected to be completed for this scenario without the need for making any control board manipulations.
		RO	IC-2 Steps 6 and 7. If the HPSI pump was started in EOP 2525 the HPSI Throttle or Stop criteria of these steps may be met and actions taken to throttle or stop the HPSI flow.
		RO	IC-2 Steps 8 HPSI flow and pumps should be controlled to meet the HPSI Throttle or Stop criteria.
		RO	IC-2 Step 10 Stop the LPSI pumps.
		RO	IC-2 step 11 Check containment sump wide range level is rising.
		RO	IC-2 steps 12-16 are not expected to be performed in the time frame of this scenario.
		RO	PC-2.. If HPSI Throttle or Stop criteria are reached, steps 3,4 and 5 may be to throttle or stop the HPSI flow.
		RO	HR-3 no additional control board manipulations are expected
		END	This scenario may be terminated after HPSI flow has been established and a controlled coodown has been established OR at the discretion of the Lead Examiner.

Exam Title: Millstone Unit 2 NRC Operating Exam

Revision: 0

ID Number: Scenario 5

Submitted by:	Fred J Nyland	6/15/00
	Developer	Date
Reviewed by:	Robert D Cummings Jr.	6/15/00
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Reviewed by:	N/A	N/A
	Cognizant Plant Supervisor *(Optional)*	Date
Approved by:	[signature]	6/20/00
	Training Supervisor	Date

Facility: Millstone Unit 2	Scenario No.:5	Op-Test No.: Contingency
Examiners:	Operators:	

Objectives: To evaluate the applicants ability to evaluate operation of the RCP seals and make a decision to shutdown the plant. Following a 5% power reduction, further degradation of the RCP seal will require a decision to trip the plant and implementation of the EOPs for a LOCA.

Initial Conditions: IC 24; 100% power at MOL.

Turnover: The plant is at 100% power at MOL. Boron is at 568 ppm. BLEND RATIO:BAST 9.5 :1 The 'B' RCP lower seal has failed several weeks ago. The turbine driven AFW pump is out of service. #1 ADV being kept in manual because of inadvertent opening in automatic.

Event No.	Malf. No.	Event Type*	Event Description
0	RC07B @100)	na	Initial condition: 'B' RCP lower seal failure
1	RX12C @0% 120 sec ramp	I(BOP)	Failure of a SG level transmitter for feed water control system causes the feed regulating valve to open and raise SG level. The BOP must diagnose the failure, deselect the failed channel and possibly take manual control of the feed water regulating valve.
2	RX01A @20% 120 sec ramp	I(RO)	Failure of the pressurizer spray controller results in the RO taking manual control of the controller and closing the spray valve. When the RO takes manual control, the simulator operator will set the malfunction severity to 0% to allow successful operator action. Subsequently, on a unrelated power reduction, forcing sprays will require some diagnostic process to determine why pressurizer pressure is higher than expected and should take action to lower the pressure to normal.
3	RC08B @ 2.5%	C(RO)	RO must evaluate seal failure by taking reading and filling out a work sheet to determine the 'B' RCP upper seal failure which then results in a decision to shutdown plant.
4		R(RO) N(BOP)	Normal plant shutdown due to RCP seal failure
5	RC09B @30% RC04 @ 75%	M(All) C(BOP)	Failure of 'B' third seal causes decision to be made to trip the plant. At time of trip, a 300 GPM Small Break LOCA occurs. The EOP diagnosis should cause the EOP for LOCA to be entered.

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

OP-Test No.:	Scenario No.:1 Event No.:N/A	Page of
Event Description: Initial Simulator Setup Instructions. Prior to the exam, set up the following initial conditions and place the simulator in run. Turnover should include a partially filled out OP 2301C Attachment 5 RCP Seal Failure Determination Worksheet for the failed lower seal.		
IC 24	100% power at MOL. 568 PPM	
	Place the #1 ADV controller in manual	
	Remove Turbine Driven AFW pump from service by closing MS 201 and 202 and placing FWR 12 and FWR 13 in RO. Place yellow tag on AFW turbine controls.	
RC07B @100%	'B' RCP lower seal failure	
RC04@75% BT-1	At time of trip, a 300GPM Small break LOCA occurs	

OP-Test No.: Scenario No.:5 Event No.:1 Page of

Event Description: RX11A @0% 600 sec ramp. Failure of a SG level transmitter for feed water control system causes the feed regulating valve to open and raise SG level. The BOP must diagnose the failure, deselect the failed channel and possibly take manual control of the feed water regulating valve.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX12C@0% 120 sec ramp Failure of a main steam generator level transmitter	BOP	May note rising SG level on the 4 SG level safety channels and 1 of the control channels and lowering indicated level on the failed channel. May also note rising feed flow. If the trend is not noted, an alarm 'SG LEVEL SETPOINT DEVIATION HI/LO' will alert the RO to the problem.
		BOP	Acknowledge and Report 'SG LEVEL SETPOINT DEVIATION HI/LO' alarm C05 per ODI Form 1.26-05 step 1.a) and 1.b) attached. In event that RO notes trend before alarm occurs the ARP can still be referenced for guidance.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		BOP	May shift FRV to manual control prior to referencing the ARP if necessary to stabilize the plant per ODI Form 1.26-15.
		BOP	Shift the transmitter control switch for #2 SG Steam Generator level to 'ALT' per ARP 2590D window D-16 attached
		BOP	If desired, refer to OP 2385 and place the Feedwater Control System in Automatic.

OP-Test No.: Scenario No.:5 Event No.:2 Page of

Event Description: RX01A@20% 120 sec ramp Failure of the pressurizer spray controller results in the RO taking manual control of the controller and closing the spray valve. When the RO takes manual control, the simulator operator will set the malfunction severity to 0% to allow successful operator action. Subsequently, on a unrelated power reduction, forcing sprays will require some diagnostic process to determine why pressurizer pressure is higher than expected and should take action to lower the pressure to normal.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	RX01A@20% 120 sec ramp Failure of pressurizer spray controller. **Be prepared to change the severity to 0% when the RO shifts to manual and closed. This can be observed on the video camera.**	RO	Acknowledge and Report "PZR Pressurizer selected channel deviation Hi/Lo" alarm on C02/3 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The alarm specified above is the first to annunciate. The RO may observe pressurizer pressure lowering before the alarm and begin diagnostics and corrective action
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP for window C02/3 D-37 and take actions per ODI form 1.26-05 step 2.a). The RO may shift the controller to manual and close the spray valve before referencing the ARP per DC 4 section 1.1. BU heaters may be energized in an attempt to keep pressure above 2225.
		US	If pressure falls below 2225 psia, enter Technical Specifications LCO 3.2.6 Action statement.

OP-Test No.: Scenario No.:5 Event No.:3 Page of

Event Description: RC08B @2.5%: 'B'RCP middle seal failure causes decision to shutdown plant

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
	Enter RC08B @2.5%: 'B'RCP middle seal failure.	RO	Acknowledge and Report "RCP 'B' Bleedoff Flow High" alarm on C02/3 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The alarm specified above are highest priority.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP for window C02/3 BB-21 and take actions per ODI form 1.26-05 step 2.a) attached
		RO	Refer to OP 2301C Section 4.13 "RCP Seal Failure Determination" and determine that the plant must be shutdown per step 4.13.5
		US	Direct performance of OP 2204 attached
		US	Conduct shift briefing per OP 2204 step 4.3.2.
		All	Maintain plant parameters per OP 2204 Attachment 1, attached
		US	Direct the performance of SP 2610E and OP 2323C. SP2610E is performed by PEOs and 2323C will not be performed during this scenario because it is normally performed well after the power reduction commences.
		US/RO	US may direct specific amount of rod insertion (typically 5-10 steps) and

			maintain oversight per ODI Form 1.25-03, attached.) RO Insert CEAs per Op 2302A section 4.4 attached.
		RO	Determine required boration and commence boration per OP 2304C (attached) OP 2204 step 4.3.6 • Perform initial conditions per OP 2304C steps 4.3.1 and 4.3.2 • Determine quantity of boric acid to add by using OP 2208 or the PPC. Boric acid addition volume may be determined using the thumbrules in OP 2204 section 1.2 and then using the PPC program to determine gallons, or may be determined using the thumbrules in OP 2208 attachment 5 and then using the PPC program to determine gallons or may be determined using OP 2208 Section 4.3and then using the PPC program to determine gallons. • Add the boric acid per OP 2304C steps 4.3.3 - 4.3.14 • Start additional charging pumps per OP 2304E section 4.4 attached
		RO	Start forcing pressurizer sprays per OP 2204 step 4.3.7
		BOP	Reduce Turbine Load and maintain Tave on program per OP 2304C step 4.3.9 (attached)
		All	After the boration has began, The US may assign the RO to control turbine load and the BOP to control the feed pump speed and perform other secondary plant operations per ODI Form 1.26-03 step 11
		Note	After the power reduction has been started or at discretion of the lead examiner, insert the next even and continue the down power.

OP-Test No.: Scenario No.:5 Event No.:4 Page of

Event Description: RC09B: Failure of 'B' third seal causes decision to be made to trip the plant.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
		RO	Acknowledge and Report "RCP 'B' controlled Bleed Off Pressure High" nd "RCP 'B' CLG WTR TEMP HI" alarms on C02/3 per ODI form 1.26-05 step 1.a) and 1.b) attached. Other alarms may or may not be announced at this time depending on operators assessment of priority. The alarm specified above are highest priority.
		US	Acknowledge report and ensure ARP is referenced per ODI form 1.26-05 step 1.c) and 2.a) attached.
		RO	Reference the ARP 2590B for window C04 A-10 and take actions per ODI form 1.26-05 step 2.a) attached and ARP 2590B window DB-21 attached.
		US/RO	Refer to OP 2301C Section 4.13 "RCP Seal Failure Determination" and determine that the plant must be tripped and that 'B' RCP must be stopped.
		US	Direct a reactor trip and shutdown of 'B' RCP.

OP-Test No.: Scenario No.:5 Event No.:5 Page of

Event Description: RC04 @ 75% BT1. At time of trip, a 300 GPM Small Break LOCA occurs. The EOP diagnosis should cause the EOP for LOCA to be entered.

Time	Simulator Instructions	Position	Applicant's Actions or Behavior
		US	Directs a reactor and turbine trip and entry to EOP 2525
		US	Open EOP 2525 and commence query of both control board operators to identify the status of the plant. US should ask for 'value and trend' rather than ask if parameter is in a certain band. (EOP implementation guidance document, step 5.2.1)
		RO	Perform EOP 2525 step 1 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Power going down • SUR is negative • All CEAs fully inserted After the reactor and turbine trips the 'B' RCP should be tripped per OP 2301C step 4.13.5.
		BOP	Perform EOP 2525 step 2 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Turbine tripped • All main stop valves are closed • Generator Megawatts are zero • 8T and 9T are opened

			• All Facility 1 and 2 Electrical busses are energized • Both Facilities of service water are operating • Both Facilities of RBCCW are operating with service water cooling
		RO	Perform EOP 2525 step 3 from memory or may use Immediate Operator Action Memory Aid and report when queried: • RO may report Pressurizer level is between 20 and 80% and is trending down • Subcooling is greater than 30°F
	LOCA-13 Trip two RCPs.	RO	Perform EOP 2525 step 4 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Pressurizer pressure is less than 1900 and trending down. Contingency action will be taken to stop 2 RCPs. 'B' RCP should have been tripped already, therfor trip the 'D' RCP.
		RO	Perform EOP 2525 step 5 or may use Immediate Operator Action Memory Aid from memory and report when queried: • Check that at least one RCP in each loop is operating • Check loop Δt is less than 10°F • Check that T_H subcooling is greater than 30 °F
		BOP	Perform EOP 2525 step 6 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Steam generator pressure is 880 psia to 900 psia • SG level is being restored in both SGs with level between 10 and 80% and a MFW pump is running

			• RCS subcooling is greater than 30°F
		RO	Perform EOP 2525 step 7 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Radiation monitors in the containment rising • Steam Plant Radiation Monitors are normal • Containment pressure is rising
		RO	Perform EOP 2525 step 8 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is rising • Containment pressure is rising
		RO	Perform EOP 2525 step 9 from memory or may use Immediate Operator Action Memory Aid and report when queried: • Containment temperature is rising • Containment pressure is rising Takes action to start containment aux circ fans and post incident recirc fans.
		RO	Report completion of subsequent actions on the primary side. (EOP 2525 step 10)
		BOP	Report completion of subsequent actions on the secondary side (EOP 2525 step 11-18)
		US	Uses the diagnostic flow chart to update the shift as to the status of the plant. Determines that a LOCA is occurring and directs entry into EOP 2532.

		US	Enters EOP 2532 and directs the crew
		US	Confirms the diagnosis per EOP 2532 step 1
		BOP	When directed, opens S/G sample valves and directs chemistry to sample S/Gs
		US	Implements Place keeping per step 3
		RO	Perform EOP 2532 Step 4 as directed • If pressure is 1800 psia and trending down, report and initiate SIAS/CIAS/EBFS (per ODI form 1.26-11 and OP 2260 step 1.11.4) • If pressure is 1714 psia and trending down, report and ensure SIAS/CIAS/EBFS and one complete Facility of CRAC and SIAS/CIAS/EBFS has actuated. If pressure is 1714 psia and SIAS has initiated, ENSURE that one RCP in each loop has been stopped. One RCP in each loop can be stopped at a higher pressure if SIAS has been initiated. 'D' RCP should be stopped.
		RO	Perform EOP 2532 Step 5 as directed. • At least one train of SIAS, CIAS, and EBFAS has properly actuated by checking CO1X. Operators may start equipment in the train that did not actuate. • adequate safety injection flow • all charging pumps are operating - Start 'A' charging pump • Start Facility 1 of vital switchgear cooling per step 5d.
		BOP	Perform EOP 2532 Step 7 as directed.

		All	Perform EOP 2532 Step 8 as directed to check that LOCA is not outside of the containment.
		RO	Perform EOP 2532 Step 9 as directed to place Hydrogen Analyzers in service per Appendix 19 attached
		RO	Perform EOP 2532 Step 10 as directed by starting both containment auxiliary circulation fans in low and starting both post-incident recirculation fans.
	LOCA-11, Perform plant cooldown. Completion is demonstrated by indications of plant cooldown. Cooldown and depressurization required to allow HPSI injection to recover vessel level.	All	Perform a controlled cooldown per step 17.
	LOCA-1 Establish RCS pressure control.		End Scenario