

FINAL SUBMITTAL

SURRY EXAM 2000-301

SEPTEMBER 14 - 21, 2000

NUREG-1021 - ES-501

FINAL AS GIVEN
OPERATOR ACTIONS

F.1.g - FORM ES-D-2
OPERATOR ACTIONS

Facility: Surry Scenario No.: LC-00.1-SE-2 Op-Test No.: 00-1

Examiners: _____

Operators: _____

Objectives: To evaluate the applicant's ability to conduct a Unit power Increase from 50%. To implement the ARPs for a Main Steam Flow transmitter failure. To implement the ARPs for an RCS median Tave failure. To implement the ARP for an air ejector radiation monitor failure. To execute the ARPs associated with an RCP thermal barrier leak. To execute the EOPs for a Large Break LOCA with a failure of both trains to automatically actuate (one train must have each component manually aligned). The team will then be evaluated implementing the EOP for a loss of Emergency Coolant Recirculation due to a loss of the only running LHSI pump.

Initial Conditions: Unit 1 is at 50% power preparing to increase power.

Turnover: Off normal conditions for Unit 1: 1-MS-119 is closed to isolate leakage past the "B" SG PORV. The Unit has been at 50% for 4 days while the Outboard motor was replaced on the "B" MFW pump. The pump has been restarted and all post-start checks are satisfactory. A record heat spell is enveloping the East Coast. Shift orders are to promptly execute a unit ramp to 100%.

Event No.	Malf. No.	Event Type*	Position (RO/SRO/BOP)	Event Description
1	N/A	R	SRO/RO	Power Increase from 50% power ✓
2	MMS08	I	SRO/BOP	Main Steam flow transmitter fails low (1-MS-FT-474) ✓
3	N/A	N	SRO/RO	Swap controlling channels IAW OP-RP-001 ✓
4	MRC08	I	SRO/RO	Median select Tave fails high ✓
5	MRM02	C	SRO/BOP	Air Ejector Radiation Monitor failure (1-SV-RI-111) ✓
6	MCC05	C	SRO/RO	"A" RCP thermal barrier leakage ✓
7	MRC01	M	ALL	Large Break LOCA (E-0, E-1) ✓
8	DISA	C	SRO/RO	Both Trains of SI fail to Auto Actuate ✓
9	MSI12	C	ALL	"B" Train of SI fails to manually actuate ✓
10	MSI09	C	SRO/RO	Both LHSI pumps trip (1-SI-P-1A/B) ✓
11	N/A	M	ALL	Loss of Emergency Coolant Recirculation (ECA-1.1)

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

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**INCREASE POWER FROM 50%, MAIN STEAM FLOW CHANNEL FAILURE, MEDAIN
TAVE CONTROL FAILURE, AIR EJECTOR RADIATION MONITOR FAILURE, RCP
TERMAL BARRIER LEAK WITH AUTO ISOLATION FAILURE, LARGE BREAK LOCA
WITH SI FAILURE (BOTH TRAINS FAIL TO AUTO ACTUATE, ONE ACTUATES
USING PUSHBUTTONS, ONE MUST BE MANUALLY ALIGNED), LOSS OF
EMERGENCY COOLANT RECIRCULATION**

LC-00.1-SE-2

REVISION 0

Referenced Procedures

<u>Procedure #</u>	<u>Procedure Name</u>	<u>Revision #</u>
1-OP-TM-005	Unit Ramping Operations	1
ARP F-D-7	STM GEN "A" FW<STM FLOW	4
ARP H-E-5	STM GEN 1A FW<STM FLOW	2
ARP H-G-5	STM GEN 1A Level Error	0
1-OP-RP-001	Align Control Channels for Testing	1
ARP C-D-8	PRZR LO LEVEL	0
ARP H-H-7	STM DUMP VV TRIP OPEN	1
ARP H-A-4	Tave-Tref DEVIATION	1
AP-1.00	Control Rod System Malfunction	6
1-E-0	Reactor Trip or Safety Injection	37
ARP RM-G-8	Cndsr Air Ejector ALERT/FAILURE	4
ARP C-A-3	RCP 1A THERMAL BARRIER CC HI TEMP	0
ARP C-A-2	RCP 1A THERMAL BARRIER CC HI FLOW	3
1-E-1	Loss of Reactor or Secondary Coolant	17
1-ECA-1.1	Loss of Emergency Coolant Recirculation	13
EPIP-1.01	Emergency Manager Controlling Procedure	41
EPIP-1.02	Response to NOUE	12
EPIP-1.04	Response to Site Area Emergency	16

Technical Specifications

Scenario Summary

This simulator examination was developed new for the 2000 License Class examination.

Initial conditions are as follows:

- Unit 1 is at 50% power to allow 1-FW-P-1B outboard motor replacement.
- 1-FW-P-1B motor replacement is complete, the pump has been started, and post start checks and vibrations are satisfactory.
- A record heat wave has enveloped the East Coast and Peak Power has reached record levels the last 4 days in a row.
- Shift orders require a prompt ramp to 100% using a turbine thumbwheel setting 8 (250 Mw/hr). Reactor Engineering has directed maintenance of delta flux with a target "D" rod height of 225 steps at 100% power. A QPTR has just been completed satisfactorily (tilt is less than .5%). Current boron concentration is 948 ppm and core burnup is 7500 MWD/MTU.
- The following off-normal equipment is present on Unit 1:
 - ◆ 1-MS-119 is isolated due to wisping past the "B" SG PORV.
 - ◆ 1-CH-P-1C is electrically tagged out for replacement of the ground overcurrent device.
- Unit 2 is at 100% power with all systems and cross-ties operable.

After turnover the team should brief and commence a power increase. During the power increase, 1-MS-FT-1474 will fail low resulting in FW flow reduction. The BOP should take manual control of "A" MFRV and restore SG levels. The team should brief and swap controlling channels per OP-RP-001. Following restoration of all MFRVs to auto, Median Tave fails high. This causes rods to step in rapidly, charging flow control increases to maximum and steam dumps generate a trip open demand signal. Following the Tave failure, the Air ejector radiation monitor will fail low leading to an ALERT/FAILURE alarm. The BOP should review the ARP and swap air ejector discharge to Containment. The next event is a leak into the "A" RCP thermal barrier. The team should review the ARPs and recognize a failure of the auto functions to isolate the leak. The team should take actions to isolate the thermal barrier.

The major accident will occur from the power level attained after the ramp from 50% power. A LBLOCA will initiate and SI will fail to actuate. The RO is expected to manually backup the auto signal and this will actuate one train of SI. The team will need to manually align the other train of SI. One LHSI pump will lockout on start, and is unrecoverable during the remainder of the scenario. After the team has entered E-1, the running LHSI will trip. At step 17 of E-1, the team should transition to ECA-1.1 and take actions to refill the RWST and minimize SI flow.

The evaluation is terminated on the lead evaluator's cue.

Team Objectives

After receiving this instruction, the trainee will be able to:

- A. Perform a power increase from 50% power in accordance with OP-TM-005 (GEN2.2.2, 4.0/3.5)
- B. Respond to a SG steam flow transmitter failure in accordance with ARPs. (SYS035.A3.01, 4.0/3.9)
- C. Determine Technical Specification requirements for a steam flow channel. (GEN2.1.10, 2.9/4.0)
- D. Swap Controlling Channels of Steam flow and Feed Flow (GEN 2.1.20, 4.3/4.2)
- E. Respond to failure of the Median Tave control circuit. (GEN2.1.30, 3.9/3.4)
- F. Respond to a failure of the Air Ejector Radiation Monitor. (APE060AA2.05, 3.7/4.2)
- G. Respond to an RCP thermal barrier leak (SYS003.A2.01, 3.5/3.9)
- H. Respond to a Large Break LOCA. (EPE011.EA2.01, 4.2/4.7)
- I. Respond to a failure of the Safety Injection system to automatically actuate. (EPE011.EA1.13, 4.1/4.2)
- J. Manually align one train of Safety Injection. (EPE011.EA1.13, 4.1/4.2)
- K. Respond to a loss of Emergency Coolant Recirculation. (EPEE11.EA2.1, 3.4/4.2)

- L. Exhibit proper self-checking, place keeping and verbatim procedural compliance while responding to various plant events. (GEN2.1.20, 4.3/4.2)**

Observation Aid:

Event #1 – Reactivity Manipulation – Increase Power from 50%:

Expected Responses, the team should:

- ❑ (Team) Briefs on the Unit ramp per OP-TM-005 Sections 1, 3, 4, 5.3.
- ❑ (Team) Begins ramp per section 5.3 of OP-TM-005.
- ❑ (BOP) Changes Load Rate thumbwheel from 6 to 8.
- ❑ (BOP) Increases Reference setter to allow turbine to ramp at 250 MW/hr.
- ❑ (BOP) Depresses “GO” button to initiate turbine ramp.
- ❑ (RO) Begins a dilution to control temperature IAW OP-CH-007.
 - Places MAKE-UP CONTROL in STOP.
 - Sets PG desired rate.
 - Sets integrator for continuous dilution (PRESET A, CLR (if value not one desired), Enter desired amount (numerically), ENT.)
 - Places MAKE-UP MODE SEL in DILUTE.
 - Places MAKE-UP CONTROL in START.
 - Verifies correct alignment of valves (Pen on VB should read desired flow rate if previous steps performed correctly)
 - Terminates makeup when desired amount reached (reverse order of above)
- ❑ (BOP) Adjusts limiter as load increases.
- ❑ (RO) Verifies core parameters during the ramp (IRPI, Temperature, Delta Flux, Delta T, NIS)

Evaluators Information: First dilution of the shift requires use of OP-CH-007, Blender Ops.

***Approximately 900 pcm of Power defect is present from 50% to 100%,
Rods are worth approximately 300 pcm, dilution will need to makeup
the other 600 pcm (3000 gallons)***

Evaluator Notes (continued):[illegible]

Event #2 – Instrument Failure – SG Steam Flow (FT-474) Transmitter Failure/low :

Expected Responses, the team should:

- (BOP) Acknowledges annunciators F-D-7, H-E-5, STM/FEED MISMATCH, H-G-5, STM GEN “A” Level Error.
- (TEAM) Recognizes “A” Channel 3 Steam Flow Failed low.
- (BOP) Places “A” MFRV in Manual.
- (RO) Reviews annunciators.
- (BOP) Restores “A” SG level by increasing feed flow with MFRV and Bypass valve if required for fine control.
- (SRO) Reviews Tech Specs and Identifies 6 hr to place channel in trip per T.S. 3.7-1#17 operator action #7, T.S. 3.7-2 # 1.E.1 Operator action # 20 and T.S. 3.7-3 #2.
- (SRO) Notifies I&C to place channel in trip.
- (SRO) Notifies OMOC of failure and plant status.

Evaluator Notes:

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Evaluator Notes (continued):[illegible]

Event #3 – Normal Evolution – Swap Controlling Channels (OP-RP-001):

Expected Responses, the team should:

- ❑ (TEAM) Briefs on evolution per sections 1, 3, 4, 5.3 of OP-RP-001.
- ❑ (TEAM) Implements section 5.3 of OP-RP-001
- ❑ (RO) Places Rod control in MANUAL
- ❑ (RO) Places Steam Dumps in OFF/RESET
- ❑ (RO) Places Polishing Building Bypass in DEFEAT
- ❑ (RO) Places “B” and “C” MFRVs in MANUAL.
- ❑ (BOP) Places “A,” “B,” “C” Steam flow and Feed Flow channel select switches in channel 4
(minimum of 2 cycles)
- ❑ (BOP) Places 1st stage impulse pressure control in channel 4.
- ❑ (RO) Places Rod control in AUTO
- ❑ (RO) Places Steam Dumps in AUTO
- ❑ (RO) Places Polishing Building Bypass in NORMAL
- ❑ (RO) Places “B” and “C” MFRVs in AUTO.

IMPORTANT EVALUATOR CUE: THE RO NEEDS TO PERFORM THE BOARD MANIPULATIONS, THE BOP NEEDS TO PERFORM THE VERTICAL BOARD MANIPULATIONS.

Evaluator Notes:

[illegible]

Event #4 – Instrument Failure – Median Tave Fails High:

Expected Responses, the team should:

- ❑ (BOP) Acknowledges annunciators HH7, STM DUMP TRIP OPEN, H-A-4, Tave-Tref Deviation
- ❑ (RO) Acknowledges annunciator C-D-8, PRZR Lo Level, and D-E-5, Chg Hi/Lo flow.
- ❑ (BOP) Places rod control in MANUAL to stop rod motion.
- ❑ (RO) Places Charging flow control in MANUAL and lowers demand to stop Pressurizer level increase.
- ❑ (RO/BOP) Reviews annunciators.
- ❑ (SRO) Reviews Tech Specs identifies no applicable limiting actions.
- ❑ (SRO) Notifies I&C of Failure.
- ❑ (SRO) Notifies OMOC of failures and unit conditions.
- ❑ (TEAM) Discusses plant operation with Steam Dumps with trip open demand, MFRVS with no trip Close criteria at 554 degrees, operation with rods and charging flow control in MANUAL.

Evaluator Notes:[illegible]

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Event #5 – Component Failure – Air Ejector Radiation Monitor Failure:

Expected Responses, the team should:

(BOP) Acknowledges annunciator RM G-8, CNDSR AIR EJECTOR ALERT/FAILURE.

(BOP) Reviews annunciator RM G-8.

(RO) Closes 1-SV-TV-103.

(RO) Opens 1-SV-TV-102.

(BOP) Notifies HP to obtain Air Ejector samples once per 8 hours (not to exceed 12 hours).

(BOP) Increases surveillance on Blowdown and MS radiation monitors.

(SRO) Reviews Tech Specs and recognizes no applicable limiting conditions.

(SRO) Notifies I&C of Failure.

(SRO) Notifies OMOC of failures and unit conditions.

Evaluator Notes:[illegible]

[illegible]

Expected Responses, the team should:

- (RO) Acknowledges annunciators C-A-2, RCP 1A Thermal barrier High Temp and C-A-3, RCP 1A Thermal Barrier High flow.
- (BOP) Reviews ARPs C-A-2 and C-A-3.
- (RO) Attempts to close 1-CC-TV-120A, recognizes it will not close.
- (RO) Closes 1-CC-TV-140A/B.
- (SRO) Briefs field operator on closure of 1-CC-28 (inside containment).
- (SRO) Obtains Management approval for a Containment entry.
- (SRO) Notifies HP.
- (SRO) Notifies OMOC of failures and plant status.
- (TEAM) Monitors RCP lower Bearing and Seal Water Outlet Temperature.

Evaluator Notes:[illegible]

[illegible]

Event #7/8/9 – Major Event – Large Break LOCA with SI failures:

Expected Responses, the team should:

- ❑ (TEAM) Identifies alarms are associated with a LOCA condition.
- ❑ (SRO) Directs a Reactor Trip and Safety Injection.
- ❑ (RO) Performs E-0 Immediate actions
 - Trip Reactor
 - Trip Turbine
 - Manually Safety Injects

Critical task (WOG-E-0-D) Manually actuate at least one train of SI before the RCS CETCs reach 1200°F.

- ❑ (SRO) Reads E-0 using adverse Cmt Numbers (bracketed numbers in EOPs, 20 psia in CTMT)
- ❑ (RO) Starts “B” LHSI pump
- ❑ (RO) Opens 1-SI-MOV-1867D
- ❑ (RO) Identifies “A” LHSI pump lockout.
- ❑ (RO) Secures RCPs
- ❑ (BOP) Closes Mini-Flow Recirc Valves.

Critical Task (SPS E-1-E) Close the Charging Mini-Flow Recirc valves before Recirc Mode

Transfer occurs.

- ❑ (RO) Performs phase I isolation
 - 1-VG-TV-109B
 - 1-CC-TV-109B
 - 1-DA-TV-100B
 - 1-CH-TV-1204B
- ❑ (BOP) Performs Attachment 1 verification (Hi Hi CLS actions)

Evaluator Notes:

Event #7/8/9 – Major Event – Large Break LOCA with SI failures (CONT):

Expected Responses, the team should:

- ☐ (BOP) Throttles AFW to limit SG overfill.
- ☐ (RO) Blocks High Steam Flow SI.
- ☐ (RO) Blocks LP and Hdr/Line SI.
- ☐ (BOP) Resets AMSAC (if >13% in all SGs or 6 minutes have elapsed)
- ☐ (BOP) Shuts down the Terry Turbine.
- ☐ (RO) Opens 1-CH-MOV-1115D
- ☐ (RO) Closes 1-CH-MOV-1115E
- ☐ (RO) Closes 1-CH-MOV-1289B
- ☐ (BOP) Performs Attachment 2
 - (BOP) Places 1-VS-MOD-100B to Filter
 - (BOP) Places 1-VS-43-VS-103X to OFF
 - (BOP) Closes 1-VS-MOD-103B
 - (BOP) Closes 1-VS-MOD-103C
 - (BOP) Starts 1 hour timer from time SI occurred.

Evaluator Notes:

Event #7/8/9 – Major Event – Large Break LOCA with SI failures (Continued):

Expected Responses, the team should:

- (TEAM) Dispatches Operator to obtain MS NRC RM readings.
- (SRO) Transitions to E-1
- (TEAM) Holds a Brief (May be performed at some other time, this is the most probable point)
- (RO) Identifies “B” LHSI pump trip. *Cue the Booth to implement the malfunction at step 6 of E-1.*
- (SRO) Directs Electricians to investigate/RTS LHSI and Charging pumps.
- (RO) Resets CLS
- (RO) Stops 1-RS-P-2A/B (O/S RECIRC SPRAY PUMPS).
- (RO) Stops 1-CS-P-1A/B (CONTAINMENT SPRAY PUMPS)
- (RO) Closes 1-CS-MOV-101A/B/C/D
- (RO) Closes 1-CS-MOV-102A/B
- (RO) Operates ISRS pumps to control CTMT pressure.
- (RO) Resets SI
- (SRO) Briefs Operator to shutdown EDGs.
- (RO) Opens 1-IA-TV-100

Evaluator Notes:

Evaluator Notes:[illegible]

Event # 11- Major Event (Contingency Actions) – Loss of Emergency Coolant Recirculation:

Expected Responses, the team should:

(SRO) transitions to ECA-1.1

(RO) Places RMT in "REFUEL"

(SRO) Directs Operator to makeup to RWST.

(BOP) Initiate SG cooldown (discusses unisolation of "B" SG PORV)

(RO) Stops 1 Charging Pump.

(SRO) Determines need to throttle SI flow to conserve RWST water.

Critical Tasks (WOG ECA-1.1-A) Stop SI pumps taking a suction on the RWST before the SI pumps cavitate, vibrate excessively, or trip.

(WOG ECA-1.1-B) Initiate actions to makeup to the RWST before beginning the RCS cooldown to cold shutdown AND take actions to minimize RWST outflow before the end of the scenario.

Evaluator Notes:

[illegible]

Critical Task Selection

CT-1 Statement: (WOG-E-0-D) Manually actuate at least one train of SI before the RCS CETCs reach 1200°F.

CT-2 Statement: (SPS E-1-E) Close the Charging Mini-Flow Recirc valves before RMT occurs.

CT-3 Statement: (WOG ECA-1.1-A) Stop SI pumps taking a suction on the RWST before the SI pumps cavitate, vibrate excessively, or trip.

CT-4 Statement: (WOG ECA-1.1-B) Initiate actions to makeup to the RWST before beginning the RCS cooldown to cold shutdown AND take actions to minimize RWST outflow before the end of the scenario.

Critical Task Identification Number: WOG E-0 – D

Plant Conditions:

- Reactor trip with *valid* SI required but not automatically actuated (*valid* means that instrument failure is not the cause of the required SI)
- SI can be manually actuated from the control room

Critical Task Statement:

Manually actuate at least one train of SI before the RCS CETCs reach 1200°F (LBLOCA).

or

subcooling is less than 30°F (SBLOCA).

Basis for Selection:

SAFETY SIGNIFICANCE – Failure to manually actuate SI under the postulated conditions constitutes "misoperation or incorrect crew performance that leads to degraded ECCS capacity." In this case, SI can be manually actuated from the control room. Therefore, failure to manually actuate SI also represents a "demonstrated inability by the crew to: 1) Take an action or combination of actions that would prevent a challenge to plant safety. 2) Effectively direct/manipulate ESF controls. 3) Recognize a failure/incorrect auto actuation of an ESF system or component".

Additionally, under the postulated plant conditions, failure to manually actuate SI (when it is possible to do so) results in a "significant reduction of safety margin beyond that irreparably introduced by the scenario." Finally, failure to manually actuate SI under the postulated conditions is a "violation of the facility license condition." The acceptable results obtained in the FSAR analyses are predicated on the assumption that, at the very least, one train of safeguards actuates. If SI is not actuated, the FSAR assumptions and results are invalid. Because compliance with the assumptions of the FSAR is part of the facility license condition, failure to manually actuate at least one train of SI (under the postulated conditions and when it is possible to do so) constitutes a violation of the license condition.

Cues:

- Indication and/or annunciation that SI is required
- No indication or annunciation that SI is actuated

Performance Indicator: Depressing one or both SI pushbuttons or component controls as required to actuate at least one train of SI

Feedback: Indication and/or annunciation that at least one train of SI is actuated.

KA References:

SYS006.K1.03, 4.2/4.3
SYS006.A2.02, 3.9/4.3
SYS006.A3.02, 4.1/4.1
SYS006.A3.08, 4.2/4.3

Comments: Instead of using the SI manual actuation switches, it is conceivable that the crew might manually operate individual safeguards components as required to achieve the same results as actuation of at least one train of SIS-actuated safeguards.

Critical Task Identification Number: SPS E-1 – E

Plant Conditions:

- LBLOCA of sufficient size to require RMT (See Comment 1)
- Safety injection is required
- RCP trip criteria is satisfied

Critical Task Statement:

Close the CHG pump miniflow recirc valves before RMT occurs (KOA).

Basis for Selection:

SAFETY SIGNIFICANCE – This is a Key Operator Action Assumed in the Safety Analysis. Since this is assumed as a KOA, this operator action is required to mitigate the consequences of a LBLOCA. Thus incorrect crew performance would be a "violation of the facility license condition." Additionally, since this is a step in ES-1.3 prior to RMT, such an omission constitutes a demonstrated inability by the crew to "take an action...that would prevent a challenge to plant safety."

Cues:

- Indications of a LBLOCA
- Indications of RCS pressure less than 1275 [1475]
- Indications RCP trip criteria are met (RCPs off) (See Comment 2)

Performance Indicator: Closing CH-MOV-1275A, B, & C OR closing CH-MOV-1373. (See Comment 2)

Feedback:

- MOV(s) closed indication green light(s) illuminated.

KA References:

EPE011.EK3.12, 4.4/4.6
EPE011.EA1.11, 4.2/4.2
EPE011.EA1.15, 4.2/4.2

Comments:

- 1) Note: This CT is unpractical for a Dynamic Simulator Exam as the time required to reach RMT following a LBLOCA may be excessive. Addition of the RWST leakage malfunction may be needed if this CT is selected for dynamic simulator exams to reduce the time to RMT. Training and/or evaluating performance of this CT as a JPM may be more appropriate. See LO JPM 52.01 for transferring SI system to cold leg recirculation.
- 2) This CT would require manual action of securing the RCPs prior to performance of this CT. This CT may be used in conjunction with CT WOG E-1 – C.

Critical Task Identification Number: WOG ECA-1.1 – A

Plant Conditions:

- LOCA large enough to preclude satisfaction of the SI termination criteria at any time prior to emptying of the RWST but not too large as to cause the core cooling CSF to be severely challenged
- Loss of emergency cooling recirculation capability with depletion of RWST inventory sufficient to require that SI pumps be stopped
- Emergency coolant recirculation flowpath cannot be established (See Comment 2)
- When RWST inventory becomes sufficiently depleted to require stopping of SI pumps,

Critical Task Statement:

Stop SI pumps taking a suction on the RWST before SI pumps cavitate, vibrate excessively, or trip.

Basis for Selection:

SAFETY SIGNIFICANCE -- Failure to stop the SI pumps taking a suction on the RWST before it empties results in cavitation, air binding, and loss of suction. All of these results can lead to pump damage sufficient to reduce the availability of the pumps when a suction source subsequently becomes available. Thus, failure to perform the critical task constitutes "misoperation or incorrect crew performance which leads to degraded SI...capacity." It also represents a "demonstrated inability by the crew to effectively direct/manipulate ESF controls...."

Cues:

- Indication and/or annunciation that SI is required and has actuated and that SI pumps taking a suction on the RWST are still running
- Indication that the suctions of the SI pumps are aligned to the RWST
- Indication that a recirculation flowpath cannot be established
- Indication and/or annunciation ("RWST EMPTY") that the RWST is about to empty

Performance Indicator: Manipulation of controls as required to stop all SI pumps taking a suction on the RWST

Feedback: Indication and/or annunciation that all SI pumps with suctions aligned to the RWST are stopped

- SI and CS pump handswitches in the pull-to-lock position
- Circuit breaker open position indication

KA References:

EPEE11.EK1.1, 3.7/4.0

EPEE11.EA1.1, 3.9/4.0

EPEE11.EA2.1, 3.4/4.2

Comments:

- 1) RWST leak malfunction can be utilized to accelerate the rate of inventory depletion.
- 2) Combinations of failures of 1-SI-MOV-1860A and/or B to open and/or LHSI pump failures can be utilized to establish conditions for this CT.

Critical Task Identification Number: WOG ECA-1.1 – B

Plant Conditions:

- LOCA large enough to preclude satisfaction of the SI termination criteria at any time prior to emptying of the RWST but not too large as to cause the core cooling CSF to be severely challenged.
- Loss of emergency cooling recirculation capability without restoration (See Comment 3)
- Capability exists for establishing makeup flow to the RWST and the RWST is not empty
- At least one method for reducing RWST outflow is available

Critical Task Statement:

Initiate actions to makeup to the RWST before beginning RCS cooldown to cold shutdown AND take actions to minimize RWST outflow before the end of the scenario.

Basis for Selection:

SAFETY SIGNIFICANCE – Failure to establish makeup flow to the RWST and/or to minimize RWST outflow leads to (or accelerates) depletion of RWST inventory to the point at which ECCS pumps taking suction on the RWST must be stopped. Loss of pumped injection (coincident with loss of emergency cooling recirculation) will lead to a severe or an extreme challenge to the core cooling CSF. Thus, failure to perform the critical task under the postulated plant conditions leads to "significant reduction in safety margin beyond that irreparably introduced by the scenario." It also represents "demonstrated inability by the crew to take an action or combination of actions that would prevent a challenge to plant safety."

Cues:

- Indication and/or annunciation that SI is required and RWST inventory is being depleted
- Indication and/or annunciation that emergency cooling recirculation is not established despite continuing attempts to establish it OR the LOCA is outside CTMT and cannot be isolated.
- Indication of insufficient water level in the containment recirculation sump to allow recirculation

Performance Indicator:

Manipulation of controls and/or dispatching of personnel to locally align systems/components as required to:

- Establish makeup flow to the RWST
- Minimize outflow from the RWST (stopping of SI pumps per ECA-1.1)

Feedback:

- Flow rate indication of makeup to the RWST
- Reduced depletion rate of RWST inventory

KA References:

EPEE11.EK1.1, 3.7/4.0
EPEE11.EA1.1, 3.9/4.0
EPEE11.EA2.1, 3.4/4.2

Comments:

- 1) RWST leak malfunction can be utilized to accelerate the rate of inventory depletion.
- 2) Combinations of failures of 1-SI-MOV-1860A and/or B to open and/or LHSI pump failures can be utilized to establish conditions for this CT.
- 3) A LOCA outside CTMT that cannot be isolated can be used as the accident sequence.

Simulator Setup

Initial Conditions:

- Recall protected IC (50% Power) and perform the directions below OR recall IC for Dynamic 2.
- Recall Simloch Screen LC00SEN2

Enter the following MALFUNCTIONS:

- MMS0801, SG "A" Steam Flow Xmtr MS-FT-474 fails low, 1 sec TD, 90 sec ramp, Deg 50-0%.
- MRC0801, Tave Taylor Math Unit fails high, 20 sec TD, 0 sec ramp, Deg 0%.
- MRM0212, Air Ejector RM fails low (RI-SV-111), 40 sec TD, 10 second ramp, Deg 50% to 0%.
- MCC0501, Thermal Barrier Leak "A" RCP, 60 sec TD, 20 second ramp, Deg 100%.
- MSI1202, "B" train SI fails to actuate, Active.
- MRC0101, RCS Cold leg pipe rupture, 120 sec. TD, 60 second ramp, Deg 0%-60%
- MSI0901, LHSI pump 1-SI-P-1A overcurrent trip, Active
- MSI0902, LHSI pump 1-SI-P-1B overcurrent trip, 150 second TD.

Enter the following OVERRIDES:

Switch

- CHP1C_START, OFF, ACTIVE.

Meter

- NONE.

Light

- NONE.

Alarm

- RMG8_W, 41 second TD, ON.

Setup SIMLOCH:

On SIMLOCH recall PRIMARY2 and LCSE1 screens, the following variables are used:

- Exam_Security_ON
- ASP_AO_OFF=T
- DISA_AUTO_SI=T, DISA_AUTO_SI(2)=T
- FWFCV150B_AUTO=T
- MS_119=0

Verify the following control room setup:

- Place the simulator in RUN, verify normal operation, verify ERFCS and PRODAC operating.
- Place whiteorange magnets adjacent to controls for:
 - ◆ 1-MS-PCV-101B ("B" SG PORV).
- Place a red magnet adjacent to controls for
 - ◆ 1-CH-P-1C
- Make log entries for the plant conditions.
- ENSURE ALL RM MONITORS AND ALARMS ARE RESET
- ENSURE ALL STEP COUNTERS ARE AT PROPER POSITION.
- Ensure turbine rate thumbwheel set at position 6.

Prebrief

This is your license class simulator performance evaluation.

If you need to communicate with the Unit #2 operator, verbally state, "Unit 2", and an instructor will locate to the Unit #2 area and respond to you as quickly as possible.

While the simulation is running, do not direct questions/comments to the evaluators.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

The evaluators will not interfere with the operating team. If an evaluator is in the way, simply ask him/her to move.

Inform the team of problems with the simulator, and define scope of certain responsibilities:

Problems which may exist on the date of the evaluation.

Assign operating positions.

Ask for and answer questions.

Conduct shift turnover:

Provide normal shift turnover. Initial conditions are as follows:

Initial conditions are as follows:

- Unit 1 is at 50% power to allow 1-FW-P-1B outboard motor replacement.
- 1-FW-P-1B motor replacement is complete, the pump has been started, and post start checks and vibrations are satisfactory.
- A record heat wave has enveloped the East Coast and Peak Power has reached record levels the last 4 days in a row.
- Shift orders require a prompt ramp to 100% using a turbine thumbwheel setting 8. Reactor Engineering has directed maintenance of delta flux with a target "D" rod height of 225 steps at 100% power. A QPTR has just been completed satisfactorily (tilt is less than .5%). Current boron concentration is 948 ppm and core burnup is 7500 MWD/MTU.
- The following off-normal equipment is present on Unit 1:
 - ◆ 1-MS-119 is isolated due to wisping past the "B" SG PORV.
 - ◆ 1-CH-P-1C is electrically tagged out for replacement of the ground overcurrent device.
- Unit 2 is at 100% power with all systems and crossties operable.

When the team has accepted the shift, proceed to the Session Conduct Section.

Session Conduct

- Ensure conditions in Simulator Setup are established.
- Recall SIMLOCH screens.
- **Important**, verify the following:
 - Turbine Thumbwheel is on 6 and .
 - Exam_Security_ON=T
 - ASP_AO_OFF=T
 - DISA_AUTO_SI=T, DISA_AUTO_SI(2)=T

Power Increase:

- Role Play as follows:
 - ◆ If requested as field operator to attend brief, support the operating team.
 - ◆ If requested to assist as different crafts, lend assistance.
 - ◆ Condenser makeup is in service, no abnormal conditions at the U-1 condenser.
 - ◆ Support as requested.

Steam Flow Transmitter Failure:

- When the lead evaluator indicates ready implement the malfunction for the Steam flow transmitter.

Role Play as follows:

- ◆ As I&C, will get paperwork together and come to the shift (PROBLEM WILL NOT BE CORRECTED DURING THE SCENARIO).
- ◆ Support as requested.

Median Tave Failure:

- When the lead evaluator indicates ready implement the malfunction for Tave failure.

Role Play as follows:

- ◆ As I&C, will get paperwork together and come to the shift (PROBLEM WILL NOT BE CORRECTED DURING THE SCENARIO).
- ◆ Support as requested.

Air Ejector Failure:

- When the lead evaluator indicates ready implement the malfunction for the AE failure.

Role Play as follows:

- ♦ As I&C, will get paperwork together and come to the shift (PROBLEM WILL NOT BE CORRECTED DURING THE SCENARIO).
- ♦ As HP, we will take a sample now, and once every 8 hours thereafter.
- ♦ Support as requested.

RCP Thermal Barrier Leakage:

- When the lead evaluator indicates ready implement the malfunction for thermal barrier leakage.

Role Play as follows:

- ♦ As plant management a Containment entry is authorized.
- ♦ As Field operator, attend brief.
- ♦ Support as requested.

Large Break LOCA:

- When the lead evaluator indicates ready implement the malfunction for the LBLOCA.

Role Play as follows:

- ♦ Provide cues that MCR pressure is positive ($>.5''$ H₂O)
- ♦ When requested report MS NRC RM readings are .01 mr/hr.
- ♦ Roleplay as an operator assigned to shutdown EDGs
- ♦ Support as requested.

Loss of Emergency Coolant Recirculation:

- At step 6 of E-1 and with the lead evaluator O.K. implement the malfunction for loss of "B" LHSI pump.

Role Play as follows:

- ♦ Obtain 1-OP-CS-001 to makeup to the U-1 RWST, brief with team.
- ♦ If requested to unisolate "B" SG PORV, set MS_119=1
- ♦ Support as requested.

When the lead evaluator indicates ready place the simulator in freeze.

Facility: Surry Scenario No.: LC-00.1-SE-1 Op-Test No.: 00-1

Examiners: _____

Operators: _____

Objectives: To evaluate the applicant's ability to conduct rod movement testing per 1-OPT-RX-005. To implement the ARPs for a PRZR pressure transmitter failure. To implement the AOPs for excessive RCS leakage through a leaking Pressurizer PORV. To implement a unit reduction to comply with a limiting Tech Spec clock. To execute the ARPs associated with a SG level transmitter failure and a spurious failure of the "B" SG PORV controller, causing it to fail open. To execute the EOPs for a Main Steam Line Break, complicated by a loss of all available AFW. The team will then be evaluated implementing RCS feed and bleed due to a loss of secondary heat removal.

Initial Conditions: Unit 1 is at 100% power preparing to conduct partial rod movement testing.

Turnover: Off normal conditions for Unit 1: 1-RC-HCV-1557A is isolated due to leakby, 1-EH-P-MP2 is tagged out for thermal overload replacement. Unit 2 is at 100% power with 2-FW-P-2 tagged out for governor replacement.

Event No.	Malfunction No.	Event Type*	Position (RO/SRO/BOP)	Event Description
1	N/A	N	SRO/RO	Conduct Rod Movement Testing (OPT-RX-005)
2	MRC48	I	SRO/RO	PRZR pressure transmitter fails high (1-RC-PT-445)
3	MRC40	C	SRO/RO	PORV leakage (1-RC-PCV-1455C)
4	N/A	R	SRO/RO	Unit Load Reduction (AP-23.00)
5	MFW13	I	SRO/BOP	"A" SG level transmitter fails low (1-FW-LT-1476)
6	MMS15	C	SRO/BOP	"B" SG PORV fails open (1-MS-RV-101B)
7	MMS01	M	ALL	Main Steam Line Break at header (E-0, E-2)
8	MCH05	C	SRO/RO	"B" Charging Pump Trips, "A"/"C" auto start failure.
9	MFW01	C	SRO/BOP	Motor Driven and Steam Driven AFW pumps trip
10	DISA	C	SRO/BOP	MSTVs fail to close (1-MS-TV-101A/B/C)
11	DISA	C	SRO/BOP	"B" and "C" Main Steam NRVs fail to close
12	N/A	M	ALL	RCS bleed and feed. (FR-H.1)

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

[illegible][illegible]

**CONDUCT ROD MOVEMENT TEST, PRZR PRESSURE TRANSMITTER FAILURE,
UNISOLABLE PRZR PORV LEAK, POWER REDUCTION, SG LEVEL TRANSMITTER
FAILURE, SG PORV FAILS OPEN, MAIN STEAM LINE BREAK, REACTOR TRIP,
LOSS OF ALL FEED WATER, RCS BLEED AND FEED**

LC-00.1-SE-1

REVISION 0

Referenced Procedures

<u>Procedure #</u>	<u>Procedure Name</u>	<u>Revision #</u>
1-OPT-RX-005	Control Rod Assembly Partial Movement	7
ARP C-F-8	PRZR HIGH PRESSURE	0
ARP D-H-4	PRZR SAFETY VV PWR RELIEF VV OPEN	3
ARP D-E-5	CHG PP TO REGEN HX HI LO FLOW	2
ARP C-E-7	PRZR RELIEF TK HI TEMP	1
ARP VSP-E-3	FIRE DETECTED	9
1-AP-16.00	Excessive RCS Leakage	7
1-AP-23.00	Rapid Load Reduction	8
1-AP-31.00	Increasing or Decreasing RCS Pressure	4
1-E-0	Reactor Trip or Safety Injection	37
1-FR-H.1	Response to Loss of Secondary Heat Sink	12
1-E-2	Faulted Steam Generator Isolation	8
EPIP-1.01	Emergency Manager Controlling Procedure	41
EPIP-1.02	Response to NOUE	12
EPIP-1.04	Response to Site Area Emergency	16
Technical Specifications		

Scenario Summary

This simulator examination was developed new for the 2000 License Class examination.

Initial conditions are as follows:

- Unit 1 is at 100% power preparing to conduct the PMT for "D" rod control bank following card replacement in the "D" bank Power Cabinet (Unit two card found bad, this card came from the same batch). Rods are still in manual until completion of the PMT. All precautions and limitations of 1-OPT-RX-005 have been met and signed off (refer to marked up copies of procedures) all non-applicable sections have been marked with an N/A.
- The following off-normal equipment is present on Unit 1:
 - ◆ 1-RC-HCV-1557A is isolated due to leakby (Excess Letdown flow path).
 - ◆ 1-EH-P-MP2 (EHC pump) is tagged out electrically for thermal overload replacement.
- Unit 2 is at 100% power with 2-FW-P-2 tagged out for governor valve replacement.

The session starts with a normal evolution, the operators should review 1-OPT-RX-005 and exercise "D" rod control bank. After the evolution is complete, PRZR pressure control channel (PT-1445) fails high. This will cause Pressurizer PORV 1-RC-PCV-1456 to fully open. The operators will need to manual close 1-RC-PCV-1456, and respond in accordance with various Annunciator Response Procedures (ARPs) and AP-31.00, Increasing or Decreasing RCS Pressure. If the team does not take timely action, an auto OTDT turbine runback signal will be generated (failure of turbine runback occurs), followed shortly thereafter by an OTDT reactor Trip. The team should review Tech Specs and isolate the inoperable PORV while leaving power on the block valve IAW TS section 3.1.A.6.a.

After the team has responded to the pressure transmitter failure, leakage will occur on the other PORV (1-RC-PCV-1455C). The team should again review AP-31.00 and/or AP-16.00, and recognize an unisolable RCS leak. IAW T.S. section 3.1.C.5 the team should enter a 6 hour to HSD clock and initiate a unit ramp.

During the ramp, the controlling level channel for "A" SG feed control will fail low, causing the "A" SG MFRV to fully open. The team is expected to take manual control of "A" SG feed flow and control level at program level.

Shortly after the SG level failure, the "B" SG PORV auto controller will fail and the PORV will fail open. The BOP is expected to take manual control of the controller and close the "B" SG PORV.

Upon the lead evaluator's cue, a major steam line break will occur inside the steam house. The team should recognize the high steam flow, trip the reactor, and manually Safety Inject (Auto SI will occur on low Pressurizer Pressure). Due to the steam break in the steam house, a fire detected alarm will sound, and all three AFW pumps will trip. The team should attempt to isolate the steam break by closing all MSTVs. Failure of the MSTVs to close should lead to attempts to use Appendix "R" main steam isolation switches, and NRV isolation. When attempts are made to isolate Main steam, only the "A" SG will isolate (NRV).

At E-0 Step 14 the team will transition to FR-H.1, Response to secondary Heat Sink. Attempts to establish AFW cross-tie and local start of the MFW pumps will fail. Attempts to feed via condensate will be delayed to require an RCS bleed and feed. When two Steam Generators are less than 7% wide range the team should initiate bleed and feed IAW FR-H.1. The team can successfully establish a heat sink via MFW (if not previously attempted) or Condensate to the "A" SG.

The evaluation is terminated on the lead evaluator's cue.

Team Objectives

After receiving this instruction, the trainee will be able to:

- A. Conduct Rod Assembly Partial Movement Testing in accordance with 1-OPT-RX-005. (GEN2.2.12, 3.0/3.4)
- B. Respond to a PRZR pressure transmitter failure in accordance with ARPs. (SYS010.A3.02, 3.6/3.5)
- C. Determine Technical Specification requirements for an inoperable Pressurizer PORV. (GEN2.1.12, 2.9/4.0)
- D. Respond to an unisolable pressurizer vapor space leak. (APE008.AA2.01, 3.9/4.2)
- E. Determine Technical Specification Requirements for excessive RCS leakage. (GEN2.1.12, 2.9/4.0)
- F. Perform a Power reduction from 100% power in accordance with 1-AP-23.00 (GEN2.2.2, 4.0/3.5)
- G. Respond to a SG level transmitter failure in accordance with ARPs. (SYS035.A2.03, 3.4/3.6)
- H. Determine Technical Specification requirements for an inoperable Pressurizer PORV. (GEN2.1.12, 2.9/4.0)
- I. Respond to failed open SG PORV. (SYS035.K6.02, 3.1/3.5)
- J. Respond to a Major Steam Line Break in Safeguards. (APE040.AK3.04, 4.5/4.7)

- K. Respond to a loss of all Main and Auxiliary Feed Water in accordance with FR-H.1. (EPEE05.EA1.3, 3.8/4.2)**
- L. Initiate an RCS Bleed and Feed in accordance with FR-H.1. (EPEE05.EA2.1, 3.4/4.4)**
- M. Exhibit proper self-checking, place keeping and verbatim procedural compliance while responding to various plant events. (GEN2.1.20, 4.3/4.2)**

Observation Aid:

EVENT #1 - Normal Evolution – Conduct Rod Movement Testing (OPT RX 005):

Expected Responses, the team should:

- ☐ (Team) Conducts a pre-job brief (sections 1.1, 3.0, 4.0, 5.0)
- ☐ (Team) Discusses Minimum Insertion Limits (will not be exceeded during the test).
- ☐ (RO) Begins evolution at section 6.3 "Control Bank D" (page 8 of 21)
- ☐ (RO) Takes Control Bank Selector Switch to "D" bank position.
- ☐ (BOP) Provides peer checking during evolution.
- ☐ (RO) Inserts "D" bank rods 12 steps. *The operator may need to withdraw if rods are driven too far in.*
- ☐ (RO) Documents OPT-RX-005 IRPI information on Attachment 1 (page 19 of 21)
- ☐ (RO) Withdraws "D" bank 12 steps.
- ☐ (RO) Places Rod Control in Auto (may elect NOT to until PMT status by I&C).
- ☐ (RO) Directs field Operator to obtain various information per section 6.9 (page 14 of 21).
- ☐ (RO) Evaluates OPT-RX-005 acceptance criteria per section 7.1 (pages 15-17).

Evaluator Information: *Tave/Tref strip chart is 0-100% of 10°F, NOT °F*

Loop Delta T meters are indicative of % reactor power, NOT °F

Evaluator Notes:

Evaluator Notes:

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Event #2 – Instrument Failure- PRZR Pressure Channel (PT-445) Transmitter Failure/High:

Expected Responses, the team should:

- ☐ (RO) Acknowledges annunciators C-F-8 PRZR Hi Pressure, D-H-4, PORV Open, D-E-5 Charging Hi flow.
- ☐ (BOP) Reviews ARPs.
- ☐ (RO) Manually closes 1-RC-PCV-1456.
- ☐ (Team) Identifies 1-RC-LT-1445 failed high.
- ☐ (SRO) Recognizes RCS pressure less than 2205 psig and enters a 2 hour TS 3.12.F clock.
- ☐ (TEAM) Initiates AP-31.00, Increasing or Decreasing RCS pressure.
- ☐ (SRO) Notifies I&C of failed transmitter.
- ☐ (SRO) Notifies OMOC of Unit status.
- ☐ (SRO) Identifies T.S. 3.1.A.6 applicable and directs isolation of 1-RC-PCV-1456.
- ☐ (RO) Closes 1-RC-MOV-1535 (Block valve for 1-RC-PCV-1456).
- ☐ (Team) Identifies RCS pressure >2205 psig.
- ☐ (SRO) Exits 2 hour T.S. 3.12.F clock.
- ☐ (TEAM) Ramps turbine if OTDT runback signal is generated (turbine runback fails)

Evaluator Information: Turbine runback signal is indicated by annunciators G-F-3, G-G-3, G-H-3

Evaluator Notes:

Evaluator Notes (continued):

[illegible]

Event #3- Component Failure – Unisolable PRZR PORV Leak:

❑ Expected Responses, the team should:

- ❑ (RO) Acknowledges increased charging flow and decreasing VCT level.
- ❑ (RO) Identifies RCS pressure decreasing.
- ❑ (SRO) Initiates AP-16.00, Increased RCS leakage or AP-31.00, Increasing or Decreasing RCS pressure .
- ❑ (TEAM) Identifies leaking PORV based on increased PORV tailpipe temperature and/or increased PRT leakage with stable Safety Valve tailpipe temperatures.
- ❑ (SRO) Identifies T.S. 3.1.A.6 applicable and directs isolation of 1-RC-PCV-1455C (2 PORVs manually isolated is allowable).
- ❑ (RO) Closes 1-RC-MOV-1536 to isolate leaking PORV.
- ❑ (RO) Identifies 1-RC-MOV-1536 loss of indicating lights.
- ❑ (SRO) Identifies T.S. 3.1.A.6 1 hour clock to restore PORV to operable or 72 hours to HSD.
- ❑ (TEAM) Dispatches Operator to investigate 1-RC-MOV-1536 breaker.
- ❑ (RO) Performs mass balance and recognize a 10-18 (14) gpm leak (AP-16.00)
- ❑ (SRO) Recognizes leakrate is <25 gpm, transitions to step 8 of AP-16.00.
- ❑ (SRO) Reviews Tech Specs and recognizes a T.S. 3.1C.5, 6 hour to HSD clock is applicable.
- ❑ (TEAM) Briefs on conditions and need to shutdown (step 8 RNO of AP-16.00).
- ❑ (TEAM) May isolate letdown per step 11 of AP-16.00.
- ❑ (RO) Acknowledges annunciator C-E-7, PRT Hi Temp.
- ❑ (BOP) Reviews ARP.

Evaluator Notes:

Evaluator Notes (continued):

[illegible]

Event #4- Reactivity Manipulation – Unit Power Reduction:

Expected Responses, the team should:

- ❑ (TEAM) Implements AP-23.00, Rapid Load Reduction.
- ❑ (TEAM) Briefs on AP-23.00, Rapid Load Reduction.
- ❑ (BOP) Places turbine in Imp in.
- ❑ (BOP) Reduces turbine reference control and initiates a turbine load reduction.
- ❑ (RO) Takes "A" BATP to FAST.
- ❑ (RO) Opens 1-CH-MOV-1350 and performs a pre-specified emergency boration.
- ❑ (RO) Closes 1-CH-MOV-1350.
- ❑ (RO) Returns "A" BATP to AUTO.
- ❑ (RO) Commences a 10 gpm normal boration using the blender.
 - Places MAKE-UP CONTROL in STOP.
 - Sets Boric Acid Controller for 10 gpm.
 - Sets integrator for continuous boration (PRESET A, CLR (if value not one desired), Enter desired amount (numerically), ENT.)
 - Places MAKE-UP MODE SEL in BORATE.
 - Places MAKE-UP CONTROL in START.
 - Verifies correct alignment of valves (Pen on VB should read 10 gpm if previous steps performed correctly)
 - Terminates makeup when desired amount reached (reverse order of above)
- ❑ (BOP) Provides a peer check on boration manipulations.
- ❑ (BOP) Reduces Valve Position Limiter during load reduction.
- ❑ (TEAM) monitors normal load reduction parameters.
- ❑ (RO) Controls Tave and Tref as closely matched as possible.

Evaluator Information: Initial boration requires use of procedure OP-CH-007.

Evaluator Notes:

Evaluator Notes:

Blank lined paper with horizontal ruling lines.

- **Event #5 – Instrument Failure-“A” SG Level Transmitter Failure/Low(1-FW-LT-1476):**

Expected Responses, the team should:

- (BOP) Acknowledges annunciators associated with SG levels, high feedflow, and FW heater oscillations.
- (TEAM) identifies “A” SG Channel 3 failed low (1-FW-LT-1476).
- (BOP) Takes manual control of “A” MFRV, and reduces FW flow.
- (RO) Reviews ARPs
- (TEAM) Briefs on failures, roles, and responsibilities.
- (SRO) Identifies TS-3.7.1#12 Operator Action 7, 3.7.2 #3 Operator Action 20, and 3.7.3#3 Operator Action 20. 6 hours to place channel 3 in trip.
- (SRO) Notifies I&C of need to place channel in trip.
- (SRO) Notifies OMOC of failures.

Evaluator Notes:

(The page contains horizontal scan artifacts.)

Evaluator Notes:

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Expected Responses, the team should:

- Evaluator Notes:**

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Event#7 – Major Event – Main Steam Line Break, Reactor Trip, Safety Injection:

Expected Responses, the team should:

- ❑ (BOP) Acknowledges annunciator VSP E-3, Fire Detected.
- ❑ (BOP) Directs Unit 2 to investigate cause of Fire Alarm.
- ❑ (BOP) Identifies High Steam flow based on Unit annunciators.
- ❑ (RO) Identifies rapidly decreasing RCS temperature, Rods stepping out.
- ❑ (SRO) Directs Unit Trip.
- ❑ (RO) Performs Immediate Actions of E-0.
 - Trip Rx.
 - Trip Turbine.
 - Reset Reheaters.

Event #8 – Component Malfunction – “B” Charging pump trips/ “A” and “C” auto start failure

- ❑ (SRO) Distributes Continuous Action Page, begins reading E-0.
- ❑ (RO) Recognizes no HHSI pumps running.
- ❑ (RO) Starts “A” and “C” HHSI pumps.

Events #10 & 11 – Component Malfunctions – MS isolation failures

- ❑ (TEAM) Attempts MS isolation prior to procedural prompt.
 - Identify MSTV switches do not work.
 - Identify MCR App “R” switch does not work
 - Identify “B” and “C” NRVs will not close.
 - Dispatch Operator to ESGR App “R” switch.

Evaluator Notes:

Expected Responses, the team should:

- Evaluator Notes:**

1

Evaluator Notes:

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Events # 9/12 – Component Malfunction/Major – Loss of AFW pumps/ Bleed and Feed:

Expected Responses, the team should:

- ☐ (BOP) Identifies loss of all AFW pumps.
- ☐ (SRO) Transitions to FR-H.1 at step 14 of E-0
- ☐ (TEAM) Identifies two SGs less than 7% Wide Range.
- ☐ (SRO) Begins reading FR-H.1 at step 10.
- ☐ (RO) Trips ALL RCPs
- ☐ (RO) Initiates SI
- ☐ (RO) Verifies feed path
- ☐ (RO) Resets SI
- ☐ (RO) Opens RCS bleed paths both PORV(s)

Critical Task (WOG FR-H.1-B) Establish RCS bleed and feed before PRZR PORVs remain open with RCS pressure > 2235psig.

- ☐ If the team decides 1-RC-MOV-1536 is not open, opens PRZR and Vessel head vents.
- ☐ (SRO) Determines Attachment 3 has been completed (may assign task to another team member)

Evaluator Notes:

Event – Loss of Heat Sink (Continued):

Expected Responses, the team should:

- ❑ (TEAM) Establishes Secondary Heat Sink via MFW
 - ❑ (BOP) Pushes both FW isolation Reset pushbuttons
 - ❑ (BOP) Starts one MFW pump
 - ❑ (BOP) Opens MFW pump discharge valve.
 - ❑ (BOP) Begins feeding “A” SG using “A” MFRV bypass valve.
- ❑ (TEAM) Establishes Secondary Heat Sink via Condensate
 - ❑ (BOP) Depressurizes “A” SG to 550 psig if required.
 - ❑ (BOP) Directs field operator to rack one set of MFW pump breakers to test.
 - ❑ (BOP) Closes MFW pump breakers
 - ❑ (BOP) Opens MFW pump discharge valve.
 - ❑ (BOP) Begins feeding “A” SG using “A” MFRV bypass valve.
 - ❑ (BOP) Depressurizes “A” SG as necessary to maintain DP to allow feeding.

Critical Task (WOG FR-P.1-B) Control AFW/MFW flow to SGs such that Integrity Red Path conditions are not exceeded. (If RCS temperature decreases to less than 285 degrees due to feeding “B” and “C” SGs, CSFST F-4, Figure 1 must be assessed to determine CT failure).

Evaluator Notes:

Evaluator Notes:

Evaluator Notes:

Blank lined paper with horizontal ruling lines.

Critical Task Selection

CT-1 Statement: (WOG FR-H.1-B)

Establish RCS bleed and feed before PRZR PORVs remain open with RCS pressure >2235psig.

CT-2 Statement: (WOG FR-P.1-B)

Control AFW/MFW flow to SGs such that Integrity Red Path conditions are not exceeded.

Critical Task Identification Number: WOG FR-H.1 – B

Plant Conditions:

- Extreme (red-path) challenge to the heat sink CSF
- Plant conditions require SGs as heat sinks
- No sources of feedwater available
- Indication that RCS bleed and feed is required per FR-H.1 CAP
- RCS pressure below the setpoint of the pressurizer PORVs
- Both pressurizer PORVs & block valves are operable from the control room

Critical Task Statement:

Establish RCS bleed and feed before PRZR PORVs remain open with RCS pressure > 2335 psig.

Basis for Selection:

SAFETY SIGNIFICANCE -- Failure to establish RCS bleed and feed before automatic opening of the PORVs reduces the probability of success to establish a heat sink for the core. This constitutes a "significant reduction of safety margin beyond that irreparably introduced by the scenario." If the crew delays until after SG dryout, the analysis shows RCS bleed and feed may or may not be successful in decreasing RCS pressure. If RCS pressure fails to decrease, core uncover would occur. Thus, the failure of the crew to establish RCS bleed and feed (which is available, given the postulated conditions) before the PORVs open from RCS heatup constitutes a "significant reduction in the safety margin beyond that irreparably introduced by the scenario." In addition, the crew's misoperation "leads to degradation of any barrier to fission product release" (fuel matrix/clad and RCS).

Cues:

- Extreme (red-path) challenge to the heat sink CSF
- Indication that RCS pressure is above the pressure of all SGs
- Indication that RCS temperature is above the temperature for RHR system service
- Indication and/or annunciation of no sources of feedwater available
- Indication and/or annunciation that RCS bleed and feed is required
- Indication that RCS pressure is below the pressurizer PORV setpoint
- Indication that pressurizer PORVs are closed

Performance Indicator: Manipulation of controls as required to establish RCS bleed and feed (SI is initiated and both PORVs opened).

Feedback:

- Indication of SI injection flow from at least one CHG pump
- Indication of PORV flow to PRT
- Indication of decreasing RCS pressure

KA References:

EPEE05.EK1.2, 3.9/4.5
EPEE05.EA1.1, 4.1/4.0
EPEE05.EA1.3, 3.8/4.2

Comments: The PORV opening as stated in this critical task means remaining open due to loss of heat sink. If a PORV cycles to relieve pressure and closes the conditions do not yet exist for "The RCS > 2335 psig from loss of heat sink".

Feedback:

- Valve position indication that all reactor vessel head vent valves are closed
- Valve position indication that all PRZR vent valves are closed
- Valve position indication that PRZR PORV is closed
-

KA References:

EPEE05.EK1.2, 3.9/4.5

EPEE05.EA1.1, 4.1/4.0

EPEE05.EA1.3, 3.8/4.2

Critical Task Identification Number: WOG FR-P.1 – B

Plant Conditions:

- Temperature in any RCS cold leg has decreased by 100°F or more within the last 60 minutes
- Integrity Orange path
- AFW/MFW continues to be (can be) delivered to any SG
- RCS pressure is greater than the pressure in any intact SG

Critical Task Statement:

Control AFW/MFW flow to SGs such that Integrity Red Path conditions are not exceeded.

Basis for Selection:

SAFETY SIGNIFICANCE – Failure to control the AFW/MFW flow rate to the SGs leads to an unnecessary and avoidable extreme challenge to the integrity CSF. Thus, failure to perform the critical task constitutes a "demonstrated inability by the crew to take an action or combination of actions that would prevent a challenge to plant safety." It also causes a "significant reduction of safety margin beyond that irreparably introduced by the scenario."

In the postulated plant conditions, the entry conditions for FR-P.1 are met on the basis of a severe (orange-path) challenge to the integrity CSF. Failure to perform the critical task means that the SGs continue to be fed at a higher-than-necessary AFW/MFW flow rate, which results in escalation of the challenge to the integrity CSF from severe to extreme. Stopping the RCS cooldown is the highest-priority MAC in FR-P.1. The RNO column for step 2 of FR-P.1 addresses controlling the feedwater flow rate to non-faulted and faulted SGs. Failure to perform the critical task constitutes failure to fully implement the highest-priority MAC of FR-P.1 at a time when PTS is imminent.

Cues:

- Indication that any RCS cold leg has decreased by 100°F or more within the last 60 minutes
- Indication that any cold leg temperature is less than 285°F.
- Valve position and total flow rate indication that AFW continues to be delivered

Performance Indicator: Manipulation of controls as required to throttle/stop AFW flow to all SGs, unless it is necessary to use a faulted SG(s) for RCS temperature control, in which case the AFW flow rate to that SG(s) is throttled to not less than the minimum value specified in FR-P.1

Feedback:

- AFW flow control valves for all SGs indicate throttled/closed
- AFW flow rate indication of minimum or zero flow
- RCS cooldown is minimized or stops

KA References:

EP008.EK1.2, 3.4/4.0

EP008.EA1.1, 3.8/3.8

SYS061.A3.02, 4.0/4.0

Comments: None

Simulator Setup

Initial Conditions:

- Recall protected IC1 (100% Power) and perform the directions below OR recall IC for Dynamic 1.
- Recall Simloch Screen lc00sen1

Enter the following MALFUNCTIONS:

- MRC4802, PRZR pressure Cont Xmtr fails low, 1 sec TD, 60 sec ramp, Deg 50 to 100%.
- MRC4002, PRZR PORV_456 leakage, 20 sec TD, 1 sec ramp, Deg 100%.
- MFW1303, "A" SG Nar Rng Level (ch.3) fails low, 40 sec TD, 120 second ramp, Deg 50% to 0%.
- MMS1502, SG "B" PORV Controller fails high, 60 sec TD, 120 sec ramp, 50 to 100%.
- MMS0101, "A" MN Steam Line Rupture at header, 80 sec TD, 60 second ramp, Deg 15%.
- MCH0502, OC trip "B" Charging pump, 0 Sec T.D, SI4 trigger.
- MFW0701, Aux Fd Pump 1-FW-P-3A trips on Overcurrent, 120 sec. TD
- MFW0702, Aux Fd Pump 1-FW-P-3B trips on Overcurrent, 200 sec. TD
- MTU13, Turbine auto Runback failure, Active
- MMS0601/02/03, MSTVs fail as is, Active

Enter the following OVERRIDES:

Switch

- MSNRV101B, Close, off.
- MSNRV101C, Close, off.

Meter

- NONE.

Light

- MSNRV101B, Red, off.

Alarm

- VSPE3_W, Fire Detected, 125 sec TD, ON.

Setup SIMLOCH:

On SIMLOCH recall PRIMARY2 and LCSE1 screens, the following variables are used:

- Exam_Security_ON
- MS_87
- MS_120
- MS_158
- MRC40_K
- PZARVK
- DISA_CHP1C_ASTRT=T
- DISA_CHP1A_ASTRT=T
- RC-PCV-1455C
- RC-PCV-1456
- RDP300/400/500/600
- FWP1A1_BKRP
- FWP1A1_BKRP(2)
- FWP1B1_BKRP
- FWP1B1_BKRP(2)
- FWP1A1_TEST
- FWP1A2_TEST
- FWP1B1_TEST
- FWP1B2_TEST

Verify the following control room setup:

- Place the simulator in RUN, verify normal operation, verify ERFCS and PRODAC operating.
- Place orange magnets adjacent to controls for:
 - ◆ NONE.
- Place a red magnet adjacent to controls for
- Make log entries for the plant conditions.
- ENSURE ALL RM MONITORS AND ALARMS ARE RESET
- ENSURE ALL STEP COUNTERS ARE AT PROPER POSITION.
- Ensure turbine rate thumbwheel set at position 6.

Prebrief

This is your license class simulator performance evaluation.

If you need to communicate with the Unit #2 operator, verbally state, "Unit 2", and an instructor will locate to the Unit #2 area and respond to you as quickly as possible.

While the simulation is running, do not direct questions/comments to the evaluators.

In the unlikely event that the simulator fails such that illogical indications result, the session will be terminated. In other words, respond to what you see. If there is a problem with the simulation, the session will be terminated or adjusted as appropriate based on the specific problem.

The evaluators will not interfere with the operating team. If an evaluator is in the way, simply ask him/her to move.

Inform the team of problems with the simulator, and define scope of certain responsibilities:

Problems which may exist on the date of the evaluation.

Assign operating positions.

Ask for and answer questions.

Conduct shift turnover:

Provide normal shift turnover. Initial conditions are as follows:

Initial conditions are as follows:

- Unit 1 is at 100% power preparing to conduct the PMT for "D" rod control bank following card replacement in the "D" bank Power Cabinet (Unit two card found bad, this card came from the same batch). Rods are still in manual until completion of the PMT. All precautions and limitations of 1-OPT-RX-005 have been met and signed off (refer to marked up copies of procedures) all non-applicable sections have been marked with an N/A.
- The following off-normal equipment is present on Unit 1:
 - ◆ 1-RC-HCV-1557A is isolated due to leakby.
 - ◆ 1-EH-P-MP2 is tagged out electrically for thermal overload replacement.
- Unit 2 is at 100% power with 2-FW-P-2 tagged out for governor valve replacement.

When the team has accepted the shift, proceed to the Session Conduct Section.

Session Conduct

- Ensure conditions in Simulator Setup are established.
- Recall SIMLOCH screens (LC00SEN1).
- Important, verify the following: MRC40_K=.04 and PZARVK=.0035

Rod Movement Testing:

- When the team has assumed unit responsibility, respond as necessary to support this normal evolution.

Role Play as follows:

- ◆ As Service Building Operator provide the following information as requested:
 - Thumbwheel settings are: S1-128, S2-226, S3-256, S4-354, S5-384, S6-482.
 - Bank overlap counter is obtained from OVLAP_COUNTER.
 - P/A for each Bank is the group 226 for "A", "B" and "C" banks.
 - Support other requests as required.

RC-PT-1445 failure:

- When the lead evaluator indicates ready implement the malfunction for pressurizer transmitter 445. Stop the malfunction timer immediately after the malfunction goes active.

IMPORTANT: after the PORV has been closed, set PZARVK=.0107

Role Play as follows:

- ◆ As I&C, they will support (The problem will NOT be corrected within the time frame of the scenario).
- ◆ Support other requests as required.

PRZR PORV Leakage:

- When the lead evaluator indicates ready implement the malfunction for 1-RC-PCV-1455C leakage.

**WHEN 1-RC-MOV-1536 BEGINS TO CLOSE, SET
RCMOV536_RACKIN=F**

Role Play as follows:

- ◆ When sent to investigate breaker for RC-MOV-1536, the breaker handle is in the trip free position.
- ◆ Support other requests as required.

Power Reduction:

Role Play as follows:

- ◆ As OMOC, if the team elects to ramp via OP-TM-005, direct the team to perform a 1%/min ramp in accordance AP-23.00 due to condition of PORVs and the leakage.
- ◆ If asked: Main Steam and Terry Turbine RMs are reading 0.01 mr/hr.
- ◆ Support other requests as required.

SG Level Transmitter Failure:

- When the lead evaluator indicates ready implement the malfunction for.

Role Play as follows:

- ◆ As I&C, they will support (The problem will NOT be corrected within the time frame of the scenario).
- ◆ Support other requests as required.

"B" SG PORV Fails Open:

- When the lead evaluator indicates ready implement the malfunction for.

Role Play as follows:

- ◆ On Lead Evaluators O.K. report, as Security, steam relief from the top of

PRIOR TO IMPLEMENTING THE NEXT MALFUNCTION DELETE MRC4001

Main Steam Line Break:

- When the lead evaluator indicates ready and you have reported the condition of the terry turbine (you are clear of the valve house) implement the malfunction for.

Role Play as follows:

- ◆ If requested to close APP "R" Main Steam Isolation, enter override V1DC8_W for the duration that the cabinet is open.
- ◆ Support other requests as required.

Loss of AFW Flow (FR-H.1):

- When the lead evaluator indicates ready implement the malfunction for.

Role Play as follows:

- ◆ If requested to rack breakers for MFW pump start in test, set Simloch variables to support the task.
- ◆ Support other requests as required.

When the lead evaluator indicates ready place the simulator in freeze.

Based on the scenario just completed, please classify the event.

Evaluator Key

Tab G-3 (Notification of Unusual Event) is applicable for the steam break **(MINIMUM ACCEPTABLE CLASSIFICATION)**.

Tab A-2 (Site Area Emergency) – If the team attempts cross-tie and MFW from the MCR **PRIOR** to feed and bleed, this tab is applicable.

The team may also declare based on loss of heat sink and a feed and bled has been initiated (The background discusses the reason feed and bleed is required due to a loss of heat sink overheating the RCS)

The team may NOT declare based on no attempts to start MFW from the MCR. (This is justified)

(MAXIMUM ACCEPTABLE CLASSIFICATION)

Tab M-3 is justified based on the potential to degrade or actual degradation to the level of safety in the station is elevated enough above a steam break to warrant an increase to ALERT.