Facility:	TMI Unit 1	Task No.:	OF1000005
Task Title:	Verify watch standing requirements – Work-hour Rules	JPM No.:	2011 NRC JPM RO A1-1
K/A Reference:	2.1.5 (2.9)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- It is currently 1700 on Week 1, Day 6 of the current shift cycle.
- Plant is at power.
- PQS is not available.

Task Standard:
- All critical steps evaluated as SAT.

Required Materials:
- LS-AA-119, FATIGUE MANAGEMENT AND WORK HOUR LIMITS
- Calculator

General References:
- LS-AA-119, FATIGUE MANAGEMENT AND WORK HOUR LIMITS

Handouts: A shift cycle with requested overtime days (Attachment 1)

Initiating Cue: You are a shift Reactor Operator. To help fill empty spots for the rest of the shift cycle, you have been asked to stand overtime watches. Review the shift schedule and determine whether you are able to stand the requested additional watches, and if not give reason for any not able to be filled.

Time Critical Task: N/A

Validation Time: 15 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

	Evaluator Cue:	Provide the shift cycle with requested overtime days (Attachment 1)
√	**Performance Step: 1**	Determine whether the examinee can stand watch as requested on Week 1, Day 7
	Standard:	Examinee determines that he/she cannot stand the requested watch on Week 1, Day 7 as that would be 7 days in a row and therefore a violation of LS-AA-119, Section 5.1.1 (No more than 72 work hours in any 7-day (168-hour) period)
	Comment:	
√	**Performance Step: 2**	Determine whether the examinee can stand watch as requested on Week 3, Day 1
	Standard:	Examinee determines that he/she cannot stand the requested watch on Week 3, Day 1 as that would be >16 hours in a row and therefore a violation of LS-AA-119, Section 5.1.1 (No more than 16 work hours in any 24-hour period)
	Comment:	
	Performance Step: 3	Determine whether the examinee can stand watch as requested on Week 5, Day 6
	Standard:	Examinee determines that he/she **can** stand the requested watch on Week 5, Day 6 as that would be > 2.5 days/week averaged over the shift cycle and therefore allowed per LS-AA-119, Section 5.1.2 (Minimum days off are averaged over the shift cycle, not to exceed 6 weeks: 2.5 days off/week for 12-hour shifts)
	Comment:	
	Terminating Cue:	**When examinee has determined whether they can or cannot stand any of the 3 requested watches, JPM may be terminated.**

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM RO A1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- It is currently 1700 on Week 1, Day 6 of the current shift cycle.
- Plant is at power.
- PQS is not available.

INITIATING CUE: You are a shift Reactor Operator. To help fill empty spots for the rest of the shift cycle, you have been asked to stand overtime watches. Review the shift schedule and determine whether you are able to stand the requested additional watches, and if not give reason for any not able to be filled.

TIME CRITICAL: No

Attachment 1
Shift Cycle with Requested Overtime Days

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Your Shift	D	D	D	D (1)	D(1)	D(1)	D(2)				N	N	N	N

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Your Shift	D(2)			D	D	D	D		T	T	T	T		

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Your Shift	N	N	N			D(2)		VAC	VAC	VAC	VAC	VAC	VAC	VAC

Key:

D= Day shift

N= Night shift

(1)= Requested additional watches already stood

(2)= Requested additional watches

Facility:	TMI Unit 1	Task No.:	GOP002003
Task Title:	Calculate an Estimated Critical Rod Position.	JPM No.:	2011 NRC JPM RO A1-2
K/A Reference:	2.1.37 (4.3)	New for 2011 NRC	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- The unit had been at 100% power for 150 days prior to the reactor trip.
- Cycle Burnup is 450 EFPD.
- TAVE = 532°F
- Final Measured Boron Concentration = 985 PPM
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is 0.95.
- The Plant Process Computer is NOT available.
- No reactor engineering personnel are on site.

Task Standard: All critical steps evaluated as SAT.

Required Materials:

- OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION Rev 3
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS Rev 2
- Calculator
- Straight Edge

General References:

- OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS

Handouts:

- OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS

Initiating Cue:	Perform an Estimated Critical Rod Position calculation using OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet.
Time Critical Task:	N/A
Validation Time:	30 minutes.

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

Performance Step: 1 CALCULATION IS FOR AN ECP AT DATE/TIME

Standard: Examinee places the current date and time on the appropriate line of Attachment 7.1.

Comment:

Performance Step: 2 The reactor coolant temperature is assumed to be 532 ±2F

Standard: Examinee obtains T_{ave} from the initial conditions and verifies this value on Line 1 of Attachment 7.1.

Comment:

Performance Step: 3 Cycle Burnup: From FIDMS Display 1 or the Hourly Log

Standard: Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 2 of Attachment 7.1.

Comment:

Performance Step: 4 Measured Boron Concentration: Obtain the latest measured boron concentration from the RCS chemistry analysis, and check the Control Room log to verify that no major boron concentration changes have been made since the analysis. If major boron concentration changes have been made since the latest sample, request a new RCS boron concentration measurement. Until the new boron concentration is available, use OP-TM-300-409, Final RCS Boron Concentration Estimate Following RCS Feed and Bleed, to estimate the current boron concentration to calculate a preliminary ECB.

Standard: Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 3a of Attachment 7.1.

Comment:

	Evaluator Cue:	**If asked about the Control Room log reading, respond "The Control Room log reading agrees with the latest measured boron concentration."**
	Evaluator Cue:	**If requested to perform additional samples, respond "Two consecutive samples are indicating Boron concentration of 985 ppm."**
	Performance Step: 5	Boron Depletion Correction Factor: From PPC, Control Room Log, or Reactor Engineering.
	Standard:	Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 3b of Attachment 7.1.
	Comment:	
√	**Performance Step: 6**	Final Corrected Boron Concentration: Adjust the measured boron concentration to account for boron-10 depletion by multiplying the Measured Boron Concentration by the Boron Depletion Correction Factor.
	Standard:	Examinee calculates the final corrected boron concentration and enters between 935 -936 ppm on Line 3c of Attachment 7.1.
	Comment:	
√	**Performance Step: 7**	Fuel Excess Reactivity: From OP-TM-300-000 Figure 2.
	Standard:	Examinee enters a value on Line 5 between: 9.0 %Δk/k and 9.2 %Δk/k on Line 5 of Attachment 7.1.
	Comment:	
√	**Performance Step: 8**	Inverse Boron Worth: From OP-TM-300-000 Figure 8.
	Standard:	Examinee enters a value between: 134.5 ppmB/%Δk/k and 135.5 ppmB/%Δk/k on Line 7a of Attachment 7.1.
	Comment:	

√ **Performance Step: 9** Boron Reactivity Worth: Quotient of 3c and 7a.

Standard: Examinee enters a value between: -6.90 %Δk/k and –6.96 %Δk/k on Line 7b of Attachment 7.1.

Comment:

Evaluator Cue: **The Plant Process Computer Program and Nuclear Engineering are unavailable.**

√ **Performance Step: 10** Xenon Reactivity Worth: Obtain xenon worth using the PPC, FIDMS Display 22 or from program XENC# (where # is the current cycle number). Figure 13 may be used if the PPC and Reactor Engineering are unavailable, provided that power prior to shutdown was constant (± 2%FP) for at least 40 hours.

Standard: Examinee enters 0.4-0.5 %Δk/k on Line 8 of Attachment 7.1.

Comment:

√ **Performance Step: 11** Samarium and Plutonium Buildup Reactivity Worth: Record the number of hours since 0% FP and obtain Sm and Pu worth per Figure 15. If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.

Standard: Examinee enters a time since last shutdown of 48 hours and a value between: -0.085 to -0.095 dk/k on Line 9 of Attachment 7.1.

Comment:

√ **Performance Step: 12** Inserted CRG 5-7 Worth Required for Criticality: Add reactivity contributions from Lines 5 through 9.

Standard: Examinee enters a value between: –1.53 %Δk/k and –1.73 %Δk/k on Line 10 of Attachment 7.1.

Comment:

Evaluator Note: **The following tolerance bands (JPM steps 13 and 14) are based on the maximum allowable error in the previous steps. The examiner shall verify, using OP-TM-300-000 Figure 5a, that the examinee has correctly interpolated the graphs to within an error of ± 2% rod withdrawal based on the reactivity value recorded by the examinee in step 12 of the JPM.**

Evaluator Note: **Groups 5-7 each have 100% of rod index for a total of 300% rod index IAW COLR Figure 1 and OP-TM-300-000 Figure 5A.**

√ **Performance Step: 13** Estimated Critical Rod Position: Rod position from Figure 5A corresponding to the reactivity value from Line 10.

Standard: Examinee enters the value determined on Figure 5a between: 90% and 115% rod index on Line 11 of Attachment 7.1.

Comment:

√ **Performance Step: 14** CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A) 12a.
Circle One: 0.5%Δk/k 0.8%Δk/k
Use 0.5%Δk/k for Steady State conditions if xenon (8) is 0.0 to -0.5%
Use 0.8%Δk/k for Transient conditions if xenon (8) is more negative than -0.5%Δk/k

Standard: Circles 0.5%Δk/k on Line 12a of Attachment 7.1

Comment:

Evaluator Note: **These numbers can vary slightly due to the starting point that is determined in Step 13 of this JPM. The evaluator will have to determine the validity of all responses using appropriate Figures and calculations shown.**

√ **Performance Step: 15** Critical Rod Position Tolerance Band: As noted on the Calculation Data Sheet. Combine the reactivity value from Line 10 with the tolerance value from Line 12a and find the corresponding rod positions on Figure 5A.

Standard: Examinee enters a value on line 4.3 for Minimum and Maximum values between:

Minimum: 67% rod index +/- 8%.

AND

Maximum: 176% rod index + 16% /- 9% (in overlap region) .

Comment:

Terminating Cue:	**When examinee has completed and signed calculation JPM may be terminated.**

CALCULATION IS FOR AN ECP AT DATE/TIME Today / NOW

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) 532 °F

2. CYCLE BURNUP 450 EFPD

3. 3a. FINAL MEASURED BORON CONCENTRATION 985 ppmB

   3b. BORON DEPLETION CORRECTION FACTOR 0.95 .
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)

   3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = **935.75** (935 to 936)ppmB

4. CRG 8 POSITION AT CRITICALITY 100 %WD

5. FUEL EXCESS REACTIVITY (FIG 2) **9.1** (9.0 to 9.2)% Δk/k

6. CRG 8 REACTIVITY WORTH
   0 % Δk/k

7. 7a. INVERSE BORON WORTH (FIG 8) **135** (134.5 to 135.5)
   ppmB/% Δk/k

   7b. BORON REACTIVITY WORTH (3c / 7a) x (-1) = **-6.93** (-6.90 to -6.96) % Δk/k

8. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) **-0.45** (-0.4 to -0.5) % Δk/k

9. SAMARIUM AND PLUTONIUM BUILDUP (FIG 13)
   - TIME SINCE LAST SHUTDOWN 48 HRS
   - REACTIVITY DUE TO BUILDUP **-0.09** (-0.85 to -0.95) % Δk/k

10. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
    (5 + 6 + 7b + 8 + 9) x (-1) = **-1.63** (-1.53 to -1.73) % Δk/k

11. ESTIMATED CRITICAL ROD POSITION (FIG 5A) **105** (90 to 115) % ROD INDEX

12. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)

    12a. Circle One: 0.5%Δk/k 0.8%Δk/k

    Use 0.5%Δk/k for Steady State conditions if xenon (8) is 0.0 to -0.5%

    Use 0.8%Δk/k for Transient conditions if xenon (8) is more negative than -0.5%Δk/k

    12b. MINIMUM ROD WITHDRAWAL LIMIT

    (10 – 12a) = **-2.13** (-2.00 to -2.30) %Δk/k ⇒ **67** (59 to 75) %ROD INDEX (FIG 5a)

    12c. MAXIMUM ROD WITHDRAWAL LIMIT

    (10 + 12a) = **-1.13** (-1.00 to -1.30) %Δk/k ⇒ **176** (165 to 192) %ROD INDEX (FIG 5a)

13. If this is a transient Xenon startup, then record the interval that ECP is valid

Job Performance Measure No.: 2011 NRC JPM RO A1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- The unit had been at 100% power for 150 days prior to the reactor trip.
- Cycle Burnup is 450 EFPD.
- TAVE = 532°F
- Final Measured Boron Concentration = 985 PPM
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is 0.95.
- The Plant Process Computer is NOT available.
- No reactor engineering personnel are on site.

INITIATING CUE: Perform an Estimated Critical Rod Position calculation using OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	EQC00015
Task Title:	Isolate a component for maintenance	JPM No.:	2011 NRC JPM RO A2
K/A Reference:	G 2.2.41 (3.5/3.9)	New for 2011 NRC Exam	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom __X__ Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions: You are the Extra RO
Plant is in a refueling outage with RCS level in the green band of the refueling canal.
There is a leaking flange on RCP Seal Return Line Relief MU-V-180.
The line is currently filled.

Task Standard: All critical steps evaluated as SAT.

Required Materials: 302-660, Makeup and Purification Flow Diagram, Rev 44
OP-TM-211-000, Makeup and Purification System, Rev 21
OP-MA-109-101, Clearance and Tagging, Rev 11

General References: OP-MA-109-101, Clearance and Tagging, Rev 11

Handout: 302-660, Makeup and Purification Flow Diagram, Rev 44
OP-TM-211-000, Makeup and Purification System, Rev 21

Initiating Cue: MU-V-180 Seal Return Relief Valve is to be removed for flange repair. You are directed to identify the required points, and sequence, to isolate, drain, and vent the liquid side of the Relief Valve.

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE:	**After candidate obtains appropriate diagram you may hand the candidate a copy they can mark up.**
Performance Step: 1	Obtains 302-660 Makeup and Purification flow diagram.
Standard:	Drawing obtained.
Comment:	
Performance Step: 2	**Locates MU-V-180 relief valve at coordinate D3**
Standard:	Relief Valve located.
Comment:	

√ **Performance Step: 3** **Candidate determines isolation points.**

Standard:

- MU-V-25 closed.
- MU-V-39 closed.
- MU-V-38 closed.
- MU-V-33A closed.*
- MU-V-33B closed.*
- MU-V-33C closed.*
- MU-V-33D closed.*
- Any one of the MU-V-179A through D valve uncapped and opened to vent.
- MU-V-141 uncapped and open to drain.

EVALUATOR NOTE: *** An acceptable alternative would be to use a combination of MU-V-177A-D, MU-V-178A-D, and MU-V-96A-D in lieu of MU-V-33A-D. Verify the isolation points would be the same as the equivalent MU-V-33.**

Comment:

√ **Performance Step: 4** **Candidate determines sequence.**

Standard: Isolation valves;

MU-V-25, MU-V-39, MU-V-38 MU-V-33A (or equivalents), MU-V-33B (or equivalents), MU-V-33C (or equivalents), and MU-V-33D (or equivalents) are closed, before Vent / Drain valves MU-V-179 and MU-V-141 are open.

Comment:

Terminating Cue: **When components and positions are identified on a print JPM may be terminated.**

STOP TIME: _____ **TIME CRITICAL STOP TIME:** N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM RO A2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

You are the Extra RO

Plant is in a refueling outage with RCS level in the green band of the refueling canal.

There is a leaking flange on RCP Seal Return Line Relief MU-V-180.

The line is currently filled.

INITIATING CUE:

MU-V-180 Seal Return Relief Valve is to be removed for flange repair. You are directed to identify the required points, and sequence, to isolate, drain, and vent the liquid side of the Relief Valve.

Facility:	TMI Unit 1	Task No.:	EPAA101007
Task Title:	Perform State and Local Event Notification	JPM No.:	2011 NRC JPM RO A4
K/A Reference:	G2.4.43 (3.2/3.8)	Bank JPM	TQ-TM-104EPAA-J002

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- An Unusual Event, MU1, was declared at Three Mile Island Unit 1 at 1300 hours on October 2, 2010 after a loss of offsite power occurred.
- It is currently 1303 hours on October 2, 2010.

Task Standard: All critical steps evaluated as SAT.

Required Materials:
- EP-MA-114-100, Mid-Atlantic State/Local Notifications Rev 15
- EP-MA-114-100-F-01 Rev J

General References:
- EP-MA-114-100, Mid-Atlantic State/Local Notifications
- EP-MA-114-100-F-01

Handouts:
- EP-MA-114-100, Mid-Atlantic State/Local Notifications
- EP-MA-114-100-F-01, filled out with: 1. MU1 for block 4a and an FU1 sticker for block 4b, 2. blocks 7a and 7b blank.

Initiating Cue: As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the Unusual Event, MU1.

Time Critical Task: Yes

Validation Time: 5 minutes.

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Time Critical Time starts with acknowledgement of CUE. Time _____

Evaluator Cue:	Provide EP-MA-114-100, Mid-Atlantic State/Local Notifications and EP-MA-114-100-F-01, filled out with: 1. MU1 for block 4a and an FU1 sticker for block 4b, 2. blocks 7a and 7b blank.
Performance Step: 1	Ensure that the number of the message is on the State and Local (S&L) Notification Form
Standard:	Examinee confirms that the "Utility Message No." blank is completed with the number "1".
Comment:	
Evaluator Cue:	**If requested what time to use indicate current clock time may be used. Time may be filled in after all parties are on phone.**
Performance Step: 2	Fills in block 2 of EP-MA-114-100-F-01.
Standard:	Name filled in. TMI checked. Phone number filled in (TMI control room number) Current time filled in (time message read).
Comment:	

Evaluator Cue: **If the examinee informs you that block 4 is wrong, apply the proper sticker, MU1.**

If the examinee informs you that block 7 is wrong, place a check mark in block 7a and line out block 7b.

√ **Performance Step: 3** Review the S&L Notification form for completeness.

Standard: Examinee detects discrepancies with blocks 4 and 7.

Comment:

Evaluator Cue: **If the examinee selects the correct telephone and lifts the handset to his/her ear, inform the examinee that they hear a dial tone**

√ **Performance Step: 4** Connect with S&L agencies using the NARS line

Standard: Examinee selects the NARS labeled telephone and lifts the handset to his/her ear

Comment:

√ **Performance Step: 5** Contact the S&L agencies using the NARS line

Standard: Examinee dials "44"

Evaluator Cue: **If the examinee dials the correct number ("44") inform the examinee that they are hearing the following: "PEMA online; Cumberland County online; Lebanon County online; Lancaster County online; York County online; Dauphin County online".**

Comment:

Performance Step: 6 Inform the agencies online that a notification message is about to be read

Standard: Examinee states "This is Exelon Nuclear TMI-1. Please standby for a notification message".

Comment:

Evaluator Cue: **As the examinee conducts a role call, respond as appropriate: "PEMA online; Cumberland County online; Lebanon County online; Lancaster County online; York County online; Dauphin County online".**

√ **Performance Step: 7** Determine if all S&L Agencies are on-line.

Standard: Examinee conducts an initial roll call of the S&L Agencies and correctly records the time contacted in 24 hour clock time on page 3 of the S&L Notification form in the appropriate block for each agency.

Evaluator Note: **Examinee must hear all S&L Agencies respond as on-line no later than 12 minutes after initiation of this JPM for a "Pass" evaluation.**

Comment:

Time Critical End point, when roll call is acknowledged. Page 3 initial roll call completed may be used if completed accurately.

Time: _____

√ **Cue time – Time above < 12 Minutes SAT UNSAT**

√ **Performance Step: 8** Notify the S&L Agencies of the declaration of an Unusual Event at TMI-1.

Standard: Using the Phonetic Alphabet for clarity, the Examinee reads each of the blocks one at a time from pages 1 and 2 of the S&L Event Notification Form.

Comment:

Evaluator Cue:	**As the examinee conducts a final role call, respond as appropriate: "PEMA online; Cumberland County online; Lebanon County online; Lancaster County online; York County online; Dauphin County online".**
Performance Step: 9	Conduct final roll call
Standard:	Examinee conducts a final roll call for each agency and checks the agencies off as they respond.
Comment:	
Evaluator Cue:	**If the examinee asks if there are any questions, inform him/here that there are none.**
Performance Step: 10	Ask if there are any questions.
Standard:	Examinee asks if there are any questions.
Comment:	
Performance Step: 11	Terminate phone call.
Standard:	Examine states: "This concludes the notification message."
Comment:	
Terminating Cue:	**When examinee ends the S&L Notification phone call JPM may be terminated.**

Job Performance Measure No.: 2011 NRC JPM RO A4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- An Unusual Event, MU1, was declared at Three Mile Island Unit 1 at 1300 hours on October 2, 2010 after a loss of offsite power occurred.
- It is currently 1303 hours on October 2, 2010.

INITIATING CUE: As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the Unusual Event, MU-1.

TIME CRITICAL: Yes

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	Three Mile Island	Task No.:	OF1000005
Task Title:	Maintain Minimum Shift Staffing, Control Overtime	JPM No.:	2011 NRC JPM SRO A1-1
K/A Reference:	2.1.5 (3.9)	New for 2011 NRC Exam	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- Plant is at 100% power with ICS in automatic
- The time is 2000 on Week 5, Day 7 of the current shift cycle.
- The shift is staffed as follows:
  - C. Six – Shift Manager
  - You – CRS
  - J. Kulasinsky – STA
  - A. Williams – URO
  - H. Blunt – ARO
  - B. Dickinson – URO Under Instruction
- The Shift Technical Advisor (STA), J. Kulasinsky, reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located, so he has requested to go home.
- No other licensed Senior Reactor Operator are on site.

Task Standard: All critical steps evaluated as SAT.

Required Materials:
- OP-TM-101-111-1001, Shift Manning Requirements, Rev. 6
- Tech Spec 6.2.2 and Table 6.2-1, Amendment 219.
- LS-AA-119, Overtime Controls, Rev. 8
- Shift Staffing Report prepared
- LMS Qual Matrix Report
- Over time list prepared

General References:
- Technical Specifications

Handout:
- OP-TM-101-111-1001, Shift Manning Requirements, Rev. 6
- LS-AA-119, Overtime Controls, Rev. 8
- Shift Staffing Report prepared
- LMS Qual Matrix Report
- Over time list prepared
- Attachments 3-8, Shift Cycle calendars

Initiating Cue: When I tell you to begin, as the Control Room Supervisor, you are to PERFORM THE STEPS NECESSARY TO ENSURE THAT YOUR SHIFT IS APPROPRIATELY STAFFED.

Time Critical Task: N/A

Validation Time: 10 minutes

SIMULATOR SETUP

Exam Setup: IC N/A

- N/A

- MALFUNCTIONS:

N/A

- OVERRIDES:

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

	Evaluators Note:	**Provide Examinee with OP-TM-101-111-1001, LS-AA-119, Shift Staffing Report, LMS Qual Matrix Report, and Overtime list**
	Performance Step: 1	Examinee references Technical Specifications and/or OP-TM-101-111-1001, Shift Manning Requirements, to determine minimum shift manning requirements for current conditions.
	Standard:	Examinee determines that three SROs are required. One SRO is required to be in the Control Room. *** Except for the Shift Manager, shift crew composition may be less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements of Table 6.2.-1. This provision does not permit any shift crew position to be unmanned upon shift change due to an incoming shift crewman being late or absent.
	Comment:	
	Evaluator's Cue:	**If asked, state that there are no other licensed SROs on site.**
	Performance Step: 2	Examinee references Shift Staffing Report to determine current shift manning status.
	Standard:	Examinee references Shift Staffing Report and determines that current SRO staffing is unacceptable.
	Comment:	
√	**Performance Step: 3**	Examinee initiates action to comply with Technical Specification requirements for three licensed SROs.
	Standard:	Action initiated by referring to Overtime list
	Comment:	

Evaluator's Cue: **If examinee tries to call scheduler, inform examinee Ops scheduler is UNAVAILABLE.**

Performance Step: 4 Examinee seeks a replacement for the third licensed SRO position left vacant by the inability of the STA to meet requirements for the job.

Standard: Examinee calls the Operations Scheduler or directly references the Overtime Callout list to identify a replacement SRO to be called.

Comment:

Evaluator's Cue: **If examinee calls Oshall to report to work, answer that you are on your way.**

√ **Performance Step: 5** Examinee references the provided materials to evaluate callout restrictions on Oshall.

Standard: Examinee determines Oshall, if called in, will violate LS-AA-119, Section 5.1.1 (No more than 72 work hours in any 7-day period.

Comment:

Evaluator's Note: **A shift cycle at TMI is 5 weeks in length, equating to 12.5 days off for the cycle to satisfy LS-AA-119 Section 5.1.2**

Evaluator's Cue: **If examinee calls Stubbs to report to work, answer that you are on your way.**

√ **Performance Step: 6** Examinee references the provided materials to evaluate callout restrictions on Stubbs.

Standard: Examinee determines Stubbs, if called in, will violate LS-AA-119, Section 5.1.2 and Table 1 (Minimum of 2.5 days off/week averaged over the shift cycle).

Comment:

Evaluator's Cue: **As candidate three (Valent, Lewis, Carreras, or Parfitt), report when called "I am making a self-declaration of fatigue and do not wish to report to work".**

√ **Performance Step: 7** Examinee references the provided materials to evaluate callout restrictions on candidate three.

Standard: Examinee initially informs candidate three to report to work immediately, then acknowledges self-declaration of fatigue and informs candidate three NOT to report at this time IAW LS-AA-119 Section 5.6.

Comment:

Evaluator's Cue: **As candidate four (Valent, Lewis, Carreras, or Parfitt), report when called "I just had four beers at a friend's house. If you need me though, I'll come in as soon as I can"**

√ **Performance Step: 8** Examinee references the provided materials to evaluate callout restrictions on candidate four.

Standard: Examinee initially informs candidate four to report to work immediately, then acknowledges alcohol consumption and informs candidate four NOT to report at this time.

Comment:

Evaluator's Cue: **As candidate five (Valent, Lewis, Carreras, or Parfitt), report when called "This is my one day off this week since I validated NRC exams in the simulator yesterday. If you need me though, I'll come in as soon as I can"**

√ **Performance Step: 9** Examinee references the provided materials to evaluate callout restrictions on candidate five.

Standard: Examinee initially informs candidate five to report to work immediately, then informs candidate five NOT to report at this time due to LS-AA-119 Section 5.1.1 requirement.

Comment:

	Evaluator's Cue:	**As candidate six (Valent, Lewis, Carreras, or Parfitt), report when called "I am on vacation, flying to Hawaii in the afternoon. If you need me though, I'll come in as soon as I can"**
√	**Performance Step: 10**	Examinee references the provided materials to evaluate callout restrictions on candidate six.
	Standard:	Examinee informs candidate six to report to work immediately.
	Comment:	

Terminating Cue: **After examinee demonstrates ability to contact an SRO at home to have them report to work JPM may be terminated.**

STOP TIME: _____ **TIME CRITICAL STOP TIME:** N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM SRO A1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Plant is at 100% power with ICS in automatic
- The time is 2000 on Week 5, Day 7 of the current shift cycle.
- The shift is staffed as follows:
  - C. Six – Shift Manager
  - You – CRS
  - J. Kulasinsky – STA
  - A. Williams – URO
  - H. Blunt – ARO
  - B. Dickinson – URO Under Instruction
- The Shift Technical Advisor (STA), J. Kulasinsky, reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located, so he has requested to go home.
- No other licensed Senior Reactor Operator are on site.

INITIATING CUE:

When I tell you to begin, as the Control Room Supervisor, you are to PERFORM THE STEPS NECESSARY TO ENSURE THAT YOUR SHIFT IS APPROPRIATELY STAFFED.

Attachment #1

LMS Qual Matrix Report
Date: 8/30/11 11:00:00 PM

Y = Currently Qualified (will not expire in the next 60 days) O = Currently Qualified (due to expire in 60 days or less) N = Not qualified (expired) (blank) = Qualification Never Assigned

FOR TRAINING PURPOSES ONLY			Alvey, T	Brady, R	Brown, F	Burger, S	Carreras, E	Coughlin, K	Goodlavage, T	Haaf, T	Kulasinsky, J	Lewis, D	Malinen, M	Oshall, D	Parfitt, B	Price, W	Six, C	Smith, C	Stubbs, J	Valent, J	Wilson, D	Yockey, G
Qualification ID	Qualification Title	Qualification Parent																				
N-TM-OP-STA QUAL	TMI STA: SHIFT QUALIFIED	Root Qual	N	N	N	N	O	N	N	N	Y	Y	N	O	Y	N	Y	N	O	O	N	N

Attachment #2

OVERTIME CALLOUT FOR Ops Shift Schedule
STARTING AT 8/30/2011 17:30:00 AND ENDING AT 8/31/2011 06:00:00
SRO # 2 STA QUALIFICATION Shift Technical Advisor
REPORT CREATION DATE 8/30/2011 23:00:00
NOTES:

FOR TRAINING PURPOSES ONLY

Crew	Currently Working Shift	Name Phone	OT Hours	Accept	Refuse	Comments
NONE		Oshall, D	36			
NONE		Stubbs, J	48			
NONE		Valent, J	24			
NONE		Lewis, D	12			
NONE		Carreras, E	24			
NONE		Parfitt, B	12			

Note: List created by PQS IAW LS-AA-119

Attachment #3
Shift Cycle - Oshall

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D								N	N	N	N

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift				D	D	D	D		T	T	T	T		

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	N	N	N	N (1)	N (1)	N (1)		VAC	VAC	VAC				

Key:

D= Day shift

N= Night shift

(1)= Requested additional watches already stood

VAC= Vacation

Attachment #4
Shift Cycle - Stubbs

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift			N (1)	N	N	N	N	N (1)			D	D	D	D

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift		T	T	T	T			N	N	N	N (1)	N (1)		

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D							N (1)	N	N	N	N

Key:

D= Day shift

N= Night shift

(1)= Additional watches already stood

VAC= Vacation

Attachment #5
Shift Cycle - Valent

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D				D (1)				N	N	N	N

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift				D	D	D	D		T	T	T	T		

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	N	N	N		D (1)			VAC	VAC	VAC				

Key:

D= Day shift

N= Night shift

(1)= Additional watches already stood

VAC= Vacation

Attachment #6
Shift Cycle - Lewis

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift				N	N	N	N				D	D	D	D

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift		T	T	T	T			N	N	N				

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D	D (1)							N	N	N	N

Key:

D= Day shift

N= Night shift

(1)= Additional watches already stood

VAC= Vacation

Attachment #7
Shift Cycle - Carreras

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D						N (1)	N (1)	N	N	N	N

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift				D	D	D	D		T	T	T	T		

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	N	N	N					D	D	D				

Key:

D= Day shift

N= Night shift

(1)= Additional watches already stood

VAC= Vacation

Attachment #8
Shift Cycle - Parfitt

FOR TRAINING PURPOSES ONLY

	WEEK 1, CURRENT CYCLE							WEEK 2, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	N (1)			N	N	N	N				D	D	D	D

	WEEK 3, CURRENT CYCLE							WEEK 4, CURRENT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift		T	T	T	T			N	N	N				

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Shift	D	D	D					VAC	VAC	VAC	VAC	VAC	VAC	VAC

Key:

D= Day shift

N= Night shift

(1)= Additional watches already stood

VAC= Vacation

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	TMI Unit 1	Task No.:	GOP002003
Task Title:	Review an Estimated Critical Rod Position Calculation for approval, identify any errors	JPM No.:	2011 NRC JPM SRO A1-2
K/A Reference:	2.1.37 (4.3 / 4.6)	New 2011 NRC Exam	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- The unit had been at 100% power for 150 days prior to the reactor trip.
- Cycle Burnup is 450 EFPD.
- TAVE = 532°F
- Final Measured Boron Concentration = 985 PPM
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is 0.95.
- The Plant Process Computer is NOT available.
- No reactor engineering personnel are on site.
- A licensed operator has prepared OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet

Task Standard: All critical steps evaluated as SAT.

Required Materials:

- OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS
- Calculator
- Straight Edge

General References:

- OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION Rev 3
- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS Rev 2

Handouts:	A completed OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet with faults. (Attachment 1)
Initiating Cue:	You are the Control Room Supervisor on duty. Perform an Estimated Critical Rod Position calculation. Then approve the supplied Estimated Critical Rod Position Calculation in accordance with OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet.
Time Critical Task:	N/A
Validation Time:	30 minutes.

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

Evaluator Cue:	Provide completed ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet with faults. (Attachment 1)
Performance Step: 1	CALCULATION IS FOR AN ECP AT DATE/TIME
Standard:	Examinee places the current date and time on the appropriate line of Attachment 7.1.
Comment:	
Performance Step: 2	The reactor coolant temperature is assumed to be 532 ±2F
Standard:	Examinee obtains T_{ave} from the initial conditions and verifies this value on Line 1 of Attachment 7.1.
Comment:	
Performance Step: 3	Cycle Burnup: From FIDMS Display 1 or the Hourly Log
Standard:	Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 2 of Attachment 7.1.
Comment:	
Performance Step: 4	Measured Boron Concentration: Obtain the latest measured boron concentration from the RCS chemistry analysis, and check the Control Room log to verify that no major boron concentration changes have been made since the analysis. If major boron concentration changes have been made since the latest sample, request a new RCS boron concentration measurement. Until the new boron concentration is available, use OP-TM-300-409, Final RCS Boron Concentration Estimate Following RCS Feed and Bleed, to estimate the current boron concentration to calculate a preliminary ECB.
Standard:	Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 3a of Attachment 7.1.
Comment:	

	Evaluator Cue:	**If asked about the Control Room log reading, respond "The Control Room log reading agrees with the latest measured boron concentration."**
	Evaluator Cue:	**If requested to perform additional samples, respond "Two consecutive samples are indicating Boron concentration of 985 ppm."**
	Performance Step: 5	Boron Depletion Correction Factor: From PPC, Control Room Log, or Reactor Engineering.
	Standard:	Examinee is given this number on the Initial Condition Sheet. This number will be entered on Line 3b of Attachment 7.1.
	Comment:	
√	**Performance Step: 6**	Final Corrected Boron Concentration: Adjust the measured boron concentration to account for boron-10 depletion by multiplying the Measured Boron Concentration by the Boron Depletion Correction Factor.
	Standard:	Examinee calculates the final corrected boron concentration and enters between 935 -936 ppm on Line 3c of Attachment 7.1.
	Comment:	
√	**Performance Step: 7**	Fuel Excess Reactivity: From OP-TM-300-000 Figure 2.
	Standard:	Examinee enters a value on Line 5 between: 9.0 %Δk/k and 9.2 %Δk/k on Line 5 of Attachment 7.1.
	Comment:	
√	**Performance Step: 8**	Inverse Boron Worth: From OP-TM-300-000 Figure 8.
	Standard:	Examinee enters a value between: 134.5 ppmB/%Δk/k and 135.5 ppmB/%Δk/k on Line 7a of Attachment 7.1.
	Comment:	
√	**Performance Step: 9**	Boron Reactivity Worth: Quotient of 3c and 7a.
	Standard:	Examinee enters a value between: -6.90 %Δk/k and –6.96 %Δk/k on Line 7b of Attachment 7.1.
	Comment:	

	Evaluator Cue:	**The Plant Process Computer Program and Nuclear Engineering are unavailable.**
√	**Performance Step: 10**	Xenon Reactivity Worth: Obtain xenon worth using the PPC, FIDMS Display 22 or from program XENC# (where # is the current cycle number). Figure 13 may be used if the PPC and Reactor Engineering are unavailable, provided that power prior to shutdown was constant (± 2%FP) for at least 40 hours.
	Standard:	Examinee enters 0.4-0.5 %Δk/k on Line 8 of Attachment 7.1.
	Comment:	
√	**Performance Step: 11**	Samarium and Plutonium Buildup Reactivity Worth: Record the number of hours since 0% FP and obtain Sm and Pu worth per Figure 15. If startup at any time during the cycle is within 5 days of a previous startup, contact Reactor Engineering for the appropriate reactivity worth.
	Standard:	Examinee enters a time since last shutdown of 48 hours and a value between: -0.085 to -0.095 dk/k on Line 9 of Attachment 7.1.
	Comment:	
√	**Performance Step: 12**	Inserted CRG 5-7 Worth Required for Criticality: Add reactivity contributions from Lines 5 through 9.
	Standard:	Examinee enters a value between: –1.53 %Δk/k and –1.73 %Δk/k on Line 10 of Attachment 7.1.
	Comment:	

	Evaluator Note:	**The following tolerance bands (JPM steps 13 and 14) are based on the maximum allowable error in the previous steps. The examiner shall verify, using OP-TM-300-000 Figure 5a, that the examinee has correctly interpolated the graphs to within an error of ± 2% rod withdrawal based on the reactivity value recorded by the examinee in step 12 of the JPM.**
√	**Performance Step: 13**	Estimated Critical Rod Position: Rod position from Figure 5A corresponding to the reactivity value from Line 10.
	Standard:	Examinee enters the value determined on Figure 5a between: 90% and 115% rod index on Line 11 of Attachment 7.1. **Examinee identifies discrepancy with the completed ECP.**
	Comment:	
√	**Performance Step: 14**	CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A) 12a. Circle One: 0.5%Δk/k 0.8%Δk/k Use 0.5%Δk/k for Steady State conditions if xenon (8) is 0.0 to -0.5% Use 0.8%Δk/k for Transient conditions if xenon (8) is more negative than -0.5%Δk/k
	Standard:	Circles 0.5%Δk/k on Line 12a of Attachment 7.1 **Examinee identifies discrepancy with the completed ECP.**
	Comment:	
	Evaluator Note:	**These numbers can vary slightly due to the starting point that is determined in Step 13 of this JPM. The evaluator will have to determine the validity of all responses using appropriate Figures and calculations shown.**
√	**Performance Step: 15**	Critical Rod Position Tolerance Band: As noted on the Calculation Data Sheet. Combine the reactivity value from Line 10 with the tolerance value from Line 12a and find the corresponding rod positions on Figure 5A.
	Standard:	Examinee enters a value on line 4.3 for Minimum and Maximum values between: Minimum: 67% rod index +/- 8%. **AND** Maximum: 176% rod index + 16% / - 9% (in overlap region). **Examinee identifies discrepancy with the completed ECP.**
	Comment:	

√	**Performance Step: 16**	Notes that anomalies exist between the two calculations and states that the ECP will not be approved.
	Standard:	Examinee notifies the Shift Manager to evaluate the discrepancy and does not sign the CRO's ECP.
	Comment:	

Terminating Cue: **When examinee has completed step 12 of the ECP and notified the Examiner that the ECP will not be signed due to the anomalies with the calculations, this JPM may be terminated.**

CALCULATION IS FOR AN ECP AT DATE/TIME Today / NOW

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) __532__ °F
2. CYCLE BURNUP __450__ EFPD
3. 3a. FINAL MEASURED BORON CONCENTRATION __985__ ppmB
   3b. BORON DEPLETION CORRECTION FACTOR __0.95__
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
   3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = **935.75** (935 to 936)ppmB
4. CRG 8 POSITION AT CRITICALITY __100__ %WD
5. FUEL EXCESS REACTIVITY (FIG 2) **9.1** (9.0 to 9.2)% Δk/k
6. CRG 8 REACTIVITY WORTH
   __0__ % Δk/k
7. 7a. INVERSE BORON WORTH (FIG 8) **135** (134.5 to 135.5)
   _____ppmB/% Δk/k
   7b. BORON REACTIVITY WORTH (3c / 7a) x (-1) = **-6.93**_(-6.90 to -6.96)_% Δk/k
8. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) **-0.45** (-0.4 to -0.5)_% Δk/k
9. SAMARIUM AND PLUTONIUM BUILDUP (FIG 15)
   - TIME SINCE LAST SHUTDOWN __48__ HRS
   - REACTIVITY DUE TO BUILDUP **-0.09** (-0.85 to -0.95)_% Δk/k
10. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
    (5 + 6 + 7b + 8 + 9) x (-1) = **-1.63** (-1.53 to -1.73)
    _% Δk/k
11. ESTIMATED CRITICAL ROD POSITION (FIG 5A) **105** (90 to 115)_% ROD INDEX
12. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)
    12a. Circle One: 0.5%Δk/k (0.8%Δk/k)
    Use 0.5%Δk/k for Steady State conditions if xenon (8) is 0.0 to -0.5%
    Use 0.8%Δk/k for Transient conditions if xenon (8) is more negative than -0.5%Δk/k
    12b. MINIMUM ROD WITHDRAWAL LIMIT
    (10 – 12a) = _**-2.13** (-2.00 to -2.30)_ %Δk/k ⇒ _**67** (59 to 75) %ROD INDEX (FIG 5a)
    12c. MAXIMUM ROD WITHDRAWAL LIMIT
    (10 + 12a) = **-1.13** (-1.00 to -1.30) %Δk/k ⇒ _**176** (165 to 192)_ %ROD INDEX (FIG 5a)
13. If this is a transient Xenon startup, then record the interval that ECP is valid

Candidate should identify wrong tolerance band applied to CRO version and minimum / maximum Withdrawal Limit calculated against 0.8 and reversed, refuses to sign until corrected.

Job Performance Measure No.: 2011 NRC JPM SRO A1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- The unit had been at 100% power for 150 days prior to the reactor trip.
- Cycle Burnup is 450 EFPD.
- TAVE = 532°F
- Final Measured Boron Concentration = 985 PPM
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is 0.95.
- The Plant Process Computer is NOT available.
- No reactor engineering personnel are on site.
- A licensed operator has prepared OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet

INITIATING CUE:

You are the Control Room Supervisor on duty.
Perform an Estimated Critical Rod Position calculation.

Then approve the supplied Estimated Critical Rod Position Calculation in accordance with OP-TM-300-403, ESTIMATED CRITICAL ROD POSITION, ATTACHMENT 7.1, Estimated Critical Position Calculation Data Sheet.

TIME CRITICAL: No

CALCULATION IS FOR AN ECP AT | DATE/TIME Today / NOW

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) 532 °F
2. CYCLE BURNUP 450 EFPD
3. 3a. FINAL MEASURED BORON CONCENTRATION 985 ppmB
   3b. BORON DEPLETION CORRECTION FACTOR 0.95 .
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
   3c. FINAL CORRECTED BORON CONCENTRATION (3.a) X (3.b) = 935.75 ppmB
4. CRG 8 POSITION AT CRITICALITY 100 %WD
5. FUEL EXCESS REACTIVITY (FIG 2) 9.1 % Δk/k
6. CRG 8 REACTIVITY WORTH 0 % Δk/k
7. 7a. INVERSE BORON WORTH (FIG 8) 135 ppmB/% Δk/k
   7b. BORON REACTIVITY WORTH (3c / 7a) x (-1) = -6.93 % Δk/k
8. XENON REACTIVITY WORTH (PPC, REACTOR ENGR., FIG 13) -0.45 % Δk/k
9. SAMARIUM AND PLUTONIUM BUILDUP (FIG 15)
   - TIME SINCE LAST SHUTDOWN 48 HRS
   - REACTIVITY DUE TO BUILDUP -0.09 % Δk/k
10. INSERTED CRG 5-7 WORTH REQUIRED FOR CRITICALITY (IRW)
    (5 + 6 + 7b + 8 + 9) x (-1) = -1.63 % Δk/k
11. ESTIMATED CRITICAL ROD POSITION (FIG 5A) 105 % ROD INDEX
12. CRITICAL ROD POSITION TOLERANCE BAND (FIG 5A)
    12a. Circle One: 0.5%Δk/k (0.8%Δk/k)
    Use 0.5%Δk/k for Steady State conditions if xenon (8) is 0.0 to -0.5%
    Use 0.8%Δk/k for Transient conditions if xenon (8) is more negative than -0.5%Δk/k
    12b. MINIMUM ROD WITHDRAWAL LIMIT
    (10 – 12a) = -0.83 %Δk/k ⇒ 205 %ROD INDEX (FIG 5a)
    12c. MAXIMUM ROD WITHDRAWAL LIMIT
    (10 + 12a) = -2.43 %Δk/k ⇒ 43 %ROD INDEX (FIG 5a)
13. If this is a transient Xenon startup, then record the interval that ECP is valid

    From: Date/Time: Time of Calc To: Date/Time 3 Hours after Calc

CALCULATED BY: Greg Hoek DATE/TIME Today T-30

APPROVED BY (SRO): _____ DATE/TIME

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	EQC02014
Task Title:	Approve Isolation points for a component for maintenance	JPM No.:	2011 NRC JPM SRO A2
K/A Reference:	G 2.2.41 (3.5/3.9)		New for 2011 NRC Exam

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:	You are the Duty SRO. Plant is in a refueling outage with RCS level in the green band of the refueling canal. A worker tag out, for the liquid portion only, has been prepared for a leaking flange on RCP Seal Return Line Relief MU-V-180. The line is currently filled.
Task Standard:	All critical steps evaluated as SAT.
Required Materials:	None
General References:	302-660, Makeup and Purification Flow Diagram Rev 44 OP-TM-211-000, Makeup and Purification System Rev 21
Handout:	Attached Worker Tag out
Initiating Cue:	You are directed to review the Worker Tag Out for accuracy and sign as Operations Authorization.

Time Critical Task: No

Validation Time: 15 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **After candidate obtains appropriate diagram you may hand the candidate a copy they can mark up.**

Performance Step: 1 Obtains 302-660 Makeup and Purification flow diagram.
Standard: Drawing obtained.

Comment:

Performance Step: 2 **Locates MU-V-180 relief valve at coordinate D3**
Standard: Relief Valve located.

Comment:

√ **Performance Step: 3** **Candidate reviews isolation points.**
Standard:
- Identifies MU-V-38 breaker needs to be added (open)
- Should add info tag to control switch for MU-V-38.

Comment:

√ **Performance Step: 4** **Candidate reviews isolation points.**
Standard:
- Identifies MU-V-39 breaker needs to be added (open)
- Should add info tags to control switch for MU-V-39.

Comment:

Performance Step: 5 **Candidate reviews restoration points.**

Standard:

- Identifies MU-V-38 and MU-V-39 breakers need to be added (closed)
- Should add line to remove info tags from control switches for MU-V-38 and MU-V-39 to be (close MU-V-38) and (Auto Close MU-V-39)
- MU-V-33A, B, C, D Breakers to be ON

Comment:

Performance Step: 6 **Candidate returns application for correction.**

Standard: Candidate identifies that Worker Tag Out can not be approved as is.

Evaluator Cue: If candidate determines error in Worker Tag Out but does not correct the errors request, "Please correct Worker Tag Out to condition where it could be approved."

Comment:

Terminating Cue: **When candidate has identified and corrected errors with Worker Tag Out JPM may be terminated.**

STOP TIME: _____ **TIME CRITICAL STOP TIME:** N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM SRO A2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Non- Power Plant Work: ☐

Power Plant Work:
(Operations Authorization may be required) ☒

Attachment 19
Worker Tagout Clearance Form
Page 1 of 2

Worker Tagout Log # **EXAM**-10-**1**

Operations Authorization Required
Prior to starting Worker Tagout: ☒

Unit: 1 System: **211** Equipment Tag: **MU-V-180** Description: **RCP SEAL RETURN LINE VALVE TO RCD**

Description of work: **REPLACE FLANGE GASKET**

Lead worker: MARINKOV 8593 Extension: Pager: _____

ISOLATION POINT EQ. TAG /EQUIPMENT NAME	TAG SEQ	TAG TYPE	TAG POSITION	TAG BY	VERIF. BY	RTS SEQ	RTS POSITION	RTS BY	VERIF. BY
MU-V-38-EX1 MU-V-38 OPEN CLOSE PUSHBUTTONS	1	INF	CLO			23	CLO		
MU-V-39-EX1 MU-V-39 OPEN/CLOSE/OFF CONTROL SWITCH	2	INF	AUC			22	AUC		
MU-V-25-EX1 MU-V-25 OPEN/CLOSE/OFF CONTROL SWITCH	3	INF	AUC			21	AUC		
MU-V-33A-EX1 MU-V-33A OPEN CLOSE PUSHBUTTONS	4	INF	CLO			20	OPN		
MU-V-33B-EX1 MU-V-33B OPEN CLOSE PUSHBUTTONS	5	INF	CLO			19	OPN		
MU-V-33C-EX1 MU-V-33C OPEN CLOSE PUSHBUTTONS	6	INF	CLO			18	OPN		
MU-V-33D-EX1 MU-V-33D OPEN CLOSE PUSHBUTTONS	7	INF	CLO			17	OPN		
MU-V-25-BK 1A ES VALVES MCC UNIT 4D	8	DGR	OFF			16	ON		
MU-V-39-BK 1A ES VALVES MCC UNIT 5D	9	DGR	OFF			15	ON		

SPECIAL INSTRUCTIONS: c2016175

COMMENTS (E. G. THROTTLED VALVE NOTES): OP-TM-211-000, 302-660

TAGOUT PREPARER: DATE: 08/16/2011 SUPERVISOR APPROVAL: _____ DATE: _____

OPERATIONS AUTHORIZATION (IF REQUIRED): _____ DATE: _____

2ND OPERATIONS AUTHORIZATION (IF REQUIRED): _____ DATE: _____

Attachment 19
Worker Tagout Clearance Form
Page 2 of 2

ISOLATION POINT EQ. TAG /EQUIPMENT NAME	TAG SEQ	TAG TYPE	TAG POSITION	TAG BY	VERIF. BY	RTS SEQ	RTS POSITION	RTS BY	VERIF. BY
MU-V-38-BK 1B RADWASTE MCC UNIT 9A	10	DGR	OFF			14	OFF		
MU-V-33A-BK 1A RADWASTE MCC UNIT 5B	11	DGR	OFF			13	ON		
MU-V-33B-BK 1A RADWASTE MCC UNIT 5C	12	DGR	OFF			12	ON		
MU-V-33C-BK 1A RADWASTE MCC UNIT 5D	13	DGR	OFF			11	ON		
MU-V-33D-BK 1A RADWASTE MCC UNIT 7B	14	DGR	OFF			10	ON		
MU-V-33A RC-P-1A #1 SEAL LEAK-OFF ISOLATION VALVE	15	DGR	HWT			9	TAO		
MU-V-33B RC-P-1B #1 SEAL LEAK-OFF ISOLATION VALVE	16	DGR	HWT			8	TAO		
MU-V-33C RC-P-1C #1 SEAL LEAK-OFF ISOLATION VALVE	17	DGR	HWT			7	TAO		
MU-V-33D RC-P-1D #1 SEAL LEAK-OFF ISOLATION VALVE	18	DGR	HWT			6	TAO		
MU-V-25 CONTAINMENT ISOLATION RCP SEAL RETURN VLV OP	19	DGR	HWT			5	TAO		
MU-V-38 RCP SEAL #1 BYPASS CONTROL VALVE OPERATOR	20	DGR	HWT			4	TAO		
MU-V-39 RCP STANDPIPE FILL ISOL VALVE OPERATOR	21	DGR	HWT			3	TAO		
MU-V-141 MU-V-25 LEAK RATE TEST AND DRAIN VALVE	22	INF	OTD			2	CAC		
MU-V-179A RC-P-1A SEAL LEAK OFF FLOW METER VENT	23	INF	OPN			1	CAC		

Note: Additional copies of this sheet may be used if additional isolation points are required.

INITIAL CONDITIONS:

You are the Duty SRO

Plant is in a refueling outage with RCS level in the green band of the refueling canal.

A worker tag out, for the liquid portion only, has been prepared for a leaking flange on RCP Seal Return Line Relief MU-V-180.

The line is currently filled.

INITIATING CUE:

You are directed to review the Worker Tag Out for accuracy and sign as Operations Authorization.

Non- Power Plant Work: ☐

Power Plant Work: (Operations Authorization may be required) ☒

Attachment 19
Worker Tagout Clearance Form
Page 1 of 2

Worker Tagout Log # **EXAM-10-1**

Operations Authorization Required Prior to starting Worker Tagout: ☒

Unit: 1 System: **211** Equipment Tag: **MU-V-180** Description: **RCP SEAL RETURN LINE VALVE TO RCD**

Description of work: **REPLACE FLANGE GASKET**

Lead worker: MARINKOV 8593 Extension: Pager: _____

ISOLATION POINT EQ. TAG /EQUIPMENT NAME	TAG SEQ	TAG TYPE	TAG POSITION	TAG BY	VERIF. BY	RTS SEQ	RTS POSITION	RTS BY	VERIF. BY
MU-V-25-EX1 MU-V-25 OPEN/CLOSE/OFF CONTROL SWITCH	1	INF	AUC			19	AUC		
MU-V-33A-EX1 MU-V-33A OPEN CLOSE PUSHBUTTONS	2	INF	CLO			18	OPN		
MU-V-33B-EX1 MU-V-33B OPEN CLOSE PUSHBUTTONS	3	INF	CLO			17	OPN		
MU-V-33C-EX1 MU-V-33C OPEN CLOSE PUSHBUTTONS	4	INF	CLO			16	OPN		
MU-V-33D-EX1 MU-V-33D OPEN CLOSE PUSHBUTTONS	5	INF	CLO			15	OPN		
MU-V-25-BK 1A ES VALVES MCC UNIT 4D	6	DGR	OFF			14	ON		
MU-V-33A-BK 1A RADWASTE MCC UNIT 5B	7	DGR	OFF			13	OFF		
MU-V-33B-BK 1A RADWASTE MCC UNIT 5C	8	DGR	OFF			12	OFF		
MU-V-33C-BK 1A RADWASTE MCC UNIT 5D	9	DGR	OFF			11	OFF		

SPECIAL INSTRUCTIONS: c2016175

COMMENTS (E. G. THROTTLED VALVE NOTES): OP-TM-211-000, 302-660

TAGOUT PREPARER: G. Hoek DATE: 08/16/2011 SUPERVISOR APPROVAL: _Rich Megill Maintenance Supervisor_____ DATE: _Exam Day____

OPERATIONS AUTHORIZATION (IF REQUIRED): _____ DATE: _____

2ND OPERATIONS AUTHORIZATION (IF REQUIRED): _____ DATE: _____

Attachment 19
Worker Tagout Clearance Form
Page 2 of 2

ISOLATION POINT EQ. TAG /EQUIPMENT NAME	TAG SEQ	TAG TYPE	TAG POSITION	TAG BY	VERIF. BY	RTS SEQ	RTS POSITION	RTS BY	VERIF. BY
MU-V-33D-BK 1A RADWASTE MCC UNIT 7B	10	DGR	OFF			10	OFF		
MU-V-33A RC-P-1A #1 SEAL LEAK-OFF ISOLATION VALVE	11	DGR	HWT			9	TAO		
MU-V-33B RC-P-1B #1 SEAL LEAK-OFF ISOLATION VALVE	12	DGR	HWT			8	TAO		
MU-V-33C RC-P-1C #1 SEAL LEAK-OFF ISOLATION VALVE	13	DGR	HWT			7	TAO		
MU-V-33D RC-P-1D #1 SEAL LEAK-OFF ISOLATION VALVE	14	DGR	HWT			6	TAO		
MU-V-25 CONTAINMENT ISOLATION RCP SEAL RETURN VLV OP	15	DGR	HWT			5	TAO		
MU-V-38 RCP SEAL #1 BYPASS CONTROL VALVE OPERATOR	16	DGR	HWT			4	TAO		
MU-V-39 RCP STANDPIPE FILL ISOL VALVE OPERATOR	17	DGR	HWT			3	TAO		
MU-V-141 MU-V-25 LEAK RATE TEST AND DRAIN VALVE	18	INF	OTD			2	CAC		
MU-V-179A RC-P-1A SEAL LEAK OFF FLOW METER VENT	19	INF	OPN			1	CAC		

Note: Additional copies of this sheet may be used if additional isolation points are required.

Facility:	TMI Unit 1	Task No.:	EPAA101014
Task Title:	Authorize emergency personnel radiation exposure in excess of 5 REM	JPM No.:	2011 NRC JPM SRO A3
K/A Reference:	2.3.4 (3.7)		New for 2011 NRC Exam

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- You are the Shift Emergency Director.
- A large break LOCA occurred; including significant fuel damage.
- The TSC is manning but has not been activated.
- A missing operator has been located. He is seriously injured, conscious, but unable to move and lying in an uncontaminated area where the general radiation level is 300 R/hr.
- It is estimated that four people using a stretcher can move him out of the area in a maximum of 10 minutes and a plan was approved based on this information.
- Six people, all between 50 and 60 years of age, have volunteered to perform the task. All volunteers verbally acknowledge they are aware of the risks associated with Attachment 1. Pertinent information is provided below.
- No radiation management personnel have arrived on site.
- The rescue team must traverse through a high contamination area to perform the rescue.

VOLUNTEER DATA

NAME	SSN	CURRENT ANNUAL EXPOSURE	PAST WORK HISTORY	N-AN-HR-MEDICAL_RESPIRATOR QUALIFIED
Volunteer #1	123-45-6789	300 mRem	None	No
Volunteer #2	234-56-7890	250 mRem	Volunteered in Chernobyl - received 30 Rem acute dose TEDE	Yes
Volunteer #3	345-67-8901	150 mRem	None	Yes
Volunteer #4	456-78-9012	400 mRem	Volunteered in Japan - received 5 Rem acute dose TEDE	Yes
Volunteer #5	567-89-0123	200 mRem	Volunteered in TMI-2 - received 2 Rem acute dose TEDE	Yes
Volunteer #6	678-90-1234	100 mRem	None	Yes

Task Standard: All critical steps evaluated as SAT.

Required Materials:
- EP-AA-113 REV 10, Personnel Protective Actions
- EP-AA-113-F-02 REV B, Authorization for Emergency Exposure
- Calculator

General References:
- EP-AA-113 REV 10, Personnel Protective Actions
- EP-AA-113-F-02 REV B, Authorization for Emergency Exposure

Handouts:
- EP-AA-113 REV 10, Personnel Protective Actions
- EP-AA-113-F-02 REV B, Authorization for Emergency Exposure

Initiating Cue: You are the Emergency Director. Perform the required actions prior to dispatching the team of volunteers to rescue the injured man.

Time Critical Task: N/A

Validation Time: 10 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

Evaluator Cue: Provide EP-AA-113, Personnel Protective Actions

√ **Performance Step: 1** ASSURE that the emergency exposure is for a bona fide emergency involving risk of life or limb, or the destruction of valuable property.
A. PLAN emergency operations prior to entry.
B. **WEAR respiratory protection** and protective clothing to reduce contamination where possible.

Standard: Examinee determines emergency exposure is for a bonafide emergency. And discusses the requirement to wear respiratory protection and protective clothing.

Examinee determines that Volunteer # 1 can not be used for the rescue efforts

Comment:

Performance Step: 2 DETERMINE if emergency exposure limits in excess of 5 Rem TEDE (EPA-400 lower limits) are required for Exelon emergency workers.

Standard: Examinee determines that maximum stay time would result in >5 Rem TEDE.

Comment:

Evaluator Cue: When requested, provide 4 copies of EP-AA-113-F-02. Only 1 copy needs to be filled out for evaluation, then state "The other three forms have been completed".

Performance Step: 3 For exposures at or above 5 Rem TEDE (EPA-400 lower limits), COMPLETE an Authorization for Emergency Exposure (EP-AA-113-F-02).

Standard: Examinee:

- Completes EP-AA-113-F-02 for each volunteer.
- Checks Block 3 (Authorized to receive greater than 25 Rem TEDE)
- Informs the volunteers and obtains their acknowledgment that the task is voluntary and they're aware of the risks.
- Have volunteer sign after reviewing Attachment 1, EMERGENCY WORKER EXPOSURE LIMITS AND ASSOCIATED RISKS.
- Signs as Station Emergency Director.

Comment:

√ **Performance Step: 4** All emergency exposures in excess of 25 Rem TEDE shall be voluntary and shall be limited to once in a lifetime. Persons who may receive exposures greater than 25 Rem TEDE shall be fully aware of the risks involved.

Standard: Examinee determines emergency exposure in excess of 25 Rem TEDE shall be limited to once in a lifetime and identifies Volunteer #2 can not be used for the rescue efforts.

Comment:

Terminating Cue: After candidate identifies Volunteer #s 1 and 2 can not be used for the rescue efforts, this JPM is complete.

Job Performance Measure No.: 2011 NRC JPM SRO A3

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the Shift Emergency Director.
- A large break LOCA occurred; including significant fuel damage.
- The TSC is manning but has not been activated.
- A missing operator has been located. He is seriously injured, conscious, but unable to move and lying in an uncontaminated area where the general radiation level is 300 R/hr.
- It is estimated that four people using a stretcher can move him out of the area in a maximum of 10 minutes and a plan was approved based on this information.
- Six people, all between 50 and 60 years of age, have volunteered to perform the task. All volunteers verbally acknowledge they are aware of the risks associated with Attachment 1. Pertinent information is provided below.
- No radiation management personnel have arrived on site.
- The rescue team must traverse through a high contamination area to perform the rescue.

VOLUNTEER DATA

NAME	SSN	CURRENT ANNUAL EXPOSURE	PAST WORK HISTORY	N-AN-HR-MEDICAL_RESPIRATOR QUALIFIED
Volunteer #1	123-45-6789	300 mRem	None	No
Volunteer #2	234-56-7890	250 mRem	Volunteered in Chernobyl - received 30 Rem acute dose TEDE	Yes
Volunteer #3	345-67-8901	150 mRem	None	Yes
Volunteer #4	456-78-9012	400 mRem	Volunteered in Japan - received 5 Rem acute dose TEDE	Yes
Volunteer #5	567-89-0123	200 mRem	Volunteered in TMI-2 - received 2 Rem acute dose TEDE	Yes
Volunteer #6	678-90-1234	100 mRem	None	Yes

INITIATING CUE: You are the Emergency Director. Perform the required actions prior to dispatching the team of volunteers to rescue the injured man.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	TMI Unit 1	Task No.:	EPAA101006
Task Title:	Given a set of conditions, determine the Emergency Action Level (EAL) and make a Protective Action Recommendation (PAR) IAW the facility Emergency Plan.	JPM No.:	2011 NRC JPM SRO A4
K/A Reference:	2.4.44 (4.4)	New for 2011 NRC JPM	

To be conducted one on one.

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions: The plant was at 100% power.

- 15:00 - Large Break LOCA resulting in ESAS actuations, 4#RB, 30# RB, 1600psig RCS, 500psig RCS.
- Reactor Coolant Pumps were manually tripped based on indication of 5°F superheat.
- An Alert was declared FA1 based on 1 barrier lost (Coolant)

Current Conditions;

- Time 15:30
- Reactor Building Pressure is 32 psig lowering very slowly.
- RM-G-6 is reading 10 R/hr rising slowly.
- RM-G-22 is reading 4.6 E +03 R/hr steady.
- RM-G-23 is reading 3.9 E +03 R/hr steady.
- Outside temperature is 49 °F.
- The wind is from 120° at 8 MPH.

Task Standard: All critical steps evaluated as SAT.

Required Materials: Perform in a location with:

- EAL Matrix
- Shift Emergency Director Book

General References:
- EP-AA-111, EMERGENCY CLASSIFICATION AND PROTECTIVE ACTION RECOMMENDATIONS, Revision 16
- EP-AA-111-F-09, TMI PLANT BASED PAR FLOWCHART, Revision D
- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST, Revision L
- EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision C
- EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision J
- EP-AA-1009 EXELON NUCLEAR RADIOLOGICAL EMERGENCY PLAN ANNEX FOR THREE MILE ISLAND (TMI) STATION Revision 17
- EP-AA-112-100-F-07 MID-ATLANTIC ERO NOTIFICATION OR AUGMENTATION Revision F.

Handouts: EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST, signed off for the declared alert.

Initiating Cue: You are the Shift Manager. Respond in accordance with the EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST.

Time Critical Task: Yes

Validation Time: 20 minutes

SIMULATOR SETUP

N/A

Start Time: _____ (When Cue is acknowledged – this is also Time Critical Start Time)

(Denote Critical Steps with a check)

Performance Step: 1 Compares updated conditions to the EAL Table.

Standard:

- Determines Primary Containment Barrier has been potentially lost. 3c1
- Determines Reactor Coolant System has been lost. 2a1
- Determines Fuel clad has been lost. 1c1.
- Determines conditions are met for GENERAL EMERGENCY EAL FG1.

Evaluator Cue: **Inform candidate Time Critical time starts with acknowledgement of CUE.**

Comment:

EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST

Performance Step: 2 Implement EP-AA-112-100-F-01 for GE.

Standard: Refers to Section 1.4.

Comment:

EP-AA-112-100-F-01, Section 1.4.A

√ **Performance Step: 3** **Announce** Event Classification to the Control Room staff.

Standard: Announces GE based on Loss of two barriers FUEL and RCS with a potential loss of CONTAINMENT.

Comment:

√ Time Critical #1 Time start _____ - Time of declaration _____ = _____

Standard: Less than 15 minutes.

EP-AA-112-100-F-01, Section 1.4.B

Performance Step: 4 **Record** the EAL and Declaration threshold(s) (as applicable).

Standard: Records EAL FG1 on EP-AA-112-100-F01.
Records thresholds 3c1 and 2a1 and 1c1.

Comment:

EP-AA-112-100-F-01, Section 1.4.C

Performance Step: 5 For Security events - - - .

Standard: N/A – not a security event.

Comment:

EP-AA-112-100-F-01, Section 1.4.D

√ **Performance Step: 6** **USE** the Emergency Public Address Announcements form to select and direct the appropriate public address announcement for a General Emergency within 15 minutes of event classification.

Standard:
- Fills out EP-AA-112-F-09 found at tab 1 and hands to communicator (NRC examiner) to make announcement.

Comment:

EP-AA-112-100-F-01, Section 1.4.E

Performance Step: 7 **If** the ERO has **NOT** already been activated, **then, PERFORM** the "ERO Response Required" steps of the ERO Notification or Augmentation form.

Standard: N/A ERO full augmentation was made at Alert.

Comment:

EP-AA-112-100-F-01, Section 1.4.F

√ **Performance Step: 8** **DETERMINE** the correct plant-based PAR per the Emergency Classification and Protective Action Recommendations procedure and the appropriate site-specific PAR flowchart:

Classification and PAR Procedure TAB 6

Plant Based PAR Flowchart TAB 7

Standard: **Determine PAR IAW EP-AA-111-F-09;**

GE – Yes

Release – No

Loss of Fuel Clad Barrier– Yes

Loss of Reactor Coolant System Barrier – Yes

Loss of Primary Containment Barrier – No

Evacuate 5 – mile radius or Shelter based on offsite impediments

Recommend KI for the General Public in Evacuated Areas

Advise remainder of EPZ to monitor EAS Messages.

Evaluator Cue: If Shift Dose Assessor is requested to provide DAPAR information respond "Offsite dose projections are < 1 REM TEDE and < 5REM CDE thyroid".

Comment:

EP-AA-112-100-F-01, Section 1.4.F

√ **Performance Step: 9**

INITIATE required State/Local notifications within 15 minutes of the event classification (including initial PAR) as required per the Notifications procedure.

Notification Procedure (EP-MA-114-100)

Notification Form (EP-MA-114-100-F-01)

Release in Progress Determination Guidance (EP-AA-114-F-01)

Standard:

Fills out EP-MA-114-100-F-01 using EP-MA-114-100 and EP-AA-114-F-01 as guidance, hands to communicator (NRC Examiner).

Evaluator Note:

- **Minimum requirements on ENF to meet critical task:**

  3.a GENERAL EMERGENCY

  3.d ESCALATION

  4.a EMERGENCY ACTION LEVEL NO. is FG-1

  5.a NO radiological release in progress

  7.b PAR Evacuate 360 checked, 5 miles filled in.

- **Record TIME _____ to be used as stop time for second critical time.**
- **Time above _____ - Time of Declaration _____ = _____< 15 minutes for second critical time.**

Comment:

Terminating Cue:

When the candidate hands the completed Emergency Notification Form to the Communicator: Evaluation on this JPM is complete.

Job Performance Measure No.: 2011 NRC JPM SRO A4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions: The plant was at 100% power.

- 15:00 - Large Break LOCA resulting in ESAS actuations, 4#RB, 30# RB, 1600psig RCS, 500psig RCS.
- Reactor Coolant Pumps were manually tripped based on indication of 5°F superheat.
- An Alert was declared FA1 based on 1 barrier lost (Coolant)

Current Conditions;

- Time 15:30
- Reactor Building Pressure is 32 psig lowering very slowly.
- RM-G-6 is reading 10 R/hr rising slowly.
- RM-G-22 is reading 4.6 E +03 R/hr steady.
- RM-G-23 is reading 3.9 E +03 R/hr steady.
- Outside temperature is 49 °F.
- The wind is from 120° at 8 MPH.

Initiating Cue: You are the Shift Manager. Respond in accordance with the EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST.

Time Critical Yes

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	62201020
Task Title:	Respond to an Inoperable/Stuck Control Rod	JPM No.:	2011 NRC JPM A
K/A Reference:	005 AA1.01 (3.6 / 3.4)	Bank JPM	TQ-TM-104-622-J104

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- A Plant startup was in progress.
- The third CRO is taking data for the 1/M plot.
- The current ECP is 50% on Group 7. Minimum ECP is 25% on Group 7.
- During withdraw of Group 5 to 50% a Group 5 rod remained stuck at approximately 40% withdrawn.
- Manual actions of MAP G-2-1 have been completed and actions are being taken IAW OP-TM-622-414, Exercising One or More Control Rods. Steps 4.1 through 4.7 have been completed, Step 4.8 remains open.
- The STA is monitoring the CRDM Stator temperature and > 1% shutdown margin has been confirmed.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References:	OP-TM-622-414, Exercising One or More Control Rods, Rev 2, signed off through Step 4.7 OP-TM-622-451, Transferring Rods to Aux Power Supply, Rev 1 (Minor Rev A)
Handout:	OP-TM-622-414, signed off through Step 4.7
Initiating Cue:	The Control Room Supervisor has directed you to withdraw the affected rod to within the Group average IAW OP-TM-622-414, Exercising One or More Control Rods, continuing at Step 4.9.
Time Critical Task:	NO
Validation Time:	20 minutes

SIMULATOR SETUP

1. Reset the simulator to IC 6 (Temporarily snapped into IC-53)

NOTE:	It is okay to use a similar IC to the IC listed above, provided the IC actually used is verified to be compatible with this and other JPMs that are scheduled to be run concurrently.

2. Run the setup:
   - Initialize the simulator and go to run.
   - Withdraw Group 5 rods to 40%.
   - Insert Malfunction RD0212
   - Withdraw Group 5 rods until MAP-G-2-1, CRD PATTERN ASYMMETRIC, alarm occurs
   - Place Group 5 position indication on CC CRT
   - Place computer point A0642 on a CRT
   - Freeze simulator
3. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.
4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

ICO CUE:	**Provide a copy of OP-TM-622-414, signed off through Step 4.8**
Performance Step: 1	Obtain copy of OP-TM-622-414
Standard:	Obtains most recent revision of procedure, proceeds to Step 4.9
Comment:	

OP-TM-622-414, Step 4.9.1

Performance Step: 2	SELECT associated Regulating Group or Group 8 on GROUP SELECT switch
Standard:	Selects Group 5 by rotating the GROUP SELECT switch to the Group 5 position.
Comment:	

PROCEDURE CAUTION: In order to avoid power changes, do not move group more than 5% from its initial position.

OP-TM-622-414, Step 4.9.2

Performance Step: 3	If any of selected regulating groups or Group 8 PI Panel OUT LIMIT lights are lit, then INSERT group until all its PI Panel OUT LIMIT lights are Off.
Standard:	Step is N/A. No OUT LIMIT lights are lit.
Comment:	

PROCEDURE CAUTION: In order to avoid power changes, do not move group more than 5% from its initial position.

OP-TM-622-414, Step 4.9.3

Performance Step: 4 If any of selected regulating group's or Group 8 PI Panel IN LIMIT lights are lit, then WITHDRAW group until all its PI Panel IN LIMIT lights are Off.

Standard: Step is N/A. No IN LIMIT lights are lit.

Comment:

OP-TM-622-414, Step 4.10.1

Performance Step: 5 ALIGN rod(s) to group as follows

- DETERMINE which rod(s) is to be moved by evaluating one or more or the following:
- PI Panel indications
- PPC rod position indications
- Zone Reference lamps

Standard: Determines that rod 1 in Group 5 is the rod to be moved.

PROCEDURE NOTE: For example: while inserting Group 1, the last PI Panel OUT LIMIT lights to de-energize were rod 1, 2, and 3 and/or PPC indications show them to be 1% higher than the group. Inserting these three rods to align closer to group average may resolve a loss of Diamond Panel group OUT LIMIT.

PROCEDURE Note: Rods may be moved one at a time or several in unison.

Comment:

OP-TM-622-414, Step 4.10.2

Performance Step: 6 TRANSFER desired rod(s) to Auxiliary Power Supply IAW OP-TM-622-451

Standard: Obtains OP-TM-622-451

EXAMINER CUE: **Provide a copy of OP-TM-622-451**

Comment:

OP-TM-622-451

Performance Step: 7 Review Precautions, Limitations, Prerequisites of current copy of OP-TM-622-451

Standard: Reviews procedure and completes Step 3.4.1 of prerequisites

Comment:

OP-TM-622-451, Step 4.1.1

Performance Step: 8 VERIFY the following lamp/pushbutton conditions at Diamond Panel:

- TRIP CONF – Off
- PROGRAMMER LAMP FAULT 'A' – Off
- PROGRAMMER LAMP FAULT 'B' – Off
- POWER SUPPLIES –SYSTEM (2 lamps) – Lit
- POWER SUPPLIES - MOTOR (2 lamps) – Lit

NOTE: if rod(s) are on Aux Power Supply then TR CF lamp will be lit

- TR CF – Off

AUTO/MAN - Man

Standard: Verifies conditions correct as listed above at Diamond Panel by observing associated lamps and pushbuttons

Comment:

OP-TM-622-451, Step 4.1.1.a

Performance Step: 9 Verify the motor fault light is off at the diamond panel or verify no trip or fault lights are lit on the front of the programmer assemblies for the Group 5-8 and Auxiliary Power Supplies.

Standard: Verifies motor fault light is off at the diamond panel by observing light is not lit

Comment:

OP-TM-622-451, Step 4.1.2

Performance Step: 10 ENSURE GROUP selected on GROUP/AUXIL switch

Standard: Verifies GROUP is selected by observing GROUP light is lit.

Comment:

OP-TM-622-451, Step 4.1.3

√ **Performance Step: 11** ENSURE SEQ OR. selected on SEQ/SEQ OR switch

Standard: Ensures SEQ OR selected by pressing the SEQ/SEQ OR switch and observing SEQ OR light lit.

Comment:

EVALUATOR NOTE: **The procedure is unclear whether to pull the affected rod out or to drive the rest of the group in. In this case, the Initiating Cue stated to withdraw the affected rod.**

OP-TM-622-451, Step 4.1.4

√ **Performance Step: 12** SELECT desired group on GROUP SELECT switch

Standard: Identifies Group 5 is selected on the Group Select switch (action done in Performance Step 2).

Comment:

OP-TM-622-451, Step 4.1.5

√ **Performance Step: 13** SELECT desired rod number or all on SINGLE SELECT switch

Standard: Selects Rod 1 by rotating the SINGLE SELECT switch to the Rod 1 position.

Comment:

OP-TM-622-451, Step 4.1.6

√ **Performance Step: 14** PRESS TRANS RESET

Standard: Presses TRANS RESET and observed TRANS RESET light is lit

Comment:

OP-TM-622-451, Step 4.1.7

√ **Performance Step: 15** SELECT AUXIL on GROUP/AUXIL switch

- VERIFY selected Group Diamond Panel CONTROL ON lamp Lit

Standard: Presses the GROUP/AUXIL switch and observes AUXIL light is lit. Observes Group 5 Diamond Panel CONTROL ON lamp is lit.

Comment:

OP-TM-622-451, Step 4.1.8

√ **Performance Step: 16** SELECT JOG speed

- VERIFY SY lamp Lit

Standard: Selects JOG speed by turning the RUN/JOG switch to IOG position and observes that the SY lamp is lit

Comment:

OP-TM-622-451, Step 4.1.9

√ **Performance Step: 17** SELECT CLAMP on CLAMP/CLAMP REL switch

Standard: Selects CLAMP by pressing the CLAMP/CLAMP REL switch and observing the CLAMP light is lit.

Comment:

OP-TM-622-451, Step 4.1.10

√ **Performance Step: 18** PRESS MAN TRANS

- VERIFY TR CF lamp Lit
- VERIFY selected rod(s) PI Panel CONTROL ON lights Lit

Standard: Presses the MAN TRANS pushbutton and observes the TR CF light is lit. Verifies that GROUP 5 ROD 1 PI Panel CONTROL ON light is lit

Comment:

OP-TM-622-451, Step 4.1.11

Performance Step: 19 If necessary, then SELECT next desired rod number on SINGLE SELECT switch

Standard: Step is N/A. Only 1 rod is misaligned.

Comment:

OP-TM-622-451, Step 4.1.12

Performance Step: 20 REPEAT step 4.1.11 until all desired rods are transferred

Standard: Step is N/A

Comment:

OP-TM-622-451, Step 4.1.13

Performance Step: 21 SELECT CLAMP REL on CLAMP/CLAMP REL switch

Standard: Selects CLAMP REL by pressing the CLAMP/CLAMP REL switch and observing that the CLAMP REL light is lit.

Comment:

OP-TM-622-451, Step 4.1.14

√ **Performance Step: 22** SELECT GROUP on GROUP/AUXIL switch

- VERIFY SY lamp Off

Standard: Selects GROUP on the GROUP/AUXIL switch and observes that the SY lamp is not lit

Comment:

OP-TM-622-451, Step 4.1.15

√ **Performance Step: 23** SELECT RUN speed

Standard: Selects RUN speed on the RUN/JOG switch

Comment:

OP-TM-622-451, Step 4.1.16

Performance Step: 24 If rod transfer was directed by a controlling procedure, then GO TO controlling procedure

Standard: Announces return to OP-TM-622-414

Comment:

OP-TM-622-414, Step 4.10.3

PROCEDURE **CAUTION: To avoid exceeding local power limits, do not move rods outside COLR rod index curves.**

PROCEDURE **CAUTION: To avoid asymmetric conditions, do not move an individual rod more than 5% above or below its group average position.**

ICO CUE:	**Prior to examinee positioning rod, delete Malfunction RD0212**
Performance Step: 25	POSITION rod(s) as required using INSERT/WITHDRAW handle
Standard:	Withdraws GROUP 5 ROD 1 by placing the Diamond Control switch in the Withdraw position until re-aligned with group average.
Comment:	

Terminating Cue: **The JPM may be terminated when the asymmetrical control rod has been re-aligned within 4% of the group average.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM A

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- A Plant startup was in progress.
- The third CRO is taking data for the 1/M plot.
- The current ECP is 50% on Group 7. Minimum ECP is 25% on Group 7.
- During withdraw of Group 5 to 50% a Group 5 rod remained stuck at approximately 40% withdrawn.
- Manual actions of MAP G-2-1 have been completed and actions are being taken IAW OP-TM-622-414, Exercising One or More Control Rods. Steps 4.1 through 4.7 have been completed, Step 4.8 remains open.
- The STA is monitoring the CRDM Stator temperature and > 1% shutdown margin has been confirmed.

INITIATING CUE: The Control Room Supervisor has directed you to withdraw the affected rod to within the Group average IAW OP-TM-622-414, Exercising One or More Control Rods, continuing at Step 4.9.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	22301010
Task Title:	Respond to a Loss of Pressurizer Level Control with Failures	JPM No.:	2011 NRC JPM B
K/A Reference:	011 A2.03 (3.8 / 3.9)	New ILT 10-1	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References:
- OP-TM-MAP-G0205, PZR Level HI/LO
- OP-TM-EOP-010, EMERGENCY PROCEDURE RULES, GUIDES AND GRAPHS, Guide 9 RCS Inventory Control

Handout: None

Initiating Cue: Respond to the cues and indications given by the simulator as well as any input from the CRS.

Time Critical Task: NO

Validation Time: 10 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-232)

1. Insert the following Malfunctions:

   RC04, RC1-LT1 RC PZR LVL Trans failure @ 0%, on **Event #1**

2. Insert the following Overrides:

   02A5S22-ZDIPBCMUV18 MU-V-18 Close Pushbutton **ON** assign to **EVENT 2**

   02A5S21-ZDIPBOMUV18 MU-V-18 Open Pushbutton **OFF IMMEDIATELY**

   02A5A10-ZAIMU3MIC FLO MU-V-5 Letdown Flow control AI assign **0**

3. Create the following Trigger:

   HLORC1LIC(2)==1&&MUVMUV17>0.01 as trigger **2**

4. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.

5. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

	ICO CUE:	When directed by the Evaluator, insert **EVENT 1**
		OP-TM-MAP-G0205, Step 4.1-1
√	**Performance Step: 1**	**PLACE** MU-V-17 in Hand and control PZR level.
	Standard:	Announces Pressurizer level lowering and failed level instrument.
		Presses MU-V-17 Hand Control pushbutton, verifies red auto light out, white hand light lit.
		Raises on MU-V-17 controller to restore Pressurizer level.
	Comment:	
	Evaluator Cue:	As CRS, acknowledge condition and entry into OP-TM-MAP-G0205
		OP-TM-MAP-G0205, Step 4.1-2
	Performance Step: 2	**SELECT** a valid level signal.
	Standard:	Selects RC-1 LT-3 instrument by pressing pushbutton on Console Center.
	Comment:	

OP-TM-MAP-G0205, Step 4.1-3

Performance Step: 3 **PLACE** MU-V-17 in AUTO.

Standard: Presses MU-V-17 Auto Control pushbutton, verifies red auto light lit, white hand light out.

Comment:

ICO Cue: When MU-V-17 placed in Auto, ensure MU-V-18 has closed.

OP-TM-MAP-G0205, Step 4.2

Performance Step: 4 **If** PZR level can **not** be restored with automatic or manual control of MU-V-17, **then INITIATE** OP-TM-EOP-010, Guide 9

Standard: Recognizes that MU-V-18 is closed and/or Pressurizer level is not being restored and enters Guide 9.

Comment:

Alternate Path starts here when candidate leaves MAP G0205 and enters Guide 9.

GUIDE 9, RCS INVENTORY CONTROL Step A.1

Performance Step: 5 **VERIFY** MU Tank Level > 55 inches **and** ESAS HPI is **not** actuated.

Standard: Verifies MU Tank level is >55 inches and ESAS HPI is not actuated.

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step A.2

Performance Step: 6 **VERIFY** MU Tank Level < 96 inches.

Standard: Verifies MU Tank Level < 96 inches. On Digital (CC).

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.1

Performance Step: 7 **VERIFY** MU pump is operating.

Standard: Verifies a MU pump is operating, by observation of Discharge pressure, or flow. May use Red light on at MU-P-1B extension control (CL).

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.2

Performance Step: 8 **VERIFY** MU-V-5 is Closed.

Standard: Verifies MU-V-5 closed by observation of MU-V-5 controller potentiometer on (CC).

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.3

Performance Step: 9 **VERIFY** MU24-FI > 20 gpm

Standard: Looks at MU24-FI on (CC) upper section, observes flow is NOT >20 gpm.

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.3 RNO

Performance Step: 10 **ENSURE** MU-V-18 is Open.

Standard: Observes MU-V-18 is closed by Green light lit, and attempts to open MU-V-18 by pressing OPEN Pushbutton. May call to have NLO OPEN MU-V-18 locally.

Comment:

ICO Cue: When sent to open MU-V-18 locally, report in that the stem is stuck and MU-V-18 cannot be opened locally.

GUIDE 9, RCS INVENTORY CONTROL Step C.4

Performance Step: 11 **ENSURE** MU-V-17 is Open.

Standard: Ensures MU-V-17 is Open. MU-V-17 will NOT Open.

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.5

Performance Step: 12 **VERIFY** PZR level is being restored.

Standard: Recognizes MU24-FI is NOT > 20 gpm

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.5 RNO

Performance Step: 13 **THROTTLE** MU-V-217.

Standard: Throttles OPEN on MU-V-217 on (CC) by pressing OPEN PB then STOP PB to attempt to establish a flow of > 20 gpm on MU24-FI. If throttling full open, the examinee will not press the STOP PB.

Comment:

Examiner Note Examinee may state that step will not be taken as MU-V-18 being failed closed will prevent success. Examinee should then continue. **If Examinee requests permission from SRO to skip step grant permission under a variance.**

GUIDE 9, RCS INVENTORY CONTROL Step C.6

Performance Step: 14 **VERIFY** MU24-FI > 20 gpm

Standard: Recognizes MU24-FI is NOT > 20 gpm

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.6 RNO

√ **Performance Step: 15** **THROTTLE** MU-V-16B **or** MU-V-16D.

Standard: Throttles MU-V-16B, by pressing Open PB then STOP PB on (CC), while observing FI-1127 for indication of > 20 gpm.

Comment:

GUIDE 9, RCS INVENTORY CONTROL Steps C.7 and C.8

Performance Step: 16 **VERIFY** PZR level is being restored.

Standard: Recognizes PZR level is being restored, by indications of flow > 20 gpm and rising level on Pressurizer Digital or Recorder indicators on (CC).

Comment:

Terminating Cue: **JPM may be terminated when Examinee recognizes Pressurizer level is being restored by MU-V-16B.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM B

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.

INITIATING CUE: Respond to the cues and indications given by the simulator as well as any input from the CRS.

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	EOPG21001
Task Title:	Transfer to Reactor Building Sump Recirculation	JPM No.:	2011 NRC JPM C
K/A Reference:	011 EA1.05 (4.3 / 3.9)	Bank JPM #	TQ-TM-104-G21-J002

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- The Reactor is shutdown with a LOCA in progress.
- OP-TM-EOP-001 and OP-TM-EOP-006 are in progress.
- OP-TM-EOP-010, Guide 20 has been completed.
- BWST level has dropped below 15 feet and is continuing to lower.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-EOP-010, Guide 21, Rev 11
OP-TM-EOP-010, Rule 2, Rev 11
OP-TM-211-901, Rev 5

Handout: None

Initiating Cue: The Control Room Supervisor has directed you to transfer the reactor building sump to recirculation mode IAW OP-TM-EOP-010, Guide 21.

Time Critical Task: NO

Validation Time: 17 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-233)

1. Insert the following:

   Insert Malfunction TH07, LOCA on 'A' RCP discharge, at 50% severity

   Insert remote DHR05 IN to energize CF-V-1A Breaker

   Insert remote DHR06 IN to energize CF-V-1B Breaker

   Insert remote DHR18 IN to energize DH-V-2 Breaker

   Insert remote DHR11 at 100% to open DH-V-64

   Insert remote DHR14 to OPEN to open DH-V-64 on EVENT 1 to open DH-V-38A/B

   Insert remote DHR32 at 20 to adjust BWST level

   Insert EXPERT COMMAND: dhvdhv6b > 0.01 on EVENT 2 "Command" irf dhr25 out. This will cause the breaker for DH-V-6B to trip when the examinee attempts to open DH-V-6B.

2. Place the simulator in RUN.

   Using OP-TM-EOP-001 and OP-TM-EOP-006, control and monitor plant conditions.

   Complete all steps of Guide 20.

   When BWST level is approximately 9.5 feet and the RB Flood Level is about 53 inches, place the Simulator in FREEZE.

3. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.

4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE:	**When a laminated copy is located by the Examinee, provide a copy of OP-TM-EOP-010, Guide 21.**
Performance Step: 1	Obtain copy of OP-TM-EOP-010, Guide 21.
Standard:	Examinee obtains laminated copy of Guide 21.
Comment:	

OP-TM-EOP-010, GUIDE 21, Step 1

Performance Step: 2	ANNOUNCE initiation of RB sump recirculation over the page and radio
Standard:	Examinee announces initiation of RB sump recirculation over plant page and radio.
Comment:	

EVALUATOR NOTE: **Reactor Building Flood Level will be reading about 50 to 52 inches at this time, which is where it should be for this event.**

OP-TM-EOP-010, GUIDE 21, Step 2

Performance Step: 3 VERIFY RB Flood Level > 29 inches

Standard: Examinee will read Reactor Building Flood level indication on Panels CC and CR to verify that levels are greater than 29 inches.

Comment:

OP-TM-EOP-010, GUIDE 21, Step 3

Performance Step: 4 VERIFY <u>either</u> DH-V-38A or DH-V-38B is Closed

Standard: Contacts AO via radio to verify either DH-V-38A or DH-V-38B is Closed.

BOOTH OPERATOR CUE: **Respond as AO and report back that both DH-V-38A and DH-V-38B are Closed.**

Comment:

OP-TM-EOP-010, GUIDE 21, Step 4

√ **Performance Step: 5** THROTTLE <u>both</u> DH-V-4A and DH-V-4B to the maximum controllable flow ≤ 3000 gpm in each line

Standard: Examinee throttles DH-V-4A and DH-V-4B using the OPEN, CLOSE, and STOP pushbuttons on Panels CC and CR to achieve max controllable flows of ≤ 3000 gpm in each line.

Comment:

OP-TM-EOP-010, GUIDE 21, Step 5

√ **Performance Step: 6** When BWST level reaches 9.5 ft., or RB Flood Level > 56 inches, then by depressing Open P.B. (CC) and (CR)

- √ OPEN DH-V-6A
- OPEN DH-V-6B

Standard: Examinee observes BWST level and Reactor Building Flood level on Panels CC and CR. When BWST level drops below 9.5 feet (which will happen prior to RB Flood level reaching 56 inches) examinee will attempt to OPEN DH-V-6A and DH-V-6B by depressing the OPEN pushbutton for each on Panels CC and CR respectively.

WHEN the pushbutton for DH-V-6B is depressed the breaker for this valve will trip, leaving the valve in the CLOSED position. The examinee should announce that the breaker for DH-V-6B has tripped, and may request an AO to investigate the tripped breaker.

Examinee enters RNO section, announces same to CRS.

EVALUATOR CUE: **As CRS acknowledge report of breaker trip for DH-V-6B and entry into RNO section.**

BOOTH OPERATOR CUE: **If asked, role-play as AO and respond to request to investigate tripped breaker (1B ESV unit 3B).**

Comment:

EVALUATOR NOTE: **ALTERNATE PATH BEGINS with entry into OP-TM-211-901. Since the RNO is an "initiate", the candidate may choose to perform OP-TM-EOP-010, GUIDE 21, Step 6 (closing DH-V-5A/B).**

OP-TM-EOP-010, GUIDE 21, Step 5 RNO

√ **Performance Step: 7** **RNO**:

- PLACE affected DH pump in PTL
- PLACE affected BS pump in PTL
- INITIATE contingency actions for one DH pump IAW OP-TM-211-901, "Emergency Injection HPI/LPI"

Standard: Examinee places extension control for DH-P-1B on (CR) in PTL.

Examinee places extension control for BS-P-1B on (CR) in PTL.

Examinee obtains copy of OP-TM-211-901 and announces entry into procedure.

EVALUATOR CUE: **Acknowledge entry into OP-TM-211-901 if/when announced.**

EVALUATOR NOTE: **Provide copy of OP-TM-211-901**

Comment:

OP-TM-211-901

Performance Step: 8 Review precautions, limitations, & prerequisites.

• Continue at step 4.2.7 under Contingency Actions

Standard: Examinee reviews precautions, limitations, & prerequisites and determines, upon procedure review, that he/she needs to initiate contingency step 4.2.7.

Comment:

EVALUATOR NOTE: **OP-TM-211-901 Steps 4.2.7.1 – 4.2.7.3.A are N/A**

BOOTH OPERATOR CUE: **Role-play as AO and if requested, report back that it has been determined that both DH-V-38A and B are accessible.**

OP-TM-211-901, Step 4.2.7.3.B.1)

√ **Performance Step: 9** If DH-V-38A and B are accessible, then perform the following:

CLOSE DH-V-4 on the train with the inoperable DH pump

Standard: Examinee closes DH-V-4B on Panel by depressing Close P.B. on (CR), Green light on Red light off.

Comment:

OP-TM-211-901, Step 4.2.7.3.B.2)

Performance Step: 10 OPEN DH-V-38A and DH-V-38B (Aux Bldg 281' el.)

Standard: Requests AO to open DH-V-38A and DH-V-38B.

BOOTH OPERATOR CUE: **Role-play as AO, respond when requested to open DH-V-38A and DH-V-38B and report back that both valves are open. Remote function DHR14 opens both valves (Event 1).**

Comment:

OP-TM-211-901, Step 4.2.7.3.B.3)

Performance Step: 11 THROTTLE DH-V-4A and DH-V-4B to balance LPI flow IAW Rule 2

Standard: Examinee obtains laminated copy of Rule 2, LPI Throttling. Announces performance of Rule 2.

EVALUATOR CUE: **Acknowledge performance of Rule 2 for LPI throttling**

EVALUATOR NOTE: **Provide copy of Rule 2**

Comment:

OP-TM-EOP-010, RULE 2, Step B.1

Performance Step: 12 VERIFY both DH-V-6A and DH-V-6B Closed

Standard: Examinee determines that DH-V-6A is OPEN and DH-V-6B is CLOSED.

Examinee performs RNO section of Rule 2 for LPI throttling.

Comment:

OP-TM-EOP-010, RULE 2, Step B.1 RNO Step 2

√ **Performance Step: 13** **RNO:** If both DH-V-38A and DH-V-38B are Open, then THROTTLE both trains for balanced total flow ≤ 2800 gpm

Standard: Examinee throttles DH-V-4A and DH-V-4B using the OPEN, CLOSE, and STOP pushbuttons on Panels (CC) and (CR), respectively, to achieve a balanced total LPI flow of: 2500-2800 gpm with a minimum of 1250 gpm in each loop as indicated on DH-FI-802A and DH-FI-803A.

Comment:

Terminating Cue: **When examinee reports balanced LPI total flow ≤ 2800 gpm JPM may be terminated.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM C

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- The Reactor is shutdown with a LOCA in progress.
- OP-TM-EOP-001 and OP-TM-EOP-006 are in progress.
- OP-TM-EOP-010, Guide 20 has been completed.
- BWST level has dropped below 15 feet and is continuing to lower.

INITIATING CUE: The Control Room Supervisor has directed you to transfer the reactor building sump to recirculation mode IAW OP-TM-EOP-010, Guide 21.

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	41101011
Task Title:	Restore TBVs and ADVs to ICS Auto Control	JPM No.:	2011 NRC JPM D
K/A Reference:	041 A4.06 (2.9/3.1)	Bank TQ-TM-104-411-J001	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom _____ Simulator __X__ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- For this event you are assigned the duties of the Assistant RO.
- The reactor is tripped due to a loss of Main Condenser vacuum. OP-TM-EOP-001 Immediate Manual Actions (IMA's) and Vital System Status Verifications (VSSV's) are complete
- Condenser vacuum has been restored.
- OTSG's are being fed from the Emergency Feedwater (EFW) system. OTSG levels are relatively steady.
- OTSG pressure is being controlled at approximately 875 psig with the Atmospheric Dump Valves (ADVs) using the Backup loaders.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs, Rev. 6

Handout: OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs, signed off through section 4.4

Initiating Cue: Restore the Turbine Bypass Valves and Atmospheric Dump Valves to ICS AUTO control per OP-TM-411-451.

Time Critical Task: NO

Validation Time: 16 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-234)

1. Trip the reactor.
2. Trip both FWPs.
3. Set **MS:TBVRST** to **FALSE** to simulate a Loss of Main Condenser Vacuum.
4. Select **MS-V-4A/4B** control to **the B/U Loaders** and stabilize Header Pressure at **880-890 psig**.
5. Set **Turbine Header setpoint** to **10.**
6. Control Primary Inventory while performing setup.
7. Use **EFW** to raise **OTSG levels** up to about **70"** so they can steam down thereby ensuring EFW does NOT interfere with B/U loader control.
8. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.
9. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE:	**Hand Examinee OP-TM-411-451, MANUAL CONTROL OF TBVs/ADVs, signed off through section 4.4**
EVALUATOR CUE:	**If asked, Local-Manual control of TBVs/ADVs was not performed.**
	Steps 5.1.1 – 5.1.4
Performance Step: 1	If MS-V-3A-F POWER 'RESET' light on CC is Off, then restore controls as follows: Verify: • Main Condenser vacuum ≥ 25" Hg vacuum • Two or more CW pumps operating • ICS Auto and ICS Hand power are available Ensure: • ADV control is on BU Loader
Standard:	Examinee Verifies: • MS-V-3A-F POWER 'RESET' light on CC is not lit • Main Condenser vacuum ≥ 25" Hg vacuum on CL (PI-340) • Two or more CW pumps operating (PLF) • ICS Auto and ICS Hand power are available (PC) Examinee Ensures: • ADV control is on BU Loader, verified by MS-V-4A/B control 'B/U LOADER' light on CC is lit.

Comment:

Steps 5.1.5 – 5.1.6

√ **Performance Step: 2** Ensure:

- **MS-V-3D, E, F or 4A** station in HAND at zero percent demand
- **MS-V-3A, B, C or 4B** station in HAND at zero percent demand

Standard: Examinee places **MS-V-3D, E, F or 4A** station (CC) to HAND by pressing the HAND pushbutton and observing the white HAND light is illuminated and the red AUTO light is not illuminated, and adjusts to zero percent demand as necessary by pressing the station's toggle switch in a downward direction and observing the station demand indicator at zero.

Examinee places **MS-V-3A, B, C or 4B** station (CC) to HAND by pressing the HAND pushbutton and observing the white HAND light is illuminated and the red AUTO light is not illuminated, and adjusts to zero percent demand as necessary by pressing the station's toggle switch in a downward direction and observing the station demand indicator at zero.

Comment:

Steps 5.1.7 – 5.1.8

PROCEDURE NOTE: **Following step will unlatch TBVs**

√ **Performance Step: 3** Press MS-V-3 A-F POWER 'RESET' pushbutton on CC.

Verify white backlight lit.

Standard: Examinee presses MS-V-3 A-F POWER 'RESET' pushbutton on CC and verifies white backlight is lit.

Comment:

PROCEDURE NOTE: **Steps 5.2 and 5.3 may be performed in parallel.**

EVALUATOR NOTE: **Steps 5.2.1 through 5.2.2.2 are N/A**

Performance Step: 4

Step 5.2.2.3

If Main Turbine load < 150 MWe, then perform the following:

- OBTAIN CRS concurrence to place OTSG A TBVs/ADV control to ICS Auto.

Standard: Examinee obtains CRS concurrence to place OTSG A TBVs/ADV control to ICS Auto.

EVALUATOR CUE: **If asked, give permission as the CRS to take TBV/ADV control to ICS Auto.**

Comment:

√ **Performance Step: 5**

Steps 5.2.2.4 – 5.2.2.6

- PLACE MS-V-3D, E, F or 4A station indicator to STEAM PRESS ERROR position.
- If STEAM PRESS ERROR is not 0%, then ADJUST TURBINE HDR PRESSURE Setpoint knob to obtain zero error (~ 50% scale).
- PLACE MS-V-3D, E, F or 4A station indicator to POSITION DEMAND position.

Standard: Examinee:

- Places MS-V-3D, E, F or 4A station indicator to STEAM PRESS ERROR position.
- Ensures STEAM PRESS ERROR is 0 % error (~ 50% scale) by adjusting Turbine Hdr Press setpoint knob (CC) and observing MS-V-3D,E,F or 4A indicator is at 50%.
- Places MS-V-3D, E, F or 4A station indicator to POSITION DEMAND position.

Comment:

Steps 5.2.2.7 – 5.2.2.8

√ **Performance Step: 6**

- PLACE MS-V-3D, E, F or 4A station in AUTO, By depressing RED Auto PB on (CC).
- VERIFY AUTO light Lit.

Standard: Examinee places MS-V-3D, E, F or 4A station in AUTO and verifies AUTO light Lit.

Comment:

EVALUATOR NOTE: **Step 5.2.2.9 is N/A**

Steps 5.3.1

Performance Step: 7 OBTAIN CRS concurrence to place OTSG B TBVs/ADV control to ICS Auto.

Standard: Examinee obtains CRS concurrence to place OTSG B TBVs/ADV control to ICS Auto.

EVALUATOR CUE: **If asked, give permission as the CRS to take TBV/ADV control to ICS Auto.**

Comment:

EVALUATOR NOTE: **Steps 5.3.2 through 5.3.3.2 are N/A, step 5.3.3.3 is the same as Performance Step #7 above.**

Steps 5.3.3.4 – 5.3.3.6

Performance Step: 8

- PLACE MS-V-3A, B, C or 4B station indicator to STEAM PRESS ERROR position.
- If STEAM PRESS ERROR is not 0%, then ADJUST TURBINE HDR PRESSURE Setpoint knob to obtain zero error (~ 50% scale).
- PLACE MS-V-3A, B, C or 4B station indicator to POSITION DEMAND position.

Standard: Examinee:

- Places MS-V-3A, B, C or 4B station indicator to STEAM PRESS ERROR position.
- Ensures STEAM PRESS ERROR is 0 % error (~ 50% scale), if necessary, by adjusting Turbine Hdr Press setpoint knob (CC) and observing MS-V-3D,E,F or 4A indicator is at 50%.
- Places MS-V-3A, B, C or 4B station indicator to POSITION DEMAND position.

EVALUATOR NOTE: **No toggle switch adjustments are expected at this time as this was done previously in Performance Step 5.**

Comment:

Steps 5.3.3.7 – 5.3.3.8

√ **Performance Step: 9**

- PLACE MS-V-3A, B, C or 4B station in AUTO.
- VERIFY AUTO light Lit.

Standard: Examinee places MS-V-3A, B, C or 4B station in AUTO by depressing RED Auto PB on (CC) and verifies AUTO light Lit.

Comment:

PROCEDURE NOTE: **Selecting "ICS" transfers MS-V-4A and MS-V-4B from B/U loaders to ICS control.**

Steps 5.4.1 – 5.4.2

√ **Performance Step: 10**

If ADV control is via B/U Loaders, then

- ENSURE MS-V-4A and MS-V-4B Closed.
- PRESS ICS pushbutton (CC).

Standard:

- Examinee ensures that MS-V-4A and MS-V-4B are closed by adjusting MS-V-4A Backup CTRL knob (CC) and MS-V-4B Backup CTRL knob (CC), and presses ICS pushbutton (CC), observing white backlight lit and B/U Loader red backlight out.

Comment:

Terminating Cue: **When candidate announces Turbine Bypass Valves and Atmospheric Dump Valves are in ICS AUTO Control, JPM may be terminated.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM D

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the Assistant RO.
- The reactor is tripped due to a loss of Main Condenser vacuum. OP-TM-EOP-001 Immediate Manual Actions (IMA's) and Vital System Status Verifications (VSSV's) are complete
- Condenser vacuum has been restored.
- OTSG's are being fed from the Emergency Feedwater (EFW) system. OTSG levels are relatively steady.
- OTSG pressure is being controlled at approximately 875 psig with the Atmospheric Dump Valves (ADVs) using the Backup loaders.

INITIATING CUE: Restore the Turbine Bypass Valves and Atmospheric Dump Valves to ICS AUTO control per OP-TM-411-451.

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	22601012
Task Title:	RCP #1 Seal Failure	JPM No.:	2011 NRC JPM E
K/A Reference:	003 A2.01 (3.5 / 3.9)		New for 2011 NRC Exam

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- For this event you assigned the duties of the assistant Reactor Operator (ARO)
- The plant is at 68% power, with FW-P-1B secured

Task Standard: All critical steps evaluated as SAT.

Required Materials: OP-TM-226-153 Rev 1 (Available)
OP-TM-AOP-040 Rev 0 (Available)

General References: OP-TM-MAP-F0103 (RCP Seal #1 Leak-Off Hi / Lo) Rev 1
OP-TM-AOP-040, RCP #1 Seal Failure Rev 0
OP-TM-MAP-F0106, RC Pump Lab Seal D/P Lo Rev 2
OP-TM-226-153, Shutdown RC-P-1C Rev 1

Handout: None

Initiating Cue: Respond to cues or indications I or the simulator gives you.

Time Critical Task: NO

Validation Time: 10 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-235)
- Reduce power per 1102-4 to 68% power secure FW-P-1B

- Create the Following Events
  - Event 1 IMF MU19C 10
  - Event 2 MMF MU19C 14

(Denote Critical Steps with a check mark)

START TIME: _____

Booth Operator	When directed enter Event 1.
Performance Step: 1	Responds to alarms and indications.
Standard:	Enters OP-TM-MAP-F0103 (RCP Seal #1 Leak-Off Flow Hi / Lo) Identifies RC-P-1C as affected pump.
Comment:	
	OP-TM-MAP-F0103, Step 4.0/4.1
Performance Step: 2	Manual Actions required: If Seal Number 1 Leak-off Flow (SLO) is ≥ 5 gpm, then Perform the following: • IAAT Seal Number 1 Leak-off Flow (SLO) is > 6 gpm, then GO TO OP-TM-AOP-040, RC Pump Seal Failures.
Standard:	Using PPC point A0950 or recorder MU-43-FR (PC), determines Seal Leak-off is < 6 gpm and continues in OP-TM-MAP-F0103.
Comment:	

OP-TM-MAP-F0103

Performance Step: 3 Trend the following Parameters:

- Seal Number 1 Leak-off Flow (SLO) (MU-43-FR)(PC)
- RCP Seal and Bearing Water Temperatures
- Lab Seal ΔP, RC-18-DPI-1/2/4 (CC)

Standard: May use RCP Group on Plant Process Computer (PPC) May Trend temperatures on computer and use console for Lab Seal, and use Panel Center Recorder for Flows.

Evaluator Cue: If STA is requested to trend data, "STA is unavailable".

Comment:

OP-TM-MAP-F0103, Step 4.1

√ **Performance Step: 4** Raise Seal Injection flow, as necessary to attempt to maintain lab seal DP positive on each RC pump. Adjust SI Flow H/A station setpoint or place MU-V-32 in manual. If lab seal DP indication is not available, then MAXIMIZE seal injection flow. Do not exceed 60 gpm.

Standard: Places MU-V-32 (CC) in hand by depressing White pushbutton on Console Center and raises flow by pushing toggle switch away to MAXIMIZE Seal Injection flow (RC-P-1C has no seal injection ΔP gage). MU-V-32 opened to 100% demand as indicated on controller gage.

Alternately may leave in AUTO and dial 100% on demand by rotating clockwise.

Comment:

NOTE: Alternate Path Starts here. With entry of the next event, the previous "If At Any Time (IAAT)" step applies and the alarm response is exited (a GO TO step is exit criteria per OS-24). AOP OP-TM-AOP-040 is entered. Alternate path decision is that a previously identified condition is now met and mitigation strategy must change from alarm response manual to AOP.

Booth Operator	**When Seal Injection is maximized (MU-V-32 at 100%) and with Lead Evaluator concurrence, insert EVENT 2.**
	OP-TM-MAP-F0103 IAAT
Performance Step: 5	Monitors seal leak-off flow in accordance with IAAT statement and determines it has exceeded 6 gpm.
Standard:	Announces need to transition to OP-TM-AOP-040
Evaluator Cue:	After candidate announces AOP-040 entry criteria, hand them OP-TM-AOP-040, and direct them to **PERFORM**.
Comment:	
	OP-TM-AOP-040 Step 1.0
Performance Step: 6	Reviews entry criteria and determines entry met.
Standard:	Continues in procedure.
Comment:	

OP-TM-AOP-040 Step 3.1

Performance Step: 7 **IAAT** any of the following exists:

- RC Pump #1 seal leakoff flow > 8 gpm

- Seal water temperature at radial bearing (A0521 through A0524) > 225°F

- #1 seal inlet temperature (A0525 thru A0528) > 235 °F

then perform the following:

A. Verify Reactor power will not challenge RPS limit when RCP is shutdown.

B. Trip affected RCP.

C. Go To step 3.5.

Standard: Determines none of the above apply at this time leaves step open.

Comment:

OP-TM-AOP-040 Step 3.2

Performance Step: 8 **MAXIMIZE** seal injection flow **not** to exceed 60 gpm.

Standard: Recognizes condition is met from Alarm response, continues in procedure.

Comment:

OP-TM-AOP-040 Step 3.3

Performance Step: 9 **Initiate a power reduction using 1102-4 to within the appropriate limits (Reactor and MWe) based on shutdown of RCP {3 pumps = 75 % RTP 665 MWe}**

Standard: Determines Reactor Power and Generated Mega Watts are already below limits.

Comment:

OP-TM-AOP-040 Step 3.4

Performance Step: 10 **When** power (Reactor and Turbine) is within limits to support RCP shutdown, **then PERFORM** the following to shutdown affected RCP:

- OP-TM-226-153 (C RCP)

Standard: Obtains OP-TM-226-153.

Evaluator Cue: **When candidate shows they can locate OP-TM-226-153 provide an exam copy.**

Comment:

OP-TM-226-153 Steps 1.0 through 4.1

Performance Step: 11 Reviews Purpose, Limits and Precautions, first step of Main Body.

Standard: May discuss above, recognizes

- Pump is in operating mode
- Reactor power is low enough
- Turbine power is low enough
- A re-ratio of feedwater will occur

Evaluator NOTE: **If candidate discusses the re-ratio need, inform them 3rd Reactor Operator is to handle feedwater.**

Procedure NOTE: **NOTE: A 2 / 1 RCP combination with OTSG levels > LLLs will require a re-ratio (≈70% / 30%) of Feedwater flow to A / B OTSG.**

Comment:

OP-TM-226-153 Step 4.2

Performance Step: 12 **If** Reactor power is > 20%,

Evaluate expected FW Flow requirements for new RCP combination, to minimize effects on delta Tc.

Standard: May evaluate re-ratio flows (approximately 4.8 Mlb/hr "A" loop and 2.1 Mlb/hr "B" loop).

Evaluator Cue: **If requested the 3rd Reactor Operator is responsible for feedwater flows.**

Comment:

OP-TM-226-153 Step 4.3

Performance Step: 13 **If** desired and time is available, **then NOTIFY** Electrical Maintenance to monitor RC-P-1C vibrations.

Standard: Determines time is not available.

Evaluator Cue: If CRS is requested to determine if vibrations are required respond no.

Comment:

OP-TM-226-153 Step 4.4

Performance Step: 14 **Place** at least one each of the following in Normal-After-Start:

- RC-P-2C-1, Oil Lift Pump AC HP (CC),

or RC-P-2C-2, Oil Lift Pump DC HP (CC)

- RC-P-3C-1, Backstop Oil Pump #1 (CC),

or RC-P-3C-2, Backstop Oil Pump #2 (CC)

Standard: Rotates extension control clockwise observing red light on green light off for at least:

- 1 backstop
- 1lift pump

Comment:

OP-TM-226-153 Step 4.5

√ **Performance Step: 15** **Place** RC-P-1C in Pull-To-Lock.

Standard: Rotates extension control counter-clockwise and pulls, observes Amps go to zero, red light off, green light on.

May also observe plant feedwater re-ratio (not part of JPM)

Comment:

OP-TM-226-153 Step 4.6

Performance Step: 16 Verify the following:

- RC-P-1C **not** rotating backwards (PPC L2877, RC-P-1C Reverse Rotation **not** in alarm).

Standard: Observes lack of alarm on Plant Process Computer.

Comment:

OP-TM-226-153 Step 4.7

Performance Step: 17 **Place** the following in Pull-To-Lock:

- RC-P-3C-2, Backstop Oil Pump #2

- RC-P-3C-1, Backstop Oil Pump #1

Standard: Rotates extension control counter-clockwise and pulls, observes red light off, green light on (CC).

Comment:

OP-TM-226-153 Step 4.8

Performance Step: 18 **Place** the following in Pull-To-Lock:

- RC-P-2C-2, Oil Lift Pump DC HP

- RC-P-2C-1, Oil Lift Pump AC HP

Standard: Rotates extension control counter-clockwise and pulls, observes red light off, green light on (CC).

Comment:

OP-TM-226-153 Step 4.9

Performance Step: 19 **Record** RC-P-1C (226) is in Standby Mode in the CR Log.

Standard: N/A

Evaluator Cue: **Inform candidate that another crew member is making the log entry.**

Comment:

OP-TM-AOP-040 Step 3,5

√	**Performance Step: 20**	**When** affected RCP stops rotating, then promptly CLOSE the following for the affected RCP: {MU-V-33C}
	Standard:	Observes low vibration of Reactor Coolant Pump "C" vibration meters on Panel Left Front (PLF), then presses MU-V-33C close pushbutton on CC. Observes Red light off Green Light on.
	Comment:	

Terminating Cue: **After the candidate closes MU-V-33C the JPM may be terminated.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM E

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

Initial Conditions:
- For this event you assigned the duties of the assistant Reactor Operator (ARO)
- The plant is at 68% power, with FW-P-1B secured

Initiating Cue: Respond to cues or indications I or the simulator gives you.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	Three Mile Island Unit 1	Task No.:	86101011
Task Title:	Restore 1D Bus from SBO Operations	JPM No.:	2011 NRC JPM F
K/A Reference:	SYS 064 A2.09 (3.1 / 3.3)		New

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom _____ Simulator __X__ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- You are the Assist Reactor Operator (ARO).
- Loss of 1D 4160 volt bus occurred.
- EG-Y-1A failed to start.
- "D" 4160 volt bus is being fed from the SBO diesel.
- OP-TM-864-901 is in progress.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: Have 1107-11 Rev 24 available.

Handout: OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS – Revision 9A, Signed off up to section 5.0

Initiating Cue: The CRS has directed you to restore normal power to the 1D 4160 volt bus IAW OP-TM-864-901.

Time Critical Task: No

Validation Time: 25 Minutes

SIMULATOR SETUP

1. Reset the simulator to Temp IC 236.

NOTE: It is okay to use a similar IC to the IC listed above, provided the IC actually used is verified to be compatible with this and other JPMs that are scheduled to be run concurrently.

INSERT **MALFUNCTION EG01A** EG-Y-1A failure.
Place 1SA-D2 and 1SB-D2 in NORM-AFT-TRIP
Start FS-P-2
Use OP-TM-864-901 to place SBO on "D" bus IAW section 4.1

2. When the above steps are completed for this and other JPMs to be run concurrently, then validate the concurrently run JPMs using the JPM Validation Checklist.

3. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

OP-TM-864-901 Step 5.0

Performance Step: 1 NOTE 1 Section 5.1 or 5.2 is used only as a transition to offsite power when a reliable source of offsite power is available.

NOTE 2 If the SBO is loaded on 1C 4160V bus parallel operation with offsite power is not used. The transition to offsite power will require a dead bus transfer.

Standard:
- Determines Section 5.1 will apply as offsite power is reliably carrying all other busses.
- Determines Note does NOT apply.

Comment:

OP-TM-864-901, Step 5.1.1

Performance Step: 2 Verify 1B Auxiliary Transformer has been energized.

Standard:
- Determines 1B Auxiliary transformer is energized by noting "C" 4160 volt bus energized from 1B or 1B 7 kV energized from 1B auxiliary transformer.

Evaluator Cue: **If asked, as CRS, confirm all problems with 1D bus were repaired.**

Comment:

OP-TM-864-901, Step 5.1.2

√ **Performance Step: 3** ENSURE synch switch for 1SB-D2 is "ON"

Standard:
- Inserts synch switch handle and rotates to "ON" position, may observe lights below synch meter to verify "ON".

Comment:

OP-TM-864-901, NOTE after Step 5.1.2

Performance Step: 4 If any adjustments to auxiliary transformer LTC settings are required, these adjustments are performed IAW 1107-11 or OP-TM-AOP-020 depending on whether power is available to LTC.

Standard:
- Determines 1107-11 will be used if needed due to power available.

Comment:

OP-TM-864-901, Step 5.1.3

Performance Step: 5 VERIFY Auxiliary Transformer 1B output "system kilovolts" is between 4000 and 4300 V.

Standard: Verifies voltage in the band of 4000-4300 on Console Right (CR) System kV meter.

Comment:

OP-TM-864-901, Step 5.1.4

√ **Performance Step: 6** PLACE the "UNIT/PARALLEL" switch in PARALLEL position

Standard:
- Calls AO at SBO to have switch placed in parallel.

ICO NOTE: Use Remote Function EGR23 to PARALLEL

Comment:

OP-TM-864-901, Step 5.1.5

Performance Step: 7 ADJUST "SPEED DROOP" to 70% in increments of 10% or less.

Standard:
- Calls AO at SBO to have "SPEED DROOP" adjusted in increments of 10% or less to 70%.

ICO NOTE: <u>SLOWLY</u> adjust Speed Droop using REMOTE FUNCTION EGR22 to 70%, follow candidate instructions 10% at a time using 3-way communications worked well in validation.

Comment:

OP-TM-864-901, Step 5.1.6

√ **Performance Step: 8** ADJUST SBO "GOVERNOR" to maintain frequency between 59 and 61 Hz.

Standard:
- Uses Governor Control Switch (CR) to raise speed, compensating for lowering speed due to adjustment of Droop.

Comment:

OP-TM-864-901, Step 5.1.7

Performance Step: 9 ENSURE "EXCITER" control in manual.

Standard:
- Verifies "EXCITER" control on (CR) is in manual.

Comment:

Evaluator Note: **1107-11 does not work well here as 1D bus is not connected to transformer LTC adjustments do not affect 1D bus.**

OP-TM-864-901, Step 5.1.8

√ **Performance Step: 10** PLACE Auxiliary Transformer 1B LTC in MANUAL IAW 1107-11.

Standard:
- Places control switch 1B LTC to manual on (PR)

Evaluator Cue: **If asked: provide 1107-11.**

Comment:

Evaluator Note: **No adjustment required during validation**

OP-TM-864-901, Step 5.1.9

Performance Step: 11 ADJUST "Manual Voltage Controller" to maintain "generator kilovolts" between 0 and 50 volts above "system kilovolts".

Standard:
- Rotates manual voltage controller clockwise to raise SBO voltage to be 0 to 50 volts higher than 1D incoming voltage. Using Generator and System Kilovolt indicators on (CR).

Comment:

OP-TM-864-901, Step 5.1.10

√ **Performance Step: 12** ADJUST SBO "GOVERNOR" to get synchroscope rotating SLOWLY (less than 1 rotation in 15 seconds) in the CLOCKWISE direction.

Standard:
- Adjusts SBO "GOVERNOR" on (CR) to get synchroscope rotating SLOWLY (less than 1 rotation in 15 seconds) in the CLOCKWISE direction. By raising/lowering as necessary.

Comment:

OP-TM-864-901, Step 5.1.11

√ **Performance Step: 13** When synchroscope is between "5 to 12" and "12 o'clock", then CLOSE 1SB-D2.

Standard:
- When synchroscope is between "5 to 12" and "12 o'clock", closes 1SB-D2 on (CR) by rotating clockwise and observing RED light on GREEN Light OFF.

Comment:

OP-TM-864-901, Step 5.2.12

Performance Step: 14 ADJUST "Manual Voltage Controller" to maintain reactive load between zero and +2.25 MVAR

Standard:
- Adjusts manual controller on (CR) as necessary.

Comment:

OP-TM-864-901, Step 5.2.13

Performance Step: 15 PLACE synch switch at 1SB-D2 to "OFF"

Standard:
- Turns synch switch on (CR) to off.

Comment:

Evaluator Cue: **If asked, report that MU-P-1A is the ES selected Makeup pump.**

OP-TM-864-901, Step 5.2.14

√ **Performance Step: 16** PLACE the following control switches in Normal-After-Stop (i.e. return to STANDBY) or as directed by CRS.

A. BS-P-1A

B. The ES selected MU pump: MU-P-1A or MU-P-1B-D.

C. DH-P-1A

D. RR-P-1A

E. EF-P-2A

Standard: Places the following control switches in Normal-After-Stop by pushing down on extension control and rotating clockwise until "green flagged"

A. BS-P-1A (CC)

B. MU-P-1A (CC)

C. DH-P-1A (CC)

D. RR-P-1A (CC)

E. EF-P-2A (CL)

Comment:

OP-TM-864-901, Step 5.1.15

Performance Step: 17 GO TO Section 5.3

Standard:
- Goes to section 5.3 of procedure.

Comment:

OP-TM-864-901, Step 5.3.1

Performance Step: 18 ENSURE Fire Service pressure > 80 psig.

Standard:
- Verifies fire service pressure on (PL).

Comment:

OP-TM-864-901, Step 5.3.2

Performance Step: 19 ADJUST Governor to maintain EG-Y-4 load < 3000kW.

Standard:
- No Adjustment should be required.

Comment:

OP-TM-864-901, Step 5.3.3

Performance Step: 20 ADJUST Voltage control as needed to maintain reactive load between zero and +2.25 MVAR **or** less than Capability Limit per Figure 1 of 1107-9.

Standard:
- No Adjustment should be required.

Comment:

OP-TM-864-901, Step 5.3.4

Performance Step: 21 ENSURE AH-E-197A or AH-E-198 are Operating.

Standard:
- Calls AO at SBO to ensure fans operating.

ICO NOTE: Report AH-E-197A is operating normally.

Comment:

OP-TM-864-901, Step 5.4.2 (Step 5.4.1 is N/A)

Performance Step: 22 If EG-Y-4 is supplying an ES 4160V bus, then

1. Verify RELIABLE OFFSITE power is available to the ES 4160V bus.
2. VERIFY 1SB-D2 or 1SA-E2 is closed.

Standard:
- Determines reliable power is available as all other busses are on OFFSITE POWER.
- Verifies 1SB-D2 is closed.

Evaluator Cue: **If asked: Offsite power is reliable**

Comment:

OP-TM-864-901, Step 5.4.3 (Step 5.4.1 is N/A)

Performance Step: 23 If G2-12 is CLOSED, then gradually REDUCE GOVERNOR to ~0.3MW.

Standard:
- Reduces load by rotating Governor Control Switch in the counter clockwise direction (several times if necessary) to reduce load while monitoring MWe for about 0.3.

Comment:

OP-TM-864-901, Step 5.4.4

√ **Performance Step: 24** OPEN G2-12 and PLACE switch in Normal-After-Trip position.

Standard:
- Rotates G2-12 switch on (CR) counterclockwise to Stop and releases switch.

Comment:

OP-TM-864-901, Step 5.4.5

Performance Step: 25 ENSURE the following breaker extension controls are in Pull-To-Lock.

1. T1-D2 is in Pull-To-Lock.
2. T1-E2 is in Pull-To-Lock.

Standard: T1-D2 on (CR) is rotated counterclockwise and pulled to place in Pull-To-Lock.

T1-E2 is verified by observation to be in Pull-To-Lock.

Comment:

Terminating Cue: **When T1-D2 is placed in Pull-To-Lock the JPM may be terminated.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM F

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the Assist Reactor Operator (ARO).
- Loss of 1D 4160 volt bus occurred.
- EG-Y-1A failed to start.
- "D" 4160 volt bus is being fed from the SBO diesel.
- OP-TM-864-901 is in progress.

INITIATING CUE: The CRS has directed you to restore normal power to the 1D 4160 volt bus IAW OP-TM-864-901.

Facility:	TMI Unit 1	Task No.:	66101004
Task Title:	Respond IAW OP-TM-MAP-C0101 Alarm Response with Failure	JPM No.:	2011 NRC JPM G
K/A Reference:	072 A3.01 (2.9 / 3.1)	Modified from 2007 NRC exam	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:
- For this event you are assigned the duties of the Assistant RO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-MAP-C0101, Radiation Level HI
OP-TM-826-901, CONTROL BUILDING VENTILATION SYSTEM RADIOLOGICAL RESPONSE OPERATIONS

Handouts: None

Initiating Cue: Respond to the cues and indications given by the simulator as well as any input from the CRS.

Time Critical Task: No

Validation Time: 10 Minutes

SIMULATOR SETUP

1. Reset the simulator to IC 16 (Temporarily snapped into IC-237)
2. Insert the following Malfunctions:

   RM01G, AH-E-17A fails to trip on interlock, insert immediately

   13A6S06ZDICSAHE18B(5) str to OFF, AH-E-18B fails to start, insert immediately

   Create or Verify the following Batch File (RMA1.bat)

   Set RMPASSWORD = 168

   Set RM:NEWFILE = True

   Set RMRAMPIN = 1

   Set RMARMA1Gnew = 3000

   Set RMARMA1Pnew = 4020

3. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.

4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

ICO Cue:	When directed by the Evaluator, type into expert command **RMA1.bat**
	OP-TM-MAP-C0101, Step 4.1
Performance Step: 1	ANNOUNCE alarm over plant page and radio.
Standard:	• Announces RM-A-1 Hi Alarm over the plant page and radio.
Evaluator Cue:	**As CRS, acknowledge condition and entry into OP-TM-MAP-C0101.**
Comment:	
	OP-TM-MAP-C0101, Step 4.2
Performance Step: 2	NOTIFY Radiation Protection to verify the alarm and determine the source.
Standard:	• Notifies Radiation Protection to verify the alarm and determine the source.
ICO Cue:	**Acknowledge, as RadPro to verify the alarm and determine the source.**
Comment:	
	OP-TM-MAP-C0101, Step 4.3.1
Performance Step: 3	IAAT High alarm is Lit, then PERFORM OP-TM-826-901, " Control Building Ventilation System Radiological Response Operations":
Standard:	• Verifies **RM-A-1** High alarm is Lit (PRF), **and goes to** OP-TM-826-901.
Comment:	

OP-TM-826-901, Step 4.1.2

√ **Performance Step: 4**

ENSURE the following fans are shutdown:

- AH-E-17A and AH-E-17B
- AH-E-95A and AH-E-95B
- AH-E-20A and AH-E-20B

Standard:

- Ensures AH-E-17B, AH-E-95A/B, AH-E-20A/B are shutdown.
- Recognizes that AH-E-17A is running and secures AH-E-17A, by rotating extension control in the counter-clockwise direction (H&V A).

Comment:

OP-TM-826-901, Step 4.1.3

Performance Step: 5

- SHUTDOWN AH-E-19A and AH-E-19B.

Standard:

- Verifies AH-E-19B secure and secures AH-E-19A by rotating extension control in the counter-clockwise direction (H&V A).

Comment:

OP-TM-826-901, Step 4.1.4

Performance Step: 6

- ENSURE AH-D-28 or AH-D-617 are CLOSED.

Standard:

- Ensures AH-D-28 or AH-D-617 is CLOSED by observation of indication on H&V Center and/or PCR.

Comment:

OP-TM-826-901, Step 4.1.5

Performance Step: 7
- PLACE ext. control for AH-E-93/94A and AH-E-93/94B to the OFF position.

Standard:
- Places ext. controls for AH-E-93/94A and AH-E-93/94B to the OFF position on H&V Center.

Comment:

OP-TM-826-901, Step 4.1.6

Performance Step: 8
- START AH-E-18B (A) if AH-E-17A (B) was previously operating.

Standard:
- Attempts to start AH-E-18B (H&V B), by rotating extension control to start and waiting for discharge damper to drive to the open position, recognizes it does not start.

Comment:

Alternate Path begins here. The opposite train from the operating will not start. Opposite train is used to prevent reverse rotation of fan. Student must recognize and identify the need to allow five minute coast down of AH-E-18A and then proceed with "A" train vice expected "B" train.

OP-TM-826-901, Step 4.1.7

√ **Performance Step: 9**
- If the opposite train of ventilation is unavailable, then WAIT 5 minutes after AH-E-17A (B) was shutdown and START AH-E-18A (B).

Standard:
- Waits 5 minutes
- Starts AH-E-18A by rotating extension control on H&V A clockwise and holding until the discharge damper travels and the RED light comes on indicating AH-E-18 contactor picked up.

Evaluator Cue: **When the candidate states that there is a 5 minute wait, announce "time compression is in effect and 5 minutes has elapsed".**

Comment:

OP-TM-826-901, Step 4.1.8

Performance Step: 10 • ENSURE AH-E-19A or B is operating.

Standard: • Ensures AH-E-19A is operating, by observing RED light (H&V A).

Comment:

OP-TM-826-901, Step 4.1.9

Performance Step: 11 ENSURE AH-E-95A or B is operating.

Standard: • Ensures AH-E-95A is operating by observing RED light H&V Center.

Comment:

GUIDE 9, RCS INVENTORY CONTROL Step C.5 RNO

Performance Step: 12 START AH-E-90 and AH-E-91.

Standard: • Orders an NLO to START AH-E-90 and AH-E-91.

ICO Cue: Acknowledge, as an NLO, to start AH-E-90 and AH-E-91.

Comment:

Terminating Cue: **When AH-E-18A has been started and the order has gone out to an NLO to start AH-E-90/91: Evaluation on this JPM is complete.**

VERIFICATION OF COMPLETION

Job Performance Measure No.:

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the Assistant RO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.

INITIATING CUE: Respond to the cues and indications given by the simulator as well as any input from the CRS.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	53101011
Task Title:	Cross Connect the Secondary River Water System to the Nuclear River Water System	JPM No.:	2011 NRC JPM H
K/A Reference:	026 AA2.02 (2.9/3.6)		Modified Bank TQ-TM-104-531-J001

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom _____ Simulator __X__ Plant _____

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- For this event you are assigned the duties of the Unit RO.
- NR-P-1B is tagged out for maintenance, 12 hours in to a 36-hour outage.
- NR-P-1C tripped 6 minutes ago.
- OP-TM-AOP-031, LOSS OF NUCLEAR SERVICES COMPONENT COOLING, was entered due to NS cooler outlet temperature approaching 100°F. Progression through step 3.8 has just been completed.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-EOP-001, REACTOR TRIP, Rev. 10

OP-TM-AOP-031, LOSS OF NUCLEAR SERVICES COMPONENT COOLING, Rev. 4

OP-TM-541-901, CROSS-TIE SECONDARY RIVER TO SUPPLY NUCLEAR RIVER, Rev. 0

Handout:	OP-TM-AOP-031, LOSS OF NUCLEAR SERVICES COMPONENT COOLING, Rev. 4, signed off through Step 3.8
Initiating Cue:	The CRS has directed you to Cross-Tie Secondary River to supply Nuclear River IAW OP-TM-541-901.
Time Critical Task:	NO
Validation Time:	25 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-238)

1. Ensure NR-P-1A/C are running.
2. Place NR-P-1B extension controls in PTL on CC and CR. Hang information tags on both switches.
3. Insert remote function **RWR10** to OUT, to rack out breaker for NR-P-1B
4. Open NR-V-4A and NR-V-4B on PL. (note, NR-V-4A is a jog control valve therefore opening requires the switch to be held down until only the open light is on.)
5. Insert malfunction **RW02C** to trip NR-P-1C.
6. Insert LO Overrides to illuminate NR-V-4A/B closed lights:
    - **04A2S04-ZLONRV4BG GRN NR-V-4BG** Value - ON
    - **04A2S08- ZLONRV4BR RED NR-V-4BR** Value - OFF
    - **04A2S11-ZLONRV4AG GRN NR-V-4AG** Value - ON
    - **04A2S15-ZLONRV4AR RED NR-V-4AR** Value – OFF
    - **08A1S40-ZLOPCRNRV4A(1) BLU** Value – ON
    - **08A1S40-ZLOPCRNRV4A(2) AMB**Value – OFF
    - **08A3S17-ZLOPCRNRV4B(1) BLU** Value – ON
    - **08A3S17-ZLOPCRNRV4B(2) AMB**Value – OFF
7. Perform OP-TM-EOP-001 IMA's and execute OP-TM-AOP-031 up through Step 3.8
8. Raise River Water temperature high enough to result in NS cooler outlet temperature > 100°F
    - Insert Remote Function **RWR14** at 100°F (It takes ~ 6 minutes in run for NS Cooler Outlet Temperatures to exceed 100°F)
9. Adjust MUT level for current plant conditions (**MUMMT** to 27500)

10. Set **Event 1** to close the following breakers:

    - **RWR19** 1A ES SHMCC Unit 2B (NR-V-3) Value – CLOSE
    - **RWR20** 1A ESV MCC Unit 8D (NR-V-5) Value – CLOSE
    - **RWR21** 1B ESV MCC Unit 10D (NR-V-6) Value – CLOSE

11. Place the simulator in FREEZE

12. When the above steps are completed for this and other JPMs to be run concurrently then validate, if not previously validated, the concurrently run JPMs using the JPM Validation Checklist.

13. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE:	**When OP-TM-541-901 has been located, provide a copy of OP-TM-541-901.**
Performance Step: 1	OP-TM-541-901, PRECAUTIONS, LIMITATIONS, AND PREREQUISITES Precautions - None Limitations - To prevent SR pump motor overload, maintain secondary river header pressure (as read on SR-PI-134) greater than 21 psig. Prerequisites - VERIFY one of the following conditions: • Reactor is shutdown • TS 3.0.1 action statement has been entered
Standard:	Examinee verifies the reactor is shutdown.
Comment:	
EVALUATOR NOTE:	**Step 4.1 is N/A**
Performance Step: 2	OP-TM-541-901, Step 4.2 ENSURE NR-V-4A or NR-V-4B is Closed.
Standard:	Notes both NR-V-4A and NR-V-4B are Closed as indicated by Green lights on PL or Blue lights on (PCR).
Comment:	

OP-TM-541-901, Step 4.3

Performance Step: 3 ENSURE discharge valves are Closed on all NR or SR pumps which are shutdown.

Standard: Examinee closes the discharge valves on all non-running NR and SR pumps, by depressing close PB NR-V-1C on (CR) and close PB SR-V-1A (CL).

Comment:

OP-TM-541-901, Step 4.4

Performance Step: 4 DISPATCH an Operator to Close the following breakers:

- 1A ES SCREEN HOUSE MCC UNIT 2B (NR-V-3)
- 1A ES VALVES MCC UNIT 8D (NR-V-5)
- 1B ES VALVES MCC UNIT 10D (NR-V-6)

Standard: Examinee contacts an AO and directs closing of the breakers for NR-V-3, NR-V-5, NR-V-6.

BOOTH OPERATOR CUE: **When requested to close the breakers for NR-V-3, NR-V-5, and NR-V-6:**

- **Acknowledge the request.**
- **Insert Event 1. Ensure RWR19, RWR20, RWR21 inserted.**
- **Report that the breakers for NR-V-3, NR-V-5, and NR-V-6 are closed**

Comment:

OP-TM-541-901, Step 4.5

Performance Step: 5 IAAT NR piping between NR-V-3 and NR-V-5 is ruptured or blocked, then CLOSE the following valves:

- NR-V-3
- NR-V-5

Standard: Determines no rupture in piping, leaves the step open (IAAT).

Comment:

OP-TM-541-901, Step 4.6

√ **Performance Step: 6** ENSURE the third Secondary River pump is operating.

Standard: Starts the third SR pump SR-P-1A by rotating extension control clockwise (CL) observes RED light on GREEN light off.

Comment:

OP-TM-541-901, Step 4.7

√ **Performance Step: 7** ENSURE SR pump discharge valves are OPEN.

Standard: Opens the discharge valve for SR-P-1A, SR-V-1A by depressing Open PB. Notes GREEN light out, RED light lit.

Comment:

EVALUATOR NOTE: **Alternate Path begins, with report of rupture. Normal cross-connect path must be abandoned and the alternate bypass path used.**

BOOTH OPERATOR CUE: **As the Outbuildings AO, contact the Control Room and inform the Examinee:**

"I am on my Screen House rounds and I've noticed there is a pipe rupture in the line just downstream of NR-V-3. I am exiting the Screen House."

OP-TM-541-901, Step 4.5

√ **Performance Step: 8** IAAT NR piping between NR-V-3 and NR-V-5 is ruptured or blocked, then CLOSE the following valves:
- NR-V-3
- NR-V-5

Standard: Presses the CLOSE pushbuttons for NR-V-3 and NR-V-5 (CC). Notes green light lit, red light out.

Comment:

OP-TM-541-901, Step 4.8

√ **Performance Step: 9** OPEN NR-V-2.

Standard: Presses the OPEN pushbutton for NR-V-2 (CC). Notes green light out, red light lit.

Comment:

OP-TM-541-901, Step 4.9

√ **Performance Step: 10** OPEN NR-V-7.

Standard: Presses the OPEN pushbutton for NR-V-7 (CC). Notes green light out, red light lit.

Comment:

OP-TM-541-901, Step 4.10

Performance Step: 11 WAAT 1B ES VALVES MCC UNIT 10D is CLOSED, then OPEN NR-V-6.

Standard: Presses the OPEN pushbutton for NR-V-6. Notes green light out, red light lit.

Comment:

OP-TM-541-901, Step 4.11

Performance Step: 12 THROTTLE SR-V-2 to maintain Secondary River discharge pressure (SR-PI-134) above 21 psig.

Standard: If necessary, Examinee throttles SR-V-2 to maintain Secondary River discharge pressure (SR-PI-134) above 21 psig.

Comment:

EVALUATOR NOTE: **NR-V-16A is an Appendix R valve, power is removed and the valve is full open.**

EVALUATOR NOTE: **NR-V-16B/C are full open already.**

EVALUATOR NOTE: **NR-V-16D should not need to be manipulated (per validation results). NS cooler outlet temperature should be less than 95°F and slowly lowering.**

OP-TM-541-901, Step 4.12

Performance Step: 13 THROTTLE OPEN NR-V-16A, B, C, D to maintains NS cooler outlet temperature less than 95 °F.

Standard: If needed, Examinee throttles open NR-V-16D to maintains NS cooler outlet temperature less than 95 °F.

Comment:

OP-TM-541-901, Step 4.13

√ **Performance Step: 14** THROTTLE OPEN NR-V-15A, B to maintain IC cooler outlet temperature less than 100 °F.

Standard: Examinee throttles NR-V-15A, B on (CR) by pressing open PB for short periods of time, to maintain IC cooler outlet temperature less than 100 °F.

Comment:

Terminating Cue: **When candidate has control of outlet temperatures (a lowering trend), JPM may be terminated.**

STOP TIME: _____ TIME CRITICAL STOP TIME: N/A

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2011 NRC JPM H

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the Unit RO.
- NR-P-1B is tagged out for maintenance, 12 hours in to a 36-hour outage.
- NR-P-1C tripped 6 minutes ago.
- OP-TM-AOP-031, LOSS OF NUCLEAR SERVICES COMPONENT COOLING, was entered due to NS cooler outlet temperature approaching 100°F. Progression through step 3.8 has just been completed.

INITIATING CUE: The CRS has directed you to Cross-Tie Secondary River to supply Nuclear River IAW OP-TM-541-901.

TIME CRITICAL: No

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility: Three Mile Island Unit 1 Task No.: 42404003

Task Title: Manually Operate MU-V-20 and IC-V-4 JPM No.: 2011 NRC JPM I

K/A Reference: 015/017 AA1.07 (3.5 / 3.4) Bank TQ-TM-105-852-J002

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator _____ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- A Loss of Instrument Air has occurred
- OP-TM-AOP-028 has been entered
- The reactor has been tripped and OP-TM-EOP-001 actions have been completed
- An Auxiliary Operator has been directed to block open IC-V-3.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-AOP-028, Loss of Instrument Air
OP-TM-541-429, Manual Operation of IC-V-4
Locally Posted Instructions

Handout: None

Initiating Cue: The In-Plant supervisor has directed you to place MU-V-20 and IC-V-4 in the BLOCKED OPEN position to prevent the loss of Reactor Coolant Pump Seal Injection and Intermediate Closed Cooling Water.

Time Critical Task: No

Validation Time: 28 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluator Note: **When examinee identifies that a "locked valve" key is needed, simulate handing the examinee a "locked valve" key**

Performance Step: 1 Obtain a locked key valve

Standard:
- Examinee obtains a locked key valve

Comment:

Evaluator Note: **Either MU-V-20 or IC-V-4 may be operated first.**

Performance Step: 2 Go to MU-V-20 and establish communications with the Control Room

Standard:
- Locates MU-V-20 and simulates establishing communications with the Control Room.

Evaluator Cue: **Role-play as the Control Room Operator for communications.**

Comment:

√ **Performance Step: 3** Unlock MU-V-20 handwheel

Standard:
- Examinee simulates unlocking and removing the chain from the MU-V-20 handwheel.

Evaluator Cue: **After the simulation is performed correctly, inform the examinee that MU-V-20 is unlocked and the chain removed.**

Comment:

√ **Performance Step: 4** Rotate the MU-V-20 handwheel in the OPEN direction (counter-clockwise) until upper local indicator is at the OPEN position (full down).

Standard:
- Examinee simulates rotating the MU-V-20 handwheel in the OPEN direction (counter-clockwise) until upper local indicator is at the OPEN position (full down).

Evaluator Cue: **After the simulation is performed correctly, inform the examinee that the upper local indicator is at the "FULL DOWN" position.**

Comment:

Evaluator Note: **Either MU-V-20 or IC-V-4 may be operated first.**

Performance Step: 5 Go to IC-V-4 and establish communications with the Control Room

Standard:
- Locates IC-V-4 and simulates establishing communications with the Control Room.

Evaluator Cue: **Role-play as the Control Room Operator for communications.**

Comment:

Performance Step: 6 Verify IC-V-4 is open.

Standard:
- Examinee verifies IC-V-4 is open by observing the dial indication on top of the valve is pointing towards the "OPEN" label.

Comment:

Evaluator Note: **The bolt loosened in the next step is physically located on the back left corner of the stop plate.**

√ **Performance Step: 7** Loosen bolt in the 10% stop plate

Standard:
- Examinee simulates loosening the bolt in the 10% stop plate

Evaluator Cue: **After the simulation is performed correctly, inform the examinee that the bolt is loosened.**

Comment:

√ **Performance Step: 8** Slide Stop Plate up IC-V-4 shaft

Standard:
- Examinee simulates sliding Stop Plate up IC-V-4 shaft

Evaluator Cue: **After the simulation is performed correctly, inform the student that the stop plate has been moved up the shaft.**

Comment:

√ **Performance Step: 9** Align bolt hole in 10% stop plate with bolt hole in valve shaft

Standard:
- Examinee aligns in 10% stop plate bolt with bolt hole in valve shaft

Evaluator Cue: **After the simulation is performed correctly, inform the student that the 10% stop plate bolt is aligned with bolt hole in valve shaft**

Comment:

√ **Performance Step: 10** Tighten bolt. IC-V-4 travel will now be limited to 10%

Standard:
- Candidate simulates tightening bolt.

Evaluator Cue: **After the simulation is performed correctly, inform the student that the bolt is tightened.**

Comment:

Performance Step: 11 Report to the Control Room that MU-V-20 AND IC-V-4 are in the Blocked Open position.

Standard:
- Examinee reports to the Control Room that MU-V-20 AND IC-V-4 are in the Blocked Open position.

Comment:

Terminating Cue: **JPM may be terminated when the examinee informs the Control Room that MU-V-20 AND IC-V-4 are in the Blocked Open position**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM I

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- A Loss of Instrument Air has occurred.
- OP-TM-AOP-028 has been entered.
- The reactor has been tripped and OP-TM-EOP-001 actions have been completed.
- An Auxiliary Operator has been directed to block open IC-V-3.

Initiating Cue: The In-Plant supervisor has directed you to place MU-V-20 and IC-V-4 in the BLOCKED OPEN position to prevent the loss of Reactor Coolant Pump Seal Injection and Intermediate Closed Cooling Water.

Facility:	Three Mile Island Unit 1	Task No.:	86104001
Task Title:	Local Start of EG-Y-1B and Loading of 1E 4160V bus	JPM No.:	2011 NRC JPM J
K/A Reference:	068 AA1.10 (3.7 / 3.9)		New for 2011 NRC JPM

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: ____

Classroom ____ Simulator ____ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- You are the Assistant RO.
- Due to a fire an immediate evacuation of the control room was required.
- All OP-TM-EOP-001 Reactor Trip IMA's were complete.
- OP-TM-EOP-020 Cooldown From Outside the Control Room is in progress all steps through and including 3.2 are complete.
- Attachment 12 actions, "Control Tower 3rd Floor Actions to Establish Control at Remote Shutdown Panels" has been completed.
- Report has been received that EF-P-1 has tripped and can not be reset.
- Power to the 1E bus has just been lost.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-EOP-020, COOLDOWN FROM OUTSIDE THE CONTROL ROOM Rev 12.

Handout: OP-TM-EOP-020, COOLDOWN FROM OUTSIDE THE CONTROL ROOM Attachment 9.

Initiating Cue:	The Shift Manager directs you to perform Attachment 9, Starting EG-Y-1B and Loading 1E 4160V bus, determination has been made that SCBAs are NOT required.
Time Critical Task:	No
Validation Time:	15 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluator Note:	**Provide Candidate with a copy of OP-TM-EOP-020 attachment 9.** EOP-020 Att. 9 step 1.1
Evaluator Cue:	If candidate indicates they are smelling for the indication of Wintergreen odor, tell them **"No wintergreen odor is detected"**
Performance Step: 1	**Trip** the following breakers on the 1E 4160V bus: • 1SA-E2 (Unit 1E14) • RR-P-1B (Unit 1E11) • BS-P-1B (Unit 1E10) • DH-P-1B (Unit 1E7) • T1-E2 (Unit 1E2) • 1SB-E2 (Unit 1E1)
Standard:	At the 336 elevation control tower, on the green 1E 4160V bus the candidate may trip each by depressing PB or if checked will find green lights on for each; • 1SA-E2 (Unit 1E14) • RR-P-1B (Unit 1E11) • BS-P-1B (Unit 1E10) • DH-P-1B (Unit 1E7) • T1-E2 (Unit 1E2) • 1SB-E2 (Unit 1E1)
Evaluator NOTE:	**Attachment 12 would have been performed by the ARO/STA previously therefore;** **All breakers above have had their locks unlocked and are positioned to emergency.** **If candidate tries to unlock "69" switch tell them it is unlocked and indicate the handle is pointed to emergency (Except BS-P-1B is in bypass, as it has no emergency)**
Evaluator Cue:	**For each breaker indicate the green light is on the red light is off.**

Comment:

EOP-020 Att. 9 Step 1.2.1 & 1.2.2

√ **Performance Step: 2** **Push** START for EG-Y-1B.

Verify READY light is lit.

Standard:
- (√) At the output breaker on 1E bus Examinee presses START PB.
- Verifies ready to load light on front of breaker.

Evaluator Cue: **After the PB is depressed and a 10 second time delay indicate Ready to load light (Green) is lit.**

Comment:

EOP-020 Att. 9 Step 1.2.3 & 1.2.4

√ **Performance Step: 3** (√) **UNLOCK and PLACE** FEEDER TRANSFER 69 switch in **EMERGENCY**

Notify operator at RSD panel that EG-Y-1B will be loaded.

Standard:
- Examinee simulates unlocking and placing in emergency FEEDER TRANSFER 69, by inserting key in 69 switch on the front of the diesel output breaker and rotating clockwise until it won't turn any further (it is now captured), then rotating handle clockwise to emergency position.

Evaluator Cue: **When described properly indicate the pointer is pointing toward EMERGENCY.**

If the handle is attempted to be turned without the key being inserted / rotated indicate handle would not turn.

Acknowledge as Remote Shutdown panel operator that the Diesel will be started.

Comment:

EOP-020 Att. 9 Step 1.2.5

√ **Performance Step: 4** **PUSH** "CLOSE" for G11-02.

Standard:
- Examinee simulates pressing close PB for G11-02 on the front of the output breaker.

Evaluator Cue: **If the steps above for the 69 switch were correct indicate a closing noise was heard, and Red light is ON Green light is OFF.**

NOTE: If the 69 switch is not in emergency the breaker will not close. (Green light remains lit.)

Comment:

EOP-020 Att. 9 Step 1.3

√ **Performance Step: 5** Perform the following to re-energize 'B' ES power train.

1. **NOTIFY** operator at RSD panel that the "B" ES power train will be reenergized.
2. (√) **PUSH** CLOSE for S1-02 (Unit 1E6).
3. (√) **PUSH** CLOSE for T1-02 (Unit 1E12)

Standard:
- Candidate contacts RSD panel operator by radio or red page.
- Candidate presses CLOSE PB on front of S1-02 breaker.
- Candidate presses CLOSE PB on front of T1-02 breaker.

Evaluator Cue: **Acknowledge report "B Train power is being restored"**

Indicate Red light on green light off on front of S1-02.

Indicate Red light on green light off on front of T1-02.

Comment:

EOP-020 Att. 9 Step 1.3.1

√ **Performance Step: 6**

IF EF-P-1 is **not** operating **then** perform the following to start EF-P-2B:

1. **NOTIFY** operator at RSD panel that EF-P-2B will be started.
2. (√) **PUSH** CLOSE for EF-P-2B (UNIT 1E5)

Standard:

- Candidate Notifies RSD operator via radio or RED phone.
- Candidate pushes close PB on front of EF-P-2B breaker.

Evaluator Cue:

Acknowledge report.

If candidate tries to insert key in 69 lock, lock has key and is in emergency.

When candidate indicates close PB is pushed, red light is lit and green light is out.

Comment:

Terminating Cue:

JPM may be terminated when the the breaker for EF-V-2B is closed.

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM J

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- You are the Assistant RO.
- Due to a fire an immediate evacuation of the control room was required.
- All OP-TM-EOP-001 Reactor Trip IMA's were complete.
- OP-TM-EOP-020 Cooldown From Outside the Control Room is in progress all steps through and including 3.2 are complete.
- Attachment 12 actions, "Control Tower 3rd Floor Actions to Establish Control at Remote Shutdown Panels" has been completed.
- Report has been received that EF-P-1 has tripped and can not be reset.
- Power to the 1E bus has just been lost.

Initiating Cue: The Shift Manager directs you to perform Attachment 9, Starting EG-Y-1B and Loading 1E 4160V bus, determination has been made that SCBAs are NOT required.

Appendix C	Job Performance Measure Worksheet	Form ES-C-1

Facility: Three Mile Island Unit 1 Task No.: EOPG15001

Task Title: Respond to a failure of EF-P-2A, and EF-V-30D. JPM No.: 2011 NRC JPM K

K/A Reference: 061 A2.04 (3.4 / 3.8) Modified for 2011 NRC

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator _____ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Initial Conditions:

- Post trip with EFW Actuation and you are the operator responding to EFW Actuation.
- EF-P-2B was OOS prior to the event.
- EF-P-2A is running and has failed to develop adequate discharge pressure. EF-PI-71, EF-P-2A DISCHARGE PRESSURE INDICATOR, is currently reading 400 psig in the Control Room.
- OTSG pressures are 1010 psig.
- 1D 4Kv bus is 4160 volts.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-424-901 Emergency Feedwater

Handout: OP-TM-424-901 Emergency Feedwater

Initiating Cue: The CRS has given you OP-TM-424-901, and requests you to investigate for possible steam binding IAW section 4.2.3.

Time Critical Task: No

Validation Time: 13 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluator Note:	**If requested provide the following EF-P-2A status when on scene Discharge pressure is still approximately 400 psig, the pump is running, 1D 4Kv bus is 4160 volts.**
	OP-TM-424-901 4.2.3 Discharge temperature
Performance Step: 1	Determine discharge piping temperature of EF-P-2A
Standard:	• Locates and reads strap on gage on discharge of EF-P-2A.
Evaluator Cue:	• **When gage is located point to 230°F (middle of the orange zone) and indicate that is what it is reading.**
Comment:	
	OP-TM-424-901 4.2.3.3 & (A) & (B)
Performance Step: 2	Reports temperature to Control Room and requests they perform steps "A" and "B" defeating start signals and placing pump in pull to lock.
Standard:	• Communicates with Control Room status of temperature and request that they complete the next two steps.
Evaluator Cue:	**Acknowledge temperature reported and after three-way communication inform candidate that HSPS is defeated and EF-P-2A is in PTL.**
Comment:	

OP-TM-424-901 4.2.3.3 (C)

√ **Performance Step: 3** Open EF-V-1024 to drain condensate through the pump.

Standard:
- Proceeds to EF-V-1024 west wall by base of pump, simulates opening EF-V-1024 by rotating counter clockwise.

Evaluator Cue:
- **After a period of steam vapor venting from pipe end a steady stream of water is now seen.**

Comment:

OP-TM-424-901 4.2.3.3 (D)

√ **Performance Step: 4** Verifies temperature is below 200°F on strap on gage on discharge of EF-P-2A, then closes EF-V-1024.

Standard:
- Verifies temperature on gage
- Simulates closing EF-V-1024 by rotating handwheel clockwise.

Evaluator Cue:
- **When gage is looked at indicate 100°F on gage face.**
- **When valve is correctly simulated closed indicate flow from pipe stopped.**

Comment:

OP-TM-424-901 4.2.3.3 (E)

Performance Step: 5 Reports status of venting to Control Room and requests that Control Start EF-P-2A.

Standard:
- Contacts Control Room and report pump vented and requests Control Room Complete 4.2.3.3 (E)

Evaluator Cue:
- **Acknowledge Cue and report pump is now operating with excessive flow to "A" OTSG EF-V-30A and EF-V-30 D have been closed but flow continues, Report positions of EF-V-30A and EF-V-30D.**

Comment:

OP-TM-424-901

Performance Step: 6 Candidate verifies Valve position of EF-V-30A and EF-V-30D.

Standard:
- Valve position of EF-V-30A and EF-V-30D verified by valve position indicator on side of valve.

Evaluator Cue:
- **When EF-V-30A is verified point to the full closed position, when EF-V-30D is verified point to the full open position.**

Comment:

OP-TM-424-901

Performance Step: 7 Candidate reports positions of EF-V-30A and EF-V-30D to Control Room.

Standard:
- Valve position of EF-V-30A reported as CLOSED and EF-V-30D reported as OPEN.

Evaluator Cue:
- **Acknowledge report Request candidate stop flow through the "D" EFW line IAW section 4.3.**

Comment:

OP-TM-424-901 4.3.2 (1)

√ **Performance Step: 8** Close EF-V-52D to isolate EF-V-30D

Standard:
- Candidate simulates closing EF-V-30D by turning hand wheel clockwise

Evaluator Cue:
- **If candidate simulates closing EF-V-30D correctly and reports it closed to Control Room then report "Control room has control of EFW."**
- **If candidate closes incorrect valve or does not properly simulate closing EF-V-52D and reports it closed to Control Room then report "High Flow continues to "A" OTSG."**

Comment:

Terminating Cue: **JPM may be terminated when EF-V-52D is closed.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2011 NRC JPM K

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- Post trip with EFW Actuation and you are the operator responding to EFW Actuation.
- EF-P-2B was OOS prior to the event.
- EF-P-2A is running and has failed to develop adequate discharge pressure. EF-PI-71, EF-P-2A DISCHARGE PRESSURE INDICATOR, is currently reading 400 psig in the Control Room.
- OTSG pressures are 1010 psig.
- 1D 4Kv bus is 4160 volts.

Initiating Cue: The CRS has given you OP-TM-424-901, and requests you to investigate for possible steam binding IAW section 4.2.3.

Facility:	Three Mile Island		Scenario No.:	2	Op Test No.: 289-2011-301
Examiners:			Operators:		
Initial Conditions:	• (Temporary IC-52)				
	• 100% Power, MOL				
Turnover:	Maintain 100% Power Operations				
Critical Tasks:	• Establish FW Flow and Feed SG(s) (CT-10)				
	• Electrical Power Alignment (CT-8)				
	• Protect against RCP Seal LOCA (CT-*)				

Event No.	Malf. No.	Event Type*	Event Description
1	MU01B	C CRS C URO C ARO TS CRS	MU-P-1B Trips (TS), entry into OP-TM-AOP-041 (URO: ensures MU-V-32 is in HAND and closed, ARO: Starts MU-P-1A)
2	ED18B	C CRS C ARO TS CRS	Loss of the 8 Bus (TS) with EG-Y-1B failing to start, entry into OP-TM-AOP-014 (ARO: Starts the SBO)
3	NI27A IC48	I CRS I URO I ARO	Narrow Range Pressure Instrument Fails high with SASS failure to actuate, entry into OP-TM-MAP-G0308 (URO: Closes Spray Valve, selects Alternate Pressure Instrument, ARO: Manual control of Pressurizer Heaters)
4	FW15B	N CRS R URO N ARO	Loss of FW-P-1B, entry into OP-TM-MAP-M0107, Runback Fails to Occur, Power Reduction Performed, entry into OP-TM-MAP-H0101 and 1102-4
5	RD0230	TS CRS	Stuck Rod (TS), entry into OP-TM-AOP-062
6	ED18A	M CRS M URO M ARO	Loss of Offsite Power (tripping SBO output breaker), entry into OP-TM-AOP-020, OP-TM-EOP-001
7	ICR02 ICR04	C CRS C ARO	EFW Valves for "A" and "B" OTSG's fail to 0% in Auto, manual control required. (ARO)
8	EG01A	C CRS C URO	"A" EDG fails to start, manual start required. (URO)

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

NOTE: SCENARIO # 1 NOT INCLUDED IN PACKAGE WAS SPARE SCENARIO NOT USED ON EXAM PER REQUEST OF LICENSEE 9/8/11

Three Mile Island NRC Scenario #2

When the crew has accepted the watch, the Lead Examiner can cue the trip of MU-P-1B, which will cause Seal Injection Flow Low, to alarm. The crew will enter OP-TM-AOP-041 and will take action to restore letdown using MU-P-1A. When letdown is restored, the scenario can continue.

When letdown flow is restored, the Lead Examiner can cue the initiation of Loss of 8 Bus with EG-Y-1B failing to start. The operators will diagnose the Loss of 8 Bus and EG-Y-1B failure on alarms, half of the CR lighting going out, and lost equipment. The CRS will enter OP-TM-AOP-014, LOSS OF 1E 4160v Bus, and direct the operators to take actions. The ARO will place the 1E 4Kv bus on the SBO IAW OP-TM-864-901. The CRS will review T.S. and declare 3.7.2.b,c,d. Once the T.S. call is made and 1E 4Kv bus is energized, the scenario can continue.

When the Tech Spec call is made and 1E 4Kv bus is energized from the SBO, the Lead Examiner can cue the Narrow Range Pressure Instrument Failure. As the instrument failure is at a severity to open the Spray Valve, but not the PORV, the URO will close the spray valve IAW OP-TM-PPC-G0308 to mitigate Pressure drop and will select the alternate instrument. The ARO will take manual control of pressurizer heaters. When the alternate instrument is selected, the scenario can continue.

When the alternate instrument is selected, the Lead Examiner can cue the Loss of FW-P-1B. The runback does not occur and a power reduction must be performed by the crew. When the Lead Examiner has seen sufficient reactivity manipulation, the scenario can continue.

When the Lead Examiner has seen sufficient reactivity manipulation, the Lead Examiner can cue the stuck rod. Crew will enter OP-TM-MAP-G0201, CRD PATTERN ASYMMETRIC, for >7" difference and OP-TM-AOP-062, INOPERABLE ROD, for >9" and/or control rod cannot be exercised. CRS will declare T.S. 3.5.2.2.b.

Once the T.S. call has been made, the Lead Examiner can cue the Loss of Offsite power, which will result in a reactor trip and the crew will have to respond IAW OP-TM-EOP-001, Reactor Trip and OP-TM-AOP-020, Loss of Offsite Power. The way Offsite Power is lost will trip the SBO Diesel Generator IAW electrical schematics.

(CT-8) "A" EDG will fail to automatically start and after maintenance has fixed the problem, the URO will manually start it IAW OP-TM-861-901, thereby energizing the 1D 4kV bus.

(CT-10) EFW valves for the "A" and "B" OTSG's fail in auto to 0%. The ARO will take manual control and feed the OTSG's to 75-85% in the operating range. This avoids drying out of the OTSG's and ensures primary to secondary heat transfer is maintained in the OTSG's. The targeted level is set to enhance the establishment of natural circulation of the RCS. Failure criteria would be considered if the OTSG's go dry. Choosing a level other than 75-85% is not failure criteria as it will still establish Natural Circulation, although at a slower rate.

(CT-*) This is not a B&W Critical task however meets the Critical Task description of NUREG 1021. The actions taken per OP-TM-AOP-020 to Isolate seal injection (close MU-V-20) and prevent ICCW cooling to the seals in the event that they have exceeded 235F prevent warping the RCP seals and prevent creating 4 LOCAs into containment. Safety significance is reduction of inventory, and potential for water hammer event if cooling is restored (see OP-TM-226-901), cueing is procedural steps in AOP-020. Measurable is MU-V-20 close pushbutton depressed, and IC-P-1A and 1B pump extension controls placed in 'PTL'. Performance feedback will be

MU-V-20 closed and pumps in 'PTL' for success and rapid cooling of RCP seals for failure to take procedural actions.

The ARO will feed and steam the OTSGs to establish Natural Circulation IAW OP-TM-EOP-010, Guide 10.

The URO will Emergency borate IAW Rule 5 to compensate for the stuck rod.

The scenario can be terminated when Natural Circulation is verified, power is restored to a 4kv bus, and emergency boration is established.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-8 - Electrical Power Alignment - If station auxiliary power is not available, then perform the following:

- Initiate proper operation of emergency AC supply.
- In the event that no emergency AC supply (or alternate AC source) is available, then perform [SBO procedure] and continue attempts to restore AC power.

Safety Significance: Plant electrical power is necessary for the operation of normal and emergency plant equipment. Therefore, it is important that the plant operator provide normal AC power, usually supplied through the station auxiliary transformer(s). If normal AC power cannot be supplied, then actions are necessary to initiate operation of the emergency AC source(s) including alternate AC supplies, if applicable. If both normal and emergency AC power are lost, then a station blackout has occurred. For such events, station blackout procedures provide plant specific actions which are to be taken while efforts are being made to restore AC power. Providing normal AC power greatly enhances the transient mitigation capability of the plant, e.g., normal RCS make up systems remain operational.

Cues:

1. Auxiliary and emergency bus voltage low alarms
2. Verbal indication by plant staff that auxiliary and emergency AC bus voltage is low
3. Overhead lights turn off

Performance Indicators:

1. Operation of auxiliary/emergency AC power source controls (EG-Y-1A/SBO)

Feedback:

1. Auxiliary/emergency bus voltage normal
2. Verbal indication by plant staff of auxiliary/emergency AC power equipment status

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-10 - Establish EFW Flow and Feed SG(s) (Rule 4) - Failure to accomplish either this or HPI/PORV cooling and allowing the plant to heatup into a Loss of Subcooling would jeopardize fuel clad and should be considered failure to met the critical task. Primary to secondary cooling is preferred over HPI/PORV cooling due to:

- More stable
- Does not challenge RCS integrity
- Does not fill the Reactor Building with RCS water

Safety Significance: The normal method of core cooling is by transferring core heat to the RC, then transferring the heat from the RC to the secondary side steam system via the SGs. This mode of heat transfer requires that adequate inventory of feedwater be supplied to the SGs, either as a liquid level, liquid flowrate or both. In the event all feedwater is lost HPI cooling can provide backup cooling of the core; however, this mode causes degradation of the RB. It is the intention of the GEOG bases to maintain appropriate FW flow, including trickle feed, to the SGs if at all possible. This includes use of approved plant specific alternate FW sources (e.g., service water, fire water systems, etc.).

Cues:

1. Low FW flow alarms
2. SG low level alarms
3. Low SG pressure alarms
4. SPDS displays and associated alarms
5. Verbal alert by plant staff that all FW flow has been lost and/or SG(s) level is inappropriate for current plant conditions

Performance Indicators:

1. Operation of associated EFW valve controls.

Feedback:

1. EFW flow
2. SG level and pressure

3. RCS pressure and temperature
4. Verbal alert by plant staff of FW flow and/or SG(s) level status

Industry Experience:

- FW-P-1A Coupling Failure (TMI CR-00189457)
- Harris Nuclear Plant Manual Scram Due to Loss of Feedwater (12/14/99)
- Oconee 1 Loss of Feedwater (5/26/00)
- Low System Grid Voltage at TMI on 7/6/99 (Control Room Log)
- Fort St. Vrain Loss of all AC Power (Blackout) (10/27/83)
- SOER 99-1 Loss of Grid (12/99)

PRA

- Feedwater Transient (Initiating Event)
- Loss of Offsite Power (Initiating Event)
- Diesel Generator 1A loss (Risk Increase Factor)

Event	Description	Procedure Support
	Initial Set-up.	100% Power, MOL
1	MU-P-1B Trips	OP-TM-AOP-041, LOSS OF SEAL INJECTION
2	Loss of the 8 bus with EG-Y-1B failing to start	OP-TM-AOP-014, LOSS OF 1E 4160v BUS
		OP-TM-864-901, "SBO Diesel Generator (EG-Y-4) Operations
		T.S. 3.7.2.b, 3.7.2.c, 3.7.2.d
3	Narrow Range Pressure Fails High	OP-TM-MAP-G0205, PZR LVL HI/LO
4	Loss of FW-P-1B, Power Reduction due to Runback Failure	1102-4, POWER OPERATIONS
		OP-TM-MAP-M0107, FW-P-1B TRIP
		OP-TM-MAP-H0101, RUNBACK
		OP-TM-621-471 ICS Manual Operations
5	Stuck Rod	OP-TM-MAP-G0201, CRD PATTERN ASYMMETRIC
		OP-TM-AOP-062, INOPERABLE ROD
		OP-TM-621-471 ICS Manual Operations
		T.S. 3.5.2.2.b.
6	Loss of Offsite Power	OP-TM-EOP-001, Reactor Trip
		OP-TM-AOP-020, Loss of Offsite Power
7	EF-V-30A-D fail to 0% in auto.	OP-TM-424-901, Emergency Feedwater
8	"A" EDG fails to start, manual start required.	OP-TM-861-901, Diesel Generator EG-Y-1A Emergency Operations

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-52	100% HFP ICS full AUTO	Equilibrium XENON
Malfunction IC16	Value: Insert When: Immediately	Failure to Runback Scenario Support
Malfunction EG01A	Value: Insert When: Immediately	EG-Y-1A Fails to Auto Start
Malfunction EG01B	Value: Insert When: Immediately	EG-Y-1B Fails to Auto Start
Remote ICR02	Value: 0 When: Immediately	EF-V-30A/D fail in auto
Remote ICR04	Value: 0 When: Immediately	EF-V-30B/C fail in auto
Malfunction MU01B	Value: Insert When: EVENT #1	MU-P-1B Trip
Malfunction ED18B	Value: Insert When: EVENT #2	Loss of 8 Bus
Malfunction NI27A	Value: Severity 85 Ramp 30 When: EVENT #3	Narrow Range Pressure Instrument Fails Hi, SASS Fails to actuate
Malfunction FW15B	Value: Insert When: EVENT #4	Loss of FW-P-1B
Malfunction RD0230	Value: Insert When: EVENT #5	Stuck Control Rod
Malfunction ED18A	Value: Insert When: EVENT #6	Loss of Off-Site Power
03A8S03-ZDIDGSBOG212(4)	Value: On When: EVENT #6	Trips SBO

Op Test No.: 1	Scenario # 2	Event # 1	Page 8 of 37
Event Description:	MU-P-1B Trips, Loss of Seal Injection		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 1.		
Indications Available: Zero amps on MU-P-1B, Yellow disagreement light MU-P-1B, MAP B-1-2, MAP B-2-, F-1-5 Alarms.		
	Crew	Diagnoses the loss of MU-P-1B.
NOTE TO EXAMINER: The crew may additionally enter alarm responses and place MU-P-1B in Pull-to-Lock.		
	CRS	Announces entry into OP-TM-AOP-041, Loss of Seal Injection.
		OP-TM-AOP-041, Loss of Seal Injection
	N/A	IAAT ICCW flow is < 550 GPM (IC-5 FI) and SI Flow < 22 GPM, then perform the following: ___ A. ENSURE the reactor is tripped. ___ B. ENSURE all RCPs are tripped.
	N/A	IAAT ICCW flow < 550 GPM and #1 seal inlet temperature > 235°F, then perform the following: ___ A. CLOSE MU-V-20. ___ B. GO TO OP-TM-226-901, "Loss of All RCP Seal Cooling".
	URO	ENSURE MU-V-32 is in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and Closed by lowering on the toggle switch (CC) to a value of zero
	CRS	When 1D or 1E 4160V bus is energized, then CONTINUE.

Op Test No.: 1 Scenario # 2 Event # 1 Page 9 of 37

Event Description: MU-P-1B Trips, Loss of Seal Injection

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY a makeup pump is operating (MU header pressure MU2-PI is above RCS pressure) and aligned to seal injection. RNO: ENSURE MU-V-17 is Closed by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and Closed by lowering on the toggle switch (CC) to a value of zero VERIFY [MU-T-1 pressure and level are in the unrestricted operating region] or [MU-V-14A or B is Open]. If MU tank level was < 18" at any time, then PERFORM OP-TM-211-271 to vent the MU pumps. If MU-V-77A & B are Open, then GO TO Section 4.
	N/A	If MU-V-77A & B are Closed and HPI train B and Normal MU header piping is intact, then DISPATCH an operator to open MU-V-77A & B. (AB 281: MU valve alley)
	URO	ENSURE MU-P-1A is ES Selected. (CB 338: 1D 4160V Bus Unit 7)
	URO	VERIFY one of the following: _ MU-V-36 and 37 are Open _ MU-V-16A or 16B is Open
	ARO	ENSURE DR-P-1A and DC-P-1A are operating by rotating the control switch for each pump (CC) clockwise, observing red light lit, green light out, and indicated amps appear normal.
	ARO	START MU-P-1A by rotating the control switch (CC) clockwise, observing red light lit, green light out, and indicated amps appear normal.
	ARO	VERIFY a makeup pump is operating (MU header pressure MU2-PI is above RCS pressure) and aligned to seal injection.

Op Test No.: 1 Scenario # 2 Event # 1 Page 10 of 37

Event Description: MU-P-1B Trips, Loss of Seal Injection

Time	Position	Applicant's Actions or Behavior
	ARO	VERIFY #1 seal temperatures are < 235°F.
	ARO	VERIFY MU-V-20 is Open.
	URO	Slowly ADJUST MU-V-32 to 38 gpm seal injection flow at a rate that will limit RCP radial bearing cooldown rate < 1°F/min by raising on the toggle switch (CC) until 38 gpm indicated seal injection flow.
	URO	If MU-V-17 is in HAND, then RESTORE Pzr level at a rate consistent with RCS pressure control by raising on the toggle switch (CC) until pressurizer level is restored.
NOTE TO EXAMINER:		**MU-V-32 and MU-V-17 to AUTO control is at the discretion of the Examiner. The scenario may continue prior to the next two actions.**
	URO	Place MU-V-32 in AUTO using OP-TM-211-476
	URO	Ensure MU-V-17 is in AUTO (OP-TM-211-472)
NOTE TO EXAMINER:		
Table 3.5-4 (Remote Shutdown System Instrumentation and Controls)		
MU-P-1B		**Required number of Functions: 1**
3.5.7 Specification: The minimum number of functions identified in Table 3.5-4 shall be OPERABLE. With the number of functions less than the minimum required, restore the required function to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within an additional 12 hours.		
NOTE TO EXAMINER:		**When Pressurizer level is being restored and after the Tech Spec call has been made, GO TO Event 2.**

Op Test No.: 1	Scenario # 2	Event # 2	Page 11 of 37
Event Description:	Loss of 8 Bus, EG-Y-1B fails to start		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 2.		
Indications Available: Loss of half of CR lighting, MAP alarms, loss of multiple loads.		
NOTE TO EXAMINER:		**For a list of loads lost due to a loss of 1E 4160V bus, refer to page 37.**
NOTE TO EXAMINER:		**The crew may enter OP-TM-AOP-034, Loss of Control Building Cooling, if cooling is lost for > 15 minutes.**
BOOTH OPERATOR: If contacted as the dispatcher for information of the 8 bus, inform the caller that you don't have any information as to the cause or expected timeframe and that you will call as soon as you get some information. No call back will be required throughout the scenario.		
	Crew	Diagnoses the Loss of 1E 4160v Bus.
	CRS	Directs entry into OP-TM-AOP-014, "Loss of 1E 4160V Bus".
		OP-TM-AOP-014, "Loss of 1E 4160V Bus"
	ARO	Announce entry into OP-TM-AOP-014, "Loss of 1E 4160V Bus" over the plant page and radio.
	ARO	Initiate OP-TM-861-902 "Diesel Generator EG-Y-1B Emergency Operations".
	URO	Verify RCP seal injection flow > 22 gpm.
BOOTH OPERATOR: If directed to throttle SR-V-6, acknowledge order only (was not manipulated during validation).		

Op Test No.: 1 Scenario # 2 Event # 2 Page 12 of 37

Event Description: Loss of 8 Bus, EG-Y-1B fails to start

Time	Position	Applicant's Actions or Behavior
	ARO	Dispatch an operator to throttle SR-V-6 to approximately 30 degrees OPEN.
BOOTH OPERATOR: If directed to go to NR-V-15A or NR-V-15B, acknowledge order (manipulation was not needed during validation).		
	ARO	If MU-V-3 is open, then dispatch an operator to open NR-V-15A or NR-V-15B to maintain ICCW temperature <100°F.
	N/A	IAAT SR-P-1A is shutdown, and GB1-02 or GB1-12 is closed, then PERFORM the following: 1. If reactor power >45%, then a. TRIP the reactor, b. PERFORM EOP-001 IMA, 2. If reactor power <45%, then TRIP the turbine. 3. INITIATE OP-TM-AOP-033, "Loss of Secondary Component Cooling".
	N/A	INITIATE reactor power reduction IAW 1102-4 to maintain secondary closed system temperature <95°F (A0322).
	N/A	IAAT the Reactor is shutdown, then PERFORM the following: ___CLOSE FW-V-17B in HAND, ___PERFORM OP-TM-732-902, "Energize 1S 480V Bus Using ES Bus Cross Tie".
	URO	ENSURE IC-P-1A is operating.
	URO	ENSURE NR-P-1A is operating.

Op Test No.: 1 Scenario # 2 Event # 2 Page 13 of 37

Event Description: Loss of 8 Bus, EG-Y-1B fails to start

Time	Position	Applicant's Actions or Behavior
	ARO	INITIATE OP-TM-541-443 to swap NR-P-1B to 1R 480V bus.
	ARO	IAAT EG-Y-1B is not available, then INITIATE OP-TM-864-901, "SBO Diesel Generator (EG-Y-4) Operations".
		OP-TM-864-901, SBO Diesel Generator (EG-Y-4) Operations
	ARO	VERIFY 1E 4160V bus is de-energized.
	ARO	ENSURE 1SA-E2 and 1SB-E2 are OPEN.
BOOTH OPERATOR: If asked as an NLO to verify a Fire Service Pump is running, report back that FS-P-3 is running.		
	ARO	VERIFY one of the following is TRUE. A. FS-P-1, FS-P-2 or FS-P-3 is operating. B. FS-P-2 is operable except that power is not available.
	ARO	ENSURE the following control switches are in PTL: A. **BS-P-1B** by turning the control switch (CR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit. B. **MU-P-1C** by turning the control switch (CR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit. C. **DH-P-1B** by turning the control switch (CR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit. D. **RR-P-1B** by turning the control switch (CR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit. E. **EF-P-2B** by turning the control switch (CC) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit.

Op Test No.: 1	Scenario # 2	Event # 2	Page 14 of 37
Event Description:	Loss of 8 Bus, EG-Y-1B fails to start		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**The pumps listed in the previous step will remain in PTL unless needed to be started by the crew. This is done to ensure loads don't overload the SBO diesel.**
	ARO	PRESS and HOLD for approx. 8 seconds SBO DIESEL GENERATOR START PB.
	N/A	If generator voltage is not between 4.1 and 4.3 kV, then ADJUST Unit Voltage Rheostat.
	N/A	If generator frequency is not between 59 and 61 Hz, then ADJUST governor.
	ARO	ENSURE G11-02 is in P-T-L by turning the control switch (CR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit.
	ARO	PLACE T1-C2 in P-T-L by turning the control switch (PR) counter-clockwise and pulling up until the handle is in the PTL position, verifies all lights are not lit.
	ARO	CLOSE G2-12 (EG-Y-4 output breaker) by turning the control switch (CR) clockwise, verifies the closed light is lit and the open light is not lit.
	ARO	CLOSE T1-E2 (1F 4160V bus cross tie to 1E 4160V) by turning the control switch (CR) clockwise, verifies the closed light is lit and the open light is not lit.
		OP-TM-AOP-014, "Loss of 1E 4160V Bus".
	CRS	IAAT 1E 4160 V bus is energized, then Go TO Section 4.0 "Return to Normal".
	CRS	Log entry into TS 3.7.2.b action statement. Reactor operation in this condition is limited to 30 days.

Op Test No.: 1	Scenario # 2	Event # 2	Page 15 of 37
Event Description:	Loss of 8 Bus, EG-Y-1B fails to start		

Time	Position	Applicant's Actions or Behavior

NOTE TO EXAMINER:

3.3.2: Maintenance or testing shall be allowed during reactor operation on any component(s) in the makeup and purification, decay heat, RB emergency cooling water, RB spray, BWST level instrumentation, or cooling water systems which will not remove more than one train of each system from service. Components shall not be removed from service so that the affected system train is inoperable for more than 72 consecutive hours. If the system is not restored to meet the requirements of Specification 3.3.1 within 72 hours, the reactor shall be placed in a HOT SHUTDOWN condition within six hours.

3.7.2.b: Both 230/4.16 kV unit auxiliary transformers shall be in operation except that within a period not to exceed eight hours in duration from and after the time one Unit 1 auxiliary transformer is made or found inoperable, two diesel generators shall be operable, and one of the operable diesel generator will be started and run continuously until both unit auxiliary transformers are in operation. This mode of operation may continue for a period not exceeding 30 days.

3.7.2.d: If one unit auxiliary transformer is inoperable and a diesel generator becomes inoperable, the unit will be placed in HOT SHUTDOWN within 12 hours. If one of the above sources of power is not made operable within an additional 24 hours the unit will be placed in COLD SHUTDOWN within an additional 24 hours thereafter.

NOTE TO EXAMINER: After the Tech Spec call is made and the SBO is powering the 1E 4Kv bus, GO TO Event 3.

Op Test No.: 1	Scenario # 2	Event # 3	Page 16 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 3.		
Indications: MAP G0308 and H0302 alarms, Spray Valve opens, ICS Transient, Pressurizer heaters deenergize.		
Examiner Note: The crew may decide to perform OP-TM-AOP-070. Those steps can be found on page 34 of this scenario.		
	Crew	Diagnoses the failure of the selected Narrow Range Pressure Instrument.
	CRS	Directs entry into OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO.
		OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO
	N/A	If RC-RV-2 PORV is Open and RCS pressure <2400 psig, then CLOSE RC-V-2.
Examiner Note: The crew may decide to close RC-V-2 to ensure that the PORV does not cause an unwanted depressurization if the instrument fails further.		
	URO	ENSURE CLOSED RC-V-1 PZR Spray Control Valve by pressing the close pushbutton (CC), verifying valve closed light is lit and valve open light not lit.
	URO	PLACE MU-V-17 in AUTO. (if not done previously, by pressing the Auto pushbutton (CC), verifying that the white "Hand" light is not lit and the red "Auto" light is lit.
	N/A	If failure of RC-V-1 is suspected, then CLOSE RC-V-3 Pressurizer Spray Line Isol Valve as required.

Op Test No.: 1 Scenario # 2 Event # 3 Page 17 of 37

Event Description: Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate

Time	Position	Applicant's Actions or Behavior
	N/A	IAAT Spray Line ΔT approaches 250°F, then CYCLE RC-V-3.
	ARO	If Pressurizer level is ≥ 80 inches, then ENSURE Pressurizer heaters are energized.
	N/A	If RC-V-1 and RC-V-3 are Open, then: 1. RESET Thermal Overload for RC-V-1 1A ES MCC Unit 9B. 2. ATTEMPT to Close RC-V-1. 3. Prior to RPS actuation in low pressure, A. TRIP the Reactor. B. SHUTDOWN RC-P-1A and RC-P-1B. C. SHUTDOWN RC-P-1C or RC-P-1D.
	N/A	If pressurizer heater capacity is inadequate to maintain RCS pressure, then GO TO OP-TM-AOP-043, "Loss Of Pressurizer".
	N/A	If RC-V-3 is Closed, then PLACE an EST on RC-V-3.
	CRS	Directs entry into OP-TM-MAP-H0302, SASS ACTUATION.
		OP-TM-MAP-H0302
	INFO	If plant control is not stable or Validity of selected instrument is unknown or suspect, then PLACE affected stations in Hand IAW associated manual operations procedures to balance plant parameters.
		OP-TM-220-503, Manual Control of Pressurizer Pressure.

Op Test No.: 1	Scenario # 2	Event # 3	Page 18 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	ARO	If ICS hand power is available, then maintain RCS pressure within limits as follows: 1. Place Pressurizer Pressure Station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out. 2. Adjust Pressurizer heater demand for Banks 1 through 3 using the toggle switch on the Pressurizer Pressure Station (CC).
	URO	If manual operation of RC-V-1 is desired, then perform the following: 1. Place RC-V-1 AUTO/MAN select switch (RC-V-EX2 CC) in MAN. 2. Cycle RC-V-1 Open or Closed as necessary to maintain RCS pressure within limits.
		OP-TM-MAP-H0302
	URO	DETERMINE which input is bad.
	INFO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	ENSURE ULD in HAND IAW OP-TM-621-473, "ULD Manual Control".
	URO	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and VERIFY both of the following: – Difference between affected and alternate channels are less than "SASS Setpoint Δs" as listed in OP-TM-MAP-H0302 Table. – Selecting alternate instrument will not affect ICS control or plant stability.

Op Test No.: 1	Scenario # 2	Event # 3	Page 19 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	URO	SELECT alternate instrument(s) with console PB by pressing the pushbutton for the valid NR Pressure instrument input to ICS (CC), verifying that valid NR Pressure selected instrument light is lit and the invalid NR Pressure selected instrument light is not lit.
	URO	VERIFY plant stable.
NOTE TO EXAMINER:		**When the alternate Narrow Range Pressure instrument is selected, GO TO Event 4.**

Op Test No.: 1	Scenario # 2	Event # 4	Page 20 of 37
Event Description:	FW-P-1B trips, Runback fails to occur, Power reduction performed		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**MAP M-1-7 actuates, LO-P-8 starts, FW-P-1B RPMs go to zero, Rods do not travel as expected for the runback.**
Examiner Note:		**Cross-Limits will drive the plant to approximately 90% Reactor Power, but will stop well shy of the runback value of 68%.**
Examiner Note:		**The crew may decide to perform OP-TM-AOP-070. Those steps can be found on page 34 of this Scenario.**
		OP-TM-MAP-M0107, FWP 1B Trip
	ARO	ENSURE plant runback and determine cause of trip.
	ARO	ENSURE LO-P-8B running.
	ARO	ENSURE FW-V-1B Closed.
		OP-TM-MAP-H0101, ICS Runback
	URO	ENSURE NI power is reduced to below the limit for the runback condition.
	INFO	INITIATE 1102-4 for power reduction.
		1102-4, Power Operation
	CRS	PERFORM Enclosure 2A (for an emergency (forced) power reduction INITIATE Enclosure 2A).
Examiner Note:		**ULD will go in "Track" mode when the Runback fails to occur and therefore the URO will not be able to control reactivity with the ULD. Control will be taken at the SG/REACTOR DEMAND STATION for the reactivity manipulation.**

Op Test No.: 1 Scenario # 2 Event # 4 Page 21 of 37

Event Description: FW-P-1B trips, Runback fails to occur, Power reduction performed

Time	Position	Applicant's Actions or Behavior
	URO	ENSURE ULD is in HAND.
	ARO	MAINTAIN Generator Reactive Load IAW OP-TM-301-472.
	INFO	If SG/REACTOR DEMAND is in HAND, then REDUCE reactor power IAW OP-TM-621-471 "ICS Manual Operations".
		OP-TM-621-471 "ICS Manual Operations"
	URO	ENSURE ULD in HAND.
	URO	PLACE SG/REACTOR DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows: 1. If maintaining stable reactor power or a slow planned power change, then RAISE or LOWER in discrete steps to keep neutron error between +2% and –2%. 2. If rapid power reduction is required, then LOWER as necessary to achieve desired reactor power level and ENSURE FW flow controlled within limits by lowering and/or raising on the SG/REACTOR DEMAND toggle switch (CC) as necessary.
		1102-4, Power Operation
	INFO	PERFORM the actions per Enclosure 2B.

Op Test No.: 1	Scenario # 2	Event # 4	Page 22 of 37
Event Description:	FW-P-1B trips, Runback fails to occur, Power reduction performed		

Time	Position	Applicant's Actions or Behavior
		1102-4, Power Operation, Enclosure 2B
	ARO	Prior to FW-U-1A speed < 4000 rpm (between 100%-90% reactor power as a guide): Start LO-P-8A by turning the control switch (CL) clockwise, verifying the red light is lit and the green light is not lit.
NOTE TO EXAMINER:		**Event 5 must be in prior to 85% power in order to get the expected results.**
NOTE TO EXAMINER:		**When the reactivity manipulation is started, and prior to 85% power, GO TO Event 5.**

Op Test No.: 1	Scenario # 2	Event # 5	Page 23 of 37
Event Description:	Stuck Control Rod		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When the reactivity manipulation is started, prior to 85% power, and with Lead Examiner's concurrence; INITIATE EVENT 5.		
Indications Available: Stuck rod indication on the PI Panel, MAP alarm G0201		
	Crew	Diagnoses the stuck control rod.
NOTE TO EXAMINER:		**The crew may enter OP-TM-MAP-G0201, CRD PATTERN ASYMMETRIC, which places the Diamond in Manual and then enter OP-TM-AOP-062.**
	CRS	Directs entry into OP-TM-AOP-062, Inoperable Rod.
		OP-TM-AOP-062, Inoperable Rod.
	CRS	RECORD time of discovery of inoperable rod.
	N/A	If a rod group has dropped, then TRIP the reactor and GO TO OP-TM-EOP-001.
	N/A	IAAT more than one safety or regulating rod is inoperable, then perform the following: A. INITIATE a plant shutdown to Hot Shutdown IAW 1102-4 and 1102-10. B. Perform the following <u>within one hour</u>: (TS 3.5.2.2.a) 1. PERFORM a shutdown margin calculation IAW 1103-15A Section 3.2, "Calculation of shutdown margin with Tave ≥ 530°F." 2. If SDM is not more negative than -1% ΔK/K, then INITIATE Emergency Boration. C. EXIT this procedure.
	N/A	IAAT <u>all</u> control rods are operable, then GO TO Section 4.0.

Op Test No.: 1 Scenario # 2 Event # 5 Page 24 of 37

Event Description: Stuck Control Rod

Time	Position	Applicant's Actions or Behavior
	CRS	REQUEST duty reactor engineer to report to the control room.
	URO	VERIFY reactor power > 5 %.
	URO	VERIFY safety group Out Limit (Diamond panel) is LIT.
	CRS	VERIFY the inoperable rod is fully inserted. RNO: 1. If any regulating or safety rods are inoperable, then perform the following within one hour: (TS 3.5.2.2.b,c). A. INITIATE 1103-15A section 3.2, "Calculation of shutdown margin with Tave ≥ 530°F." (TS 3.5.2.2.c). B. If shutdown margin less negative than - 1% ΔK/K then INITIATE boration to achieve required shutdown margin. 2. If one of the following is true: rod does not meet trip insertion time rod can not be exercised rod can not be located then INITIATE OP-TM-622-201 Control Rod Movement to verify the operability of other rods, and GO TO step 3.11. (TS 3.5.2.2.b).
NOTE TO EXAMINER:		**Do NOT allow the Crew to perform the next step (transferring to the Aux Power Supply).**

Op Test No.: 1	Scenario # 2	Event # 5	Page 25 of 37
Event Description:	Stuck Control Rod		

Time	Position	Applicant's Actions or Behavior
	URO	If all of the following are satisfied: The misaligned rod is latched and in Group 7 Rod group overlap can be satisfied with group adjusted to the affected rod position Rod insertion limits can be satisfied with the group adjusted to the affected rod position. then perform the following: ___ A. TRANSFER all rods in Group 7 except the affected rod to the aux power supply IAW OP-TM-622-451. ___ B. ADJUST RCS boron concentration to trim Group 7 position to within 9" of the affected rod.

NOTE TO EXAMINER:

3.5.2.2.b Specification: If a control rod in the regulating and/or safety rod banks is declared inoperable in the withdrawn position as defined in Specification Paragraph 4.7.1.1 and 4.7.1.3, an evaluation shall be initiated immediately to verify the existence of one percent Δk/k hot shutdown margin. Boration may be initiated to increase the available rod worth either to compensate for the worth of the inoperable rod or until the regulating banks are fully withdrawn, whichever occurs first. Simultaneously a program of exercising the remaining regulating and safety rods shall be initiated to verify operability.

NOTE TO EXAMINER: **When the Tech spec call has been declared and prior to placing rods on the Aux power supply, GO TO Event 6.**

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 26 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 6.**
Indications Available: Loss of half of CR lighting, MAP alarms, loss of multiple loads, Reactor and Turbine Trip.		
	Crew	Diagnose the loss of offsite power, reactor and turbine trips.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip.
		OP-TM-EOP-001, Reactor Trip
	URO	PRESS both Reactor Trip and DSS pushbuttons (CC).
	URO	VERIFY REACTOR SHUTDOWN.
	URO	PRESS Turbine Trip pushbutton (CL).
	URO	VERIFY the turbine stop valves are Closed.
	ARO	Performs a Symptom Check and declares Lack of Heat Transfer based on: *Incore temperatures rising and RCS circulation can not be confirmed.*
	CRS	Directs entry into OP-TM-EOP-004, Lack of Primary to Secondary heat Transfer.
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer.
	CRS	ENSURE no more than one RCP operating per loop.

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 27 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
	ARO	INITIATE OP-TM-424-901, "Emergency Feedwater".
		OP-TM-424-901, Emergency Feedwater
	ARO	Recognizes no flow to A or B OTSGs. 4.1.3 IAAT steps 4.1.4, 4.1.5, or 4.1.6 are not satisfied, then initiate Section 4.2 "Contingency Actions". 4.1.5: Verify A OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established. 4.1.6: Verify B OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established.
CT-10	ARO	4.2.7 If there is no EFW flow and level is < setpoint, then perform the following: 1. Open one EF-V-30 to each OTSG to maintain required level by pressing the Manual pushbuttons (CC and CL) and adjusting the toggle switches in the open direction. ARO may pin the toggle switches in the full open position.
NOTE TO EXAMINER:		**ARO may choose to open all EF-V-30 valves (A-D) IAW OS-24:** **Licensed operators may take action without procedural guidance, and without taking a variance under the following conditions.** **Action taken to directly compensate for the failure of an automatic system.**
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer.
	ARO	ENSURE announcement of reactor trip.

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 28 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
	CRS	VERIFY both 1D and 1E 4160V buses are energized from auxiliary transformers. RNO: If offsite power has been lost, then INITIATE OP-TM-AOP-020, "Loss of Station Power".
	CRS	Directs entry into OP-TM-AOP-020, Loss of Station Power simultaneous with EOP-004.
		OP-TM-AOP-020, Loss of Station Power
	ARO	INITIATE "Emergency Feedwater".
	ARO	INITIATE both OP-TM-861-901, "EG-Y-1A Emergency Operations" and OP-TM-861-902, "EG-Y-1B Emergency Operations".
	CRS	VERIFY 1D 4160V and 1E 4160V bus are energized. RNO: If neither ES 4160V bus is energized, then GO TO Section 4.0 Station Blackout
		OP-TM-AOP-020, Section 4.0 Station Blackout
	ARO	Initiate OP-TM-864-901 to energize 1D or 1E 4160V bus from the SBO Diesel.
	ARO	IAAT RCP seal temperature cannot be verified <235°F, then initiate OP-TM-226-901, "Loss of all RCP Seal Cooling".
		OP-TM-226-901, "Loss of all RCP Seal Cooling"

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 29 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
	URO	**ENSURE** at least one of the following: - **MU-V-25 is Closed and 1A ES Valves MCC Unit 4D (MU-V 25) is Off.** - MU-V-189 is Closed (AB 281' Behind MU-C-2A/B). IA-V-1214 is Closed (MU-V-26 IA isolation) **and** - MU-V-26 is failed closed (AB 305' Cubicle Behind MU-F-4A/B station).
	URO	**CLOSE** IC-V-4
	URO	**CLOSE** the following valves: IC-V-79A IC-V-79B IC-V-79C IC-V-79D
	URO	**OPEN** IC-V-4
		OP-TM-AOP-020, Section 4.0 Station Blackout
CT-*	URO	Place the following in PTL by turning each control handle counter-clockwise and pulling up: IC-P-1A IC-P-1B
CT-*	URO	Ensure the following closed by pressing the closed pushbuttons for each and observing closed light lit and open light not lit: MU-V-3 MU-V-20 (This is critical to prevent seal warp) MU-V-26
	CRS	Request SM evaluate EALs

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 30 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
	ARO	If main generator pressure >15 psig, then announce "Hydrogen gas leaking from the main generator may be a fire and explosion hazard."
	ARO	Adjust MS-V-4A and MS-V-4B to maintain Tavg stable by operating the MS-V-3D/E/F/4A and MS-V-3A/B/C4B ICS control switches open or closed as necessary.
	ARO	IAAT SCM <30°F, then adjust MS-V-4A and MS-V-4B to reduce RCS temperature as necessary to maintain SCM > 30°F.
	URO	IAAT RCS pressure <1750 psig, then bypass ESAS HPI.
	ARO	Initiate OP-TM-AOP-034, Loss of Control Building Cooling.
	N/A	Break vacuum in the main and auxiliary condensers, and isolate Gland Steam by performing the following: - Open VA-V-8 - Open VA-V-4A - Open VA-V-4B - IAAT condenser vacuum <10in Hg vac, then close MS-V-7
	CRS	Initiate the following procedures to maximize station battery life and protect DC equipment - OP-TM-AOP-023, "a" DC System Failures - OP-TM-AOP-024, "B" DC System Failures

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 31 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**When AOP-023 and AOP-024 have been initiated, direct the Booth Operator to call in as the Maintenance Supervisor and report that the "A" Emergency Diesel Generator has been repaired and turned over to the Control Room. (This should be done before the OTSGs are completely depressurized to avoid a potential simulator crash).**
BOOTH OPERATOR NOTE: Create the following trigger prior to EG-Y-1A being started:		**Trigger #7** **Value: ZDIDGSTRT(1)==1** **Command: DMF EG01A**
		OP-TM-861-901, DIESEL GENERATOR EG-Y-1A EMERGENCY OPERATIONS
	URO	ENSURE 1SA-D2 and 1SB-D2 are Open.
	URO	If EG-Y-1A is not running, then PRESS and HOLD for ~ 8 seconds 1A DIESEL GENERATOR START PB.
	URO	If generator frequency is not between 59 and 61 Hz, then ADJUST governor.
CT-8	URO	ENSURE G1-02 is Closed.
NOTE TO EXAMINER:		**MU-P-1A, DC-P-1A and DR-P-1A are secured when the loss of offsite power occurs. Upon starting EDG-Y-1A and energizing the 1D 4kV bus, MU-P-1A will restart but DC-P-1A and DR-P-1A will not.**
	URO	Starts DC-P-1A and DR-P-1A by rotating the control switch for each pump (CC) clockwise, observing red light lit, green light out, and indicated amps appear normal.

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 32 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
		OP-TM-AOP-020, Section 4.0 Station Blackout
		IAAT 1D or 1E 4160V bus is energized, **then PERFORM** the following: ___ 1 **If** SCM < 25 °F, **then INITIATE** HPI, ___ 2 **INITIATE** restoration of Attachment 4 valves, ___ 3 **GO TO** Step 3.1
		OP-TM-AOP-020, Loss of Station Power
	ARO	INITIATE "Emergency Feedwater".
	N/A	INITIATE both OP-TM-861-901, "EG-Y-1A Emergency Operations" and OP-TM-861-902, "EG-Y-1B Emergency Operations".
	CRS	Initiate OP-TM-EOP-010 Guide 10, "Natural Circulation"
		OP-TM-EOP-010, Guide 10, NATURAL CIRCULATION
	ARO	IAAT all RCPs are off, then If all of the following conditions exist, then adequate natural circulation is present: – RCS THOT minus TCOLD stabilizes at less than 50 °F. – THOT < 600 °F. – Incore temperature stabilizes and tracks THOT. – Cold leg temperatures approach saturation temperature for secondary side pressure. – OTSG heat removal is indicated by feeding or steaming with stable OTSG pressure. – SCM > 25 F.
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer.
	CRS	When primary to secondary heat transfer (PSHT) has been restored, then CONTINUE.

Op Test No.: 1	Scenario # 2	Event # 6,7,8	Page 33 of 37
Event Description:	Loss of Offsite Power, Reactor and Turbine Trip, SBO Trip, "A" EDG fails to start, EFW valves fail to 0% in auto.		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**The scenario can be terminated when Natural Circulation flow is verified to be established.**

Follow-up question highest event entered during scenario?

Answer: MS1 Loss of all Offsite Power and Loss of all Onsite AC Power to Essential Busses

Note: If time compression covers a time period greater than 4 hours, then MG-1 applies.

Op Test No.: 1	Scenario # 2	Event # 3/4 Alt. Actions	Page 34 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
Examiner Note: The crew may decide to perform OP-TM-AOP-070 for Events 3 and/or 4.		
		OP-TM-AOP-070
	URO	Ensure Diamond Station in MAN by pressing the "Auto/Manual" pushbutton (CC) on the diamond panel and observing the Manual light lit and the auto light not lit, and INSERT control rods as necessary to reduce power below Reactor power limit and for gross balance with total FW flow.
	ARO	ENSURE both SG A & B FW DEMAND in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature.
	URO	Verify Turbine Header Pressure is between 835 and 935 psig. (MAP H-2-3 is not in alarm).
	URO	VERIFY RCS pressure is lowering or less than 2205 psig.
	N/A	IAAT RPS setpoint is reached or Reactor trips, then GO TO EOP-001.
	N/A	IAAT MU Tank Level is approaching 55", then perform the following: ____ 1. INITIATE OP-TM-EOP-010 Guide 9, Section A, "MU Tank Level Control". ____ 2. If control rod index approaching 300%, then LOWER reactor power to achieve desired control rod band.
	ARO	VERIFY Main Turbine is RESET.

Op Test No.: 1	Scenario # 2	Event # 3/4 Alt. Actions	Page 35 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	CRS	ASSIGN manual control responsibilities and control bands: – INSERT or WITHDRAW rods to maintain Reactor power within 1% of current power level. – ADJUST FW Flow to maintain Tavg within 2°F of current temperature. – MAINTAIN Turbine Hdr Pressure within 10 psig of current pressure. – If Main Generator Breakers are CLOSED, then ADJUST Turbine Load Set. – If Main Generator Breakers are OPEN, then ADJUST TBVs.
	URO	If Reactor power has been reduced > 3%, then INITIATE 1102-4, "Power Operations," actions for power reduction.
	URO	ENSURE the following ICS stations are in HAND. ____ - SG/Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - SG A/B Load Ratio by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - ULD
	ARO	VERIFY both of the following: ____ - Operating MFW Pumps are controlling FW Valve dP greater than 30 psid. ____ - Reactor power is greater than 75%.

Op Test No.: 1	Scenario # 2	Event # 3/4 Alt. Actions	Page 36 of 37
Event Description:	Narrow Range Pressure Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	ARO	If Main Turbine is in ICS HAND control, then PERFORM the following: ____ 1. MAINTAIN Tavg stable using FW control and slowly ADJUST Main Turbine to control header pressure between 865 and 905 psig. ____ 2. INITIATE OP-TM-301-471, "Manual Control of Main Turbine."
	ARO	MAINTAIN RCS pressure between 2105 and 2205 psig and slowly ADJUST feedwater flow to control RCS Tavg 578 to 580 °F.
	ARO	MAINTAIN RCS Tavg 578 to 580°F and slowly ADJUST loop feedwater flows to control RCS $\Delta Tc < 5^{\circ}$ F.
	ARO	If FW valves are in HAND, then INITIATE OP-TM-421-451 (452), "Manual Control of Feed Flow to A (B) OTSG."
	ARO	If TBVs are in Hand, then INITIATE OP-TM-411-451, "Manual Control of TBVs/ADVs."

Op Test No.: 1	Scenario # 2	Event # 2 – Info Only	Page 37 of 37
Event Description:	Loss of 8 Bus, EG-Y-1B fails to start		

Time	Position	Applicant's Actions or Behavior

Effects of Loss of 1E 4160V bus

- Loss of many BOP indicators, FW valve dp indication is available for FW pump control.
- Loss of MU batch controller
- Loss of MU-P-1B-E and MU-P-1C.
- Loss of MU-P-3B (main oil pump for MU-P-1B)
- Loss of EF-P-2B
- Loss of BS Train B
- Loss of SR-P-1B and SR-P-1C
- Loss of: RR Train B, RR-V-3B, RR-V-4B
- Loss of DH, DC and DR Train B
- Loss of NR-P-1C and NR-P-1B-T
- Loss of NS-P-1C and NS-P-1B-S
- Loss of IC-P-1B
- Loss of SF-P-1B and AH-E-8B
- Loss of CA-P-1B, BAMT heater
- 1C ES Valves MCC transfers to 1P bus.
- Loss of Group 9 Pressurizer heaters ES power supply
- Loss of RC-V-3 (Pzr Spray Block Valve)
- Loss of AH-E-1B
- Loss of AH-E-9B
- Loss of AH-E-27B & SW-P-2B
- Loss of AH-E-14B and AH-E-14D
- Loss of "B" ESF ventilation system
- Loss of "B" side Control Building chiller, ventilation fans and various heating coils.
- Loss of cooling fans in ESAS Cabinets: 1B, 2B, 3B, 5A, 5B, 5C and 5D
- B, D, and F Inverters transfer to "B" Battery.
- Loss of sample pumps on: RM-A-2, RM-A-8
- Loss of FW-V-5B and FW-V-92B
- TD-V-4A and TD-V-4B fail open.
- Loss of River Water Chem. Treatment Sys. (CL-P-2 booster pump loss)
- Loss of WT-P-33B
- Loss of SR-S-2B Bar Rake
- Loss of SR-S-3B Traveling Screen.
- Loss of remote actuation capability for fire deluge of charcoal filters

Facility:	Three Mile Island	Scenario No.: 3	Op Test No.: 289-2011-301
Examiners:		Operators:	
Initial Conditions:	• (Temporary IC-54)		
	• 100% Power, MOL		
	• EF-P-1 OOS for bearing replacement, 12 hours into a 72 hour clock T.S. 3.4.1.1(2)		
Turnover:	Maintain 100% Power Operations		
Critical Tasks:	• Reduce Steaming/Isolate Affected SGs (includes use of SG drains) (CT-22)		
	• Minimize SCM (CT-7)		

Event No.	Malf. No.	Event Type*	Event Description
1	03A4S01 - ZDIPB1R CB ON	I CRS I URO I ARO TS CRS	Inadvertent ES Actuation, "B" Train (TS), entry into OP-TM-AOP-046 (URO: Defeats signal, ARO: Opens MU-V-2A/B)
2	RC08B IC51A	I CRS I URO I ARO	Tc Instrument Fails High, SASS Fails to Actuate, entry into OP-TM-AOP-070 (URO: Manual control of Control Rods, ARO: Manual control of Feedwater)
3	TH17B	C CRS C URO TS CRS	~30 gpm "B" OTSG Tube Leak (TS), entry into OP-TM-EOP-005 (URO: Guide 9)
4	N/A	N CRS R URO N ARO	Power Reduction IAW 1102-4
5	CC04A CC04B	C CRS C URO	Loss of ICCW, entry into OP-TM-AOP-032, OP-TM-EOP-001 (URO: Trips Reactor)
6	TH16B	M CRS M URO M ARO	~800 gpm "B" OTSG Tube Rupture, entry into OP-TM-EOP-005
7	MS09A MS09B MS09C	C CRS C ARO	"B" TBV's fail closed, entry into OP-TM-421-451 (ARO: Places ADV on Backup Loader)

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

Three Mile Island NRC Scenario #3

When the crew has accepted the watch, the Lead Examiner can cue Event #1, "B" Train Inadvertent ESAS Actuation (1600# Manual HPI). The operators will diagnose the Inadvertent ESAS based on RCS Pressure, RCS Temperature, and RB Pressure. The CRS will enter OP-TM-AOP-046, Inadvertent ESAS Actuation, and direct the operators to take the actions. URO will defeat the signal to avoid overpressure of the RCS and Reactor Trip. The CRS will review T.S. and declare 3.3.2, 3.5.1.1, 3.5.1.3, and Table 3.5-1. Once the T.S. has been declared, the scenario can continue.

When OP-TM-AOP-046 has been performed and the Tech Spec calls are made, the Lead Examiner can cue the Tc Instrument Failure (High) with SASS failing to actuate. Crew will take manual control of ICS and coordinate to stabilize the plant. When plant is stable, the URO will select the alternate instrument. Once ICS is in manual control and the plant is stable, the scenario can continue.

When ICS is in manual control and the plant is stable, the Lead Examiner can cue the "B" OTSG Tube Leak. The CRS will enter OP-TM-EOP-005. The URO will initiate Guide 9, opening MU-V-18 to reestablish Makeup flow to the Pressurizer, making up for losses due to the tube leak. The CRS will review T.S. and declare 3.1.6.2.

A reactor shutdown will commence IAW 1102-4, POWER OPERATIONS, with the ULD in HAND. The crew may perform this with ICS as is (currently in Manual control) or choose to place ICS in auto prior to commencing a reactor shutdown. When the Lead Examiner has seen sufficient reactivity manipulation and the T.S. has been declared, the scenario can continue.

When sufficient reactivity manipulation has occurred and the T.S. has been declared, the Lead Examiner can cue the Loss of ICCW. The crew will enter OP-TM-AOP-031. The URO will trip the reactor and perform the Immediate Manual Actions of OP-TM-EOP-001. The ARO will perform a symptom check, confirming an OTSG tube leak as the highest priority. Once the symptom check is complete, the scenario may continue.

Once a Symptom Check has been performed, the Lead Examiner can cue the "B" OTSG Tube Rupture. The CRS will continue in OP-TM-EOP-005, OTSG Tube Leak.

(CT-7) The URO will minimize SCM to lower pressure and therefore lower the OTSG tube leak rate. Guide 8 and OS-24 give direction to maintain SCM 30-70F, but as close to 30F as possible. Failure criteria would be considered if SCM is <25F at any time, as LSCM procedure would be invoked.

(CT-22) The ARO will preferentially steam the "B" OTSG. The preferred method, opening the Turbine Bypass Valves, will not work, requiring the ARO to use the "B" ADV on the backup loader. The ARO should steam only enough to maintain OTSG level relatively constant. Over-steaming would result in more dose released to the public than is necessary. Under-steaming would result in rising OTSG level and complications from possible emergency cooldown and/or isolation of the OTSG. Once Offsite Dose Levels are called in, a rapid cooldown will be implemented. Once RCS pressure is <1000#, the "B" OTSG will be isolated IAW OP-TM-EOP-005, attachment 1B.

The scenario can be terminated when the "B" OTSG has been isolated, HPI has been throttled, and SCM has been minimized.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-7 – Minimize SCM - HPI must be throttled to minimize SCM while maintaining margin> 30°F this minimizes primary to secondary leakage and reduces dose on the secondary side of the plant as well as minimizing release to the public. If HPI is allowed to raise OTSG pressure above 1000 psig after OTSG is full, a liquid RCS release to atmosphere would occur. Task failure would be to not throttle and challenge this.

Safety Significance: Except when RCP NPSH limits are applicable and are more restrictive, RCS pressure should be maintained close to, but above, the minimum SCM to minimize RCS-SG ΔP. The reason for minimizing RCS-SG ΔP is to reduce the leak flowrate from primary to secondary to as low as possible. Therefore, this procedure (minimizing SCM) is desirable whenever possible during SGTR mitigation.
Reducing the leak flowrate from the RCS to the secondary side of a SG reduces RCS losses and when accomplished with an impaired steam system (e.g., weeping MSSV and MSL leak) should reduce integrated radiation releases from the impaired system. If the level of the leaking SG can be maintained within normal operating limits, then the SG will remain available for continued use during the cooldown, thus enhancing the transient mitigation capability of the plant.

Cues:

1. SCM monitor
2. SPDS displays and associated alarms
3. P-T display and associated alarms

Performance Indicators:

1. Operation of MU/HPI pump and valve controls
2. Operation of normal or auxiliary spray valve controls

Feedback:

1. SCM meter and/or plant SPDS and/or P-T display
2. RCS pressure and temperature
3. MU/HPI pump and valve status indications
4. Normal and auxiliary spray valve status indications

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-22 – Reduce Steaming/Isolate Affected SGs (includes use of SG drains) – Steam affected SGs to maintain level < [overfill setpoint]. If steaming alone cannot prevent SG fill, then use SG drains (if available) to maintain SG level below [overfill setpoint]. Isolate SG(s) if steaming and draining cannot prevent overfill and maintain RCS and isolated SG pressures < 1000 PSIG by use of [primary and secondary relief paths].

Safety Significance: The more probable tube rupture scenario is a tube leak in one SG with both SGs available. The preferred mitigation strategy is therefore isolation of the affected SG following the initial cooldown and depressurization to <1000 PSIG. This limits the radiological consequences of the event, but does require cooldown to DHRS operation using one SG.
Both SGs are always used in the initial cooldown and depressurization to < 1000 PSIG. Prevention of MSSV lift on the affected SG(s) is integral to the goal of minimizing off-site release, and assurance requires RCS temperatures at or below 500°F in order to maintain SCM when RCS pressure is < 1000 PSIG. Once this initial cooldown and RCS depressurization to <1000 PSIG is completed, then SG isolation can be considered.
There are limitations on continued steaming of a SG with a SGTR. These limitations consider the overriding concerns of SGTR transients that dictate the isolation of the SG(s) and initiation of HPI cooling, if necessary. These limits are based on integrated radiation dose reaching predetermined values and SG filling due to tube leakage despite steaming to achieve maximum allowable cooldown rate.
SGs isolated due to SG fill criteria pose concerns related to liquid passing through MSSVs. MSSVs should be prevented from passing liquid, since their failure to reseat becomes more probable. For this reason, RCS and SG pressures are maintained <1000 PSIG by use of [primary and secondary relief paths]. These relief paths may include such things as letdown, PZR vents, HPVs, the PORV, TBVs and ADVs.

Cues:

1. Rising OTSG level
2. Rad Monitor Alarms
3. Lowering Pressurizer level
4. Lowering RCS Pressure
5. Automatic initiation of HPI

Performance Indicators:

1. Operation of TBV/ADV controls

Feedback:

1. SG(s) level and pressure
2. RCS pressure
3. MFW/EFW flow
4. MFW/EFW pump and valve status indication
5. TBV/ADV status indication

Industry Experience:

- TMI Reactor Trip (11/2/06) Main Steam Safety Valves remained open longer than expected. (IR 552591)
- Indian Point 2 (2/15/00) - Steam Generator Tube Failure (380 litres per minute)
- Palo Verde 2 (3/14/93) - Steam Generator Tube Leak ranged between 11 and 39 litres per day, suddenly turned to 900 litres per minute tube rupture.

PRA

- Steam Generator Tube Rupture (Initiating Event)

Scenario Event Description

NRC Scenario 3

Event	Description	Procedure Support
	Initial Set-up.	100% Power, MOL EF-P-1 Tagged OOS due to bearing replacement
1	Inadvertent ES Actuation	OP-TM-AOP-046, Inadvertent ES Actuation
		T.S. 3.3.2, 3.5.1.1, 3.5.1.3, and Table 3.5-1
2	Tc Instrument Fails High, SASS fails to actuate	OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset
		OP-TM-621-471, ICS Manual Control
3	"B" OTSG Tube Leak	OP-TM-EOP-005, OTSG Tube Leakage
		T.S. 3.1.6.3
4	Power Reduction	1102-4, Power Operations
5	Loss of ICCW	OP-TM-EOP-001, Reactor Trip
		OP-TM-AOP-031, Loss of ICCW
6	"B" OTSG Tube Rupture	OP-TM-EOP-005, OTSG Tube Leakage
		OP-TM-EOP-010, Guide 8
7	MS-V-3 A/B/C Fail Closed	OP-TM-421-451, MANUAL CONTROL OF TBVs/ADVs

Scenario Set-up

NRC Scenario 3

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-54	100% HFP ICS full AUTO	Equilibrium XENON
Console Center	EF-P-1 Tagged OOS	EF-P-1 Scenario Support
Malfunction FW17	Value: Insert When: Immediately	EF-P-1 Scenario Support
Main Console	Robust Barriers applied IAW Protected Equipment Tracking Sheet	EF-P-1 Scenario Support
Remote FWR78	Value: Manual When: Immediately	EF-P-1 Scenario Support
Remote FWR79	Value: 0 When: Immediately	EF-P-1 Scenario Support
Remote FWR80	Value: Manual When: Immediately	EF-P-1 Scenario Support
Remote FWR81	Value: 0 When: Immediately	EF-P-1 Scenario Support
Remote MSR67	Value: 1006 When: Immediately	"A" MSSVs setpoint change
I/O Override 03A4S01-ZDIPB1RCB ON	Value: On When: EVENT #1	Inadvertent ESAS Actuation
Malfunction RC08B	Value: 100 Ramp 30 secs When: EVENT #2	Tc Instrument Failure/ SASS Failure
Malfunction IC51A	Value: Insert When: EVENT #2	Tc Instrument Failure/ SASS Failure
Malfunction TH17B	Value: Severity 0.2 When: EVENT #3	"B" OTSG Tube Leak
Malfunction CC04B	Value: Insert When: EVENT #5	Loss of ICCW
Malfunction CC04A	Value: Insert When: EVENT #5	Loss of ICCW
Malfunction TH16B	Value: Severity 5.5 When: EVENT #6	"B" OTSG Tube Rupture
Malfunction MS09A	Value: 0 When: EVENT #6	MS-V-3A Fails closed
Malfunction MS09B	Value: 0 When: EVENT #6	MS-V-3B Fails closed
Malfunction MS09C	Value: 0 When: EVENT #6	MS-V-3C Fails closed
I/O Override 02A4A29-ZDIICS12BMCS(4) LO	Value: On When: Immediately	TBV/ADV ICS Control failure

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
I/O Override 02A4A29-ZDIICS12BMCS(1) AUT	Value: Off When: EVENT #6	TBV/ADV ICS Control failure
I/O Override 02A4A29-ZDIICS12BMCS(2) MAN	Value: Off When: EVENT #6	TBV/ADV ICS Control failure
I/O Override 02A4A29-ZLOICS12BMCS(1) RED	Value: Off When: EVENT #6	TBV/ADV ICS Control failure
I/O Override 02A4A29-ZLOICS12BMCS(2) GRN	Value: Off When: EVENT #6	TBV/ADV ICS Control failure

Op Test No.: 1	Scenario # 3	Event # 1	Page 9 of 36
Event Description:	Inadvertent Manual ESAS Actuation		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 1.		
Indications Available: 'B' Train ESAS Actuation indications on PCR and CR, MU-P-1C running, HPI flow to the RCS indicated, RB Emergency Cooling in operation, MAP alarms.		
	Crew	Diagnoses the Inadvertent ES using RCS pressure and RB pressure indications.
	CRS	Directs entry into OP-TM-AOP-046, Inadvertent ESAS
		OP-TM-AOP-046, Inadvertent ESAS IMAs
	URO	DEFEAT invalid ESAS signals by pressing the "B" 1600# manual Defeat pushbuttons (CR), verifying the defeat lights are lit, the actuated lights are not lit, overhead ES alarms are clear, and the blue status lights are clear.
	URO	STOP Makeup Pumps <u>not</u> required for seal injection (MU-P-1C) by turning the control switch (CR) counter-clockwise, verifying the green light is lit and the red light is not lit.
	URO	THROTTLE MU-V-16s with HPI flow to minimize and maintain MU PUMP FLOW > 115 gpm.
		OP-TM-AOP-046, Inadvertent ESAS, Followup Actions
	ARO	ANNOUNCE entry into OP-TM-AOP-046, "Inadvertent ESAS Actuation" over the plant page and radio
	N/A	IAAT ICCW flow < 550 gpm (IC5-FI) and SI flow < 22 gpm (MU42-FI1), then perform the following: 1. ENSURE the reactor is tripped. 2. ENSURE all RCPs are tripped.

Op Test No.: 1	Scenario # 3	Event # 1	Page 10 of 36
Event Description:	Inadvertent Manual ESAS Actuation		

Time	Position	Applicant's Actions or Behavior
	URO	ENSURE MU-V-36 is Open.
	URO	ENSURE MU-V-37 is Open by pressing the open pushbutton (CC), verifying that the valve open light is lit and the valve closed light is not lit.
	N/A	If seal injection flow was adjusted, then ENSURE seal injection flow ~ 38 gpm.
	N/A	IAAT RCP #1 seal inlet temp > 235°F (A0525 to A0528) or RCP seal water temp at radial bearing > 225°F, (A0521 to A0524) then SHUTDOWN the affected RCP IAW OP-TM-226-151, 152, 153, or 154.
	N/A	IAAT all RCP seal cooling is lost and any RCP #1 seal inlet temperature can not be verified less than 235°F (A0525 to A0528), then INITIATE OP-TM-226-901, "Loss of All RCP Seal Cooling".
	N/A	IAAT all the following conditions exist: – MU-V-16s with HPI can not be controlled from CR – Pressurizer level > 100" – Adequate IC cooling water supply to RCPs available, then perform the following: 1. ENSURE IC-P-1A and IC-P-1B are running. 2. ENSURE all Makeup Pumps are Shutdown.
	URO	VERIFY MU-V-36 and MU-V-37 are Open.
	N/A	If MU-V-77A&B are Open, then perform the following: • ENSURE MU-V-16A is Closed. • ENSURE MU-V-16B is Closed.

Op Test No.: 1	Scenario # 3	Event # 1	Page 11 of 36
Event Description:	Inadvertent Manual ESAS Actuation		

Time	Position	Applicant's Actions or Behavior
	N/A	If MU-V-76A&B are Open, then perform the following: • ENSURE MU-V-16C is Closed. • ENSURE MU-V-16D is Closed.
	N/A	If all Makeup Pumps are Shutdown, then perform the following: 1. INITIATE AOP-041, "Loss of Seal Injection". 2. When seal injection flow has been established, then CONTINUE. 3. If ICCW System available and both IC pumps are running, then PLACE one Intermediate Closed Pump in Normal-After-Stop.
	URO	If at power, then perform the following: • ENSURE MU-V-14A is Closed. • ENSURE MU-V-14B is Closed by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit.
	URO	IAAT control rods are above desired band, then LOWER reactor power to the desired control rod band.
	ARO	If at power, then ENSURE two Secondary River pumps running.
	ARO	INITIATE an alarm review.
	ARO	INITIATE OP-TM-211-950, "Restoration of Letdown Flow."
	N/A	IAAT Makeup Tank level >96", then initiate OP-TM-211-462, "Lowering RCS/MU Volume – Bleed"
		OP-TM-211-950, Restoration of Letdown Flow

Op Test No.: 1 Scenario # 3 Event # 1 Page 12 of 36

Event Description: Inadvertent Manual ESAS Actuation

Time	Position	Applicant's Actions or Behavior
		Limitation
	ARO	To prevent letdown cooler leakage caused by thermal stress, the rate of change of letdown flow should be limited to 2.5 GPM/Min. If letdown flow indication is not available, then maximum open position of MU-V-5 is 50% or MU-V-98 ½ turn. Open valve from closed to the maximum open position gradually over at least a 20 minute period.
		Prerequisites
	ARO	VERIFY ICCW flow > 550 GPM.
	ARO	VERIFY the following valves are Open: – IC-V-2 – IC-V-3 – IC-V-4
	URO	VERIFY any of the following: – ESAS defeated. – ESAS did not actuate. – AOP-046 was entered.
	URO	VERIFY ICCW cooler outlet temperature < 100°F.
	URO	VERIFY all CRD stator temperatures < 160°F or reactor is shutdown.
		OP-TM-211-950, "Restoration of Letdown Flow." Section 4.5
	ARO	ENSURE the following valves are Closed: – MU-V-3 – MU-V-4 – MU-V-5 or MU-V-97A (AB 281: MU Valve Alley)
	ARO	ENSURE the following are Open: – MU-V-1A – MU-V-1B

Op Test No.: 1 Scenario # 3 Event # 1 Page 13 of 36

Event Description: Inadvertent Manual ESAS Actuation

Time	Position	Applicant's Actions or Behavior
	ARO	ENSURE the following are Open: – MU-V-2A by taking the control switch to open (PCR), verifying red light is lit, green light is not lit (PCR and CC) – MU-V-2B by taking the control switch to open (PCR), verifying red light is lit, green light is not lit (PCR and CC)
	ARO	If MU-V-5 is remotely operable, then PLACE MU-V-5 at 10% Open by dialing up the rheostat to 10% open demand (CC)
	ARO	ENSURE MU-V-8 is aligned to the THRU position.
	ARO	ENSURE MU-V-3 is Open by pressing the open pushbutton (CC), verifying that the valve open light is lit and the valve closed light is not lit.
	None	CONTROL ICCW temperature IAW OP-TM-541-461.
	None	MAINTAIN letdown temperature <125°F.
	ARO	Raise letdown flow at < 2.5 gpm/min to desired flow as follows: Throttle MU-V-5 by dialing up the rheostat in the open demand direction (CC)
		OP-TM-AOP-046, Inadvertent ESAS
	CRS	REVIEW Tech Specs for ES operability impact.
	CRS	Reviews Tech Spec 3.5.1.1, 3.5.1.3 and Table 3.5-1 For ESAS Operability requirements.

Op Test No.: 1	Scenario # 3	Event # 1	Page 14 of 36
Event Description:	Inadvertent Manual ESAS Actuation		

Time	Position	Applicant's Actions or Behavior

NOTE TO EXAMINER:

Table 3.5-1 (Instruments Operating Conditions)

C. Engineered Safety Features

Functional Unit	Min Operable Channels	Min Degree of Redundancy
Manual Pushbutton	2	N/A

(g) The Operability requirement is for the manual actuation switch for the specified feature on each train to be OPERABLE.

1. If the manual actuation switch on one train is inoperable, restore the switch to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 6 hours.

NOTE TO EXAMINER: After the Tech Spec call is made and MU-V-5 is ≥20% DEMAND go to Event 2.

Op Test No.: 1	Scenario # 3	Event # 2	Page 15 of 36
Event Description:	Tc Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 2.		
Indications Available: Tc indication offscale high, Digital Tave indicator rising, multiple MAP alarms, Control Rod movement inward.		
Examiner Note: The crew may decide to perform OP-TM-MAP-H0302. Those steps can be found on page 36 of this Scenario.		
	Crew	Diagnoses the Tc Instrument failure.
	CRS	Directs entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	URO	Ensure Diamond Station in MAN by pressing the "Auto/Manual" pushbutton (CC) on the diamond panel and observing the Manual light lit and the auto light not lit, and INSERT control rods as necessary to reduce power below Reactor power limit and for gross balance with total FW flow.
	ARO	ENSURE both SG A & B FW DEMAND in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature.
	URO	Verify Turbine Header Pressure is between 835 and 935 psig. (MAP H-2-3 is not in alarm)
	URO	VERIFY RCS pressure is lowering or less than 2205 psig.
	N/A	IAAT RPS setpoint is reached or Reactor trips, then GO TO EOP-001.

Op Test No.: 1	Scenario # 3	Event # 2	Page 16 of 36
Event Description:	Tc Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	N/A	IAAT MU Tank Level is approaching 55", then perform the following: ____ 1. INITIATE OP-TM-EOP-010 Guide 9, Section A, "MU Tank Level Control". ____ 2. If control rod index approaching 300%, then LOWER reactor power to achieve desired control rod band.
	ARO	VERIFY Main Turbine is RESET.
	CRS	ASSIGN manual control responsibilities and control bands: – INSERT or WITHDRAW rods to maintain Reactor power within 1% of current power level. – ADJUST FW Flow to maintain Tavg within 2°F of current temperature. – MAINTAIN Turbine Hdr Pressure within 10 psig of current pressure. – If Main Generator Breakers are CLOSED, then ADJUST Turbine Load Set. – If Main Generator Breakers are OPEN, then ADJUST TBVs.
	URO	If Reactor power has been reduced > 3%, then INITIATE 1102-4, "Power Operations," actions for power reduction.
	URO	ENSURE the following ICS stations are in HAND. ____ - SG/Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - SG A/B Load Ratio by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. ____ - ULD

Op Test No.: 1	Scenario # 3	Event # 2	Page 17 of 36
Event Description:	Tc Instrument Fails High, SASS Fails to Actuate		

Time	Position	Applicant's Actions or Behavior
	ARO	VERIFY both of the following: ____ - Operating MFW Pumps are controlling FW Valve dP greater than 30 psid. ____ - Reactor power is greater than 75%.
	ARO	If Main Turbine is in ICS HAND control, then PERFORM the following: ____ 1. MAINTAIN Tavg stable using FW control and slowly ADJUST Main Turbine to control header pressure between 865 and 905 psig. ____ 2. INITIATE OP-TM-301-471, "Manual Control of Main Turbine."
	ARO	MAINTAIN RCS pressure between 2105 and 2205 psig and slowly ADJUST feedwater flow to control RCS Tavg 578 to 580 °F.
	ARO	MAINTAIN RCS Tavg 578 to 580°F and slowly ADJUST loop feedwater flows to control RCS $\Delta Tc < 5^{o}$ F.
	ARO	If FW valves are in HAND, then INITIATE OP-TM-421-451 (452), "Manual Control of Feed Flow to A (B) OTSG."
	ARO	If TBVs are in Hand, then INITIATE OP-TM-411-451, "Manual Control of TBVs/ADVs."
NOTE TO EXAMINER:		**Ensure Pressurizer level is >160 inches prior to moving on to Event 3.**
NOTE TO EXAMINER:		**The crew may select the alternate Tc instrument, but the scenario is not dependent on it.**
NOTE TO EXAMINER:		**When ICS is in manual control, and the plant is stable, GO TO Event 3.**

Op Test No.: 1	Scenario # 3	Event # 3, 4	Page 18 of 36
Event Description:	30 gpm "B" OTSG Tube Leak, Power Reduction		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner and if Pressurizer level is > 160 inches, INITIATE EVENT 3.**
Indications Available:		**MAP Annunciator C-1-1 actuates, RM-A-5/15/RM-G-27 counts rise.**
	Crew	Diagnoses the "B" OTSG Tube leak.
	CRS	Announces entry into OP-TM-EOP-005, OTSG Tube leakage
		OP-TM-EOP-005, OTSG Tube leakage
	CRS	NOTIFY "Shift Dose Assessor" to begin offsite dose assessment.
	ARO	ANNOUNCE OTSG TUBE LEAK.
	INFO	INITIATE Guide 9, "RCS Inventory Control.
		OP-TM-EOP-010, GUIDE 9, RCS Inventory Control
	URO	VERIFY MU pump is operating.
	URO	VERIFY MU-V-5 is Closed.
	URO	VERIFY MU24-FI > 20 gpm **RNO:** ENSURE MU-V-18 is Open by pressing the open pushbutton (CC), verifying that the valve open light is lit and the valve closed light is not lit.
	URO	ENSURE MU-V-17 is Open.
	URO	VERIFY PZR level is being restored.

Op Test No.: 1 Scenario # 3 Event # 3, 4 Page 19 of 36

Event Description: 30 gpm "B" OTSG Tube Leak, Power Reduction

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-005, OTSG Tube leakage
	ARO	INITIATE the following procedures to start both Auxiliary Boilers: – OP-TM-414-401, "Starting AS-B-1A". – OP-TM-414-402, "Starting AS-B-1B".
	CRS	VERIFY the reactor is critical.
	N/A	IAAT pressurizer level < 150 inches and reactor power > 25%, then perform the following: 1. INITIATE HPI. 2. TRIP the reactor. 3. GO TO EOP-001
	N/A	IAAT the turbine trips, and reactor power > 15%, then perform the following: 1. TRIP the reactor, 2. GO TO EOP-001
	URO	VERIFY SG/REACTOR DEMAND is in Auto. 1. ENSURE ULD is in HAND. 2. SET ULD LOAD RATE OF CHANGE as directed by CRS. 3. SET ULD Target Load Demand to 0%. **RNO:** REDUCE power at a rate within manual control limitations IAW OP-TM-621-471 "ICS Manual Operations".
	ARO	PLACE both FW-P-1A and FW-P-1B in HAND IAW the following procedures: – OP-TM-401-472, "Manual Control of FW-P-1A" by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out. – OP-TM-401-473, "Manual Control of FW-P-1B" by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.

Op Test No.: 1 Scenario # 3 Event # 3, 4 Page 20 of 36

Event Description: 30 gpm "B" OTSG Tube Leak, Power Reduction

Time	Position	Applicant's Actions or Behavior
		OP-TM-621-471 "ICS Manual Operations", Step 4.2.4
EVENT 4	URO	If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows: 1. If maintaining stable reactor power or a slow planned power change, then RAISE or LOWER in discrete steps to keep neutron error between +2% and –2%. 2. If rapid power reduction is required, then LOWER as necessary to achieve desired reactor power level and ENSURE FW flow controlled within limits by lowering and/or raising on the SG/REACTOR DEMAND toggle switch (CC) as necessary.
		OP-TM-EOP-005, OTSG Tube leakage
	CRS	REQUEST SM to ___ Evaluate Emergency Action Levels ___ NOTIFY Power Team ___ NOTIFY TSO ___ NOTIFY NDO.
	CRS	IDENTIFY the affected OTSG:
	N/A	IAAT all of the following conditions exist: – The affected OTSG is identified – EF-P-1 is not running – Either Motor Driven EFW Pump is Operable then Place the Handwheel, of the affected MS-V-13, in the CLOSED position.

Op Test No.: 1	Scenario # 3	Event # 3, 4	Page 21 of 36
Event Description:	30 gpm "B" OTSG Tube Leak, Power Reduction		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER: **Specification 3.1.6.2:** **If unidentified reactor coolant leakage (excluding normal evaporative losses) exceeds one gpm or if any reactor coolant leakage is evaluated as unsafe, the reactor shall be placed in hot shutdown within 24 hours of detection.**		
NOTE TO EXAMINER:		**After the Tech Spec call is made and sufficient power reduction has occurred, GO TO Event 5.**

Op Test No.: 1	Scenario # 3	Event # 5	Page 22 of 36
Event Description:	Loss of ICCW, Reactor Trip		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available:		**MAP Annunciators alarm, ICCW Pump off Indications, rising temperatures on ICCW-cooled components.**
	Crew	Diagnoses loss of ICCW
	CRS	Announces entry into OP-TM-AOP-032, LOSS OF INTERMEDIATE COOLING, based on approaching the following entry conditions: The OTSGs are being used for RCS heat removal, and at least one secondary river or nuclear river pump is available, and any of the following: – IC cooler outlet temperature (IC6-TI) approaching 120°F – ICCW CRD flow (IC10-FI) < 100 GPM and any CRD stator temperature > 180 °F – No ICCW flow in RB and reactor is shutdown – IC surge tank level < 8 in. (IC-LI-802 / 803) and lowering
		OP-TM-AOP-032, LOSS OF INTERMEDIATE COOLING
	ARO	ANNOUNCE the following over the plant page and radio: "Entering AOP-032, Loss of Intermediate Component Cooling. Tripping the reactor."
	CRS	INITIATE EOP-001, "Reactor Trip".
NOTE TO EXAMINER:		**The CRS may continue with OP-TM-AOP-032, LOSS OF INTERMEDIATE CLOSED COOLING simultaneous to the actions listed below. The AOP-032 steps continue on page 24.**
		OP-TM-EOP-001, "Reactor Trip".
	URO	PRESS both Reactor Trip and DSS pushbuttons (CC).

Op Test No.: 1 Scenario # 3 Event # 5 Page 23 of 36

Event Description: Loss of ICCW, Reactor Trip

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY REACTOR SHUTDOWN.
	URO	PRESS Turbine Trip pushbutton (CL).
	URO	VERIFY the turbine stop valves are Closed.
	ARO	Performs a symptom check and announces OTSG tube leak, B OTSG based on: *A valid unexpected alarm from offgas or steam line radiation monitors (RM-A-5, RM-A-15, RM-G-26, RM-G-27)*
	N/A	IAAT a symptom exists, then GO TO the symptom response procedure using the following priority: 1. EOP-002, "Loss of 25 °F Subcooling Margin", 2. EOP-003, "Excessive Primary to Secondary Heat Transfer", 3. EOP-004, "Lack of Primary to Secondary Heat Transfer", 4. EOP-005, "OTSG Tube Leakage".
	CRS	Announces re-entry into OP-TM-EOP-005, OTSG Tube Leakage.
NOTE TO EXAMINER:		**The CRS should re-perform the steps of OP-TM-EOP-005 that were completed previously. The crew may or may not have made it through step 3.12. Those steps are listed in the previous event.**
		OP-TM-EOP-005, OTSG Tube Leakage.
	CRS	Re-performs steps 3.1-3.5, 3.10-3.12
	ARO	INITIATE Attachment 2, "Radiological Controls".

Op Test No.: 1 Scenario # 3 Event # 5 Page 24 of 36

Event Description: Loss of ICCW, Reactor Trip

Time	Position	Applicant's Actions or Behavior
	ARO	IAAT Aux. Steam is available, then perform the following: 1. OPEN AS-V-8 (TB 355' south of 6th stage drain collection tank). 2. CLOSE GS-V-4 3. Transfer operating FW pumps to Auxiliary Steam as follows: ___ OPEN AS-V-5A (TB 322: 7' W of FW-P-1A 2' up). ___ OPEN AS-V-5B (TB 322: 7' W of FW-P-1B 2' up).
	ARO	ENSURE announcement of reactor trip.
	ARO	DISPATCH an Operator to check MSSV status.
	ARO	ENSURE performance of an alarm review.
		OP-TM-AOP-032, LOSS OF INTERMEDIATE COOLING
	N/A	IAAT either condition exists: – IC surge tank level < 8 in. and lowering – No ICCW flow in RB then PLACE ICCW pumps in PTL: ___ IC-P-1A ___ IC-P-1B
	N/A	WAAT all the following conditions exist: – An IC pump is available – ES/UV lockouts are Reset – IC surge tank level > 8 in. – RCP#1 seal inlet temp < 235 °F or IC-V-79A/B/C/D are Closed then START either ICCW pump: ___ IC-P-1A ___ IC-P-1B
	URO	ENSURE MU-V-3 is Closed.

Op Test No.: 1	Scenario # 3	Event # 5	Page 25 of 36
Event Description:	Loss of ICCW, Reactor Trip		

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY Seal injection > 22 gpm.
	N/A	WAAT IC flow in RB > 550 GPM, and IC cooler outlet temperature < 110 °F, then GO TO Section 4.0, "Return To Normal".
	ARO	PLACE WDL-P-8 (RCDT pump) in PTL.
NOTE TO EXAMINER:		**After Reactor is tripped and EOP-005 has been re-entered, GO TO Event 6.**

Op Test No.: 1	Scenario # 3	Event # 6, 7	Page 26 of 36
Event Description:	800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 6.**
Indications Available:		**Pressurizer level lowering, RCS Pressure lowering, "B" OTSG level rising**
NOTE TO EXAMINER:		**The CRS should continue in OP-TM-EOP-005. This event picks up at step 3.29. The crew may or may not have made it through step 3.28. Those steps are listed in the previous events**
	Crew	Diagnoses the "B" OTSG Tube Rupture.
		OP-TM-EOP-010, GUIDE 9, RCS Inventory Control
	URO	Verify Pressurizer Level is being restored. **RNO:** Throttle MU-V-217 by pressing the open pushbutton (CC), verifying valve open light is lit and valve closed light not lit.
	URO	Verify MU24-FI > 20gpm
	URO	Verify Pressurizer Level is being restored. **RNO:** Close MU-V-3 by pressing the close pushbutton (CC), verifying valve closed light is lit and valve open light not lit.
	URO	Verify Pressurizer Level is being restored. **RNO:** INITIATE HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI" by pressing manual ES pushbuttons (CC and CR)
NOTE TO EXAMINER:		**The URO may press 4# ES manual pushbuttons due to the inadvertent 1600# "B" ES manual pushbuttons being faulted. The result is the same, 4# initiates 1600# ES.**

Op Test No.: 1	Scenario # 3	Event # 6, 7	Page 27 of 36
Event Description:	800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**The ARO will have to control ADV's on the backup loader (B side only).**
		OP-TM-EOP-005, OTSG Tube Leakage.
	ARO	IAAT OTSG A (B) pressure approaches, or is greater than 1000 psig, then perform the following: ___ ENSURE MS-V-2A (MS-V-2B) is Open. ___ OPEN MS-V-3D, E, F (MS-V-3A, B, C) to maintain OTSG pressure < 1000 psig. **RNO:** OPEN MS-V-4A (MS-V-4B) to maintain OTSG pressure < 1000 psig by pressing the B/U Loader pushbutton (CC) and dialing the backup loader control wheels for MS-V-4B clockwise/counter-clockwise as necessary.
NOTE TO EXAMINER:		**Cooldown rate is 100°F/hr per Guide 11 until 10CFR 50.54x**
CT-22	ARO	IAAT OTSG level is rising due to tube leakage in an AVAILABLE OTSG, then preferentially STEAM to maintain OTSG level < 85% by dialing the backup loader control wheels for MS-V-4B clockwise/counter-clockwise as necessary..
PROCEDURE NOTE:		If exceeding RCS or Pressurizer Tech Spec cooldown rate limits is needed to permit isolation of an OTSG, then 10CFR 50.54x entry should be evaluated.
NOTE TO EXAMINER:		**The following step should not be performed until the offsite dose is called in (page 30).**
	Crew	IAAT OTSG isolation criteria may be challenged prior to reducing RCS pressure < 1000 psig, then perform the following: ___ 1. INITIATE RCS cooldown to 500°F at a rate within RCS inventory control capability and < 240 °F/hr. ___ 2. ENSURE RC-V-2 is Open. ___ 3. CYCLE the PORV to reduce SCM to approximately 30°F.

Op Test No.: 1 Scenario # 3 Event # 6, 7 Page 28 of 36

Event Description: 800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails

Time	Position	Applicant's Actions or Behavior
	URO	IAAT all of the following exist: ___ RCS pressure < 1750 psig, ___ SCM > 25 °F, ___ RCS pressure is being controlled, then BYPASS 1600 psig ESAS IAW 1105-3 by pressing the appropriate bypass/defeat pushbuttons (CC and CR) and verifying that the appropriate bypass/defeat lights are lit.
	INFO	MINIMIZE SCM IAW Guide 8, "RCS Pressure Control".
		OP-TM-EOP-010 Guide 8, "RCS Pressure Control".
	INFO	IAAT REACTOR is SHUTDOWN and SCM > 25 °F, and pressurizer has a steam bubble, then CONTROL RCS pressure as follows: 1. MAINTAIN RCS pressure within the limits of Figure 1 and 1A 2. If it is required to MINIMIZE SCM, then LOWER RCS pressure IAW Section B. Steps should be performed sequentially until RCS Press is lowering at the desired rate. Pressure may be lowered until one of the following limits is approached: – MAINTAIN SCM > 30°F, – If an RCP is ON, then MAINTAIN RCS pressure above RCP NPSH limits (1102-11 Fig 1 and 1A, or OP-TM-226-000), – If all RCPs are OFF and OTSG TUBE LEAKAGE does not exist, then MAINTAIN pressure above "Head bubble" limit (Fig 1 and 1A).
	INFO	ENSURE HPI/LPI is throttled per Rule 2
		OP-TM-EOP-010 RULE 2, HPI THROTTLING
	URO	VERIFY MU PUMP FLOW ≤ 515 gpm/pump.
	URO	VERIFY SCM < 250°F.

Op Test No.: 1 Scenario # 3 Event # 6, 7 Page 29 of 36

Event Description: 800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY an RCP is ON.
	INFO	When any of the following conditions exist: – SCM > 25°F and HPI COOLING is not required, – SCM > 25°F and HPI COOLING is required and incore temperature is lowering, – Incore temperature < 25°F superheat and BWST level < 15 ft and LPI > 1250 gpm in each line, then HPI may be THROTTLED IAW OP-TM-211-901, "Emergency Injection (HPI/LPI)".
		OP-TM-EOP-010 RULE 2, HPI THROTTLING
	URO	IAAT all of the following exist: • RCS Press is being controlled • SCM > 25°F • CRS concurrence is obtained then perform the following: ___If RCS pressure is < 1750 psig then BYPASS 1600 psig ESAS ___If RCS pressure is < 900 psig then BYPASS 500 psig ESAS
	URO	ENSURE Przr Heaters are OFF by taking each Pressurizer heater switch (CR) to the Off position.
CT-7	URO	PERFORM the following: A. VERIFY an RCP is ON B. ENSURE RC-V-3 is Open C. THROTTLE OPEN RC-V-1 by placing the Spray valve auto/manual switch (CC) in the manual position and pressing the Spray valve open pushbutton, verifying the valve open light is lit and the valve closed light is not lit. D. When desired press is achieved, then CLOSE RC-V-1 by pressing the Spray valve close pushbutton, verifying the valve closed light is lit and the valve open light is not lit.

Op Test No.: 1 Scenario # 3 Event # 6, 7 Page 30 of 36

Event Description: 800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-005, OTSG Tube Leakage.
	N/A	IAAT OTSG level > 85% Operate Range, then perform the following: ___ 1. When RCS pressure < 1000 psig, then INITIATE Attachment 1A or 1B to isolate the OTSG. ___ 2. If both OTSGs are being isolated, then GO TO EOP-009 ___ 3. When affected OTSG's TBVs and ADVs are closed, then PERFORM Guide 12 "RCS Stabilization".
BOOTH OPERATOR NOTE: When directed by the Lead Examiner, call in as the shift dose assessor and report that "projected Off-Site Integrated Dose is 1.5R thyroid".		
NOTE TO EXAMINER:		**Upon receiving the offsite dose projections, the CRS should invoke 10CFR 50.54x and raise the cooldown rate IAW OP-TM-EOP-005, Step 3.31.**
	CRS	IAAT both OTSGs are available and projected or actual offsite integrated dose approaches 0.5R whole body or 1.5R thyroid, then perform the following: 1. When RCS pressure <1000 psig, then initiate Attachment 1A or 1B to isolate the most affected OTSG. 2. When the affected OTSG TBVs and ADVs are closed, then perform Guide 12 "RCS Stabilization".
		OP-TM-EOP-005, ATTACHMENT 1B, OTSG B Isolation

Op Test No.: 1	Scenario # 3	Event # 6, 7	Page 31 of 36
Event Description:	800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails		

Time	Position	Applicant's Actions or Behavior
	ARO	Ensure Closed the following valves (Control Room): MS-V-1C MS-V-1D FW-V-17B FW-V-5B FW-V-16B FW-V-92B EF-V-30B EF-V-30C MS-V-3A MS-V-3B MS-V-3C MS-V-4B MS-V-13B CA-V-4B or CA-V-5B If MS-V-3A/B/C or MS-V-4B are suspected of leaking, then close MS-V-2B
	ARO	Ensure Closed the following valves (in-plant): MS-V-92 MS-V-13B MS-V-10B MS-V-88C MS-V-33C FW-V-85B FW-V-85D MS-V-33D MS-V-42B

Op Test No.: 1 Scenario # 3 Event # 6, 7 Page 32 of 36

Event Description: 800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**The scenario can be terminated when HPI has been throttled, SCM has been minimized, and the "B" OTSG has been isolated. The following steps are scripted as they may be performed during the cooldown to <1000 psig RCS.**
	ARO	IAAT EF-P-2A or EF-P-2B are running, then perform the following: 1. PLACE both trains of each EFW actuation in "DEFEAT". (Eight switches) by turning the switches to the defeat position. 2. CLOSE Main Steam supply valves to EF-P-1: ___ MS-V-13A ___ MS-V-13B
	N/A	IAAT HPI COOLING is in progress, and RCS pressure rises and approaches 1000 psig, then perform the following: 1. If Incore temperature is lowering, then throttle HPI to minimize SCM IAW Rule 2. 2. Open the following RCS vent paths: - RC-V-40A and RC-V-41A - RC-V-40B and RC-V-41B 3. Establish or raise letdown flow.
	N/A	IAAT RCS >25°F superheat, then GO TO EOP-008
	ARO	Initiate OP-TM-826-901, "Control Building Ventilation System Radiological Event Operations"
		OP-TM-826-901, CONTROL BUILDING VENTILATION SYSTEM RADIOLOGICAL RESPONSE OPERATIONS
	ARO	**SHUTDOWN** AH-E-19A **and** AH-E-19B.

Op Test No.: 1	Scenario # 3	Event # 6, 7	Page 33 of 36
Event Description:	800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails		

Time	Position	Applicant's Actions or Behavior
	ARO	**PLACE** ext. control for AH-E-93/94A and AH-E-93/94B to the OFF position.
	ARO	**START** AH-E-18B
	ARO	**ENSURE** AH-E-19A or B is operating.
	ARO	**ENSURE** AH-E-95A or B is operating.
	N/A	**START** AH-E-90 and AH-E-91 (FHB 305: hallway next to Hot Tool Room).
		OP-TM-EOP-005, OTSG Tube Leakage.
	URO	Initiate Rule 5, "Emergency Boration"
		RULE 5, EMERGENCY BORATION
	N/A	**WAAT** one of the following conditions exist: – 1% dk/k SHUTDOWN has been achieved for the expected plant condition IAW Figure 1 of 1103-4, "Soluble Poison Concentration Control", **or** 1103-15A, "SDM and Reactivity Balance" – LPI > 1250 gpm per line – Tavg > 525 °F and stable or rising **and** all Control Rods are inserted, **and** Neutron flux is lowering as expected. **then** emergency boration **may** be terminated.
	URO	**VERIFY** a MU pump is operating.
	URO	Perform one of the following: – **OPEN** MU-V-14A by pressing the OPEN pushbutton, – **OPEN** MU-V-14B by pressing the OPEN pushbutton,, – **PERFORM** Guide 1 "Emergency Boration Backup Methods".
	N/A	**STOP** any activities which may be diluting RCS boron concentration.

Op Test No.: 1	Scenario # 3	Event # 6, 7	Page 34 of 36
Event Description:	800 gpm "B" OTSG Tube Rupture, "B" TBV/ADV ICS Control fails		

Time	Position	Applicant's Actions or Behavior
	URO	**VERIFY** Total Injection (MU, SI and HPI) > 50 gpm.
	N/A	**If** SCM > 25 □F and neutron flux indication is rising, **then STABILIZE** RCS temperature.
		OP-TM-EOP-005, OTSG Tube Leakage.
	URO	**If** RC-P-1A and RC-P-1B are operating, **then ENSURE** the following are SHUTDOWN: ___ RC-P-1C by turning the Control Switchcounter-clockwise (additionally may pull on handle to place it in Pull-to-Lock) ___ RC-P-1D by turning the Control Switchcounter-clockwise (additionally may pull on handle to place it in Pull-to-Lock)
NOTE TO EXAMINER:		**The scenario can be terminated when HPI has been throttled, SCM has been minimized, and the "B" OTSG has been isolated.**
		TERMINATE the scenario.

Follow-up question highest event entered during scenario?

Answer: **FS1** due to 1) Primary to Secondary leakage >10 gpm with an unisolable steam release from the affected OTSG to the environment and a Steam Generator Tube Rupture requiring ESAS actuation.

Op Test No.: 1	Scenario # 3	Event # 2 (Alt. Actions)	Page 35 of 36
Event Description:	Tc Instrument Fails High, SASS Fails to Actuate (Alt. Actions)		

Time	Position	Applicant's Actions or Behavior
Examiner Note: The crew may decide to perform OP-TM-MAP-H0302 for Event 2.		
		OP-TM-MAP-H0302
	INFO	If plant control is not stable or Validity of selected instrument is unknown or suspect, then PLACE affected stations in Hand IAW associated manual operations procedures to balance plant parameters.
		OP-TM-621-471, ICS Manual Control
	URO	ENSURE ULD in HAND.
	URO	If SG/REACTOR Station is being placed in HAND to support a planned activity, then VERIFY reactor power is less than 2558 MWth (99.6%).
	URO	PLACE SG/REACTOR DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	PLACE SG A/B LOAD RATIO (ΔTC) station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	PLACE SG A FW DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	PLACE SG B FW DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.

Op Test No.: 1	Scenario # 3	Event # 2 (Alt. Actions)	Page 36 of 36
Event Description:	Tc Instrument Fails High, SASS Fails to Actuate (Alt. Actions)		

Time	Position	Applicant's Actions or Behavior
		OP-TM-MAP-H0302
	URO	DETERMINE which input is bad.
	INFO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	ENSURE ULD in HAND IAW OP-TM-621-473, "ULD Manual Control".
	URO	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and VERIFY both of the following: – Difference between affected and alternate channels are less than "SASS Setpoint Δs" as listed in OP-TM-MAP-H0302 Table. – Selecting alternate instrument will not affect ICS control or plant stability.
	URO	SELECT alternate instrument(s) with console PB by pressing the pushbutton for the valid Tc instrument input to ICS (CC), verifying that valid Tc selected instrument light is lit and the invalid Tc selected instrument light is not lit.
	URO	VERIFY plant stable.

Facility:	Three Mile Island		Scenario No.:	4	Op Test No.: NRC
Examiners:			Operators:		
Initial Conditions:	• (Temporary IC-55)				
	• 5% Power, MOL				
	• EF-P-1 OOS for bearing replacement				
Turnover:	Continue with Power escalation				
Critical Tasks:	• Control HPI (CT-5)				
	• Isolate Overcooling SGs (CT-17)				

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N CRS R URO	Raise Reactor Power from 5% to 10%
2	IC37A IC41A	C CRS C ARO TS CRS	Invalid "A" OTSG Low Level (TS), "A" EFW actuation, entry into OP-TM-424-901 (ARO: defeats invalid signal, secures EF-P-2A)
3	IA07 IA01C	C CRS C ARO	Loss of Instrument Air, entry into OP-TM-AOP-028 (ARO: Starts IA-P-1A or B)
4	MS02B	C CRS C ARO TS CRS	Steam Leak into the Reactor Building, entry into OP-TM-AOP-051 RR-P-1B Fails to start (TS) (ARO: Initiate RB Emergency Cooling)
5	TH08	C CRS C URO	PORV fails open, entry into OP-TM-MAP-G0106 (URO: Closes PORV Block Valve)
6	RD03C	C CRS C URO	Uncontrolled outward rod motion, group 7, entry into OP-TM-AOP-064 and OP-TM-EOP-001, Reactor Trip (URO: Selects Sequence Override, performs IMA's of EOP-001)
7	MS02B	M CRS M URO M ARO	Steam Rupture in Reactor Building, entry into OP-TM-EOP-003, Excessive Heat Transfer, and OP-TM-EOP-010, Rule 3 to isolate "B" OTSG.
8	MUR67 MUR94	C CRS C URO	MU-V-36, MU-P-1A/1B/1C RECIRC ISOL VALVE, breaker opens, Valve fails closed. Alternative minimum flow path for Makeup Pump established.

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

Three Mile Island NRC Scenario #4

When the crew has accepted the watch, the Lead Examiner can cue the raising power from 5% to 10%. When the Lead Examiner has seen sufficient reactivity manipulation, the scenario can continue.

When sufficient reactivity manipulation has occurred, the Lead Examiner can cue the Inadvertent low level signal on the "A" OTSG with EFW actuation. The ARO will respond per OP-TM-424-901, and defeat the HSPS signal, secure the running EFW pump (EF-P-2A), and re-enable HSPS. The CRS will review T.S. and declare Table 3.5-1.D.(a). When the T.S. call is made and HSPS is re-enabled, the scenario can continue.

When the T.S. call is made and HSPS is re-enabled, the Lead Examiner can cue the Loss of Instrument Air. The operators will diagnose the Loss of Instrument Air based on IA-P-4 trip and lowering IA pressure. The CRS will enter OP-TM-AOP-028, LOSS OF INSTRUMENT air. ARO will start IA-P-1A or IA-P-1B from the Control Room prior to Instrument Air reaching 60psig (setpoint below which a manual Reactor Trip must occur).

When OP-TM-AOP-028 has been performed and IA-P-1A or B is running, the Lead Examiner can cue the Steam Leak in the Reactor Building. The CRS will enter OP-TM-AOP-051, Steam Leak. The URO will commence a reactor shutdown. The ARO will perform OP-TM-861-901, RB Emergency Cooling. RR-P-1B fails to start and only 1 train of cooling will be in service. The CRS will review T.S. for failure of RR-P-1B to start and declare 3.3.1.3.a. Once the Tech Spec has been made and RB Emergency Cooling is in service ("A" Train), the scenario can continue.

When RB Emergency Cooling ("A" Train) is in service and the Tech Spec call is made, the Lead Examiner can cue the PORV failing open. The crew will diagnose a faulted signal (comparison with actual plant pressure) and the URO will close the PORV block valve IAW OP-TM-MAP-G0106. Once the PORV Block Valve is closed, the scenario can continue.

When the PORV Block Valve is closed, the Lead Examiner can cue the Uncontrolled Rod Motion on Group 7. The crew will enter OP-TM-AOP-064. The URO will perform the IMA's and rod motion will not stop, leading to a manual reactor trip and entry into OP-TM-EOP-001.

When OP-TM-AOP-064 and OP-TM-EOP-001 IMA's have been completed, the Lead Examiner can cue the Steam Rupture in the Reactor Building. A symptom check performed by the ARO will reveal Excessive Heat Transfer. The CRS will enter OP-TM-EOP-003, Excessive Heat Transfer. IAW OP-TM-EOP-003 IMA's, the ARO will perform Rule 3 and isolate the "B" OTSG **(CT-17)**. Once the "B" OTSG has been isolated, the URO will throttle HPI to avoid raising pressure to the point of lifting a safety (PORV was blocked in an earlier event) **(CT-5)**. Additionally, the URO will minimize subcooling margin (Guide 8) and Emergency Borate (Rule 5). The ARO will use the "A" TBV's to commence a cooldown of 100F/hr (Guide 11).

MU-V-36 breaker will trip open and the valve will be failed closed. Upon termination of HPI, the URO will maintain > 40 gpm Makeup flow to avoid damaging a Makeup Pump, by using an alternative method, either throttling HPI valve MU-V-16B or placing MU-V-32 in HAND and adjusting for >40 gpm seal injection flow, either option IAW Rule 2.

The scenario can be terminated when "B" OTSG is isolated, HPI has been throttled, and a cooldown rate is in progress IAW Guide 11.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-5 – Control HPI – MU/HPI flow MUST be THROTTLED to prevent overpressurizing the RCS when SCM exists by keeping the RC pressure below the RV P-T limit. HPI flow must be maintained within acceptable operational bounds. This requires maintaining HPI flow greater than the minimum allowable pump flow rate and less than the pump runout flow rate.

Safety Significance: The only requirement to allow throttling of HPI is the existence of SCM. Throttling means to reduce the HPI flow rate below full flow rate. In general, HPI flow may be throttled anytime SCM exists as indicated by the incore T/Cs. HPI flow must not be throttled when SCM is lost.
If the PORV is not maintained open (i.e., allowed to cycle) during HPI cooling, the RC will continue to heat up as the PORV is opened and closed either automatically or manually to control pressure. This heatup will continue until SCM is lost or HPI mass flow starts removing more energy than is being added to the RC. Full HPI flow must always be maintained when SCM does not exist. In addition, while the PORV is being cycled, full HPI flow must be maintained until the core outlet temperature is decreasing. This criteria ensures that full HPI flow will be maintained if the PORV is permitted to cycle; therefore, throttling the HPI flow cannot be permitted until the HPI flow is sufficient to remove decay heat.
MU/HPI flow MUST be THROTTLED to prevent overpressurizing the RCS when SCM exists by keeping the RC pressure below the RV P-T limit. HPI flow must be maintained within acceptable operational bounds. This requires maintaining HPI flow greater than the minimum allowable pump flow rate and less than the pump runout flow rate

Cues:

1. SPDS displays and associated alarms
2. SCM monitor and associated alarms
3. P-T display and associated alarms
4. RCS pressure and temperature (incore T/Cs)

Performance Indicators:

1. Operation of HPI pump controls
2. Operation of HPI valve controls

Feedback:

1. HPI pump status indications
2. HPI valve status indications
3. HPI Flow
4. RCS pressure and temperature (incore T/Cs)

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-17 - Isolate Overcooling SGs - This is a critical task in that continued feeding of an OTSG with a steam break will continue to overcool the RCS, which could result in emptying the Pressurizer and causing a loss of subcooling margin. This would significantly change the mitigation strategy of the event

- Critical task (CT-17) is to isolate the affected OTSG prior to emptying the, pressurizer. Alternately if HPI held pressurizer level, cooldown below 329°F with HPI on would violate TS. Either condition should be considered grounds for failing critical task.

Safety Significance: If the overcooling SG has been identified then that SG should be isolated, otherwise both SGs should be isolated. Isolating a SG means to stop all FW flow (MFW and AFW) and steam flow (e.g., close TBVs, ADVs, steam supply to FW pumps, MSIVs etc.). FW flow should be maintained to the unaffected SG and cooling stabilized using the unaffected SG.
Isolation of a SG or both SGs should always follow a logical progression of increasingly more drastic attempts to isolate the SG. For example, if the overcooling is not severe it may be possible to close both the TBVs and ADVs as well as the auxiliary steam valves thus isolating the SG. If this does not work, then for those plants which have main steam isolation valves, the main steam isolation valve should then be closed. For severe overcooling situations, [secondary plant protection system] will likely actuate.
Inappropriate mitigative actions can cause loss of both SGs even if only one SG is faulted; such a situation would cause degradation of the transient mitigation capability of the plant.

Cues:

1. SPDS displays and associated alarms
2. P-T display and associated alarms
3. Rising RB Pressure and Temperature
4. RB Fire/Heat alarms

Performance Indicators:

1. Operation of HIPI/MU pump start switches
2. Operation of associated FW pump and valve controls (affected OTSG)
3. Operation of associated steam valve (included TBVs/ADVs) controls (affected OTSG)
4. Operation of MSIV's (affected OTSG)

Feedback:

1. RC temperature and pressure
2. SG level and pressure
3. MSIV status indication
4. MFW/AFW pump and valve status indications

Industry Experience:

- Rod Control Direction Error (TMI CR-008513201)
- AH-E-1 C Tripped During ES Testing (TMI CR-00778856)
- SER 1-05 Hope Creek Steam Leak and scram (10/10/04)

PRA

- Secondary Line Breaks (Initiating Event)
- PORV RC-RV-2 (Risk Increase Factor)

Event	Description	Procedure Support
	Initial Set-up.	5% Power, MOL EF-P-1 Tagged OOS due to bearing replacement
1	Raise Reactor Power from 5% to 10%	1102-4
2	Invalid "A" OTSG Low Level, "A" EFW actuation	OP-TM-424-901
3	Loss of Instrument Air	OP-TM-AOP-028, Loss of Instrument Air
		OP-TM-PLB-0106
4	Steam Leak into the RB, RR-P-1B fails to auto-start	OP-TM-AOP-051, Steam Leak
		OP-TM-861-901, RB Emergency Cooling
		T.S. 3.3.1.3.a
5	PORV fails open	OP-TM-MAP-G0106
6	Uncontrolled outward rod motion, group 7	OP-TM-AOP-064, Uncontrolled Rod Motion
		T.S. 3.5.2.5.a
7	Steam Rupture in RB, Excessive Heat Transfer.	OP-TM-EOP-001, Reactor Trip
		OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer
		OP-TM-EOP-010, RULE 3
		OP-TM-EOP-010, RULE 5
		OP-TM-EOP-010, GUIDE 11
8	MU-V-36 breaker opens, Valve fails closed. Alternative minimum flow path for Makeup Pump established.	OP-TM-EOP-010, RULE 2

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-55	5% HFP ICS full AUTO	Equilibrium XENON
PPC Point A0602	Value: Delete From Monitor When: Immediately	Scenario Support
PPC Point A0603	Value: Delete From Monitor When: Immediately	Scenario Support
PPC Point A0604	Value: Delete From Monitor When: Immediately	Scenario Support
PPC Point A0605	Value: Delete From Monitor When: Immediately	Scenario Support
Malfunction PRF-2-8	Value: Off When: Immediately	Scenario Support
Console Center	EF-P-1 Tagged OOS Protected Equipment Tracking Sheet	EF-P-1 Scenario Support
Malfunction FW17	Value: Insert When: Immediately	EF-P-1 Scenario Support
Main Console	Robust Barriers applied IAW Protected Equipment Tracking Sheet	EF-P-1 Scenario Support
Remote FWR78	Value: Manual When: Immediately	EF-P-1 Scenario Support
Remote FWR79	Value: 0 When: Immediately	EF-P-1 Scenario Support
Remote FWR80	Value: Manual When: Immediately	EF-P-1 Scenario Support
Remote FWR81	Value: 0 When: Immediately	EF-P-1 Scenario Support
Remote FWR94	Value: Open When: Immediately	Scenario Support
Remote IAR01	Value: Off When: Immediately	Loss of Instrument Air Scenario Support
Remote IAR02	Value: Off When: Immediately	Loss of Instrument Air Scenario Support
Remote IAR03	Value: Off When: Immediately	Loss of Instrument Air Scenario Support
Remote IAR04	Value: Off When: Immediately	Loss of Instrument Air Scenario Support
I/O Override 03A6S06-ZDIRRPIB(2) STR CR RR-P-1B Control Sw	Value: Off When: Immediately	Scenario Support
Malfunction IC37A	Value: Insert When: EVENT #2	Invalid "A" OTSG Low Level, "A" EFW actuation

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Malfunction IC41A	Value: Insert When: EVENT #2	Invalid "A" OTSG Low Level, "A" EFW actuation
Malfunction IA07	Value: Severity 10, Ramp 30 When: EVENT #3	Loss of Instrument Air
Malfunction IA01C IA-P4	Value: Insert When: EVENT #3	Loss of Instrument Air
Malfunction MS02B	Value: Severity 0.2 When: EVENT #4	Steam Leak in the Reactor Building
Malfunction TH08	Value: Severity 10% When: EVENT #5	PORV Fails Open
Malfunction RC26	Value: Severity 100 When: EVENT #5	PORV Fails Open
Malfunction RD03C	Value: 100% When: EVENT #6	Outward Rod Motion Group 7
Trigger	Value: mmf MS02B 20 When: Trigger 7	Steam Rupture in the Reactor Building
Trigger	Value: Event 8 When: FWNEFP2(2)>0.5	MU-V-36 breaker opens, Valve fails closed.
Remote MUR67	Value: OPEN When: EVENT #8	MU-V-36 breaker opens, Valve fails closed.
Remote MUR94	Value: 0 When: EVENT #8	MU-V-36 breaker opens, Valve fails closed.
I/O Override 02A5A03-ZAIMU42FIC FLO	Value: 40 When: EVENT #8 **Note: Original Value is 48.6839**	MU-V-36 breaker opens, Valve fails closed.
Remote CCR32	Value: Closed When: EVENT 10	Close NS-V-85

Op Test No.: 1	Scenario # 4	Event # 1	Page 9 of 32
Event Description:	Power Ascension From 5% to 10%		

Time	Position	Applicant's Actions or Behavior
		NOTE TO EXAMINER: There are no malfunctions to set for event #1.
		1102-2 Plant Startup, Section 3.2.15
	URO	RAISE reactor power at a rate within limits per Enclosure 4 to 100% by withdraw of control rods in sequence by moving the Diamond Insert/Withdrawal switch (CC) to the Withdrawal position, verifying outmotion white light is lit, and rod motion is occurring.
	URO	When NI power is between 5% and 10%, then 1. VERIFY AUTO INHIBIT is Off. 2. ENSURE rod control is in SEQ. 3. VERIFY neutron error is "zero". 4. PLACE Diamond station in AUTO by pressing the AUTO/MANUAL pushbutton (CC) and verifying that the AUTO light is lit and the MANUAL light is not lit. 5. ADJUST REACTOR DEMAND to control reactor power.
	URO	When Tavg is 579 ± .5°F, then 1. Verify SG FW A & B DEMAND are in AUTO. 2. ADJUST setpoint on REACTOR DEMAND station to obtain zero error on T-AV ERROR indicator. 3. VERIFY Tavg calibrating integral (A5016) is between –10.0 and +10.0 volts and stable. 4. PLACE REACTOR DEMAND in AUTO. 5. ADJUST SG/REACTOR DEMAND to control reactor power 6. Slowly ADJUST Tavg setpoint to 579°F (in parallel with subsequent actions).

Op Test No.: 1 Scenario # 4 Event # 1 Page 10 of 32

Event Description: Power Ascension From 5% to 10%

Time	Position	Applicant's Actions or Behavior
	URO	When the REACTOR DEMAND is in AUTO and feedwater demand is above LLL, then 1. OBTAIN CRS concurrence. 2. VERIFY SG/REACTOR DEMAND HAND MINUS AUTO indication is at 50%. 3. PLACE SG/REACTOR DEMAND to AUTO.
	URO	When SG/REACTOR DEMAND is in AUTO, then 1. SET ULD LOAD RATE OF CHANGE for ≤ 0.5 %/minute AND consistent with MMR (Enclosure 1). 2. SET ULD Target Load Demand to desired setpoint.
		1102-2 Plant Startup, Enclosure 2
	ARO	When FW-V-16A is between 50% and 80% OPEN _____ VERIFY FW-V-17A is closed. _____ OPEN FW-V-5A.
	ARO	When FW-V-16A is between 50% and 80% OPEN _____ VERIFY FW-V-17A is closed. _____ OPEN FW-V-5A.
NOTE TO EXAMINER:		**The Diamond needs to be in AUTO for later Events to occur.**
NOTE TO EXAMINER:		**When sufficient Reactivity Manipulation has occurred and the Diamond is in AUTO, GO TO Event 2.**

Op Test No.: 1	Scenario # 4	Event # 2	Page 11 of 32
Event Description:	Invalid "A" OTSG Low Level, Inadvertent "A" EFW actuation.		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 2.		
Indications Available: "A" OTSG Low Level alarm clears, EF-P-2A indicates running.		
	Crew	Diagnosis inadvertent EFW actuation, "A" side.
	CRS	Directs entry into OP-TM-424-901, Emergency Feedwater.
		OP-TM-424-901, Emergency Feedwater
	INFO	If EFW actuation was caused by an invalid signal or condition, then GO TO section 5.
	ARO	Obtain CRS concurrence to shutdown EFW.
	N/A	If incore temperature <200F then GO TO step 5.5.
	INFO	When all of the following conditions exist: - SCM > 25°F. - Main Feedwater flow is available to each OTSG AVAILABLE. - At least one reactor coolant pump is operating. - OTSG level >20" in each available OTSG. - RB pressure < 2 psig. then Continue.

Op Test No.: 1 Scenario # 4 Event # 2 Page 12 of 32

Event Description: Invalid "A" OTSG Low Level, Inadvertent "A" EFW actuation.

Time	Position	Applicant's Actions or Behavior
	ARO	Places the EFW control valves in Manual: - EF-V-30A by pressing the Manual pushbutton (CL), verifying the Manual light is lit, and the Auto light is not lit. - EF-V-30B by pressing the Manual pushbutton (CC), verifying the Manual light is lit, and the Auto light is not lit. - EF-V-30C by pressing the Manual pushbutton (CC), verifying the Manual light is lit, and the Auto light is not lit. - EF-V-30D by pressing the Manual pushbutton (CL), verifying the Manual light is lit, and the Auto light is not lit.
	ARO	Ensures all EFW actuation switches (8) are in DEFEAT by rotating the 8 EFW actuation switches counterclockwise to the DEFEAT position.
	ARO	Closes both EF-V-30A and EF-V-30D by adjusting the toggle switches (CL) in the closed direction. ARO may pin the toggle switches in the full closed position.
	ARO	If OTSG A is available, then ensure level is maintained with Main Feedwater.
	ARO	Closes both EF-V-30B and EF-V-30C by adjusting the toggle switches (CC) in the closed direction. ARO may pin the toggle switches in the full closed position.
	ARO	If OTSG B is available, then ensure level is maintained with Main Feedwater.

Op Test No.: 1 Scenario # 4 Event # 2 Page 13 of 32

Event Description: Invalid "A" OTSG Low Level, Inadvertent "A" EFW actuation.

Time	Position	Applicant's Actions or Behavior
	ARO	Place Loss of RCPs and High RB Pressure in ENABLE as follows: - Train A Loss of RCPs in ENABLE by rotating the switch (CL) clockwise to the ENABLE position. - Train B Loss of RCPs in ENABLE by rotating the switch (CC) clockwise to the ENABLE position. - Train A High RB Pressure in ENABLE by rotating the switch (CL) clockwise to the ENABLE position. - Train B High RB Pressure in ENABLE by rotating the switch (CC) clockwise to the ENABLE position.
	ARO	If at least one MFW pump is reset, then place Loss of FWPs in ENABLE as follows: - Train A Loss of FW Pumps in ENABLE by rotating the switch (CL) clockwise to the ENABLE position. - Train B Loss of FW Pumps in ENABLE by rotating the switch (CC) clockwise to the ENABLE position.
	ARO	If OTSG A level > 20 inches and OTSG B level > 20 inches then place Lo-Lo OTSG Level in ENABLE as follows: - Train A Lo-Lo OTSG Level in ENABLE by rotating the switch (CL) clockwise to the ENABLE position. - Train B Lo-Lo OTSG Level in ENABLE by rotating the switch (CC) clockwise to the ENABLE position.
	ARO	Places EF-P-2A in Normal-After-Stop by rotating the Control Switch (CL) counter-clockwise, verifying the green light is lit, the red light is not lit, and amps indicate zero.
	N/A	Close AS-V-4 Ensure MS-V-10A is Closed Close MS-V-13A Ensure MS-V-10B is Closed Close MS-V-13B

Op Test No.: 1	Scenario # 4	Event # 2	Page 14 of 32
Event Description:	Invalid "A" OTSG Low Level, Inadvertent "A" EFW actuation.		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER: The crew may decide to maintain EF-V-30A and EF-V-30D in manual control due to a faulted signal being present.		
	ARO	Place each of the following EFW control valves in AUTO and select REMOTE setpoint: - EF-V-30A by pressing the Auto pushbutton (CL), verifying the Auto light is lit, and the Manual light is not lit. - EF-V-30B by pressing the Auto pushbutton (CC), verifying the Auto light is lit, and the Manual light is not lit. - EF-V-30C by pressing the Auto pushbutton (CC), verifying the Auto light is lit, and the Manual light is not lit. - EF-V-30D by pressing the Auto pushbutton (CL), verifying the Auto light is lit, and the Manual light is not lit.
NOTE TO EXAMINER: **Table 3.5-1 (Instruments Operating Conditions)** **D. Heat Sink Protection System** **Functional Unit / Min Operable Channels / Min Degree of Redundancy** **OTSG Low Level / 2 / 1** **(a) Restore the conditions of Column (A) and Column (B) within 72 hours, or place the unit in HOT SHUTDOWN within the next 12 hours.**		
NOTE TO EXAMINER: After EF-V-30's have been placed in AUTO control and the Tech Spec call has been made, GO TO Event 3.		

Op Test No.: 1	Scenario # 4	Event # 3	Page 15 of 32
Event Description:	Loss of Instrument Air		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 3.		
Indications Available: Lowering Instrument Air pressure, IA-P-4 trip indication, PLB 1-6, PLB 1-7, PLB 2-7 annunciator alarms.		
	Crew	Diagnoses the Loss of Instrument Air.
NOTE TO EXAMINER: The crew may go to PRF alarm response before AOP-028. The alarm response will lead to AOP-028.		
BOOTH OPERATOR NOTES: **If directed to investigate IA-P-4, acknowledge order. No call back occurred during validation. If called a second time, report that you can find nothing wrong with IA-P-4.** **If directed to go to IA-P-1A/B, delay calling back until the ARO starts IA-P-1A or B.**		
	CRS	Announces entry into OP-TM-AOP-028, Loss of Instrument Air.
		OP-TM-AOP-028, Loss of Instrument Air
	ARO	ANNOUNCE loss of instrument air over plant page and radio. (AO response per OS-24 Attachment E).
	N/A	IAAT IA pressure is < 60 psig (PI-222 or PI-1403), then PERFORM the following: ___ A. If SI Flow > 22 gpm, then DISPATCH an operator to block Open MU-V-20 (AB 305: behind MU-F-4A/B). ___ B. If ICCW Flow > 550 gpm, then DISPATCH an operator to block Open IC-V-4 (AB 305: W of RB wall) and IC-V-3 (AB 281: A shielded area). ___ C. ENSURE reactor is tripped. ___ D. GO TO Section 4.0.
BOOTH OPERATOR: If asked, IA-PI-491 Reads 80 psig.		

Op Test No.: 1	Scenario # 4	Event # 3	Page 16 of 32
Event Description:	Loss of Instrument Air		

Time	Position	Applicant's Actions or Behavior
	ARO	If IA-PI-491 (IB 295: upstream of pre-filters) < 85 psig and IA-P-1A and IA-P-1B are not loaded, then START IA-P-1A or 1B from the Control Room by rotating the control switch for either pump (PL) clockwise, verifying the red light is lit, and the green light is not lit.
BOOTH OPERATOR:		**If asked, IA-P-1A/B filter and dryer DP reads 10 psid. (Δ of IA-PI-491 and IA-PI-493)**
BOOTH OPERATOR:		**If asked, IA-P-4 filter and dryer DP reads 10 psid. (Δ of IA-PI-1408 and IA-PI-1411)**
NOTE TO EXAMINER:		**After IA-P-1A or 1B is started, GO TO Event 4.**

Op Test No.: 1	Scenario # 4	Event # 4	Page 17 of 32
Event Description:	Steam Leak into RB, RR-P-1B fails to start.		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**Rising RB Pressure, Fire alarm in RB.**
	Crew	Diagnoses the steam leak in the RB.
	CRS	Announces entry into OP-TM-AOP-051, SECONDARY SIDE HIGH ENERGY LEAK.
		OP-TM-AOP-051, SECONDARY SIDE HIGH ENERGY LEAK
	ARO	ANNOUNCE entry into OP-TM-AOP-051, "Secondary Side High Energy Leak" and to evacuate affected area over the plant page and radio.
	URO	MAINTAIN reactor power < 100%.
	N/A	IAAT leak can be isolated, then ISOLATE the leak and GO TO Section 7.0.
	N/A	IAAT leak is isolated, then GO TO Section 7.0.
	N/A	IAAT XHT or LOHT exists, then GO TO EOP-001.
	CRS	REQUEST SM to evaluate EALs.
	CRS	If leak is in Reactor Building, then GO TO Section 4.0.
	N/A	IAAT RB pressure greater than 2 psig, then TRIP the reactor and GO TO EOP-001.
	INFO	INITIATE OP-TM-534-901, "RB Emergency Cooling Operations".

Op Test No.: 1 Scenario # 4 Event # 4 Page 18 of 32

Event Description: Steam Leak into RB, RR-P-1B fails to start.

Time	Position	Applicant's Actions or Behavior
		OP-TM-534-901, "RB Emergency Cooling Operations".
	ARO	Prerequisites: - VERIFY Reactor Building Emergency River Water System was in ES standby IAW OP-TM-534-000, "Reactor Building Emergency Cooling Water System". - VERIFY 1600 psig ES actuation, RB pressure is approaching 2 psig or Emergency Director or Shift Manager has authorized use of RBEC. - VERIFY 1D or 1E 4160V Bus is energized.
BOOTH OPERATOR:		**When directed to close NS-V-85, insert CCR32 closed (Event #10) and report NS-V-85.**
	ARO	DISPATCH an operator to CLOSE NS-V-85 (IB 295: S of RR Valve Room).
	ARO	START or VERIFY running: RR-P-1A by rotating the control switch for either pump (CC) clockwise, verifying the red light is lit, and the green light is not lit. RR-P-1B
	ARO	Announces RR-P-1B will not start.
	ARO	ENSURE OPEN: RR-V-3A by pressing the open pushbutton (CR), verifying valve open light is lit and valve closed light not lit. RR-V-3B (Might not perform). RR-V-3C by pressing the open pushbutton (CR), verifying valve open light is lit and valve closed light not lit.

Op Test No.: 1	Scenario # 4	Event # 4	Page 19 of 32
Event Description:	Steam Leak into RB, RR-P-1B fails to start.		

Time	Position	Applicant's Actions or Behavior
	ARO	ENSURE OPEN: RR-V-4A by pressing the open pushbutton (CR), verifying valve open light is lit and valve closed light not lit. RR-V-4B (Might not perform). RR-V-4C by pressing the open pushbutton (CR), verifying valve open light is lit and valve closed light not lit. RR-V-4D (Might not perform). RR-V-1A by pressing the open pushbutton (CC), verifying valve open light is lit and valve closed light not lit. RR-V-1B (Might not perform).
	ARO	ENSURE NS-V-85 is Closed
		OP-TM-534-901, "RB Emergency Cooling Operations" Section 4.2, Contingency Actions
	N/A	If RR-P-1B is not operating and 1E 4160V bus is energized, then perform the following: ___ A. START RR-P-1B. ___ B. If RR-V-10B and RR-V-1B are Closed, then OPEN RR-V-1B.
	CRS	Declare TS for RR-P-1B non-operational.
NOTE TO EXAMINER:		**Reactivity manipulation has already been observed and is not required or desired prior to moving to Event 5.**
		OP-TM-AOP-051, SECONDARY SIDE HIGH ENERGY LEAK
	URO	INITIATE Plant Shutdown IAW 1102-4, "Power Operation", and 1102-10, "Plant Shutdown".

Op Test No.: 1	Scenario # 4	Event # 4	Page 20 of 32
Event Description:	Steam Leak into RB, RR-P-1B fails to start.		

Time	Position	Applicant's Actions or Behavior
		NOTE TO EXAMINER: **3.3.1.3 Specification: The following components must be OPERABLE:** **a. Two reactor building spray pumps and their associated spray nozzles headers and two reactor building emergency cooling fans and associated cooling units (one in each train. Specification 3.0.1 applies.**
		NOTE TO EXAMINER: When RB Emergency Cooling is in effect and the T.S. call is made, GO TO Event 5

Op Test No.: 1	Scenario # 4	Event # 5	Page 21 of 32
Event Description: PORV Fails Open			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 5.		
Indications Available: MAP Annunciator G0106, RCS Pressure lowering.		
	Crew	Diagnoses PORV has failed open with an invalid signal.
	CRS	Directs entry into MAP Alarm Response G0106.
		OP-TM-MAP-G0106
	URO	**OBSERVE** ΔP indication on DPI 921, 922, or 923 (CC) to determine which valve is OPEN. Alarm G-1-6, PZR SAFETY OR PORV OPEN (DP) and tailpipe differential temperatures may also be used. - RC-V-1A tailpipe delta temp (A0518) - RC-V-1B tailpipe delta temp (A0519) - RC-RV-2 tailpipe delta temp (A0517)
	URO	**If** PORV is OPEN without a valid demand, **then CLOSE** RC-V-2 by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit.
NOTE TO EXAMINER: After RC-V-2 is closed GO TO Event 6.		

Op Test No.: 1	Scenario # 4	Event # 6	Page 22 of 32
Event Description:	Uncontrolled outward rod motion, Group 7, manual Reactor Trip		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 6.**
Indications Available:		**MAP Annunciator alarms for Excessive Group overlap, Outward rod motion on group 7.**
	URO	Diagnoses uncontrolled rod motion on group 7.
	CRS	Announces entry into OP-TM-AOP-064, UNCONTROLLED ROD MOTION.
		OP-TM-AOP-064, UNCONTROLLED ROD MOTION
	URO	ENSURE Diamond control station is in MANUAL by pressing the AUTO/MANUAL pushbutton (CC) and verifying that the MANUAL light is lit and the AUTO light is not lit.
	URO	ENSURE JOG is selected by turning the RUN/JOG switch on the Diamond Panel (CC) to JOG.
	URO	ENSURE GROUP and SINGLE SELECT switches are OFF.
	URO	ENSURE SEQ OR is selected by pressing the SEQ/SEQ OR pushbutton (CC) and verifying that the SEQ OR light is lit and the SEQ light is not lit.
	URO	If out motion continues, then SELECT the affected GROUP and INSERT the affected group. **RNO:** A. Trip the Reactor by pressing the reactor trip and DSS pushbuttons (CC). B. GO TO OP-TM-EOP-001.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip.

Op Test No.: 1	Scenario # 4	Event # 6	Page 23 of 32
Event Description:	Uncontrolled outward rod motion, Group 7, manual Reactor Trip		

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-001, Reactor Trip IMAs
	URO	VERIFY REACTOR SHUTDOWN.
	URO	PRESS Turbine Trip pushbutton (CL).
	URO	VERIFY the turbine stop valves are Closed.
NOTE TO EXAMINER:		**After the EOP-001 IMA's are completed, GO TO Event 7.**

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 24 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 7.**
Indications Available:		**RB Pressure rises rapidly, 4# ES signal, MAP annunciator alarms.**
	Crew	Diagnose the Steam rupture.
	ARO	Performs a Symptom Check, Announces Excessive Primary to Secondary Heat Transfer based on: *All of the following conditions:* • *RCS average temperature below 540°F.* • *Uncontrolled lowering of RCS temperature.* • *Tsat for OTSG pressure is less than Tcold on affected OTSGs.*
	CRS	ANNOUNCE Entry into OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer.
		OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer
	ARO	PERFORM Rule 3, XHT.
		OP-TM-EOP-010, Rule 3, XHT.
	ARO	VERIFY OTSG level < 97.5%.
	ARO	VERIFY primary to secondary heat transfer is excessive.
	ARO	PERFORM Phase 1 Isolation of the affected OTSG(s).

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 25 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
	ARO	Phase 1 Isolation: OTSG B ___ MS-V-1C by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit. ___ MS-V-1D by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit. ___ FW-V-16B by lowering and/or raising on the FW-V-16B toggle switch (CC). ___ FW-V-17B by lowering and/or raising on the FW-V-17B toggle switch (CC). ___ FW-V5B by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit. ___ FW-V-92B by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit. ___ MS-V-3A ___ MS-V-3B ___ MS-V-3C ___ MS-V-4B by lowering and/or raising on the MS-V-3A,B,C, MS-V-4 toggle switch (CC). If Open for minimum FW Nozzle flow ___ FW-V-85B (Interm Bldg 322').
BOOTH OPERATOR:		**When directed to close FW-V-85B, close FW-V-85 and report it closed.**
	ARO	PERFORM Phase 2 Isolation of the affected OTSG(s).

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 26 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
CT-17	ARO	Phase 2 Isolation: OTSG B ___ EF-V-30B by pressing the Manual pushbutton (CC), verifying the Manual light is lit, and the Auto light is not lit and closing by adjusting the toggle switches (CL) in the closed direction. ARO may pin the toggle switches in the full closed position. ___ EF-V-30C by pressing the Manual pushbutton (CC), verifying the Manual light is lit, and the Auto light is not lit and closing by adjusting the toggle switches (CL) in the closed direction. ARO may pin the toggle switches in the full closed position. ___ MS-V-2B by pressing the closed pushbutton (CC), verifying that the valve closed light is lit and the valve open light is not lit. ___ Time ___ If unable to close an EF-V-30, then CLOSE the associated EF-V-52 valve IAW OP-TM-424-901, "Emergency Feedwater".
	ARO	THROTTLE EFW IAW Rule 4, "Feedwater Control" (maintain OTSG level > 25" Startup Range Level using Main or EFW.
	ARO	VERIFY OTSG level and pressure stabilizes.
	ARO	INITIATE Guide 12, "RCS Stabilization".
		OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer
	URO	INITIATE Guide 9, "RCS Inventory Control".
		OP-TM-EOP-010, Guide 9, "RCS Inventory Control"
	URO	VERIFY MU Tank Level > 55 inches and ESAS HPI is not actuated. RNO: OPEN MU-V-14A or MU-V-14B by pressing the open pushbutton (CC), verifying that the valve open light is lit and the valve closed light is not lit.

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 27 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY MU Tank Level < 96 inches.
	URO	VERIFY MU pump is operating.
	URO	VERIFY MU-V-5 is Closed.
	URO	VERIFY MU24-FI > 20 gpm.
	URO	ENSURE MU-V-17 is Open.
	URO	VERIFY PZR level is being restored. RNO: THROTTLE MU-V-217. RNO: CLOSE MU-V-3. RNO: INITIATE HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI".
		OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer
	N/A	IAAT RCS temperature reduction has been terminated, then PERFORM Guide 12, "RCS Stabilization".
	ARO	ENSURE announcement of reactor trip.
	ARO	VERIFY primary to secondary heat transfer is being established.
	URO	VERIFY RCS Tcold > 525 °F. RNO: INITIATE Rule 5, "Emergency Boration". INITIATE Rule 6 "Pressurized Thermal Shock".
	ARO	ENSURE performance of an alarm review.

Op Test No.: 1 Scenario # 4 Event # 7, 8 Page 28 of 32

Event Description: Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed

Time	Position	Applicant's Actions or Behavior
	CRS	REQUEST SM evaluate Emergency Action Levels (EALs).
	URO	VERIFY RCS Tcold > 465 °F.
	ARO	VERIFY OTSG B is providing sufficient steam for Gland Steam. **RNO:** 1. ENSURE Aux Boiler is operating. 2. Transfer gland sealing steam to the Auxiliary Steam supply as follows: ___ A. OPEN AS-V-8 (TB 355' South of 6th stage drain collection tank). ___ B. CLOSE GS-V-4.
	N/A	If OTSG TUBE LEAKAGE exists, then GO TO EOP-005.
	ARO	VERIFY RB Pressure < 2 psig.
	ARO	INITIATE Guide 14, "Tube-to-Shell Delta T Limit/Control".
	URO	VERIFY PRESSURIZER LEVEL IS BEING MAINTAINED WITHOUT HPI.
	CRS	Announces entry into OP-TM-EOP-001, Reactor Trip, VSSV's.
CT-5		**OP-TM-EOP-010, RULE 2, "HPI THROTTLING"**
	URO	**VERIFY** MU PUMP FLOW < 515 gpm/pump.
	URO	**VERIFY** SCM < 250°F.
	URO	**VERIFY** an RCP is ON.

Op Test No.: 1 Scenario # 4 Event # 7, 8 Page 29 of 32

Event Description: Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed

Time	Position	Applicant's Actions or Behavior
	URO	**When** any of the following conditions exist: – SCM > 25F **and** HPI COOLING is **not** required, – SCM > 25F **and** HPI COOLING is required **and** incore temperature is lowering, – Incore temperature < 25F superheat **and** BWST level < 15 ft **and** LPI > 1250 gpm in each line, **then** HPI may be THROTTLED IAW OP-TM-211-901, "Emergency Injection (HPI/LPI)".
		OP-TM-211-901, "Emergency Injection (HPI/LPI)", ATTACHMENT 7.3 THROTTLING HPI
	URO	**VERIFY** ESAS in defeat IAW OP-TM-642-901, "1600 psig ESAS Actuation".
	URO	**IAAT** three MU pumps are running **and** CRS concurrence is obtained, **then SHUTDOWN** the ES selected pump lined up to MU & SI **and PLACE** CS in Normal-After-Stop. (e.g. normally MU-P-1A) by turning the MU-P-1C control switch (CR) counter-clockwise, verifies green light is lit and red light not lit, and no amps.
	URO	**VERIFY** throttling is permitted IAW RULE 2 **and OBTAIN** CRS concurrence.
	CRS	Concurs with throttling HPI.
	URO	**WAAT** HPI throttling is permitted IAW RULE 2 **and** prior to reducing any MU pump flow to less than 115 GPM, **then** perform the following: 1. **If** DH-V-7A **and** DH-V-7B are Closed, **then OPEN** MU-V 36 **and** MU-V-37 by pressing the open pushbuttons (CC), verifying that the valve open lights are lit and the valve closed lights are not lit. 2. **If** DH-V-7A **or** DH-V-7B are Open, **then** 1) **OPEN** RC-V-2 **and** RC-RV-2. 2) **ENSURE** any MU pump opposite MU & SI is shutdown.

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 30 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
	URO	**WAAT** Emergency Boration is **not** required (Rule 5), **then INITIATE** Guide 9 to close MU-V-14A and MU-V-14B.
	URO	**IAAT** CRS directs "termination" of HPI, **then** A. **SHUTDOWN the** MU pumps which started on ES **and PLACE** CS in Normal-after-stop by turning the MU-P-1A control switch (CR) counter-clockwise, verifies green light is lit and red light not lit, and no amps. B. **CLOSE** both MU-V-16 valves lined up to MU/SI pump by pressing the closed pushbutton (CC) for each valve, verifying the closed lights are lit and the open lights are not lit, and no HPI flow indicated. C. **CLOSE** both MU-V-16 valves opposite MU/SI pump by pressing the closed pushbutton (CR) for each valve, verifying the closed lights are lit and the open lights are not lit, and no HPI flow indicated. D. **GO TO** Step 10.
	URO	**When** OP-TM-244-901 criteria is satisfied, **then OPEN** MU-V-18 the open pushbutton (CC), verifying valve open light is lit and valve closed light not lit.
	URO	**If** MU-V-36 or MU-V-37 is Closed, **then ENSURE** MU or SI flow > 40 GPM.
	OR	
	URO	**THROTTLE** MU-V-16 parallel to MU and SI (i.e. normally MU-V-16B).
		OP-TM-EOP-001, Reactor Trip, VSSV's
	N/A	ANNOUNCE Reactor Trip.
	URO	VERIFY control rod groups 1 through 7 are fully inserted.
	ARO	VERIFY both OTSG Operate Range levels < 97.5%.

Op Test No.: 1 Scenario # 4 Event # 7, 8 Page 31 of 32

Event Description: Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed

Time	Position	Applicant's Actions or Behavior
	ARO	VERIFY Main FW Flow to each OTSG < 0.5 Mlb/hr.
	ARO	VERIFY OTSG levels > setpoint.
	URO	VERIFY ICS/NNI HAND or AUTO Power is available.
	URO	VERIFY 1D and 1E 4160V buses are energized from auxiliary transformers.
	N/A	INITIATE Guide 9, "RCS Inventory Control".
	ARO	INITIATE Guide 6, "OTSG Pressure Control".
	URO	INITIATE Guide 8, "RCS Pressure Control".
	ARO	WAAT Generator MW ≤ zero, or Turbine speed < 1770 rpm, then VERIFY both GB1-12 and GB1-02 are Open.
	ARO	WAAT both GB1-12 and GB1-02 are Open, then ENSURE the Generator Field Breaker is Open.
	ARO	VERIFY Primary and Secondary Instrument Air pressure > 80 psig.
	ARO	INITIATE OP-TM-642-904 "Reactor Trip Isolation ESAS Actuation".

Op Test No.: 1	Scenario # 4	Event # 7, 8	Page 32 of 32
Event Description:	Steam Rupture in RB, Excessive Heat Transfer, MU-V-36 Fails Closed		

Time	Position	Applicant's Actions or Behavior
	ARO	IAAT Containment pressure exceeds 2 psig, then perform the following. ___ 1. INITIATE OP-TM-534-901, RB Emergency Cooling. ___ 2. DETERMINE source of elevated Containment pressure by observing the following: – Radiation Monitors, – OTSG pressures, – OTSG feed rates. ___ 3. If Containment pressure source is a secondary side leak (either FW or MS), then PERFORM EOP-001 Attachment 1, "OTSG Isolation" for the affected OTSG. ___ 4. If an OTSG is isolated, then INITIATE EOP-010 Guide 2, "OTSG Isolation From Condenser".
	ARO	VERIFY PRF1-3-5 "Intermed Bldg Flooding" alarm is Clear.
	N/A	IAAT PRESSURIZER LEVEL can not be MAINTAINED WITHOUT HPI, then GO TO EOP-006.
NOTE TO EXAMINER: The scenario may be terminated when the "B" OTSG is isolated and HPI is terminated.		
NOTE TO EXAMINER: Terminate the scenario		

Follow-up question highest event entered during scenario?

Answer: HA6: FIRE or EXPLOSION Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown. (If overcooling results in Loss of Sub-cooling Margin, FA1 also applies.