

Facility:	Three Mile Island	Task No.:	G0P002005
Task Title:	<u>PERFORM A REACTIVITY BALANCE AT POWER</u>	JPM No.:	<u>2019 TMI NRC JPM RA1-1</u>
K/A Reference:	2.1.25      3.9	NEW JPM	
Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	
<u>Method of testing:</u>			
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 third Reactor Operator.
  - The instructor/examiner will act as the CRS.
  - Plant Conditions
    - The Reactor is at 100% steady state power for 30 days.
    - Tave = 579°F
    - 300 EFPD
    - CRG 1-6 at 100% WD
    - Group 7 at 92% withdrawn
    - Measured Boron Concentration 1000 ppmB ( $\pm$  30 ppmB of MUT)
    - Boron Depletion Factor is 1.0
  - The Plant Computer is unavailable.

Initiating Cue: The CRS has directed you to calculate a Reactivity Balance IAW OP-TM-300-405 Reactivity Balance at Power.

Task Standard: Complete a Reactivity Balance IAW OP-TM-300-405 Reactivity Balance at Power.

Required Materials:

- OP-TM-300-405, Rev 5, Reactivity Balance at Power
- OP-TM-300-000, Rev 9, Reactivity and Power Distribution Calculations
- Calculator

General References:

- OP-TM-300-405, Rev 5, Reactivity Balance at Power
- OP-TM-300-000, Rev 9, Reactivity and Power Distribution Calculations

Time Critical Task: N/A

Validation Time: 20 minutes

**PROCEDURE SETUP**

**OP-TM-300-405, Reactivity Balance at Power with the prerequisites signed off.**

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

START TIME: \_\_\_\_\_

**EVALUATOR CUE:** Provide the operator with a copy of OP-TM-300-405, Reactivity Balance at Power with the prerequisites signed off.

Provide OP-TM-300-000 Reactivity and Power Distribution Calculations and

**PROCEDURE NOTE:** SRO review on Attachment 7.1 is not required when this procedure is being performed for NF-TM-100-8010, TMI Core Follow.

**Performance Step: 1** Procedure Step 4.1  
**PERFORM** calculation per Attachment 7.1 or DTSQA-approved software

**Standard:** Examinee obtains Attachment 7.1 and Attachment 7.2 to perform calculation

**Comment:**

***Attachment 7.1, Steps 1 - 3***

**Procedure Note:** Refer to Attachment 7.2 to complete the Data Sheet. Data may be entered in any sequence. Sign-off verifies all data entered as required. Approval signature indicates an "Independent Verification".

**Performance Step: 2** Step 1: **Enters Tave = 579°F** (Given Information)  
Step 2: **Enters 100%** Reactor Power (Given Information)  
Step 3: **Enters 300** EFPD (Given Information)

**Standard:** Date is entered as required.

**Comment:**

## PERFORMANCE INFORMATION

**EVALUATOR CUE:** *When examinee request Boron Depletion Factor, respond the value is 1.0.*

**Attachment 7.1 Steps 4 - 5**

**Performance Step: 3** 4a. **Enters 1000** ppmB for MEASURED RCS BORON CONCENTRATION ( $\pm 30$  ppmB of MUT) (Given information)  
4b. **Enters 1.0** for BORON DEPLETION CORRECTION FACTOR (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)  
4c. CORRECTED BORON CONCENTRATION (4a x 4b), **Enters 1000**  
5. Control Rod Position: Enters the following values: (Given Information)  
**5a CRG 1-4 100%,**  
**5b CRG 5 100%,**  
**5c CRG 6 100%,**  
**5d CRG 7 92%**

**Standard:** Examinee enters the above data.

**Comment:**

**Attachment 7.1 Step 6 and OP-TM-300-000, Fig 3**

**Performance Step: 4** 6. FUEL EXCESS REACTIVITY (FIG. 3): **Enters 6.8%**

√ **Standard:** **Examinee using Fig 3**  
**Enters 6.8% (6.7% - 6.9%)**

**Comment:**

**Attachment 7.1 Step 7 and OP-TM-300-000. Fig 6A or 6B**

**Performance Step: 5** 7.0 INSERTED ROD WORTH  
CRG 1-7 (FIG. 6A or 6B). **Enters -0.045%**

√ **Standard:** **Examinee using Fig 36A or 6B**  
**Enters -0.045% (-0.05 to - 0.04)**

**Comment:**

## PERFORMANCE INFORMATION

***Attachment 7.1 Step 8 and OP-TM-300-000, Fig 9*****Performance Step: 6**

BORON REACTIVITY WORTH

8a. HFP Inverse Boron Worth (Fig 9) **ENTERS 155 ppmB from Fig 9**8b. Boron Worth  $(4c / 8a) \times (-1)$  **ENTERS -6.45 %**✓ **Standard:****Examinee using Fig 9****8a. Enters 155 ppmB (154 -156)****8b. Enters -6.45% (-6.49 to -6.41)****Comment:*****Attachment 7.1 Step 9 and OP-TM-300-000 Fig 12*****Performance Step: 7**

9.0 XENON REACTIVITY WORTH ADJUSTMENT (PPC, Reactor Engr, FIG. 12)

9a. Present Xenon worth: **ENTERS -2.434% from Fig 12**9b. 100% FP Xenon worth: **ENTERS -2.434% from Fig 12**9c. 100% Xenon adjustment  $(9a - 9b)$ : **ENTERS 0%**✓ **Standard:****Examinee using Fig 12****9a. Enters -2.434%****9b. Enters -2.434%****9c. Enters 0%****Comment:*****Attachment 7.1 Step 10 and OP-TM-300-000 Fig 16*****Performance Step: 8**10. POWER DOPPLER DEFICIT (FIG. 16) **ENTERS 0%****Standard:****Examinee using Fig 16****10. Enters 0%****Comment:**

## PERFORMANCE INFORMATION

**Attachment 7.1 Step 11****Performance Step: 9**11. EOC  $T_{AVE}$  REDUCTION CORRECTION ( $T_{AVE} < 577^{\circ}\text{F}$ )11a. Temperature Difference (1) – (579°F) **ENTERS 0**11b. Temperature Coefficient (Table 5) **ENTERS N/A**11c. Temperature Worth (11a x 11b) = **ENTERS N/A****Standard:****EXAMINEE ENTERS:****11a. 0°F****11b. N/A****11c. N/A****Comment:****Attachment 7.1 Step 12****Performance Step: 10**12. NET REACTIVITY (6 + 7 + 8b + 9c + 10 + 11c) **ENTERS: 0.305**

√

**Standard:****EXAMINEE ENTERS:****6.8% + -0.045% + -6.45% + 0% + 0% = 0.305% (0.16 to 0.45%)****6.7% + -0.05% + -6.49% + 0% + 0% = 0.16%****6.9% + -0.04% + -6.41% + 0% + 0% = 0.45%****Comment:****Attachment 7.1**

Signs and dates Attachment 7

**Standard:****Examinee Signs and Dates Attachment 7.1****Comment:****Terminating Cue:****After the CRS is notified and Attachment 7 is complete, Evaluation on this JPM is complete.****STOP TIME:**

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

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Job Performance Measure No.: NEW JPM: 2019 TMI NRC JPM RA1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



**ATTACHMENT 7.1****ANSWER KEY: Do NOT Give to Examinee**

NOTE: Refer to Attachment 7.2 to complete the Data Sheet. Data may be entered in any sequence. Sign-off verifies all data entered as required. Approval signature indicates an "Independent Verification".

CALCULATION IS FOR: DATE \_\_\_\_\_ TIME \_\_\_\_\_

- |     |   |  |
|-----|---|--|
| 1.  | $T_{AVE}$ ( $579 \pm 2^\circ\text{F}$ , $+2 / -10^\circ\text{F}$ during EOC $T_{AVE}$ Reduction)            | <u>579</u> °F  |
| 2.  | REACTOR POWER ( $\geq 15\%$ FP)   | <u>100</u> %FP   |
| 3.  | CYCLE BURNUP  | <u>300</u> EFPD  |
| 4.  | 4a. MEASURED RCS BORON CONCENTRATION ( $\pm 30$ ppmB of MUT)  | <u>1000</u> ppmB   |
|     | 4b. BORON DEPLETION CORRECTION FACTOR<br>(PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet) | <u>1.0</u>   |
|     | 4c. CORRECTED BORON CONCENTRATION (4a x 4b) =   | <u>1000</u> ppmB   |
| 5.  | CONTROL ROD GROUP POSITION  |  |
|     | 5a. CRG 1-4   | <u>100</u> % WD  |
|     | 5b. CRG 5   | <u>100</u> % WD  |
|     | 5c. CRG 6   | <u>100</u> % WD  |
|     | 5d. CRG 7   | <u>92</u> % WD   |
| 6.  | FUEL EXCESS REACTIVITY (FIG. 3)   | <b><u><math>6.8 \pm 0.1</math></u></b> % $\Delta k/k$      |
| 7.  | INSERTED ROD WORTH  |  |
|     | CRG 1-7 (FIG. 6A or 6B)   | <b><u><math>-0.045 \pm 0.005</math></u></b> % $\Delta k/k$ |
| 8.  | BORON REACTIVITY WORTH  |  |
|     | 8a. HFP Inverse Boron Worth (FIG. 9)  | <b><u><math>155 \pm 1</math></u></b> ppmB/% $\Delta k/k$   |
|     | 8b. Boron Worth (4c / 8a) x (-1)  | <b><u><math>-6.45 \pm 0.04</math></u></b> % $\Delta k/k$   |
| 9.  | XENON REACTIVITY WORTH ADJUSTMENT (PPC, Reactor Engr, FIG. 12)  |  |
|     | 9a. Present Xenon worth   | <u>-2.434</u> % $\Delta k/k$                               |
|     | 9b. 100% FP Xenon worth   | <u>-2.434</u> % $\Delta k/k$                               |
|     | 9b. 100% FP Xenon worth   | <u>0</u> % $\Delta k/k$                                    |
| 10. | POWER DOPPLER DEFICIT (FIG. 16)   | <u>0</u> % $\Delta k/k$                                    |
| 11. | EOC $T_{AVE}$ REDUCTION CORRECTION ( $T_{AVE} < 577^\circ\text{F}$ )  |  |
|     | 11a. Temperature Difference (1) – ( $579^\circ\text{F}$ ) =   | <u>0</u> °F  |
|     | 11b. Temperature Coefficient (Table 5)  | <u>N/A</u> % $\Delta k/k/F$                                |
|     | 11c. Temperature Worth (11a x 11b) =  | <u>N/A</u> % $\Delta k/k$                                  |
| 12. | NET REACTIVITY (6 + 7 + 8b + 9c + 10 + 11c) =   | <b><u><math>0.305 \pm 0.145</math></u></b> % $\Delta k/k$  |

NOTE: If net reactivity exceeds  $\pm 0.5\% \Delta k/k$  (steady state) or  $\pm 0.8\% \Delta k/k$  (transient), refer to Main Body Section 4.2.

CALCULATED BY \_\_\_\_\_ DATE/TIME \_\_\_\_\_

APPROVED BY (SRO) \_\_\_\_\_ DATE/TIME \_\_\_\_\_

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**JPM CUE SHEET**

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 third Reactor Operator.
- The instructor/examiner will act as the CRS.
- Plant Conditions
  - The Reactor is at 100% steady state power for 30 days.
  - Tave = 579oF
  - 300 EFPD
  - CRG 1-6 at 100% WD
  - Group 7 at 92% withdrawn
  - Measured Boron Concentration 1000 ppmB ( $\pm$  30 ppmB of MUT)
  - Boron Depletion Factor is 1.0
- The Plant Computer is unavailable.

**INITIATING CUE:**

The CRS has directed you to calculate a Reactivity Balance IAW OP-TM-300-405 Reactivity Balance at Power.

**Time Critical:**

No

Facility: THREE MILE ISLAND Task No.: 82301006

Task Title: Complete RB Average Temperature Calculation JPM No.: 2019 TMI NRC JPM RA1-2

K/A Reference: 2.1.7 4.4 Bank JPM: TQ-TM-104-ADM-1301-J100

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:**
- 100% power
  - You are the 3<sup>rd</sup> CRO

**Initiating Cue:** Complete 1301-1 Shift and Daily Checks Section B.3 of Data Sheet 1

Time Critical: No

Task Standard: Complete the RB air temperature attachment. Identify that the temperatures above 320' is out-of-spec and that there are NOT at least 4 operable detectors below 320' elevation.

- Required Materials:
- 1301-1, SHIFT AND DAILY CHECKS, Rev 178, Data Sheet 1, Section B.3 and Enclosure 5
  - Handouts
  - Calculator

General References: • 1301-1, SHIFT AND DAILY CHECKS, Rev 178

Validation Time: 20 Minutes

**JPM SETUP**

1. Use Attached Power Point: AH-TR-655 RB Ambient Temperatures

OR

2. AH-TR-655 setup:
  - a. Use classroom simulator to enter the following values for AH-TR-655
    - i. TR-655A = 135.6
    - ii. TR-655B = 128.7
    - iii. TR-655C = "Blank"
    - iv. TR-655D = 131.5
    - v. TR-655E = 130.6
    - vi. TR-655F = "Blank"
    - vii. TR-655G = 130.4
    - viii. TR-655H = 135.8
    - ix. TR-655I = 135.6
    - x. TR-655J = 137.7
    - xi. TR-655K = 135.5
    - xii. TR-655L = 137.3
    - xiii. TR-655M = "Blank"
    - xiv. TR-655N = 115.6
    - xv. TR-655O = "Blank"
    - xvi. TR-655P = 135.6
    - xvii. TR-655Q = 112.4
    - xviii. TR-655R = "Blank"
    - xix. TR-655S = "Blank"
    - xx. TR-655T = 116.3
    - xxi. TR-655U = "Blank"
    - xxii. TR-655V = 114.9
    - xxiii. TR-655W = 126.9
    - xxiv. TR-655X = 125.8
  - b. Numbers are inserted as (number above)-50 = Analog override value.
  - c. Save screen capture.
3. Ensure students have a calculator.

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

START TIME: \_\_\_\_\_

**EVALUATORS CUE:** Direct the student(s) to complete 1301-1 Shift and Daily checks section B.3 of Data Sheet 1.  
Provide a copy of Attachment 1: RB temperatures from AH-TR-655.  
**DO NOT GIVE ENCLOSURE 5 UNTIL REQUESTED.**

**1301-1, Data Sheet 1, Section B.3**

**Performance Step: 1** Note: If one or more RTD has failed in a Group, then the Average Temperature for the group must be hand calculated using Enclosure 5.

**Standard:** Examinee per **NOTE**, goes to Enclosure 5, Containment Temperature Average Calculation Sheet

**Comment:**

**EXAMINER CUE:** When Examinee recognizes that Enclosure 5 is required, provide the Examine a Copy of Enclosure 5.

**1301-1, Enclosure 5**

**Performance Step: 2** Perform Attachment 5, >320' Elevation

√ **Standard:** Examine completes Enclosure 5:  
Temperature above Elev. 320' filled in and calculated to be 131.4°F by dividing the sum of the 14 operable detectors (1839.4) by 14.

**Comment:**

## PERFORMANCE INFORMATION

**1301-1, Enclosure 5****Performance Step: 3**

Perform Attachment 5, below 320' Elevation

√

**Standard:**

Examine completes Enclosure 5:

Temperature below Elev. 320' calculated to be 115.6°F by dividing the sum of the 3 operable detectors (346.8) by 3

**Comment:****1301-1, Enclosure 5****Performance Step: 4**

When the average temperatures for the groups has been calculated and verified, then transpose the calculated average values to Data Sheet 1, Section B.3

**Standard:**

Examinee transfer average temperatures' to Data Sheet 1, Section B.3

The Examinee records the correct value for average temperature above 320' elevation. (131.4)

The Examinee records the average temperature below 320' elevation. (115.6)

**Comment:****1301-1, Data Sheet 1, Section B.3****Performance Step: 5**

Are there 13 or more operable detectors above 320' elevation? (Circle Y/N)

**Standard:**

Examinee Circles **YES**

**Comment:**

## PERFORMANCE INFORMATION

**Examiner Note:** The examinee may notify Shift management that ave RB Temp above 320' is > 130°F and to take the required actions.

**1301-1, Data Sheet 1, Section B.3**

✓ **Performance Step: 6** Is Avg. Temp. above 320' Elev. less than 130F? (Circle Y/N)

**Standard:** Examinee Circles **NO**

**Comment:**

**1301-1, Data Sheet 1, Section B.3**

✓ **Performance Step: 7** Are there 4 or more operable detectors below 320' elevation? (Circle Y/N)

**Standard:** Examinee Circles **NO**

**Comment:**

**1301-1, Data Sheet 1, Section B.3**

**Performance Step: 8** Is Avg. Temp. below 320' Elev. less than 120F? (Circle Y/N)

**Standard:** Examinee Circles **YES**

**Comment:**

**Terminating Cue:** When the average temperature below 320' Elevation less than 120°F (Circle Y/N) step has been completed this JPM may be terminated.

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

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Job Performance Measure No.: ILT 18-01 NRC JPM RA1-2

Examinee's Name:

Examiner's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



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:**

- 100% power
- You are the 3<sup>rd</sup> CRO

**INITIATING CUE:**

Complete 1301-1 Shift and Daily checks section B.3 of Data Sheet 1.

**TIME CRITICAL:**

No

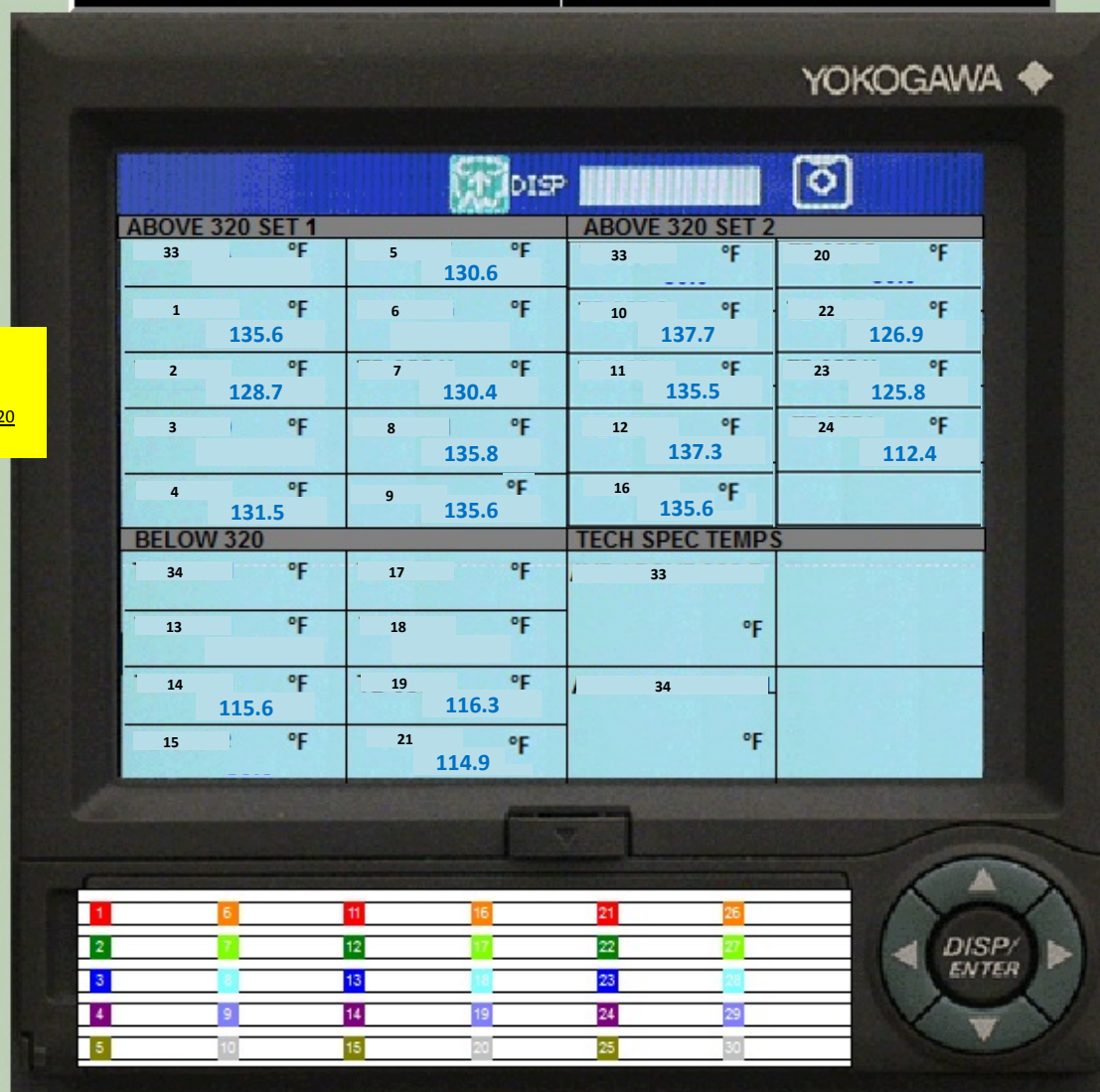
## CUE SHEET

Attachment 1  
AH-TR-655 RB Ambient Temperatures

# REACTOR BUILDING AMBIENT TEMPERATURE

RTD TAG	CH.	LOCATION	RTD TAG	CH.	LOCATION
TE-655A	1	SE WALL 352"	TE-655M	13	NE WALL 314"
TE-655B	2	NW SEC SH 352"	TE-655N	14	S WALL 314"
TE-655C	3	NE SEC SH 382"	TE-655O	15	NW WALL 314"
TE-655D	4	E WALL 382"	TE-655P	16	E SEC SH 352"
TE-655E	5	NE SEC SH 352"	TE-655R	17	NE WALL 287"
TE-655F	6	NW SEC SH 352"	TE-655S	18	S WALL 287"
TE-655G	7	NE SEC SH 352"	TE-655T	19	NW WALL 287"
TE-655H	8	NW SEC SH 352"	TE-655U	20	E SEC SH 352"
TE-655I	9	NW WALL 352"	TE-655V	21	NW SEC SH 287"
TE-655J	10	E WALL 400"	TE-655W	22	NE SEC SHIELD WALL 364"
TE-655K	11	S SEC SHIELD WALL 352"	TE-655X	23	N SEC SH 364"
TE-655L	12	NW SEC SH 352"	TE-655Q	24	S RX WALL 321"

EDT: 3296  
EQUIP# AH-TR-655  
DEF FAILED Points  
3, 6, 13, 15, 17, 18, 20  
AR# MMT 8663



AH-TR-655

**Attachment 2**  
**ANSWER KEY**  
**DO NOT GIVE TO EXAMINEE**

1301-1  
 Data Sheet 1 Section B.3  
 ANSWER KEY

B.3 Tech. Spec. 4.20, 3.17

<b>NOTE:</b> If one or more RTD has failed in a group, then the average temperature for the group must be hand calculated using Enclosure 5.			
AH-TR-655			
Average Temp. ABOVE 320' Elev.	<b><u>131.4°F</u></b>	Average Temp. BELOW 320' Elev.	<b><u>115.6°F</u></b>
Are there 13 or more operable detectors above 320' elevation? (Circle Y/N)			<b>Y</b> / N
Is Avg. Temp. above 320' Elev. less than 130°F? (Circle Y/N)			Y / <b>N</b>
Are there 4 or more operable detectors below 320' elevation? (Circle Y/N)			Y / <b>N</b>
Is Avg. Temp. below 320' Elev. less than 120°F? (Circle Y/N)			<b>Y</b> / N

**Attachment 3**  
**ANSWER KEY**  
**DO NOT GIVE TO EXAMINEE**

1301-1 ENCLOSURE 5

Page 1 of 1

**Containment Temperature Average Calculation Sheet**

Data Sheet to Substitute when a RTD on AH-TR-655 has failed

Indicator	Location	Record Indication °F		Indicator	Location	Record Indication °F	
		<320' El.	>320' El.			<320' El.	>320' El.
TE-655A	SE WALL 352'	xxxx	<b>135.6</b>	TE-655P	E SEC SH 352'	xxxx	<b>135.6</b>
TE-655B	NW SEC SH 352'	xxxx	<b>128.7</b>	TE-655U	E SEC SH 352'	xxxx	
TE-655C	NE SEC SH 352'	xxxx		TE-655W	NE SEC SH 364'	xxxx	<b>126.9</b>
TE-655D	E WALL 382'	xxxx	<b>131.5</b>	TE-655X	N SEC SH 364'	xxxx	<b>125.8</b>
TE-655E	NE SEC SH 352'	xxxx	<b>130.6</b>	TE-655Q	S RX WALL 321'	xxxx	<b>112.4</b>
TE-655F	NW SEC SH 352'	xxxx		TE-655M	NE WALL 314'		xxxx
TE-655G	NE SEC SH 352'	xxxx	<b>130.4</b>	TE-655N	S WALL 314'	<b>115.6</b>	xxxx
TE-655H	NW SEC SH 352'	xxxx	<b>135.8</b>	TE-655O	NW WALL 314'		xxxx
TE-655I	NW WALL 352'	xxxx	<b>135.6</b>	TE-655R	NE WALL 287'		xxxx
TE-655J	E WALL 400'	xxxx	<b>137.7</b>	TE-655S	S WALL 287'		xxxx
TE-655K	S SEC SH 352'	xxxx	<b>135.5</b>	TE-655T	NW WALL 287'	<b>116.3</b>	xxxx
TE-655L	NW SEC SH 352'	xxxx	<b>137.3</b>	TE-655V	NW SEC SH 287'	<b>114.9</b>	xxxx
Avg. Temp. above 320' Elev.		<b>131.4°F</b>		Avg. Temp. below 320' Elev.		<b>115.6°F</b>	
Calculations Performed By						Date	
Calculations Verified By						Date	

When the average temperatures for the groups has been calculated and verified, then transpose the calculated average values to Data Sheet 1, Section B.3

Facility: TMI – Unit 1 Task No.: 85201004

Task Title: Station Print Reading: JPM No.: 2019 TMI NRC JPM  
Isolate Instrument Air Leak RA2

K/A Reference: 2.2.41 (3.9) New JPM

Examinee: NRC Examiner:

Facility Examiner: Date:

Method of testing:

Simulated Performance: X Actual Performance: \_\_\_\_\_  
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 Third Reactor Operator on shift.
  - Reactor Power is 100%,
  - A Small Instrument Air Leak has been detected at IA-V-1626B located on Print 302-273, 2 Hour Backup Supply Air.
  - IA Pressure is being maintained by IA-P-4 Instrument Air Compressor.
  - All other systems and components are in their normal configuration.

**Initiating Cue:** Identify the Mechanical Isolation Points on 302-273 to allow maintenance on IA-V-1626B AND the effect that isolation will have on plant components.

Time Critical Task: No

Task Standard: 

- Leak isolated and consequences of isolation identified.

Required Materials: 

- Print 302-273, Rev 24 2 Hour Backup Supply Air

General References: 

- Instrument and Control Air Prints:
- 302-268 Rev 18, 301-272 Rev 24, 302-276 Rev 6
- OP-TM-AOP-028 Rev 9, Loss of Instrument Air
- OP-AA-109-101 Rev 013, Personnel and Equipment Tagout Process

Handouts: 

- Print 302-273 2 Hour Backup Supply Air with IA-V1626B Highlighted

Validation Time: 20 minutes

**JPM SETUP**

1. Print 302-273 with IA-V1626B Highlighted.

(Denote Critical Steps with an asterisk)

Start Time \_\_\_\_\_

**EXAMINER CUE:**

**Hand Examinee the following:**

- **Print 302-273 and identify the leaking valve. (IA-V-1626B)**
  - **Provide the following prints if they are requested:**
    - **302-268**
    - **302-272**

**Inform the examinee this valve has a slow leak and ask the examinee to:**

- 1. Identify the isolation points to allow maintenance on the valve.**
- 2. State the effect(s) of the isolation on plant components.**

**NOTE:**

**STEPS 1-8 CAN BE PERFORMED IN ANY SEQUENCE.**

Using print 302-273 Identifies the following points of isolation for the given leak

√ **Performance Step: 1** Determines that valve IA-V1629B must be closed.

**Standard:**

- Identifies IA-V1629B will be closed.

**Comment:**

√ **Performance Step 2:** Determines that valve IA-V-1616B must be closed **OR** States that 'B' Side 2 Hours Instrument Bottles would have to be blown down.

**Standard:**

- Identifies IA-V1616B will be closed **OR** 'B' Train of 2 Hour Instrument Air Bottles will have to be blown down.

**Comment:**

√ **Performance Step: 3** Determines that valve IA-V1617B AND/OR IA-V-1618B must be closed.

**Standard:**

- Identifies IA-V1617B will be closed.

**Comment:**

√ **Performance Step: 4** Determines that valve IA-V1798 must be closed.

**Standard:**

- Identifies IA-V1798 will be closed.

**Comment:**

√ **Performance Step: 5** Determines that valve IA-V1662 must be closed.

**Standard:**

- Identifies IA-V1662 will be closed.

**Comment:**

√ **Performance Step: 6** Determines that valve IA-V1650 must be closed.

**Standard:**

- Identifies IA-V1650 will be closed.

**Comment:**

√ **Performance Step: 7** Determines that valve IA-V1652 must be closed.

**Standard:**

- Identifies IA-V1652 will be closed.

**Comment:**



**Performance Step: 8** Determines that valve IA-V1632 will be closed.

**Standard:**

- Identifies IA-V1632 will be closed.

**Comment:**

**EXAMINER CUE:** If examinee states this completes the isolation, ask the examinee to identify the effect on plant components.

✓ **Performance Step: 9** Identifies the effect on EF-V-30B and EF-V-30D, Emergency Feedwater supply to 'B' OTSG and 'A' OTSG respectively.

**Standard** Both the Emergency Valves have all air supplies isolated and would be inoperable(Failed Closed) AND/OR require Local Manual Operation.

**Comment:**

**EXAMINER NOTE:** The Examinee may identify that MS-V-4B is inoperable (Failed Closed Step 10) OR may recommend opening the valves to provide an alternate source of air (Step 11).

✓ **Performance Step: 10** Identifies the effect on MS-V-4B, OTSG B Atmospheric Dump Valve

**Standard** MS-V-4B has all air supplies isolated and would be inoperable (Failed Closed) AND/OR require Local Manual Operation.

**Comment:**

OR

✓ **Performance Step: 11** Print 302-272  
Determines if IA-V1444 and IA-V1447 were opened, this would supply BUIA to MS-V-4B, OTSG B Atmospheric Dump Valve to maintain normal automatic operation.

**Standard** Identifies that IA-V-1444 and IA-V1447 to be Opened to maintain normal automatic operation of MS-V-4B.

**Comment:**

**Terminating Cue:** When the examinee has completed identifying the isolation points and states the effect on plant components.

**STOP TIME:** \_\_\_\_\_

Job Performance Measure No.: 2019 TMI NRC JPM RA2

Examinee's Name:

Examiner's Name:

Date Performed:

Facility Examiner:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

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---

Response:

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Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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 Third Reactor Operator on shift.
  - Reactor Power is 100%,
  - A Small Instrument Air Leak has been detected at IA-V-1626B located on Print 302-273, 2 Hour Backup Supply Air.
  - IA Pressure is being maintained by IA-P-4 Instrument Air Compressor.
  - All other systems and components are in their normal configuration.

**Initiating Cue:** Identify the Mechanical Isolation Points on 302-273 to allow maintenance on IA-V-1626B AND the effect that isolation will have on plant components.

**Time Critical Task:** No

Facility:	TMI Unit 1	Task No.:	EPAA101007
Task Title:	Perform State and Local Event Notification	JPM No.:	2019 TMI NRC JPM RA4
K/A Reference:	G2.4.43 (3.2)	Modified Bank JPM	

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 third Reactor Operator on shift.
  - I will act as the Shift Manager/Shift Emergency Director.
  - An Alert, MA5, was declared at Three Mile Island Unit 1 at 1300 hours.
  - An explosion occurred near the BWST which resulted in visible damage to the BWST. The BWST is NOT leaking.
  - Neither the TSC nor the EOF are staffed.
  - It is currently 1303 hours.

Initiating Cue: As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the alert, MA5, IAW EP-MA-114-100, Mid-Atlantic State/Local Notifications, Step 4.2.

Time Critical Task: Yes

Task Standard: Complete the notification message within the allotted time frame.

- Required Materials:
- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 25
  - EP-MA-114-100-F-01, State/Local Event Notification Form, Rev S
  - TMI EP Aid 56, Rev 0, Callouts

- General References:
- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 25
  - EP-MA-114-100-F-01, State/Local Event Notification Form, Rev S

## Handouts:

- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 25, filled out through Step 4.1.16.
- Attachment 1: EP-MA-114-100-F-01, State/Local Event Notification Form, Rev S filled out IAW EP-MA-114-100 with the following exceptions:
  - **1. Do not fill out the “Utility Message No” line**
  - **2. Do not sign on the “Emergency Director Approval” line**

Validation Time: 10 minutes

*(Denote Critical Steps with a check mark)*

START TIME: \_\_\_\_\_

TIME CRITICAL START TIME: \_\_\_\_\_

Same as Start Time

**EVALUATOR NOTE:** Time Critical Time starts with acknowledgement of CUE.

**EVALUTAOR CUE:** Provide EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 25, filled out through Step 4.1.16 and EP-MA-114-100-F-01, filled out with the errors stated in the Handout section.

**EVALUTAOR CUE:** Direct the Examinee to perform State/Local Event Notifications IAW EP-MA-114-100 Step 4.2.1.

Examinee may use TMI EP Aid 56 (Attachment 2), located at the Phone, instead of EP-MA-114-100.

When it is brought to your attention that the Utility Message Number has not been assigned, state "This is Utility Message Number 1". If required, fill out a number 1.

***EP-MA-114-100, Step 4.2.1.1***

√ **Performance Step: 1**

When provided with the completed notification form, the designated communicator shall:

- Ensure that "Utility Message No." has been assigned using a sequential number.

**Standard:** Examinee confirms that the "Utility Message No." has not been filled out and tells the Evaluator.

**Comment:**

**EVALUATOR CUE:** When it is brought to your attention that the signature block is blank, then place a signature in the appropriate space at the top of EP-MA-114-100-F-01.

***EP-MA-114-100, Step 4.2.1.2***

✓ **Performance Step: 2** Verify “Emergency Director Approval” signature has been entered on the top of the form.

**Standard:** Examinee confirms that the “Emergency Director Approval” signature has not been filled in and tells the Evaluator.

**Comment:**

***EP-MA-114-100, Step 4.2.1.3***

**Performance Step: 3** Review form for completeness and identify any missing information (incomplete blocks) to:  
Control Room → Shift Manager (Shift Emergency Director)  
TSC → TSC Director  
EOF → EOF Director

**Standard:** Examinee reviews the form and verifies completeness.

**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

After pressing the notify button, inform the examinee they have been prompted.

***EP-MA-114-100, Step 4.2.2***

**Performance Step: 4**      **INITIATE** the all-call notification by **PRESSING** the “Notify” button for the applicable station. **CONFIRM** that you would like to initiate the call by **PRESSING** the “Yes” button when prompted

**PROCEDURE NOTE:**      **Completion of the call (contact made via dedicated or commercial line with agencies listed) must be performed within 15 minutes of initial classification, reclassification, or PAR change.**

√ **Standard:**      Examinee selects the NARS labeled telephone and presses the “**NOTIFY**” button for the applicable station.  
  
Examinee **CONFIRMS** he would like to initiate the call by “**PRESSING**” the “**YES**” button when prompted.

**Comment:**

**EVALUATOR CUE:**      **If the examinee performs the correct steps above, state the following: “You hear people answer the phone”.**

***EP-MA-114-100, Step 4.2.3***

**Performance Step: 5**      **REPEAT** the following message while allowing for agencies to come on line:

**"This is the Exelon Nuclear [Station and Facility originating the call]. Please standby for a notification message."**

After approximately 10 to 15 seconds, **READ** the following message:

**"This is the Exelon Nuclear [Station and Facility originating the call]. Please standby to receive a notification message and respond as the roll is called."**

**Standard:**      **Examinee completes the required messages above.**

**Comment:**



**EVALUATOR CUE:** As the examinee conducts a role call, respond as appropriate: “PEMA is online; Cumberland County is online; Lebanon County is online; Lancaster County is online; York County is online; Dauphin County is online”.

- ✓ **Performance Step: 6** *EP-MA-114-100, Step 4.2.4, 4.2.4.1*  
Conduct an Initial Roll Call for the agencies listed on Page 3 of the State/Local Event Notification Form.
- Record the time (in 24-hour clock) as each required party responds to the roll call.

**Standard:** Examinee conducts an initial roll call of the State and Local Agencies.

Examinee 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.

**Comment:**

**EVALUATOR NOTE:** Steps 4.2.4.2. and 4.2.4.3 are N/A.

- Performance Step: 7** *EP-MA-114-100, Step 4.2.5.4*  
Enter the time (in 24-hour clock) that initial roll call was completed at the bottom of the roll call box.

**Standard:** Examinee correctly records the time that initial roll call was completed at the bottom of the roll call box.

**Comment:**

***EP-MA-114-100, Step 4.2.5***

√ **Performance Step: 8** Read blocks one at a time from the approved notification form.

1. Use the phonetic alphabet for clarity.
2. Speak clearly and slowly.
3. Record message delivery completion date and time in Block 12: Conclusion

**Standard:**

Examinee reads each of the blocks one at a time from pages 1 and 2 of the S&L Event Notification Form.

Examinee records the message delivery completion date and time in Block 12.

**Comment:****EVALUATOR CUE:**

**As the examinee conducts a role call, respond as appropriate: “PEMA is online; Cumberland County is online; Lebanon County is online; Lancaster County is online; York County is online; Dauphin County is online”.**

**EVALUATOR CUE:**

**When the examinee asks if there are any questions, state “there are no questions”.**

***EP-MA-114-100, Step 4.2.6, 4.2.7, 4.2.8***

√ **Performance Step: 9** **4.2.6 Conduct** the final roll call for each agency listed on the back of the Event Notification Form, **and check** them off as they respond to the final roll call.

4.2.6.1 Ask if there are any questions about the information provided and clarify as needed.

4.2.6.2 N/A

**Standard:**

Examinee conducts a final roll call for each agency and checks the agencies off as they respond.

Examinee asks if there are any questions about the information provided.

**Comment:**

**EVALUATOR NOTE:** The time Critical End point is when the FINAL roll call is completed.

TIME CRITICAL STOP TIME: \_\_\_\_\_

***EP-MA-114-100, Step 4.2.7***

Performance Step: 10 To end the call, READ the following:  
"This concludes the notification message."

**Standard:** Examine states: "This concludes the notification message."

**Comment:**

**Terminating Cue:** When examinee states that the notification message has concluded, JPM may be terminated.

**TIME CRITICAL STOP TIME – CRITICAL START TIME: (Must be less than 12 minutes)**

\_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_ Minutes  
STOP TIME START TIME TOTAL TIME

Job Performance Measure No.: TMI 2019 TMI NRC JPM RA4

Examinee's Name:

Examiner's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

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Response:

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Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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## JPM CUE SHEET

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 third Reactor Operator on shift.
- I will act as the Shift Manager/Shift Emergency Director.
- An Alert, MA5, was declared at Three Mile Island Unit 1 at 1300 hours.
- An explosion occurred near the BWST which resulted in visible damage to the BWST. The BWST is NOT leaking.
- Neither the TSC nor the EOF are staffed.
- It is currently 1303 hours.

Initiating Cue:

As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the alert, MA5, IAW EP-MA-114-100, Mid-Atlantic State/Local Notifications, Step 4.2.

Time Critical Task:     Yes

## Attachment 1



EP-MA-114-100-F-01

Rev. S

Page 1 of 3

**STATE/LOCAL EVENT NOTIFICATION FORM**

(OR ELECTRONIC FACSIMILE)

UTILITY MESSAGE NO. \_\_\_\_\_ EMERGENCY DIRECTOR APPROVAL: \_\_\_\_\_

PERFORM INITIAL ROLL CALL PRIOR TO TRANSMITTING – Refer to Page 3 of Form

Block 1: <u>CALL STATUS</u>		
<input checked="" type="checkbox"/> This is a DRILL	<input type="checkbox"/> This is an ACTUAL EVENT	
Block 2: <u>AFFECTED STATION</u>		
<input type="checkbox"/> A- LIMERICK	<input type="checkbox"/> B- PEACH BOTTOM	<input checked="" type="checkbox"/> C- TMI
Block 3: <u>AFFECTED UNIT(S)</u>		
<input checked="" type="checkbox"/> A- ONE	<input type="checkbox"/> B- TWO	<input type="checkbox"/> C- THREE
Block 4: <u>CLASSIFICATION</u>		
<input type="checkbox"/> A- UNUSUAL EVENT	<input type="checkbox"/> C- SITE AREA EMERGENCY	<input type="checkbox"/> E- RECOVERY
<input checked="" type="checkbox"/> B- ALERT	<input type="checkbox"/> D- GENERAL EMERGENCY	<input type="checkbox"/> F- TERMINATION
Block 5: <u>DECLARED AT:</u> TIME: <u>1300</u> (24-hr clock) DATE: <u>TODAY</u>		
Block 6: <u>THIS REPRESENTS A/AN:</u>		
<input checked="" type="checkbox"/> A- INITIAL DECLARATION	<input type="checkbox"/> B- ESCALATION	<input type="checkbox"/> C- NO CHANGE
<input type="checkbox"/> D- REDUCTION		
Block 7: <u>EMERGENCY ACTION LEVEL (EAL) NUMBER:</u> <u>MA5</u>		
Block 8: <u>A BRIEF NON-TECHNICAL DESCRIPTION OF THE EVENT</u>		
<input type="checkbox"/> A- Abnormal Rad Levels / Radiological Effluent	<input checked="" type="checkbox"/> D- Hazards and Other Conditions Affecting Plant Safety	
<input type="checkbox"/> B- Fission Product Barrier Degradation	<input type="checkbox"/> E- Independent Spent Fuel Storage Installation Malfunction	
<input type="checkbox"/> C- System Malfunction	<input type="checkbox"/> F- Cold Shutdown/Refueling System Malfunctions	
Block 9: <u>RADIOLOGICAL RELEASE STATUS</u>		
<input checked="" type="checkbox"/> A- NO radiological release in-progress		
<input type="checkbox"/> B- AIRBORNE radiological release in-progress		
<input type="checkbox"/> C- LIQUID radiological release in-progress		
<input type="checkbox"/> D- Radiological release TERMINATED		
Block 10: <u>METEOROLOGICAL DATA:</u>		
WIND DIRECTION is FROM: <u>90</u> (degrees)		
WIND SPEED is: <u>10</u> (miles per hour)		

## Attachment 1

EP-MA-114-100-F-01

Rev S

Page 2 of 3

## STATE/LOCAL EVENT NOTIFICATION FORM

## Block 11: PROTECTIVE ACTION RECOMMENDATION:

☒ A- NONE (Proceed to Box 12)

(Complete the following for Shelter or Evacuation for a General Emergency only for the applicable station):

☐ B- The PROTECTIVE ACTION RECOMMENDATION (PAR) from the utility is:

S = Shelter E = Evacuate

[ S / E ] 360 DEGREES FROM 0 MILES (SITE BOUNDARY) TO 2 MILES

AND

THE FOLLOWING SECTORS FROM 2 MILES TO 5 MILES:

[ S / E ] A (Alpha)	[ S / E ] E (Echo)	[ S / E ] J (Juliette)	[ S / E ] N (November)
[ S / E ] B (Bravo)	[ S / E ] F (Foxtrot)	[ S / E ] K (Kilo)	[ S / E ] P (Papa)
[ S / E ] C (Charlie)	[ S / E ] G (Golf)	[ S / E ] L (Lima)	[ S / E ] Q (Quebec)
[ S / E ] D (Delta)	[ S / E ] H (Hotel)	[ S / E ] M (Mike)	[ S / E ] R (Romeo)

AND

THE FOLLOWING SECTORS FROM 5 MILES TO 10 MILES:

[ S / E ] A (Alpha)	[ S / E ] E (Echo)	[ S / E ] J (Juliette)	[ S / E ] N (November)
[ S / E ] B (Bravo)	[ S / E ] F (Foxtrot)	[ S / E ] K (Kilo)	[ S / E ] P (Papa)
[ S / E ] C (Charlie)	[ S / E ] G (Golf)	[ S / E ] L (Lima)	[ S / E ] Q (Quebec)
[ S / E ] D (Delta)	[ S / E ] H (Hotel)	[ S / E ] M (Mike)	[ S / E ] R (Romeo)

AND

Potassium Iodide (KI) be administered to the general public in accordance with state procedures and advise the remainder of the EPZ to Monitor and Prepare.

AND

This Protective Action Recommendation [IS] [IS NOT] the result of a Rapidly Progressing Severe Accident

## Block 12: CONCLUSION

The current Time is \_\_\_\_\_ Date: \_\_\_\_\_

## Block 13: COMMUNICATOR INFORMATION

☒ This is a DRILL☐ This is an ACTUAL EVENTNAME: RO#3CALL BACK NUMBER 717-948-1000

- PERFORM FINAL ROLL CALL UPON COMPLETION – Refer to Page 3 of Form
- ASK if there are any questions regarding message or repeat backs needed
- READ "This concludes the notification message"
- FAX completed copies of all form pages to the Control Room, TSC and EOF, as applicable.
- INFORM the Shift Manager, Emergency Director, TSC Director or EOF Director, as applicable, when notification is completed to required contacts.

## Attachment 1

EP-MA-114-100-F-01

Rev S

Page 3 of 3

**"15 Minute Notifications"**  
**PEACH BOTTOM**

**"Notification Line"** Press the 'PB Notify' button on the NARS phone. Stay on the line until agencies come on.  
**"Point-to-Point Call"** Press the blue point-to-point button on the NARS phone for the corresponding agency or dial the commercial numbers below to contact an individual agency.

<u>Initial Roll Call</u>	<u>Final Roll Call</u>
(Time Contacted: 24-hour clock)	(v)
_____ <b>Pennsylvania EMA</b>	<input type="checkbox"/>
1-800-424-7362 /	
1-717-651-2001	
_____ <b>Maryland EMA</b>	<input type="checkbox"/>
1-410-517-3600	
_____ <b>York County</b>	<input type="checkbox"/>
1-717-854-5571	
_____ <b>Harford County</b>	<input type="checkbox"/>
1-410-638-3400 /	
1-410-638-4900	
_____ <b>Cecil County</b>	<input type="checkbox"/>
1-410-392-2010	
_____ <b>Lancaster County</b>	<input type="checkbox"/>
1-800-808-5236 /	
1-717-664-1190	
_____ <b>Chester County</b>	<input type="checkbox"/>
1-610-344-5100	
_____ <b>Initial Roll Call Completed</b>	

**FOLLOW-UP NOTIFICATIONS \***  
**(PEACH BOTTOM ONLY)**

[ ] **Maryland Dept. of the Environment**  
Blue Point-to-Point MDE button on the NARS line  
or 1-866-633-4686  
Contacted at: \_\_\_\_\_ (time: 24-hour clock)

[ ] **PA State Police, York Barracks**  
Blue Point-to-Point PSP button on the NARS line  
or 1-717-428-1011  
Contacted at: \_\_\_\_\_ (time: 24-hour clock)

\* NOT required within 15 minutes of Classification

**"15 Minute Notifications"**  
**LIMERICK**

**"Notification Line"** Press the 'LGS Notify' button on the NARS phone. Stay on the line until agencies come on.  
**"Point-to-Point Call"** Press the blue point-to-point button on the NARS phone for the corresponding agency or dial the commercial numbers below to contact an individual agency.

<u>Initial Roll Call</u>	<u>Final Roll Call</u>
(Time Contacted: 24-hour clock)	(v)
_____ <b>Pennsylvania EMA</b>	<input type="checkbox"/>
1-800-424-7362 or	
1-717-651-2001	
_____ <b>Montgomery County</b>	<input type="checkbox"/>
1-610-631-6541	
_____ <b>Chester County</b>	<input type="checkbox"/>
1-610-344-5100	
_____ <b>Berks County</b>	<input type="checkbox"/>
1-610-655-4931	
_____ <b>Initial Roll Call Completed</b>	

---

**"15 Minute Notifications"**  
**TMI**

**"Notification Line"** Press the 'TMI Notify' button on the NARS phone. Stay on the line until agencies come on.  
**"Point-to-Point Call"** Press the blue point-to-point button on the NARS phone for the corresponding agency or dial the commercial numbers below to contact an individual agency.

<u>Initial Roll Call</u>	<u>Final Roll Call</u>
(Time Contacted: 24-hour clock)	(v)
_____ <b>Pennsylvania EMA</b>	<input type="checkbox"/>
1-800-424-7362 or	
1-717-651-2001	
_____ <b>Cumberland County</b>	<input type="checkbox"/>
1-717-238-9676, 1-717-243-4121 or	
1-717-532-8878	
_____ <b>Lebanon County</b>	<input type="checkbox"/>
1-717-272-2025 / -7621 / -2054	
_____ <b>Lancaster County</b>	<input type="checkbox"/>
1-717-664-1190 / -1200	
_____ <b>York County</b>	<input type="checkbox"/>
1-717-854-5571, 1-717-840-2955 or	
1-800-427-8347	
_____ <b>Dauphin County</b>	<input type="checkbox"/>
1-717-558-6900	
_____ <b>Initial Roll Call Completed</b>	

**FOLLOW-UP NOTIFICATIONS \* (TMI)**

[ ] **York Haven Power Station**  
1-717-860-6605 or 1-717-818-3976  
Contacted at: \_\_\_\_\_ (time: 24-hour clock)



## Attachment 2

**TMI EP AID 56** Rev 0

- ☐ **REVIEW** the form for completeness
- ☐ **PRESS** the applicable "TMI Notify or TMI Notify Drill" button on the EMnet phone
- ☐ **CONFIRM** that you would like to initiate the call by Pressing "Yes"
  - ☐ **ENSURE** you push the button to talk when using the handset.
- ☐ **READ:** "This is the Exelon Nuclear Three Mile Island (Facility originating the call MCR/TSC). Please standby for a notification message."
- ☐ **AFTER** approximately 10 to 15 seconds, **READ** the following message:  
"This is the Exelon Nuclear Three Mile Island (Facility originating the call MCR/TSC). Please standby to receive a notification message and respond as the roll is called."
- ☐ **CONDUCT** an initial roll call for the agencies listed on Page 3 of the State/Local Event Notification Form and **RECORD** accurate times
- ☐ **READ** Blocks 1 through 11.
- ☐ **COMPLETE** block 12 with an accurate time and date and **READ**.
- ☐ **COMPLETE** block 13 and **READ**.
- ☐ **CONDUCT** the final roll call for each agency listed on Page 3 of the State/Local Event Notification Form, and **CHECK** them off as they respond to the final roll call.
- ☐ **READ** "Are there any questions regarding the message or repeat backs needed"
- ☐ **READ** "This concludes the notification message"
  - ☐ **PRESS** the "Hang up" button to **END** the call
- ☐ Perform Follow-up notifications (York Haven)
- ☐ Fax the paperwork to the other applicable facilities
- ☐ Notify the Shift Manager / TSC Director as applicable when notifications are complete.

**NOTE:** This EP Aid is to be used in conjunction with procedure EP-MA-114-100

Facility: THREE MILE ISLAND Task No.: 3430220303

Task Title: ISSUE CONTROLLED KEYS JPM No.: ILT 18-01 NRC JPM SA1-1

K/A Reference: 2.1.13 (3.2) Modified JPM: TQ-TM-104-ADM-J003 Issue Controlled Key

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance:  X   
Classroom  X  Simulator \_\_\_\_\_ Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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 is at 100% steady state power.

Initiating Cue: You are the CRS; Technicians will be coming to you to request keys to support job activities.

Task Standard:

1. Issue and Document the issuance of a Key for a Locked High Radiation Area IAW AP-1011 Controlled Key Locker.
2. Issue and document the issuance of a Critical Digital Assets(CDA) key IAW OP-AA-108-1000 CDA Control Program

Required Materials:

- AP-1011 Controlled Key Locker Control, Rev 41
- OP-AA-108-103-1000 CDA Key Control Program, Rev 1

General References:

- AP-1011 Controlled Key Locker Control, Rev 41
- OP-AA-108-103-1000 CDA Key Control Program, Rev 1

Time Critical Task: No

Validation Time: 25 mins

**JPM SETUP**

Simulated Keys:

1. Key # 322, Red Label
2. Key # 260, Orange Label per CDA Guidance
3. Attachment 1: LMS Printout in COLOR
4. Attachment 2: Sample Work Request

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EVALUATORS CUE:** 1. As a Rad Con Tech request Key #322 MU Tank Room (Locked High Radiation Area) to perform a routine survey. Key #322 located down in Rad Con was inadvertently taken home.  
When asked, provide a copy of AP-1011 Controlled Key Locker Control

***AP 1011, Precautions, Limitations, and Prerequisites***

**Performance Step: 1** Examinee reviews refers to Section 4.5 Issuing Controlled Keys.

**Standard:** Examinee locates correct section of procedure.

**Comment:**

**EVALUATORS CUE:** When Examinee identifies the location of the Key, provide Key#322 to the Examinee. (Combination from Shift Manager)

***AP 1011, Step 4.5.2.1***

**Performance Step: 2** **OBTAIN** the key(s) requested by the individual

**Standard:** Examinee obtains Key #322 from the Controlled Key Locker. (Located in Shift Managers Office)

**Comment:**

***AP 1011, Step 4.5.2.2***

**Performance Step: 3** **IF** any of the keys are "GREEN" tagged obtain the CRS's permission to issue the key or **ELSE** N/A this step.

**Standard:** Examinee N/A's this step.

**Comment:**

## PERFORMANCE INFORMATION

**EVALUATORS CUE:** When Examinee contacts the Rad Con Supervisor, state the Rad Tech has permission to check out Key #322

**AP 1011, Step 4.5.2.3**

- √ **Performance Step: 4** IF any of the keys are "Yellow" or "Red" tagged obtain the Group Radiological Controls Supervisor permission to issue the key to Radiological Controls personnel ONLY or ELSE N/A this step.

**Standard:** Examinee calls the Rad Control Supervisor for permission to issue Key #322. (Red Colored Key)

**Comment:**

**AP 1011, Step 4.5.2.4**

**Performance Step: 5** IF any of the keys are the "CDA Locker Key", ensure the individuals qualifications have been verified current in LMS for "Critical Group".

**Standard:** Examinee N/A's this step.

**Comment:**

**EVALUATORS CUE:** Provide Examinee Exhibit 1 to log out Key #322.

**AP 1011, Attachment 7.3**

- √ **Performance Step: 6** **RECORD** on Exhibit 1 or the electronic log at least the following information:
- a) key number(s): **322**
  - b) lock: Make-up Tank Room (NOT critical)
  - c) purpose for the key issuance: Survey, Perform Work or similar words. (NOT critical)
  - d) who it was issued to: **RAD CON**
  - e) the Issuing person's initials or name: **Examinee's Initial**
  - f) the date and time: **Present Date & Time**

**Standard:** Examinee correctly fills in all the required columns. (First six columns)

**Comment:**

## PERFORMANCE INFORMATION

**EVALUATORS CUE:** After Key 322 is issued, plays the role of the I&C Tech:

**2. Provide Work Order 12345 (Attachment 1) for repair of a CB7 faulty alarm to the Examinee AND request key: CDA0026034 Fire Panel CB7.**

- If ASKED, Provide a copy of OP-AA-108-103-1000 CDA Key Control Program, Rev 0.
- If Examinee states the CDA Key can only be issued by the Shift Manager, inform the Examinee, he/she is the Shift Manager.

**EVALUATORS CUE:** After Examinee states he/she would open LMS to verify the I&C Tech Qualification Status, provide Exhibit 1.

**OP-AA-108-103-1000, Step 4.5.2**

- ✓ **Performance Step: 7**
1. **VERIFY** End User has met the following requirements prior to issuing CDA Key *[Shift Management]*:
    - A. **VERIFIED** Critical Group qualification in LMS (N-AN-SY-CRITICAL-GROUP).
    - B. **OBTAINED** Work Order (WO), Service Request, Preventive Maintenance Identification (PMID), IR or Action Request (AR) authorizing work on CDA.

**Standard:**

- A. Examinee verifies I&C Tech Qualifications using LMS
- B. Examinee verifies one of the following: WO, Service Request, PMID, IR, OR AR Number

**Comment:**

**EVALUATORS CUE:** When examinee request CDA Key, provide him/her with KEY: CDA0026034

## PERFORMANCE INFORMATION

**OP-AA-108-103-1000,****Step 4.5.2****Performance Step: 8**

2. When a WO, PMID, procedure or supervisor directs activities requiring access to a locked CDA, **REQUEST** permission from Shift Management to: *[End User]*

A. **OBTAIN** possession of the CDA Key, **and**

B. **UNLOCK** the associated Cabinet/Enclosure (Safe in Shift Managers Office) to access the CDA.

3. **OBTAIN** CDA Key from CDA Key Locker *[Shift Management]*.

**Examiner Cue:**

When examinee compares key markings to Attachment 2, inform the Examinee they meet CDA Key Tag Requirements.

**OP-AA-108-103-1000,****Step 4.5.2****Performance Step: 9**

4. **ENSURE** required visible markings on CDA key tag prior to use. **REFER** to Attachment 2 for CDA Key Tag requirements *[Shift Management]*.

**Standard:**

Examinee verifies correct marking on CDA Key.

**Comment:**

## PERFORMANCE INFORMATION

**Procedure NOTE:** PowerTrakR shall be updated following periods of PowerTrakR unavailability when Attachment 3, CDA Key Log is used.

**EVALUATORS CUE:** Inform the Examinee that ***“PowerTrakR” is unavailable.***

**Provide copy of Attachment 3 CDA Key Log.**

**OP-AA-108-103-1000, Step 4.5.2**

✓ **Performance Step: 10** **5. ENSURE** the issuance of CDA Keys to the end user is documented in PowerTrakR. If PowerTrakR is unavailable, document issuance of CDA Keys on Attachment 3, CDA Key Log. *[Shift Management]*

**Standard:** Examinee Completes Attachment 3:  
CDA Key #: **CDA0026034**  
Key Issue To: **I&C Tech**  
Time/  
Date Issued: **Today / Current Time**  
WO: **12345**  
Critical Group Qualification: **Yes**

**Comment:**

**JPM is complete after Attachment 3 is completed.**

**STOP TIME:** \_\_\_\_\_



VERIFICATION OF COMPLETION

---

Job Performance Measure No.: ILT 18-01 NRC JPM SA1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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 is at 100% steady state power.

Initiating Cue:            You are the CRS, Technicians will be coming to you to request keys to support job activities.

TIME CRITICAL:            No

## ATTACHMENT 1

W/O #: 12345TASK: 01Rev. 00U1**Work Task Instructions****1 PURPOSE:**

- 1.1 To repair Faulty Water Flow Alarm on Incipient Fire Panel CB7
- 1.2 Equip/Comp ID: CB7.
- 1.3 Equip/Comp Location: Service Building

**2 OPERATIONAL IMPACT:**

- 2.1 N/A

**3 PRECAUTIONS:**

- 3.1 This task requires working on a CDA component.

**4 LIMITATIONS:**

- 4.1 N/A

**5 PREREQUISITES:**

- 5.1 None

**6 GENERAL NOTES / SUPPORT INFORMATION:**

- 6.1 OP-AA-108-103-1000 CDA Control Key Program
- 6.2 IC202 Fire Panel Maintenance

**7 SCOPE:**

- 7.1 Diagnose & Repair the Faulty Water Flow Alarm associated with CB7.
  - 7.1.1 Request permission form Shift Management to obtain CDA Key 00260
  - 7.1.2 Obtain possession of the key
  - 7.1.3 Unlock the associated Cabinet to access the CDA
  - 7.1.4 Diagnose and Repair the faulty Water Flow Alarm on Incipient Fire Panel CB7  
IAW IC202 Fire Panel Maintenance.

**8 PMT:**

- 8.1 N/A

**9 COMPLETION STEPS:**

- 9.1 Document repair on Work Order 12345.

**TRAINING USE ONLY**  
**EXHIBIT 1**

Lookup ID

My Qual Check	Qual Rpt	Qual Matrix Rpt	Supvr Matrix	Dept Matrix	Dept Forecast	Class Schedule	
---------------	----------	-----------------	--------------	-------------	---------------	----------------	--

**Student Information**

Date: **TODAY** Employee **123456** Employee Name **I&C Tech** Jr  
**Legend:** **Y** = Currently Qualified (will not expire in next 60 days) **O** = Currently Qualified (due to expire in 60 days or less) **N** = Not Qualified (expired)

21 Qualification(s) Found

Page 1 of 1

FILTER APPLIED: **ALL QUALS VIEW**

Qualifications (Required to be complete prior to performing specific jobs or tasks)			Training Requirements (Required Training Not Linked to Qualifications)
All Quals Assigned	Assigned & Qualified	Assigned Not Qualified	Training Requirements

*You are currently viewing only QUALIFICATIONS. To view TRAINING REQUIREMENTS, click on the tab above!*

*Be sure to check your Training Requirements also!*

ID	Title	Status	Expiration Date	Days Remaining
+ N-AN-RP-NGET-1-SWF	General Employee Training Level 1 (FFD/PAT)	Y	6/30/2021	
+ N-AN-RP-NGET-2-SWF	General Employee Training Level 2 (FFD/PAT/RWT)	Y	6/30/2021	
+ N-AN-SY-CRITICAL-GROUP	Critical Group Qualification	Y	5/31/2020	
+ N-AN-SA-CONF-SPC-MONITOR	Confined Space Air Monitoring	Y		
+ N-AN-SA-FALL-PROT	Fall Protection	Y		

Facility: THREE MILE ISLAND

Task No.: 62201020

Task Title: Calculate and Approve a SDM  
calculationJPM No.: ILT 18-01 NRC JPM  
SA1-2

K/A Reference: 2.1.37 4.6

Bank JPM: TQ-TM-104-SADM-205-  
J100

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 Control Room Supervisor
- The instructor/examiner will act as the Shift Manager
- Reactor Power is approximately 60% and steady for the last 48 hours due to a dropped rod in Group 5.
- Dropped Rod in Group 5 is fully inserted.
- Boron Depletion Correction Factor is 0.92
- Cycle Burnup is 120 EFPD
- Boron Concentration is 1173 ppmB.
- The PPC and Reactor Engineering are not available.

Initiating Cue: As the CRS, Review and Approve the calculation of a quantitative shutdown margin using OP-TM-300-205, SHUTDOWN MARGIN FOR HOT SHUTDOWN CONDITIONS.

Time Critical Task: No

Validation Time: 20 minutes

Task Standard: Identify errors in a Quantitative shutdown margin calculation, and correctly calculate a separate shutdown margin calculation.

Required Materials:

- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 9
- OP-TM-300-205, SHUTDOWN MARGIN FOR HOT SHUTDOWN CONDITIONS, Rev 6
- Calculator
- Ruler

General References:

- OP-TM-300-000, REACTIVITY AND POWER DISTRIBUTION CALCULATIONS, Rev 9
- OP-TM-300-205, SHUTDOWN MARGIN FOR HOT SHUTDOWN CONDITIONS, Rev 6

**SETUP**

1. Obtain an copy of OP-TM-300-205, and perform the following:
  - a. Sign off the prerequisites in section 3.3
  - b. On attachment 7.3, enter the following values on the correct line:
    - i. Calculation for SDM at Date: Today Time: Now
    - ii. Line 2 – 120
    - iii. Line 3a – 1173
    - iv. Line 3b - 0.92
    - v. Line 3c – 1079.2
    - vi. Line 4 – 8.6
    - vii. Line 5a – 151
    - viii. Line 5b – (-7.15)
    - ix. Line 6 – (-1.6)
    - x. Line 7a – N/A
    - xi. Line 7b – 0
    - xii. Line 8a – 0
    - xiii. Line 8b – 0
    - xiv. Line 9 – (-0.15)
    - xv. Acceptance Criteria
      1. Circle 'NO'
    - xvi. Calculated by Reactor Operator #1, time/date: Today/Now



## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

START TIME: \_\_\_\_\_

**EVALUATORS CUE:** Provide the operator with a copy of OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, and OP-TM-300-000, Reactivity and Power Distribution Calculations.

***OP-TM-300-205, Section 3.3 Prerequisites***

**Performance Step: 1** Examinee with review the prerequisites.

**Standard:** Examinee reviews the prerequisites and moves to the next section.

**Comment:**

***OP-TM-300-205, Section 4.0***

**Performance Step: 2** Step 4.1: DETERMINE whether a qualitative or quantitative assessment of Shutdown Margin is desired.

**Standard:** Examinee determines that a quantitative assessment is desired.

**Comment:**

***OP-TM-300-205, Section 4, Step 4.1.1 is NA***

***OP-TM-300-205, Section 4.0***

**Performance Step: 3** Step 4.1.2: If a quantitative assessment of Shutdown Margin is desired, then DETERMINE Shutdown Margin IAW Section 4.3.

**Standard:** Examinee goes to section 4.3.

**Comment:**

PERFORMANCE INFORMATION

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***OP-TM-300-205, Section 4.0***

**Performance Step: 4** Step 4.3.1: PERFORM calculation IAW Attachment 7.3 and instructions in Attachment 7.4 or DTSQA-approved software.

**Standard:** Examinee goes to Attachments 7.3 and 7.4.

**Comment:**

***OP-TM-300-205, Attachment 7.3***

**Performance Step: 5** CALCULATION FOR A SDM AT:  
DATE \_\_\_\_\_ TIME \_\_\_\_\_

**Standard:** Examinee verifies date and time

**Comment:**

***OP-TM-300-205, Attachment 7.3***

**Performance Step: 6** Line 2: Record Cycle Burnup.

**Standard:** Examinee verifies 120 EFPD is recorded

**Comment:**

***OP-TM-300-205, Attachment 7.3***

**Performance Step: 7** Line 3a: Record Measured Boron Concentration.

**Standard:** Examinee verifies 1173 ppmB is recorded

**Comment:**

***OP-TM-300-205, Attachment 7.3***

**Performance Step: 8** Line 3b: Record Boron Depletion Correction Factor.

**Standard:** Examinee verifies 0.92 is recorded.

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-300-205, Attachment 7.3***

**Performance Step: 9** Line 3c: Calculate Corrected Boron Concentration.

**Standard:** Examinee records  $\geq 1079$  ppmB but  $\leq 1079.5$  ppmB.

**Comment:**

**EXAMINER NOTE:** If during the JPM, the examinee states that they are complete with the review (due to finding an error), inform them to complete the entire calculation.

***OP-TM-300-205, Attachment 7.3***

✓ **Performance Step: 10** Line 4: Determine Fuel Excess Reactivity from Figure 1

**Standard:** Examinee Records 7.8 ( $\geq +7.7\% \Delta k/k$  but  $\leq +7.9\% \Delta k/k$ ) and  
***Recognizes error with the RO calculation.***

**Comment:**

✓ ***OP-TM-300-205, Attachment 7.3***

**Performance Step: 11** Line 5a: Determine HZP Inverse Boron Worth from Figure 8.

**Standard:** Examinee records 151 ( $> 150$  ppmB/% $\Delta k/k$  but  $< 152$  ppmB/% $\Delta k/k$ )

**Comment:**

***OP-TM-300-205, Attachment 7.3***

✓ **Performance Step: 12** Line 5b: Calculate Boron Worth.

**Standard:** Examinee records 7.15 ( $\geq -7.1\% \Delta k/k$  but  $\leq -7.2\% \Delta k/k$ )

**Comment:**

PERFORMANCE INFORMATION

---

***OP-TM-300-205, Attachment 7.3***

- ✓ **Performance Step: 13** Line 6: Record Xenon Reactivity Worth  
**Standard:** Examinee records -1.95%  $\Delta k/k$  (-1.94 to -1.97)  
***Recognizes error with the RO calculation.***

**Comment:**

***OP-TM-300-205, Attachment 7.3***

- Performance Step: 14** Line 7a: Record time since last shutdown  
**Standard:** Examinee records Zero hours

**Comment:**

***OP-TM-300-205, Attachment 7.3***

- Performance Step: 15** Line 7b: Record Samarium and Plutonium Buildup Reactivity Worth from Figure 15  
**Standard:** Examinee records Zero %  $\Delta k/k$

**Comment:**

***OP-TM-300-205, Attachment 7.3***

- Performance Step: 16** Line 8a: Record number of known Inoperable Control Rods  
**Standard:** Examinee records zero

**Comment:**

***OP-TM-300-205, Attachment 7.3***

- Performance Step: 17** Line 8b: Record Total Inoperable Rod Worth  
**Standard:** Examinee records Zero %  $\Delta k/k$

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-300-205, Attachment 7.3***

✓ **Performance Step: 18** Line 9: Calculate Shutdown Margin

**Standard:** Examinee records -1.30 ( $\geq -1.14\% \Delta k/k$  but  $\leq -1.47\% \Delta k/k$ )  
and **recognizes error with the RO calculation**

**Comment:**

**EXAMINER NOTE:** The examinee must identify that the Reactor Operators calculation is not accurate, should not sign it and determines SDM is more negative than -1%  $\Delta k/k$  and meets the acceptance criteria.

***OP-TM-300-205, Attachment 7.3, Acceptance Criteria***

**Performance Step: 19** Step 1: Shutdown margin is verified to be more negative than -1%  $\Delta k/k$ . (Checks Test Acceptance Criteria Satisfied)

**Standard:** Examinee Checks Correct Box

**Comment:**

***OP-TM-300-205, Attachment 7.3***

✓ **Performance Step: 20** CALCULATED BY \_\_\_\_\_ DATE/TIME \_\_\_\_\_

**Standard:** Examinee does **NOT** sign original attachment 7.3, but may sign his own calculation.

**Comment:**

**Terminating Cue:** After the determination is made whether or not to sign Attachment 7.3: Evaluation on this JPM is complete.

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

---

Job Performance Measure No.: ILT 18-01 NRC JPM SA1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## ATTACHMENT 7.3 (rev 6)

**ANSWER KEY:  
DO NOT GIVE TO EXAMINEE**

NOTE: Refer to Attachment 7.4 to complete this Data Sheet. Data may be entered in any sequence. Sign-off verifies all data entered as required. Approval signature indicates "Independent Verification".

- 1.0 CALCULATION FOR A SDM AT: DATE \_\_\_\_\_ TIME \_\_\_\_\_
1.  $T_{AVE}$  (Assume  $T_{AVE} = 532 \pm 2^{\circ}\text{F}$ ) 532 °F
  2. CYCLE BURNUP 120 EFPD
  3. a. MEASURED BORON CONCENTRATION 1173 ppmB
  - b. BORON DEPLETION CORRECTION FACTOR 0.92
  - c. CORRECTED BORON CONCENTRATION ( $3a \times 3b$ ) = 1079.2 ppmB
  4. EXCESS REACTIVITY (FIG. 1) 7.8 %  $\Delta k/k$
  5. BORON REACTIVITY WORTH
    - 5a. HZP Inverse Boron Worth (FIG. 8) 151 ppmB/% $\Delta k/k$
    - 5b. Boron Worth ( $3c \div 5a$ )  $\times (-1)$  -7.15 %  $\Delta k/k$
  6. XENON REACTIVITY WORTH -1.95 %  $\Delta k/k$
  7. SAMARIUM AND PLUTONIUM BUILDUP REACTIVITY WORTH (FIG. 15)
    - 7a. If shutdown: Time since last shutdown 0 HRS
    - 7b. Reactivity due to samarium and plutonium buildup 0 %  $\Delta k/k$
  8. INOPERABLE CONTROL RODS THAT ARE NOT FULLY INSERTED
    - 8a. No. of known inoperable rods ( $>0\%WD$ ) 0
    - 8b. Total inoperable rod worth (OP-TM-300-401) 0 %  $\Delta k/k$   
(In addition to the stuck rod as required by T.S. included in Line 5)
  9. SHUTDOWN MARGIN ( $4 + 5b + 6 + 7b + 8b$ ) -1.30 %  $\Delta k/k$

**CAUTION**

Verification of shutdown margin more negative than  $-1\% \Delta k/k$  does **not** imply  $1\% \Delta k/k$  subcriticality.

## 2.0 ACCEPTANCE CRITERIA

- Shutdown Margin shall be more negative than  $-1\% \Delta k/k$ .

☐

Test Acceptance Criteria Satisfied

☒

Test Acceptance Criteria **not** satisfied

If Acceptance Criteria is **not** satisfied, then **PERFORM** Main Body Step 4.4

CALCULATED BY \_\_\_\_\_ DATE/TIME \_\_\_\_\_

APPROVED BY (SRO) \_\_\_\_\_ DATE/TIME \_\_\_\_\_

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 Control Room Supervisor
- The instructor/examiner will act as the Shift Manager
- Reactor Power is approximately 60% and steady for the last 48 hours due to a dropped rod in Group 5.
- Dropped Rod in Group 5 is fully inserted.
- Boron Depletion Correction Factor is 0.92
- Cycle Burnup is 120 EFPD
- Boron Concentration is 1173 ppmB
- The PPC and Reactor Engineering are not available.

Initiating Cue: As the CRS, Review and Approve the calculation of a quantitative shutdown margin using OP-TM-300-205, SHUTDOWN MARGIN FOR HOT SHUTDOWN CONDITIONS.

Time Critical Task: No



Facility:	Three Mile Island	Task No.:	EQC02005
Task Title:	Evaluate a Completed Surveillance Procedure and Perform Appropriate Actions	JPM No.:	<u>ILT 18-01 NRC JPM SA2</u>
K/A Reference:	2.2.37 4.6	Previous JPM:	ILT 14-01 Cert
Examinee:		NRC Examiner:	
Facility Evaluator:		Date:	
<u>Method of testing:</u>			
Simulated Performance:	_____	Actual Performance:	<u>  X  </u>
Classroom	<u>  X  </u>	Simulator	_____
		Plant	_____

### READ THE CUE SHEET ON THE LAST PAGE 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 CRS.
  - The instructor/examiner will act as all other personnel.
  - The reactor is at 100% power.
  - OP-TM-214-201, IST OF BS-P-1A AND VALVES, is in progress and ready for SRO review.
  - This is the first performance in a refueling outage year.
  - All test equipment was proven reliable.
  - All indication worked correctly.
  - During the performance of the test for BS-P-1A it was reported that DR-V-1B has not had power for 10 minutes. Troubleshooting has begun with an estimated Return to Service time of 3 hours.

Initiating Cue: Review & Evaluate OP-TM-214-201, IST OF BS-P-1A and Valves for accuracy and complete Attachment 7.1.  
If there are any problems with acceptance criteria, determine impact on Plant Operations.

Time Critical Task: NO

Task Standard: Double frequency testing is identified for Building Spray pump 1A (BS-P-1A) Outboard Bearing in Alert Range.  
Building Spray Valve, BS-V-3A is declared inoperable due to excessive close stroke time.  
Tech Spec 3.01 applies due to DR-V-1B and BS-V-3A being inoperable.

- Required Materials:
- OP-TM-214-201, IST OF BS-P-1A AND VALVES, Rev. 15, complete up to Step 5.3
  - Completed data package for OP-TM-214-201.
- General References:
- OP-TM-214-201, IST OF BS-P-1A AND VALVES, Rev. 15
  - ER-TM-321-1041, TMI-1 IST Program Requirements, Rev. 7
  - Technical Specifications
- Handouts:
- A completed OP-TM-214-201 IST of BS-P-1A and Valves with Attachment 7.1.
- ER-TM-321-1041, TMI-1 IST Program Requirements, Rev. 7
- Validation Time: 20 minutes.

**SIMULATOR SETUP****N/A**

**START TIME:** \_\_\_\_\_**(Denote Critical Steps with a check mark)**

**EVALUATOR CUE:** Provide filled out OP-TM-214-201 and with attachment 7.1. ER-TM-321-1041, TMI-1 IST Program Requirements, Rev. 7

**EVALUATOR NOTE:** Tech Spec 3.3.2 is in effect (72 hours). The Tech Spec change due to DR-V-1B being inoperable is discussed later.

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.

**Performance Step: 1** *OP-TM-214-201, Attachment 7.1, BS-P-1A DP and Vibrations*  
BS-P-1A Pump differential pressure and vibration measurements were within the Allowable Range from attached IST Data Sheets (Required for T.S. 4.2.2)

**Standard:** Examinee determines that differential pressure is in the normal range.

√ Examinee determines that BS-P-1A Pump Outboard Brg Vib Vert (ips) (DV) is in the "Alert" range, and may refer to ER-TM-321-1041, TMI-1 IST PROGRAM REQUIREMENTS.  
(double base test frequency)

Examinee determines all other vibration measurements are in the acceptable operating region.

**Comment:**

**EVALUATOR NOTE:** The examinee may either refer to the OP-TM-214-201 data package or ER-TM-321-1041 to determine the action for being in the Alert range. Either is acceptable.

**EVALUATOR CUE:** If contacted as Work Management, acknowledge any direction given.

***ER-TM-321-1041, Step 4.4.3(c).8***

- √ **Performance Step: 2** Work Management shall take action from the IR to double the testing frequency of the pump.
- Examinee either states that they will initiate an IR or informs Work Management to initiate an IR.
  - Increased pump testing frequency (double base test frequency) shall be in effect until the pump is no longer in the Alert range as determined by the successful performance of the IST surveillance and identification and correction of the cause.

**Standard:** Double the testing frequency of BS-P-1A.

**Comment:**

***OP-TM-214-201, Attachment 7.1, Acceptance Criteria BS-V-1A, Open / Close Stroke time.***

***ER-TM-321-1041, Step 4.5.2.D.(a)***

**Performance Step: 3** Open and Close stroke times of BS-V-1A were within the Allowable Range from attached IST Data Sheets. (Required for T.S. 4.2.2).  
**Open Time: 14.83: Acceptable**  
**Close Time: 14.70: Acceptable**

**Standard:** Examinee verifies that the Open / Close stroke time for BS-V-1A are within the Allowable Range.

**Comment:**

***OP-TM-214-201, Attachment 7.1, Acceptance Criteria BS-V-3A, Open / Close Stroke time.******ER-TM-321-1041, Step 4.5.2.D.(a)*****✓ Performance Step: 4**

Open and Close stroke times of BS-V-3A were NOT within the Allowable Range from attached IST Data Sheets. (Required for T.S. 4.2.2).

**Open Time: 47.20 Acceptable**

**Close Time: 60.3 Inoperable Region**

**Standard:**

Examinee verifies that the Open stroke time for BS-V-3A is within the Allowable Range.

Examinee identifies that the **Close** stroke time for BS-V-3A is in the Inoperable Region and must be declared inoperable. (ER-TM-321-1041)

**Comment:****EVALUATOR NOTE:**

**Tech Spec 3.3.2 is no longer valid due to DR-V-1B being inoperable (there is a component out of service in each ES Train). Therefore, either 3.3.1.3.a or 3.3.1.5 is applicable.**

**3.3.1.3 Reactor Building Spray System and Reactor Building Emergency Cooling System. 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.**

**3.3.1.4 Cooling Water Systems - Specification 3.0.1 applies.**

**d. Two decay heat river water pumps must be OPERABLE.**

**3.3.1.5 Engineered Safeguards Valves and Interlocks Associated with the Systems in Specifications 3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.1.4 are OPERABLE. Specification 3.0.1 applies.**

**EVALUATOR NOTE:**

**3.0.1 When a Limiting Condition for Operation is not met, except as provided in action called for in the specification, within one hour action shall be initiated to place the unit in a condition in which the specification does not apply by placing it, as applicable, in:**

- 1. At least HOT STANDBY within the next 6 hours.**
- 2. At least HOT SHUTDOWN within the following 6 hours, and**
- 3. At least COLD SHUTDOWN within the subsequent 24 hours.**

✓ **Performance Step: 5** *ER-TM-321-1041, Step 4.5.2.D.(b)*  
Shift Management shall initiate the Technical Specification time clock if applicable.

**Standard:** Candidate determines that Tech Spec 3.0.1 is applicable.  
(DR-V-1B and BS-V-3A are Inoperable)

**Comment:**

**Performance Step: 6** *OP-TM-214-201, Attachment 7.1, Step 4*  
BS-V-1A and BS-V-3A Control Room console pushbutton position indication lights (Open and Closed) agree with local valve position as observed by the local operator. (Required for T.S. 4.2.2 every two years).

**Standard:** Examinee determines that this data should have been taken from the initial conditions.

**Comment:**

**EVALUATOR CUE:** *Upon notification that T.S. 3.01 Applies, direct the examinee to complete Attachment 7.1, Page 1.*

***OP-TM-214-201, Attachment 7.1, Step 5***

**Performance Step: 7**

- ◇ Test Acceptance Criteria satisfied.
  - ◇ Test Acceptance Criteria not satisfied.
- Discrepancy and Action Taken: \_\_\_\_\_

SRO review of completed procedure and evaluation of Acceptance Criteria:

Signature: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

√ **Standard:**

Candidate determines that Test Acceptance Criteria is NOT satisfied and checks the appropriate box, then lists the discrepancies and actions to be taken.

1. Double frequency testing is identified for Building Spray pump 1A (BS-P-1A) Outboard Bearing in Alert Range.
2. Building Spray Valve, BS-V-3A is declared inoperable due to excessive close stroke time.
3. Tech Spec 3.01 applies (Entered) due to DR-V-1B and BS-V-3A being inoperable.

**Comment:**

**Terminating Cue:**

When Attachment 7.1 has been completed: Evaluation on this JPM is complete.

**STOP TIME:** \_\_\_\_\_

**Verification of Completion**

I

Job Performance Measure No.: LT 18-01 NRC JPM SA2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

**Question Documentation:**

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



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 CRS.
  - The instructor/examiner will act as all other personnel.
  - The reactor is at 100% power.
  - OP-TM-214-201, IST OF BS-P-1A AND VALVES, is in progress and ready for SRO review.
  - This is the first performance in a refueling outage year.
  - All test equipment was proven reliable.
  - All indication worked correctly.
  - During the performance of the tet for BS-P-1A it was reported that DR-V-1B has not had power for 10 minutes. Troubleshooting has begun with an estimated Return to Service time of 3 hours.
- Initiating Cue: Review & Evaluate OP-TM-214-201, IST OF BS-P-1A and Valves for accuracy and complete Attachment 7.1.  
If there are any problems with acceptance criteria, determine impact on Plant Operations.
- Time Critical Task: NO

Facility: Three Mile Island Task No.: 66101006

Task Title: Authorize emergency personnel radiation exposure in excess of 5 REM JPM No.: ILT 18-01 NRC JPM SA3

K/A Reference: 2.3.4 3.7 Previous Exam: 2015 TMI CERT JPM SRO A3

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. The operator is seriously injured, conscious, but unable to move and lying in an area where the general radiation level is 300 R/hr.
  - It is estimated that four people using a stretcher can move the operator out of the area in a maximum of 10 minutes and a plan was approved based on this information.
  - Seven people, all between 50 and 60 years of age, have volunteered to perform the task. 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.
  - Rad Con has stated that all precautions to reduce contamination are possible to be implemented.

Initiating Cue: As the Emergency Director, review the filled out EP-AA-113-F-02 forms IAW EP-AA-113 Section 4.3 for approval in order to dispatch a team of volunteers to rescue the injured operator.

If any volunteer cannot be selected, identify the reason why.

Time Critical Task: No

**VOLUNTEER DATA**

NAME	SSN	CURRENT ANNUAL EXPOSURE	PAST WORK HISTORY	N-AN-HR-MEDICAL_RESPIRATOR QUALIFIED
Volunteer #1	123-45-6789	300 mRem	None	Yes
Volunteer #2	234-56-7890	250 mRem	Volunteered at Chernobyl - received 20 Rem acute dose TEDE (1987)	Yes
Volunteer #3	345-67-8901	150 mRem	None	Yes
Volunteer #4	456-78-9012	400 mRem	Volunteered at Fukushima - received 35 Rem acute dose TEDE (2011)	Yes
Volunteer #5	567-89-0123	200 mRem	Volunteered at TMI-2 - received 2 Rem acute dose TEDE	Yes
Volunteer #6	678-90-1234	100 mRem	None	No
Volunteer #7	789-01-2345	450 mRem	Volunteered in TMI-2 - received 14 Rem acute dose TEDE (1979)	Yes

Task Standard: All critical steps evaluated as SAT. Volunteers 1, 2, 5, 7 are acceptable for the rescue mission, volunteers 2, 4, and 6 are determined unacceptable and the reason why.

Required Materials:

- EP-AA-113 REV 13, Personnel Protective Actions
- Completed EP-AA-113-F-02 REV B, Authorization for Emergency Exposure, forms
- Calculator

General References:

- EP-AA-113 REV 13, Personnel Protective Actions
- EP-AA-113-F-02 REV B, Authorization for Emergency Exposure

Validation Time: 20 minutes

(Denote Critical Steps with a check)

**START TIME:** \_\_\_\_\_

**EVALUATOR CUE:** Review the filled out EP-AA-113-F-02 forms IAW EP-AA-113 Section 4.3 for approval in order to dispatch a team of volunteers to rescue the injured operator.

Provide EP-AA-113, Personnel Protective Actions and filled out EP-AA-113-F-02 (7 total).

***EP-AA-113, Step 4.3.1.1***

- √ **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.

- Examinee determines emergency exposure is for a bonafide emergency.
- Examinee determines that respiratory protection is required.

**Standard:** - Examinee determines that **Volunteer #6 cannot** be used for the rescue efforts due to not being respirator qualified.

Comment:

***EP-AA-113, Step 4.3.1.2***

**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 NOTE:** Step 4.3.1.3 is N/A.

**EVALUATOR CUE:** If attempts are made to get Volunteer #3's acknowledgement, state that Volunteer #3 refuses to acknowledge the risk.

***EP-AA-113, Step 4.3.2***

**Performance Step: 3**

1. For exposures at or above 5 Rem TEDE (EPA-400 lower limits), complete an Authorization for Emergency Exposure (EP-AA-113-F-02).
2. Inform emergency personnel (volunteers) before the fact of possible health effects at the anticipated exposure level using Attachment 1, Emergency Worker Exposure Limits and Associated Risks.
3. Obtain emergency worker's acknowledgement that they have volunteered and understand the associated risks. Acknowledgement should be in writing on Authorization for Emergency Exposure Form if possible OR verbally for teams in the field.
4. Forward the completed form to the Station Emergency Director for approval.

**Standard:** \* Examinee determines that he/she is to review the Authorization for Emergency Exposure forms (EP-AA-113-F-02).

√

\* Examinee determines that **Volunteer #3 cannot** be used for the rescue efforts due to not acknowledging the associated risks.

**Comment:**

***EP-AA-113, Step 4.3.3 Caution Statement***

**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 that **Volunteer #4 cannot** be used for the rescue efforts due to previously receiving an exposure greater than 25 Rem.

**Comment:**

**EVALUATOR NOTE:** A note at the bottom of Form EP-AA-11-F-02 states that The Shift Manager (Shift Emergency Director) may approve prior to transferring Command and Control to the Station Emergency Director.

***EP-AA-113, Step 4.3.3.1***

**Performance Step: 5** Obtain and document Station Emergency Director approval, by signature, for the use of the emergency dose limits above 5 Rem TEDE (EPA-400 lower limits) on the Authorization for Emergency Exposure form

**NOTE:** The decision to authorize personnel exposure per EPA-400 limits is the responsibility of the Station Emergency Director and may not be delegated.

✓ **Standard:** Examinee determines that Volunteers #1,2,5, and 7 can be used to rescue the injured operator.  
Examinee may sign EP-AA-113-F-02 for Volunteers # 1,2,5, and 7.

**Comment:**

**Terminating Cue:** After candidate identifies the status of all seven volunteer #s, this JPM is complete.

**STOP TIME:** \_\_\_\_\_

Job Performance Measure No.: ILT 18-01 NRC JPM SA3

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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. The operator is seriously injured, conscious, but unable to move and lying in an area where the general radiation level is 300 R/hr.
- It is estimated that four people using a stretcher can move the operator out of the area in a maximum of 10 minutes and a plan was approved based on this information.
- Seven people, all between 50 and 60 years of age, have volunteered to perform the task. 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.
- Rad Con has stated that all precautions to reduce contamination are possible to be implemented.

Initiating Cue:

As the Emergency Director, review the filled out EP-AA-113-F-02 forms IAW EP-AA-113 Section 4.3 for approval in order to dispatch a team of volunteers to rescue the injured operator.

If any volunteer cannot be selected, identify the reason why.

Time Critical Task: No

INITIATING CUE:

**As the Emergency Director, Review the filled out EP-AA-113-F-02 forms IAW EP-AA-113 Section 4.3 for approval in order to dispatch a team of volunteers to rescue the injured operator.**

TIME CRITICAL: No



**GIVE TO EXAMINEE****VOLUNTEER DATA**

NAME	SSN	CURRENT ANNUAL EXPOSURE	PAST WORK HISTORY	N-AN-HR- MEDICAL_RESPIRATOR QUALIFIED
Volunteer #1	123-45-6789	300 mRem	None	Yes
Volunteer #2	234-56-7890	250 mRem	Volunteered at Chernobyl - received 20 Rem acute dose TEDE (1987)	Yes
Volunteer #3	345-67-8901	150 mRem	None	Yes
Volunteer #4	456-78-9012	400 mRem	Volunteered at Fukushima - received 35 Rem acute dose TEDE (2011)	Yes
Volunteer #5	567-89-0123	200 mRem	Volunteered at TMI-2 - received 2 Rem acute dose TEDE	Yes
Volunteer #6	678-90-1234	100 mRem	None	No
Volunteer #7	789-01-2345	450 mRem	Volunteered in TMI-2 - received 14 Rem acute dose TEDE (1979)	Yes

Appendix C		Job Performance Measure Worksheet		Form ES-C-1
Facility:	Three Mile Island	Task No.:	OF010009	
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.:	ILT 18-01 NRC JPM SA4
K/A Reference:	2.4.44 (4.4)	Bank JPM: TQ-TM-104-SADM-BRP-J100		

**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:

**Plant conditions:**

The Reactor was tripped due to a SECURITY THREAT.

The Plant is at Hot Shutdown.

The Shift Security Supervisor has informed the Shift Supervisor that a "Hostile Force" has seized the "SPENT FUEL POOL AREA" of the Fuel Handling Building.

- PLB 2-9/10: Spent Pool A/B Level Low Alarm has just occurred.

Security has reported the intruders are confined to the Spent Fuel Building

There is **NO** non-routine radiological release in progress at this time.

Wind direction is from 50 degrees and wind speed is 10 miles per hour.

- Initiating Cue:
- You are the Shift Manager and have the responsibilities of the Shift Emergency Director from the Control Room. I will act as your communicator. Declare the appropriate EAL and respond as the Shift Emergency Director.
- Ensure all communications are marked as a DRILL.
- Time Critical Task: Yes
- Task Standard: Correctly identify the EAL, complete State and Local Notification Form, and identify the PAR.
- Required Materials: Perform in a location with:
- EAL Matrix
  - Shift Emergency Director Book
- General References:
- PLB-2-9/10, Spent Fuel Pool A/B Level Low Rev. 9/10
  - EP-AA-111, EMERGENCY CLASSIFICATION AND PROTECTIVE ACTION RECOMMENDATIONS, Revision 21
  - EP-AA-111-F-09, TMI PLANT BASED PAR FLOWCHART, Revision G
  - EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST, Revision Z
  - EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision F
  - EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision S
  - EP-AA-1009 Addendum 3 EXELON NUCLEAR EMERGENCY ACTION LEVELS FOR THREE MILE ISLAND (TMI) STATION, Revision 2
  - EP-AA-112-100-F-06 ERO NOTIFICATION OR AUGMENTATION Revision W
  - EP-AA-114-F-01 PWR RELEASE IN PROGRESS DETERMINATION GUIDANCE, Revision E
  - EP-MA-114-100, MID-ATLANTIC STATE/LOCAL NOTIFICATIONS, Revision 25
- Handouts:
- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST.
  - Emergency Director Binder
- Validation Time: 23 minutes

**SIMULATOR SETUP**

N/A

(Denote Critical Steps with a check)

**START TIME** \_\_\_\_\_

**EVALUATOR CUE:**

**The Time Critical Start Time is when the Cue is acknowledged.**

- **You are the Shift Manager and have the responsibilities of the Shift Emergency Director from the Control Room. I will act as your communicator. Declare the appropriate EAL and respond in accordance with the EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST.**

**#1 Time Critical Start Time:** \_\_\_\_\_

**Performance Step: 1**

Compares plant conditions to the EAL Table.

√ **Standard:**

Examinee:

- Reactor Trip
- Hot Shutdown
- SECURITY THREAT
- Hostile Force” has seized the “SPENT FUEL POOL AREA” of the Fuel Handling Building
- PLB 1-10: Spent Pool Level Low Alarm has just occurred.

The examinee should declare **HG1: Hostile Action resulting in loss of physical control of facility.**

**Comment:**

**EVALUATOR NOTE:**

**The Examinee MAY announce his E-Plan Declaration to the Control Room, prior to implementing EP-AA-112-100-F-01. This would be the STOP Time #1.**

**EP-AA-112-100-F-01****Performance Step: 2** Locate and Implement EP-AA-112-100-F-01 for GE.**Standard:**

- Examinee locates EP-AA-112-100-F-01.
- Examinee determines that Section 1.4 is to be implemented for General Emergency Initial Actions.

**Comment:****EVALUATOR NOTE:** The #1 Time Critical Stop Time is when the General Emergency is declared.

#1 Time Critical Stop Time: \_\_\_\_\_

#2 Time Critical Start Time: \_\_\_\_\_  
(This is the same time as #1 Stop Time)**EP-AA-112-100-F-01, Step 1.4.A****Performance Step: 3** Announce the event classification, possible escalation paths, and declaration time to the Control Room staff.

√ **Standard:** Examinee announces HG1: Hostile Force” has seized the “SPENT FUEL POOL AREA” of the Control Tower. Occupation of Protected Area and Damage to Spent Fuel Pool is imminent.

**Comment:****EVALUATOR NOTE:** Time Critical #1 must be equal to or less than 15 minutes.

**Time Critical #1=** (Time of declaration) \_\_\_\_\_  
 (#1 Time start) - \_\_\_\_\_  
 = \_\_\_\_\_ mins

**EP-AA-112-100-F-01, Step 1.4.B**

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

**Standard:** Examinee records EAL HG1 on EP-AA-112-100-F01.

Examinee records the time of declaration on EP-AA-112-100-F01.

**Comment:**

**EP-AA-112-100-F-01, Step 1.4.C**

√ **Performance Step: 5** Security Related Events, **GO** to Step 4.1 Security Related Events.

**Standard:** Examinee Goes to Section 4.1 Security Related Events

**Comment:**

**Examiner Cue:** For Step 4.1.A.1, inform the Examinee the proper procedures are being implemented.

**EP-AA-112-100-F-01, Step 4.1.A**

**Performance Step: 6** **USE** site-specific Operations/Security procedures for:  
1) **NRC Expedited Communications - NOTIFY** the NRC within 15 minutes as required.  
2) **CONSIDER** the limitations the threat poses on personnel movement with Security prior to sounding alarms or making Announcements.

**Standard:** Examinee Checks box for steps 4.1.A.1 and 4.1.A.2

**Comment:**

**PROCEDURE NOTE:** Activation of the ERO at an Unusual Event is not required for SECURITY CONDITIONS that do not involve HOSTILE ACTION (HU1.3), but is required for HU1.1 and HU1.2.

**EP-AA-112-100-F-01, Step 4.1.B**

- √ **Performance Step: 7**     **DIRECT** activation of the ERO using Scenario 3, “Actual Event Alternative Facility Response” per EP-AA-112-100-F-06. (Tab 2)

**Standard:**                      Examinee Circles : 1.1 TMI Row  
Examinee Circles: 03 Actual Event Alternate Facility Response

**Comment:**

**EP-AA-112-100-F-01**     **Step 4.1.C:** Return to Step in progress.

Examinee returns to Section 1.4 Step C and proceeds to Step D

**EVALUATOR CUE:**     **If prompted, act as security and recommend Alternate Facility Response.**

**EP-AA-112-100-F-01, Step 1.4.D**

**Performance Step: 8**     SELECT the Emergency Public Address Announcements from the form and DIRECT performance of the public address announcement within 15 minutes of event classification.

**Standard:**                      Examinee direct the communicator to perform EP-AA-112-F-09 (found at tab 1), for a General Emergency,(section 4.2.A).

**Comment:**                      **Description: Security Event / Words to that effect.**



**EVALUATOR CUE:** Repeat Back any direction given to you with regards to EP-AA-112-100-F-06. (Tab #2)

**EXAMINER NOTE:** Step 1.4E has been performed above, Step 7

**EP-AA-112-100-F-01, Step 1.4.E**

**Performance Step: 9** If the ERO has not been activated, then DIRECT activation of the ERO Notification using Scenario 1, "Actual Event Respond to Facility," or Scenario 3, "Actual Event Alternate Reporting Location," as appropriate, per EP-AA-112-100-F-06. (Tab #2)

**Standard:** N/A

**Comment:**

**EP-AA-112-100-F-01, Step 1.4.F**

- √ **Performance Step: 10** Determine the PAR per the Emergency Classification and Protective Action Recommendations procedure.
- Emergency Classification and PAR Procedure: EP-AA-111 (Tab 6)
  - Plant Based PAR Flowchart: EP-AA-111-F-09 (Tab 7)
- Examinee follows the flowchart of EP-AA-111-F-09, Page 1, as follows:
- Classification is a General Emergency: **YES**
  - Is this the Initial PAR? – **Yes**
  - Any Loss of Containment? – **NO**
  - 1. Loss of Primary Containment: **NO**  
AND EITHER:  
2. Containment Rad Monitors  $\geq 4.40E+3$  R/Hr? **NO**  
OR  
EAL RG1 been met? **NO**
  - Is there a Hostile Action event in Progress?– **Yes**
  - Shelter 5 Mile Radius

**Standard:** Examinee determines the following actions are required:

- **Shelter 5 Mile radius**

**Comment:**

**EVALUATOR CUE:** Repeat Back any direction given to you with regards to EP-MA-114-100-F-01.

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

- ✓ **Performance Step: 11**
- Direct performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.
- Notification Procedure EP-MA-114-100: (Tab 3)
- Notification Form EP-MA-114-100-F-01): (Tab 4)
- Release in Progress Determination Guidance EP-AA-114-F-01: (Tab 21)
- Standard:**
- Examinee fills out EP-MA-114-100-F-01 (while using EP-MA-114-100 and EP-AA-114-F-01 for guidance) as follows:
    - Block 1: This is a DRILL (**This step NOT critical**)
    - Block 2: C- TMI
    - Block 3: A- ONE
    - Block 4: D- GENERAL EMERGENCY
    - Block 5: Time and Date of declaration
    - Block 6: A- INITIAL DECLARATION
    - Block 7: HG1
    - Block 8: D – Hazards and other Conditions Affecting Plant Safety
    - Block 9: A – NO Radiological release in progress.
    - Block 10: 50 (degrees) / 10 (miles per hour)
    - Block 11: B-
- (S) All Sectors to 5 Miles
- THIS PAR(1S NOT) THE RESULT OF A RAPIDLY PROGRESSING SEVERE ACCIDENT.
- Examinee hands the filled out form to the communicator.

**EVALUATOR NOTE:** Time Critical #2 must be equal to or less than 12 minutes.

Time Critical #2= (#2 Critical Stop Time) \_\_\_\_\_  
 (# 2Critical Start Time) - \_\_\_\_\_  
 = \_\_\_\_\_ mins

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

Job Performance Measure No.: ILT 18-01 NRC JPM SA4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT \_\_\_\_\_ UNSAT \_\_\_\_\_

Examiner's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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 conditions:**

The Reactor was tripped due to a SECURITY THREAT.

The Plant is at Hot Shutdown.

The Shift Security Supervisor has informed the Shift Supervisor that a "Hostile Force" has seized the "SPENT FUEL POOL AREA" of the Fuel Handling Building.

- PLB 2-9/10: Spent Pool A/B Level Low Alarm has just occurred.

Security has reported the intruders are confined to the Spent Fuel Building

There is **NO** non-routine radiological release in progress at this time.

Wind direction is from 50 degrees and wind speed is 10 miles per hour.

Initiating Cue:

- You are the Shift Manager and have the responsibilities of the Shift Emergency Director from the Control Room. I will act as your communicator. Declare the appropriate EAL and respond as the Shift Emergency Director.

Ensure all communications are marked as a DRILL.

Time Critical Task: Yes

Facility: Three Mile Island Task No.: 62201024

Task Title: Respond to a dropped control rod-  
ICS fails to complete runback JPM No.: ILT 18-01 NRC JPM A

K/A Reference: 003 AA1.02 (3.6/3.4) Bank JPM: TQ-TM-104-621-J102

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance:   X    
Classroom \_\_\_\_\_ Simulator   X   Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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.

Task Standard: Complete the faulted plant runback to less than 455MWe (~55% power) as indicated by the most conservative NI indication. The examinee must complete the actions in Section 1.0 or 2.0 of this JPM (not both).

Required Materials: 

- None

General References: 

- OP-TM-621-471, Rev 13, ICS Manual Control
- OP-TM-MAP-H0101, Rev 2, ICS Runback
- 1102-4, Rev 137 Power Operation
-

Initial Conditions: 

- Reactor is at full power, no maintenance in progress
- You are the URO
- The instructors/examiner will act as the ARO and CRS
- The ICO will act as the Auxiliary Operators in the plant as needed.

Initiating Cue: When you are told to begin, respond to the cues or indications that the examiner will provide verbally or by the simulator.

Time Critical Task: No

Validation Time: 10 Minutes  
ILT18-01 NRC JPM A

**SIMULATOR SETUP****Exam Setup: Reset to IC 16**

1. Insert the following:
  - a. Malfunction RD0153 on **EVENT #1**
  - b. Change point **ICK106B = 0.2** to change Asymmetric Rod Runback to > 55% reactor power
2. Freeze the 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.
5. NOTE: After the JPM is complete return **ICK106B = -0.09**

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EVALUATORS CUE:** After the applicant is in role, insert **EVENT #1**. Due to modification of the constant ICK106B, the plant will stabilize at greater than 55% power (~ 500 MWe)

**Performance Step: 1** Recognize the dropped rod, respond to MAP H-1-1 alarm and verify plant is running back

**Standard:** Examinee recognizes dropped rod, references MAP H-1-1 and verifies plant is running back.  
Examinee may announce ICS Runback and Dropped Control Rod  
ICS Runback indicated by Multiple alarms,  
Both the Red and White Light on ULD H/A Station are "LIT".

**Comment:**

**EVALUATORS NOTE:** Runback for Asymmetric Rod is 455 MWe (~55% NI Power) at a Rate of 30% per minute.  
  
If the examinee requests to enter OP-TM-AOP-062, INOPERABLE ROD then inform them that you will initiate the procedure.

**EVALUATORS NOTE:** Section 1 - The examinee may use OP-TM-621-471, ICS Manual Control instead of the ULD.  
**OR**  
Section 2 - If the examinee recognizes that the ULD is operable for the given plant conditions, 1102-4 POWER OPERATIONS will provide directions using the ULD.

## PERFORMANCE INFORMATION

**Section 1 – OP-TM-621-471****OP-TM-MAP-H0101**

- ✓ **Performance Step: 2** ENSURE NI power is reduced to below the limit (455 MWe) for the runback condition.

If ICS manual control is required, then INITIATE OP-TM-621-471, ICS Manual Control.

**Standard:**

Identifies the Runback has stopped and that NI power is > ~55% (> ~455 MWe) for the asymmetric rod fault.

Indication:

- ICS Runback Alarm Clears
- ICS High Load Limit Alarm Clears
- Only the White Light is 'LIT' on ULD

**Comment:**

**EVALUATORS CUE:** If the examinee determines 1102-4 is required, use section 3.3.2 for reference. Give the examinee the copy of the procedure.

Inform the examinee that you will Initiate Enclosure 2A and make all of the notifications and logs.

If Examinee inquires whether or not to continue the Power reduction at this time, ask them the course of action they recommend.

If the Examinee inquires to the desired ULD LOAD RATE OF CHANGE, reply: *3%/minute*



## PERFORMANCE INFORMATION

**1102-4 Step 3.3.2.3 b)1****Performance Step: 3**

The SG/REACTOR DEMAND is in AUTO:

b) ENSURE the ULD is in HAND

√

**Standard:**

Examinee ENSURES the white light is "LIT" on the ULD, and the red light is OFF.

**Comment:****1102-4 Step 3.3.2.3 b)2****Performance Step: 4**

**SET** ULD LOAD RATE OF CHANGE to < 1 %/minute for PLANNED reductions **or** at a **rate determined by CRS** for Forced power reductions.

**Standard:**

Student sets the ULD LOAD RATE OF CHANGE to 30 on the Rate of Change Indicator. (3%/min)

**Comment:****1102-4 Step 3.3.2.3 b)3**

√

**Performance Step: 5**

SET ULD Target Load Demand to desired setpoint.

**Standard:**

Examinee using the toggle switch on the ULD H/A Station sets MWe Demand to a value < 455MWe as indicated on the indicator or PPC.

**Comment:**

**Terminating Cue:** JPM may be terminated when generated megawatts has been lowered to less than 455 MWe (~55% power)

## PERFORMANCE INFORMATION

**Section 2 – 1102-4*****OP-TM-621-471 Step 4.1 and 4.2***

**Performance Step: 3A**    VERIFY all prerequisites have been met.  
ENSURE ULD in HAND IAW OP-TM-621-473.

**Standard:**                Examinee verifies WHITE light is LIT and RED Light is OFF  
on ULD Hand/Auto Station.

**Comment:**

***OP-TM-621-471 Step 4.3***

**Performance Step: 4A**    If SG/REACTOR Station is being placed in HAND to  
support a planned activity, then VERIFY reactor power is  
less than 2555 MW<sub>th</sub> (99.5%).

**Standard:**                Examinee verifies Reactor power is less than 2555 MW<sub>th</sub>  
(99.5%) using NI-Power Indication.

**Comment:**

***OP-TM-621-471 Step 4.4 - 4.4.1***

√ **Performance Step: 5A**    Establish manual SG/REACTOR Control as follows:  
**PLACE** SG/REACTOR DEMAND station in HAND.

**Standard:**                Examinee pushes the HAND pushbutton on the SG/RX Demand  
H/A Station and verifies White Light is LIT and Red Light is OFF.

**Comment:**

***OP-TM-621-471 Step 4.4.2 – 4.4.3***

**Performance Step: 6A**    VERIFY control rod position does not change.  
VERIFY alarm H-2-1 “ICS in Track” In.

**Standard:**                Verifies NO Control motion on PI Panel and  
ICS Track Alarm is in.

**Comment:**

PERFORMANCE INFORMATION

---

**OP-TM-621-471 Step 4.4.4**

- ✓ **Performance Step: 7A** 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.

**Standard:**

Using the SG/RX Demand Hand Auto Station in manual the examinee reduces Reactor Power using the Toggle Switch until <455 MWe per the Alarm response Procedure for a dropped control rod.

**Comment:****Terminating Cue:**

**JPM may be terminated when generated megawatts has been lowered to less than 455 MWe (~55% power)**

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

---

Job Performance Measure No.: ILT 18-01 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: \_\_\_\_\_

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:

- Reactor is at full power, no maintenance in progress
- You are the URO
- The instructors/examiner will act as the ARO and CRS
- The ICO will act as the Auxiliary Operators in the plant as needed.

## INITIATING CUE:

When you are told to begin, respond to the cues or indications that the Examiner will provide verbally or by the simulator.

## TIME CRITICAL:

No

Facility: THREE MILE ISLAND Task No.: 64201009, 64201010

Task Title: Manually Initiate ESAS –Alt path JPM No.: ILT 18-01 NRC JPM BK/A Reference: 013 A4.01 4.5/4.8 Bank JPM: Modified ILT 16-01  
Cert JPM B

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:Simulated Performance: \_\_\_\_\_ Actual Performance:   X    
Classroom \_\_\_\_\_ Simulator   X   Plant \_\_\_\_\_**READ CUE SHEET ON LAST PAGE 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.

Task Standard: 'B' Side HPI is initiated prior to losing SCM. MU-P-1C is running with flow through MU-V-16C/D.

Required Materials:

- OP-TM-EOP-010, Guide 9, RCS Inventory Control, implemented through step 8, Rev 20
- OP-TM-211-901, EMERGENCY INJECTION (HPI/LPI), Rev 8

- General References:
- OP-TM-EOP-010, Guide 9, RCS Inventory Control, Rev 20.
  - OP-TM-211-901, EMERGENCY INJECTION (HPI/LPI), Rev 8.

Initial Conditions:

- You are the URO.
- A second operator (instructor) will monitor and take action for inventory.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- Reactor Trip, Immediate Actions & VSSVs are completed
- A small Break LOCA has occurred.
- Guide 9 has been implemented through step C.8.
- MU-P-1B has tripped
- The 'D' 4kV bus has tripped
- OP-TM-AOP-041 will be handled by the ARO

Initiating Cue: The Control Room Supervisor directs you to INITIATE 'B' HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI". Review the procedure and let me know when you are ready to begin.

Time Critical Task: N/A

Validation Time: 16 minutes

**SIMULATOR SETUP****Exam Setup: IC 245**

1. Insert the following:
  - a. Malfunction ES01A **Immediately**
  - b. Malfunction ES01B **Immediately**
  - c. Malfunction ES02A **Immediately**
  - d. Malfunction ES02B **Immediately**
  - e. Malfunction ES04A **Immediately**
  - f. Malfunction ES04B **Immediately**
  - g. Malfunction MU33A **Immediately**
  - h. Override 02A4S66-ZDIPB1RCA to OFF **Immediately**
  - i. Override 02A4S67-ZDIPB1RBA to OFF **Immediately**
  - j. Override 03A4S01-ZDIPB1RCB to OFF **Immediately**
  - k. Override 03A4S02-ZDIPB1RBB to OFF **Immediately**
  - l. Remote MUR12 to OPEN on **EVENT #2**
2. Trip the Reactor and perform the Immediate actions and VSSV's
3. **Perform Guide 9** through step C.8 up to the point where HPI must be initiated.
4. Insert TH06 to 0.06 to start the leak when the JPM is started.
5. Insert ED05D to trip the 'D' 4kV bus
6. Freeze the Simulator.
7. 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.
8. This completes the setup for this JPM.



## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

START TIME:	
-------------	--

**EVALUATORS CUE:** Provide a copy of OP-TM-211-901, EMERGENCY INJECTION (HPI/LPI).

**Performance Step: 1** PRECAUTIONS, LIMITATIONS, AND PREREQUISITES.

**Standard:** Examinee reviews Precautions, Limitations, and Prerequisites.

**Comment:**

**PROCEDURE NOTE:** There are special usage requirements for Section 4.1 and Attachments 7.1, 7.2 and 7.3. These actions are memory items (IAW OS 24) and performed from memory when required. The sequence of actuation and verification of ES is not train dependent. Either train may be performed first or trains may be performed in parallel.

***OP-TM-211-901 Step 4.1.1***

**Performance Step: 2** If 1D 4160V bus is not energized, then GO TO step 4.1.5

**Standard:** Examinee verifies 1D 4160V bus is NOT energized goes to step 4.1.5.

**Comment:**

**Examiner Note:** Examinee may attempt to initiate "B" Train ES prior to going to Section 4.2. This is allowed IAW OS-24.

***OP-TM-211-901 Step 4.1.4***

**Performance Step: 3** If 1E 4160V bus is not energized, then GO TO Section 4.3

**Standard:** Examinee verifies 1E 4160V bus is energized and N/A's the step.

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-211-901 Step 4.1.5***

**Performance Step: 4** If ESAS Train B "Load Seq Block 4" lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (Train B CR).

**Standard:** Examinee recognizes ESAS Train B "Load Seq Block 4" lights (PCR) are NOT blue and presses "Manual ES Actuation" "1600 PSIG RC PRESS" (Train B CR).

**Comment:**

**PROCEDURE NOTE:** PCR graphic display is equivalent to Attachment 7.2

***OP-TM-211-901 Step 4.1.6***

**Performance Step: 5** IAAT any of the components on Attachment 7.2 are not in the required condition, then INITIATE Section 4.2.

**Standard:** Examinee recognizes that components are NOT in the required condition and initiates Section 4.2.

**Comment:**

**Alternate Path Begins*****OP-TM-211-901 Step 4.2.1.1***

**Performance Step: 6** If MU-V-14A or MU-V-14B did not Open, then perform the following:

1. **IAAT MU tank level < 18", then perform the following:**

**A. PLACE all of the following in Pull-to-lock.**

\_\_\_ **MU-P-1A**

\_\_\_ **MU-P-1B**

\_\_\_ **MU-P-1C**

**Standard:** Examinee recognizes MU tank level is NOT <18" and continues on. Examinee will leave this step open.

**Comment:**

## PERFORMANCE INFORMATION

**OP-TM-211-901 Step 4.2.1.2**

**Performance Step: 7** If MU-V-14A or MU-V-14B did not Open, then perform the following:  
**2. If all three MU pumps are operating, then perform the following:**  
**A. DEFEAT ESAS IAW OP-TM-642-901 "1600 psig ESAS Actuation"**  
**B. SHUTDOWN the ES selected pump lined up to MU & SI and PLACE Control Switch in Normal-After-Stop. (e.g., normally MU-P-1A)**

**Standard:** Examinee recognizes all three MU pumps are NOT operating and N/A's this step.

**Comment:**

**OP-TM-211-901 Step 4.2.1.3**

✓ **Performance Step: 8** If MU-V-14A or MU-V-14B did not Open, then perform the following:  
**3. ENSURES MU-V-14B is Open.**

**Standard:** Examinee opens MU-V-14B by pressing the open pushbutton, observing the Red Open light is lit and the Green closed light is not lit.

**Comment:**

**PROCEDURE NOTE:** Step 4.2.2.1 & 4.2.2.2 are N/A due to the loss of 1D 4160V Bus.

## PERFORMANCE INFORMATION

**OP-TM-211-901 Step 4.2.2.3**

- ✓ **Performance Step: 9** IAAT DC-P-1A or DC-P-1B fails to start or is shut down unexpectedly, then perform the following:  
**3. If DC-P-1B fails to start, then START DC-P-1B**
- Standard:** Examinee starts DC-P-1B by rotating the control switch in the clockwise direction, observing Red running light is lit and normal running amps.
- Comment:**

**PROCEDURE NOTE:** Step 4.2.2.4 is N/A since DC-P-1B is started in previous step.

**PROCEDURE NOTE:** 4.2.3.1 is N/A because A Train ES does not have power.

**OP-TM-211-901 Step 4.2.3.2.A**

- Performance Step: 10** IAAT either ES selected MU pump fails to start or is shut down unexpectedly, then perform the following:  
**4.2.3.2. If Train B ES selected MU pump is not operating, then perform the following:**  
**A. VERIFY 1E 4160V bus is energized.**
- Standard:** Examinee recognizes that MU-P-1C is not operating and verifies that 1E 4160V bus is energized.
- Comment:**

**EXAMINER NOTE:** Due to the loss of the 1D 4kV bus the console indication for MU-V-36 will be off. The examinee should use the ES status panel to verify MU-V-36 is NOT closed.

**OP-TM-211-901 Step 4.2.3.2.B**

- Performance Step: 11** IAAT either ES selected MU pump fails to start or is shut down unexpectedly, then perform the following:  
1. If Train B ES selected MU pump is not operating, then perform the following:  
B. If MU-V-36 or MU-V-37 is closed, then ENSURE one of the following valves is Open:  
MU-V-16C  
MU-V-16D
- Standard:** Examinee recognizes that MU-V-36 and MU-V-37 are open, Red open light LIT, and N/A's the step.

## PERFORMANCE INFORMATION

**Comment:**

**BOOTH CUE:** If contacted as an NLO in the next step, state that MU-P-2C is operating.

If contacted about the status of the MU-P-1C 43 selector switch, immediately report that MU-P-1C is ES selected.

***OP-TM-211-901 Step 4.2.3.2.C.1***

**Performance Step: 12** IAAT either ES selected MU pump fails to start or is shut down unexpectedly, then perform the following:  
1. If Train B ES selected MU pump is not operating, then perform the following:  
**C. If MU-P-1C is ES Selected, then perform the following:**

**1) VERIFY MU-P-2C or MU-P-3C is operating**

**Standard:** Examinee verifies MU-P-2C or MU-P-3C is operating by one or more of the following:

- "RC Makeup Pump C Oil Pumps" light is lit
- MAP D-1-3 is clear
- Contacting an NLO

**Comment:**

***OP-TM-211-901 Step 4.2.3.2.C.2***

✓ **Performance Step: 13** IAAT either ES selected MU pump fails to start or is shut down unexpectedly, then perform the following:  
1. If Train B ES selected MU pump is not operating, then perform the following:  
**C. If MU-P-1C is ES Selected, then perform the following:**

**2) START MU-P-1C**

**Standard:** Examinee starts MU-P-1C by rotating the control switch in the clockwise direction, observing the Red Light Lit and normal running amps.

**Comment:**

**Examiner Note:** A critical step for this JPM is to open two MU-V-16's to have flow through all 4 HPI nozzles. In this case, MU-V-16 C and D will satisfy that requirement.

**PROCEDURE NOTE:** 4.2.4.1 is N/A because only one MU pump is operating  
4.2.4.2 is N/A because MU-P-1A is not operating  
4.2.4.3 is N/A because MU-P-1B is not operating

## PERFORMANCE INFORMATION

**OP-TM-211-901 Step 4.2.4.4**

- ✓ **Performance Step: 14** 4. If only MU-P-1C is operating, then perform one of the following steps: (N/A steps not performed)

A. **ENSURE** MU-V-16C and MU-V-16D are Open.

**Standard:** Examine presses the MU-V-16C and MU-V-16D Red Open Lights on console center.

**Comment:**

**PROCEDURE NOTE:** *4.2.5.1 is N/A since neither MU-P-1A or MU-P-1B is operating*

**OP-TM-211-901 Step 4.2.5.2**

- Performance Step: 15** If MU-V-36 and MU-V-37 did NOT close, then perform the following:

2. If MU-P-1C or MU-P-1B-E is operating then ENSURE MU-V-16C or MU-V-16D is OPEN.

**Standard:** Examinee recognizes MU-P-1C is operating and ENSURE MU-V-16C and MU-V-16D Red open lights on console center.

**Comment:**

**OP-TM-211-901 Step 4.2.5**

- ✓ **Performance Step: 16** If MU-V-36 and MU-V-37 did NOT close, then perform the following:

3. ENSURE MU-V-36 or MU-V-37 are closed.

**Standard:** Examinee presses the Green pushbutton on console center for MU-V-37.

**Comment:**

## PERFORMANCE INFORMATION

**Examiner Note:** The examinee could choose to perform either step of 4.2.6 or both.

***OP-TM-211-901 Step 4.2.6***

- √ **Performance Step: 17** If MU-V-18 did not Close, then perform one of the following: (N/A step not performed)
1. ENSURE MU-V-18 is Closed.
  2. ENSURE MU-V-17 and MU-V-217 are Closed

**Standard:** Examinee closes MU-V-18 by pressing the close pushbutton and verifying that the Green closed light is lit and the open Red light is not lit. Examinee N/A's step not performed.

**Comment:**

**Terminating Cue:** After Step 4.2.6 is complete this JPM is complete.

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

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Job Performance Measure No.: ILT 18-01 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:

- You are the URO.
- A second operator (instructor) will monitor and take action for inventory.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- Reactor Trip, Immediate Actions & VSSVs are completed
- A small Break LOCA has occurred.
- Guide 9 has been implemented through step C.8.
- MU-P-1B has tripped
- The 'D' 4kV bus has tripped
- OP-TM-AOP-041 will be handled by the ARO

## INITIATING CUE:

The Control Room Supervisor directs you to INITIATE 'B' HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI". Review the procedure and let me know when you are ready to begin.

## TIME CRITICAL:

No

Worksheet  
ILT 18-01 NRC EXAM MATERIAL

Facility: THREE MILE ISLAND UNIT 1 Task No.: 21301001

Task Title: Lower CFT Level and Pressure from the Control Room JPM No.: ILT 18-01 NRC JPM C

K/A Reference: 006 A4.02 (4.0 / 3.8) JPM: 2015 NRC JPM

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.

Task Standard: Core Flood Tank Volume/Pressure are restored to clear the MAP D0207 alarm.

Volume: 11.87 - 11.29 ft

Pressure: 615 - 585 psig

Required Materials: None

General References: OP-TM-MAP-D0207, CF TNK 1A LEVEL/PRESS HI/LO, Rev 3  
OP-TM-213-465, LOWERING CF-T-1A LEVEL, Rev 3  
OP-TM-213-477, LOWERING CF-T-1A NITROGEN PRESSURE DURING ES STANDBY MODE, Rev 4  
OP-TM-213-473, RAISING CF-T-1A, Rev 3, field actions complete.  
OP-TM-213-000, CORE FLOOD SYSTEM, Rev 15

Handout: None

Validation Time: 21 minutes

- Initial Conditions:
- For this event you are assigned the duties of the Third RO.
  - The instructor/examiner will act as the URO, ARO and CRS.
  - The ICO will act as the 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.
  - MAP D-2-7, CF TNK 1A LEVEL/PRESS HI/LO, has just alarmed.
  - The Core Flood System is in the ES Standby Mode.
  - Core Flood Sample valve lineup is current IAW N1807, Primary Chemistry Sampling.
  - High Pressure Nitrogen is available IAW 1104-26, Nitrogen Supply System.
  - The Vent Header is lined up to MWST IAW 1104-27, Waste Disposal – Gaseous.
  - OP-TM-220-251, RCS Leak Rate Determination, is not in progress.

Initiating Cue: The Control Room Supervisor has directed you to return CF-T-1A to normal bands IAW OP-TM-MAP-D0207.

Time Critical Task: No

**SIMULATOR SETUP**

- Temporary IC-250 or a 100% power IC with the following setup:
- 1. The following setup initiates a Core Flood Tank leak into the Reactor Building, the set up masks this as the CFT is normally drained to the MWST and not the RB Sump.
  - **03A3M21-ZAOWDLLI805** to a value of **17.0 immediately**.
  - **03A3M21-ZAOWDLLI804** to a value of **17.0 immediately**.
  - **03A3M09-ZAODHLI811** to a value of **4.0 immediately**.
  - **06A2A6-ZAORBPI 1186** to a value of **0.7 immediately**
  - **06A2A7-ZAOBSPI982B** to a value of **25.2 immediately**.
  - **06A2A8-ZAOBSPI982A** to a value of **0.04 immediately**.
  - **06A2A9-ZAOBSPI981A** to a value of **0.03 immediately**.
  - **14A1AR1-ZAOLI115(2)** to:
    - **INITIAL VALUE of 46.0**
    - **FINAL VALUE of 48.0**
    - **ramp of 5 minutes on EVENT #1**
  - **Place PPC Point C4235 in Delete from Monitor**
  - **Place MAP B0207 in OFF**
- **Mudmgastank(8)** to a value of **1823.0 immediately** or as necessary to ensure CF-T-1A is between 655-660#.
- **Mudmasstank(8)** to a value of **50800 immediately** or as necessary to ensure CF-T-1A is >12.01 ft.
- **DH07A Water Leak from Core Flood Tank 1A** to a value of **100.0 on EVENT #1**
- **DH15A DH/CF A Injection Leak into Reactor Building** to a value of **0.4 on EVENT #1**
- **DHR07 CF-V-3A Breaker Core Flood Tank Vent to Vent Header** to a value of **IN on EVENT #4**
- **TRIGGER #1:**
  - **ZDIPBOCFV2A==1**
  - **EVENT #1**

- **TRIGGER #2:**
    - **ZDISSCFV20A(2) == 1**
    - **DMF DH07A**
  
  - **TRIGGER #3:**
    - **ZDISSCFV20A(2) == 1**
    - **DMF DH15A**
2. 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.
  3. This completes the setup for this JPM.

## VERIFICATION OF COMPLETION

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_ **TIME CRITICAL START TIME:** Same as Start Time

**EVALUATOR NOTE:** Tech Specs allow 1 Hour to return CFT Level and Pressures to Band before action must be taken (TS 3.3.1.2.a)

**EVALUATOR CUE:** If the examinee identifies that the OP-TM-213 series is to be used and states that OP-TM-213-000 is required, hand the examinee a copy of OP-TM-213-000.

**EVALUATOR CUE:** Directed the examinee to return CF-T-1A to normal bands IAW OP-TM-MAP-D0207.

If the examinee identifies the need to refer to Tech Specs, state that the CRS will refer to the appropriate Tech Specs and proceed to adjust the level IAW OP-TM-213 series of procedures.

***OP-TM-MAP-D0207, Step 4.0***

**Performance Step: 1**

- MONITOR PPC Area 5 Group 26 for CF-Tank's parameters.
- ADJUST level and/or pressure as required IAW OP-TM-213 series procedures.
- If either CFT pressure indication is outside of 585 to 615 psig or level indication is outside of 11.29 to 11.87 ft and Reactor is critical, then REFER Tech. Spec. 3.3.1.2.a Action Statement.
- If CF T 1A level rise was not expected, then perform the following:
  - NOTIFY Chemistry to sample CF-T-1A IAW N1807, Primary Chemistry Sampling.
  - When CF T 1A sample results are received, then VERIFY CF T 1A boron concentration is between 2305 and 2750 ppmB

**Standard:**

- Examinee determines that CF-T-1A level AND pressure are high out of band and refers to OP-TM-213-000, Core Flood System.
- Examinee determines that OP-TM-213-465, Lowering CF-T-1A Level, will be used to lower CF-T-1A level.
- Examinee determines that OP-TM-213-477, Lowering CF-T-1A Nitrogen Pressure during ES Standby Mode, will be used to lower CF-T-1A pressure.

**Comment:**

VERIFICATION OF COMPLETION

---

**EVALUATOR NOTE:** The following steps are to lower CF-T-1A Level IAW OP-TM-213-465. The steps to lower CF-T-1A pressure is found on Page 9 of this JPM.

**EVALUATOR NOTE:** If the examinee lowers pressure first, then lowering level may bring pressure low out of band. This can be corrected with OP-TM-213-473. This is not scripted, however, since it is not expected to occur in that order. If required, hand out a copy of OP-TM-213-473.

**Performance Step: 2** *OP-TM-213-465, Steps 3.0 through 4.1*  
Precautions, Limitations, and Prerequisites

**Standard:** Examinee verifies that the Precautions, Limitations, and Prerequisites are all met.

**Comment:**

**Performance Step: 3** *OP-TM-213-465, Step 4.2*  
USE the following points on the PPC to monitor changes (Area 5 Group 26)

A0476, CF TANK 1A PRESS 1

A0477, CF TANK 1A PRESS 2

A0480, CF TANK 1A LEVEL 1

A0481, CF TANK 1A LEVEL 2

**Standard:** Examinee selects the above points on the PPC.

**Comment:**

## VERIFICATION OF COMPLETION

**PROCEDURE NOTE:** At approximately 600 psig, CF Tank pressure will decrease approximately 40 psig if level is reduced from 11.81 to 11.35 feet.

**EVALUATOR NOTE:** Step 4.3 is an IAAT statement that is expected to remain Open for the duration of the JPM.

**Performance Step: 4** *OP-TM-213-465, Step 4.4*  
If CFT pressure > 50 psig, then perform the following:

**Standard:** Examinee determines that, since CFT pressure is greater than 50 psig and that the reactor is NOT shutdown, continues in Section 4.4.

**Comment:**

**BOOTH CUE:** If directed to open CF-V-18B, pause and then report back that CF-V-18B is open. CF-V-18B is not modeled.

**Performance Step: 5** *OP-TM-213-465, Step 4.4.1*  
OPEN CF-V-18B.

**Standard:** Examinee directs an NLO to open CF-V-18B.

**Comment:**

**PROCEDURE NOTE:** CF-V-20A may be operated from either Panel PL or from the sampling panel.

**BOOTH CUE:** If directed to open CF-V-20A in the field, state that the switch at the sampling panel is rotating freely with no change in valve position.

**Performance Step: 6** *OP-TM-213-465, Step 4.4.2*  
OPEN CF-V-20A (PL).

√ **Standard:** Examinee opens CF-V-20A by rotating the control switch clockwise verifying red open light lit, green close light not lit.

**Comment:**



## VERIFICATION OF COMPLETION

<b>BOOTH CUE:</b>	<b>Ensure Trigger 1 occurs when CF-V-2A is opened. If not, insert Event #1.</b>
<b>Performance Step: 7</b>	<b>OP-TM-213-465, Step 4.4.3</b> OPEN CF-V-2A (CC).
√ <b>Standard:</b>	Examinee opens CF-V-2A by pressing the open pushbutton, verifying red open light lit, green close light not lit.
<b>Comment:</b>	
<b>EVALUATOR CUE:</b>	<b>If asked, give a target level band of 11.35-11.81 ft.</b>
<b>PROCEDURE NOTE:</b>	<b>CF-T-1A must be maintained &gt; 11.35 ft when the Reactor is critical.</b>
<b>BOOTH CUE:</b>	<b>Ensure Triggers 2 and 3 occur when CF-V-20A is closed. If not, then delete DH07A and DH15A.</b>
<b>Performance Step: 8</b>	<b>OP-TM-213-465, Step 4.4.4</b> When CF-T-1A reaches the desired level, then CLOSE CF-V-20A (PL).
√ <b>Standard:</b>	Examinee closes CF-V-20A by rotating the control switch counter-clockwise verifying red open light not lit, green close light lit.
<b>Comment:</b>	
<b>Performance Step: 9</b>	<b>OP-TM-213-465, Step 4.4.5</b> CLOSE CF-V-2A (CC).
√ <b>Standard:</b>	Examinee closes CF-V-2A by pressing the close pushbutton, verifying red open light not lit, green close light lit.
<b>Comment:</b>	

## VERIFICATION OF COMPLETION

**BOOTH CUE:** If directed to close CF-V-18B, pause and then report back that CF-V-18B is closed, with an Independent Verification performed by another Auxiliary Operator. CF-V-18B is not modeled.

**Performance Step: 10** *OP-TM-213-465, Step 4.4.6*  
CLOSE CF-V-18B.

**Standard:** Examinee directs an NLO to close CF-V-18B.

**Comment:**

**EVALUATOR NOTE:** Examinee may have drained the tank to the low end of the level band. The following steps to lower pressure may not be necessary.

**EVALUATOR NOTE:** The following steps are to LOWER CF-T-1A PRESSURE IAW OP-TM-213-477. The steps to lower CF-T-1A Level are found on page 5 of this JPM.

**Performance Step: 11** *OP-TM-213-477, Steps 3.0 through 4.1*  
Precautions, Limitations, and Prerequisites

**Standard:** Examinee verifies that the Precautions, Limitations, and Prerequisites are all met.

**Comment:**

## VERIFICATION OF COMPLETION

**BOOTH CUE:** If directed to report which sample points are selected for the Beckman gas analyzers, state that Points 2 and 6 are selected.

**PROCEDURE NOTE:** Steps 4.2 through 4.4 may be done in parallel.

**Performance Step: 12** *OP-TM-213-477, Step 4.2*  
VERIFY sample point other than Point 10 "RCDT" is selected on the Beckman gas analyzers. (Ref 1104-43B, Beckman Analyzer Operation)

**Standard:** Examinee directs an NLO to verify that a sample point other than Point 10 "RCDT" is selected on the Beckman gas analyzers.

**Comment:**

**BOOTH CUE:** If directed to close CF-V-3A-BK, enter EVENT 4 and then report back that CF-V-3A-BK is closed.

**PROCEDURE NOTE:** CF-V-3A breaker has an EST for positive control IAW T.S. concerns.

**Performance Step: 13** *OP-TM-213-477, Step 4.3*  
CLOSE CF-V-3A-BK (Unit 6C on 1A RW MCC).

**Standard:** Examinee directs an NLO to close CF-V-3A-BK.

**Comment:**

## VERIFICATION OF COMPLETION

**Performance Step: 14** ***OP-TM-213-477, Step 4.4***  
TREND the following points on the PPC: (Area 5 Group 26)

☐ A0476, CF TANK 1A PRESS 1

☐ A0477, CF TANK 1A PRESS 2

☐ A0480, CF TANK 1A LEVEL 1

☐ A0481, CF TANK 1A LEVEL 2

**Standard:** Examinee selects the above points on the PPC.

**Comment:**

**EVALUATOR NOTE:** Step 4.5 is an IAAT statement that is expected to remain Open for the duration of the JPM.

**EVALUATOR CUE:** If addressed, state that an extra Reactor Operator is monitoring RCDT level and pressure. An LWDS alarm for the RCDT pressure high may momentarily come in while venting level. Inform the examinee that the alarm is in and clear and they may proceed with lowering pressure.

**Performance Step: 15** ***OP-TM-213-477, Step 4.6***  
VENT CF-T-1A as needed using CF-V-3A (CC).

√ **Standard:** Examinee opens and closes CF-V-3A, as necessary, pushing the appropriate pushbuttons.

**Comment:**

**Performance Step: 16** ***OP-TM-213-477, Step 4.7***  
VERIFY a pressure decrease in CF-T-1A.

**Standard:** Examinee verifies lowering pressure in CF-T-1A by observing the PPC points.

**Comment:**

## VERIFICATION OF COMPLETION

**Performance Step: 17** ***OP-TM-213-477, Step 4.8***  
When the need for further venting is not required, then ENSURE CLOSED CF-V-3A (CC).

✓ **Standard:** Examinee closes CF-V-3A by pushing the close pushbutton, verifying red open light not lit, green close light lit.

**Comment:**

**Performance Step: 18** ***OP-TM-213-477, Step 4.9***  
VERIFY a stable trend on the following PPC points (Area 5 Group 26):

☐ A0476, CF TANK 1A PRESS 1

☐ A0477, CF TANK 1A PRESS 2

✓ **Standard:** Examinee verifies the above points are stable.

**Comment:**

**BOOTH CUE:** If directed to open CF-V-3A-BK, then open CF-V-3A-BK and then report back that CF-V-3A-BK is open. (DHR07 to 'OPEN')

**Performance Step: 19** ***OP-TM-213-477, Step 5.1***  
VERIFY CF-T-1A parameters as follows:

- CF-T-1A Pressure is > 590 psig and < 610 psig.

- CF-T-1A Level is > 11.35 ft and < 11.81 ft.

✓ **Standard:** Examinee verifies CF-T-1A parameters are in the correct bands

**Comment:**

**Terminating Cue:** When examinee has returned cleared alarm MAP D0207 the JPM may be terminated.

STOP TIME: \_\_\_\_\_

Job Performance Measure No: ILT 18-01 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:
- For this event you are assigned the duties of the Third RO.
  - The instructor/examiner will act as the URO, ARO and CRS.
  - The ICO will act as the 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.
  - MAP D-2-7, CF TNK 1A LEVEL/PRESS HI/LO, has just alarmed.
  - The Core Flood System is in the ES Standby Mode.
  - Core Flood Sample valve lineup is current IAW N1807, Primary Chemistry Sampling.
  - High Pressure Nitrogen is available IAW 1104-26, Nitrogen Supply System.
  - The Vent Header is lined up to MWST IAW 1104-27, Waste Disposal – Gaseous.
  - OP-TM-220-251, RCS Leak Rate Determination, is not in progress.

INITIATING CUE: The Control Room Supervisor has directed you to return CF-T-1A to normal bands IAW OP-TM-MAP-D0207.

TIME CRITICAL: No

Facility: Three Mile Island Task No.: EOPG15001

Task Title: Respond to Emergency Feedwater Actuation-Alternate Path JPM No.: ILT 18-01 NRC JPM D

K/A Reference: 061 A2.05 3.1/3.4 Bank: TQ-TM-104-424-J100

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance: X  
Classroom \_\_\_\_\_ Simulator X Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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.

Task Standard: Applicant performs Rule 1 LSCM and successfully establishes flow to raise level to 75% to 85% in the operating range.

Required Materials: • None

General References: • OP-TM-EOP-002, Rev 9, Loss of 25°F Subcooling Margin  
• OP-TM-EOP-010, Rev 20, Emergency Procedures Rules, Guides and Graphs  
• OP-TM-642-902, Rev2, 4 PSIG ESAS Actuation  
• OP-TM-424-901, Rev 4, Emergency Feedwater

Validation Time: 5 minutes



For this event you are assigned the duties of the URO/ARO.

The instructor/examiner will act as the CRS.

The ICO will act as Auxiliary Operators in the plant as needed.

When you are told to begin you are to respond to the cues and indications that I provide to you verbally or by the simulator.

Before you start, I will describe the general plant conditions, answer any questions and state the initiating cues. Unless otherwise informed, you are to perform all actions taken.

Initial Conditions:

- Reactor tripped due to a main turbine trip
- All immediate manual actions and VSSV's of OP-TM-EOP-001 have been performed

Initiating Cue: When you assume the shift, I am directing you to perform an alarm review

Time Critical Task: Yes

**SIMULATOR SETUP****Exam Setup: IC 16 (Temp 235)**

1. Insert the following:
  - A. REMOTE ICR02 to 0 immediately
  - B. REMOTE ICR04 to 0 immediately
  - C. MALFUNCTION TH05 to 2% on EVENT #1
3. Trip the reactor and perform the immediate manual actions and VSSV's of OP-TM-EOP-001, Reactor Trip
4. Freeze the Simulator.
5. 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.
6. This completes the setup for this JPM.

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**Evaluator's Cue:** Direct the applicant to perform an alarm review.

**Performance Step: 1** N/A

**Standard:** Applicant reviews the MAP alarms

**Comment:**

**EXAMINER AND BOOTH CUE:** After 15 seconds after assumption of URO duties and insert EVENT #1

<b>NOTE:</b>	Time of Loss of SCM _____
--------------	---------------------------

**Performance Step: 2** Recognize loss of 25°F sub-cooled margin and entry condition into OP-TM-EOP-002, Loss of 25°F Sub-cooling Margin

**Standard:** Announce loss of subcooling margin and perform Rule 1

**Comment:**

***OP-TM-EOP-010, Rule 1 Step 1***

**Performance Step: 3** **VERIFY** it has been more than two minutes since RCP start

**Standard:** Verifies that more than 2 minutes has elapsed since the RCPs were started.

**Comment:**

## PERFORMANCE INFORMATION

**OP-TM-EOP-010, Rule 1 Step 2**

- ✓ **Performance Step: 4**      **ENSURE** all RCPs are shutdown within one minute by performing the following:

**IAAT** a RCP cannot be secured from the Console, **then** de-energize 1A 6900v **and** 1B 6900v busses.

- **ENSURE** RC-P-1A is **OFF**.
- **ENSURE** RC-P-1B is **OFF**.
- **ENSURE** RC-P-1C is **OFF**.
- **ENSURE** RC-P-1D is **OFF**

**Standard:**

Stops the Reactor Coolant Pumps by rotating the control switches to the STOP position on CC for:

- RC-P-1A
- RC-P-1B
- RC-P-1C
- RC-P-1D

Verifies RCPs are shutdown, Green Light "ON" and Red Light "OFF".

**NOTE:**

Time RCPs are secured\_\_\_\_\_

This time must be within 1 minute of Loss of SCM

**Comment:**

## PERFORMANCE INFORMATION

**Procedure Note**  
**OP-TM-642-902:** There are special usage requirements for steps 4.1 through 4.5. These actions are memory items (IAW OS 24) and performed from memory when required. The sequence of actuation and verification of ES is not train dependent. Either train may be performed first or trains may be performed in parallel.

**OP-TM-EOP-010, Rule 1 Step 3**

- √ **Performance Step: 5**     **INITIATE** 4# ESAS Actuation IAW OP-TM-642-902, 4# ESAS Actuation
- Standard:**                PRESSES
- Train "A" Manual ES Actuation
- Train "A" 4 PSIG RB PRESS
- Train "B" Manual ES Actuation
- Train "B" 4 PSIG RB PRESS
- "ENABLED" Light for all 3 channels on both Trains go "OUT" for 4 psi and 1600 psi actuations'.

**Comment:**

<b>NOTE:</b>	Time ES is initiated _____ This time must be within 2 minutes of Loss of SCM
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**OP-TM-EOP-010, Rule 1 Step 4**

**Performance Step: 6**     **INITIATE** OP-TM-424-901, Emergency Feedwater" and FEED IAW Rule 4.

**Standard:**                Initiates OP-TM-424-901

**Comment:**

## PERFORMANCE INFORMATION

**Procedure Note**  
**OP-TM-424-901:**

**There are special usage requirements for Section 4.1. These actions are memory items (IAW OS 24) and performed from memory when required.**

***OP-TM-424-901 , Step 4.1.1***

**Performance Step: 7**

**If EFW actuation was caused by an invalid signal or condition, then GO TO section 5**

**Standard:**

Step is **N/A**

**Comment:**

***OP-TM-424-901 , Step 4.1.2***

**Performance Step: 8**

**Dispatch** an Auxiliary Operator to EF-V-30 area.

**Standard:**

An AO is dispatched to the EF-V-30 Area.

**Comment:**

***OP-TM-424-901 , Step 4.1.3***

**Performance Step: 9**

**IAAT** steps 4.1.4, 4.1.5, or 4.1.6 are **not** satisfied, **Then INITIATE** Section 4.2 "Contingency Actions".  
4.1.4 **VERIFY** the following Emergency Feedwater pumps discharge pressure > OTSG pressure:  
- EF-P-1  
- EF-P-2A  
- EF-P-2B

**Standard:**

Examiner recognizes all discharge pressures are > OTSG Pressure.

**Comment:**

## PERFORMANCE INFORMATION

**OP-TM-424-901 , Step 4.1.5**

**Performance Step: 10**     **VERIFY** A OTSG level is above setpoint IAW Rule 4,  
or Emergency Feedwater flow is established

**Standard:**                      Examinee identifies OTSG level are NOT above setpoint and  
initiates Section 4.2

**Comment:**

**Alternate Path Begins**

**Performance Step: 11**     Recognize EF-V-30A/D and EF-V-30B/C did not respond to the  
start signal.

**Standard:**                      Observes that EF-V-30A/D and EF-V-30B/C are not open and  
there is NO flow to the either OTSG.  
  
Examinee informs the CRS that EF-V-30A/D and EF-V-30B/C  
did not respond to the start signal.

**Comment:**

**EXAMINER NOTE:**     Step 4.2.1 is N/A because all of the EFW pumps are operating.  
Step 4.2.2 is N/A because all of the EFW pumps are operating.  
Step 4.2.3 is N/A because EF-P-1 discharge pressure is > OTSG  
pressures  
Step 4.2.4 is N/A because EF-P-2A is not steam bound.  
Step 4.2.5 is N/A because EF-P-2B is not steam bound.  
Step 4.2.6 is N/A because the OTSG is not dry.

**OP-TM-424-901, Section 4.2 Step 4.2.7**

**Performance Step: 12**     Ensure EF-V-2A and EF-V-2B are open.

**Standard:**                      Examinee uses the red lights on CC to determine that EF-V-2A  
and EF-V-2B are open.

**Comment:**

## PERFORMANCE INFORMATION

**EXAMINER NOTE:**    **Examinee may have taken action IAW OS-24 in a previous step.**

***OP-TM-424-901, Section 4.2 Step 4.2.8***

- √ **Performance Step: 13**    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.

**Standard:**

Establishes flow to the 'A' OTSG with either EF-V-30A or EF-V-30D.

Establishes flow to the 'B' OTSG with either EF-V-30B or EF-V-30C.

Examinee places the desired control valves in manual by depressing the Manual Pushbutton: White Light Lit.

Examinee controls EFW flow by moving the control switch to the open position and observing flow on the EFW flow indicators.

**Comment:**

- √ **Performance Step: 14**    Raises level in each OTSG to 75% to 85% in the operating range

**Standard:**

Examinee raises flow to establish level at 75% to 85% in the operating range IAW Rule 4.

**Comment:**

**Terminating Cue:**

JPM may be terminated when Emergency Feedwater flow is established to both OTSG's and levels are rising.

**STOP TIME:** \_\_\_\_\_

**TIME CRITICAL STOP TIME:** \_\_\_\_\_



VERIFICATION OF COMPLETION

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Job Performance Measure No.: ILT 18-01 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: \_\_\_\_\_

For this event you are assigned the duties of the URO and ARO.

The instructor/examiner will act as the CRS.

The ICO will act as Auxiliary Operators in the plant as needed.

When you are told to begin you are to respond to the cues and indications that I provide to you verbally or by the simulator.

Before you start, I will describe the general plant conditions, answer any questions and state the initiating cues. Unless otherwise informed, you are to perform all actions taken.

INITIAL CONDITIONS:

- Reactor tripped due to a main turbine trip
- All immediate manual actions and VSSV's of OP-TM-EOP-001 have been performed

INITIATING CUE:

When you assume the shift, I am directing you to perform an alarm review.

TIME CRITICAL:

Yes

Facility: THREE MILE ISLAND Task No.: 22601021

Task Title: Restore Seal Injection with a Loss of ICCW – Alt Path JPM No.: ILT 18-01 NRC JPM E

K/A Reference: 003 A3.01 3.3/3.2 Previous: 14-01 CERT EXAM C

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance:  X   
Classroom \_\_\_\_\_ Simulator  X  Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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.

Task Standard: The reactor is tripped, all RCP's are secured, and MU-V-33A/B/C/D are closed.

Required Materials: • OP-TM-AOP-041, Loss Of Seal Injection, Rev 8.

General References: • OP-TM-AOP-041, Loss Of Seal Injection, Rev 8.  
• OP-TM-EOP-001, Reactor Trip, Rev 16.

Initial Conditions: • The Reactor is at 100% power.  
• You are the URO.  
• The instructor/examiner will act as the ARO and CRS.  
• The ICO will act as Auxiliary Operators in the plant as needed.  
• MU-P-1B has tripped and is not selected for ES from either power supply.

Initiating Cue: The Control Room Supervisor directs you to restore Seal Injection IAW OP-TM-AOP-041, Loss of Seal Injection.

Time Critical Task: N/A

Validation Time: 12 minutes

**SIMULATOR SETUP****Exam Setup: IC 16, (Temp IC 240)**

1. Insert the following:
  - A. Remote MUR12 on Event #1 to open MU-V-76A&B
  - B. Malfunction CC04A on Event #2 to trip IC-P-1A
  - C. Insert CC04B immediately
  - D. Override 02A5S71-ZDICSMUP1A(2) to OFF Immediately
  - E. Malfunction RC36 Immediately
  - F. Malfunction MU33A Immediately
  - G. Malfunction MU01A Immediately
3. Freeze the Simulator.
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.

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**Evaluator's Cue:** Provide a copy of OP-TM-AOP-041, Loss Of Seal Injection.

**Evaluator's Note:** Steps 3.1 and 3.2 are "If At Any Time" steps and are not applicable at this time.

***OP-TM-AOP-041 Step 3.3***

√ **Performance Step: 1** ENSURE MU-V-32 is in HAND and Closed.

**Standard:** Examinee recognizes that MU-V-32 is in AUTO and open, and:

1. Presses the white HAND button on the MU-V-32 Bailey controller station, observing that the white HAND light is lit and the red AUTO light is not lit (CC).
2. Holds the toggle switch on the MU-V-32 Bailey controller station in the downward direction until MU-V-32 indicates closed by the indicator being at 0 (CC).

**Comment:**

***OP-TM-AOP-041 Step 3.4***

**Performance Step: 2** When 1D or 1E 4160V bus is energized, then CONTINUE.

**Standard:** Examinee verifies 1D and/or 1E 4160V bus is energized and continues.

**Comment:**

***OP-TM-AOP-041 Step 3.5***

**Performance Step: 3** VERIFY a makeup pump is operating (MU header pressure MU2-PI is above RCS pressure) and aligned to seal injection.

**Standard:** Examinee determines that a makeup pump is not operating by none of the three makeup pumps showing red running lights or amps (CC/CR) and goes to the RNO column.

**Comment:**

PERFORMANCE INFORMATION

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***OP-TM-AOP-041 Step 3.5, RNO 1*****Performance Step: 4** ENSURE MU-V-3 is Closed.**Standard:** Examinee closes MU-V-3 by pressing the green closed pushbutton and verifying that the red Open light is not lit and the green closed light is lit (CC).**Comment:*****OP-TM-AOP-041 Step 3.5, RNO 2***✓ **Performance Step: 5** ENSURE MU-V-17 is Closed.**Standard:** Examinee closes MU-V-17 by:

1. Presses the white HAND button on the MU-V-17 Bailey controller station, observing that the white HAND light is lit and the red AUTO light is not lit (CC).
2. Holds the toggle switch on the MU-V-17 Bailey controller station in the downward direction until MU-V-17 indicates closed by the indicator being at 0 (CC).

**Comment:*****OP-TM-AOP-041 Step 3.5, RNO 3*****Performance Step: 6** VERIFY [MU tank level >40"] or [MU-V-14A or B is Open].**Standard:** Examinee verifies that MU tank level is greater than 40" by observing the MU-T level indicator (CC)**Comment:**

PERFORMANCE INFORMATION

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**Examiner Note:**            **Step 3.5, RNO 4 is N/A.**

***OP-TM-AOP-041 Step 3.5, RNO 5***

**Performance Step: 7**    If MU-V-77 A & B are Open, then GO TO section 4.0.

**Standard:**            Examinee recognizes that MU-V-77A&B are open by the plate indicator (CC) or by recognizing the initial conditions did not state anything to contradict normal lineups, and Goes To Section 4.0

**Comment:**

**Examiner Note:**            **Step 4.0 is N/A.**

**Booth Operator Note:**    **If contacted as an NLO, reply that MU-P-1A has been verified as ES selected.**

***OP-TM-AOP-041 Step 4.1***

**Performance Step: 8**    Ensure MU-P-1A is ES Selected. (CB 338: 1D 4160V Bus Unit 7)

**Standard:**            Examinee recognizes MU-P-1A is ES Selected from the initial conditions.

**Comment:**

***OP-TM-AOP-041 Step 4.2***

**Performance Step: 9**    VERIFY one of the following:

- MU-V-36 and 37 are Open
- MU-V-16A or 16B is Open

**Standard:**            Examinee verifies that MU-V-36 and MU-V-37 are open by the red open lights lit, green closed lights not lit (CC)

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-AOP-041 Step 4.3***

✓ **Performance Step: 10** ENSURE DR-P-1A and DC-P-1A are operating.

**Standard:****Examinee:**

1. Starts DR-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CC).
2. Starts DC-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CC).

**Comment:*****OP-TM-AOP-041 Step 4.4***

**Performance Step: 11** START MU-P-1A.

**Standard:**

Examinee attempts to start MU-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, recognizes that MU-P-1A fails to start by red running light not lit, green stop and yellow mismatch lights lit, and no amps (CC).

Examinee Goes to RNO column.

**Comment:****ALTERNATE PATH #1 BEGINS**

**Examiner Note:** Step 4.4, RNO 1 is N/A.

***OP-TM-AOP-041 Step 4.4, RNO 2***

**Performance Step: 12** If MU-P-1C is available, then GO TO Section 6.0.

**Standard:**

Examinee determines that MU-P-1C is available and Goes To Section 6.0.

**Comment:**



PERFORMANCE INFORMATION

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**Booth Operator Cue:** If contacted as an NLO to open MU-V-76A&B, acknowledge the direction and insert EVENT #1 to open MU-V-76A&B. After 1 minute report back that MU-V-76A&B are OPEN.

***OP-TM-AOP-041 Step 6.0***

**Performance Step: 13** If MU-V-76A & B are closed and HPI train A and Normal MU header piping is intact, then DISPATCH an operator to open MU-V-76 A & B. (AB 281: MU valve alley)

**Standard:** Examinee determines that MU-V-76A&B are closed by the plate indicator (CC) or by recognizing the initial conditions did not state anything to contradict normal lineups, and dispatches an NLO to open MU-V-76A and MU-V76B.

**Comment:**

***OP-TM-AOP-041 Step 6.1***

**Performance Step: 14** Ensure MU-P-1C is ES Selected. (CB 338: 1E 4160V Bus Unit 9)

**Standard:** Examinee recognizes MU-P-1C is ES Selected from the initial conditions.

**Comment:**

***OP-TM-AOP-041 Step 6.2***

**Performance Step: 15** VERIFY one of the following:

- MU-V-36 and 37 are Open
- MU-V-16A or 16B is Open

**Standard:** Examinee verifies that MU-V-36 and MU-V-37 are open by the red open lights lit, green closed lights not lit (CC)

**Comment:**

## PERFORMANCE INFORMATION

**OP-TM-AOP-041 Step 6.3**

✓ **Performance Step: 16** ENSURE DR-P-1B and DC-P-1B are operating.

**Standard:****Examinee:**

1. Starts DR-P-1B by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).
2. Starts DC-P-1B by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).

**Comment:****OP-TM-AOP-041 Step 6.4**

**Performance Step: 17** START MU-P-1C.

**Standard:**

Starts MU-P-1C by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).

**Comment:****Alternate Path #2 Begins Prior to SI > 22 GPM**

**Booth Operator Cue:** When directed by the examiner, Insert EVENT #2, to trip IC-P-1A

**OP-TM-AOP-041 Step 3.1.A**

**Performance Step: 18** IAAT ICCW flow is < 550 GPM (IC-5 FI) and SI Flow < 22 GPM, then perform the following:

**A. ENSURE the reactor is tripped.**

**Standard:**

Examinee recognizes that ICCW flow is < 550 GPM (CR) and SI Flow < 22 GPM (CC) and performs the Immediate Manual Actions of OP-TM-EOP-001.

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-EOP-001, Step 2.1***

✓ **Performance Step: 19** PRESS both Reactor Trip and DSS pushbuttons.

**Standard:** Examinee presses the Reactor Trip pushbutton (CC) and the DSS pushbutton (CC).

**Comment:**

***OP-TM-EOP-001, Step 2.2***

**Performance Step: 20** VERIFY REACTOR SHUTDOWN.

**Standard:** Examinee verifies the reactor is shutdown as defined in OS-24, Conduct of Operations During Abnormal and Emergency Events:

The reactor is shutdown when the heat generation by fission has been stopped. This condition can be confirmed immediately following a reactor trip as follows:

- 1) Power Range NI's indicate less than 5%,
- 2) all control rods are inserted, or
- 3) source range count rate is continuously lowering.

**Comment:**

***OP-TM-EOP-001, Step 2.3***

**Performance Step: 21** PRESS Turbine Trip pushbutton.

**Standard:** Examinee presses the Turbine Trip pushbutton (CL)

**Comment:**

***OP-TM-EOP-001, Step 2.4***

**Performance Step: 22** VERIFY the turbine stop valves are Closed.

**Standard:** Examinee verifies the Turbine Stop Valves are closed by observing the digital indications on CL.

**Comment:**

**Examiner Note:** The examinee may perform a symptom check at this time, but it is not required.

## PERFORMANCE INFORMATION

**OP-TM-AOP-041 Step 3.1.B**

✓ **Performance Step: 23     B. ENSURE all RCPs are tripped.**

**Standard:**

Examinee secures RC-P-1A by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).

Examinee secures RC-P-1B by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).

Examinee secures RC-P-1C by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).

Examinee secures RC-P-1D by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).

**Comment:**

**OP-TM-AOP-041 Step 3.1.C**

**Performance Step: 24     C. Records Time:**

**Standard:**

Examinee records time

**Comment:**

**OP-TM-AOP-041 Step 3.1.D**

✓ **Performance Step: 25     D. Ensure MU-V-33A/B/C/D are closed.**

**Standard:**

Examinee closes MU-V-33A/B/C/D.

**Comment:**

**Terminating Cue:**                      **After RCP's are secured, evaluation on this JPM is complete.**

**STOP TIME:** \_\_\_\_\_

Job Performance Measure No.: ILT 18-01 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:

- The Reactor is at 100% power.
- You are the URO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- MU-P-1B has tripped and is not selected for ES from either power supply.

## INITIATING CUE:

The Control Room Supervisor directs you to restore Seal Injection IAW OP-TM-AOP-041, Loss of Seal Injection.

## TIME CRITICAL:

No

Facility: THREE MILE ISLAND

Task No.: 57001004

Task Title: Pump RCDT to MWSTJPM No.: ILT 18-01 NRC JPM F

K/A Reference: 007 A1.01 2.9/3.1

BANK JPM: ILT 16-01 Cert JPM F

Examinee:

NRC Examiner:

Facility Evaluator:

Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance:   X    
Classroom \_\_\_\_\_ Simulator   X   Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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.

Task Standard: Pump the RCDT to the MWST and maintain RCDT above the limit of OP-TM-220-501, TRANSFERS FROM R.C. DRAIN TANK. Limitation 3.2.1 gives a band of 91-74.6%.

Required Materials: • OP-TM-220-501, Rev 4

General References: • OP-TM-220-501, Rev 4

Initial Conditions: • 100% power  
• You are the ARO  
• The instructor/examiner will act as the URO and CRS.  
• The ICO will act as Auxiliary Operators in the plant as needed.

Initiating Cue: Due to chemistry concerns with the RCDT water, the Control Room Supervisor directs you to pump the RCDT to the MWST in accordance with OP-TM-220-501, "Transfers from the R.C. Drain Tank". The desired level is 76.0% in the RCDT.

Time Critical Task: No

Validation Time: 10 minutes

**SIMULATOR SETUP****Exam Setup: IC 16,**

1. Ensure the RCDT level is greater than 78% by using remote WDR16 =78.5
  - a. It may be preferable to set the remote to between 78.0 and 78.5, but ensure level is greater than 78%.
2. Freeze the 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.



## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EVALUATORS CUE:** Provide a copy of OP-TM-220-501, Rev 4, and direct the applicant to pump the RCDT to the MWST.  
If the examinee asks about the status of the RCS, inform them it is in the Operating Mode.  
If the examinee asks the status of the WDL system, inform them it is in the operating mode.

**OP-TM-220-501**

**Performance Step: 1** Step 4.1: Obtain shift management direction for the receiving tank:  
3. Misc. Waste Storage Tank.

**Standard:** Applicant reviews the precautions, limitations and prerequisites and identifies that MWST is the correct tank to pump to.

**Comment:**

**EVALUATOR NOTE:** The MWST alarm levels are below the gas and liquid temperature meters on the LWDS panel.

**OP-TM-220-501**

**Performance Step: 2** Step 4.2: Verify transfer will not raise receiving tank level above high level ALARM point.

**Standard:** Applicant should review the placards on the LWDS panel and determine that a high level alarm will not come in.

**Comment:**

**BOOTH CUE:** When called, acknowledge as Radiation Protection that you understand that Ops is going to pump the RCDT to the MWST.

**OP-TM-220-501**

**Performance Step: 3** Step 4.3: NOTIFY Radiation Protection

## PERFORMANCE INFORMATION

**Standard:** Applicant calls Radiation Protection to notify them that Ops is pumping the RCDT to the MWST.

**Comment:**

**OP-TM-220-501 step 4.4 is N/A because the RCS is not in the draindown mode.**

**OP-TM-220-501**

✓ **Performance Step: 4** Step 4.5: Align the following valves applicable to the designated receiving tank. (N/A columns **not** required for transfer): CLOSE WDL-V-161, OPEN WDL-V-56

**Standard:**

1. Applicant will N/A the columns for the B-Reactor Coolant Bleed Tank, and C-Reactor Coolant Bleed tank.
2. Applicant will **CLOSE WDL-V-161** (on the LWDS Panel). Red lamp will extinguish, and Green lamp will light.
3. Applicant will **OPEN WDL-V-56** (on the LWDS Panel). Green lamp will extinguish, and Red lamp will light.

**Comment:**

**OP-TM-220-501**

✓ **Performance Step: 5** Step 4.6: Open the following:

- **WDL-V-303 (PCR)**
- **WDL-V-304 (PCR)**

**Standard:** Applicant locates WDL-V-303 and WDL-V-304 and one at a time rotates the barrels switches to the OPEN position (right). The green lamps turn red when the valves are completely open. The applicant should ensure the lights on the LWDS panel corresponding to WDL-V-303 and WDL-V-304 also indicate red.

**Comment:**

## PERFORMANCE INFORMATION

**EXAMINER NOTE:** The next step will start pumping water from the RCDT to the MWST.

**OP-TM-220-501**

✓ **Performance Step: 6** Step 4.7: Ensure WDL-P-8 is operating.

**Standard:** Applicant locates WDL-P-8 on the LWDS panel, and rotates the pistol grip to the right. The green indicating lamp will extinguish, and the red indicating lamp will light. Level in the RCDT will begin to lower, level in the MWST will rise.

**Comment:**

**EXAMINER NOTE** If asked if a faster transfer rate is required, reply that it is **NOT** required. If the examinee determines on their own that a faster rate **IS** required, they will perform the next step to **CLOSE WDL-V-302**. Either is acceptable.

**OP-TM-220-501**

**Performance Step: 7** Step 4.8: If faster transfer rate is required, then **CLOSE WDL-V-302**.

**Standard:** Applicant presses the WDL-V-302 pushbutton on the WDL panel. The green light comes on and the transfer rate rises.

**Comment:**

**EXAMINER NOTE:** The note and caution prevent the operator from pumping the RCDT to lower than the alarm setpoint that the tech spec limit.

**OP-TM-220-501**

**Performance Step: 8** Step 4.9: When the desired level or 75.5% in R.C. Drain Tank is attained, then perform the following:  
1. ENSURE WDL-V-302 is Open

**Standard:** Applicant verifies that WDL-V-302 is open (or opening) by checking that the indicating lamp is still red.

**Comment:**

## PERFORMANCE INFORMATION

**OP-TM-220-501**

- ✓ **Performance Step: 9**                      2. Place WDL-P-8 control switch in Normal-After-Stop

**Standard:**                      The applicant will rotate the pistol grip for WDL-P-8 on the LWDS panel left. The green indicating lamp will light, the red indicating lamp will extinguish.

**Comment:**

**OP-TM-220-501**

- ✓ **Performance Step: 10**                      3. Close WDL-V-303

**Standard:**                      The applicant will rotate the WDL-V-303 barrel switch to off, the indicating lamp will turn green.

**Comment:**

**Terminating Cue:**                      **After step 4.9.3 is complete and WDL-V-303 is closed, the JPM can be terminated.**

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

---

Job Performance Measure No.: ILT 18-01 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:

- 100% power
- You are the ARO
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.

## Initiating Cue:

Due to chemistry concerns with the RCDT water, the Control Room Supervisor directs you to pump the RCDT to the MWST in accordance with OP-TM-220-501, "Transfers from the R.C. Drain Tank". The desired level is 76.0% in the RCDT.

## TIME CRITICAL:

No

Facility: Three Mile Island Unit 1 Task No.: 86101004

Task Title: Energize 1E 4kV Bus from SBO JPM No.: 18-01 NRC JPM G  
Alternate Path

BANK Modified ILT 16-01  
JPM: CERT JPM G

K/A Reference: 064 A4.01 (4.0 4.3)

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.

Task Standard: The 1E 4kV Bus is energized by the SBO diesel generator in accordance with OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS.

Required Materials: OP-TM-AOP-020, LOSS OF STATION POWER – Revision 24  
OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS – Revision 18

General References: OP-TM-AOP-020, LOSS OF STATION POWER – Revision 24  
OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS – Revision 18

Handout: OP-TM-AOP-020, LOSS OF STATION POWER – Revision 24 with step 3.1 signed off for initiating Emergency Feedwater

Initial Conditions:

- You are the Assist Reactor Operator (ARO).
- Another RO is initiating Emergency Feedwater and handling Seal Injection.
- Plant was in normal lineup with no equipment OOS.
- Unit tripped 10 minutes ago. The VSSV's of OP-TM-EOP-001 have been completed.

- Loss of Off-Site Power (LOOP) just occurred.

Initiating Cue: The CRS directs you to perform OP-TM-AOP-020, LOSS OF STATION POWER.

Time Critical Task: No

Validation Time: 10 Minutes



**SIMULATOR SETUP**

1. Reset the simulator to Temp IC 16.
2. PLACE **MALFUNCTION EG07B** EG-Y-1B failure  
INSERT **MALFUNCTION ED01** Loss of Offsite Power
3. Start MU-P-1A on the 1D 4160V bus  
  
Perform the Immediate Actions and VSSVs of EOP-010.  
  
INITIATE Global Silence.  
FREEZE the Simulator.  
Verify Visual Effects are enabled.
4. 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.
5. This completes the setup for this JPM.

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

**EVALUATOR CUE:** Hand the examinee a copy and tell them to perform OP-TM-AOP-020.

**EXAMINER NOTE:** OS -24 allows the operator to start EG-Y-1B outside of the procedure. The examinee could determine EG-Y-1B will not start and then go right to placing the SBO diesel on the 1D 4160V bus in accordance with OP-TM-AOP-020.

***OP-TM-AOP-020, Step 3.1***

**Performance Step: 1** Initiate OP-TM-424-901, EMERGENCY FEEDWATER

**Standard:** Step is signed off and from the initial conditions another RO is initiating EFW.

**Comment:**

***OP-TM-AOP-020, Step 3.2***

**Performance Step: 2** Initiate both OP-TM-861-901 and OP-TM-861-902 for EG-Y-1A and EG-Y-1B operations.

**Standard:** Examinee initiates these procedures.

**Comment:**

***OP-TM-861-902, Step 4.1, 4.2, and 4.3***

**EXAMINER NOTE:** Step 4.1 Prerequisite has been met.  
Step 4.2 N/A: EG-Y-1B is NOT running..  
Step 4.3 is left OPEN.

***OP-TM-861-902, Step 4.4.1***

**EXAMINER NOTE:** Step 4.4.1 is left OPEN

***OP-TM-861-902, Step 4.4.2***

**Performance Step: 3**      Ensure 1SA-E2 and 1SB-E2 are Open on CR

**Standard:**                      Examinee verifies the 1SA-E2 and 1SB-E2 are open.

**Comment:**

**EXAMINER NOTE:**          **Step 4.4.3 is NA because no ESAS signal is present.**

***OP-TM-861-902, Step 4.4.4***

**Performance Step: 4**      If PPC is available, then VERIFY S2073, 4KV BUS 1E OVERCURRENT, is NORM.

**Standard:**                      Examinee verifies with the CRS or the PPC that S2073 is NORM.

**Comment:**

***OP-TM-861-902, Step 4.4.5***

**Performance Step: 5**      If EG-Y-1B is not running, then press and hold for ~8 seconds the 1D DIESEL GENERATOR START PB.

**Standard:**                      Examinee presses the start PB. The examinee identifies that the diesel did NOT start.

**Comment:**

**EXAMINER CUE:**              **If the examinee asks to if they should place the SBO diesel on the 1E 4160V bus, ask them to make a recommendation**

## PERFORMANCE INFORMATION

**ALTERNATE PATH BEGINS*****OP-TM-AOP-020, Step 3.3***

- ✓ **Performance Step: 6**      Examinee identifies that the 1E 4160V bus is not energized and goes to the RNO to initiate OP-TM-864-901, SBO Diesel Generator (EG-Y-4) OPERATIONS.

**Standard:**                      Examinee determines that the 1E 4160V bus and be powered from the SBO diesel.

**Comment:**

**EXAMINER NOTE:**              **Perform only one of Sections 4.1, 4.2, or 4.3 (mark the other two sections NA).**

**The examinee will perform Section 4.2: Manually Start & Load EG-Y-4 onto 1E 4160V Bus.**

**EXAMINER NOTE:**              **Step 4.2.1 is left open**

***OP-TM-864-901, Step 4.2.2***

**Performance Step: 7**              4.2.2 Verify 1E 4160V bus is de-energized.

**Standard:**                      • Verifies no volts on “E” bus or overhead lights not lit.

**Comment:**

***OP-TM-864-901, Step 4.2.3***

**Performance Step: 8**              **If the PPC is available, then VERIFY S2073, 4 KV BUS 1E OVERCURRENT, is NORM.**

**Standard:**                      Using the PPC, the examinee verifies Pont S2073 Bus 1E Overcurrent is ‘NORM’

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-864-901, Step 4.2.4*****Performance Step: 9** ENSURE 1SA-E2 and 1SB-E2 are OPEN:**Standard:**

- 1SA-E2 verified open by Green light and Amber light or by taking to Normal-After-Trip.
- 1SB-E2 verified open by Green light or by taking to Normal-After-Trip.

**Comment:*****OP-TM-864-901, Step 4.2.5***

- √ **Performance Step: 10** ENSURE the following control switches are in PTL
- A. BS-P-1B
  - B. The ES selected MU pump: MU-P-1A-EX1 or MU-P-1B-EX2
  - C. DH-P-1B-EX1
  - D. RR-P-1B-EX1
  - E. EF-P-2B-EX1

**Standard:**

- √
- √
- √
- √
- √
- Place the following in Pull-To-Lock by counter clockwise rotation and pulling extension control. (Location Console Center)
  - BS-P-1B
  - MU-P-1C
  - DH-P-1B
  - RR-P-1B
  - EF-P-2B

**Comment:*****OP-TM-864-901, Step 4.2.6*****Performance Step: 11** PRESS and HOLD for approx. 8 seconds EG-Y-4-EX1 START PB for SBO Diesel Generator

- √ **Standard:**
- Presses and holds start PB for EG-Y-4 for approx. 8 seconds.

**Comment:**

PERFORMANCE INFORMATION

---

***OP-TM-864-901, Step 4.2.7***

**Performance Step: 12** If generator voltage is not between 4.1 and 4.3 kV, then ADJUST Unit Voltage Rheostat (SBO: Inside Rear of Exciter Control Cabinet: Key #21).

**Standard:**

- Verifies voltage at EG-Y-4 Volt meter is between 4.1` and 4.3 kV.

**Comment:**

***OP-TM-864-901, Step 4.2.8***

**Performance Step: 13** If generator frequency is not between 59 and 61 Hz, then ADJUST SBO governor.

**Standard:**

- Verifies frequency is between 59 and 61 Hz at frequency meter for EG-Y-4.

**Comment:**

***OP-TM-864-901, Step 4.2.9***

**Performance Step: 14** ENSURE G11-02 is in P-T-L.

**Standard:**

- Verifies G11-02 at EG-Y-1B section of Console Right is in Pull-To-Lock, by Rotating counterclockwise and pulling.

**Comment:**

***OP-TM-864-901, Step 4.2.10***

**Performance Step: 15** PLACE T1-C2 in P-T-L.

√ **Standard:**

- Verifies T1-C2 at Panel Right is in Pull-To-Lock, by Rotating counterclockwise and pulling.

**Comment:**

## PERFORMANCE INFORMATION

***OP-TM-864-901, Step 4.2.11*****Performance Step: 16** CLOSE G2-12 (EG-Y-4 output breaker).

- √ **Standard:**
- Closes EG-Y-4 output breaker on Console Right by rotating clockwise and verifying Red Light ON.

**Comment:**

.....  
Note Record time of overhead lights on for calculation below, or stop the stop-watch.  
.....

***OP-TM-864-901, Step 4.2.12***

√ **Performance Step: 17** CLOSE T1-E2 (1F 4160V bus cross tie to 1E 4160V).

- Standard:**
- Closes T1-E2 output breaker on Console Right by rotating clockwise and verifying Red Light ON.

**Comment:**

**Terminating Cue:** When T1-E2 has been closed, the JPM may be terminated.

**STOP TIME:** \_\_\_\_\_

Job Performance Measure No.: ILT 18-01 NRC JPM G

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).
  - Another RO is initiating Emergency Feedwater and handling Seal Injection.
  - Plant was in normal lineup with no equipment OOS.
  - Unit tripped 10 minutes ago. The VSSV's of OP-TM-EOP-001 been completed.
  - Loss of Off-Site Power (LOOP) just occurred.

Initiating Cue: The CRS directs you to perform OP-TM-AOP-020, LOSS OF STATION POWER.

Time Critical Task: No

Facility: THREE MILE ISLAND Task No.: 66101004

Task Title: Respond IAW OP-TM-MAP-C0101 Fuel Handling Incident: Spent Fuel Pool JPM No.: ILT 18-01 NRC JPM H

K/A Reference: 072 A3.01 (2.9 / 3.1) Previous JPM: NEW

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: \_\_\_\_\_ Actual Performance: X

Classroom \_\_\_\_\_ Simulator X Plant \_\_\_\_\_

**READ CUE SHEET ON LAST PAGE 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:

- 100% power
- Spent Fuel movement is taking place in the Spent Fuel Pool
- 'A' Fuel Handling ESF ventilation is in Service
- You are the ARO.
- The examiner will act as the URO and CRS.
- The booth operator will be the Auxiliary Operators.
- No other Maintenance or surveillances are scheduled for this shift.

Task Standard: Fuel Handling Building Supply Fan, AH-E-10, is shutdown, dampers AH-D-120, 121, 122 are closed. AH-E-14A/C and AH-E-14B/D are shutdown.

Required Materials:

- OP-TM-MAP-C0101, Radiation Level HI, Rev 4
  - RM-G-9 Fuel Handling Area

General References:

- OP-TM-MAP-C0101, Radiation Level HI, Rev 4
- OP-TM-826-901, CONTROL BUILDING VENTILATION SYSTEM RADIOLOGICAL RESPONSE OPERATIONS, Rev 3

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: 6 mins

**SIMULATOR SETUP**

1. Reset the simulator to IC 16
2. Insert the following Malfunctions  
**RM01H**, AH-E-10 fails to trip on interlock, **insert IMMEDIATELY** (RM-A-4)
3. Insert the following Override:  
**09A1A03S7-ZDISSG9** ENBL PRF **RM-G-9** Inter **ENAB/DEF SW** to **ON**, and leave panel switch in **ENABLE**, immediately.  
**During RESET: OVERRIDE RM-G-9 Switch in ENABLE**  
**MAP C-2-1 Rad Monitor Interlock Bypass to OFF**
4. Set **RM09 = 100** on **EVENT #1**, with a Ramp of 60 seconds
5. Set **RM29 = 1000000** on **EVENT #1** with a 60 Second Delay and a 2 minute Ramp
6. Verify **AH-E-14B/D** are operating.
7. 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.
8. This completes the setup for this JPM.

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EVALUATORS NOTE:** The examinee may recognize that the Automatic actions of C-1-1 did not occur and may perform the actions IAW OS-24.

**BOOTH CUE:** When directed, insert EVENT #1, RM-A-9 High Alarm

**EVALUATORS CUE:** Acknowledge condition and entry into OP-TM-MAP-C0101, for RM-G-9.

As the CRS inform the Examinee you will contact Radiological Protection.

When RM-A-4 Alarms and the Examinee announce Alarm, direct the Examinee to continue with RM-A-9.

When Radiological Protection is notified, acknowledge contact

***OP-TM-MAP-C0101, Step 4.1***

**Performance Step: 1** NOTIFY Radiological Protection

**Standard:**

- Contacts Radiological Protection

**Comment:**

**EVALUATORS CUE:** If asked, notify the examinee that Rad Protection recommended to evacuate the Fuel Handling Building.

***OP-TM-MAP-C0101, Step 4.2***

**Performance Step: 2** CLEAR Fuel Handling Building (Aux Bldg.) per Rad Con direction.

**Standard:**

- Makes a Page Announcement to for personnel to evacuate the Fuel Handling Building. (Aux Building)

**Comment:**

**OP-TM-MAP-C0101, Step 4.3**

✓ **Performance Step: 3** **IAAT** High alarm is Lit, **then** **PERFORM** the following:

**Standard:** **4.3.1 ENSURE** AH-E- 10 is Shutdown.

- Examine recognizes AH-E-10 is still operating and takes the Control Switch to OFF. (Green Light Lit, Red Light OFF)

**Comment:**

✓ **OP-TM-MAP-C0101, Step 4.3.2**  
**Performance Step: 4** **ENSURE** the following are Closed:  
AH-D-120  
AH-D-121  
AH-D-122

**Standard:**

- Examinee recognizes the Dampers are still Open, and takes the Control Switch for AH-D-120, 121, 122 to **CLOSE**. (Green Light Lit, Red Light Off)

**Comment:**

**EVALUATOR NOTE:** **If asked, the CRS will work with Rad Protection to isolate the release.**

**OP-TM-MAP-C0101 Step 4.4**  
**Performance Step: 5** **If** possible, **then ISOLATE** the source of radioactive release.

**Standard:**

- Examinee N/A this step

**Comment:**

**OP-TM-MAP-C0101, Step 4.5**

**Performance Step: 6**      **REQUEST** SM evaluates Emergency Action Levels (EALs).

**Standard:**                      Examinee request CRS to evaluate EAL's.

**Comment:**

**OP-TM-MAP-C0101, Step 4.6**

If fuel handling is in progress, then perform the following:

**Performance Step: 7**      4.6.1 **NOTIFY** the fuel handling SRO to suspend fuel handling IAW 1505-1, "Fuel and Control Component Shuffles".

**Standard:**                      • Examinee request CRS to notify fuel handling SRO to suspend fuel handling.

**Comment:**

**EXAMINER CUE:**              **ESF Ventilation is not modeled in the simulator. If asked about the status of ESF ventilation, inform the examinee one train (A) is in service.**

**OP-TM-MAP-C0101, Step 4.6**

If fuel handling is in progress, then perform the following:

**Performance Step: 8**      4.6.2 **ENSURE** one train of ESF ventilation in service IAW 1104-15D, "Fuel Handling E.S.F. Ventilation System".

**Standard:**                      • Examinee verifies ESF Ventilation is in Operation.

**Comment:**

**EXAMINER NOTE:** When the Examinee initiates OP-TM-826-901, inform the examinee the 3<sup>rd</sup> CRO will perform this procedure and to continue with the MAP Alarm procedure for RM-G-9.

**OP-TM-MAP-C0101, Step 4.6**  
If fuel handling is in progress, then perform the following:

**Performance Step: 9** 4.6.3 **INITIATE** OP-TM-826-901, Control Building Ventilation System Radiological Event Operations”..

**Standard:**

- Examinee initiates OP-TM-826-901

**Comment:**

**OP-TM-MAP-C0101, Step 4.6**  
If fuel handling is in progress, then perform the following:

√ **Performance Step: 10** 4.6.4 **If** RM-A-4 high alarm Lit, **then** perform the following:  
**STOP** the following:  
– AH-E-14A/C  
– AH-E-14B/D

**Standard:**

- Examine Stops AH-E-14B/D by rotating the Control Switch to the left. (Green Light is Lit, Red Light is Off)
- Verifies AH-E-14A/C are off. (Green Light is Lit, Red Light is Off)

**Comment:**

**Examiner Cue:** When AH-E-14A/C and AH-E-14B/D are shutdown the JPM may be terminated.

**STOP TIME:** \_\_\_\_\_

Job Performance Measure No.: ILT 18-01 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:

- 100% power
- Spent Fuel movement is taking place in the Spent Fuel Pool
- 'A' Fuel Handling ESF ventilation is in Service
- You are the ARO.
- The examiner will act as the URO and CRS.
- The booth operator will be the Auxiliary Operators.
- No other 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.: 21104017 & 54204003

Task Title: Manually Operate IC-V-4 JPM No.: ILT 18-01 NRC JPM I

K/A Reference: 008A2.05 4.5/3.4

Bank JPM: TQ-TM-105-852-J100

Examinee:

NRC Examiner:

Facility Evaluator:

Date:

Method of testing:

Simulated Performance:   X   Actual Performance:             
Classroom            Simulator            Plant   X  

### READ CUE SHEET ON THE LAST PAGE 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.

Task Standard: IC-V-4 has been Opened.

Required Materials: • OP-TM-541-429, Manual Operation of IC-V-4, Rev. 1

General References: • OP-TM-541-429, Manual Operation of IC-V-4, Rev. 1

Initial Conditions:

- A loss of instrument air has occurred. OP-TM-AOP-028, LOSS OF INSTRUMENT AIR is entered.
- Primary Instrument Air pressure (PI-222) is < 60 psig.
- Reactor has been tripped. EOP-001, Reactor Trip actions have been completed.
- CRS is directing actions and another AO has been directed to ensure IC-V-3 is open.

Initiating Cue: Block open IC-V-4 in accordance with OP-TM-541-429, Section 4.4.  
**(ALL ACTIONS ARE TO BE SIMULATED)**

Time Critical Task: No

Validation Time: 15 minutes

**SIMULATOR SETUP**

N/A

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EXAMINER CUE:** Block open IC-V-4 in accordance with OP-TM-541-429, Section 4.4. (ALL ACTIONS ARE TO BE SIMULATED)

**EXAMINER CUE:** Hand the examinee a copy of OP-TM-541-429. The examinee may use the Local Placard.

Examine Reports to IC-V-4: Examinee locates IC-V-4 (305', Aux Building) and establishes communications with the Control Room.

**EXAMINER CUE:** If asked, IC-V-4 is in the position as shown. (Open)

**OP-TM-541-423** 4.4 If IC-V-4 Local Manual Operation is required, then **PERFORM** the following::

**EXAMINER CUE:** After performing 4.4.1 correctly, Inform the examinee that the "T" handle is in the described position.

√ **Performance Step: 1** 4.4.1 **ROTATE** "T" handle under clutch arm to align with groove under "T" handle.

**Standard:** Examinee describes rotating the "T" handle under the clutch arm to align with the groove under the "T" handle.

**Comment:**

**OP-TM-541-423**

**EXAMINER CUE:** Inform the examinee that the IC-V-4 handwheel is in the described position.

√ **Performance Step: 2** 4.4.2 **ROTATE** IC-V-4 manual actuation handwheel to match actual valve position.

**Standard:** Examinee describes rotating the handwheel to match the actual valve position (open)

**Comment:**

**OP-TM-541-423**

**EXAMINER CUE:** Inform the examinee that the clutch arm is in the described position.

√ **Performance Step: 3** 4.4.3 **DEPRESS** and **HOLD** clutch arm.

**Standard:**

Examinee describes depressing and holding the clutch arm.

**Comment:**

**OP-TM-541-423**

**EXAMINER CUE:** Inform the examinee that the IC-V-4 handwheel is in the described position.

**Performance Step: 4** 4.4.4 **PLACE** IC-V-4 in desired position (when handwheel engages, "T" handle will remain seated in the groove).

**EXAMINER CUE:** Inform the examinee that the IC-V-4 handwheel is in the described position.

**Standard:**

Examinee determines the valve is open.

**Comment:**

**OP-TM-541-423**

**EXAMINER CUE:** Inform the examinee that the clutch arm is in the described position.

**Performance Step: 5** 4.4.5 **RELEASE** IC-V-4 clutch arm.

**Standard:**

Examinee describes releasing the clutch arm

**Comment:**

**OP-TM-541-423**

**EXAMINER CUE:** Inform the examinee that IC-V-4 is Open

**Performance Step: 6** 4.4.6 **VERIFY** IC-V-4 maintains desired position.

**Standard:**

Examinee verifies that IC-V-4 remains in the open position.

**Comment:**

**OP-TM-541-423****Performance Step: 7**

Report to the Control Room, IC-V-4 is in Manual Control and OPEN.

**Standard:**

Examinee reports to the Control Room, IC-V-4 is in Manual Control and OPEN.

**Comment:****Terminating Cue:**

**JPM may be terminated after IC-V-4 is simulated open.**

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

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Job Performance Measure No.: ILT 18-01 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, LOSS OF INSTRUMENT AIR is entered.
  - Primary Instrument Air pressure (PI-222) is < 60 psig.
  - Reactor has been tripped. EOP-001, Reactor Trip actions have been completed.
  - CRS is directing actions and another AO has been directed to ensure IC-V-3 is open.

Initiating Cue: Block open IC-V-4 in accordance with OP-TM-541-429, Section 4.4.  
**(ALL ACTIONS ARE TO BE SIMULATED)**

Time Critical Task: No



Facility: Three Mile Island Unit 1 Task No.: 23104004

Task Title: Purge of the Waste Gas System  
Radiation Monitor (RM-A-7) JPM No.: ILT 18-01 NRC JPM J

K/A Reference: 071 A4.09 3.3 / 3.5 Bank JPM: TQ-TM-105-231-J002

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance:   X   Actual Performance:           

Classroom            Simulator            Plant   X  

**READ CUE SHEET ON THE LAST PAGE 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.

Task Standard: The Waste Gas Radiation Monitor (RM-A-7) is purged and at background.

Required Materials: • 1104-27, WASTE DISPOSAL – Gaseous, rev 89, Section 3.11

General References: • 1104-27, WASTE DISPOSAL – Gaseous, rev 89

Initial Conditions: • Plant is operating at 100% power.  
• Venting/Release of WDG-T-1A has just been completed.

Initiating Cue: The In-Plant supervisor has directed you (Primary AO) to establish communications with the Control Room Operator and coordinate the purging of RM-A-7 until background radiation is indicated IAW Section 3.11 of 1104-27, Waste Disposal – Gaseous.

Time Critical Task: No

Validation Time: 15 minutes

**SIMULATOR SETUP**

**N/A**

*(Denote Critical Steps with a check mark)*

**START TIME:** \_\_\_\_\_

**EXAMINER CUE:** Direct Examinee to perform Section 3.11 Purge of the Waste Gas System Radiation Monitor RM-A-7 IAW Section 3.11 of 1104-27.

Inform examinee that all prerequisites of 1104-27, Waste Disposal – Gaseous are met.

**EXAMINER CUE:** Role-play as the Control Room Operator for communications.

**Performance Step: 1** Establish communications with the Control Room Operator

**Standard:** Examinee establishes communications with the Control Room Operator

**Comment:**

**EXAMINER NOTE:** Verify that the examinee is using the Nitrogen bottle and not the Hydrogen bottle.

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the supply tubing is connected.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 2**

1. INSTALL the supply tubing from a regulated Nitrogen bottle to WDG-V-103.

**Standard:** Examinee locates the regulated Nitrogen bottle and simulates installing the supply tubing from the bottle to WDG-V-103

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the Nitrogen regulator is fully backed out.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 3**

2. ENSURE the Nitrogen regulator is fully backed out.

**Standard:** Examinee simulates backing out the Nitrogen regulator

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the nitrogen bottle isolation valve stem is fully raised.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 4**

3. OPEN the Nitrogen bottle isolation valve.

**Standard:** Examinee simulates removing clam shell  
Examinee simulates opening the nitrogen bottle isolation valve by turning the valve Counter Clockwise (CCW.)

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that WDG-V-67 valve stem is fully lowered.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 5**

4. UNLOCK and CLOSE WDG-V-67.

**Standard:** Examinee simulates unlocking and closing WDG-V-67 by turning the valve Clockwise.

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that WDG-V-103 valve stem is fully raised.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 6**

5. UNLOCK and OPEN WDG-V-103,.

**Standard:** Examinee simulates unlocking and opening WDG-V-103 by turning the valve CCW.

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the Nitrogen regulator outlet isolation valve has been turned fully counter-clockwise.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 7**

6. OPEN the Nitrogen regulator outlet isolation valve.

**Standard:** Examinee simulates opening the Nitrogen regulator outlet isolation valve by turning the valve CCW.

**Comment:**

**PROCEDURE  
CAUTION****DO NOT exceed 10 psig at the inlet side of RM-A-7****EXAMINER CUE:****If the simulation is performed in the correct direction, role-play with the student, informing that the outlet pressure is going up in 1 psig intervals.****If the examinee goes above 10 psig, critical step is not met.****If the simulation is performed in the incorrect direction, inform the student that the outlet pressure is 0 psig.****1104-27, Step 3.11.2****√ Performance Step: 8****7. ADJUST the Nitrogen regulator to raise outlet pressure to approximately 5 psig to purge RM-A-7.****Standard:****Examinee simulates adjusting the Nitrogen regulator, turns CCW to raise outlet pressure to approximately 5 psig to purge RM-A-7.****Comment:****EXAMINER CUE:****After ~ 1 Minute inform the examinee, the CRS has contacted him/her and the Background Radiation is satisfactory and terminate the purge of RM-A-7.****After the simulation is performed correctly, inform the student that the outlet pressure is approximately 0 psig.****1104-27, Step 3.11.2.8****Performance Step: 9****WHEN RM-A7 indicates only background radiation or CRS indicates reading is satisfactory, then BACK OFF regulator setting to 0 psig.****Standard:****Examinee simulates adjusting the Nitrogen regulator Clockwise to lower outlet pressure to approximately 0 psig.****Comment:****EXAMINER CUE:****After the simulation is performed correctly, inform the student that WDG-V-103 is closed and locked****EXAMINER CUE:****If asked for a Concurrent Verification, inform the examinee that a Concurrent Verification has been completed.****1104-27, Step 3.11.2****√ Performance Step: 10****9. CLOSE AND LOCK WDG-V-103.****Standard:****Examinee simulates closing and locking WDG-V-103 by turning valve Clockwise.****Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that WDG-V-67 is open and locked

**EXAMINER CUE:** If asked for a Concurrent Verification, inform the examinee that a Concurrent Verification has been completed.

✓ **1104-27, Step 3.11.2**  
**Performance Step: 11**

10. OPEN AND LOCK WDG-V-67.

**Standard:** Examinee simulates opening by turning the valve CCW and locking WDG-V-67.

**Comment:**

**Procedure Note:** All radioactive gas should be purged from lines before removing Nitrogen apparatus.

**EXAMINER CUE:** If asked, inform the examinee that all radioactive gas has been purged from lines

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the Nitrogen regulator outlet isolation valve. has been turned fully clockwise

✓ **1104-27, Step 3.11.2**  
**Performance Step: 12**

11. CLOSE the Nitrogen regulator outlet isolation valve.

**Standard:** Examinee simulates closing the Nitrogen regulator outlet isolation valve by turning the valve Clockwise.

**Comment:**

**EXAMINER CUE:** After the simulation is performed correctly, inform the student that the Nitrogen bottle is isolated and the tubing is removed.

**1104-27, Step 3.11.2**  
**Performance Step: 13**

12. ISOLATE the Nitrogen bottle and REMOVE tubing from WDG-V-103.

**Standard:** Examinee simulates isolating the Nitrogen bottle and removing the tubing from WDG-V-103.  
Examinee re-installs clam shell.  
Examinee places FME cover on tube and pipe cap on pipe.

**Comment:**

**Terminating Cue:** JPM may be terminated when the examinee when Nitrogen Bottle is Isolated and clam shell re-installed..

**STOP TIME:** \_\_\_\_\_

VERIFICATION OF COMPLETION

---

Job Performance Measure No.: ILT 18-01 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:

- Plant is operating at 100% power.
- Venting/Release of WDG-T-1A has just been completed.

## Initiating Cue:

The In-Plant supervisor has directed you (Primary AO) to establish communications with the Control Room Operator and coordinate the purging of RM-A-7 until background radiation is indicated IAW Section 3.11 of 1104-27, Waste Disposal – Gaseous.

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.: ILT 18-01 NRC JPM K

K/A Reference: 061 A2.04 (3.4 / 3.8) Bank 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.

Task Standard: EF-P-2A does not indicate steam binding and is operating and EF-V-52D is closed.

Required Materials: None

General References: OP-TM-424-901 Emergency Feedwater, Rev 4

Handout: OP-TM-424-901 Emergency Feedwater, Rev 4

- 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 4.2.4.
- Time Critical Task: No
- Validation Time: 13 minutes

**SIMULATOR SETUP**

**N/A**

## PERFORMANCE INFORMATION

*(Denote Critical Steps with a check mark)*

START TIME: \_\_\_\_\_

**EVALUATOR CUE:** The CRS direct you to investigate EF-P-2 for possible steam binding IAW OP-TM-424-901, Section 4.2.4.2. hand the Examinee OP-TM-424-901.

**EVALUATOR NOTE:** If requested provide the following EF-P-2A status when on scene, the pump is running (RED indication light is lit), 1D 4Kv bus is 4160 volts, and Discharge pressure is still approximately 400 psig.

**EVALUATOR CUE:** When gage is located point to 230°F (middle of the orange zone) and indicate that is what it is reading.

***OP-TM-424-901, Step 4.2.4.2***

**Performance Step: 1** Examinee verifies EF-P-2A is running, discharge pressure < OTSG pressure and determines discharge piping temperature of EF-P-2A

**Standard:** Examinee locates and reads strap on gage on discharge of EF-P-2A.

**Comment:**

**EVALUATOR CUE:** Acknowledge temperature reported and after three-way communication inform candidate that HSPS is defeated and EF-P-2A is in PTL.

***OP-TM-424-901, Steps 4.2.4.3.A and B***

**Performance Step: 2** If pump steam binding is suspected, then perform the following:  
A. ENSURE EFW actuation is in DEFEAT (8 switches).  
B. PLACE EF-P-2A in Pull to Lock.

**Standard:** Examinee requests that the Control Room ensure EFW actuation is in defeat and to place EF-P-2 in PTL.

**Comment:**

## PERFORMANCE INFORMATION

**EVALUATOR CUE:** If the next action is described correctly, the state that steam vapor was seen venting from pipe and a steady stream of water is now seen coming out of the pipe.

Otherwise, state that nothing is seen.

***OP-TM-424-901, Step 4.2.4.3.C***

✓ **Performance Step: 3** Open EF-V-1024 to drain condensate through the pump. (IB 295': On wall west by EF-P-2A near floor)

**Standard:** Examinee proceeds to EF-V-1024 west wall by base of pump, simulates opening EF-V-1024 by rotating counter clockwise.

**Comment:**

**EVALUATOR CUE:** When gage is looked at indicate 100°F on gage face.

**EVALUATOR CUE:** If valve is correctly simulated closed, state that all flow from pipe stopped.

Otherwise, state that a steady stream of water is seen coming out of the pipe.

***OP-TM-424-901, Step 4.2.4.3.D***

✓ **Performance Step: 4** When pump discharge pipe temperature is below 200 degrees °F then CLOSE EF-V-1024.

**Standard:** Examinee verifies temperature on gage < 200°F

Examinee simulates closing EF-V-1024 by rotating handwheel clockwise.

**Comment:**

## PERFORMANCE INFORMATION

**EVALUATOR CUE:** Acknowledge the cue below and state that EF-P-2A is now operating.

***OP-TM-424-901, Step 4.2.4.3.E***

**Performance Step: 5** START EF-P-2A

**Standard:** Examinee contacts Control Room and requests Control Room start EF-P-2A.

**Comment:**

**EVALUATOR CUE:** As the Control Room, state "There is excessive flow to the "A" OTSG. EF-V-30 valves associated with the "A" OTSG both indicate closed but flow continues. Report position of the EF-V-30 valves associated with the "A" OTSG."

**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  
  
If EF-V-30B or EF-V-30C are referred to, point to the half open positions.

**EVALUATOR CUE:** When the valve positions are reported to the Control Room, acknowledge the report and direct the examinee to stop EFW flow through the "D" EFW line IAW section 4.3 of OP-TM-424-901.

***N/A***

**Performance Step: 6** Examinee verifies Valve position of EF-V-30A and EF-V-30D.

**Standard:** Examinee identifies the valve position of EF-V-30A and EF-V-30D by valve position indicator on side of valve.

Examinee reports the position of the valves to the Control Room.

**Comment:**

## PERFORMANCE INFORMATION

**Evaluator Cue:** If Examinee simulates closing EF-V-52D correctly and reports it closed to Control Room then report "Control room has control of EFW."

If Examinee 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."

***OP-TM-424-901, Step 4.3.2***

IAAT an EF-V-30 valve is failed Open, then perform the following:

√ **Performance Step: 7** 4.3.2.1 CLOSE EF-V-52A (B-D) (IB 295' elev.) to isolate the failed EF-V-30 valve(s).

**Standard:** Examinee simulates closing EF-V-52D by turning hand wheel clockwise.

**Comment:**

**Terminating Cue:** JPM may be terminated when EF-V-52D is closed.

**STOP TIME:** \_\_\_\_\_



VERIFICATION OF COMPLETION

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Job Performance Measure No.: ILT 18-01 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 4.2.4.



Appendix D		Scenario Outline		Form ES-D-1	
ILT 18-01 NRC EXAM MATERIAL					
Facility:	Three Mile Island	Scenario No.:	1	Op Test No.:	TMI2019
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:	<ul style="list-style-type: none"> <li>85% power, MOL as ordered by the load dispatcher</li> <li>AH-E-18B is running for a surveillance (1303-5.5B)</li> <li>EF-P-1 is OOS for the next 24 hours</li> <li>Main Feedwater Pumps in Manual</li> </ul>				
Turnover:	Maintain 85% power				
Critical Tasks:	<ul style="list-style-type: none"> <li>CT-1 Shutdown reactor – ATWS</li> <li>CT-2 Restore feed to a dry OTSG (in necessary)</li> <li>CT-3 Establish a cooldown rate less than Guide 11 limits (if necessary)</li> </ul>				
Event No.	Malf. No.	Event Type*	Event Description		
1	CH630TCRC	TS CRS C ARO	AH-E-18B trip (ARO: Re-aligns ventilation, CRS: TS call).		
2	RD10B	I CRS I URO I ARO	Uncontrolled inward rod motion, entry into OP-TM-AOP-070 (URO/ARO: Manual control of ICS)		
3	MU06	TS CRS C URO	MU-V-18 fails partially closed (URO: Controls pZR level with HPI)		
4	FW16A	C CRS R URO C ARO	'A' MFP Trips, manual runback required (URO/ARO: manual runback)		
5	FW15B RD28 RD32	M CRS M URO M ARO	'B' MFP trips, Reactor Trip with an ATWS		
6	FW18A FW18B	C CRS C URO C ARO	Sequential loss of all EFW pumps. Entry into OP-TM-EOP-004, Lack of Heat Transfer. (URO: Secures RCP, ARO: Condensate Booster pump cooling)		
		C CRS C URO	(If required) HPI-PORV cooling, entry into OP-TM-EOP-009, HPI Cooling (URO: Opens PORV)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

**Three Mile Island NRC Scenario #1**

**Event #1:** Surveillance 1303-5.5B, CONTROL ROOM EMERGENCY FILTERING SYSTEM “B” OPERATIONAL TEST, is in progress. AH-E-18B, Control Tower Emergency Fan is running.

The Lead Examiner will cue AH-E-18B to trip. Alarm response HVB 6-11 will be entered, and the opposite side of Control Tower Ventilation should be started.

The CRS will enter Technical Specification 3.15.1.3:

*From and after the date that one control room air treatment system is made or found to be inoperable for the reason other than 3.15.1.2.d, reactor operation or irradiated fuel handling operations are permissible only during the succeeding 7 days provided the redundant system is verified to be OPERABLE.*

Once ventilation is restored, the scenario can continue.

**Event #2:** The Lead Examiner will cue the Uncontrolled Inward Rod Motion. This will cause an ICS transient.

The crew will diagnose the uncontrolled inward rod motion by an inward signal shown on the Diamond panel and the Position Indication Panel, Reactor Power lowering, RCS pressure and temperature lowering.

Entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET will be required based on a heat transfer upset requiring manual ICS operation.

Once the plan is stabilized in HAND, the scenario can continue. It may be prudent to enter Event #3 prior to pressurizer level rising above 220” to the ICS upset.

**Event #3:** The Lead Examiner will cue the partial closure of MU-V-18.

The crew will diagnose MU-V-18 closing by the green and red light indications on console center turning off (due to a breaker trip), lowering Pressurizer level indications (CC), and if left unattended long enough, MAP G-2-5, Pressurizer Level Hi/Lo in alarm.

The URO will establish Pressurizer Makeup manually via HPI Control Valve, MU-V-16B IAW OP-TM-EOP-010, Guide 9, RCS Inventory Control:

If normal makeup flow has not been established via MU-V-17 or MU-V-217 and through MU-V-18 (i.e. MU24-FI < 20 GPM), then MU-V-16B (or MU-V-16D) is used for normal MU flow. MU-V-16D is only used when the MU discharge cross connects are not in the normal lineup.

When MU-V-18 fails partially closed, the examinee should refer to the tech specs and OP-TM-211-000, MAKEUP AND PURIFICATION SYSTEM, for operability guidance.

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Scenario Set-up  
NRC Scenario 1

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According to OP-TM-211-000, step 4.6, manual operation of MU-V-18 defeats the ES automatic closure of the valve. MU-V-18 is also a containment isolation valve. Comply with tech spec 3.3.2 and 3.6.6 respectively. Manual operation is equivalent to MU-V-18 failing partially closed in the aspect that the system designated to close the valve will not put the valve in the required (closed) position.

Tech spec 3.3.2 and 3.6.6 are both shutdown LCO's of 72 hours and 48 hours, respectively.

Once Pressurizer level is being restored and Makeup is being controlled manually, the scenario can continue.

**Event #4:** The Lead Examiner will cue the Loss of the "A" Main Feedwater Pump.

The crew will diagnose the Loss of FW-P-1A by an immediate drop in Feedwater flow, OTSG level decreasing rapidly, steam header pressure increasing, a neutron cross-limit alarm coming in, and the remaining feedwater pump speed increases causing feedwater flow to recover somewhat.

OP-TM-MAP-H0101, Plant Runback, will be entered and a manual runback will be performed to lower Reactor Power to approximately 68%. This will require coordination between the URO and ARO, ensuring that the Control Rods and Feedwater are run back in symphony. This is the reactivity manipulation for the scenario.

Once sufficient reactivity manipulation has been observed, the scenario can continue.

**Event #5:** The Lead Examiner will cue the Loss of the "B" Main Feedwater Pump, and ATWS.

The crew will diagnose the Loss of FW-P-1B by an immediate drop in Feedwater flow, OTSG level decreasing rapidly, steam header pressure increasing, a neutron cross-limit alarm coming in, and the remaining feedwater pump speed increases causing feedwater flow to recover somewhat.

The URO will identify that an ATWS has occurred and will perform the Immediate Manual Actions of OP-TM-EOP-001, REACTOR TRIP. The URO must open the 1G-02 and 1L-02 breakers on panel right.

Once the IMA's are complete, the crew will perform a symptom check, which will be negative and warrant continuing in OP-TM-EOP-001, REACTOR TRIP.

**Event # 6:** Three minutes after the "B" Main Feedwater Pump has tripped, EF-P-2A will trip. Eight minutes after the "B" Main Feedwater Pump has tripped, EF-P-2B will trip.

Eight minutes of Emergency Feedwater is given to subside the initial decay heat produced by the reactor. If all EFW pumps tripped immediately, the crew would transition from OP-TM-EOP-004, LACK OF HEAT TRANSFER, to OP-TM-EOP-009, HPI-PORV cooling almost immediately, based on NO FEEDWATER available to RCS

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Scenario Set-up  
NRC Scenario 1

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Pressure approaching (or exceeding) 2450 psig. The crew may still end up in OP-TM-EOP-009 due to the nature of the casualty.

The crew will identify a Lack of Heat Transfer based on the following definition from OS-24, Conduct of Operations During Abnormal and Emergency Events:

LOHT can be confirmed if one of the following sets of conditions exists:

- Incore temperatures or Thot rising above 580°F and at least one RC Pump operating
- Incore temperatures rising and NO FEEDWATER available
- Incore temperatures rising and RCS circulation can not be confirmed

The CRS will direct entry into OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER.

Depending on the response of the crew, one of two paths will be taken:

- The first path will be to perform Attachment 1 of OP-TM-EOP-004 to feed the OTSG's with the Condensate Booster Pumps.
- The second path (if the conditions are met) the CRS will direct entry into OP-TM-EOP-009, HPI COOLING. HPI will be adequate and the crew will open the PORV, then transition to OP-TM-EOP-006, LOCA Cooldown.

**Termination:** The scenario can be terminated if one of the following conditions is met (or at the discretion of the lead examiner):

- OP-TM-EOP-004 criteria: The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.
- OP-TM-EOP-009 criteria: Adequate HPI verified and RCS Cooldown initiated.

**CT – 1 Shutdown Reactor - ATWS** – Actuation of the manual reactor trip pushbutton, to backup the automatic trip and/or provide the necessary reactor trip, anytime the reactor trips or should have tripped. In the event the reactor fails to trip, in response to automatic and manual demands, then perform the following: De-energize CRDMs

- Shutting down the reactor due to an ATWS outside of the following limit should be considered **grounds for failure of the critical task**:
  1. Not de-energizing the CRDM power supplies (1G-02 and 1L-02) prior the completion of the 1<sup>st</sup> symptom check.

**Safety Significance:** Without taking the proper actions, there exists a potential challenge to the Reactor Coolant System pressure boundary due to high RCS pressure.

An ATWS could occur due to a failure of the RPS to initiate a reactor trip signal upon one of the reactor trip parameters reaching its trip limit or the control and safety rods failing to insert once the RPS trip signal is given automatically or manually. A Diverse Scram System (DSS) is provided, independent of the RPS, to minimize the potential for an ATWS event. However, the operator must recognize and react to any of the reactor trip parameters that exceeds its limit but does not cause a reactor trip.

In this situation, the manual reactor trip button has been actuated but reactor power is not less than the plant specific reactor power level for verification of a reactor trip. Therefore, the reactor has not been shut down and there has been a failure of all or most of the control and safety rods to insert into the reactor core. Given that RPS, DSS and the manual reactor trip have failed to trip the reactor, then immediate actions to shut down the reactor by the alternate methods should be initiated. These methods include trip of CRDM breakers and maximum rate of boron addition to the RCS. Once the control and safety rods are successfully tripped into the core, or sufficient boric acid has been added to provide an adequate shutdown margin, the reactor will be shut down.

This should be achieved prior to taking additional mitigating actions because post-trip transient mitigation, from this point forward, is based on the assumption that the reactor is shutdown (subcritical).

**Cues:**

1. RPS channel alarms
2. RCS Power, Pressure and Temperature indications
3. P-T display and associated alarms
4. Verbal alert by plant staff that reactor shutdown requirements have not been met



**Performance Indicators:**

1. Operation of control rod drive feeder breakers (1G-02 and 1L-02) prior to completion of the 1<sup>st</sup> symptom check.

**Feedback:**

1. Nuclear Instruments
2. Control rod status indication
3. Control rod drive breaker status indication
4. Verbal indication from plant staff of reactor shutdown status

**CT – 2 Restore Feed to a Dry OTSG** - If a RCP is running, establish FW to the SG(s) and control FW flow to maintain RCS cooldown rate within limits. MFW flow is established at less than 200,000 LBM/HR total with condensate booster pump cooling (OP-TM-EOP-004, Attachment 1). If the crew enters OP-TM-EOP-009, HPI cooling, this critical task is still valid if they continue with booster pumps cooling. The crew may choose to use HPI COOLING exclusively in which case this critical task cannot be evaluated.

- Restoring Feed to a Dry OTSG (sustained) outside of the following limits should be considered **grounds for failure of the critical task**:
  1. To minimize OTSG stress, do not exceed MFW flow greater than 200,000 LBM/HR total flow in accordance with OP-TM-EOP-010, Rule 4(sustained).

**Safety Significance:**

If it is decided to perform the cooldown by using trickle feeding, it will be necessary to control the rate of FW addition to the SGs to maintain RCS cooldown limits. The FW flow rate should be adjusted to get the desired cooldown rate. If possible EFW should be used to limit SG thermal stresses. If MFW is used with the MFW nozzles, it will only be effective with forced flow.

Once heat transfer is restored in the SG, feed rates can be adjusted as necessary to control the cooldown and SG tube-to-shell  $\Delta T$ .

**Cues:**

1. Low SG level alarms
2. Low SG pressure alarms
3. Verbal alert by plant staff that no SG is available for heat transfer

**Performance Indicators:**

1. Operation of TBVs to maintain OTSG Pressure

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Scenario Set-up  
NRC Scenario 1

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2. Operation of Condensate and Feedwater valves to establish condensate booster pump cooling.

**Feedback:**

1. MFW flow
2. SG level and pressure
3. RCS pressure and temperature
4. Verbal alert by plant staff of MFW flow status

**CT – 3 Establish a Cooldown rate less than Guide 11 limits** – Depending on the crew actions during the “A” Main Feedwater Pump trip and/or the ATWS transients, the crew may have to enter OP-TM-EOP-009, HPI COOLING. In this case, the crew will transition from attempting to establish Condensate Booster Pump cooling to HPI cooling through the PORV. The crew will establish HPI cooling and transition to OP-TM-EOP-006 LOCA Cooldown. During the performance of this EOP the crew will initiate a cooldown within the limits of Guide 11, which will be 100 F/hr.

- The examinee must demonstrate the ability to not violate Guide 11 limits. The examinee must establish and maintaining a cooldown rate that results in incore temperature to lower 100F in an hour. Establishing and maintain a cooldown rate in excess of 100F/hr is **grounds for failure for this critical task**. The examiner should allow leeway if/when the crew established HPI cooling concurrently with Condensate Booster Pump cooling. The examinees can exhibit competency by maintaining proper FW flow and OTSG pressures in addition to having full HPI cooling.
- Not having ADEQUATE HPI (in accordance with Attachment 7.4 of OP-TM-211-901) flow during OP-TM-EOP-009 is **grounds for failure for this critical task**.

**Safety Significance:** When no source of feedwater is readily available, establishing cooling to the RCS is of the utmost importance. The crew must establish an adequate HPI flow and open the PORV for one form of cooling. In addition the crew must enter the LOCA Cooldown procedure and establish a cooldown rate. The crew may continue with and transition to Condensate Booster Pump cooling, which would also satisfy the requirements of this critical task.

**Cues:**

1. Adequate HPI verified
2. PORV Open
3. OP-TM-EOP-006, LOCA COOLDOWN procedure is entered.

**Performance Indicators:**

1. Cooldown Rate
2. PPC Plot
3. RCS Temperature

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Scenario Set-up  
NRC Scenario 1

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4. TBV position (if feedwater established)

**Feedback:**

1. Cooldown rate alarms
2. RCS temperature lowering greater than 100F/hr

**Industry Experience:**

- Harris Nuclear Plant Manual Scram Due to Loss of Feedwater (12/14/99)
- Oconee 1 Loss of Feedwater (5/26/00)

**PRA:** Feedwater Transient (Initiating Event)

Scenario Set-up  
NRC Scenario 1

<b>Event</b>	<b>Description</b>	<b>Procedure Support</b>
	Initial Set-up	85% Power, MOL
<b>1</b>	AH-E-18B Trips during surveillance	HVB 6-11
		T.S. 3.15.1.3
<b>2</b>	Uncontrolled Inward Rod Motion	OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset
		1102-4, Power Operations
<b>3</b>	MU-V-18 Fails Partially Closed	OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
		T.S. 3.3.2 and 3.6.6
<b>4</b>	“A” Main Feed Pump Trips, Manual runback required	OP-TM-MAP-H0101, Plant Runback
		OP-TM-621-471, ICS Manual Control
<b>5</b>	“B” Main Feed Pump trips, ATWS	OP-TM-EOP-001, Reactor Trip
<b>6</b>	EFW Pumps trip	OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
<b>7</b>	Condensate Booster Pump cooling	OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
<b>8</b>	HPI-PORV cooling (if required)	OP-TM-EOP-009, HPI Cooling, OP-TM-EOP-006, LOCA Cooldown

Scenario Set-up  
NRC Scenario 1

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-241	85% HFP ICS full AUTO	Equilibrium XENON
Trigger Event 1	Trigger: 0 Command: SET CH:630RCTC = True	Trips AH-E-18B
Malfunction RD10B	Value: Insert When: EVENT 2	Uncontrolled Inward Rod Motion
Malfunction MU06	Value: On When: EVENT 3	MU-V-18 fails as is
Override ZLOMUV18(1)	Value: Off When: EVENT 3	Dims MU-V-18 CLOSE indication
Monitor MUV18	Value: 0.01 When: When directed	MU-V-18 fails partially closed
Malfunction FW15A	Value: On When: EVENT 4	FW-P-1A Trips
Malfunction FW15B	Value: On When: EVENT 5	FW-P-1B Trips
Malfunction FW17	Value: Trip When: Immediately	Trips EF-P-1
Malfunction FWR78	Value: Manual When: Immediately	Local Control of MS-V-13A
Malfunction FWR79	Value: 0 When: Immediately	Closes MS-V-13A
Malfunction FWR80	Value: Manual When: Immediately	Local Control of MS-V-13B
Malfunction FWR81	Value: 0 When: Immediately	Closes MS-V-13B
Malfunction RD28	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD32	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD27A	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD27B	Value: Insert When: Immediately	ATWS Scenario Support
Remote FW18A	Value: Trip When: EVENT #5 with 3 min delay	Trips EF-P-2A

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Scenario Set-up  
NRC Scenario 1

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Remote FW18B	Value: Trip When: EVENT #5 w/ 8 min del	Trips EF-P-2B
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1. Start LO-P-8A/8B
2. Start AH-E-18B IAW 1303-5.5B, ensure a copy of the procedure for the students and ICO.
3. Ensure HVB-5-10 Annunciator Window is failed off
4. Place info tags on MS-V-13A/B and MS-V-10A/B for EF-P-1 being out of service.
5. Ensure Breakers for MS-V-13A/B are open.
6. Print 1104-19, pages 1-13, 32-34 to give to students when requested. Ensure a copy of the procedure is available for the ICO.
7. Include attachments of 1303.5.5B
8. Establish a critical parameter for reactor power (86% to 84% on NI-5)
9. Ensure OP-TM-401-473 and 473 (Manual Control of FW-P-1A/B) to step 4.1.2.
10. Have a copy of 1102-4 marked up for power at 85%.

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Event Description: AH-E-18B trip

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE:** When directed by the Lead Examiner: Initiate Event 1. If directed to investigate, report that AH-E-18B is hot to the touch.

**INDICATIONS AVAILABLE:** Alarm HVB 6-11, AH-E-18B red light turns off

**EXAMINER NOTE:** HVB -6-11 directs starting the opposite train of heating and ventilation. AH-E-17A should be started because AH-E-18B is running. If AH-E-17B is started ensure proper time has elapsed for dampers to close.

OP-TM-AOP-034, LOSS OF CONTROL BUILDING COOLING may be entered which will direct the starting of a control tower fan. This procedure is not necessary, but is an alternate path.

Examinee may partial out surveillance procedure to ensure ventilation is properly shutdown and/or restored.

#### HVB-6-11, Heating and Ventilation Panel Annunciator B

ARO

Step 3: For systems with redundant components

- SHUTDOWN in-service train and START standby train.
- INITIATE investigation into the cause of the fan trip.

#### 1104-19, Control Building Ventilation System, Section 3.7.2.2

ARO

Step 1: Plant Announcement for shifting control building ventilation.

ARO

Step 2: Verify no fire alarms on H&V A and H&V B.

ARO

Step 3: Starts AH-E-19A (H&V panel) by taking the extension control in the clockwise direction until the red start light is illuminated.

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Event Description: AH-E-18B trip

Time	Position	Applicant's Actions or Behavior
	ARO	Step 4: Starts AH-E-17A (H&V panel) by taking the extension control in the clockwise direction until the red start light is illuminated
	ARO	Step 5: Verifies AH-E-95A (H&V panel) starts automatically. Examinee will verify the red light is illuminated above AH-E-95A.
	ARO	Step 6: Depress and Hold "AH-D-28/617 RESET PB" on H&V Panel and START AH-E-20A or AH-E-20B.
	ARO	Step 7: Release RESET PB when AH-D-28/617 OPEN as indicated by ESAS indication on PCR or white open light on H&V Panel.
	ARO	Step 8: Select either AH-E-93A/94A or AH-E-93B/94B for operation at H&V panel. Fans may not immediately start depending upon ambient temperature of the "Patio" area
	ARO	Step 9: Dispatches an NLO to start AH-E-21
<b>EXAMINER NOTE: Step 10 is N/A</b>		
	ARO	Step 11: Dispatches an NLO to start AH-E-26
<b>EXAMINER NOTE</b>	<b>The CRS should refer to Technical Specification 3.15.1.3:</b> <i>From and after the date that one control room air treatment system is made or found to be inoperable for reason other than 3.15.1.2d, or if the inoperable system of 3.15.1.3 cannot be made operable in 7 days, irradiated fuel handling operations shall be terminated in 2 hours and reactor shutdown shall be initiated and the reactor shall be in COLD SHUTDOWN within 48 hours.</i>	
<b>EXAMINER NOTE:</b>	<b>Once ventilation is restored and the Technical Specification is identified, go to Event 2.</b>	



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Event Description: Uncontrolled Inward Rod Motion

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: When directed by the Lead Examiner: Initiate Event 2.**

**INDICATIONS AVAILABLE:** Rods indicating inward motion on the Position Indication Panel and the Diamond station, a rapid lowering of RCS pressure, Reactor Power lowering, and changes in indications at multiple ICS stations.

**EXAMINER NOTE:** The crew may elect to place the SG/Rx Demand Station to Hand IAW OP-TM-621-471.

	Crew	Diagnoses uncontrolled inward rod motion.
	CRS	DIRECTS entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
<b>OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET</b>		
	URO	Step 2.1 ( <b>IMA</b> ): Places the Diamond Station in Manual by pressing the Manual/Auto pushbutton on the Diamond Panel and observing the Manual light is lit and the Auto light is not lit (CC).
	URO/ARO	Step 2.2 ( <b>IMA</b> ): Places SG "A" FW Demand and SG "B" FW Demand ICS Stations in HAND by pressing the HAND pushbuttons on each ICS Station and verifying the white HAND lights are lit and the red AUTO lights are not lit on the selected ICS stations (CC).
	URO	Step 2.3 ( <b>IMA</b> ): Verifies Turbine Header Pressure is between 835 and 935 psig as read on the Turbine Header Pressure digital indication (CL)

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Event Description: Uncontrolled Inward Rod Motion

Time	Position	Applicant's Actions or Behavior
	URO	<p>Step 2.4 (<b>IMA</b>): Verifies RCS Pressure is lowering and/or less than 2205 PSIG by observing RCS pressure meters (CC and PC).</p> <p>As required, if RCS Pressure is &gt;2205 psig, URO places RC-V-1 control in Manual (CC), opens RC-V-1 fully by pressing the open pushbutton and observing the red open light lit and the green closed light not lit (CC), and then places RC-V-1 control back to AUTO.</p>
<b>EXAMINER'S NOTE: OP-TM-AOP-070, steps 3.1 and 3.2 are IAAT's that should not be applicable during this Event.</b>		
	CRS	Step 3.3: Verifies the Main Turbine is reset by observing it on-line (CL).
	CRS	Step 3.4: Assigns manual control responsibilities and control bands as follows:
	URO	Step 3.4: INSERT or WITHDRAW rods to maintain Reactor power within 1% of current power level by operating the Control Rod switch on the Diamond Panel as applicable (CC).
	ARO	Step 3.4: Adjust FW Flow to maintain Tavg within 2 °F of current temperature by adjusting SG "A" FW Demand and SG "B" FW Demand ICS Station toggle switches as applicable (CL and CC).
	ARO	Step 3.4: Maintain Turbine Hdr Pressure within 10 psig of current pressure by adjusting Turbine Load Set Station demand as applicable (CC).
	ARO	Step 3.5: Announce over the plant page and radio: "A plant upset has occurred. Reactor power is currently XX%. AOP-070 has been entered."
	CRS	Step 3.6: Initiates 1102-4, Power Operations.

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Event Description: Uncontrolled Inward Rod Motion

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.7: Ensures SG/Reactor Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Ensures Reactor Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Ensures SG A/B Load Ratio Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Observes that the ULD ICS Station is already in HAND by the white HAND light being lit.
	CRS	Step 3.8: Verifies that MFW Pumps are controlling FW Valve dP greater than 30 psid
<b>EXAMINER'S NOTE: OP-TM-AOP-070, step 3.9 is N/A and 3.10 has already been verified.</b>		
	ARO	Step 3.11: Maintains RCS pressure between 2105 and 2205 psig by adjusting SG "A" FW Demand and SG "B" FW Demand ICS Station toggle switches as applicable as applicable (CL and CC).
	ARO	Step 3.12: Maintains RCS Tavg 578 to 580 °F, and controls RCS $\Delta T_c < 5^\circ \text{F}$ by adjusting SG "A" FW Demand and SG "B" FW Demand ICS Station toggle switches as applicable as applicable (CL and CC).
<b>EXAMINER'S NOTE: OP-TM-AOP-070, steps 3.13 and 3.14 are N/A.</b>		
<b>EXAMINER NOTE: Once the appropriate stations from OP-TM-AOP-070 have been placed in HAND and the plant is stable, Go to Event 3</b>		

Op Test No.: TMI2019 Scenario # 1 Event # 3

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Event Description: MU-V-18 fails partially closed

Time	Position	Applicant's Actions or Behavior
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**EXAMINER NOTE: EVENT 3 should be inserted before PZR level is above 220".**

**BOOTH CUE:** When directed by the Lead Examine to initiate event #3, insert Event #3 and make monitor point MUVMOV18 = 0.01. Ensure the MU-V-18 green indication light becomes dim to indicate the breaker tripped.

**INDICATIONS AVAILABLE:** Lowering level on Pressurizer indicators (CC), MAP G-0205 in alarm (if Pressurizer level falls to 200"), green closed light lit on MU-V-18 (CC). ES status board will indicate MU-V-18 is open. Makeup flow to RCS will be reduced. MAP F0105, RCP SEAL TOT INJECT FLOW HI/LO may come in due to response from other malfunctions.

	Crew	Diagnoses MU-V-18 closed. The crew may attempt to open MU-V-18.

Op Test No.: TMI2019 Scenario # 1 Event # 3

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Event Description: MU-V-18 fails partially closed

Time	Position	Applicant's Actions or Behavior
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**EXAMINER'S NOTE:** The CRS may enter alarm response based on "approaching" criteria, as described in OS-24:

### 3.2 APPROACHING:

The parameter is trending toward the setpoint or limit, and based on its trend and plant conditions it is likely that the parameter will reach the setpoint or limit.

#### 4.1.14 Guidance on using APPROACHING

A. If it is clear that the plant trend is going to reach a setpoint requiring action, Shift Management may elect to perform the action before the setpoint is reached. This applies to EOP and AOP entry, safety system actuation, and the performance of emergency response procedure steps.

**BOOTH CUE:** If asked to investigate MU-V-18, report that MU-V-18 looks partially open and you are unable to determine cause.

**BOOTH CUE:** If asked to take manual control of MU-V-18, report back to them that the handwheel is bent.

**BOOTH CUE:** If asked to investigate the MU-V-18 breaker, report back that the breaker is tripped with no indication on cause of the failure. If asked to close the breaker, inform them the breaker will not close.

	CRS	Directs entry into OP-TM-MAP-G0205, PZR LEVEL HI/LO

**EXAMINER'S NOTE:** Step 4.1 is N/A.

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#### OP-TM-MAP-G0205, PZR LEVEL HI/LO

	CRS	Step 4.2: If PZR level cannot be restored with automatic or manual control of MU-V-17, then INITIATE OP-TM-EOP-010, Guide 9.

**EXAMINER'S NOTE:** Sections A and B are N/A.

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#### OP-TM-EOP-010, Guide 9, RCS Inventory Control

Op Test No.: TMI2019 Scenario # 1 Event # 3Page **19** of **35**

Event Description: MU-V-18 fails partially closed

Time	Position	Applicant's Actions or Behavior
	URO	Step C.1: Verifies MU-P-1B is operating by observing red light lit, green light not lit, and amps in the green band of the ammeter (CC).
	URO	Step C.2: Ensures MU-V-5 is Closed by placing the MU-V-5 Bailey Controller toggle switch in the downward direction until the MU-V-5 indication is at zero (CC).
<b>EXAMINER'S NOTE: Steps C.3 through C.5 are either not possible to accomplish (e.g. Open MU-V-18) or will be ineffective due to MU-V-18 being closed.</b>		
<b>EXAMINER'S NOTE: The URO will NOT use MU-V-16D to ensure makeup flow due to valve lineup within the Makeup System. MU-V-16D is a component in the "B" HPI Train and there is no associated pump running and no discharge path lined up for flow to get to the Pressurizer. The URO will therefore be required to throttle MU-V-16B.</b>		
	URO	Step C.6 RNO: Throttles MU-V-16B by pressing the red open pushbutton, green close pushbutton, and white stop pushbutton associated with MU-V-16B (CC) as necessary to ensure proper makeup flow, as indicated on the HPI flow indicator for MU-V-16B. (CC).
	URO	Step C.7 and C.8: Verify PZR level is being restored by observing rising level on Pressurizer level indicators (CC) and/or the PPC.
<b>EXAMINER NOTE:</b> According to OP-TM-211-000, step 4.6, manual operation of MU-V-18 defeats the ES automatic closure of the valve. MU-V-18 is also a containment isolation valve. Comply with tech spec 3.3.2 and 3.6.6 respectively. Manual operation is equivalent to MU-V-18 failing partially closed in the aspect that the system designated to close the valve will not put the valve in the required (closed) position.  Tech spec 3.3.2 and 3.6.6 are both shutdown LCO's of 72 hours and 48 hours, respectively.		

Op Test No.: <u>TMI2019</u> Scenario # <u>1</u> Event # <u>3</u>			Page <b>20</b> of <b>35</b>
Event Description: MU-V-18 fails partially closed			
Time	Position	Applicant's Actions or Behavior	

<b>EXAMINER'S NOTE:</b> Once Pressurizer level is recovering and makeup flow is being controlled, Go to Event 4.			

Op Test No.: TMI2019 Scenario # 1 Event # 4Page **21** of **35**

Event Description: FW-P-1A trips, manual runback required

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: When directed by the Lead Examiner: Initiate Event 4.**

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**INDICATIONS AVAILABLE: Main Annunciator Panel alarms M-1-1 and H-1-1 actuate, FW-P-1A indicate zero RPMs.**

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	Crew	Diagnoses FW-P-1A tripped and that a manual runback is required.
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**OP-TM-MAP-M0101, FWP 1A Trip**

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**EXAMINER NOTE: Crew will be required to run the plant back manually due to ICS being in HAND control. Those steps are listed on the next page.**

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	ARO	Step 4.2: Ensure plant runback and determine cause of trip.
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	ARO	Step 4.3: Ensure LO-P-8A running by the red running light lit, green light not lit (CL).
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	ARO	Step 4.4: Ensure FW-V-1A Closed by the red closed light lit, green open light not lit (CL).
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**OP-TM-MAP-H0101, ICS Runback**

	URO	Step 4.1: Ensure NI power is reduced to below the limit for the runback condition. If ICS manual control is required, then initiate OP-TM-621-471, ICS Manual Control.
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**EXAMINER NOTE: Crew will run the plant back to 560 MWe ( $\approx$  68% NI power) for a loss of 1 MFP. Actual reactor power may vary due to plant efficiencies.**

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	INFO	Step 4.2: INITIATE 1102-4 for power reduction.
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Op Test No.: TMI2019 Scenario # 1 Event # 4Page **22** of **35**

Event Description: FW-P-1A trips, manual runback required

Time	Position	Applicant's Actions or Behavior
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**1102-4, Power Operation**

	CRS	Step 3.3.2.A.1: Perform Enclosure 2A (for an emergency (forced) power reduction INITIATE Enclosure 2A).
	ARO	Step 3.3.2.A.2.a): MAINTAIN Generator Reactive Load IAW OP-TM-301-472.
<b>Examiner Note: Step 3.3.2.A.2.b is N/A.</b>		
	CRS	Step 3.3.2.A.2.c): If SG/REACTOR DEMAND is in HAND, then REDUCE reactor power IAW OP-TM-621-471 "ICS Manual Operations".
<b>OP-TM-621-471 "ICS Manual Operations"</b>		
<b>Examiner Note: Steps 4.2.1 through 4.2.3 have already been accomplished in an earlier event.</b>		
	URO/ARO	<p>Step 4.2.4: 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:</p> <ol style="list-style-type: none"> <li>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%.</li> <li>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.</li> </ol>
<b>Examiner Note: 1102-4, Power Operation Step 3.3.2.A.2.d) is N/A.</b>		
<b>1102-4, Power Operation</b>		
	INFO	Step 3.3.2.A.2.e): PERFORM the actions per Enclosure 2B.

Op Test No.: <u>TMI2019</u> Scenario # <u>1</u> Event # <u>4</u>			Page <b>23</b> of <b>35</b>
Event Description: FW-P-1A trips, manual runback required			
Time	Position	Applicant's Actions or Behavior	

<b>EXAMINER'S NOTE:</b> Once sufficient reactivity manipulation has been observed and Reactor Power < 68%, go to Event 5.		

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **24** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE:** When directed by the Lead Examiner then initiate Event 5.**BOOTH CUE:** After the reactor trip announcement, perform the OS-24 post trip actions that the Auxiliary Operators normally perform.**Indications Available:** Alarm MAP M-1-7, RCS Pressure Rises, OTSG levels and Feedwater flow lowers, Change in feed water valve position.

	Crew	Diagnoses a loss of Feedwater and ATWS.

**EXAMINER NOTE** The URO will trip the reactor, as allowed by OS-24:

**4.2 Actions Not Described in Procedures**

**A. Licensed operators may take action without procedural guidance, and without taking a variance under the following conditions:**

☐ Initiating a manual reactor TRIP when a licensed operator believes the reactor is not in a safe condition.

☐ Action taken to directly compensate for the failure of an automatic system.

☐ Action to manually actuate a safety system when the automatic actuation setpoint is being approached.

**OP-TM-EOP-001, Reactor Trip**

	URO	Step 2.1 (IMA): Presses Both Reactor Trip and DSS pushbuttons (CC).

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **25** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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CT – 1	URO	<p>Step 2.2 (IMA): Verifies that the reactor is shutdown by <u>one</u> of the following:</p> <ol style="list-style-type: none"> <li>1. Power Range Nuclear Instrumentation indicates less than 5% (CC)</li> <li>2. All control rods are inserted (PC)</li> <li>3. Source Range count rate is continuously lowering (CC)</li> </ol> <p>RNO: <b>TRIP both 1G-02 and 1L-02.</b></p>
	URO	Step 2.3 (IMA): Presses the Turbine Trip pushbutton (CL)
	URO	Step 2.4 (IMA): Verifies the Turbine Stop valves are closed by observing the indication on CL.
<p><b>EXAMINER NOTE:</b> The initial symptom check will be negative, and the crew will work through the OP-TM-EOP-001 Follow Up actions. After EF-P-2B trips, a Lack of Primary-to Secondary Heat Transfer will be identified based on the following definition found in OS-24:</p> <p>One of the following sets of conditions:</p> <p><input type="checkbox"/> Incore temperatures rising and NO FEEDWATER available.</p> <p><b>EXAMINER NOTE:</b> EF-P-1 is OOS as part of the initial conditions. EF-P-2A breaker will trip in 3 minutes, followed by EF-P-2B breaker in 8 minutes.</p> <p><b>BOOTH CUE:</b> If asked to investigate, report that a breaker failure is the cause of both EF-P-2A and EF-P-2B pump trips.</p> <p><b>BOOTH CUE:</b> After the trips make communication to the control rooms per the OS-24, Attachment E: Primary Fire Brigade will report MSSV status and open AS-V-8, Secondary Fire Brigade will fire both Aux Boilers (which requires the Control Room to open CO-V-14A).</p>		

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **26** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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	ARO	Performs a Symptom Check, recognizes a Lack of Primary-to-Secondary Heat Transfer based on NO Main Feedwater and NO Emergency Feedwater due to no MFW or EFW pumps running.
	CRS	Announces entry into OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER.
<b>OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER</b>		
	URO	Step 3.1: Ensure no more than one RCP operating per loop by shutting down RC-P-1A or RC-P-1B and RC-P-1C or RC-P-1D by rotating the control switch for either pump clockwise, verifying the red light is lit, and the green light is not lit (CC).
<b>EXAMINER NOTE: The MFW and/or EFW will remain OOS for the duration of the scenario. The crew must use Condensate Booster Pump cooling or transition to HPI-PORV cooling.</b>		
	CRS	Step 3.2: Initiate OP-TM-424-901, "Emergency Feedwater".
	ARO	Step 3.3: Announces the reactor trip.
<b>EXAMINER NOTE: Steps 3.4-3.7 are N/A.</b>		
<b>EXAMINER NOTE:</b> (Alternate Path) If conditions are met for OP-TM-EOP-004 Step 3.8 the CRS will transition to OP-TM-EOP-009, HPI Cooling. (Pages 29-32) <i>b</i> <b>(Expected Path) If conditions are met for OP-TM-EOP-004, Step 3.9 the crew will attempt to feed the OTSGs with a Condensate Booster Pump IAW Attachment 1 of OP-TM-EOP-004.</b>		
	ARO	Step 3.8: IAAT RCS pressure approaches 2450 psig (or 529 psig if < 329°F), and feedwater is not available, then GO TO EOP 009 "HPI COOLING".

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **27** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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	CRS	<p>Step 3.9: If all of the following conditions are met:</p> <ul style="list-style-type: none"> <li>• A Condensate Booster Pump is On</li> <li>• At least one RCP is On</li> <li>• An OTSG is intact;</li> </ul> <p>then PERFORM Attachment 1, "OTSG Feed Using a Condensate Booster Pump", to the ARO.</p>
<b>OP-TM-EOP-004, ATTACHMENT 1, OTSG feed using a Condensate Booster Pump</b>		
	N/A	Step 1: IAAT EFW is recovered, then perform: N/A
	ARO	<p>Step 2: Ensures CLOSED the following:</p> <ol style="list-style-type: none"> <li>1. FW-V-16A by placing the FW-V-16A Bailey Station Controller to HAND by pressing the white HAND button, observing the white HAND light lit, red AUTO light not lit, and then lowering (if required) the toggle switch on the FW-V-16A Bailey Station until the valve position indicates zero (CC).</li> <li>2. FW-V-16B by placing the FW-V-16B Bailey Station Controller to HAND by pressing the white HAND button, observing the white HAND light lit, red AUTO light not lit, and then lowering (if required) the toggle switch on the FW-V-16B Bailey Station until the valve position indicates zero (CC).</li> </ol>
	ARO	Step 3: Maintains TSDT IAW Guide 14
<b>CT – 2</b>	ARO	Step 4: Opens FW-V-6 by pressing the red open pushbutton and observing the red open pushbutton lit, green closed pushbutton closed (CL).
<b>CT – 2</b>	ARO	Step 5: When OTSG Pressure < 750 psig, then defeats OTSG Lo-Lo Pressure MFW Isolation by pressing the Lo-Lo Pressure MFW Isolation bypass pushbuttons and observing the amber lights for each are lit (CC and CL).
<b>CT – 2</b>	ARO	Step 6: When OTSG Press <600 psig, then Feeds IAW Rule 4.

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **28** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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	ARO	Step 7: Throttle MS-V-3's to maintain OTSG Press 500-600 psig by adjusting the toggle switch on each Turbine Bypass Valve Bailey Station in either the upward or downward direction, as necessary, to maintain proper OTSG pressure.
<b>OP-TM-EOP-010, RULE 4, Feedwater Control</b>		
	ARO	Step 3: VERIFY the OTSG is not DRY.  RNO: If Primary to Secondary Heat Transfer is not available to either OTSG, then initiate FW as follows: If EFW is not available, then MAINTAIN MFW flow < 0.2 Mlb/HR / OTSG.
<b>OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer</b>		
	N/A	Step 3.11: IAAT OTSG pressure < 750 psig, then DEFEAT HSPS Lo-Lo Pressure MFW Isolation.
	URO	Step 3.12: IAAT all RCPs are Off, then INITIATE Guide 7, "RCP Restart".
	ARO	Step 3.13: REDUCE OTSG Pressure so that secondary Tsat is 40 to 60°F lower than incore thermocouple temperature.
<b>EXAMINER NOTE: Step 3.14 is N/A</b>		
	ARO	Step 3.15: REDUCE OTSG Pressure so that secondary Tsat is 90 to 100°F lower than incore thermocouple temperature.
<b>CT – 2</b>	ARO	Step 3.16: RAISE OTSG level to 75 to 85% Operate Range with EFW.
<b>OP-TM-EOP-010, RULE 4, Feedwater Control</b>		
	N/A	Step 1: If EFW is actuated, then VERIFY two or more EFW pumps are running.

Op Test No.: TMI2019 Scenario # 1 Event # 5/6 Page **29** of **35**

Event Description: FW-P-1B Trip, ATWS, Entry into OP-TM-EOP-001, and then EOP-004

Time	Position	Applicant's Actions or Behavior
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	ARO	Step 2: Verify SCM > 25°F For OTSG level between 75 to 85% Operating Range Level by observing that SCM is greater than 25°F on the PPC.
<b>CT – 2</b>	ARO	Step 3: Verify the OTSG is not dry. RNO: If Primary to Secondary Heat Transfer is not available to either OTSG, then initiate FW as follows: <ul style="list-style-type: none"> <li>- If EFW is not available, then MAINTAIN MFW flow &lt; 0.2 Mlb/HR / OTSG.</li> </ul> END

**EXAMINER NOTE:** The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.



Op Test No.: TMI2019 Scenario # 1 Event # Alt PathPage **30** of **35**

Event Description: Alternate path to OP-TM-EOP-009 and OP-TM-EOP-006

Time	Position	Applicant's Actions or Behavior
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**OP-TM-EOP-009, HPI COOLING**

	URO	Step 3.1: IAAT SCM < 25°F, then perform the following: 1. PERFORM Rule 1 2. CONTINUE with EOP-009
	URO	Step 3.2: Ensure RC-V-2 is OPEN by the red light lit, green light not lit (CC).
	URO	Step 3.3: Initiates 4 psig ESAS IAW OP-TM-642-902, "4 psig ESAS Actuation" by pressing the "A" and "B" train 4# ESAS manual pushbuttons (CC/CR)
	URO	Step 3.4: Verifies ADEQUATE HPI
	URO	Step 3.5: Shuts down all but one RCP
	URO	Step 3.6: Opens the PORV
	URO	Step 3.7: Verifies flow through the PORV
	URO	Step 3.8: Requests SM to Evaluate EALs
	URO	Step 3.9: De-energizes all pressurizer heaters
	CRS	Step 3.10: Verifies there is < 25F superheat
	ARO	Step 3.11: Verifies no OTSG Tube leakage exists
	CRS	Step 3.12: GO TO EOP-006

**OP-TM-EOP-006 LOCA COOLDOWN**

Op Test No.: TMI2019 Scenario # 1 Event # Alt PathPage **31** of **35**

Event Description: Alternate path to OP-TM-EOP-009 and OP-TM-EOP-006

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.1: Ensures 4 psig ESAS
	CRS/URO	Step 3.2: Initiates: <ul style="list-style-type: none"> <li>• OP-TM-211-901 "Emergency Injection HPI/LPI"</li> <li>• OP-TM-244-901 "Containment Isolation"</li> <li>• OP-TM-534-901 "RB Emergency Cooling"</li> </ul>
	URO	Step 3.3: Ensures HPI and LPI are operating IAW Rule 2
	URO	Step 3.4: Verifies Core Flood levels are > 2 ft and ENSURES CF-V-1A and CF-V-1B are open
	CRS/ARO	Step 3.5: Verifies that containment pressure has not exceed 30 psig.
	ARO	Step 3.6: Dispatches an operator to initiate 1105-18 for the containment hydrogen monitors.
	ARO	Step 3.7: Initiates OP-TM-826-901 to put control tower on emergency recirculation.
	CRS	Step 3.8: Verifies there is < 25F superheat.
	URO	Step 3.9: Initiates Guide 20
	ARO	Step 3.10: Ensures performance of an alarm review.
	CRS	Step 3.11: Request SM to evaluate EALs
	ARO	Step 3.12: Verifies both G1-02 and G11-02 are CLOSED
	URO	Step 3.13: Initiates Rule 5 to emergency borate.

Op Test No.: TMI2019 Scenario # 1 Event # Alt PathPage **32** of **35**

Event Description: Alternate path to OP-TM-EOP-009 and OP-TM-EOP-006

Time	Position	Applicant's Actions or Behavior
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	CRS/URO	Step 3.14: IAAT to initiate transfer to RB sump recirculation, which is not applicable in this scenario.
	CRS	Step 3.15: IAAT for LPI flow which is not applicable in this scenario.
<b>EXAMINER NOTE: Condensate Booster Pump cooling should have been established by this point. Expected cooldown rate will be &gt; 40F</b>		
	Crew	Step 3.16: IAAT for Inadequate RCS cooldown. Not applicable in this scenario.
	CRS	Step 3.17: IAAT does not apply for this scenario.
<b>CT - 3</b>	CRS/ARO	Step 3.18: Initiate RCS cooldown within Guide 11, "Cooldown Rate Limits"
	ARO	Step 3.19: ENSURE OTSG pressure is being controlled IAW Guide 6.
	URO	Step 3.20: Maintain minimum SCM IAW Guide 8, "RCS Pressure Control"
	CRS	Step 3.21: IAAT applies to GO To HPI COOLING Recovery (OP-TM-EOP-009 section 5.0)
<b>OP-TM-EOP-009, Section 5.0 Recovery from HPI Cooling</b>		
	URO	Step 5.1: Maintain SCM between 50F and 70F by throttling HPI
	ARO	Step 5.2: Initiates OP-TM-211-950 "Restoration of letdown flow"
	ARO	Step 5.3: Ensures TBV/ADVs are controlling OTSG pressure at desired setpoint

Op Test No.: <u>TMI2019</u> Scenario # <u>1</u> Event # <u>Alt Path</u>			Page <b>33</b> of <b>35</b>
Event Description: Alternate path to OP-TM-EOP-009 and OP-TM-EOP-006			
Time	Position	Applicant's Actions or Behavior	

	CRS	Step 5.4 Verify OTSG level is at or above setpoint IAW Rule 4
<b>EXAMINER NOTE:</b> The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.		

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## Initial Conditions:

- 85% power, MOL, as ordered by load dispatcher
- AH-E-18B is running for a surveillance (1303-5.5B)
- EF-P-1 is OOS for the next 24 hours
- Main Feedwater Pumps in Manual

## Turnover:

- Maintain 85% power

Facility:	Three Mile Island	Scenario No.:	2	Op Test No.:	<u>TMI2019</u>
Examiners:	_____	Operators:	_____	_____	_____
Initial Conditions:	<ul style="list-style-type: none"> <li>28% power</li> <li>RC-P-1B ready to start after an oil leak</li> <li>NI-8 OOS due to a failed power supply</li> <li>RPS Channel 'D' is in manual bypass, RPS logic is 2 out of 3 to trip</li> </ul>				
Turnover:	Start RC-P-1B (interlock checks are not required) and maintain current power until maintenance has completed RCP leak checks				
Critical Tasks:	<ul style="list-style-type: none"> <li>Isolate OTSG SG(s) (CT-17)</li> <li>Control HPI (CT-5)</li> </ul>				
Event No.	Malf. No.	Event Type*	Event Description		
1		N CRS N ARO	Start RC-P-1B IAW OP-TM-226-102 (ARO: Start RCP)		
2	RCR42 RCR43	I CRS I URO	Pressurizer Spray Valve Failure (URO: Closes spray block valve)		
3	NI15B	TS CRS C ARO	NI-6 failure (fails low) (ARO: Places RPS channel 'B' in tripped state)		
4	RD0117	TS CRS C URO	Dropped rod group 7 (URO: Recovers dropped rod)		
5	MS02A	C CRS R URO C ARO	Steam leak in RB entry into OP-TM-AOP-051 and 1102-4 (URO: Lower power, ARO: RB Emergency Cooling)		
6	MS02A	M CRS M URO M ARO	Steam line rupture in RB, Reactor Trip, OP-TM-EOP-003, XHT entry.		
7	FW19A	C CRS C ARO	EF-V-30A fails open, entry into OP-TM-424-901 (ARO: Closes EF-V-2A, secures EF-P-2A)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

### **Three Mile Island NRC Scenario #2**

**Event #1:** When the crew has accepted the watch they will perform OP-TM-226-102, Start RC-P-1B. The turnover will inform the crew to stay at the current power level to allow maintenance to perform RCP checks.

Once RC-P-1B has been started, the scenario can continue.

**Event #2:** Once the RC-P-1B is started, the lead examiner will cue Event #2. The pressurizer spray valve will open when pressure is above 2125 psig, and will close at 2000 psig.

Since normal RCS pressure is 2155 psig, the crew should enter OP-TM-MAP G0308 on approaching (alarm setpoint is 2055 psig).

A malfunction of the spray valve is suspected, the URO will be directed to close RC-V-3 may place an EST on it.

**Event #3:** The Lead Examiner will cue the failure of Nuclear Instrument, NI-6.

The crew will diagnose the failure of Nuclear Instrument, NI-6 by Annunciator H-3-2, SASS Mismatch (comparison between NI-5 and NI-6) in alarm, PPC point A0621 in alarm, and NI-6 console indication reading LOW (CC).

The URO will ensure the plant is stable.

The CRS will identify and declare the following Tech Spec: 3.5.1.3:

The reactor shall not be in a startup mode or in a critical state unless the requirements of Table 3.5-1, Column "A" and "B" are met, except as provided in Table 3.5-1, Column "C". Specification 3.0.1 applies.

TABLE 3.5-4  
REMOTE SHUTDOWN SYSTEM INSTRUMENTATION AND CONTROLS

Function Unit	(A) Minimum Operable Channels	(B) Minimum Degree of Redundancy	(C) Operator Action if Conditions of Column A and B Cannot be Met
Power range instrument channel	2	1	(a)

(a) Restore the conditions of Column (A) and Column (B) within one hour or place the unit in HOT SHUTDOWN within an additional 6 hours.

The ARO should place the 'B' RPS channel in a tripped state to meet the minimum degree of redundancy.



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Scenario Set-up  
NRC Scenario 2

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Once the Tech Spec has been declared, the scenario can continue.

**Event #4:** Once the Tech spec is declared. The lead examiner will cue the dropped group 7 control rod.

The PIP will indicate Group 7, Rod 1 has fallen into the core.

The crew will enter OP-TM-AOP-062, and recover the dropped control rod. The crew should recover the rod use the automatic latch function to recover the rod.

Once the rod is recovered, the scenario can continue.

**Event #5:** The lead examiner will cue the steam leak in the reactor building.

The crew must identify changing atmospheric conditions in the reactor building and take action to identify the source of the leak (RCS, Steam, or Feedwater). Due to OTSG pressure lowering slightly, and counts on RM-A-2 NOT rising the crew will deduce it is a steam and enter OP-TM-AOP-051, SECONDARY SIDE HIGH ENERGY LEAK.

The crew will enter the section for a leak in the reactor building, which require them to place RB emergency cooling in service and shutdown the reactor.

When the RB Emergency Cooling is placed into service, the scenario can continue.

**Event #6:** The lead examiner will cue the Steam Rupture on the "A" OTSG which will cause RB pressure to approach then exceed 2 psig. The crew must trip the reactor and perform the IMA's of EOP-001. The steam leak will cause an Excessive Heat Transfer condition. An excessive heat transfer event is a challenge to the reactor coolant system pressure boundary. This fission product barrier challenge is greatest if RCS pressure is not controlled when the cooldown is terminated. The sequenced priorities of mitigation are:

- Stop excessive primary-to-secondary heat transfer,
- Restore controlled primary-to-secondary heat transfer,
- Stabilize RCS pressure and temperature,

Immediate action is initiated to terminate the overcooling and ensure pressurizer level is maintained. Loss of pressurizer inventory may result in a loss of SCM or less severe challenges to RCS pressure control. Isolating feedwater to the affected OTSG terminates excessive primary to secondary heat transfer. Isolating steam paths may further limit the overcooling or may allow continued use of the OTSG for plant cooldown. Control of RCS pressure after terminating an overcooling is dependent upon two independent actions (1) steaming the unaffected OTSG to prevent RCS temperature rise, and (2) throttle/terminate MU/HPI avoid raising pressurizer level above the desired post trip band (~ 100")

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Scenario Set-up  
NRC Scenario 2

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The crew will diagnose the Steam Rupture based on multiple alarms, lowering RCS pressure and temperature, and lowering Pressurizer level.

The crew will diagnose the excessive heat transfer based on all of the following conditions existing (or being approached):

- RCS average temperature is below 540°F,
- Uncontrolled lowering of RCS temperature,
- Tsat for OTSG pressure is less than Tcold for the affected OTSG(s),

The CRS will enter OP-TM-EOP-003, EXCESSIVE PRIMARY TO SECONDARY HEAT TRANSFER. The ARO will isolate the “A” OTSG. Once the “A” OTSG is isolated, the URO will terminate HPI IAW Rule 2.

An alternative path may be to isolate the OTSG via OP-TM-EOP-001, REACTOR TRIP. The crew may opt to wait until RCS average coolant temperature is below 540°F to enter OP-TM-EOP-003. In which case, containment pressure could be greater than 2 psig (Step 3.16 of OP-TM-EOP-001) and the ‘A’ OTSG is isolated in that step.

In this case, all critical tasks will still be met.

**Events #7:** While trying to isolate the ‘A’ OTSG, EF-V-30A (EFW Control Valve to ‘A’ OTSG) fails open. The consequences of EF-V-30A failing open allowing flow to an OTSG that is experiencing excessive heat transfer is that an uncontrolled cooldown will occur.

Immediate attempts to close the EF-V-52A (EF-V-30A Block Valve), the ARO must close EF-V-2A (EFW discharge cross connect) to split EFW, and secure EF-P-2A until the EF-V-52A is closed.

Once the EF-V-52A is closed, the ARO will start EF-P-2A and open EF-V-2A to restore normal EFW.

**Termination:** The scenario can be terminated when the “A” OTSG has been isolated, the “B” OTSG is being fed IAW Rule 4, and HPI has been terminated.

**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.**

- Controlling HPI outside of the following limits should be considered **grounds for failure of the critical task**:
  - Do not cause a loss of subcooling margin limiting HPI flow.
  - Maintain RCS Pressure below the PORV setpoint of 2450 psig.

**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)

**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 HPI/MU pump start switches
2. Operation of associated FW pump and valve controls (affected OTSG)
3. Operation of associated steam valve (included TBVs/ADV's) 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

Scenario Set-up  
NRC Scenario 2

Event	Description	Procedure Support
	Initial Setup	28% Power, MOL Perform 1102-4 for power reduction to 28% Place RPS "D" in Manual Bypass. Provide OP-TM-226-102 markup to 4.11 Provide copy of OP-TM-641-455
1	Start RC-P-1B	OP-TM-226-102, Start RC-P-1B with prerequisites signed off.
		OP-TM-226-000, Reactor Coolant Pumps
		OP-TM-MAP-H0302, SASS Mismatch
2	Pressurizer Spray Valve Failure	OP-TM-MAP-G0308, RC Press Narrow RNG HI/LO
3	Nuclear Instrument, NI-6, Failure	OP-TM-641-421, Tripping and Resetting RPS Channels
		Technical Specifications
4	Dropped Group 7 control rod	OP-TM-AOP-062, Inoperable Rod
5	Steam Leak in RB	OP-TM-AOP-051, Secondary Side High Energy Leak
		OP-TM-621-471, ICS Manual Control
		1102-4, Power Operations
6	Steam Line Rupture	OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
7	EF-V-30A fails open	OP-TM-424-901, Emergency Feedwater

Scenario Set-up  
NRC Scenario 2

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC - 242	28% HFP ICS full AUTO	Equilibrium XENON
RC-P-1B	Value: Pull-To-Lock When: Immediately	RCP Initial Setup
RC-P-2B-1	Value: Normal After Start When: Immediately	RCP Initial Setup
RC-P-2B-2	Value: Normal After Stop When: Immediately	RCP Initial Setup
RC-P-3B-1	Value: Normal After Start When: Immediately	RCP Initial Setup
RC-P-3B-2	Value: Normal after Stop When: Immediately	RCP Initial Setup
Turn off NI-8 by using power switch in 'D' RPS Cabinet	Value: OFF When: Immediately	NI-8 Scenario Support
Malfunction RCR42	Value: 2125 When: Event #2	Pressurizer Spray Valve Failure – Open Setpoint
Malfunction RCR43	Value: 2000 When: Event #2	Pressurizer Spray Valve Failure – Close Setpoint
Malfunction NI15B	Value: Insert When: Event 3	NI-6 Failure
Malfunction RD0117	Value: Insert When: Event 4	Dropped control rod group 7
Malfunction MS02A	Value: 0.4 When: Event 5	Steam Leak in the Reactor Building
Malfunction FW19A	Value: 100 When: EVENT 6	EF-V-30A fails open
Trigger #6	Value: MMF MS02A 20 60	Modifies Malfunction to get XHT.
Trigger #10	Value: zdiardcps1(7) When: dmf rd0117	Deletes dropped rod

1. Place an EST on NI-8
2. Make PPC Point A0964 to 0.0 and thx10111(2) to 0.57 to satisfy the procedural requirements to start RC-P-1B
3. Markup OP-TM-226-102 to step 4.11 for starting RC-P-1B
4. Ensure MU-V-17 is controlling at 220"
5. Prepare copy of OP-TM-641-455 and complete Main Body Section (up to and including step 4.2) and blank OP-TM-641-421.
6. Prepare Copy of 1102-4 for plant status

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Event Description: Start RC-P-1B

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: There is no malfunction to enter for Event 1.****Indications Available: N/A**

	CRS	Acknowledges the direction to start RC-P-1B.

**OP-TM-226-102, Start RC-P-1B**

	ARO	Step 4.10: Brings up RC-P-1B PPC points – Area 5 Groups 10 and 11 to monitor on the PPC.
	ARO	Step 4.11: Verifies the following: <ul style="list-style-type: none"> <li>- PPC point L2876, RC-P-1B Reverse Rotation, is normal.</li> <li>- and L2795, RC-P-1B Backstop Oil Flow-Lo, are both normal.</li> </ul>

**EXAMINER NOTE: Step 4.12 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**

	ARO	Step 4.12: Interlock checks are not desired
	ARO	Step 4.13: After the Lift and Backstop pumps have been operating > 60 seconds, starts RC-P-1B by rotating the control switch clockwise, observing red running light lit and green secured light not lit (CC).
	ARO	Step 4.14: Verifies that RC-P-1B amps are normal and steady and then secures the running RC-P-2B and RC-P-3B pumps by rotating the applicable control switches counter-clockwise, observing red running light not lit and green secured light lit for each(CC).

**EXAMINER NOTE: After RC-P-1B is running, then GO TO Event 2.**

Op Test No.: TMI2019 Scenario# 3 Event # 2Page **10** of **27**

Event Description: Pressurizer Spray Valve Failure

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: When directed by the Lead Examiner: Initiate Event 2.**

**Indications Available:** Spray Valve indicates open on CC with pressure below normal setpoint, RCS Pressure lowering, MAP alarm G0308 comes in at 2055 psig

	Crew	Diagnoses spray valve is open below normal setpoint
	CRS	DIRECTS entry into OP-TM-MAP-G0308. The CRS can wait for the alarm, or use approaching criteria.

**OP-TM-MAP-G0308, Step 4.2.1 is N/A****OP-TM-MAP-G0308, Step 4.2**

	URO	Substep 2: Ensure Spray Valve (RC-V-1) is closed. The URO will place the spray valve in MANUAL and press the closed pushbutton.
	URO	Substep 3: IF failure of RC-V-1(Spray Valve) is suspected, then CLOSE RC-V-3 Pressurizer Spray Line Isol Valve as required. The URO may close the spray block valve.

**OP-TM-MAP-G0308, Step 4.2.4 – 7 are N/A**

	CRS	Substep 8: If RC-V-3 is Closed, then place an EST on RC-V-3. The CRS will retrieve an EST from the drawer, and direct the URO to place it on RC-V-3 on CC.

**EXAMINER NOTE: Once RC-V-1 is closed, then GO TO Event 3.**



Op Test No.: TMI2019 Scenario# 3 Event # 3

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Event Description: NI-6 Failure

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE:** When directed by the Lead Examiner, INITIATE Event 3.

**Indications Available:** NI-6 Power reads 0 (CC), NI-6 Imbalance reads 0 (CC), PPC Point A0621 in alarm.

	Crew	Diagnoses loss of NI-6, performs a stability check.

**BOOTH CUE:** If requested for information, state that the instrument (NI-6) will take 4 hours to repair.

	CRS	Declares a 3.5.1.3 (1 Hour) Tech Spec clock.

**EXAMINER NOTE:** T.S. 3.5.1.3: In the event the number of protection channels operable falls below the limit given under Table 3.5-1, Column "A" operation shall be limited as specified in Column "C". Specification 3.0.1 applies.

**TABLE 3.5-4  
REMOTE SHUTDOWN SYSTEM INSTRUMENTATION AND CONTROLS**

Function Unit	(A) Minimum Operable Channels	(B) Minimum Degree of Redundancy	(C) Operator Action if Conditions of Column A and B Cannot be Met
Power range instrument channel	2	1	(a)

**Table 3.5-1 Action (a):** Restore the conditions of Column (A) and Column (B) within one hour or place the unit in HOT SHUTDOWN within an additional 6 hours.

Op Test No.: TMI2019 Scenario# 3 Event # 3Page **12** of **27**

Event Description: NI-6 Failure

Time	Position	Applicant's Actions or Behavior
	CRS	Decides to place the "B" RPS cabinet in a tripped state IAW OP-TM-641-421, Tripping and Resetting RPS Channels.
<b>OP-TM-641-421, Tripping and Resetting RPS Channels</b>		
	ARO	Section 3.0: Verifies Precautions, Limitations, and Prerequisites.
	ARO	Step 4.1: Performs the administration actions associated with this step.
	ARO	Step 4.2: ENSURE channel is not in Manual Bypass
	ARO	Step 4.2: PLACE Contact Monitor Test module switch to TEST OPERATE.
	ARO	Step 4.2: VERIFY Alarm MAP G-1-2 RPS Channel Trip In.
	ARO	Step 4.2: VERIFY Reactor Trip module (RTM) TEST TRIP lamp Bright.
	ARO	Step 4.2: VERIFY respective RTM Protective Subsystem lamp Bright.
	ARO	Step 4.2: PLACE Contact Monitor Test module switch to OPERATE.
<b>EXAMINER NOTE: Once the TS call is made and the "B" RPS channel is tripped (or the crew has decided not to trip the channel), then GO TO Event 4.</b>		

Op Test No.: TMI2019 Scenario# 3 Event # 4Page **13** of **27**

Event Description: Dropped Rod, Group 7

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: When directed by lead examiner, initiate Event 4.**

**INDICATIONS AVAILABLE:** PIP individual rod indication, OP-TM-MAP-G0201 when greater than 7 inches asymmetric, PPC Alarm L2278 when greater than 9 inches asymmetric. The crew could enter OP-TM-AOP-062 through the MAP-G0201 alarm, or MAP-0304 alarm.

	Crew	Diagnoses the dropped control rod.
<b>OP-TM-AOP-062, Inoperable Rod</b>		
	CRS	Step 3.1: Records the time of discovery of inoperable rod.
<b>Step 3.2 is N/A for this scenario</b>		
	CRS	Step 3.3: IAAT all control rods are operable, then GO TO section 4.0.
	CRS	Step 3.4: <b>REQUEST</b> duty reactor engineer to report to the control room.
	CRS	Step 3.5: <b>VERIFY</b> reactor power >5%.
	URO	Step 3.6: <b>VERIFY</b> safety groups Out Limit LEDs (Diamond Panel) are LIT.
	CRS	Step 3.7: <b>Verify</b> the inoperable rod is fully inserted
<b>Step 3.8 is N/A, the rod is at its in limit</b>		
	CRS	Step 3.9: Verify reactor power < 60% of allowable power for the operating RCPs.

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Event Description: Dropped Rod, Group 7

Time	Position	Applicant's Actions or Behavior
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**Step 3.10 is N/A, the rod is not latched.**

	CRS	Step 3.11: <b>VERIFY</b> quadrant power tilt is less than COLR table 2 limit and imbalance less than COLR Figure limits.
	CRS	Step 3.12: <b>VERIFY</b> Rod Index above COLR limit.
	CRS	Step 3.13: <b>VERIFY</b> rod group overlap 25±5% (T.S 3.5.2.5)
	URO	Step 3.14: IAAT the affected rod is a dropped rod then PERFORM Attachment 1.
	CRS	Step 3.15: If the rod remains inoperable then the CRS will: A. Direct performance of 1430-RPS-3 to lower RPS trip setpoints B. Direct performance of OP-TM-300-205 C. Direct performance of OP-TM-622-201
<b>EXAMINER NOTE:</b>		<b>Allow the crew to perform OP-TM-AOP-062 until Step 3.15 before cueing the booth to inform the crew they can recover the rod in automatic. This will allow enough time for the CRS to make a Tech Spec call.</b>
<b>BOOTH CUE:</b>		<b>After the crew notifies shift management or maintenance of the dropped rod report that a technician keyed their radio in the relay room and shift management has determined it is safe to recover the dropped rod in automatic.</b>

Op Test No.: TMI2019 Scenario# 3 Event # 4Page **15** of **27**Event Description: Dropped Rod, Group 7

Time	Position	Applicant's Actions or Behavior
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<b>EXAMINER NOTE:</b>		<b>The following Technical Specifications apply:</b> <b>3.5.2.2.c – If within one hour of determination of an inoperable rod as defined in Specification 4.7.1, and once per 12 hours thereafter, it is not determined that one percent deltaK/K hot shutdown margin exists combining the worth of the inoperable rod with each of the other rods, the reactor shall be brought to the HOT SHUTDOWN condition within 6 hours until this margin is established.</b>
<b>EXAMINER NOTE:</b>		<b>The crew will perform attachment 1 in the next step. Depending on the status of ICS (Auto or manual) will affect the section of attachment 1 that is performed.</b>
<b>EXAMINER NOTE:</b>		<b>Ensure with the booth operator that malfunction RD0117 is deleted when Group 7 is selected on the Rod Group Selector Switch.</b>
<b>BOOTH CUE:</b>		<b>Once group 7 is selected on the Rod Group Selector switch ensure the dropped rod malfunction (RD0117) has been deleted.</b>
<b>OP-TM-AOP-062, Attachment 1</b>		
	Crew	Step 1.1: N/A because the crew should choose to recover the rod automatically.
	Crew	Step 1.2: The crew should choose to recover the rod in automatic.
	URO/CRS	Step 1.2.1: CRS or URO should monitor the dropped rod position on the PPC. (PPC Points: API – A0831, RPI – 1531)
	URO	Step 1.2.2: Verifies the white SEQ light on the Diamond Panel is lit.

Op Test No.: TMI2019 Scenario# 3 Event # 4Page **16** of **27**Event Description: Dropped Rod, Group 7

Time	Position	Applicant's Actions or Behavior
	URO	Step 1.2.3: Verifies the white AUTO light on the Diamond Panel is lit.
	URO	Step 1.2.4: Selects Group 7 on the GROUP SELECT SWITCH by rotating the switch.
	URO	Step 1.2.5: Selects Rod 1 on the SINGLE SELECT SWITCH.
	URO	Step 1.2.6: Verifies the CONTROL ON light is energized for Group 7 Rod 1 on the PIP and DIAMOND PANEL.
	URO	Step 1.2.7: Verifies the MANUAL portion of the AUTO/MAN light on the DIAMOND PANEL is blinking.
	URO	Step 1.2.8: Selects LATCH AUTO on the DIAMOND PANEL and performs the following:
	URO	Step 1.2.8.1: Observes the PI Panel for the selected rod coming off its IN LIMIT and then inserting to its IN LIMIT.
	URO	Step 1.2.8.2: Verifies the LATCH AUTO is OFF.
<b>EVALUATOR NOTE / BOOTH CUE:</b>		<b>The crew will ask Nuclear Engineering for any hold points that are necessary for the dropped rod. Reply "There are no hold points necessary."</b>
<b>EVALUATOR NOTE:</b>		<b>The following will occur during rod withdrawal:</b> <ul style="list-style-type: none"> <li>• <b>At 9" delta, the rod height will be restored to the group average calculation, causing a small downward step change in group average height.</b></li> <li>• <b>At 7" delta, MAP G-2-1, CRD Pattern Asymmetric will clear, if it is alarming.</b></li> <li>• <b>The MANUAL light on the DIAMOND PANEL will stop flashing when the rod reaches the group average.</b></li> </ul>

Op Test No.: TMI2019 Scenario# 3 Event # 4

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Event Description: Dropped Rod, Group 7

Time	Position	Applicant's Actions or Behavior
	CRS	Step 1.3: Obtain Nuclear Engineering guidance for any hold points necessary.
	URO	Step 1.4: Uses the shim switch to withdraw Group 7, Rod 1 to align the group average.
	URO	Step 1.5: Ensures ASYM FAULT BYPASS is de-selected on the DIAMOND PANEL.
	URO	Step 1.6: Presses FAULT RESET on the DIAMOND PANEL.
	CREW	Step 1.7: Verifies <ul style="list-style-type: none"> <li>• MAP G-3-4 CRD SYSTEM FAULT clears</li> <li>• ASYM FAULT on the DIAMOND PANEL is NOT lit</li> <li>• Asymmetric Rod is not indicated on the PIP.</li> </ul>
	CREW	Step 1.8: The recovery was in auto, then perform the following
	URO	Step 1.8.1: Verifies the MANUAL mode indicator has stopped blinking.
	URO	Step 1.8.2: Selects OFF on the GROUP SELECT SWITCH
	URO	Step 1.8.3: Selects OFF on the SINGLE SELECT SWITCH.
	Crew	Steps 1.10 and 1.11 are N/A.
<b>EXAMINER NOTE: Once the rod is recovered, go to event #5.</b>		

Op Test No.: TM2019 Scenario# 3 Event # 5Page **18** of **27**

Event Description: Steam Leak in the Reactor Building

Time	Position	Applicant's Actions or Behavior
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<b>BOOTH CUE:</b>		<b>When directed by the Lead Examiner INITIATE Event 5.</b>
<b>Indications Available: Generated megawatts lowering (slightly), Reactor Building Temperature and Pressure rising</b>		
<b>EXAMINER NOTE:</b>		<b>Initially the steam leak is very hard to differentiate from an RCS leak. The crew may enter OP-TM-AOP-050, REACTOR COOLANT LEAKAGE which will direct them to shutdown.</b>
	Crew	Diagnoses Steam Leak in the Reactor Building.
	CRS	Directs entry into OP-TM-AOP-051, Secondary Side High Energy Leak.
<b>OP-TM-AOP-051, Secondary Side High Energy Leak</b>		
	ARO	Step 3.1: Announces entry into OP-TM-AOP-051, "Secondary Side High Energy Leak" and to evacuate affected area over the plant page and radio.
	URO	Step 3.2: MAINTAIN reactor power < 100%.
<b>EXAMINER NOTE:</b>		<b>Steps 3.3 through 3.5 are IAAT statements that are expected to remain N/A for the duration of the scenario. Step 3.6 is an IAAT step that is not applicable at this time.</b>
<b>BOOTH CUE:</b>		<b>As Shift Manager, acknowledge the request to evaluate EAL's.</b>
	CRS	Step 3.7: Request SM to Evaluate EALs.
	CRS	Step 3.8: Determines that the Steam Leak is in the Reactor Building



Op Test No.: TM2019 Scenario# 3 Event # 5Page **19** of **27**

Event Description: Steam Leak in the Reactor Building

Time	Position	Applicant's Actions or Behavior
<b>OP-TM-AOP-051, Section 4.0</b>		
	CRS	Step 4.1: IAAT RB pressure greater than 2 psig, then TRIP the reactor and GO TO EOP-001
<b>EXAMINER NOTE: The ARO and CRS should determine that RB temperature is not stable and will initiate OP-TM-534-901 "RB Emergency Cooling Operations".</b>		
	ARO	Step 4.2: Verify RB temperature is stable and less than 130F.
<b>OP-TM-534-901 RB EMERGENCY COOLING OPERATIONS</b>		
<b>EXAMINER NOTE: The sequence of actuation and verification of ES is not train dependent. Either train may be performed first or trains may be performed in parallel.</b>		
	ARO	Step 4.1.3: Starts RR-P-1A and/or RR-P-1B
	ARO	Step 4.1.4: Ensures open RR-V-3A, RR-V-3B, and RR-V-3C (sequence depends upon sequence of initiation)
	ARO	Step 4.1.5: Ensures open RR-V-4A, RR-V-4C, RR-V-1A and/or RR-V-4B, RR-V-4D, RR-V-1B
	ARO	Step 4.1.6: Verifies all coolers are 50-75 psig (CR).
	ARO	Step 4.1.7: Verifies the RB cooling fans (AH-E-1's) are running (CR).
<b>OP-TM-AOP-051, Section 4.0</b>		

Op Test No.: TM2019 Scenario# 3 Event # 5Page **20** of **27**

Event Description: Steam Leak in the Reactor Building

Time	Position	Applicant's Actions or Behavior
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	CRS/URO	Step 4.4: Initiate Plant Shutdown IAW 1102-4, "Plant Operation", and 1102-10 "Plant Shutdown".
	CRS/URO	Step 4.5: Initiate 1102-11, "Plant Cooldown".
<b>1102-4, Power Operations, Section 3.3</b>		
	CRS	Verify Pre-requisites and inform SM to perform Enclosures and make notifications in Section 3.3.
	CRS/URO	Step 3.3.3.b – SG/Reactor Demand should be in auto
	URO	Step 3.3.3.b.1 – Ensure ULD is in HAND
	URO	Step 3.3.3.b.2 – Set ULD LOAD RATE OF CHANGE to a rate determined by the CRS (CC).
	URO	Step 3.3.3.b.3 – Set ULD Target Load Demand to desired setpoint.
<b>EXAMINER NOTE: When appropriate reactivity manipulation is observed GO TO Event 6.</b>		

Op Test No.: TMI2019 Scenario # 2 Event # 6/7 Page **21** of **27**

Event Description: Steam Line Rupture, EF-V-30A fails to close from control room.

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE:** When directed by the Lead Examiner INITIATE Event 6.**BOOTH CUE:** When the reactor trip is announced then perform the actions the Auxiliary Operators normally perform.**INDICATIONS AVAILABLE:** Rapid lowering of RCS Pressure, Lowering Pressurizer level, Rising RB pressure and temperature, ESAS Actuation.

	Crew	Diagnoses Steam Line Rupture.
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**OP-TM-EOP-001, Reactor Trip**

	ARO	Step 3.1: Performs a Symptom Check and recognizes the criteria for any symptoms are not met but that the plant is approaching Excessive Primary to Secondary Heat Transfer.
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	CRS	Announces entry into OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer, based on approaching criteria.
--	-----	--

**OP-TM-EOP-003, EXCESSIVE PRIMARY TO SECONDARY HEAT TRANSFER**

	ARO	Step 3.1: Perform Rule 3, XHT
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**OP-TM-EOP-010, RULE 3 EXCESSIVE HEAT TRANSFER**

	ARO	Step 1: Verifies "A" OTSG level is less than 97.5% by the digital indication (CC).
--	-----	--

**EXAMINER NOTE:** Step 2 is a verification step that is met.

CT-17

ARO

Step 3: Performs Phase 1 isolation of "A" OTSG by:

- Closing MS-V-1A by pushing the Close pushbutton and observing the Close light lit and the Open and Test lights not lit (CC).

Op Test No.: TMI2019 Scenario # 2 Event # 6/7 Page **22** of **27**

Event Description: Steam Line Rupture, EF-V-30A fails to close from control room.

Time	Position	Applicant's Actions or Behavior
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing MS-V-1B by pushing the Close pushbutton and observing the Close light lit and the Open and Test lights not lit (CC).</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing FW-V-17A by directing an Auxiliary Operator to manually close the valve and observing the Close light lit and the Open light not lit (CC).</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing FW-V-16A by directing an Auxiliary Operator to manually close the valve and observing the Close light lit and the Open light not lit (CC).</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Ensuring FW-V-5A is closed by directing an Auxiliary Operator to close FW-V-5A.</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Ensuring FW-V-92A is closed by directing an Auxiliary Operator to close FW-V-92A.</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Verifying MS-V-3D, MS-V-3E, and MS-V-3F are closed by contacting an Auxiliary Operator to report local position.</li> </ul>
<b>CT-17</b>	ARO	Step 3: Performs Phase 1 isolation of "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing MS-V-4A by rotating the Backup Loader Handwheel counter-clockwise and observing the green closed light lit and the red open light not lit. (CC)</li> </ul>

Op Test No.: TMI2019 Scenario # 2 Event # 6/7 Page **23** of **27**  
 Event Description: Steam Line Rupture, EF-V-30A fails to close from control room.

Time	Position	Applicant's Actions or Behavior
<b>CT-17</b>	ARO	Step 4: Determines that the leak is in the Reactor Building and performs Phase 2 isolation of the "A" OTSG by:
<b>BOOTH CUE:</b> After the examinee attempts to close EF-V-30A and EF-V-30D, they will realize that EFW is still flowing to the 'A' OTSG. If called to investigate, inform them that EF-V-30A is still fully open. If asked to take manual control of EF-V-30A, inform the control room that EF-V-30A will not operate manually. <b>BOOTH CUE:</b> When dispatched to EF-V-52A, inform the control room that it feels like the handwheel is spinning freely and it is doesn't appear to be closing. If dispatched to EF-V-52D, close the valve and report the valve is closed back to the control room.		
<b>CT-17</b>	ARO	Step 4: Determines that the leak is in the Reactor Building and performs Phase 2 isolation of the "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing EF-V-30A and D by pressing manual and putting the toggle switch in close position until their demand is 0.</li> <li>- EF-V-30A is failed open, so the examinee will realize that there is still flow to the 'A' OTSG.</li> <li>- After local operations fail (see cue's above), the operator should enter OP-TM-424-901, EMERGENCY FEEDWATER.</li> <li>- Step 4.3.2;             <ol style="list-style-type: none"> <li>1. Close the EF-V-52A (which will fail to work locally)</li> <li>2. If affected EF-V-52 has not been closed, and primary-to-secondary heat transfer is excessive (XHT), the perform the following:                 <ol style="list-style-type: none"> <li>a. Verify 2 EFW pumps operating</li> <li>b. Close EF-V-2A</li> <li>c. Shutdown EF-P-2A</li> </ol> </li> </ol> </li> </ul>

Op Test No.: TMI2019 Scenario # 2 Event # 6/7 Page **24** of **27**

Event Description: Steam Line Rupture, EF-V-30A fails to close from control room.

Time	Position	Applicant's Actions or Behavior
<b>CT-17</b>	ARO	Step 4: Determines that the leak is in the Reactor Building and performs Phase 2 isolation of the "A" OTSG by: <ul style="list-style-type: none"> <li>- Closing MS-V-2A by pushing the Close pushbutton and observing the Close light lit and the Open light not lit (CC).</li> </ul>
	ARO	Step 7: INITIATE Guide 12
	CRS	Directs the termination of HPI.
<b>OP-TM-EOP-010, RULE 2, HPI Throttling</b>		
<b>CT-5</b>	URO	Recognizes that conditions are met to Terminate IAW OP-TM-211-901, Emergency Injection (HPI/LPI).
<b>OP-TM-211-901, Emergency Injection (HPI/LPI), Attachment 7.3</b>		
<b>CT-5</b>	URO	Step 1: Defeats ESAS signals by pressing the defeat pushbuttons (manual and/or automatic signals as required).
<b>CT-5</b>	URO	Step 3: Obtains CRS concurrence to throttle HPI.
	URO	Step 4.1: WAAT throttling is permitted IAW Rule 2, and prior to reducing any MU pump flow to less than 115 GPM, perform the following: <ul style="list-style-type: none"> <li>• DH-V-7A and DH-V-7B are closed, OPEN MU-V-36 and MU-V-37.</li> </ul>
<b>EXAMINER NOTE: OP-TM-211-901, Step 5 will be performed, but is not the priority. Guide 9 is initiated already, so the step is met, but it is important to move on and terminate HPI to avoid lifting the PORV.</b>		
	URO	Step 6: Obtains CRS direction to terminate HPI and secures MU-P-1A by rotating the Control Switch counter-clockwise and observing no amps, green light lit, red light not lit (CR).

Op Test No.: TMI2019 Scenario # 2 Event # 6/7 Page **25** of **27**

Event Description: Steam Line Rupture, EF-V-30A fails to close from control room.

Time	Position	Applicant's Actions or Behavior
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	URO	Step 6.B: Closes MU-V-16A and MU-V-16B by pressing the close pushbuttons for each valve and observing the closed lights lit and the open lights not lit (CC).
	URO	Step 6.C: Closes MU-V-16C and MU-V-16D by pressing the close pushbuttons for each valve and observing the closed lights lit and the open lights not lit (CR).

**EXAMINER'S NOTE:** Scenario can be terminated when OTSG "A" has been isolated, and HPI has been terminated.

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## Initial Conditions:

- 28% power
- RC-P-1B ready to start after an oil leak
- NI-8 OOS due to a failed power supply
- RPS Channel 'D' is in manual bypass, RPS logic is 2 out of 3 to trip

## Turnover

- Start RC-P-1B (interlock checks are not required) and maintain current power until maintenance has completed RCP leak checks

## Post-Exam Changes/Corrections to Scenario #2

### Event #4 Tech Specs

The following TS LCO Actions are applicable for the dropped rod event:

- 3.5.2.2 c (listed in Scenario on page 15 of 27)
- 3.5.2.2 d
- 3.5.2.2 e
- 3.5.2.2 f
- 3.5.2.2 g

Facility:	Three Mile Island	Scenario No.:	3	Op Test No.:	<u>TMI2019</u>
Examiners:	_____	Operators:	_____		
	_____		_____		
	_____		_____		
Initial Conditions:	<ul style="list-style-type: none"> <li>2% power, MOL, ICS is in manual with reactivity control at the diamond</li> <li>Turbine Reset and all 6 Circulating Water Pumps are running for a maintenance PMT.</li> <li>FW-P-1B is operating with control on the air speed changer</li> <li>Fuel is not deconditioned</li> </ul>				
Turnover:	Raise reactor power to 10% for special physics testing, initiate a bleed to the 'B' RCBT				
Critical Tasks:	<ul style="list-style-type: none"> <li>Establish and Maintain Reactor Shutdown Requirements (CT-1)</li> <li>Control HPI (CT-2)</li> </ul>				
Event No.	Malf. No.	Event Type*	Event Description		
1		N CRS R URO N ARO	Raise reactor power from 2% to 10% (URO: Power ascension with ICS in Manual, ARO: Bleeds to 'B' RCBT)		
2	RM0323	TS CRS	Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure		
3	RC04A	I CRS I URO	Pressurizer Level fails low, entry into OP-TM-MAP-G0105, OP-TM-MAP-G0205 (URO: Controls MU-V-17 in HAND)		
4	ED03E EG21A	TS CRS C ARO	Loss of the 1B Aux Transformer, EG-Y-1A fails to auto start (ARO: Starts EG-Y-1A)		
5		C CRS C ARO	Cavitating Circ Water Pump (ARO: Secure cavitating circ water pump)		
6	MU07	I CRS I URO	Seal Flow Instrument Fails, RCP Seal flow High (URO: Normalizes Seal Injection)		
7	PLA-4-9 PLB-8-3	M CRS M URO M ARO	Circ Water Rupture, Loss of Vacuum, Reactor Trip, Entry into EOP-001, Stuck Rods		
8	TH06	C CRS C URO C ARO	RCS leak, PZR Level Cannot be maintained without HPI, Entry into EOP-006 (URO: Initiate HPI, ARO: Initiate EFW)		
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor					

### **Three Mile Island NRC Scenario #3**

**Event #1:** The Lead Examiner will cue the reactivity manipulation. Once a report comes in that the 1102-2 testing is complete and that the Reactor Startup may continue, the URO will perform a reactivity manipulation by continuing the power ascension. This is the reactivity manipulation for the scenario.

The ARO will perform an RCS Bleed in accordance with OP-TM-211-462, LOWERING RCS / MU VOLUME – BLEED.

When sufficient reactivity and the bleed is complete has been observed and the Diamond Panel is in Auto control, the scenario can continue.

**Event #2:** After the reactivity manipulation has been completed, Lead Examiner can cue the Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure.

The operators will diagnose the Failure of RM-G-23 based on alarms and RM-G-23 indications. The CRS will review T.S. and declare 7 day clock IAW Table 3.5-3.

Although there is a redundant instrument (RM-G-22), Tech Specs require both instruments to be operational based upon the following:

The operability of design basis accident monitoring instrumentation as identified in Table 3.5-3 ensures that sufficient information is available on selected plant parameters to monitor and assess the variables following an accident. (This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," Rev. 3, May 1983.) These instruments will be maintained for that purpose.

IAW Tech Spec 3.5.5.2:

3.5.5.2 The channels identified for the instruments specified in Table 3.5-3 shall be OPERABLE. With the number of instrumentation channels less than required, restore the inoperable channel(s) to OPERABLE in accordance with the action specified in Table 3.5-3.

Table 3.5-3

INSTRUMENTS	REQ'D # OF CHANNELS	MIN # OF CHANNELS	ACTION
Containment High Range Radiation (RM-G22/G-23)	2	2	A

Action A: With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirements:

1. either restore the inoperable channel(s) to OPERABLE status within 7 days of the event, or

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Scenario Set-up  
NRC Scenario 3

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2. prepare and submit a Special Report within 30 days following the event outlining action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

When the T.S. is declared, the scenario can continue.

**Event #3:** The Lead Examiner will cue the Pressurizer Level fails low. This will establish a high Makeup flow to the pressurizer through MU-V-17. The URO will take manual control of MU-V-17 to control Pressurizer level, select the alternate Pressurizer Level Transmitter and then place the MU-V-17 controller to AUTO. Failure to take these actions will result in an unnecessary low level in the Pressurizer and entry into Guide 9.

When the alternate Pressurizer Level Transmitter has been selected and MU-V-17 is in AUTO, the scenario can continue.

**Event #4:** The Lead Examiner will cue the loss of the 1B Aux Transformer. Emergency Diesel Generator 1A, EG-Y-1A will fail to auto start.

The crew will enter OP-TM-AOP-013, LOSS OF THE 1D 4160V BUS and start EG-Y-1A by pressing the start pushbutton on console right (CR).

The CRS should declare the technical specification 3.7.2.b for the 1B Auxiliary Transformer being inoperable.

Once the bus is recovered and the technical specification is declared, the scenario can continue.

**Event #5:** The crew will receive a report that Circulating Water Pump 1A (CW-P-1A) is cavitating and vibrating abnormally from the in plant supervisor. The IPS will call in to describe the severity of the pump damage. The crew will trip the circulating water pump.

After the pump is secured, the scenario can continue.

**Event #6:** The Lead Examiner will cue the seal injection flow instrument Failure. This will cause RCP Seal Injection to be excessive. The URO will take HAND control of MU-V-32 and adjust RCP Seal Injection flow to approximately 38 gpm.

After MU-V-32 has been placed in HAND and Seal Injection returned to the normal band, the scenario can continue

**Event #7:** The Lead Examiner will cue the Circ Water Rupture. This will lead to a loss of vacuum and a reactor trip.

The crew will diagnose a Circ Water Rupture by annunciators PLA-4-9 and PLA-8-3 in alarm. The ARO will trip all Circ Water Pumps. The URO will perform the immediate Manual Actions of OP-TM-EOP-001, REACTOR TRIP to trip the reactor.

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Scenario Set-up  
NRC Scenario 3

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The URO will recognize multiple stuck rods and will initiate Emergency Boration from the Borated Water Storage Tank IAW Rule 5, EMERGENCY BORATION, to ensure the reactor remains greater than 1% shutdown margin. The importance of this action is described below:

Following reactor trip, neutron flux decays as a function of the delayed neutron precursors. This rate is well understood and observable. Any unexpected increase in neutron flux following a reactor trip may be an indication of undesirable addition of positive reactivity.

Control rod design criteria allow the most reactive rod to be fully withdrawn or stuck following reactor trip and still complete reactor shutdown. For the condition where all control rods are not fully inserted following reactor trip, the reactor may be fully shutdown at the existing temperature, however the margin to criticality is affected, and boration may be required to restore a minimum margin.

The intent of emergency boration is to ensure the reactor remains shutdown throughout the performance of event mitigation.

Once the reactor is tripped, a symptom check is performed, the Circ Water pumps are tripped from the control room and emergency boration is in progress in accordance with Rule 5, then the scenario can continue.

**Event #8:** The Lead Examiner will cue the RCS leak. This will lead to pressurizer level not being able to be maintained without HPI, and the crew entering OP-TM-EOP-006, LOCA Cooldown.

Due to the loss of vacuum from the circ water rupture, the crew will have to use the ADV's to establish a cooldown rate.

**Termination:** When HPI is throttled and OP-TM-EOP-006, LOCA COOLDOWN is entered.

**CT-1** - Establish and Maintain Reactor Shutdown Requirements - Fulfillment of this CT requires the following:

- If all rods do not insert, boration is commenced to achieve acceptable shutdown margin.
- Not commencing emergency boration by the completion of the VSSV's **should be considered grounds for failure of this critical task**. This is based on the time the validation crew determined the need for emergency boration.

**Safety Significance:** When a reactor trip occurs or should occur, the operator must initiate rod insertion signals and maintain decreasing reactor power. If more than one rod remains stuck out, the operator should begin boration to increase the shutdown margin.

**Cues:**

1. RPS channel alarms
2. Reactor trip alarm
3. Turbine trip alarm
4. RCS pressure and temperature alarms
5. SPDS displays and associated alarms
6. P-T display and associated alarms

**Performance Indicators:**

1. Operation of manual reactor trip pushbutton
2. Operation of boric acid addition pump controls
3. Operation of boric acid addition valve controls
4. Operation of RCP start switches.

**Feedback:**

1. Nuclear instruments
2. Control rod status indication
3. Verbal indication from plant staff of reactor shutdown status

**CT-2** – 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.

- Controlling HPI outside of the following limits should be considered **grounds for failure of the critical task**:
  - Do not allow the Pressurizer to go empty.

- Maintain RCS Pressure below the PORV setpoint.

**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)

**Industry Experience:**

- OE29538 – Potential Inadequate Controls of Reactor Coolant System (RCS) Leak Path (Oconee Nuclear Station –ONS) (8/3/09)

**PRA**

- Small LOCAs (Initiating Event)



Scenario Set-up  
NRC Scenario 3

Event	Description	Procedure Support
	Initial Set-up, IC - 243	5% Power, MOL
1	Raise Reactor Power from 5% to 15%	1102-2, PLANT STARTUP
		OP-TM-211-462, LOWERING RCS/MU VOLUME
2	Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure	OP-TM-PRF1-0108, RM-G-22 RM-G-23 ALERT
		OP-TM-PRF1-0208, RM-G-22 RM-G-23 HI
3	Pressurizer Level Transmitter Fails High	OP-TM-MAP-G0205, PZR LEVEL HI / LO
		OP-TM-621-451, SELECTING ALTERNATE INSTRUMENT INPUTS TO ICS
		1105-6, NON-NUCLEAR INSTRUMENTATION
4	Loss of 1B Aux Transformer	OP-TM-AOP-013, LOSS of 1D 4160V BUS
5	Circulating Water Pump Cavitation, Power Reduction	OP-TM-511-431, SHUTDOWN CW-P-1A
6	MU-V-32 controller fails, RCP Seal flow high	OP-TM-MAP-F0105, RCP SEAL TOT INJECT FLOW HI/LOW
		OP-TM-211-476, SEAL INJECTION CONTROL-MU-V-32 CONSOLE OPERATIONS
7	Circ Water Rupture, Loss of Vacuum, Reactor Trip	PLA – 4-9, TURB BLDG CIRC WATER PIPELINE RUPTURE
		PLB- 8-3, CONDENSER SUMP LEVEL HIGH
		OP-TM-EOP-001, REACTOR TRIP
		OP-TM-424-901, EMERGENCY FEEDWATER
8	RCS Leak, Entry into OP-TM-EOP-006	OP-TM-EOP-006, LOCA COOLDOWN

Scenario Set-up  
NRC Scenario 3

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-243	2% MOL	Equilibrium XENON
Malfunction RM0323	Value: Insert When: EVENT 2	RM-G-23 Fails
Malfunction RC04A	Value: 100 When: EVENT 3	Pressurizer Level Transmitter fails high
Malfunction ED03E	Value: Insert When: EVENT 4	1B Aux Transformer trips
Malfunction EG21A	Value: Insert When: Immediately	EG-Y-1A fails to auto start
Event Trigger #20	Value: Command:SET PPA0219_V = 215.0	Sets PPC point A0219 to 215.0 to match the Event 5
Monitor Point	Value: SET PPA0219_O =True When: Immediately	Enables PPC Point A0219 to be set by event trigger #20
Monitor Point	Value: CWA0219 =215.0 When: When Directed	Sets the Circ water pump to 215.0 temperature
Event Trigger #21	Value: Command:SET PPA0218_V = 215.0	Sets PPC point A0218 to 215.0 to match the Event 5
Monitor Point	Value: SET PPA0218_O =True When: Immediately	Enables PPC Point A0218 to be set by event trigger #21
Monitor Point	Value: CWA0218 =153.0 When: When Directed	Sets the Circ water pump to 215.0 temperature
Malfunction MU07	Value: 100 When: Event 6	Seal Injection Instrument Failure
Malfunction PLA-4-9	Value: On When: Event 7	Circ Water Leak in Turbine Building
Malfunction PLB-8-3	Value: On, delay of 20 sec When: Event 7	Circ Water Leak in Turbine Building
Override 05A2M1-ZAOCWLI154	Value: 40, ramp of 120 sec When: Event 7	Circ Water Leak in Turbine Building
Malfunction RD0255	Value: On When: Even 7	Stuck Rod
Malfunction RD0206	Value: On When: Event 7	Stuck Rod
Malfunction TH04A	Value: .09 When: Event 8	RCS LOCA: Hot leg nozzle

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Scenario Set-up  
NRC Scenario 3

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Setup:

1. Ensure the turbine is reset on the DTCS and the Turbine Trip Lockout on console right.
2. Ensure turbine header pressure is 895 psig
3. Mark 1102-2 up to raise reactor power
4. Ensure the pressurizer level graph is available and filled out.
5. Ensure copies of OP-TM-211-476, SEAL INJECTION CONTROL – MU-V-32 CONSOLE OPERATIONS, OP-TM-621-451, SELECTING ALTERNATE INSTRUMENT INPUTS to ICS and 1105-6, NON-NUCLEAR INSTRUMENTATION AND CONTROLS are available to replace possible used copies.
6. Ensure all circ water pumps are operating.
7. Ensure copies of OP-TM-511-431, SHUTDOWN CW-P-1A are available for each scenario.
8. Monitor the following points: CWA0219, CWA0218, PPA0219\_V, PPA0218\_V, PPA0219\_O, PPA0218\_O
9. Ensure MUT high enough to bleed to desired level using monitor point mummt and set the level  $\geq 96"$ . (~28800)
10. Ensure 3 Powdex Vessels in hand in accordance with 1102-2.
11. Ensure the FW-P-1B from Standby to Operating Mode (OP-TM-401-104) is performed and the FW-P-1B is on the air speed changer.
12. Ensure the CSTs are equalized.
13. Print OP-TM-211-462 for the bleed for each group.
14. Perform OP-TM-314-102 to place GS to Operating Mode.
15. Ensure Intermediate Closed Temperature is 90F to 95F
16. Ensure the MAN book is marked up for the feedwater pump operations.

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Event Description: Raise reactor power to 10%, ARO bleeds to 'B' RCBT

Time	Position	Applicant's Actions or Behavior
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<b>BOOTH OPERATOR: There are no malfunctions to set for event #1.</b>		
<b>BOOTH CUE:</b> When directed by the Lead Examiner, call in as the Operations Director report that all testing is complete and direct the CRS to continue the power ascension. In addition, the ARO will bleed from the makeup tank to the 'B' Reactor Coolant Bleed Tank.		
<b>EXAMINER NOTE: The MMR is 30%/hr. To raise power 5% will take ~10 minutes.</b>		
	CRS	Directs a power ascension IAW 1102-2 Plant Startup.
<b>1102-2 Plant Startup, Section 3.2.15</b>		
	URO	Step 3.2.14: 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 out motion white light is lit, and rod motion is occurring.
<b>EXAMINER NOTE: Step 3.2.15 is N/A</b>		
	URO	Step 3.2.16: When NI power is between 5% and 10%, then performs the following: <ul style="list-style-type: none"> <li>• Verifies AUTO INHIBIT is Off.</li> </ul>
	URO	Step 3.2.16: When NI power is between 5% and 10%, then performs the following: <ul style="list-style-type: none"> <li>• Ensures rod control is in SEQ.</li> </ul>
	URO	Step 3.2.16: When NI power is between 5% and 10%, then performs the following: <ul style="list-style-type: none"> <li>• Verifies neutron error is "zero".</li> </ul>

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Event Description: Raise reactor power to 10%, ARO bleeds to 'B' RCBT

Time	Position	Applicant's Actions or Behavior
	URO	<p>Step 3.2.16: When NI power is between 5% and 10%, then performs the following:</p> <ul style="list-style-type: none"> <li>Places 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.</li> </ul>
<p><b>PROCEDURE NOTE:</b> Raising reactor power with the Rx Demand while on Low Level Limits will cause a rise in Tave. With Reactor Demand Station in Manual the Tave Calibrating Integral will attempt to drive the input to the Rx Dmd to match the output of the Rx Demand Station. Closely monitor PPC point A5016 Tave Calibrating Integral to ensure it stays on scale. At low power, the Tave Calibrating Integral will be wound out at the low end (-10 Volts). As Rx Demand output is raised the Tave Calibrating integral will come on scale and may windout on high end (+10 Volts). If the Tave Calibrating Integral is wound out the Rx Demand station cannot be placed in AUTO.</p>		
	URO	Step 3.2.17: Adjusts REACTOR DEMAND to control reactor power.
<p><b>EXAMINER NOTE:</b> The following steps are scripted, but are not required to be completed prior to continuing on.</p>		
	ARO	<p>Enclosure 2 Page 5, Line 3: When FW-V-16A is between 50% and 80% OPEN:</p> <ul style="list-style-type: none"> <li>VERIFY FW-V-17A is closed.</li> </ul>
	ARO	<p>Enclosure 2 Page 5, Line 3: When FW-V-16A is between 50% and 80% OPEN:</p> <ul style="list-style-type: none"> <li>OPEN FW-V-5A</li> </ul>
	ARO	<p>Enclosure 2 Page 5, Line 4: When FW-V-16B is between 50% and 80% OPEN:</p> <ul style="list-style-type: none"> <li>VERIFY FW-V-17B is closed.</li> </ul>

Op Test No.: TMI2019 Scenario# 3 Event # 1

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Event Description: Raise reactor power to 10%, ARO bleeds to 'B' RCBT

Time	Position	Applicant's Actions or Behavior
	ARO	Enclosure 2 Page 5, Line 4: When FW-V-16B is between 50% and 80% OPEN: <ul style="list-style-type: none"> <li>• OPEN FW-V-5B.</li> </ul>
	URO	Step 3.2.18: When Tavg is >578.0°F, or Tavg calibrating integral (A5016) is between +7.0 and +9.0 volts, then perform the following to place the REACTOR DEMAND in AUTO. <ul style="list-style-type: none"> <li>• VERIFY SG FW A &amp; B DEMAND are in AUTO.</li> </ul>
	URO	Step 3.2.18: When Tavg is >578.0°F, or Tavg calibrating integral (A5016) is between +7.0 and +9.0 volts, then perform the following to place the REACTOR DEMAND in AUTO. <ul style="list-style-type: none"> <li>• ADJUST setpoint on REACTOR DEMAND station to obtain zero error on T-AV ERROR indicator.</li> </ul>
	URO	Step 3.2.18: When Tavg is >578.0°F, or Tavg calibrating integral (A5016) is between +7.0 and +9.0 volts, then perform the following to place the REACTOR DEMAND in AUTO. <ul style="list-style-type: none"> <li>• VERIFY Tavg calibrating integral (A5016) is between – 10.0 and +10.0 volts and stable.</li> </ul>
	URO	Step 3.2.18: When Tavg is >578.0°F, or Tavg calibrating integral (A5016) is between +7.0 and +9.0 volts, then perform the following to place the REACTOR DEMAND in AUTO. <ul style="list-style-type: none"> <li>• PLACE REACTOR DEMAND in AUTO.</li> </ul>
	URO	Step 3.2.19: ADJUST SG/REACTOR DEMAND to control reactor power.
	URO	Step 3.2.20: Slowly ADJUST Tavg setpoint to 579°F (in parallel with subsequent actions).

Op Test No.: TMI2019 Scenario# 3 Event # 1

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Event Description: Raise reactor power to 10%, ARO bleeds to 'B' RCBT

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.2.21: When the REACTOR DEMAND is in AUTO and feedwater demand is above LLL, then <ul style="list-style-type: none"> <li>OBTAIN CRS concurrence.</li> </ul>
	URO	Step 3.2.21: When the REACTOR DEMAND is in AUTO and feedwater demand is above LLL, then <ul style="list-style-type: none"> <li>VERIFY SG/REACTOR DEMAND HAND MINUS AUTO indication is at 50%.</li> </ul>
	URO	Step 3.2.21: When the REACTOR DEMAND is in AUTO and feedwater demand is above LLL, then <ul style="list-style-type: none"> <li>PLACE SG/REACTOR DEMAND to AUTO.</li> </ul>
	URO	Step 3.2.22: When SG/REACTOR DEMAND is in AUTO, then <ul style="list-style-type: none"> <li>SET ULD LOAD RATE OF CHANGE for <math>\leq 0.5</math> %/minute AND consistent with MMR (Enclosure 1).</li> </ul>
	URO	Step 3.2.22: When SG/REACTOR DEMAND is in AUTO, then <ul style="list-style-type: none"> <li>SET ULD Target Load Demand to desired setpoint.</li> </ul>
<b>OP-TM-211-462, LOWERING RCS / MU VOLUME - BLEED</b>		
	ARO	Section 3.3: Verifies Prerequisites
	ARO	Step 4.1: Verifies enough freeboard for expected bleed volume.
	ARO	Step 4.2: Verifies WDL-V-2 is closed (illuminated green) on the LWDS panel.
	ARO	Step 4.3: N/A, primary instrument air is > 60 psig.

Op Test No.:	<u>TMI2019</u>	Scenario#	<u>3</u>	Event #	<u>1</u>	Page <b>14</b> of <b>33</b>
Event Description:	Raise reactor power to 10%, ARO bleeds to 'B' RCBT					
Time	Position	Applicant's Actions or Behavior				

	ARO	Step 4.4: Positions the Bleed Tank Select Switch on the LWDS panel to T1B (for WDL-T-1B). WDL-V-4 on the LWDS panel will open (illuminate red).
	ARO	Step 4.5: Verifies WDL-V-1 and WDL-V-4 are open (illuminated RED) on the LWDS panel.
	ARO	Step 4.6: N/A unless makeup tank level becomes less than 50".
	ARO	Step 4.7: N/A, auto power is available.
	ARO	Step 4.8: N/A unless makeup tank level becomes less than 18"
	ARO	Step 4.9: Presses the BLEED button for MU-V-8 on console center. The red bleed light becomes illuminated.
	ARO	Step 4.10: Observes makeup tank level lowering.
<b>EXAMINER NOTE</b>		<b>When the crew chooses to end the bleed, the ARO will press the "THRU TO FILTERS BUTTON". This may be done using step 4.11 or 4.12. If the crew decides a bleed will be necessary in the future due to starting up, they will use step 4.11. If they decide to complete the procedure they will use step 4.12. Either choice is acceptable. Once the bleed is terminated by MU-V-8 being positioned in the "THRU TO FILTERS BUTTON" the actions for bleed are completed.</b>
	ARO	Step 4.11: The crew may decide to use this step to stop the bleed if they determine that they will have to bleed in the near future to offset any temperature effects on the RCS.
	ARO	Step 4.12: When the appropriate level is reached, the ARO will press the "THRU TO FILTERS" button to stop the bleed.
<b>EXAMINER NOTE:</b>		<b>When sufficient Reactivity Manipulation and the bleed to the 'B' RCBT have occurred, GO TO Event 2.</b>



Op Test No.: TMI2019 Scenario# 3 Event # 2

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Event Description: Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure

Time	Position	Applicant's Actions or Behavior
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**BOOTH CUE: When directed by the Lead Examiner INITIATE Event 2****Indications Available: PRF1 alarms, RM-G-23 indication.**

	Crew	Identifies failed instrument
	CRS	Initiates entry into the following timeclock: Table 3.5-3

**EXAMINER NOTE:** Tech Spec 3.5.5.2 (ACCIDENT MONITORING INSTRUMENTATION) – The channels identified for the instruments specified in Table 3.5-3 shall be **OPERABLE**. With the number of instrumentation channels less than required, restore the inoperable channel(s) to **OPERABLE** in accordance with the action specified in Table 3.5-3.

**Containment High Range Radiation (RM-G-22/23)**

**Required number of channels: 2**

**Minimum number of channels: 2**

**Action A: With the number of **OPERABLE** channels less than required by the minimum channels**

**OPERABLE requirements:**

1. either restore the inoperable channel(s) to **OPERABLE** status within 7 days of the event, or
2. prepare and submit a Special Report within 30 days following the event outlining action taken, the cause of the inoperability and the plans and schedule for restoring the system to **OPERABLE** status.

**EXAMINER NOTE: After the Tech Spec call is made, then GO TO Event 3**

Op Test No.: TMI2019 Scenario# 3 Event # 3Page **16** of **33**

Event Description: Pressurizer Level Fails Low

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: When directed by the Lead Examiner INITIATE Event 3**

**Indications Available: Main Annunciators G-2-5 and G-3-5 in alarm, Pressurizer Level fails on recorder.**

	Crew	Diagnoses Pressurizer Level Transmitter Failure.
	CRS	Directs entry into OP-TM-MAP-G0205, PZR LEVEL HI/LO.
OP-TM-MAP-G0205, PZR LEVEL HI/LO		
	URO	Step 4.1: Determines that the PZR level indication is not valid, and the performs the following:
		Step 4.1: Places MU-V-17 in HAND by pressing the white HAND pushbutton on the MU-V-17 Bailey Control Station, verifying that the white HAND light is lit and the red AUTO light is not lit (CC).
<b>EXAMINER NOTE:</b> The crew may decide to select the alternate instrument IAW OP-TM-621-451, SELECTING ALTERNATE INSTRUMENT INPUTS TO ICS, IAW 1105-6, NON-NUCLEAR INSTRUMENTATION AND CONTROLS, or OP-TM-MAP-G0205, PZR LEVEL HI/LO.		
	URO	Step 4.1: Selects a valid level signal by pressing the pushbutton for the alternate Pressurizer level instrument, verifying that the alternate instrument light (lower light) is lit and the primary instrument light (upper light) is not lit, and that indicated Pressurizer level has returned to an accurate reading. (CC).

Op Test No.: <u>TMI2019</u> Scenario# <u>3</u> Event # <u>3</u>			Page 17 of 33
Event Description: Pressurizer Level Fails Low			
Time	Position	Applicant's Actions or Behavior	

		Step 4.1: Places MU-V-17 in AUTO by pressing the red AUTO pushbutton on the MU-V-17 Bailey Control Station, verifying that the white HAND light is not lit and the red AUTO light is lit (CC).
<b>EXAMINER NOTE:</b>		The URO may use OP-TM-621-451 or OP-TM-MAP-G0205 to place MU-V-17 in AUTO.
<b>EXAMINER NOTE:</b>		Steps 4.2 through 4.7 are N/A.
<b>EXAMINER NOTE:</b>		Once MU-V-17 is in AUTO control and the power escalation has recommenced, go to event 4.

Op Test No.:	<u>TMI2019</u>	Scenario#	<u>3</u>	Event #	<u>4</u>	Page 18 of 33
Event Description:	Loss of 1B Aux Transformer, EG-Y-1A fails to auto start, Loss of the 1D 4160V Bus					
Time	Position	Applicant's Actions or Behavior				

<b>BOOTH NOTE:</b>			<b>When directed by the Lead Examiner INITIATE EVENT 4.</b>
<b>Indications Available:</b> ½ of the CR lights de-energize, fast transfer of the C 4160V bus, multiple MAP and PPC alarms.			
<b>EXAMINER NOTE:</b>		After power to the 1D 4160V Bus does not automatically get restored, the crew may check EG-Y-1A to ensure a proper start. After checking that no overcurrent exists on the 1D 4160V ES Bus, the ARO press the start button on CR, which will start the diesel and power the bus. This is allowed per OS-24. If choose to enter OP-TM-AOP-013 first, then EG-Y-1A will be started on step 3.2.	
	Crew	Diagnoses the loss of the B Aux Transformer and 1D 4160V ES bus and enters OP-TM-AOP-013, LOSS OF 1D 4160V BUS.	
<b>OP-TM-AOP-014, LOSS OF THE 1D 4160V BUS</b>			
	ARO	Step 3.1: Announces entry into OP-TM-AOP-013, "Loss of the 1D 4160V Bus" over the red plant page.	
	CRS/ARO	Step 3.2: Initiate OP-TM-861-901, DIESEL GENERATOR EG-Y-1A EMERGENCY OPERATIONS. (See EXAMINER NOTE above for starting the Emergency Diesel Generator).	
<b>EXAMINER NOTE:</b>		<b>Tech Spec 3.7.2.b</b> <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 Unit 1 auxiliary transformer is made or found inoperable, two diesel generators shall be operable, and one of the operable diesel generators 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.</b>	

Op Test No.: TMI2019 Scenario# 3 Event # 4Page **19** of **33**

Event Description: Loss of 1B Aux Transformer, EG-Y-1A fails to auto start, Loss of the 1D 4160V Bus

Time	Position	Applicant's Actions or Behavior
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<b>OP-TM-861-901, DIESEL GENERATOR EG-Y-1A EMERGENCY OPERATIONS</b>		
	ARO	Step 4.4.2: Ensure 1SA-D2 and 1SB-D2 are Open (CR).
	ARO	Step 4.4.3 is N/A because no ES signal is present.
	ARO/CRS	Step 4.4.4 verifies PPC point S2072 is NORM on PPC.
	ARO	Step 4.4.5 presses the EG-Y-1A start pushbutton for ~8 seconds. The diesel will start and load on the bus.
<b>EXAMINER NOTE: After EG-Y-1A is started and technical specification is complete, go to Event 5.</b>		

Op Test No.: TMI2019 Scenario# 3 Event # 5

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Event Description: Cavitation of Circulating water pump 1A (CW-P-1A)

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR:** When directed by the Lead Examiner INITIATE insert event #20 and #21. Set PPC points CWA0218 and CWA0219 to 215.0.

**Indications Available:** PPC Alarms A0218 and A0219 alarm.

**BOOTH CUE:** After a watchstander is dispatched to investigate the circ water pump, call the control room and state the following to the CRS:

“This is inplant supervisor. I’m down in the Circ Water pump house and it sounds like CW-P-1A has an abnormal vibration sound, and it is getting worse.”

CRS

Directs ARO to shutdown CW-P-1A

**OP-TM-511-431, SHUTDOWN CW-P-1A**

ARO

Section 3.0: Verifies precautions, limitations, and prerequisites.

ARO

Step 4.1: IAAT that will not apply in this scenario. N/A

ARO

Step 4.2: ENSURES the ULD is in HAND. Reactivity control is that the diamond station.

ARO

Step 4.3: ENSURES reactor power is less than 2555 MWth (99.5%).

ARO

Step 4.4: Condenser pressure is not &gt; 3.0 in HGA.

ARO

Step 4.5: Verifies ULD station is in HAND.

ARO

Step 4.6: Places CW-P-1A in Normal After Stop.

Op Test No.:	<u>TMI2019</u>	Scenario#	<u>3</u>	Event #	<u>5</u>	Page <b>21</b> of <b>33</b>
Event Description:	Cavitation of Circulating water pump 1A (CW-P-1A)					
Time	Position	Applicant's Actions or Behavior				

	ARO	Step 4.7: Verifies that CW-P-1A is closed.
	ARO	Step 4.8: Verifies CW-P-1A stops.
	ARO	Step 4.9: Monitors condenser vacuum, CW temperature, and Reactor power.
	ARO	Step 4.10: Shift management will not elect to put the ULD back in Auto
<b>EXAMINER NOTE: When CW-P-1A is secured, the scenario can continue.</b>		

Op Test No.: TMI2019 Scenario# 3 Event # 6 Page **22** of **33**

Event Description: MU-V-32 controller fails high

Time	Position	Applicant's Actions or Behavior
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**BOOTH OPERATOR: When directed by the Lead Examiner INITIATE EVENT 6.****Indications Available: MU-V-32 controller position demand rises, Seal Injection flow rises**

	URO	Diagnoses excessive Reactor Coolant Pump seal injection.
	CRS	Directs entry into OP-TM-MAP-F0105, RCP SEAL TOT INJECT FLOW HI / LO.

**OP-TM-MAP-F0105, RCP SEAL TOT INJECT FLOW HI / LO**

	N/A	IAAT unable to maintain SI flow > 22 gpm from Control room, then GO TO OP-TM-AOP-041, Loss Seal Injection.
	URO	Place MU-V-32 Controller in manual IAW OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations, and ESTABLISH correct flow. The crew may take the valve to hand in accordance with OS-24 guidance and then follow up with the procedure.

**OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations**

	URO	Step 4.1: Monitor current seal injection flow (MU42-FI1) (CC)
	URO	Step 4.2.1: Manually control SI flow using MU-V-32 H/A station as follows: <ul style="list-style-type: none"> <li>Place MU-V-32 in HAND by pressing White HAND Pushbutton (CC).</li> </ul>
		Step 4.2.2: Manually control SI flow using MU-V-32 H/A station as follows: <ul style="list-style-type: none"> <li>Verify the white Hand light is lit and the red Auto light is not lit (CC).</li> </ul>



Op Test No.: TMI2019 Scenario# 3 Event # 6 Page **23** of **33**

Event Description: MU-V-32 controller fails high

Time	Position	Applicant's Actions or Behavior
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<b>EXAMINER NOTE:</b>	<b>Although the next step does not provide a range to achieve for seal injection flow, Limitation 3.2.1 states "If any RCP are operating, then maintain seal injection flow between 32 and 40 gpm".</b>	
	URO	Step 4.2.3: Manually control SI flow using MU-V-32 H/A station as follows: ADJUST Seal Injection Flow using the MU-V-32 Bailey Control Station toggle switch in the up and/or down direction, as necessary, to maintain seal injection flow between 32 and 40 gpm as read on MU42-FI1 (CC).
<b>EXAMINER NOTE:</b>	<b>When Seal Injection has been restored to normal, go to Event 7.</b>	

Op Test No.: TMI2019 Scenario# 3 Event # 7 Page 24 of 33

Event Description: Circ Water Rupture, Loss of Vacuum, Loss of Both Main Feedwater Pumps, Reactor Trip, Multiple Stuck Rods

Time	Position	Applicant's Actions or Behavior
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**Booth Operator: When directed by the Lead Examiner INITIATE Event 7.****Indications Available: Annunciators PLA-4-9 and PLB-8-3 in alarm, Main Circ Water flume level lowering.****BOOTH CUE: If contacted as an Auxiliary Operator to investigate Circ Water, acknowledge the order only. No response will be needed for the scenario.****EXAMINER NOTE: The vacuum pumps and FW-P-1B will receive alarms which will lead the crew to secure those pumps.**

CRS

Announces entry into OP-TM-PLA-0409, TURB BLDG CIRC WATER PIPELINE RUPTURE.

**OP-TM-PLA-0409, TURB BLDG CIRC WATER PIPELINE RUPTURE**

ARO

Step 1: Verifies CW line rupture by observing PLA-8-3 in alarm (PL)

URO

Step 2: Performs OP-TM-EOP-001, REACTOR TRIP IMA's.

**OP-TM-EOP-001, Reactor Trip**

URO

Step 2.1 (IMA): Presses Both Reactor Trip and DSS pushbuttons (CC).

URO

Step 2.2 (IMA): Verifies that the reactor is shutdown by one of the following: Power Range nuclear instrumentation indicates less than 5% (CC) All control rods are inserted (PC) Source Range count rate is continuously lowering (CC)

URO

Step 2.3 (IMA): Presses the Turbine Trip pushbutton (CL).

Op Test No.: TMI2019 Scenario# 3 Event # 7 Page **25** of **33**

Event Description: Circ Water Rupture, Loss of Vacuum, Loss of Both Main Feedwater Pumps, Reactor Trip, Multiple Stuck Rods

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.4 ( <b>IMA</b> ): Verifies the Turbine Stop valves are closed by observing the indication on CL.
<b>OP-TM-PLA-0409, TURB BLDG CIRC WATER PIPELINE RUPTURE</b>		
	ARO	Step 3: Trips all Circ Water Pumps.
	CRS	Step 4: Initiates OP-TM-EOP-001, REACTOR TRIP
<b>OP-TM-EOP-001, Reactor Trip</b>		
	ARO	Step 3.1: Performs a Symptom Check and recognizes that no symptoms exist at this time.
	ARO	Step 3.2: Announces Reactor Trip.
	URO/ARO	Step 3.3: Verifies the 1E 4160V buses are energized from auxiliary transformers
	URO	Step 3.4: Verifies that not all rods within Control Rod Groups 1-7 are fully inserted (PC) and initiates Rule 5, "Emergency Boration".
<b>OP-TM-EOP-010, Rule 5, Emergency Boration</b>		
	URO	Step 2: Verifies a Makeup Pump is Operating by observing the red running light lit, green light not lit, and red flag indicated for MU-P-1B (CR).
<b>CT-1</b>	URO	Step 3: Opens MU-V-14A or MU-V-14B by pressing the Open pushbutton and observing the red open light lit, green closed light not lit (CC).
<b>CT-1</b>	URO	Step 4: Verify Total Injection (MU, SI, HPI) > 50 gpm.

Op Test No.: TMI2019 Scenario# 3 Event # 7 Page **26** of **33**

Event Description: Circ Water Rupture, Loss of Vacuum, Loss of Both Main Feedwater Pumps, Reactor Trip, Multiple Stuck Rods

Time	Position	Applicant's Actions or Behavior
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**OP-TM-EOP-001, Reactor Trip**

	ARO	Step 3.5: Verifies that both OTSG levels are less than 97.5%.
	ARO	Step 3.6: Verifies Main FW to each OTSG is less than 0.5 MLB/hr.

**EXAMINERS NOTE:** The crew may manually trip the Feedwater pumps or manually initiate Emergency Feedwater to ensure feedwater to the OTSGs.

**EXAMINERS NOTE:** Once all Circ Water Pumps have been tripped from the Control Room and Emergency Boration is initiated, Go to Event 8.

Op Test No.: TMI2019 Scenario# 3 Event # 8 Page 27 of 33

Event Description: RCS Leak, LOCA Cooldown

Time	Position	Applicant's Actions or Behavior
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**Booth Operator: After the operators have initiated Emergency Boration, and when directed by the Lead Examiner, insert event 8.**

**EXAMINER'S NOTE: The RCS leak should be inserted during the VSSV's of OP-TM-EOP-001, this section may start at an earlier or later VSSV.**

**EXAMINER'S NOTE: The RCS leak will be diagnosed by lowering pressurizer level, rising RB pressure, and rising counts on RM-A-2.**

	ARO	Step 3.7: Verifies OTSG levels > setpoint.
	ARO	Step 3.8: Verifies ICS/NNI HAND or AUTO Power is available.
	URO	Step 3.9: Initiates Guide 9, "RCS Inventory Control"
	ARO	Step 3.10: Initiates Guide 6, "OTSG Pressure Control".
	URO	Step 3.11: Initiates Guide 8, "RCS Pressure Control".
	ARO	Step 3.12: Verifies both GB1-12 and GB1-02 are Open when Generator MW at zero, or Turbine speed < 1770 rpm.
	ARO	Step 3.13: Verifies the Generator Field Breaker is open when GB1-12 and GB1-02 are open.
	ARO	Step 3.14: Verifies Primary and Secondary Instrument Air pressure > 80 psig.
	URO	Step 3.15: Initiates OP-TM-642-904 "Reactor Trip Isolation ESAS Actuation".
	Crew	Step 3.16: Verifies Containment pressure does not exceed 2 psig. The CRS may use approaching criteria to initiate OP-TM-534-901, RB Emergency Cooling.

Op Test No.: TMI2019 Scenario# 3 Event # 8Page **28** of **33**

Event Description: RCS Leak, LOCA Cooldown

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.17: Verifies PLA-4-9 "Turb Bldg Circ Water Pipeline Rupture" alarm is in, but actions should have been taken at this point. If not, the PLA-4-9 actions could be taken here.
	ARO	Step 3.18: Verifies PRF1-3-5 "Intermed Bldg Flooding" alarm is Clear.
	ARO	Step 3.19: Verifies the following alarms are clear: - PLB-2-9, SF Pool A Level Lo - PLB-2-10, SF Pool B Level Lo - PLB-3-9, SF Pool A Hi Temp - PLB-3-10, SF Pool B Hi Temp
	URO	Step 3.20: Verifies PRESSURIZER LEVEL can <b>NOT</b> be MAINTAINED WITHOUT HPI and announces entry into EOP-006, LOCA Cooldown.
<b>OP-TM-EOP-006, LOCA COOLDOWN</b>		
	URO	Step 3.1: Ensures 4 psig ESAS IAW OP-TM-642-902, "4 psig ESAS Actuation".
	CRS	Step 3.2: Ensures OP-TM-211-901, "Emergency Injection HPI/LPI", OP-TM-244-901, "Containment Isolation", OP-TM-534-901, and "RB Emergency Cooling", are initiated.
<b>EXAMINER NOTE: Steps for throttling HPI will be covered in the addendum at the end of the SEG.</b>		
<b>CT-2</b>	URO	Step 3.3: Ensures HPI <b>and</b> LPI are operated IAW Rule 2
	URO	Step 3.4: Verifies Core Flood tank levels > 2 ft and ensures both CF-V-1A and CF-V-1B are Open.
	CRS	Step 3.5: Verifies Containment pressure has NOT exceeded 30 psig.

Op Test No.: TMI2019 Scenario# 3 Event # 8Page **29** of **33**

Event Description: RCS Leak, LOCA Cooldown

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.6: Initiates 1105-18, Containment Hydrogen Monitor, to perform an Emergency Condition Startup of the Hydrogen Monitors
	ARO	Step 3.7: Initiates OP-TM-826-901, "Control Building Ventilation System Radiological Event Operations".
	CRS	Step 3.8: Verifies RCS is NOT >25 °F superheat.
	URO	Step 3.9: Initiates Guide 20, "PRIOR to Transfer to RB Sump".
	CRS	Step 3.10: Performs an alarm review.
	CRS	Step 3.11: Requests SM evaluate Emergency Action Levels (EALs).
	ARO	Step 3.12: Verifies both G1-02 <b>and</b> G11-02 are Closed.
	URO	Step 3.13: Verifies both G1-02 <b>and</b> G11-02 are Closed.
	URO	Step 3.13: Initiates Rule 5, "Emergency Boration". Steps in this Rule should have been completed.
	URO	Step 3.14: Verifies BWST level is NOT <15 ft and RB flood level is NOT >54"
	URO	Step 3.15: Verifies LPI flow is NOT >1250 gpm in each line.
	CRS	Step 3.16: Verifies that primary to secondary heat transfer (PSHT) exists, so this step is NA.
	CRS	Step 3.17: Verifies HPI flow is adequate.

Op Test No.: TMI2019 Scenario# 3 Event # 8Page **30** of **33**

Event Description: RCS Leak, LOCA Cooldown

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.18: Initiates RCS Cooldown within the limits of Guide 11, "Cooldown Rate limits".
	ARO	Step 3.19: Ensures OTSG pressure is being controlled IAW Guide 6, "OTSG Pressure Control". Since there is no vacuum ARO will use the ADV's for pressure control.
	URO	Step 3.20: Maintains minimum SCM IAW Guide 8, "RCS Pressure Control".
	CRS	Step 3.21: Recognizes HPI cooling was not initiated. This step is NA.
	CRS/URO	Step 3.22: Recognizes HPI is still required to maintain pressurizer level.
	CRS	Step 3.23: RCPs are not off, step is NA.
	CRS	Step 3.24: RCS pressure will not get less than 900 psig, step is NA for this scenario.
	URO	Step 3.25: RC-P-1A and RC-P-1B are running, RC-P-1C and RC-P-1D will be shutdown in this step.
	CRS/ARO	Step 3.26: Maintains RCS cooldown rate within limits of Guide 11, "Cooldown Rate Limits" with the ADVs.
<b>TERMINATION POINT: At the examiners discretion after HPI is throttled and OP-TM-EOP-006, LOCA COOLDOWN is entered the scenario may be terminated.</b>		



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Event Description: Throttling HPI

Time	Position	Applicant's Actions or Behavior
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EXAMINER NOTE:	<p><b>This addendum assumes that the only ES signal in is the 4 psig signal initiated by OP-TM-EOP-006. These steps are attachment 7.3 of OP-TM-211-901, and are found on the back of Rule 2 on the console.</b></p> <p><b>When throttling HPI, the goal is to have controlled flow into the RCS while maintaining (or approaching) a pressurizer level band. The attachment written such that the operator could reverse their steps in order to achieve the optimal HPI flow (i.e, start a Makeup Pump which was just secured, or throttle open an MU-V-16 which was just closed) or if necessary, re-initiate the ES and then start from the beginning.</b></p>	
	URO	Step 1: Defeat ESAS actuation signals by pressing the 4# manual defeat pushbuttons until the DEFEAT or ENABLED light is lit.
	URO	Step 2: Examinee gains CRS concurrence and secures MU-P-1A by taking the pistol grip (CC) to the trip position. The RED light will become dim. The GREEN light will become bright.
	URO	Step 3: Throttling is permitted IAW Rule 2 based on SCM >25F and HPI cooling not needed.
	URO	Step 4: Examinee will open MU-V-36 and MU-V-37 by pressing the RED open pushbuttons on CC. The GREEN closed lights will become dim, the RED lights will become bright.
	URO	Step 5: Emergency boration may or may not be required.
	URO	Step 6: The crew will not terminate HPI in this scenario. This step is NA.
	URO	Step 7: The examinee will close MU-V-16A & D. The examinee will press the GREEN closed pushbutton.

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Event Description: Throttling HPI

Time	Position	Applicant's Actions or Behavior
	URO	Step 8: If necessary, the operator will appropriately throttle the remaining HPI valve, MU-V-16C by pressing the CLOSED pushbutton if less flow is required, or the OPEN pushbutton if more flow is required. To stop the valve at a desired position, the WHITE STOP pushbutton should be depressed.
	URO	Step 9: If MU-V-16C is fully closed, the examinee shutdown MU-P-1C by taking the pistol grip (CR) to the trip position. The RED light will become dim. The GREEN light will become bright
	URO	Step 10: If MU-V-36 and MU-V-37 have not been opened in step 4 (which they likely have been), the examinee will ensure MU pump flow is > 40 gpm. The operator can add up the Seal Injection and HPI to ensure flow is sufficient.
	URO	Step 11: Throttle MU-V-16B (CC) to maintain desired level and/or trend of pressurizer level.
	URO	Step 12: The crew may choose to OPEN MU-V-18 to restore normal pressurizer level control.

## Initial Conditions:

- 2% power, MOL, ICS is in manual with reactivity control at the diamond
- Turbine Reset and all 6 Circulating Water Pumps are running for a maintenance PMT
- FW-P-1B is operating with control on the air speed changer
- Fuel is not deconditioned

## TURNOVER:

- Raise reactor power to 10% for special physics testing, initiate a bleed to the 'B' RCBT