JPM "RO A1-1" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added Control Rod Group 8 position (100%) to Initial Conditions.
3. Bolded "Estimated Critical Boron" on Initiating Cue per D'Antonio.
4. Added Examiner Note in front of Step 1.

NOTE to EXAMINER: See page 8 of 10 for KEY

Facility: TMI – Unit 1 Task No.: GOP002004

Task Title: Calculate an Estimated Critical Boron Concentration JPM No.: TMI08 NRC JPM A1-1RO

K/A Reference: 2.1.25 (3.9)

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ____ Actual Performance: X

Classroom X Simulator ____ Plant ____

READ TO THE EXAMINEE

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

Initial Conditions:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- Reactor Power was 100%
- The unit had been on-line for 150 days.
- The last down power was 30 days ago.
- Cycle Burnup is 310 EFPD.
- TAVE = 532˚F
- Current Boron Concentration = 1785 PPM
- Control Rod Group 8 is 100% withdrawn
- The Desired Critical Rod Position is: 80% WD on CRG-6.
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is .95

Task Standard: Calculates the Estimated Critical Boron accurately.

Required Materials: None

General References: 1103-15B, ESTIMATED CRITICAL CONDITIONS, Rev. 37

Handouts: 1103-15B, ESTIMATED CRITICAL CONDITIONS, Rev. 37

Initiating Cue: You are the URO. A reactor startup is anticipated for this shift. **Calculate Estimated Critical Boron** IAW 1103-15B, Enclosure 1 - ESTIMATED CRITICAL CONDITIONS.

Time Critical Task: No

Validation Time: 30 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with an asterisk)

NOTE to EXAMINER: See page 8 of 10 for KEY

1103-15B Step 2.0

Performance Step: 1 Locates/reviews procedure Limits and Precautions.

Standard: The Examinee reviews LIMITS AND PRECAUTIONS.

Evaluator Cue: **Provide a clean copy of 1103-15B to the Examinee**

Comment:

1103-15B Step 3.1.1 Prerequisite

Performance Step: 2 It is desired to perform an Estimated Critical Boron Concentration (ECB).

Standard: The Examinee verifies the desire to perform and ECB.

Comment:

1103-15B Step 3.1.2.1

Performance Step: 3 Obtain Enclosure 1 and use the following to complete.

Standard: The Examinee obtains Enclosure 1.

Comment:

1103-15B Step 3.1.2.2

Performance Step: 4

- Obtain the average reactor coolant temperature, TAVE, from the PPC or from the digital display window on the Control Room Center Console.
- Obtain the cycle burn up from Core Monitoring System (CMS) Display 1 or the hourly log.
- Obtain the latest measured boron concentration from the Reactor Coolant Chemistry Analysis, and check the Control Room log to verify that no major boron concentration changes have been made since the analysis.
- If major boron concentration changes have been made since the latest sample, request a new RCS boron concentration measurement.
- Until the new boron concentration is available, use 1103 4, Soluble Poison Concentration Control to estimate the current boron concentration to calculate a preliminary ECB.

Standard: The Examinee reviews the given plant conditions.

Evaluator Cue: **There have been no major boron concentration changes since the latest sample.**

Comment:

1103-15B Step 3.1.2.2.d

Performance Step: 5 Record the desired critical rod positions.

Standard: The Examinee records the desired critical rod positions on Enclosure 1.

Comment:

1103-15B Step 3.1.2.3.a

√ **Performance Step: 6** Determine the FUEL EXCESS REACTIVITY per Figure 1.

Standard: The Examinee records 11.8% to 12.0% dk/k on Enclosure 1

Comment:

1103-15B Step 3.1.2.3.b

√ **Performance Step: 7** Determine the CRG 5-7 REACTIVITY WORTH of Step 2.d per Figure 6

Standard: The Examinee records -0.9% to -1.1% dk/k

Comment:

√ **Performance Step: 8** Determine the CRG 8 REACTIVITY WORTH of Step 2.d per Figure 2

Standard: The Examinee records 0% dk/k on Enclosure 1.

Comment:

1103-15B Step 3.1.2.3.d

√ **Performance Step: 9** Obtain the Xenon worth - - - .

Standard: The Examinee records -0.45% to -0.5% dk/k from Figure 4 on Enclosure 1.

Evaluator Cue: **The Plant Process Computer Program and Nuclear Engineering are unavailable. Figure 4 is to be used for the completed Enclosure 1.**

Comment:

1103-15B Step 3.1.2.3.e

√ **Performance Step: 10** Determine the reactivity associated with SAMARIUM AND PLUTONIUM BUILDUP after shutdown by using Figure 5.

Standard: The Examinee records -0.065% to -0.075% dk/k on Enclosure 1.

Comment:

1103-15B Step 4.1.1

√ **Performance Step: 11** Determine the BORON REACTIVITY WORTH REQUIRED FOR CRITICALITY.

Standard: The Examinee calculates the Boron Reactivity Worth Required for Criticality on Enclosure 1, Step 4.1 and records the value (-10.125% to -10.585% dk/k)

Comment:

1103-15B Step 4.1.2

√ **Performance Step: 12** Determine the HZP INVERSE BORON WORTH associated with cycle burnup per Figure 3.

Standard: The Examinee records 142.75 to 143.25 ppmB/%dk/k

Comment:

1103-15B Step 4.3.1

√ **Performance Step: 13** Determine the CORRECTED CRITICAL BORON CONCENTRATION by multiplying the required boron worth (Step 4.1) by the HZP Inverse Boron Worth (Step 4.2)

Standard: The Examinee calculates the CORRECTED CRITICAL BORON CONCENTRATION and records on Enclosure 1, Step 4.3.1 (1445 to 1516.3 ppmB)

Comment:

1103-15B Step 4.3.2

Performance Step: 14 Determine the FINAL MIXED BORON DEPLETION CORRECTION FACTOR based on current correction factor and accounting for predicted boron additions.

Standard: The Examinee records .95 as given in the initial conditions

Comment:

1103-15B Step 4.3.3

√ **Performance Step: 15** Determine the ESTIMATED MEASURED CRITICAL BORON CONCENTRATION by dividing the CORRECTED CBC (Step 4.3.1) by the DEPLETION CORRECTION FACTOR (4.3.2)

Standard: The Examinee calculates ESTIMATED MEASURED CRITICAL BORON CONCENTRATION as 1521 to 1596.1 ppmB and records on Enclosure 1.

Evaluator Note: **The ECB time to become invalid is N/A since the Xenon worth is within 0.5% of its zero value.**

Comment:

Terminating Cue: **When the candidate returns the completed Enclosure 1 to the examiner: This JPM is complete.**

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

ENCLOSURE 1 KEY for use with JPM
Estimated Critical Boron Concentration (3.1)

NOTE

dividual data entries may be completed in any sequence. Sign-off of the Enclosure signifies e completion of the Enclosure calculation.

2.a CALCULATION IS FOR AN ECB AT 532 ± 2°F ON TAVE 532 DATE/TIME 1 hour ago exam day

2.b CYCLE BURNUP 310EFPD

2.c PRESENT MEASURED BORON CONCENTRATION 1785ppmB

2.d DESIRED CRITICAL ROD POSITION

- CRG 1-4 100 % WD
- CRG 5 100 % WD
- CRG 6 80 % WD
- CRG 7 5 % WD
- CRG 8 100 % WD

3.a FUEL EXCESS REACTIVITY (FIG 1) 11.8-12.0 % Δk/k

3.b DESIRED CRITICAL CRG 5-7 REACTIVITY WORTH (FIG 6) -0.9 to -1.1 % Δk/k

3.c DESIRED CRITICAL CRG 8 REACTIVITY WORTH (F G 2) 0 % Δk/k

3.d XENON REACTIVITY WORTH (PPC, REACTOR ENGR. FIG 4) -.45 to -0.5 % Δk/k

.e SAMARIUM AND PLUTONIUM BUILDUP (FIG 5)

- TIME SINCE SHUTDOWN 48 HRS
- REACTIVITY DUE TO BUILDUP -0.065 to -0.075% Δk/k

4.1 BORON REACTIVITY WORTH REQUIRED FOR CRITICALITY

$$\left[\underset{3.a}{(\text{FUEL})} + \underset{3.b}{(\text{CRG } 5-7)} + \underset{3.c}{(\text{CRG } 8)} + \underset{3.d}{(\text{Xenon})} + \underset{3.e}{(\text{SM})}\right] \times (-1) =$$ -10.125 to -10.585% Δk/k

4.2 INVERSE BORON WORTH (FIG 3) 142.75 to 143.25 ppmB/% Δk/k

4.3 CRITICAL BORON CONCENTRATION

4.3.1 CORRECTED CRITICAL BORON CONCENTRATION

$$\left[\underset{4.2}{(\text{Inverse Boron})} \times (-1) \times \underset{4.1}{(\text{Boron React})}\right] =$$ 1445 to 1516.3 ppmB

4.3.2 FINAL MIXED BORON DEPLETION CORRECTION FACTOR (PPC, Control Room Log, Reactor Engineering) .95

4.3.3 ESTIMATED MEASURED CRITICAL BORON CONCENTRATION (4.3.1) / (4.3.2) = 1521 to 1596.1 ppmB

4.3.4 INVALID If this is not a Xenon free startup, then RECORD the TIME when ECB becomes _____ date _____ time

CALCULATED BY: _____ DATE/TIME _____

APPROVED BY (SRO): _____ DATE/TIME _____

Job Performance Measure No.: TMI08 NRC JPM A1-1RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- Reactor Power was 100%
- The unit had been on-line for 150 days.
- The last down power was 30 days ago.
- Cycle Burnup is 310 EFPD.
- TAVE = 532˚F
- Current Boron Concentration = 1785 PPM
- Control Rod Group 8 is 100% withdrawn
- The Desired Critical Rod Position is: 80% WD on CRG-6.
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is .95

INITIATING CUE:

You are the URO. A reactor startup is anticipated for this shift. **Calculate Estimated Critical Boron** IAW 1103-15B, Enclosure 1 - ESTIMATED CRITICAL CONDITIONS.

JPM "RO A1-2" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added a quick key to page 7 of 10.
3. Added Examiner note in front of step 1. "**NOTE to EXAMINER: See page 7 of 10 for KEY**".
4. Edited the word "Boron" on pages 1 and 6.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 82301006

Task Title: Complete RB Avg Temperature Calculation JPM No.: TMI08 NRC JPM A1-2RO

K/A Reference: G 2.1.7 (4.4/4.7)

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 ARO
Plant is at 100% power
Time is 2100 hours

Task Standard: Average temperature calculations have been verified for both elevations, determination is made that elevation below 320' is out of spec high and there are less than 4 operable detectors below 320' elevation.

Required Materials: Calculator

General References: 1301-1, SHIFT AND DAILY CHECKS, Rev 161

Handout:
- 1301-1 Enclosure 5, Containment Temperature Average Calculation Sheet.
- 1301-1 Data Sheet 1, Section B.3
- "Picture of AH-TR-655, with temperatures doctored per setup"

Initiating Cue: You are directed to complete 1301-1 Shift and Daily checks section B.3 of Data Sheet 1 and Enclosure 5, which is being used due to instruments out of service.

Time Critical Task: No

Validation Time: 15 Minutes

SIMULATOR SETUP

Set up a "Doctored picture of AH-TR-655" with the following data by using classroom simulator.
TR-655A = 135.6
TR-655B = 128.7
TR-655C = "Blank"
TR-655D = 131.5
TR-655E = 130.6
TR-655F = "Blank"
TR-655G = 130.4
TR-655H = 135.8
TR-655I = 135.6
TR-655J = 137.7
TR-655K = 135.5
TR-655L = 137.3
TR-655M = "Blank"
TR-655N = 115.6
TR-655O = "Blank"
TR-655P = 135.6
TR-655Q = 112.4
TR-655R = "Blank"
TR-655S = "Blank"
TR-655T = 116.3
TR-655U = "Blank"
TR-655V = 114.9
TR-655W = 126.9
TR-655X = 125.8

Numbers are inserted as (number above)-50 = Analog override value.
Save screen capture.

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EXAMINER NOTE: See EXAM KEY page 7 of 10

1301-1 Enclosure 5 Avg. Temp above 320' Elev.

√ **Performance Step: 1** **Avg. Temp above 320' Elev.**

Avg. Temperature above 320' Elev. Calculated

Standard: 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.

Evaluator Cue: **If Examinee points out that the recorded average above 320' elevation is above 130°F have them record the value and continue.**

Comment:

1301-1 Enclosure 5 Avg. Temp below 320' Elev.

Performance Step: 2 **Avg. Temp below 320' Elev.**

Standard: Temperature above 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 Avg. Temp verified signature

Performance Step: 3 Signs for Verification of calculation.

Standard: Should sign for calculation.

Evaluator Note: **If the Examinee asks about the discrepancies inform them to continue with Data sheet 1.**

Comment:

1301-1 Data Sheet 1 section B.3

Performance Step: 4 Records average temperature above 320' elevation.

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

Comment:

1301-1 Data Sheet 1 section B.3

Performance Step: 5 Records average temperature below 320' elevation.

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

Comment:

1301-1 Data Sheet 1 section B.3

Performance Step: 6 Are there 13 or more operable detectors above 320' elevation? (Circle Y/N)

Standard: Examinee circles Y

Comment:

1301-1 Data Sheet 1 section B.3

√ **Performance Step: 7** Is Avg. Temp. above 320' Elev. Less than 130°F? (Circle Y/N)

Standard: Examinee circles N

Comment:

1301-1 Data Sheet 1 section B.3

√ **Performance Step: 8** Are there 4 or more operable detectors below 320' elevation? (Circle Y/N)

Standard: Examinee circles N

Comment:

1301-1 Data Sheet 1 section B.3

Performance Step: 9 Is Avg. Temp. below 320' Elev. Less than 120°F? (Circle Y/N)

Standard: Examinee circles Y

Comment:

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

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

KEY

From page 75

Containment Temperature Average Calculation Sheet
Data Sheet to Substitute when a RTD on AH-TR-655 has failed

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

From page 17

B.3 Tech. Spec. 4.20, 3.17

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.

AH-TR-655

Average Temp. ABOVE 320' Elev. **131.4** °F Average Temp. BELOW 320' Elev. **115.6** °F

Are there 13 or more operable detectors above 320' elevation? (Circle Y/N) (Y) / N
Is Avg. Temp. above 320' Elev. less than 130°F? (Circle Y/N) Y / (N)
Are there 4 or more operable detectors below 320' elevation? (Circle Y/N) Y / (N)
Is Avg. Temp. below 320' Elev. less than 120°F? (Circle Y/N) (Y) / N

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A1-2RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

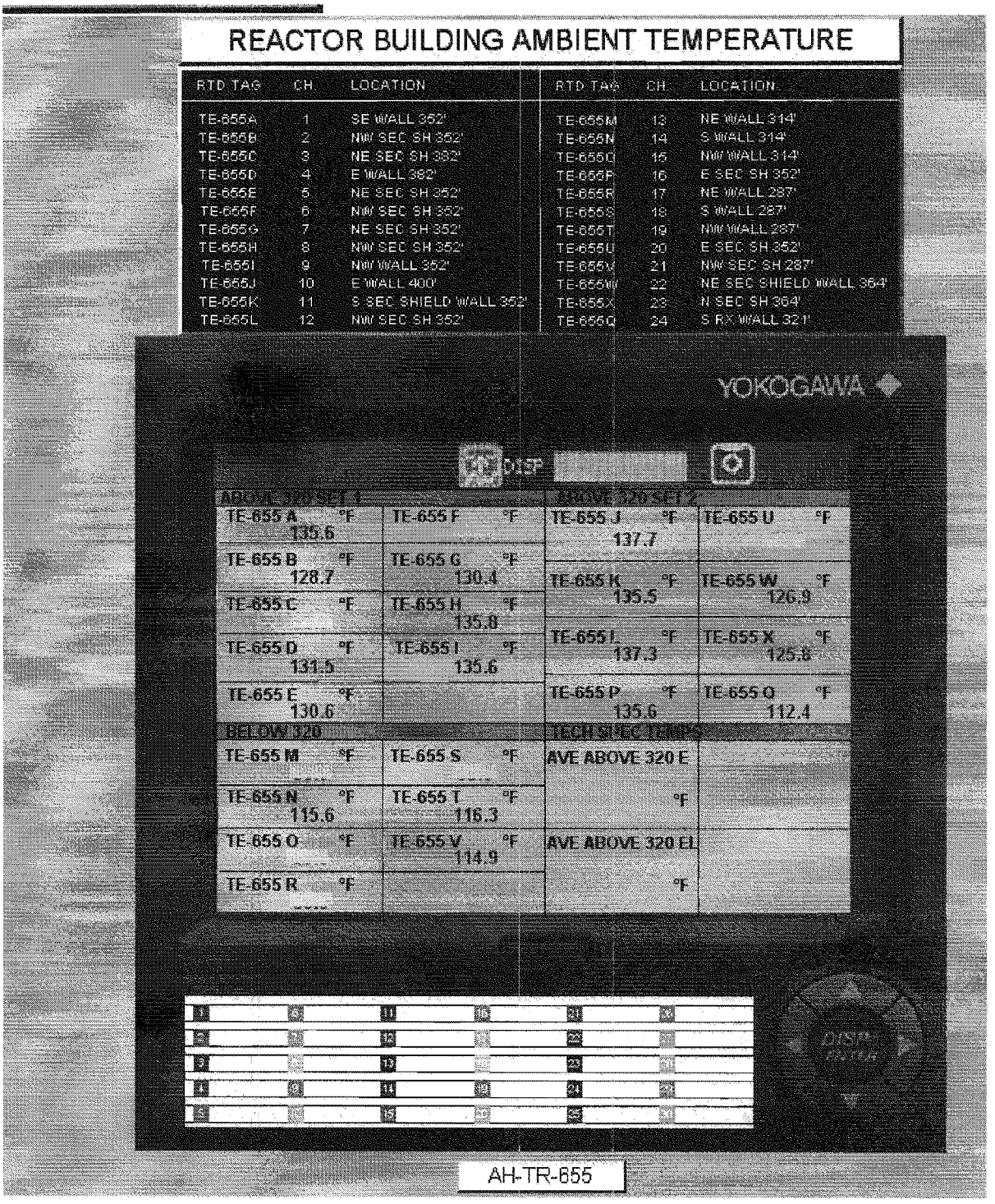
Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

You are the ARO
Plant is at 100% power
Time is 2100 hours

INITIATING CUE:

You are directed to complete 1301-1 Shift and Daily checks section B.3 of Data Sheet 1 and Enclosure 5, which is being used due to instruments out of service.


REACTOR BUILDING AMBIENT TEMPERATURE
RTD TAG CH LOCATION
TE-655A 1 SE WALL 352'
TE-655B 2 NW SEC SH 352'
TE-655C 3 NE SEC SH 382'
TE-655D 4 E WALL 382'
TE-655E 5 NE SEC SH 352'
TE-655F 6 NW SEC SH 352'
TE-655G 7 NE SEC SH 352'
TE-655H 8 NW SEC SH 352'
TE-655I 9 NW WALL 352'
TE-655J 10 E WALL 400'
TE-655K 11 S SEC SHIELD WALL 352'
TE-655L 12 NW SEC SH 352'
TE-655M 13 NE WALL 314'
TE-655N 14 S WALL 314'
TE-655O 15 NW WALL 314'
TE-655P 16 E SEC SH 352'
TE-655R 17 NE WALL 287'
TE-655S 18 S WALL 287'
TE-655T 19 NW WALL 287'
TE-655U 20 E SEC SH 352'
TE-655V 21 NW SEC SH 287'
TE-655W 22 NE SEC SHIELD WALL 364'
TE-655X 23 N SEC SH 364'
TE-655Q 24 S RX WALL 321'
YOKOGAWA
DISP
ABOVE 320 SET 1
TE-655 A °F 135.6
TE-655 F °F
TE-655 B °F 128.7
TE-655 G °F 130.4
TE-655 C °F
TE-655 H °F 135.8
TE-655 D °F 131.5
TE-655 I °F 135.6
TE-655 E °F 130.6
BELOW 320
TE-655 M °F
TE-655 S °F
TE-655 N °F 115.6
TE-655 T °F 116.3
TE-655 O °F
TE-655 V °F 114.9
TE-655 R °F
ABOVE 320 SET 2
TE-655 J °F 137.7
TE-655 U °F
TE-655 K °F 135.5
TE-655 W °F 126.9
TE-655 L °F 137.3
TE-655 X °F 125.8
TE-655 P °F 135.6
TE-655 Q °F 112.4
TECH SUPEC TEMPS
AVE ABOVE 320 E
°F
AVE ABOVE 320 EL
°F
AH-TR-655

JPM "A2 RO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. To initial conditions "Electricians have reported …" added "and thus associated contacts cannot close as designed", per Allison and D'Antonio This matches the SRO initial conditions.
3. Added Evaluator cue to step 4

Evaluator CUE: **If examinee indicates that contact will not close ask what effect the inability of the contact to close will have on equipment.**

4. Added an Evaluator note to explain the operation of the equipment under the failed contact state given;

EVALUATOR NOTE: The given contact failure affects the LOAD shed lock out feature of the Engineered Safeguards Feature. Normal Load shed / lockout occurs for either an ES signal and UV on the associated bus or ES signal and the associated Diesel Generator Breaker closed. This failure only affects the Diesel Breaker and ES signal logic NOT the ES and UV logic.

5. Added an Evaluator Note to notify the possible need to give the examinee up to 3 additional handouts if requested by the examinee.

EVALUATOR NOTE: The examinee throughout the JPM may request 208-169 to determine that the UV is not affected. Provide if requested. The examinee throughout the JPM may also request 208-300 or 208-318 to determine the affect on lockout. Provide if requested.

Facility: THREE MILE ISLAND UNIT 1 Task No.:

Task Title: Use Station Drawing to Predict Impact of Component Failure JPM No.: TMI08 NRC JPM A2 RO

K/A Reference: G 2.2.41 (3.5/3.9)

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ____ Actual Performance: X

Classroom X Simulator ____ Plant ____

READ TO THE EXAMINEE

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

Initial Conditions: You are the Extra RO
Plant is at 100% power
Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker and thus associated contacts cannot close as designed.
Electricians have provided a copy of 208-164.
Only contacts associated with 52 MOC(2) are affected.

Task Standard: Determination that 27/86 lockouts will not occur for condition of Diesel breaker closed and ESAS.

Required Materials: None

General References: 208-314 1S 480 Volt Swgr, 208-316 1T 480 Volt Swgr., 208-169 Bus 1E UV and Potential Indicating Circuits, 208-300 Bus 1T UV Lock-out Relays, 208-318 Bus 1S UV Lock-out Relays

Handout: 208-164, G11-02

Initiating Cue: You are directed to determine impact to operations based on this failure.

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **The given contact failure affects the LOAD shed lock out feature of the Engineered Safeguards Feature. Normal Load shed / lockout occurs for either an ES signal and UV on the associated bus or ES signal and the associated Diesel Generator Breaker closed. This failure only affects the Diesel Breaker and ES signal logic NOT the ES and UV logic.**

EVALUATOR NOTE: **The examinee throughout the JPM may request 208-169 to determine that the UV is not affected. Provide if requested. The examinee throughout the JPM may also request 208-300 or 208-318 to determine the affect on lockout. Provide if requested.**

Performance Step: 1 **Obtains 208-164 G11-02 Elementary Electrical Diagram**

Standard: Drawing obtained.

Evaluator Cue: **Hand the candidate a copy they can mark up.**

Comment:

Performance Step: 2 **52 MOC(2) located on drawing at grid A-7 (52 MOC(2))**

Standard: Contacts located.

Comment:

Performance Step: 3 **Refers to sheet 314 or 316 to determine contact effect.**

Standard: 208-314 or 208-316 referred to

Evaluator Note: **After student obtains appropriate diagram you may hand the candidate a copy they can mark up.**

Comment:

√ **Performance Step: 4** **Determines from 208-314 or 316 that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**

Standard: Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.

Evaluator CUE: **If examinee indicates that contact will not close ask what effect the inability of the contact to close will have on equipment.**

Comment:

√ **Performance Step: 5** **Determines from 208-314 or 316 (which ever was not evaluated in previous step) that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**

Standard: Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.

Comment:

Terminating Cue: **When it has been identified that the 27/86 lockouts (undervoltage plus ESAS) will not trip / lockout for the condition of diesel breaker closed plus ESAS the JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A2 RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

You are the Extra RO

Plant is at 100% power

Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker and thus associated contacts cannot close as designed.

Electricians have provided a copy of 208-164.

Only contacts associated with 52 MOC(2) are affected.

INITIATING CUE:

You are directed to determine impact to operations based on this failure.

JPM "A4 RO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added Alternate path statement

ALTERNATE PATH STARTS HERE;

Examinee must recognize that the Dialogic system is not working and proceed to section 2 of the procedure.

3. Modified Toll Free phone number CUE sheet to ensure it won't be handed out accidentally at the start.
4. Edited Examiner Cue in Steps 3 and 8 to match that in Step 14.
5. Edited Examiner Cue in Step 12 to ensure that the appropriate sheet is handed out vice the information just being stated by the examiner.

Facility: TMI – Unit 1 Task No.:

Task Title: ERO Notification JPM No.: TMI08 NRC JPM A4 RO

K/A Reference: 2.4.39 (3.9) New Alternate Path

Examinee: NRC Examiner:

Facility Examiner: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:
- An ALERT has been declared at TMI-1
- The Emergency Response Organization needs to be called out

Task Standard:
- The Examinee uses the Manual Activation of the Primary Call Out System to notify the ERO to report IAW EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation.

Required Materials: None

General References: EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation

Handouts: EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation Call Out System toll free phone number 1-800-123-4567 ON A YELLOW PIECE OF PAPER

Initiating Cue: As the Shift Communicator you are directed to call out the Emergency Response Organization to the Site Facilities.

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP

Ensure the ERO Notification Phone is set up in the Simulator Observation area and is **UNPLUGGED.**

(Denote Critical Steps with an asterisk)

Start Time _____

Performance Step: 1	Locate the ERO Notification Phone
Standard:	The Examinee locates the Simulator ERO Notification Phone in the Simulator Observation area and locates the local copy of EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation.
Examiner Cue:	**Provide the Examinee a copy of EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation**
Comment:	

Performance Step: 2	Determines section 1.1 applies to the notification for the ERO to respond to the Site Facilities.
Standard:	The Examinee reviews EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation front page and determines that section 1.1 applies to the notification for the ERO to respond to the Site Facilities.
Procedure Notes:	If EP Pager Call Phone does not operate, go to Section 2, Manual Activation of the Primary Call Out System. If cancellation of the call out scenario is required once activated, proceed to Section 4, Call Out System Scenario Cancellation.
Examiner Note:	**Neither of the two procedure notes apply at this time.**
Comment:	

Performance Step: 3	IF ERO Response To Site Facilities Is Required, THEN perform the following steps: A. LIFT the designated EP Pager Call Phone receiver. B. Press the "Part 1 ERO Response Required" button
Standard:	The Examinee lifts the receiver and presses the "Part 1 ERO Response Required" button (1101)
Examiner Cue:	**Provide the following prompt after the number is entered and "#" sign is pressed:** **You have entered XXXX (the number entered by the Examinee), is this correct?**
Comment:	
Performance Step: 4	THEN press "9" for Yes and continue
Standard:	The Examinee presses "9" on the phone keypad.
Comment:	
√ **Performance Step: 5**	PRESS the "Part 2 ERO Response Required" button.
Standard:	The Examinee presses the "Part 2 ERO Response Required" button.
Procedure Note:	If the "Good-bye" prompt is NOT heard after the 2nd attempt, the system was NOT successfully activated, proceed to Section 2, Manual Activation of the Primary Call Out System, to attempt to manually initiate the callout system via any available touchtone telephone (e.g. 4-digit station telephone, satellite telephone, or cellular/mobile telephone).
Examiner Cue:	**Provide the Examinee the Voice Prompt saying "Invalid entry"**
Comment:	

Performance Step: 6 The Examinee hangs up the receiver.

Standard: The Examinee hangs up the receiver for at least 5 seconds.

Comment:

Performance Step: 7 Go back to step 1.1.A

Standard: The Examinee goes back to step 1.1.A

Comment:

Performance Step: 8 IF ERO Response To Site Facilities Is Required, THEN perform the following steps:

A. LIFT the designated EP Pager Call Phone receiver.

B. Press the "Part 1 ERO Response Required" button

Standard: The Examinee lifts the receiver and presses the "Part 1 ERO Response Required" button (1101)

Examiner Cue: **Provide the following prompt after the number is entered and "#" sign is pressed:**

You have entered XXXX (the number entered by the Examinee), is this correct?

Comment:

Performance Step: 9 THEN press "9" for Yes and continue

Standard: The Examinee presses "9" on the phone keypad.

Comment:

Performance Step: 10 PRESS the "Part 2 ERO Response Required" button.

Standard: The Examinee presses the "Part 2 ERO Response Required" button.

Procedure Note: If the "Good-bye" prompt is NOT heard after the 2nd attempt, the system was NOT successfully activated, proceed to Section 2, Manual Activation of the Primary Call Out System, to attempt to manually initiate the callout system via any available touchtone telephone (e.g. 4-digit station telephone, satellite telephone, or cellular/mobile telephone).

Examiner Cue: **Provide the Examinee the Voice Prompt saying "Invalid entry"**

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must recognize that the Dialogic system is not working and proceed to section 2 of the procedure.

√ **Performance Step: 11** The Examinee proceeds to Section 2

Standard: The Examinee proceeds to Section 2 of the procedure.

Comment:

Performance Step: 12 Reviews the Procedure Notes and requests the toll free number to access the call out system.

Standard: The Examinee reviews the Procedure Notes and requests the toll free number to access the call out system.

Procedure Notes: If cancellation of the call out scenario is required once activated, proceed to Section 4, Call Out System Scenario Cancellation.
N/A

REFER to the Confidential Pager Report (LGS/PBAPS/OC) or Automated Call out System / Pager Access Numbers List (TMI– the list is located in the Shift Manager's office safe or the Control Room Supervisor's desk cabinet).

Examiner Cue: **When asked for the designated toll free phone number to access the call out system provide the "CALL OUT SYSTEM TOLL FREE NUMBER" sheet.**

Comment:

√ **Performance Step: 13** DIAL the designated toll free phone number to access the call out system.

Standard: The Examinee dials the designated toll free number

Examiner Cue: **If the phone number is dialed correctly provide the following cue:**

"This is the remote activation module. Please enter your scenario activation password followed by the # sign."

Comment:

√ **Performance Step: 14** The Examinee enters "1101" and presses the # sign on the phone keypad.

Standard: The Examinee enters "1101" and presses the # sign on the phone keypad.

Examiner Cue: **Provide the following prompt after the number is entered and "#" sign is pressed:**

You have entered XXXX (the number entered by the Examinee), is this correct?

Comment:

√ **Performance Step: 15** The Examinee presses the "9".

Standard: The Examinee presses the "9" if the number is correct.

Examiner Cue: **Provide the following cue after "9" is pushed:**

"To start a scenario, enter the scenario ID followed by the # sign or press # alone for more options."

Comment:

√ **Performance Step: 16** The Examinee re-enters "1101" and presses the "#" sign on the keypad.

Standard: The Examinee re-enters "1101" and presses the "#" sign on the keypad.

Examiner Cue: **Provide the following prompt after the number is entered and "#" sign is pressed:**

You have entered XXXX (the number entered by the Examinee), is this correct?

Comment:

√ **Performance Step: 17** The Examinee presses the "9".

Standard: The Examinee presses the "9" if the number is correct.

Examiner Cue: **After the Examinee presses "9" on the keypad provide the following Cue:**

"To Start the Scenario Press 3. To Return to the Main Menu press #."

Comment:

√ **Performance Step: 18** PRESS the "3" button to start the scenario.

Standard: The Examinee presses the "3" button to start the scenario.

Examiner Cue: **After the "3" button is pressed on the keypad provide the following Cue:**

"The scenario is building."

Comment:

√ **Performance Step: 19** PRESS the "#" button to exit.

Standard: The Examinee presses the "#" button to exit.

Examiner Cue: **After the Examinee presses the "#" button provide the following Cue:**

"Good-bye"

Comment:

Performance Step: 20 After you hear the voice prompt: "Good-bye", HANG-UP the receiver.

Standard: The Examinee hangs up the receiver

Comment:

Performance Step: 21 Record the time of the call out system initiation: _____.

Standard: The Examinee records the time of the call out system initiation.

Comment:

Terminating Cue: **When the Examinee has recorded the time of the call out system initiation the JPM may be terminated.**

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

Job Performance Measure No.: TMI08 NRC JPM A4 RO

Examinee's Name:

Date Performed:

Facility Examiner:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- An ALERT has been declared at TMI-1
- The Emergency Response Organization needs to be called out

INITIATING CUE:

As the Shift Communicator you are directed to call out the Emergency Response Organization to the Site Facilities.

JPM "A1-1 SRO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added words filled out to Handout 1103-15B... on page 1
3. Created Exam Key page (page 6 of 8)
4. Created electronic copy of "handout copy 1103-15B"
5. Added a blank copy of 1103-15B for the examinee to use.

Facility: TMI – Unit 1 Task No.: GOP002004

Task Title: Review and approve an Estimated Critical Boron Concentration Calculation JPM No.: TMI08 NRC JPM A1-1SRO

K/A Reference: 2.1.25 (4.2)

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- Reactor Power was 100%
- The unit had been on-line for 150 days.
- The last down power was 30 days ago.
- Cycle Burnup is 310 EFPD.
- TAVE = 532˚F
- Current Boron Concentration = 1785 PPM
- The Desired Critical Rod Position is: 80% WD on CRG-6.
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is .95

Task Standard: Identifies all errors.

Required Materials: Completed 1103-15B, Enclosure 1

General References: 1103-15B, ESTIMATED CRITICAL CONDITIONS, Rev. 37

Handouts: 1103-15B, ESTIMATED CRITICAL CONDITIONS, Rev. 37, filled out.

Initiating Cue: You are the Control Room Supervisor on duty. A reactor startup is anticipated for this shift. An 1103-15B, Enclosure 1 - ESTIMATED CRITICAL CONDITIONS, has been prepared by a licensed operator. Perform Step 3.1.5.2 – Have an Independent licensed SRO review and approve the calculation.

Time Critical Task: No

Validation Time: 26 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with an asterisk)

Performance Step: 1 Locates/reviews procedure.

Standard:
- Determines Section 3.1 applies.
- Reviews LIMITS AND PRECAUTIONS.

Comment:

Evaluator Cue:
- **Provide a copy of the prepared 1103-15B, Enclosure 1.**
- **Provide a clean copy of 1103-15B Section 1.0 through 3.1 and Enclosure 1.**

Performance Step: 2 Verify present conditions (TAVE, Burnup, Boron Concentration, Desired Critical Rod Positions) are correct.

Standard: Compares Enclosure 1, 2.a -2.d, against initial condition information and determines no errors.

Comment:

Evaluator Cue: **No major boron concentration changes have been made since the last analysis.**

Performance Step: 3 Determine the FUEL EXCESS REACTIVITY per Figure 1.

Standard: Records/verifies 11.8% dk/k

Comment:

Performance Step: 4 Determine the CRG 5-7 REACTIVITY WORTH of Step 2.d per Figure 6

Standard: Records/verifies -1.0% dk/k

Comment:

√ **Performance Step: 5** Determine the CRG 8 REACTIVITY WORTH of Step 2.d per Figure 2

Standard: Reads/records 0% dk/k

Comment:

Evaluator Cue: **Complete the review of Enclosure 1.**

Performance Step: 6 Obtain the Xenon worth - - - .

Standard: Records/verifies -0.495% dk/k

Comment:

Evaluator Cue: **The Plant Process Computer Program and Nuclear Engineering are unavailable. Figure 4 was used for the completed Enclosure 1.**

Performance Step: 7 Determine the reactivity associated with SAMARIUM AND PLUTONIUM BUILDUP after shutdown by using Figure 5.

Standard: Records/verifies -.07 dk/k

Comment:

√ **Performance Step: 8** Determine the BORON REACTIVITY WORTH REQUIRED FOR CRITICALITY.

Standard: Reviews Enclosure 1, Step 4.1 calculation and notes sign not carried down from 3.d (Xenon Reactivity Worth).

Comment:

Evaluator Cue: **If the Examinee identifies the error, inform them to make any necessary corrections and complete the calculation.**

Performance Step: 9 Determine the HZP INVERSE BORON WORTH associated with cycle burnup per Figure 3.

Standard: Records/verifies 142.75 to 143.25 ppmB/%dk/k

Comment:

Performance Step: 10 Determine the CORRECTED CRITICAL BORON CONCENTRATION by multiplying the required boron worth (Step 4.1) by the HZP Inverse Boron Worth (Step 4.2)

Standard: Recalculates Enclosure 1, Step 4.3.1 calculation and records 1461 to 1466.2 ppmB

Comment:

Performance Step: 11 Determine the FINAL MIXED BORON DEPLETION CORRECTION FACTOR based on current correction factor and accounting for predicted boron additions.

Standard: Verifies/records .95

Comment:

Evaluator Cue: **If necessary: The FINAL MIXED BORON DEPLETION CORRECTION FACTOR in the control room log is .95.**

√ **Performance Step: 12** Determine the ESTIMATED MEASURED CRITICAL BORON CONCENTRATION by dividing the CORRECTED CBC (Step 4.3.1) by the DEPLETION CORRECTION FACTOR (4.3.2)

Standard: Calculates ESTIMATED MEASURED CRITICAL BORON CONCENTRATION as 1537.9-1543.4 ppmB. Returns completed Enclosure 1 unapproved.

Comment:

Terminating Cue: **When the candidate returns the completed Enclosure 1 to the examiner: This JPM is complete.**

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

ENCLOSURE 1 KEY for use with JPM
Estimated Critical Boron Concentration (3.1)

NOTE

Individual data entries may be completed in any sequence. Sign-off of the Enclosure signifies the completion of the Enclosure calculation.

2.a CALCULATION IS FOR AN ECB AT 532 ± 2°F ON TAVE 532 DATE/TIME 1 hour ago exam day

2.b CYCLE BURNUP 310EFPD

2.c PRESENT MEASURED BORON CONCENTRATION 1785ppmB

2.d DESIRED CRITICAL ROD POSITION

- CRG 1-4 100 % WD
- CRG 5 100 % WD
- CRG 6 80 % WD
- CRG 7 5 % WD May make minor adjustments
- CRG 8 100 % WD to 3a through 3e

3.a FUEL EXCESS REACTIVITY (FIG 1) 11.8 % Δk/k

3.b DESIRED CRITICAL CRG 5-7 REACTIVITY WORTH (FIG 6) -1.0 % Δk/k

3.c DESIRED CRITICAL CRG 8 REACTIVITY WORTH (FIG 2) 0 % Δk/k

3.d XENON REACTIVITY WORTH (PPC, REACTOR ENGR. FIG 4) -.495 % Δk/k

3.e SAMARIUM AND PLUTONIUM BUILDUP (FIG 5)

- TIME SINCE SHUTDOWN 48 HRS
- REACTIVITY DUE TO BUILDUP -0.07 % Δk/k

4.1 BORON REACTIVITY WORTH REQUIRED FOR CRITICALITY

(11.8) + (-1.0) + (0) + (.495) + (-.07) .495 should be -.495 answer would be -10.23

$$\left[\underset{3.a}{(\text{FUEL})} + \underset{3.b}{(\text{CRG } 5-7)} + \underset{3.c}{(\text{CRG } 8)} + \underset{3.d}{(\text{Xenon})} + \underset{3.e}{(\text{SM})}\right] \times (-1) = \text{-11.225\% } \Delta k/k$$

4.2 INVERSE BORON WORTH (FIG 3) 143 ppmB/% Δk/k

4.3 CRITICAL BORON CONCENTRATION

4.3.1 CORRECTED CRITICAL BORON CONCENTRATION Corrected answer below 1461 to 1466.2

$$\left[\underset{4.2}{(\text{Inverse Boron})} \times (-1) \times \underset{4.1}{(\text{Boron React})}\right] = \text{1605 ppmB}$$

4.3.2 FINAL MIXED BORON DEPLETION CORRECTION FACTOR .95
(PPC, Control Room Log, Reactor Engineering)

Corrected answer below 1537.9 to 1543.4

4.3.3 ESTIMATED MEASURED CRITICAL BORON CONCENTRATION (4.3.1) / (4.3.2) = 1689.7ppmB

4.3.4 If this is not a Xenon free startup, then RECORD the TIME when ECB becomes INVALID _____ date _____ time

CALCULATED BY: RO#1 DATE/TIME _____

APPROVED BY (SRO): _____ DATE/TIME _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A1-1SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- A sequential trip of both main feedwater pumps resulted in a reactor trip 48 hours ago.
- Reactor Power was 100%
- The unit had been on-line for 150 days.
- The last down power was 30 days ago.
- Cycle Burnup is 310 EFPD.
- TAVE = 532°F
- Current Boron Concentration = 1785 PPM
- The Desired Critical Rod Position is: 80% WD on CRG-6.
- The FINAL MIXED BORON DEPLETION CORRECTION FACTOR as specified in the control room log is .95

INITIATING CUE:

You are the Control Room Supervisor on duty. A reactor startup is anticipated for this shift. An 1103-15B, Enclosure 1 - ESTIMATED CRITICAL CONDITIONS, has been prepared by a licensed operator. Perform Step 3.1.5.2 – Have an Independent licensed SRO review and approve the calculation.

JPM "A1-2 SRO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added names of people to be called or not called to JPM.
3. Modified CRO position offering sheet per D'Antonio / Allison comments.

Need to do Stand Alone

Facility: Three Mile Island | Task No.: OF1000005

Task Title: Maintain Minimum Shift Staffing, Control Overtime | JPM No.: TMI08 NRC JPM A1-2SRO

K/A Reference: 2.1.5 2.9/3.9 | Facility Bank JPM 03 SRO exam

Examinee: | NRC Examiner:

Facility Evaluator: | Date:

Method of testing:

Simulated Performance: ____ | Actual Performance: X

Classroom X Simulator ____ Plant ____

READ TO THE EXAMINEE

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

Initial Conditions:

- Plant is at 100% power with ICS in automatic
- The time is 2355 on 5/5/09.
- The shift is staffed as indicated on the **provided** Shift Staffing Report.
- Unit Reactor Operator (URO) Craddock reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located.
- Third CRO Greg Hoek is in an ILT class and is NOT yet licensed. He is in the Auxiliary Building performing OJT.

Task Standard: Examinee identifies required actions to restore minimum staffing, and selects personnel in accordance with requirements to control overtime.

Required Materials:

- OP-TM-101-111-1001, Shift Manning Requirements, Rev. 4
- Tech Spec 6.2.2 and Table 6.2-1, Amendment 219.
- LS-AA-119, Overtime Controls, Rev. 7
- Shift Staffing Report prepared
- Over time list prepared

General References:

- Technical Specifications

Handout:

- OP-TM-101-111-1001, Shift Manning Requirements, Rev. 4
- LS-AA-119, Overtime Controls, Rev. 7
- Shift Staffing Report prepared
- Over time list prepared

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

Time Critical Task: N/A

Validation Time: 25 minutes

SIMULATOR SETUP

Exam Setup: IC N/A

- N/A

- MALFUNCTIONS:

N/A

- OVERRIDES:

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluators Note:	**Provide Examinee with Shift Staffing Report**
Performance Step: 1	Examinee references Shift Staffing Report to determine current shift manning status.
Standard:	Examinee references Shift Staffing Report and determines that current staffing is unacceptable.
Comment:	
Evaluator's Cue:	**If asked, report that there are no other licensed CROs on site.**

Performance Step: 2 Examinee references Technical Specifications and/or OP-TM-101-111-1001, Shift Manning Requirements, to determine minimum shift manning requirements for current conditions.

Standard: Examinee determines that three CROs are required, two of which must be RO licensed. One CRO is required to be in the Control Room.

*** Except for the Shift Manager, shift crew composition may be less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements of Table 6.2.-1. This provision does not permit any shift crew position to be unmanned upon shift change due to an incoming shift crewman being late or absent.

Comment:

√ **Performance Step: 3** Examinee initiates action to comply with Technical Specification requirements for two licensed ROs.

Standard: Action initiated by referring to Overtime list

Comment:

Evaluator's Cue:

Performance Step: 4 Examinee seeks a replacement for the second licensed CRO position left vacant by the inability of the URO to meet requirements for the job.

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

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

Comment:

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

√ **Performance Step: 5** Examinee references LS-AA-119, Overtime Controls, to evaluate callout restrictions.

Standard: Examinee skips first candidate (Snyder, Tara) as they are inactive, skips next two candidates (Gramlich, Ken and Craddock, Bill) as they are >72 hour work restriction, calls out candidate number 4 or 5 (Sabulsky Joseph, or McKinney, Carl) .

Comment:

Performance Step: 6 Requests CRO called out report immediately to restore shift manning.

Standard: Informs examinee to report to work immediately.

Comment:

Evaluator's Cue: **As CRO (Sabulsky or McKinney who ever was called first) report, "I just had 1 beer with dinner."**

√ **Performance Step: 7** Acknowledges alcohol consumption, informs CRO not to report at this time.

Standard: Informs CRO not to report at this time.

Comment:

Performance Step: 8 Calls last CRO available on list (Sabulsky or McKinney who ever was not called above).

Standard: Informs examinee to report to work immediately.

Comment:

Evaluator's Cue: **Acknowledge request to report immediately.**

Terminating Cue: **After examinee demonstrates ability to contact CRO at home to report to work JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A1-2SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Plant is at 100% power with ICS in automatic
- The time is 2355 on 5/5/09.
- The shift is staffed as indicated on the **provided** Shift Staffing Report.
- Unit Reactor Operator (URO) Craddock reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located.
- Third CRO Greg Hoek is in an ILT class and is NOT yet licensed. He is in the Auxiliary Building performing OJT.

INITIATING CUE:

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

JPM "A2 SRO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. To initial conditions "Electricians have reported ..." added "and thus associated contacts cannot close as designed", per Allison and D'Antonio
3. Changed initiating cue to add to end of sentence, "and any Administrative Requirements"
4. Corrected typo in Step 6
5. Added an Evaluator note to explain the operation of the equipment under the failed contact state given;

EVALUATOR NOTE: The given contact failure affects the LOAD shed lock out feature of the Engineered Safeguards Feature. Normal Load shed / lockout occurs for either an ES signal and UV on the associated bus or ES signal and the associated Diesel Generator Breaker closed. This failure only affects the Diesel Breaker and ES signal logic NOT the ES and UV logic.

6. Added an Evaluator Note to notify the possible need to give the examinee up to 3 additional handouts if requested by the examinee.

EVALUATOR NOTE: The examinee throughout the JPM may request 208-169 to determine that the UV is not affected. Provide if requested. The examinee throughout the JPM may also request 208-300 or 208-318 to determine the affect on lockout. Provide if requested.

Facility: THREE MILE ISLAND UNIT 1 Task No.:

Task Title: Use Station Drawing to Predict Impact of Component Failure and Evaluate Technical Specification Implications

JPM No.: TMI08 NRC JPM A2 SRO

K/A Reference: G 2.2.41 (3.5/3.9)

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:
- You are the CRS
- Plant is at 100% power
- Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker and thus associated contacts cannot close as designed.
- Electricians have provided a copy of 208-164.
- Only contacts associated with 52 MOC(2) are affected.

Task Standard: Determination that 27/86 lockouts will not occur for condition of Diesel breaker closed and ESAS and declares a 7 day timeclock to return to service IAW Tech Spec 3.7.2.c and 3.7.2.f.

Required Materials: None

General References: 208-314 1S 480 Volt Swgr, 208-316 1T 480 Volt Swgr., 208-169 Bus 1E UV and Potential Indicating Circuits, 208-300 Bus 1T UV Lock-out Relays, 208-318 Bus 1S UV Lock-out Relays

Tech Spec 3.7.2.c and 3.7.2.f

Handout:
- 208-164, G11-02

Initiating Cue: You are directed to determine impact to operations based on this failure, and any Administrative Requirements.

Time Critical Task: No

Validation Time: 20 Minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **The given contact failure affects the LOAD shed lock out feature of the Engineered Safeguards Feature. Normal Load shed / lockout occurs for either an ES signal and UV on the associated bus or ES signal and the associated Diesel Generator Breaker closed. This failure only affects the Diesel Breaker and ES signal logic NOT the ES and UV logic.**

EVALUATOR NOTE: **The examinee throughout the JPM may request 208-169 to determine that the UV is not affected. Provide if requested. The examinee throughout the JPM may also request 208-300 or 208-318 to determine the affect on lockout. Provide if requested.**

Performance Step: 1 **Obtains 208-164 G11-02 Elementary Electrical Diagram**

Standard: Drawing obtained.

Evaluator Cue: **After student obtains appropriate diagram you may hand the candidate a copy they can mark up.**

Comment:

Performance Step: 2 **52 MOC(2) located on drawing at grid G-7 (52 MOC(2))**

Standard: Contacts located.

Comment:

Performance Step: 3 **Refers to sheet 314 or 316 to determine contact effect.**

Standard: 208-314 or 208-316 referred to

Evaluator Note: **After student obtains appropriate diagram you may hand the candidate a copy they can mark up.**

Comment:

√ **Performance Step: 4** **Determines from 208-314 or 316 that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**

Standard: Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.

Comment:

√ **Performance Step: 5** **Determines from 208-314 or 316 (which ever was not evaluated in previous step) that 52/G11-02 contact remaining open will prevent 27/86 actuation for bus 1S or 1T, dependent on sheet 314 or 316 respectively.**

Standard: Examinee verbalizes 27/86 for bus 1S or 1T will not work for the condition of diesel breaker closed with ESAS actuated.

Comment:

√ **Performance Step: 6** **Determines 3.7.2.f and 3.7.2.c of Technical Specifications apply due to the failed load shedding ability and declares a 7 day timeclock to repair.**

Standard: Declares a 7 day timeclock IAW 3.7.2.c due to the failed load shedding ability.

Comment:

Terminating Cue: **When Tech Specs have been addressed this JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A2 SRO

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 CRS

Plant is at 100% power

Electricians have reported a broken cam connecting rod on G11-02 EG-Y-1B output breaker and thus associated contacts cannot close as designed.

Electricians have provided a copy of 208-164.

Only contacts associated with 52 MOC(2) are affected.

INITIATING CUE:

You are directed to determine impact to operations based on this failure, and any Administrative Requirements.

JPM "A3 SRO" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Edited reference number to "6610-ADM-4250.11" on pages 1 and 6.
3. Added "Rev. 14" to 6610-ADM-4250.10 on pages 1 and 2.
4. Changed title on JPM to reflect actual task performed.
5. Changed Initiating Cue to K Core Loading

Facility: TMI – Unit 1 Task No.: SGT02002

Task Title: Respond to failed Radiation Monitor during Release JPM No.: TMI08 NRC JPM A3 SRO

K/A Reference: 2.3.15 (3.1)

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 CRS.
- The plant is at 100% power
- RM-A-4 Gas Channel is OOS for replacement of the indicator.
- RM-A-7 is OOS due to a detector failure.
- Waste Gas Tank WDG-T-1A is being released IAW 6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents- Waste Gas Tanks A/B/C.
- The URO informs you that RM-A-8 Gas channel has failed low.
- All other plant equipment is operating properly.

Task Standard: Identify the Gas Decay Tank release must be secured and releases via Auxiliary Building ventilation exhaust may continue provided 1) gas grab samples are taken at least once per twelve (12) hours, and 2) the initial sample is analyzed by gamma scan within 24 hours after the channel has been declared inoperable.

Required Materials: None

General References: CY-TM-170-300, Offsite Dose Calculation Manual (ODCM), Rev. 1
6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents- Waste Gas Tanks A/B/C, Rev. 13
6610-ADM-4250.10, Radiological Controls/Chemistry Actions When RMS Malfunctions, Rev. 14

Handouts: CY-TM-170-300, Offsite Dose Calculation Manual (ODCM), Rev. 1

6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents- Waste Gas Tanks A/B/C, Rev. 13
6610-ADM-4250.10, Radiological Controls/Chemistry Actions When RMS Malfunctions, Rev. 14

Initiating Cue: As CRS evaluate conditions and convey concerns if any.

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with an asterisk)

Performance Step: 1 Identifies entry into the ODCM is required.

Standard: The Examinee determines entry into the ODCM is required.

Evaluator Cue: **If the Examinee asks for a copy of the ODCM, 6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents- Waste Gas Tanks A/B/C or 6610-ADM-4250.10, Radiological Controls/Chemistry Actions When RMS Malfunctions provide a copy.**

Comment:

ODCM 2.1.2 Radioactive Gaseous Process and Effluent Monitoring Instrumentation

Performance Step: 2 Enters ODCM 2.1.2 Radioactive Gaseous Process and Effluent Monitoring Instrumentation

Standard: The Examinee recognizes applicability of section 2.1.2.b:

With less than the minimum number of radioactive gaseous process or effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in table 2.1-2. Exert best efforts to return the instrumentation to OPERABLE status within 30 days and, if unsuccessful, explain in the next Annual Effluent Release Report why the inoperability was not corrected in a timely manner.

Evaluator Cue: **Acknowledge the report.**

Comment:

ODCM Table 2.1-2 Radioactive Gaseous Process and Effluent Monitoring Instrumentation

√ **Performance Step: 3** The Examinee enters the ODCM Table 2.1-2 to determine operability requirements.

Standard: The Examinee determines that the Waste Gas Tank release must be terminated due to the inability of RM-A-8G to automatically close WDG-V-47 IAW the Table Notation applicability and ACTION 25 associated with RM-A-7G being inoperable.

Evaluator Cue: **If Examinee asks if two independent samples were taken of the tank's contents prior to the release answer no.**

Comment:

ODCM Table 2.1-2

√ **Performance Step: 4** Determine actions required for Auxiliary Building ventilation with RM-A-4G and RM-A-8G inoperable.

Standard: The Examinee reviews the ODCM Table 2.1-2, ACTION 27 for RM-A-8G and RM-A-4G being inoperable and determines releases via the Auxiliary Building ventilation exhaust may continue provided 1) gas grab samples are taken at least once per twelve (12) hours, and 2) the initial sample is analyzed by gamma scan within 24 hours after the channel has been declared inoperable.

Evaluator Cue: **Acknowledge report.**

Comment:

Terminating Cue: **When the Examinee completes the call on Auxiliary Building ventilation the JPM may be terminated.**

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

Job Performance Measure No.: TMI08 NRC JPM A3 SRO

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 CRS.
- The plant is at 100% power
- RM-A-4 Gas Channel is OOS for replacement of the indicator.
- RM-A-7 is OOS due to a detector failure.
- Waste Gas Tank WDG-T-1A is being released IAW 6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents-Waste Gas Tanks A/B/C.
- The URO informs you that RM-A-8 Gas channel has failed low.
- All other plant equipment is operating properly.

INITIATING CUE: As CRS evaluate conditions and convey concerns if any.

JPM "A4 SRO" changes from submittal

1. Changed wording of initiating cue to clearly indicate that the SRO is the shift ED and is to complete required paperwork.
2. Added "JPM Stop Time" at the end of the JPM (page 7)
3. Modified Initiating cue to be less leading
4. Added a NOTE on Crew to administer one at a time

Facility:	TMI Unit 1	Task No.:	5001045001
Task Title:	Emergency Action Level Identification and Event Declaration	JPM No.:	TMI08 NRC JPM SRO A4
K/A Reference:	2.4.41 (4.6)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

To be conducted one – on – one, in a class room.

READ TO THE EXAMINEE

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

Initial Conditions:

- The Plant is Shutdown for Refueling.
- ALL Fuel is removed from the Reactor Vessel.
- EG-Y-1A failed during the power transfer test due to a broken connecting rod.
- Additional conditions will be provided.

Task Standard: An ALERT (MA2) is declared IAW the EAL Matrix within 15 minutes of recognition and the Emergency Notification Form is completed and provided to the communicator in <15 minutes from time of the declaration.

Required Materials: Perform in a location with:

- EAL Matrix
- Shift Emergency Director Book

General References:

- EP-AA-111, EMERGENCY CLASSIFICATION AND PROTECTIVE ACTION RECOMMENDATIONS, Revision 14
- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST, Revision 1
- EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision B
- EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision G

- EP-AA-1009 RADIOLOGICAL EMERGENCY PLAN ANNEX FOR THREE MILE ISLAND (TMI) STATION (EAL Matrix)

Handouts:

- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST
- EAL Matrix
- EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision B
- EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision G
- EP-AA-111, EMERGENCY CLASSIFICATION AND PROTECTIVE ACTION RECOMMENDATIONS, Revision 14
- EP-AA-114, NOTIFICATIONS

Initiating Cue: You are the Shift Manager. Analyze the provided data, assume the duties of the Shift Emergency Director, and complete any required paperwork.

Time Critical Task: Yes

Validation Time: 15 minutes

SIMULATOR SETUP

N/A

Start Time: _____

(Denote Critical Steps with a check)

Performance Step: 1 Reviews the sequence of events provided by the Evaluator.

Standard: Reviews the sequence of events provided by the Evaluator.

Evaluator Cue: **Provide a copy of the Attachment 1 Sequence of Events to the Examinee**

Provide a copy of the EAL Matrix to the Examinee

Comment:

√ **Performance Step: 2** Compare current conditions to the EAL Table.

Standard: Determines the EAL "COLD" MATRIX applies

Evaluator Note: **The loss of power conditions provided in the sequence of events would result in a Site Area Emergency declaration in Modes 1-4 (MS1) if the HOT MATRIX is mistakenly used by the Examinee instead of the COLD MATRIX.**

Comment:

√ **Performance Step: 3** Compare current conditions to the EAL Table.

Standard: Determines an Alert declaration is required IAW MA2 Threshold Values:

1. Loss of power to Aux Transformers 1A and 1B.

AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV busses.

AND

3. Failure to restore power to either Emergency 4KV bus within 15 MINUTES from the time of loss of both offsite and onsite AC power.

Evaluator Cue: **Provide handouts listed on the cover page.**

Comment:

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

Performance Step: 4 Implement EP-AA-112-100-F-01 for an ALERT.

Standard: Refers to Section 1.2.

Comment:

EP-AA-112-100-F-01, Section 1.2.A

√ **Performance Step: 5** Announce Event Classification to the facility staff.

Standard: Simulates Announcing the ALERT Declaration to the facility staff

Evaluator NOTE:

- **Mark the time of the announcement: _____**
- **JPM Start Time – Announcement Time must be < 15 minutes to satisfy critical task.**

Comment:

EP-AA-112-100-F-01, Section 1.2.B

Performance Step: 6 RECORD the EAL and Declaration threshold(s)

Standard: Examinee records the ALERT and Thresholds 1, 2 and 3

Comment:

EP-AA-112-100-F-01, Section 1.2.D

Performance Step: 7 Use the Emergency Public Address Announcements form to select and direct the appropriate public address announcement for an ALERT.

Standard: Simulates announcement IAW with Tab 1, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, EP-AA-112-F-09

Comment:

EP-AA-112-100-F-01, Section 1.2.E

Performance Step: 8 If the ERO has NOT already been activated then, PERFORM the "ERO Response Required" steps of the ERO Notification or Augmentation form.

Standard: Examinee simulates activating the ERO Response

Evaluator Cue: **As the Shift Communicator respond by accepting the task of making the ERO Callout.**

Comment:

EP-AA-112-100-F-01, Section 1.2.F

Performance Step: 9 INITIATE required State/Local notifications within 15 minutes of the event classification as required per the notifications procedure.

Standard:
- Refers to Tab 3 - EP-AA-114 Notifications
- Refers to Tab 4 – EP-MA-114-100-F-01, Notification Form

Comment:

EP-MA-114-100-F-01

√ **Performance Step: 10** INITIATE required State/Local notifications within 15 minutes of the event classification as required per notifications procedure.

Standard: Completes, approves and hands STATE/LOCAL EVENT EMERGENCY NOTIFICATION FORM to Communicator within 15 minutes.

Evaluator Cue: **If the Examinee asks for Meteorological Data provide them a copy of Attachment 2.**

Evaluator Note:
- **Minimum requirements on ENF to meet critical task:**
  3.a EMERGENCY CLASSIFICATION – ALERT
  3.d INITIAL DECLARATION
  4.a EMERGENCY ACTION LEVEL NO. is – MA2
  5.a No radiological release in-progress
  7.a Not Applicable
- **Mark the time that the notification form is provided to the communicator: _____**
- **Announcement Time – ENF Handover Time must be < 15 minutes to satisfy critical task.**

Comment:

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

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

Job Performance Measure No.: TMI08 NRC JPM SRO A4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- The Plant is Shutdown for Refueling.
- ALL Fuel is removed from the Reactor Vessel.
- EG-Y-1A failed during the power transfer test due to a broken connecting rod.
- Additional conditions will be provided.

INITIATING CUE: You are the Shift Manager. Analyze the provided data, assume the duties of the Shift Emergency Director, and complete any required paperwork.

Time Critical Task: Yes

ATTACHMENT 1

SEQUENCE OF EVENTS

Sequence of Events:

0815	A loss of the #4 and #8 230 K Volt Busses occurred. EG-Y-1B caused a fault on the 1E 4160 Volt Bus when the output breaker closed.
0820	Preparations to start the SBO Diesel began.
0825	Electrical Maintenance arrived at the 1E 4160 Volt Bus.
0830	The SBO Diesel has started.
0831	Electrical Maintenance reports that the 1E 4160 Volt Bus remains faulted.
0832	The 1D 4160 Volt Bus is energized by the SBO Diesel.

ATTACHMENT 2

METEOROLOGICAL DATA

Wind Speed 5 mph

Wind Direction from 230°

Final JPMs

JPM "A" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Changed setup to have Pressurizer at 132 inches.
3. Changed setup to add Pressurizer auto setpoint failure.
4. Added to Examiner CUE for step 7, "Provide OP-TM-211-412 if requested."
5. ALTERNATE PATH STARTS HERE statement added after step 3 with clarification of what makes it alternate path.
6. Added new critical step to address the MU-V-17 controller will have to be taken to hand.
7. Added a colon after the word "NOTE" at the top of page 6.
8. Removed critical task indication from step 7 and added a note stating that the step will only be performed if letdown flow is >70 gpm.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 21101013

Task Title: EMERGENCY BORATE DUE TO MULTIPLE STUCK RODS JPM No.: TMI08 NRC JPM A

K/A Reference: SYS 004 A2.14 (3.8/3.9) New Alternate Path

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 URO
- The Reactor is tripped with 2 rods stuck out
- The Immediate Manual Actions of OP-TM-EOP-001 are complete
- MU-V-201 is open bypassing MU-F-2A/B, for maintenance

Task Standard: Emergency Boration established with increased Letdown > 70 gpm.

Required Materials: None

General References: See handouts below

Handout: OP-TM-EOP-010 Emergency Procedures Rules Guides and Graphs Rev 10, Section Rule 5 EB

Supplemental Handouts:
- OP-TM-211-441, Increased Letdown Flowrates
- OP-TM-211-412, Placing MU-F-1B Into Service, Rev. 1
- OP-TM-541-461, IC & NS Temperature Control, Rev. 5

Initiating Cue: The CRS has directed you to **INITIATE** Rule 5 Emergency Boration

Time Critical Task: No

Validation Time: 18 minutes

SIMULATOR SETUP

TEMP IC-50

- Reset the simulator to IC-15, IC-16, or IC-17 (Full Power IC)
- ENSURE MU-V-5 is CLOSED
- INSERT MALFUNCTION RD0229 IMMEDIATELY
- INSERT MALFUNCTION RD0239 IMMEDIATELY
- INSERT MALFUNCTION RD29 TO TRIP THE REACTOR
- Perform the Immediate Manual Actions of OP-TM-EOP-001, Reactor Trip
- Place the Feedwater Pumps in Hand and set FW-P-1A Hand control at 20%
- Allow Pressurizer level to rise to 132"
- Reduce level setpoint to 0
- INSERT MALFUNCTION IC46C to fail pressurizer setpoint at this value
- Then raise Pressurizer level setpoint to 100" (25%)
- ENSURE MU-V-14A and MU-V-14B are closed
- FREEZE THE SIMULATOR

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH OPERATOR **GO TO RUN ON THE SIMULATOR**

OP-TM-EOP-010 RULE 5 step 1

Performance Step: 1 **WAAT** <u>one</u> of the following conditions exist:

- 1% dk/k SHUTDOWN has been achieved for the expected plant condition IAW Figure 1 of 1103-4, "Soluble Poison Concentration Control" **or** 1103-15A, " SDM and Reactivity Balance"
- LPI > 1250 gpm per line
- Tavg > 525°F and stable or rising **and** <u>all</u> Control Rods are inserted, **and** Neutron flux is lowering as expected.

then emergency boration **may** be terminated.

Standard: Step reviewed, no conditions exist that allow terminating emergency boration at this time.

Evaluator Cue: **If the Examinee asks, 1% dk/k SHUTDOWN has not been verified at this time.**

Comment:

OP-TM-EOP-010 RULE 5 step 2

Performance Step: 2 **VERIFY** a MU pump is operating.

Standard: Verifies a MU pump is operating by Red light above MU-P-1B control switch on console right, discharge pressure on console center or Seal injection flow/makeup flow existing on console center.

Comment:

OP-TM-EOP-010 RULE 5 step 3

√ **Performance Step: 3** Perform one of the following:

- **OPEN** MU-V-14A, by pressing OPEN PB on (CC)
- **OPEN** MU-V-14B, by pressing OPEN PB on (CC)
- **PERFORM** Guide 1 "Emergency Boration Backup Methods".

Standard: Opens MU-V-14A or MU-V-14B, Red OPEN light lit, Green CLOSED light off for one of the two valves (both would be OK)

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must recognize that TOTAL injection (Seal Injection plus Makeup plus HPI) is NOT greater than 50 gpm, examinee must then go to the RNO column recognize that letdown exists and proceed with part 2 of the RNO, Increase letdown flow.

OP-TM-EOP-010 RULE 5 step 4

√ **Performance Step: 4** **VERIFY** Total Injection (MU, SI and HPI) > 50 gpm.

(RNO),
1. **INITIATE** OP-TM-211-950, "Restoration of Letdown Flow".
2. **INITIATE** OP-TM-211-441, "Increased Letdown Flowrates".

Standard: The Examinee determines flow is less than 50 gpm, refers to Response Not Obtained (RNO) column, determines letdown is not lost and does not need to be restored. **INITIATES** OP-TM-211-441, by retrieving procedure.

Evaluator Cue: **When Examinee locates OP-TM-211-441, hand Examinee copy of procedure.**

Comment:

NOTE: IAW OS-24 Conduct of Operations During Abnormal and Emergency Events, Initiate means begin action described (steps or procedure) and continue with the other procedures in parallel, therefore the last two steps of Rule 5 may be addressed while activities of OP-TM-211-441 are being done.

OP-TM-211-441 Limitations and Precautions

Performance Step: 5 Reviews OP-TM-211-441 Limitations and Precautions

Standard: The Examinee reviews the Limitations and Precautions.

Comment:

OP-TM-211-441 Prerequisites

Performance Step: 6 **VERIFY** the Make Up and Purification System is in LTOP or ES Standby Mode.

Standard: The Examinee determines Make Up and Purification was in ES Standby Mode, by knowledge of plant operating requirements at power or may refer to OP-TM-211-000.

Comment:

NOTE: Step 7 will be performed only if Letdown flow is >70 gpm.

OP-TM-211-441 step 4.1

Performance Step: 7 **If** RCS pressure > 2100 psig, **then PERFORM** the following:

If letdown flow > 70 gpm is required, **then**

1. **VERIFY** MU-V-201 (MU-V-2A/B Bypass valve) is Open **or** MU-F-2A and MU-F-2B are in service IAW OP-TM-211-414.
2. **VERIFY** MU-F-1A and MU-F-1B are in service IAW OP-TM-211-412 **or** MU-V-110 is Open.

Standard: The Examinee places MU-F-1B in service by pressing Open PB for MU-V-11B on (CC) and verifying the RED open light is on and the GREEN closed light is off.

MU-F-2s are bypassed by MU-V-201 given in initial conditions.

Evaluator Cue: **If examinee requests OP-TM-211-412, "Place MU-F-1B into service", provide them a copy.**

If target letdown flow rate is requested respond with 80 gpm.

If the Examinee recognizes Emergency Boration criteria are met prior to reaching 80 gpm, request that they continue to 80 gpm.

If the Examinee asks, inform them that MU-F-1B is filled and vented.

Comment:

OP-TM-211-441 step 4.1.2

Performance Step: 8 **MONITOR** ICCW temperature and **ADJUST** IAW OP-TM-541-461.

Standard: The Examinee determines temperature is satisfactory by reading IC6-TI between 90°F and 100°F on console right.

Evaluator Note: **If ICCW temperature is outside of the 90-100°F band the Examinee may open or close NR-V-15B on console right to adjust flow to the ICCW coolers IAW OP-TM-541-461.**

Comment:

OP-TM-211-441, step 4.1.3

Performance Step: 9 **Ensure** letdown temperature is maintained less than 130°F.

Standard: The Examinee monitors MU-4 FI on console center for letdown temperature while raising letdown flow.

Comment:

OP-TM-211-441 step 4.1.4

Performance Step: 10 **Ensure** the rate of letdown flow adjustment is less than 2.5 GPM/Min.

Standard: The Examinee controls MU-V-5 controller in step below to ensure the rate of change on MU-4 FI is maintained < 2.5 GPM/Min.

Comment:

OP-TM-211-441 step 4.1.5

√ **Performance Step: 11** Throttle **OPEN** MU-V-5-EX1 to maintain letdown flow between 70 and 123 gpm.

Standard: The Examinee opens MU-V-5 by rotating setpoint knob slowly to raise approximately 2.5 gals then waits 1 minute prior to increasing another 2.5 gals.

Evaluator Cue: **After examinee demonstrates ability to control flow increases, you may allow time compression by stating, "For the purposes of time compression you may raise the flow to 80 gpm without the 2.5 gpm/min limitation."**

Comment:

√ **Performance Step: 12** When pressurizer goes below 100" and MU-V-17 fails to respond in AUTO

Examinee takes hand control of MU-V-17 by depressing HAND PB, and raises demand by use of toggle in raise direction, to establish Makeup flow such that MU plus SI is greater than 50 GPM, and pressurizer level is being restored to 100".

Standard: MU-V-17 in hand (WHITE LIGHT LIT), demand raised, MU-24A-FI plus MU-42-FI > 50 GPM

Comment:

OP-TM-EOP-010 RULE 5 step 5.

Performance Step: 13 **STOP** any activities which may be diluting RCS boron concentration.

Standard: The Examinee verifies no make up to the makeup tank.

Comment:

OP-TM-EOP-010 RULE 5 step 6.

Performance Step: 14 **If** SCM > 25°F and neutron flux indication is rising, **then** **STABILIZE** RCS temperature.

Standard: Determines neutron flux is not rising from count rate meters on (CC)

Comment:

Terminating Cue: **When Letdown flow has been raised to allow minimum emergency boration flow of >50 gpm and count rates have been verified stable or lowering the JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM A

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

You are the URO
The Reactor is tripped with 2 rods stuck out
The Immediate Manual Actions of OP-TM-EOP-001 are complete
MU-V-201 is open bypassing MU-F-2A/B, for maintenance

INITIATING CUE:

The CRS has directed you to **INITIATE** Rule 5 Emergency Boration

JPM "B" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Changed failed component from DR-P-1B, to DC-P-1B to avoid procedure interpretation issue. This also eliminated the need to have computer point above 105°F.
3. ALTERNATE PATH STARTS HERE statement added after step 14 with clarification of what makes it alternate path.
4. Modified termination criteria as DC-P-1B does not have to be place in TPL for this failure.
5. Edited the terminating cue to read "initiated" vice "imitated".
6. Removed "DC-P-1B to PTL" from the task standard on page 1 as it is not required by the procedure.
7. Edited Steps 2 and 3 Standard to read "Examinee verifies at least 2 of 3" vice "Examinee verifies 2 of 3".
8. Changed the font size in steps 18, 19, and 20 to match the rest of the JPM.
9. Added an Evaluator Cue after Step 4 stating to give the examinee an exam copy of OP-TM-211-901 when he locates the procedure.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 64201010

Task Title: ESAS Component Verification JPM No.: TMI08 NRC JPM B

K/A Reference: SYS 006 A3.02 (4.1/4.1) New Alternate Path

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 URO.
- The Reactor tripped due to a large RCS leak that resulted in a 1600 psig ESAS Actuation.
- OP-TM-EOP-001, Reactor Trip Immediate Manual Actions have been taken.

Task Standard: MU-P-1C, DH-P-1B and BS-P-1B control switches are placed in Pull to Lock (PTL) IAW OP-TM-211-901, Emergency Injection (HPI/LPI).

Required Materials: None

General References: OP-TM-211-901, Emergency Injection (HPI/LPI), Rev. 3
OP-TM-642-901, 1600 PSIG ESAS ACTUATION, Rev. 2

Handout: None

Initiating Cue: The CRS directs you to initiate OP-TM-642-901, 1600 PSIG ESAS ACTUATION

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP

(TEMP IC-51)

- Initialize in IC-15, 16 or 17
- INSERT MALFUNCTION TH07 at 1% severity with a 60 second ramp
- INSERT MALFUNCTION CC02B (DC-P-1B Trip) After it starts
- Perform OP-TM-EOP-001 Immediate Manual Actions
- Place Feedwater Pumps in Hand and set FW-P-1A to 20% demand on the ICS Controller.
- Start the Auxiliary Boilers
- DELETE from MONITOR points A0602, A0603, A0604, A0605
- FREEZE the simulator when all ESAS components have actuated to their ES position

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH OPERATOR	**GO TO RUN ON THE SIMULATOR**
	OP-TM-642-901 Step 3.3.1 Prerequisites
Performance Step: 1	VERIFY at least one of the following conditions: - RCS pressure < 1600 psig and 1600 psig ESAS is not bypassed, - RCS pressure < 500 psig and 500 psig ESAS is not bypassed, - 4 psig ESAS was actuated - CRS direction or 1600 psig ESAS actuation is required by procedure.
Standard:	The Examinee verifies RCS pressure is <1600 psig and the 1600 psig ESAS is not bypassed using RCS pressure indications on console center or PCL and PCR blue indications for block loading are lit.
Evaluator Note:	**Examinee may also use console indications for ESAS status to determine it is not bypassed.**
Comment:	
	OP-TM-642-901 Step 4.1
Performance Step: 2	If 2 of 3 ESAS Train "A" Block 4 lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (CC).
Standard:	The Examinee verifies at least 2 of 3 ESAS Train "A" Block 4 lights (PCR) are BLUE.
Evaluator Note:	**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.**

Comment:

OP-TM-642-901 Step 4.2

Performance Step: 3 If 2 of 3 ESAS Train "B" Block 4 lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (CR).

Standard: The Examinee verifies at least 2 of 3 ESAS Train "B" Block 4 lights (PCR) are BLUE.

Comment:

OP-TM-642-901 Step 4.3.1

Performance Step: 4 INITIATE OP-TM-211-901 "Emergency Injection HPI/LPI".

Standard: The Examinee initiates OP-TM-211-901 "Emergency Injection HPI/LPI" by looking at PCR to verify a BLUE BOARD and diagnoses the trip of DC-P-1B.

Evaluator Note: **Steps 4.3.2 through 4.3.5 initiate other Emergency Support procedures that do not have any equipment misaligned. The examinee should first address OP-TM-211-901 since DC-P-1B has tripped.**

Evaluator Cue: **When Examinee locates OP-TM-211-901, hand Examinee copy of procedure.**

Comment:

OP-TM-211-901 Step 3.0

Performance Step: 5 The Examinee reviews the Precautions, Limitations and Prerequisites.

Standard: The Precautions, Limitations and Prerequisites are reviewed.

Evaluator Note: **The Examinee may obtain CRS permission and DEFEAT the ESAS Actuation signal prior to operating the equipment but it is not necessary.**

Comment:

OP-TM-211-901 Step 3.3.1 Prerequisites

Performance Step: 6 VERIFY 1D or 1E 4160V bus is energized.

Standard: The Examinee verifies the 1D and 1E busses are energized by checking the bus voltage at approximately 4160V for each bus on console right indications.

Comment:

OP-TM-211-901 Step 3.3.2 Prerequisites

Performance Step: 7 VERIFY Make Up system was in ES standby IAW OP-TM-211-000, "Make Up and Purification".

Standard: The Examinee verifies the Make Up system was in ES standby based on plant initial conditions.

Comment:

OP-TM-211-901 Step 3.3.3 Prerequisites

Performance Step: 8 VERIFY Decay Heat system was in ES standby IAW OP-TM 212-000, "Decay Heat Removal".

Standard: The Examinee verifies the Decay Heat system was in ES standby based on plant initial conditions.

Comment:

OP-TM-211-901 Step 3.3.4 Prerequisites

Performance Step: 9 VERIFY a valid automatic actuation has occurred or a manual actuation of HPI is required.

Standard: The Examinee verifies a valid automatic actuation has occurred by checking RCS pressure <1600 psig on console center and/or on PCL.

Comment:

OP-TM-211-901 Step 4.1.1

Performance Step: 10 If 1D 4160V bus is not energized, then GO TO step 4.1.5.

Standard: The Examinee verifies 1D 4160V bus is energized by checking its voltage at approximately 4160V on console right.

Evaluator 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.**

Comment:

OP-TM-211-901 Step 4.1.2

Performance Step: 11 If ESAS Train A "Load Seq Block 4" lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (Train A CC).

Standard: The examinee verifies ESAS Train A "Load Seq Block 4" lights (PCR) are BLUE.

Comment:

OP-TM-211-901 Step 4.1.3

Performance Step: 12 If any of the components on Attachment 7.1 are not in the required condition, then INITIATE Section 4.2

Standard: The Examinee verifies all components on Attachment 7.1 are in the required condition by checking the PCR indications are BLUE.

Evaluator Note: **PCR graphic display is equivalent to Attachment 7.1**

Comment:

OP-TM-211-901 Step 4.1.4

Performance Step: 13 If 1E 4160V bus is not energized, then GO TO Section 4.3.

Standard: The Examinee verifies 1E 4160V bus is energized by checking its voltage at approximately 4160V on console right.

Comment:

OP-TM-211-901 Step 4.1.5

Performance Step: 14 If ESAS Train B "Load Seq Block 4" lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (Train A CC).

Standard: The examinee verifies ESAS Train B "Load Seq Block 4" lights (PCR) are BLUE.

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must recognize DC-P-1B is tripped. This may be accomplished by review of "BLUE BOARD" or amber light above pump extension control. Examinee will then INITIATE section 4.2, skipping 4.2.1 as it does not apply.

OP-TM-211-901 Step 4.1.6

Performance Step: 15 If any of the components on Attachment 7.2 are not in the required condition, then INITIATE Section 4.2

Standard: The Examinee diagnoses that DC-P-1B has tripped based on amber PCR indication and the amber overload light indication for the DC-P-1B breaker on console right and initiates Section 4.2 Step 4.2.2.

Evaluator Note: **PCR graphic display is equivalent to Attachment 7.2**

Comment:

OP-TM-211-901 Step 4.2.2

Performance Step: 16 **IAAT** DC-P-1A **or** DC-P-1B fails to start **or** is shut down unexpectedly, **then** perform the following:

Standard: The Examinee recognizes that DC-P-1B failed to start and goes to 4.2.2.3

Evaluator Note: **ESAS signal will have to be defeated to try and start DC-P-1B to prevent the pump breaker from anti-pump operation.**

Evaluator Cue: **If the Examinee requests permission to bypass the ESAS signal, give the permission and acknowledge actions to be taken.**

Comment:

OP-TM-211-901 Step 4.2.2.3.

Performance Step: 17 **If** DC-P-1B fails to start, **then START** DC-P-1B

Standard: The Examinee may try to start DC-P-1B; however the pump will not start.

Alternatively the Examinee may state DC-P-1B is tripped and continue with the procedure steps.

Comment:

OP-TM-211-901 Step 4.2.2.4.A

√ **Performance Step: 18** PLACE MU-P-1C in PTL.

Standard: The Examinee places MU-P-1C control switch in PTL on console right.

Comment:

OP-TM-211-901 Step 4.2.2.4.B

√ **Performance Step: 19** PLACE DH-P-1B in PTL.

Standard: The Examinee places DH-P-1B control switch in PTL on console right.

Comment:

OP-TM-211-901 Step 4.2.2.4.C

√ **Performance Step: 20** PLACE BS-P-1B in PTL.

Standard: The Examinee places BS-P-1B control switch in PTL on console right.

Comment:

OP-TM-211-901 Step 4.2.2.4.D

Performance Step: 21 INITIATE OP-TM-543-440 "Swapping MU-P-1C cooling to NS".

Standard: The Examinee initiates OP-TM-543-440.

Evaluator Note: **OP-TM-543-440 "Swapping MU-P-1C cooling to NS" does not have to be completed**

Comment:

Terminating Cue: **The JPM may be terminated when OP-TM-543-440 is initiated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 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.
- The Reactor tripped due to a large RCS leak that resulted in a 1600 psig ESAS Actuation.
- OP-TM-EOP-001, Reactor Trip Immediate Manual Actions have been taken.

INITIATING CUE:

- The CRS directs you to initiate OP-TM-642-901, 1600 PSIG ESAS ACTUATION

JPM "C" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Moved direction to maintain plant pressure from Initial condition to Initiating cue.
3. Used a specific AO name at valve instead of "An AO"
4. Edited "IC-V-37. RCDT Cooler Inlet Valve" to "IC-V-37, RCDT Cooler Inlet Valve".

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	22301009
Task Title:	Venting the Pressurizer to RCDT (WDL-T-3)	JPM No.:	TMI08 NRC JPM C
K/A Reference:	SYS 010 A1.03 2.9/3.2	Bank	N/A

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 ARO.
- The Reactor is shutdown and a cooldown is in progress.
- The RCS will be opened to atmosphere following the cooldown.
- Jim Randisi is in the Reactor Building at IC-V-37, RCDT Cooler Inlet Valve.

Task Standard: The Pressurizer is venting to the RCDT.

Required Materials: Stop Watch available

General References: OP-TM-220-552, Venting the Pressurizer to RCDT (WDL-T-3), Rev. 2
OP-TM-541-461, IC & NS Temperature Control, Rev. 5

Handout: OP-TM-220-552, Venting the Pressurizer to RCDT (WDL-T-3), Rev. 2, with the Prerequisites signed off.
OP-TM-541-461, IC & NS Temperature Control, Rev. 5 (Available)

Initiating Cue: The CRS directs you to vent the Pressurizer to the RCDT IAW OP-TM-220-552, Venting the Pressurizer to RCDT (WDL-T-3).
Maintain RCS Pressure 2050 psig to 2150 psig.

Time Critical Task: No

Validation Time: 14 minutes

SIMULATOR SETUP

NOTE: Simulator setup will take some time if an Initial Condition does not exist.

TEMP IC-52

1. Initialize the Trainer to IC-6 with the Reactor in Hot Shutdown

   a. Reset to IC-6 and go to Run
   b. Drive Group 8 rods to full in.
   c. Place each RPS contact monitor to "Test Operate" and back to "Operate".
   d. Defeat RTI
   e. Open WDG-V-3 and WDG-V-4.
   f. MAINTAIN Makeup Tank level by Setting MUMMT TO 28000 in MONITOR.
   g. Use the MS-V-3s to cool the RCS Temperature to approximately 515°F.
   h. Pump the RCDT to approximately 78%.
   i. Reduce RCS Pressure to between 2100-2155 psig.

2. Set REMOTE FUNCTIONS:

   a. None

3. Display on MONITOR:

   a. MUMMT

4. OP-TM-220-552,Venting the Pressurizer to RCDT (WDL-T-3) Prerequisites and sign off steps.

5. FREEZE the simulation.

6. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH OPERATOR: **GO TO RUN ON THE SIMULATOR**

Step 4.2.1

Performance Step: 1 ENSURE IC-P-1A is running.

Standard: IC-P-1A RED running light is on and GREEN stop light is off.

Evaluator Note: **RCS Temperature will be above 400°F at the start of the JPM.**

Comment:

Step 4.2.2

√ **Performance Step: 2** ENSURE IC-P-1B is running.

Standard: The examinee starts IC-P-1B.

(IC-P-1B Green Light extinguishes and the Red Light is on.)

Evaluator Note:

Comment:

Step 4.2.3

Performance Step: 3 FULLY OPEN IC-V-37 while counting the number of turns.

Standard: Examinee contacts the AO in the RB and orders IC-V-37 opened and the number of turns counted.

Booth Operator: **Report back as the AO that IC-V-37 is open and it took 8 turns to open it.**

Comment:

Step 4.2.4

Performance Step: 4 RECORD number of turns IC-V-37 opened.

_____ turns opened (to nearest ¼ turn)

Standard: The Examinee records the number of turns IC-V-37 is open.

Comment:

Step 4.2.5

Performance Step: 5 VERIFY IC-F-1A(B) filter differential pressure on IC-11-DPI is less than 12 psid.

Standard: The Examinee dispatches an AO to VERIFY IC-F-1A filter differential pressure is < 12 psid.

Booth Operator: **Report back as the AO that IC-F-1A filter differential pressure is 2.5 psid.**

Comment:

Step 4.2.6

Performance Step: 6 CONTROL IC temperatures IAW OP-TM-541-461, IC and NS Temperature Control.

Standard: The examinee VERIFIES IC temperature is 90-100°F on Console Right instrument IC-6TI.

Evaluator Note: **The Examinee may open or close NR-V-15B on console right to adjust IC Temperature.**

If the Examinee requests OP-TM-541-461, IC and NS Temperature Control, hand it to them.

Comment:

Step 4.3

√ **Performance Step: 7** START WDL-P-8 (LWDS).

Standard: WDL-P-8 RED Running Light is on and the GREEN stop light is off (LWDS).

Comment:

Step 4.4

√ **Performance Step: 8** **OPEN** RC-V-44 (CC).

Standard: RC-V-44 RED open light is lit and the GREEN closed light is off (PC).

Evaluator Note: **The Examinee may refer to Annunciator Response G-3-6, RC VENT OPEN.**

Procedure Note: When RC-V-28 is opened, a high alarm for RC-RV-2 (PORV) tailpipe delta-T (computer point A0517) should be expected due to an above seat drain line from the PORV to a tie-in point just downstream of RC-V-28.

Procedure Note: WDL-P-8 auto starts at 110°F WDL-T-3 temperature, WDL-T-3 high temperature PPC alarm set point is 120°F.

Comment:

Step 4.5

√ **Performance Step: 9** THROTTLE OPEN, 1 second, RC-V-28 (CC).

Standard: RC-V-28 RED light is on and GREEN light is on (CC).

Comment:

Step 4.8

√ **Performance Step: 10** ADJUST RC-V-28 as needed to maintain:

- Desired RCS pressure (CC)
- Pressurizer cooldown rate < 100°F/hr
- RCDT pressure < 4 psig

Standard: The examinee ADJUSTS RC-V-28 to maintain parameters within limits.

Evaluator Note: **If at any time Pressurizer cooldown rate (C4040) approaches 100°F/hr or RCDT pressure exceeds 4 psig the Examinee must CLOSE RC-V-28.**

Comment:

Terminating Cue: **When RC-V-28 is open and the venting rate has been stabilized within limits, the JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 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:

- You are the ARO.
- The Reactor is shutdown and a cooldown is in progress.
- The RCS will be opened to atmosphere following the cooldown.
- Jim Randisi is in the Reactor Building at IC-V-37, RCDT Cooler Inlet Valve.

INITIATING CUE:

- The CRS directs you to vent the Pressurizer to the RCDT IAW OP-TM-220-552, Venting the Pressurizer to RCDT (WDL-T-3).
- Maintain RCS Pressure 2050 psig to 2150 psig.

JPM "D" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Used a specific AO name at valve instead of "An AO".
3. N/A'd step 4.7.4 of OP-TM-424-902.

Facility: THREE MILE ISLAND UNIT 1 Task No.: EOPG17001

Task Title: Shift Emergency Feedwater Pump Suctions JPM No.: TMI08 NRC JPM D

K/A Reference: SYS 061 AA1.01 4.5/4.4 Bank TQ-TM-104-424-J005

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 ARO.
- The Reactor is tripped due a loss of offsite power. The cause is unknown and power is not expected to be returned to service for at least 24 hours.
- EOP-001 has been completed.
- A cooldown on Natural Circulation is in progress.
- The EFW pumps are taking suction from DW-T-2 via the Hotwell, and MS-V-4A/B backup controllers are throttled to control the cooldown.
- John Levengood, the secondary AO at the EFW Pumps, reports that the suction pressure for these pumps indicates Less than 2 psig.

Task Standard: Emergency Feedwater Pump suction has been shifted to the Reactor Building Emergency Cooling Pump discharge.

Required Materials: None

General References: OP-TM-424-902, EFW Alternate Inventory, Rev. 2

Handout: OP-TM-424-902, EFW Alternate Inventory Rev. 2, Signed off with the exception of step 4.5

Initiating Cue: The CRS directs you to switch the EFW Pump suction from Hotwell / DW-T-2 to the discharge of the Reactor River Water System, IAW OP-TM-424-902 EFW Alternate Inventory; no other condensate sources are immediately available. (Hand Examinee a copy of the procedure)

For the purpose of conserving simulator time on this examination, reports from field operators will occur immediately.

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP

NOTE: Simulator setup will take some time if an Initial Condition does not exist.

Temp IC-53

1. Initialize the Trainer to IC15, 16, 17, 100% Power.

   a. INSERT MALFUNCTION ED01, Electrical Blackout
   b. Perform EOP-001 IMA's and VSSV's
   c. Allow OTSG to fill to 50% Operating Range
   d. Start AH-E-24A or 24B
   e. Establish a 40°F cooldown
   f. Maintain Pressurizer level 90-100 inches.
   g. Maintain Makeup Tank level in the unrestricted operating region.

2. Set REMOTE FUNCTIONS:

   a. ISR81, NI-11/12 INDICATION NOISE 0-10 CPS set to 10%.
   b. PL-B-8-4 alarm set to ON.
   c. FWR01, VA-V-4A AUX CDSR CO-C-2A VAC BKR A set to 100% when breaking vacuum.
   d. FWR02, VA-V-4B AUX CDSR CO-C-2B VAC BKR B set to 100% when breaking vacuum.
   e. FWR98 CO-V-12 BREAKER set to CLOSE.
   f. FWR10 EF-V-4 BREAKER EMER RW TO EMER FW PUMPS set to IN.
   g. FWR11 EF-V-5 BREAKER EMER RW TO EMER FW PUMPS set to IN.
   h. FWR43, CO T 1A Level (set to 11%, 2.2 ft after CO-V-12 is Open).
   i. FWR44, CO T 1B Level (set to 11%, 2.4 ft after CO-V-12 is Open).

3. Display on MONITOR:

   a. FWVCOV13 (Set to 0 when requested to close during JPM, step 4.5.5)
   b. FWMCOC1, Main Condenser Hotwell Level (set at to 8.0E5, < 5 ft after CO-V-12 is OPEN).

4. Perform OP-TM-424-902, EFW Alternate Inventory, Sign off steps

   a. Section 4.1, 4.2, 4.3, 4.4
      Note: Spectacle Flange is NOT modeled in simulator
   b. Section 4.6
   c. Section 4.7
   d. Section 4.8, No specific action required, procedure steps should be signed off.

5. FREEZE the simulation.

6. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH OPERATOR:	**GO TO RUN ON THE SIMULATOR**
	Step 4.5.1
Performance Step: 1	ENSURE spectacle flange between EF-V-4 and EF-V-5 (EF-SF-1) has been aligned to the "thru" position.
Standard:	The ARO contacts the A.O. stationed at EF Pumps (John Levengood) to ensure that the spectacle flange has been rotated.
Evaluator Note:	This requirement was performed previously.
Booth Operator Cue	As the A.O. (John Levengood), inform the Examinee that the flange has been rotated to the "Thru" position.
Comment:	
	Step 4.5.2
√ **Performance Step: 2**	ENSURE either RR-P-1A or RR-P-1B is running.
Standard:	The examinee starts either RR-P-1A OR RR-P-1B using the respective control switch. (RR-P-1A or 1B Green Light extinguishes and the Red Light is Lit.)
Evaluator Note:	The Examinee should announce the starting either RR-P-1A or 1B over the plant page system.
Comment:	

Step 4.5.3

√ **Performance Step: 3** ENSURE RR-V-1A (B) is Open on the running pump.

Standard: Examinee verifies RR-V-1A or 1B Green Light Out and Red Light Lit.

Comment:

Step 4.5.4

√ **Performance Step: 4** OPEN the following valves:

EF-V-4

EF-V-5

Standard: The Examinee pushes the open pushbutton for EF-V-4 and EF-V-5 on CC.

(The Green Light extinguishes for both valves and the Red light is lit for both valves.)

Booth Operator: **On Monitor display FWVCOV13 and set to 0 to close CO-V-13 when directed by the examinee in the next step.**

Comment:

Step 4.5.5

√ **Performance Step: 5** Close the following valves:

CO-V-13

CO-V-14A

CO-V-14B

Standard: The Examinee dispatches an AO to close CO-V-13 locally.

Examinee pushes the Close PB for:

CO-V-14A, CO-V-14B

(The Green Light is ON for CO-V-14A/14B valves and the Red light is OFF.)

Comment:

Performance Step: 6 Examinee completes Section 4.5

Standard: The examinee announces EF Pumps are lined up to RR or Section 4.5 is complete.

Comment:

Terminating Cue: **When examinee completes Section 4.5 of OP-TM-424-902, the JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM D

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the ARO.
- The Reactor is tripped due a loss of offsite power. The cause is unknown and power is not expected to be returned to service for at least 24 hours.
- EOP-001 has been completed.
- A cooldown on Natural Circulation is in progress.
- The EFW pumps are taking suction from DW-T-2 via the Hotwell, and MS-V-4A/B backup controllers are throttled to control the cooldown.
- John Levengood, the secondary AO at the EFW Pumps, reports that the suction pressure for these pumps indicates Less than 2 psig.

INITIATING CUE:

- The CRS directs you to switch the EFW Pump suction from Hotwell / DW-T-2 to the discharge of the Reactor River Water System, IAW OP-TM-424-902 EFW Alternate Inventory; no other condensate sources are immediately available. (Hand Examinee a copy of the procedure)
- For the purpose of conserving simulator time on this examination, reports from field operators will occur immediately.

JPM "E" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added Alternate path start note after step 10 including criteria of why it is alternate path.
3. Added to the Standard in Step 9 addressing that the examinee will verify DH-V-5A or DH-V-6A position.
4. Added to the Standard in Step 11 addressing that the examinee will verify DH-V-5B or DH-V-6B position.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 21401004

Task Title: Initiate RB Spray JPM No.: TMI08 NRC JPM E

K/A Reference: SYS 026 A2.03 4.1/4.4 New Alternate Path

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 ARO.
- The Reactor tripped due to a large RCS leak.
- ESAS Actuation has occurred.

Task Standard: Train B RB Spray is initiated.

Required Materials: None

General References: OP-TM-214-901, RB Spray Operation, Rev. 3
OP-TM-642-903, 30 PSIG ESAS Actuation, Rev. 1

Handout: None

Initiating Cue: The CRS directs you to INITIATE OP-TM-642-903, 30 PSIG ESAS Actuation.

Time Critical Task: No

Validation Time: 9 minutes

SIMULATOR SETUP

1. Initialize the Trainer to Temp IC54, 100% Power MOC

   a. Insert MALFUNCTION BS05B, BS-P-1B ES Start Failure
   b. Insert MALFUNCTION ES04B, ES Fail to Actuate at Hi RB Press (4#)
   c. SET I/O OVERRIDE 03A4S02-ZDIPB1RBB to OFF ('B' Train 4# Manual PB)
   d. Insert MALFUNCTION TH05 at 50%
   e. Perform IMAs of OP-TM-EOP-001
   f. Perform OP-TM-EOP-010, Rule 1 and secure all four RCPs

2. After the 'A' Train of RB Spray has actuated, FREEZE the simulation.

3. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH OPERATOR: **GO TO RUN ON THE SIMULATOR**

OP-TM-642-903 Step 3.0

Performance Step: 1 The Examinee will review the Precautions, Limitations, and Prerequisites of OP-TM-642-903.

Standard: The Examinee reviews the Precautions, Limitations, and Prerequisites.

Comment:

OP-TM-642-903 Step 3.3.1

Performance Step: 2 VERIFY at least one of the following conditions:

- Containment pressure > 30 psig,
- CRS direction or 30 psig ESAS actuation is required by procedure.

Standard: The Examinee VERIFIES CRS direction to initiate 30 psig ESAS actuation.

Comment:

OP-TM-642-903 Step 4.1

Performance Step: 3 If ESAS Train "A" "RB PRESS 30 PSIG ACTUATION" (PCR) lights are not BLUE, then PRESS Train "A" "MANUAL ES ACTUATION" "30 PSIG RB PRESS" (CC) pushbutton.

Standard: Examinee VERIFIES the Train "A" "RB PRESS 30 PSIG ACTUATION" lights are blue on PCR.

Evaluator Note: **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.**

Comment:

OP-TM-642-903 Step 4.2

Performance Step: 4 If ESAS Train "B" "RB PRESS 30 PSIG ACTUATION" (PCR) lights are not BLUE, then PRESS Train "A" "MANUAL ES ACTUATION" "30 PSIG RB PRESS" (CC) pushbutton.

Standard: Examinee VERIFIES the Train "B" "RB PRESS 30 PSIG ACTUATION" lights are blue on PCR.

Comment:

OP-TM-642-903 Step 4.3

Performance Step: 5 Ensure complete actuation and proper operation as follows:

4.3.1 **INITIATE** OP-TM-214-901 "RB Spray Operation".

Standard: The Examinee diagnoses the "B" Train of Containment Spray components did not actuate to their ES position as indicated by the component amber indication on PCR and INITIATES OP-TM-214-901 "RB Spray Operation".

Comment:

OP-TM-214-901 Step 3.0

Performance Step: 6 The Examinee will review the Precautions, Limitations, and Prerequisites of OP-TM-214-901

Standard: The Precautions, Limitations, and Prerequisites of OP-TM-214-901 are reviewed.

Comment:

OP-TM-214-901 Step 3.3

Performance Step: 7 Prerequisites:

3.3.1 **VERIFY** RB spray system was in ES standby IAW OP-TM-214-000.

3.3.2 **VERIFY** RB Spray has been automatically actuated **or** Reactor building pressure is approaching 30 psig **or** Emergency Director has authorized use of RB Spray.

3.3.3 **VERIFY** 1D or 1E 4160V Bus is energized

Standard: The Examinee VERIFIES the Prerequisites are met.

Evaluator Cue: **As CRS direct 'B' Train of the 30 psig ESAS started, if requested.**

Comment:

OP-TM-214-901 Step 4.1.1

Performance Step: 8 If 1D 4160V bus is not energized, then GO TO step 4.1.4

Standard: The Examinee VERIFIES the D 4160V bus is energized as indicated by the bus voltmeter reading approximately 4160V.

Evaluator 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.**

Comment:

OP-TM-214-901 Step 4.1.2

Performance Step: 9 If any of the following components are not in the required condition,
then INITIATE Section 4.2
1. DH-V-5A or DH-V-6A OPEN
2. BS-V-3A OPEN
3. BS-V-1A OPEN
4. BS-P-1A OPERATING

Standard:
- The Examinee VERIFIES that DH-V-5A or DH-V-6A are open as indicated by the RED open lights being on and the GREEN closed lights off.
- The Examinee VERIFIES that BS-V-3A and BS-V-1A are open as indicated by the RED open lights being on and the GREEN closed lights off.
- The Examinee VERIFIES that BS-P-1A is running as indicated by its RED breaker closed light being on and the GREEN breaker open light off.

Comment:

OP-TM-214-901 Step 4.1.3

Performance Step: 10 If 1E 4160V bus is not energized, then GO TO Section 4.3

Standard: The Examinee VERIFIES 1E 4160V bus is energized as indicated by the bus voltmeter reading approximately 4160V.

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must diagnose "B" train ES Components did not actuate, and go to section 4.2, then skip to 4.2.2 as "A" train components are already in correct alignment.

OP-TM-214-901 Step 4.1.4

√ **Performance Step: 11** If any of the following components are not in the required condition,
then INITIATE Section 4.2
1. DH-V-5B or DH-V-6B OPEN
2. BS-V-3B OPEN
3. BS-V-1B OPEN
4. BS-P-1B OPERATING

Standard:
- The Examinee VERIFIES that DH-V-5B or DH-V-6B are open as indicated by the RED open lights being on and the GREEN closed lights off.
- The Examinee diagnoses that BS-V-3B AND BS-V-1B are closed as indicated by the GREEN closed lights being on and the RED open lights off.
- The Examinee diagnoses that BS-P-1B is not running as indicated by its GREEN breaker open light being on and the RED breaker closed light off.
- The Examinee GOES TO Section 4.2.

Comment:

OP-TM-214-901 Step 4.2.2.1

Performance Step: 12 VERIFY 1E 4160V bus is energized.

Standard: The Examinee VERIFIES 1E 4160V bus is energized as indicated by the bus voltmeter reading approximately 4160V.

Comment:

OP-TM-214-901 Step 4.2.2.2

Performance Step: 13 If DH-V-5B or DH-V-6B is not OPEN, then perform the following:

Standard: The Examinee VERIFIES DH-V-5B is open as indicated by the RED open light is on and the GREEN closed light is off on console right.

Comment:

OP-TM-214-901 Step 4.2.2.3

√ **Performance Step: 14** If BS-V-3B is not OPEN, then perform the following:

A. ENSURE BS-P-1B is shutdown.

B. OPEN BS-V-3B

C. VERIFY BS-V-3B is OPEN.

Standard: The Examinee opens BS-V-3B as indicated by the RED open light is on and the GREEN closed light is off on console right.

Comment:

OP-TM-214-901 Step 4.2.2.4

√ **Performance Step: 15** If BS-V-1B is not OPEN, then perform the following:

A. ENSURE BS-P-1B is shutdown

B. OPEN BS-V-1B

C. VERIFY BS-V-1B is OPEN

Standard: The Examinee opens BS-V-1B as indicated by the RED open light is on and the GREEN closed light is off on console right.

Comment:

OP-TM-214-901 Step 4.2.2.5

√ **Performance Step: 16** If BS-P-1B is not operating, then perform the following:

A. VERIFY DH-V-5B or DH-V-6B is OPEN.

B. START BS-P-1B

Standard: The Examinee starts BS-P-1B as indicated by the RED breaker closed indication on and the GREEN breaker open indicator off.

Comment:

Terminating Cue: **When BS-P-1B is running the JPM can be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 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:

- You are the ARO.
- The Reactor tripped due to a large RCS leak.
- ESAS Actuation has occurred.

INITIATING CUE:

- The CRS directs you to INITIATE OP-TM-642-903, 30 PSIG ESAS Actuation.

JPM "F" changes from submittal

1. Removed critical task from examinee cue sheet.
2. Added Alternate path start note after step 15 including criteria of why it is alternate path.
3. Edited step 6 to read the correct Make Up Pumps (MU-P-1c and MU-P-1B-E)
4. Edited Step 1 to mirror Step 2 as far as verifying signed off steps are completed.

Facility: Three Mile Island Unit 1 Task No.: 86101004

Task Title: Energize 1E Bus from SBO JPM No.: TMI08 NRC SIM JPM F

K/A Reference: SYS 064 A4.01 (4.0 4.3) Modified, Alt Path

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- You are the Assist Reactor Operator (ARO).
- Plant was in normal lineup with no equipment OOS.
- Unit tripped 60 minutes ago.
- Loss of Off-Site Power (LOOP) just occurred.
- OP-TM-AOP-020 is in progress

Task Standard: All critical tasks evaluated as SAT.

Required Materials: None

General References: OP-TM-AOP-020, LOSS OF STATION POWER – Revision 12

Handout: OP-TM-864-901, SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS – Revision 8

Initiating Cue: The CRS has directed you restore power to the 1E 4160 volt bus IAW OP-TM-864-901, "SBO Diesel Generator (EG-Y-4) Operations.

Time Critical Task: Yes – 10 minutes to energize bus

Validation Time: 8 Minutes

SIMULATOR SETUP

1. Reset the simulator to Temp IC 59.

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

2. PLACE **MALFUNCTION EG07A** EG-Y-1A failure **on Event 1.**
   INSERT **MALFUNCTION EG07B** EG-Y-1B failure**.**
   INSERT **MALFUNCTION ED01**. Electrical Blackout.
   INSERT **REMOTE FSR01 OFF** prevents operation FS-P-1.
   INSERT **REMOTE FSR03 OFF** prevents operation FS-P-3.
   INSERT **REMOTE FSR02 OFF** prevents automatic operation FS-P-2.
   SET **REMOTE FSR02 to AUTO ON EVENT 2**
   SET **I/O OVERRIDE 04A2M1-ZAOFSPI371** TO 30
   SET **I/O OVERRIDE 04A2M1-ZAOFSPI371** TO 80 ON EVENT 2
   SET **EVENT TRIGGER 2** TO zdifsp2(1)==1
   INITIATE Global Silence.
   FREEZE the Simulator.
   Verify Visual Effects are enabled.
3. 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.
4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

OP-TM-864-901 Step 3.3.1

Performance Step: 1 NOTE: If 1C 4160 V bus has been de-energized for > 3 hours, the SBO battery may not be sufficiently charged to support SBO start and load.

Verify one of the following has occurred:

1. An unplanned loss of 1C 4160V bus.
2. An unplanned loss of 1D 4160V bus and EG-Y-1A is inoperable.
3. An unplanned loss of 1E 4160V bus and EG-Y-1B is inoperable.
4. Testing IAW OP-TM-642-231 or OP-TM-642-232

Standard:
- Determines note is NOT applicable from initial conditions.
- Reviews signed-off step.

Evaluator Cue:

Go to RUN on the simulator.

As URO, ICO/Examiner must acknowledge alarms.

As the US, inform the Examinee to; "You are to restore power to the 1E 4160 volt bus IAW OP-TM-864-901."

Provide examinee with OP-TM-864-901, Rev 8 signed off through and including Step 3.3.2. section.

Comment:

OP-TM-864-901, Step 3.3.2

Performance Step: 2 **Verify** EG-Y-4 was in standby per 1107-9 when the event began.

Standard:
- Reviews signed-off step.

Comment:

Note Record time of lights out for calculation below, or use stop-watch.

Critical Action Start time _____.

Booth Operator **when directed enter Event 1** to de-energized 1E 4160V bus.

OP-TM-864-901, Step 4.2.1

Performance Step: 3 **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 4.2.2

Performance Step: 4 **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 4.2.3

Performance Step: 5 **VERIFY** one of the following is TRUE.

A. FS-P-1, FS-P-2 or FS-P-3 is operating.

B. FS-P-2 is operable except that power is not available.

Standard: May attempt to start FS-P-1 and/or FS-P-3 however they will not start.
Determines FS-P-2 is operable except power is not available.

Comment:

OP-TM-864-901, Step 4.2.4

√ **Performance Step: 6** **ENSURE** the following control switches are in PTL
A. BS-P-1B
B. The ES selected MU pump: MU-P-1C or MU-P-1B-E
C. DH-P-1B
D. RR-P-1B
E. EF-P-2B

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 4.2.5

√ **Performance Step: 7** **PRESS AND HOLD** for approx. 8 seconds SBO DIESEL GENERATOR START PB.

Standard:
- Presses and holds start PB for EG-Y-4 for approx. 8 seconds.

Comment:

OP-TM-864-901, Step 4.2.6

Performance Step: 8 **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 4.2.7

Performance Step: 9 **If** generator frequency is **not** between 59 and 61 Hz, **then ADJUST** governor.

Standard:
- Verifies frequency is between 59 and 61 Hz at frequency meter for EG-Y-4.

Comment:

OP-TM-864-901, Step 4.2.8

Performance Step: 10 **ENSURE** G11-02 is in P-T-L.

Standard:
- Verifies G11-02 at EG-Y-1A section of Console Right is in Pull-To-Lock, by Rotating counterclockwise and pulling.

Comment:

OP-TM-864-901, Step 4.2.9

√ **Performance Step: 11** **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:

OP-TM-864-901, Step 4.2.10

√ **Performance Step: 12** **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.

Critical Action Stop time _____.

Critical time is Stop time minus start time above, or stopwatch time.

Time must be less than 10 minutes reference critical operator action times listed in 1001E.

OP-TM-864-901, Step 4.2.11

√ **Performance Step: 13** **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:

OP-TM-864-901, Step 4.2.12

Performance Step: 14 **GO TO** Section 4.4.

Standard:
- Skips ahead in procedure to Section 4.4

Comment:

OP-TM-864-901, Step 4.4.1

Performance Step: 15 **IAAT** operation of MU pump, DH pump, RR pump, EFW pump or BS pump is required and EG-Y-4 is supplying 1D **or** 1E 4160V bus, **then**

1. **VERIFY** ESAS is defeated or not actuated.
2. **START** one large ES motor
3. **VERIFY** affected bus voltage >4100 volts.
4. **PLACE** the motor in PTL when operation is no longer required.

Standard:
- Determines If At Any Time (IAAT) does not apply.

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must recognize that Fire service pressure is less than 80 PSIG, and perform step 4.4.2. Normally this would be a condition met step as one of three fire pumps should have started either on loss of starting aid power (Diesels) or low fire service pressure (all three). FS-P-2 can only be started after a class 1E bus is energized, and with no ESAS signal present.

OP-TM-864-901, Step 4.4.2

Performance Step: 16 **If** Fire Service pressure < 80 psig, **then**

1. **START** FS-P-1 **or** FS-P-3.
2. **If** FS-P-2 was operable but does not have power available, **then ENSURE** ESAS is not actuated **and SKIP** next two steps.
3. **If** FS pressure < 80 psig, **then START** FS-P-2.
4. **VERIFY** Fire Service pressure > 80 psig.

Standard:

- May attempt to start FS-P-1 and/or FS-P-3, will not start.
- Starts FS-P-2 at Panel Left (PL) by rotating switch clockwise to start.

Comment:

Terminating Cue: **When FS-P-2 has been started the JPM may be terminated.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC JPM F

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the Assist Reactor Operator (ARO).
- Plant was in normal lineup with no equipment OOS.
- Unit tripped 60 minutes ago.
- Loss of Off-Site Power (LOOP) just occurred.
- OP-TM-AOP-020 is in progress

INITIATING CUE:

The CRS has directed you restore power to the 1E 4160 volt bus IAW OP-TM-864-901, "SBO Diesel Generator (EG-Y-4) Operations.

JPM "G" changes from submittal

1. Removed critical task from examinee cue sheet.
2. Added Alternate path start note after step 6 including criteria of why it is alternate path.
    - Modified initial conditions as follows:

Initial Conditions:

- You are the ARO.
- The Reactor is in Hot Shutdown in preparation for a refueling outage.
- Normal equipment lineups exist.
- A Reactor Building Purge is being started IAW OP-TM-823-406, RB Purge – Containment Closed.
- Jim Randisi is available to report AH-TI-6A and AH-TI-6B temperatures.
- All limits, precautions and prerequisites have been met.
- Both AH-E-6s and both AH-E-7s have been started, all four AH-V-1's are open.
- AH-FT-148B has been selected for alarm input with an alarm setpoint of 4.28E+04, per the release permit.
- The purge loader has NOT been operated.

3. Modified initiating cue as follows, added starting at step 4.19.
4. Added evaluator note on what pens indicate to step 2
5. Added evaluator cue to step 3:

Evaluator Cue: If requested what is the limit, determine if candidate is RO or SRO:

If RO, probe their understanding of what determines limit, then provide "42,800 cfm" from the permit.
If SRO, inform them they have the information they need.

6. Under General References, changed 6610-ADM-4250.12 to "Release Permit" to account for associated paperwork.

Facility: THREE MILE ISLAND UNIT 1 Task No.:

Task Title: Initiate and Isolate a Reactor Building Purge JPM No.: TMI08 NRC JPM G

K/A Reference: SYS 029 K1.01 3.4/3.7 New Alternate Path

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 ARO.
- The Reactor is in Hot Shutdown in preparation for a refueling outage.
- Normal equipment lineups exist.
- A Reactor Building Purge is being started IAW OP-TM-823-406, RB Purge – Containment Closed.
- Jim Randisi is available to report AH-TI-6A and AH-TI-6B temperatures.
- All limits, precautions and prerequisites have been met.
- Both AH-E-6s and both AH-E-7s have been started, all four AH-V-1's are open,
- AH-FT-148B has been selected for alarm input with an alarm setpoint of 4.28E+04, per the release permit.
- The purge loader has NOT been operated.

Task Standard: RB Purge is initiated IAW OP-TM-823-406, RB Purge Containment Closed, and then isolated following RM-A-9G High Radiation alarm IAW OP-TM-MAP-C0101, Radiation Level Hi.

Required Materials: None

General References:	OP-TM-823-406, RB Purge Containment Closed, Rev. 5 OP-TM-MAP-C0101, Radiation Level Hi, Rev. 0 Release Permit
Handout:	OP-TM-823-406, RB Purge Containment Closed, Rev. 5 signed off through Step 4.19 6610-ADM-4250.12, Releasing Radioactive Gaseous Effluents – Reactor Building Purge with Steps 3.3.1, 3.3.2 and 3.3.3 signed off.
Initiating Cue:	The CRS directs you to INITIATE a Reactor Building Purge IAW OP-TM-823-406, RB Purge Containment Closed, Rev. 5, starting at step 4.19.
Time Critical Task:	No
Validation Time:	32 minutes

SIMULATOR SETUP

1. Initialize the Trainer to Temp IC 60, Hot Shutdown

    a. INSERT MALFUNCTION RM01L RM-A9 INTERLOCK FAILURE IMMEDIATELY.
    b. PLACE MALFUNCTION RM04H RM-A-9G ATMOSPHERIC RAD MONITOR FAILS HIGH ON EVENT #1.

2. Complete OP-TM-823-406, RB Purge – Containment Closed and sign off through Step 4.19.

3. FREEZE the simulation.

4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

OP-TM-823-406 Step 3.1 and 3.2

Performance Step: 1 The Examinee may review the Limitations and Precautions of OP-TM-823-406.

Standard: The Examinee reviews the Limitations and Precautions.

Comment:

OP-TM-823-406 Step 4.20

Performance Step: 2 MARK FR-148 with start time, date, and release number.

Standard: The Examinee marks FR-148 with start time, date, and release number.

Evaluator Note: Red Pen is total system flow – presently 50K cfm, all outside makeup air.

Green Pen is RB purge flow hi range.

Blue Pen is RB purge flow lo range.

Comment:

OP-TM-823-406 Step 4.21

√ **Performance Step: 3** ADJUST RB Purge Manual Loader Purge Rate (AH-D-8B-EX1) to establish desired purge rate (not to exceed maximum allowable purge rate) and maintain RB pressure near 0 psig.

Standard: The Examinee adjusts purge flow rate to ≈13,400 scfm by fully opening the RB Purge Manual Loader Purge Rate (AH-D-8B-EX1) and maintains RB Pressure approximately 0 psig.

Evaluator Cue: If requested what is the limit, determine if candidate is RO or SRO:

If RO, probe their understanding of what determines limit, then provide "42,800 cfm" from the permit.
If SRO, inform them they have the information they need.

Comment:

OP-TM-823-406 Step 4.22

Performance Step: 4 MONITOR purge supply fan discharge temperature (AH-TI-6A and/or AH-TI-6B) at least once/shift.

Standard: The Examinee monitors temperature once/shift.

Evaluator Cue: **As the AO at AH-TI-6A and AH-TI-6B report temperature is 110°F if asked in Step 4.23.**

Comment:

OP-TM-823-406 Step 4.23

Performance Step: 5 IAAT either of the following conditions exist:

- Purge supply fan discharge temperature cannot be maintained ≥ 90°F with containment integrity required
- Purge supply fan discharge temperature cannot be maintained ≥ 55°F with containment integrity not required

then GO TO Section 5.0 to stop RB purge.

Standard: The Examinee verifies Purge supply fan discharge temperature can be maintained ≥ 90°F based on feedback from the AO on temperature at the Johnson Controller.

Comment:

OP-TM-823-406 Step 4.24

Performance Step: 6 RECORD initial purge data on Waste Gas Release Permit.

Standard: The Examinee records the initial data on Waste Gas Release Permit, 6610-ADM-4250.12.

Evaluator Cue: **When the release data has been recorded cue the actuation of RM-A-9G on high radiation. AH-V-1A and AH-E-1B will fail to close and will have to be closed from the Panel Left (PL) by the Examinee.**

Booth Operator: **When cued by the Evaluator, Initiate Event #1 to insert the high radiation on RM-A-9G.**

Comment:

ALTERNATE PATH STARTS HERE;

Examinee must recognize that when the High radiation alarm on Gas channel came in the purge valves did not close. The examinee may take immediate action to close the valves in accordance with OS-24 failure of an automatic actuation to occur or the may follow the alarm response to close the valves. They must recognize the failure of the valves to isolate a radioactive release and close the valves to stop the release.

OP-TM-MAP- C0101

Performance Step: 7 Acknowledge the MAP Annunciator alarm C-1-1.

Standard: The Examinee acknowledges MAP Annunciator alarm C-1-1 and diagnoses that RM-A-9G is in high alarm and that the Purge isolation valves AH-V-1A, AH-V-1B, AH-V-1C and AH-V-1D did not close as required.

Comment:

OP-TM-MAP- C0101

√ **Performance Step: 8** The following occurs on a gaseous high alarm:

– R.B. Purge Valves AH-V-1A, B, C, and D Close

– R.B. Sump Isol. Valves WDL-V-534 and 535 Close

– Remote sampler starts (MAP-5)

Standard: The Examinee diagnoses AH-V-1A, AH-V-1B, AH-V-1C and AH-V-1D did not close and closes them manually from Panel Left (PL).

- AH-V-1A is closed as indicated by the GREEN closed indicator is on and the RED open indicator is off.
- AH-V-1B is closed as indicated by the GREEN closed indicator is on and the RED open indicator is off.
- AH-V-1C is closed as indicated by the GREEN closed indicator is on and the RED open indicator is off.
- AH-V-1D is closed as indicated by the GREEN closed indicator is on and the RED open indicator is off.

Evaluator Note: **The Examinee may refer to the Annunciator Response for RM-A-9G in OP-TM-MAP-C-0101. The Evaluator may have to respond as RP to acknowledge the alarm was received and as the SM to evaluate EALs.**

The Examinee will continue with the purge shutdown; however the JPM can be terminated when AH-V-1A, AH-V-1B, AH-V-1C and AH-V-1D are closed.

Comment:

Terminating Cue: **When AH-V-1A, AH-V-1B, AH-V-1C and AH-V-1D are**

closed the JPM can be terminated.

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 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 ARO.
- The Reactor is in Hot Shutdown in preparation for a refueling outage.
- Normal equipment lineups exist.
- A Reactor Building Purge is being started IAW OP-TM-823-406, RB Purge – Containment Closed.
- Jim Randisi is available to report AH-TI-6A and AH-TI-6B temperatures.
- All limits, precautions and prerequisites have been met.
- Both AH-E-6s and both AH-E-7s have been started, all four AH-V-1's are open,
- AH-FT-148B has been selected for alarm input with an alarm setpoint of 4.28E+04, per the release permit.
- The purge loader has NOT been operated.

INITIATING CUE:

- The CRS directs you to INITIATE a Reactor Building Purge IAW OP-TM-823-406, RB Purge Containment Closed, Rev. 5, starting at step 4.19.

JPM "H" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Added Initial Condition that STA has set computer points for alarm limits.
3. Added examiner Cue if examinee attempts to check alarms setpoints during review of L&P that **"The alarm setpoints have been set to the proper setpoint."**
4. Described the function of DC-V-2A and DC-V-65A and there expected position demands in an examiner note on Step 7.
5. Placed Examiner note in Step 8 to better describe the affect on the plant of the steps being taken.

Facility: THREE MILE ISLAND UNIT 1 Task No.: 21201002

Task Title: Shifting DH Train A From Operating to Standby Mode JPM No.: TMI08 NRC JPM H

K/A Reference: SYS 005 A4.02 (3.4/3.1) Bank N/A

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 ARO
- The STA is monitoring plant HU and CD rate
- The Plant is in cold shutdown with both trains of Decay Heat Removal in the Operating Mode, per OP-TM-212-000.
- Preparations to cooldown to Refueling Shutdown conditions are in progress.
- The STA has set computer points for DH Suction (A0932, A0934) and Cooler Outlet (A0933, A0935), to the correct values.

Task Standard: RCS Cooling is transferred to Decay Heat Removal Train B and Decay Heat Removal Train A is placed in DHR Standby Mode IAW OP-TM-212-151, Shifting DH Train A from DHR Operating to DHR Standby Mode.

Required Materials: None

General References: OP-TM-212-151, Shifting DH Train A from DHR Operating to DHR Standby Mode, Rev. 3

Handout: OP-TM-212-151, Shifting DH Train A from DHR Operating to DHR Standby Mode, Rev. 3

Initiating Cue:	The CRS directs you to shift DH Train A from DHR Operating to DHR Standby Mode IAW OP-TM-212-151. Maintain RCS temperature less than 140°F
Time Critical Task:	No
Validation Time:	30 Minutes

SIMULATOR SETUP

- Initialize the Trainer to Temp IC-56, Cold Shutdown
- Place the idle Decay Heat Removal train in the Operating Mode IAW OP-TM-212-111 or OP-TM-212-112 and leave both trains in service.
- FREEZE the simulation.
- This completes the setup for this JPM.
- Display Area 5 Group 22 on Console Center Computer screen.

(Denote Critical Steps with a check mark)

START TIME: _____

OP-TM-212-151 Step 3.1 and 3.2

Performance Step: 1 The Examinee will review the Limitations and Precautions of OP-TM-212-151.

Standard: The Examinee reviews the Limitations and Precautions.

Evaluator Cue: **If the examinee reviews the Computer points A0932 through A0935 per L&P 3.1.1, inform them to assume that, "The alarm setpoints have been set to the proper setpoint."**

Comment:

OP-TM-212-151 Step 3.3 Prerequisites

Performance Step: 2 DH (212)System Train A is in DHR Operating Mode IAW OP-TM-212-000, Decay Heat Removal System.

Standard: The Examinee verifies DHR is in the Operating Mode IAW OP-TM-212-000.

Comment: Given in initial conditions.

OP-TM-212-151 Step 3.3 Prerequisites

Performance Step: 3 One of the following:

- All fuel is removed from the RV.
- FTC Level > 344′ 3″ (i.e. green band).
- RCS temperature is low and sufficient time available to allow start of standby train prior to reaching 140°F (Refueling Mode) (Decay Heat low).
- DH Train B in is DHR Operating Mode.
- Plant Heatup is in progress and DHR is no longer required

Standard: The Examinee verifies DH Train B is in the Operating Mode based on console indications and given plant conditions.

Comment:

OP-TM-212-151 Step 4.1

Performance Step: 4 VERIFY all prerequisites have been met.

Standard: The Examinee verifies all prerequisites are met.

Comment:

OP-TM-212-151 Step 4.2

Performance Step: 5 If Plant Heatup is in progress, then ENSURE DH System has been vented IAW one of the following:

Standard: The Examinee verifies a plant heatup is not in progress based on given plant conditions.

Comment:

OP-TM-212-151 Step 4.3

Performance Step: 6 If only DH Train A is in service, then VERIFY the following:

Standard: The Examinee verifies DH Train B is in the Operating Mode based on console indications and given plant conditions.

Comment:

OP-TM-212-151 Step 4.4

Performance Step: 7 RECORD position of the following:

DC-V-2A (CC) _____% Open Demand.

DC-V-65A (CC) _____% Open Demand.

Standard: The Examinee records the position of DC-V-2A and DC-V-2B in OP-TM-212-151.

Examiner NOTE These are position demands located at the valve controllers on CC. During validation they read;

DC-V-2A (Decay closed train "A" cooler inlet), 60%

DC-V-65A (Decay closed train "A" cooler bypass), 55%

Comment:

OP-TM-212-151 Steps 4.5.1-4.5.4

√ **Performance Step: 8**

4.5 If DH Train B is in DHR Operating Mode,
then TRANSFER Heat Removal as follows:

4.5.1 THROTTLE Closed DC-V-65B (CR).

4.5.2 THROTTLE Open DC-V-2B (CR).

4.5.3 THROTTLE Open DC-V-65A (CC).

4.5.4 THROTTLE Closed DC-V-2A (CC).

Standard: The Examinee throttles the valves using the valve position loaders on console center and console right.

Examiner NOTE The examinee will transfer the heat load from the "A" train of Decay Heat Removal to the "B" train of Decay Heat Removal by Closing on the "B" train cooler bypass, Opening on the "B" train cooler inlet, and opening on the "A" train bypass while closing on "A" train inlet, the intent is to maintain CCW flow at about the same value for each of these independent trains while transferring the cooling to the "B" train prior to securing the "A" train.

Comment:

OP-TM-212-151 Step 4.5.5

√ **Performance Step: 9**

4.5.5 REPEAT steps 4.5.1 through 4.5.4 until all of the following are met:

- DC-V-2A is Closed (CC).
- DC-V-65A is throttled Open (CC).
- DC flow on each side is approximately 3300 gpm (DC-FI-26 and DC-FI-27) (CC).

Standard:

- The Examinee repeats steps 4.5.1 through 4.5.4 using the valve position loaders on console center and console right until DC-V-2A is closed and DC-V-65A is throttled open.
- The Examinee verifies DC flow on each side is approximately 3300 gpm on console indicators DC-FI-26 and DC-FI-27 (CC).

Comment:

OP-TM-212-151 Step 4.6

Performance Step: 10 If Plant Heatup is in progress, then VERIFY primary to secondary heat transfer as follows:

Standard: The Examinee verifies a heatup is not in progress based on given plant conditions.

Comment:

OP-TM-212-151 Step 4.7.1

Performance Step: 11 DEACTIVATE Decay Heat Low Flow alarm by pressing the Alarm Off pushbutton for DH A at DH-1-MS (CR).

Standard: The Examinee deactivates the Decay Heat Low Flow alarm by pressing the Alarm Off pushbutton for DH A at DH-1-MS (CR) and verifies the ON pushbutton light is off and the OFF pushbutton light is on.

Comment:

OP-TM-212-151 Step 4.7.2

√ **Performance Step: 12** SECURE DH-P-1A and PLACE in Pull-to-Lock (CC).

Standard: The Examinee turns the control switch for DH-P-1A to the stop position and then to PTL and verifies the pump stops by observing amps going to zero and train flow going to zero.

Comment:

OP-TM-212-151 Step 4.7.3

√ **Performance Step: 13** CLOSE DH-V-4A (CC).

Standard: The Examinee closes DH-V-4A by pressing the close pushbutton and verifying the valve is closed by observing the GREEN closed light on and the RED open light is off.

Comment:

OP-TM-212-151 Step 4.7.4

Performance Step: 14 RECORD the following in the CR Log:

- DH (212) System Train A in DHR Standby Mode.
- DC-V-2A / 65A Positions from Step 4.4.

Standard: The Examinee logs DH System Train A in DHR Standby Mode and the positions of DC-V-2A / 65A.

Comment:

Terminating Cue: **When DH-V-4A is closed the JPM can be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 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:

- You are the ARO
- The STA is monitoring plant HU and CD rate
- The Plant is in cold shutdown with both trains of Decay Heat Removal in the Operating Mode, per OP-TM-212-000.
- Preparations to cooldown to Refueling Shutdown conditions are in progress.
- The STA has set computer points for DH Suction (A0932, A0934) and Cooler Outlet (A0933, A0935), to the correct values.

INITIATING CUE:

- The CRS directs you to shift DH Train A from DHR Operating to DHR Standby Mode IAW OP-TM-212-151.
- Maintain RCS temperature less than 140°F

JPM "I" changes from submittal

1. Removed non-critical task from examinee cue sheet.
2. Indicated and explained Alternate path criteria starting at step 1.

Facility: Three Mile Island Unit 1 | Task No.: 85201004

Task Title: RESPOND TO LOSS OF INSTRUMENT AIR | JPM No.: TMI08 NRC IP JPM I

K/A Reference: 078 A3.01 (3.1 3.2) | New, Alt Path, In-plant AOP

Examinee: | NRC Examiner:

Facility Evaluator: | Date:

Method of testing:

Simulated Performance: X | Actual Performance: ____

Classroom ____ Simulator ____ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:

- You are an extra Reactor Operator.
- Plant is at 100% power.
- IA-P-4 is OOS.
- IA-P-1A has just tripped and OP-TM-AOP-028 has been entered.

Task Standard: All critical tasks evaluated as SAT.

Required Materials: None

General References: OP-TM-AOP-028, LOSS OF INSTRUMENT AIR – Revision 4

Handout: OP-TM-AOP-028, LOSS OF INSTRUMENT AIR – Revision 4

Initiating Cue: The CRS has directed you to Perform in-plant steps of AOP-028 starting at step 3.3.

Time Critical Task: No

Validation Time: 30 Minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

ALTERNATE PATH STARTS HERE;

When Control Room reports that IA-P-1B failed to start, examinee must go to RNO column and attempt to start service air pumps (unsuccessful) or reset thermal overload to get an IA compressor back.

OP-TM-AOP-028, Step 3.3

Performance Step: 1 If IA-PI-491<85 PSIG and IA-P-1A and IA-P-1B are **not** loaded, **then START** IA-P-1A or 1B from the Control Room.

Standard:
- Proceeds to IA-PI-491 in IB Basement reads gauge.
- Determines IA pressure below setpoint requests IA-P-1A or 1B be started.

Evaluator Cue: **Using a Laser Pointer, point to 80 PSIG point on IA-PI-491.**

When requested to start IA-P-1A or 1B report IA-P-1B failed to start. (IA-P-1A was reported tripped in initial conditions)

Comment:

OP-TM-AOP-028, Step 3.3 RNO pt 1

Performance Step: 2 **Ensure** SA-P-1A or SA-P-1B is running.
RESET thermal overload cutout on IA-P-1A or IA-P-1B

Standard:
- May request status of SA-P-1A or 1B from Control Room. Attempts to start SA-P-1A and/or 1B locally in Turbine Building 305 south by selecting hand.

Evaluator Cue:
- **If necessary: when area is entered you may report no rotation of flywheel.**
- **When HAND is selected report no sound, and no rotation of Flywheel.**

Comment:

OP-TM-AOP-028, Step 3.3 RNO pt 2

√ **Performance Step: 3**

Reset thermal overload cutout on IA-P-1A **or** IA-P-B (1A ES MCC Unit 4B or 1B ES MCC Unit 5B).

Standard:

- At 1A and/or 1B ES MCCs 2nd floor Control tower depresses red Reset button on 1A ES MCC unit 4A or 1B ES MCC Unit 5B.

Evaluator Cue:

- **When thermal O/L reset has been adequately demonstrated indicate that a contactor was heard picking up.**

Comment:

OP-TM-AOP-028, Step 3.4

√ **Performance Step: 4**

If IA-P-1A/B filter and dryer DP (IA-PI-491 minus IA-PI-493) > 20 psid (IB 295: IA-P-1A area), **then PERFORM** the following:

If IA-V-2104A **and** B are Closed, **then OPEN** IA-V-2106 (IA-V-2104A and B Bypass Valve)
(IB 295: IA-Q-1 area, 7' up)

Standard:

- Locates and reads gauges, performs subtraction and determines DP greater than 20.
- Obtains ladder and simulates opening IA-V-2106.

Evaluator Cue:

Indicate IA-PI-493 indicates 90 psig, IA-PI-491 indicates 65 psig.

If asked the position of IA-V-2104A and B inform the Examinee that the GREEN indicating lights are lit.

When IA-V-2106 has been indicated as being turned counterclockwise multiple turns, indicate IA-PI-491 is rising.

Comment:

Terminating Cue: **When IA-V-2106 has been properly opened the JPM may be terminated.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC IP 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:

- You are an extra Reactor Operator.
- Plant is at 100% power.
- IA-P-4 is OOS.
- IA-P-1A has just tripped and OP-TM-AOP-028 has been entered.

INITIATING CUE: The CRS has directed you to Perform in-plant steps of AOP-028 starting at step 3.3.

JPM "J/K" changes from submittal

1. None

Facility: Three Mile Island Unit 1 Task No.: 21104016

Task Title: Initiate emergency boration IAW EOP-020 JPM No.: TMI08 NRC IP JPM J

K/A Reference: 004 G2.1.30 (4.4/4.0) **Bank JPM TQ-TM-105-211-J001**

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: ____

Classroom ____ Simulator ____ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:
- The control room has been evacuated due to a fire.
- The operating crew is performing EOP-020, COOLDOWN FROM OUTSIDE OF CONTROL ROOM.

Task Standard: All critical tasks evaluated as SAT.

Required Materials: None

General References: EOP-020, COOLDOWN FROM OUTSIDE OF CONTROL ROOM, Revision 10

Handout: EOP-020, Step 3.20 (pg. 13), and simulated Key #2

Initiating Cue: The CRS has assigned you to perform EOP-020, Step 3.20 – Initiate Emergency Boration. No other operators are available to assist with Emergency Boration.

Time Critical Task: No

Validation Time: 37 minutes (includes time to sign on RWP)

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluator Note: **When the transfer switches have been placed in emergency (previous to this evolution), the "as found position" for MU-V-14A and MU-V-14B will be CLOSED (GREEN lights).**

EOP-020, Step 3.20 – Initiate Emergency Boration as follows:

√ **Performance Step: 1** ENSURE MU-V-14A and MU-V-14B are OPEN. (RSD panels)

Standard:
- Determines MU-V-14A and MU-V-14B indicate CLOSED
- Pushes the OPEN pushbutton on MU-V-14A and MU-V-14B and verifies indication change.

Evaluator Cue:
- **Initial condition: The GREEN lights are illuminated for MU-V-14A and MU-V-14B.**
- **After simulation of selecting each valve to OPEN: The RED light has illuminated and the GREEN light is out.**

Comment:

√ **Performance Step: 2** OPEN MU-V-51 (AB 281: North of seal return coolers)

Standard:
- Locates MU-V-51.
- Removes cotter pin from stem.
- Rotates handwheel in the CLOCKWISE direction.

Evaluator Note: **MU-V-51 is a reverse action valve (clockwise to OPEN). Procedure for operating valve is located on wall next to MU-V-51.**

Evaluator Cue:
- **The cotter pin is removed.**
- **The handwheel has stopped rotating and the stem is fully extended.**
- **Negative CUE if cotter pin is not removed or if valve is simulated turned counterclockwise, "handwheel would not turn."**

Comment:

√ **Performance Step: 3** START CA-P-1A or CA-P-1B (CB 322: 1A ES MCC Unit 14B or 1B ES MCC Unit 2C) [KEY#2]

Standard:
- Proceeds to CA-P-1A (CB 322: 1A ES MCC Unit 14B) or CA-P-1B (1B ES MCC Unit 2C)
- Simulates inserting and turning KEY #2 in the breaker cubicle for the selected pump.

Evaluator Cue:
- **After Key is turned, "A mechanical contacting noise was heard from inside the cubicle"**

Comment:

Terminating Cue: **After a CA-P-1A or CA-P-1B has been started: Evaluation on this JPM is complete.**

STOP TIME: _____ _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC IP 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:

- The control room has been evacuated due to a fire.
- The operating crew is performing EOP-020, COOLDOWN FROM OUTSIDE OF CONTROL ROOM.

INITIATING CUE:

The CRS has assigned you to perform EOP-020, Step 3.20 – Initiate Emergency Boration. No other operators are available to assist with Emergency Boration.

JPM "J/K" changes from submittal

1. None

Facility: THREE MILE ISLAND UNIT 1 Task No.: 41104015

Task Title: Operate MS-V-3C Locally JPM No.: TMI08 NRC JPM K

K/A Reference: SYS 041 A4.08 3.0/3.1 Bank TQ-TM-105-411-J001

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: ____

Classroom ____ Simulator ____ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:
- You are an extra Reactor Operator
- The plant is in Hot Shutdown
- MS-V-3C has failed open

Task Standard: MS-V-3C is simulated in local manual control and all critical steps are performed satisfactorily.

Required Materials: None

General References: OP-TM-411-451, Attachment 7.1, Local Operation of TBVs (MS-V-3s)/(MS-V-4s)

Handout: OP-TM-411-451, Attachment 7.1, Local Operation of TBVs (MS-V-3s)/(MS-V-4s)

Initiating Cue: The CRS has directed you to:
- Establish communications with the Reactor Operator in the Control Room.
- Take local manual operation of MS-V-3C, IAW OP-TM-411-451, Attachment 7.1, Local Operation of TBVs (MS-V-3s).
- Close MS-V-3C.

Time Critical Task: No

Validation Time: 13 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

OP-TM-411-451 Attachment 7.1 Step 1

Performance Step: 1 Locate MS-V-3C on the west side of the Main Condenser on the 322' elevation center cubicle.

Standard: The Examinee LOCATES MS-V-3C on the west side of the Main Condenser, 322' elevation of the Turbine Building and ESTABLISHES communications with the Reactor Operator.

Evaluator Cue: **When the Examinee locates the posted copy of Attachment 7.1 hand them a YELLOW COPY of the procedure.**

Comment:

OP-TM-411-451 Attachment 7.1 Step 2

√ **Performance Step: 2** TURN handwheel to align holes in sleeve with hole in stem (either set of holes in sleeve will work).

Standard: The Examinee DESCRIBES rotating handwheel to align the holes in the sleeve and the stem using either set of holes.

Evaluator Cue: **If examinee describes rotating handwheel to align the holes in the sleeve and stem, inform him/her that holes are aligned.**

Comment:

OP-TM-411-451 Attachment 7.1 Step 3

√ **Performance Step: 3** INSERT pin into sleeve/stem.

Standard: The Examinee INSERTs the pin into the holes of the sleeve and stem for the manual operator.

Evaluator Cue: **If examinee properly describes inserting the pin into the holes on the sleeve and stem inform them the pin is inserted.**

Comment:

OP-TM-411-451 Attachment 7.1 Step 4

√ **Performance Step: 4** PRESS and ROTATE Auto/Manual switch, 90 degrees counterclockwise to Manual position.

Standard: The Examinee DESCRIBES how the AUTO/MANUAL switch is unlocked and POSITIONED to the MANUAL position.

Evaluator Note: **Auto/Manual switch for MS-V-3s is located on side of positioner box.**

Evaluator Cue: **NEGATIVE CUE: If examinee does not describe how to unlock and position switch correctly, inform him/her switch is not in MANUAL.**

CUE: If examinee describes how to unlock and position switch correctly, inform him/her switch is in MANUAL.

Comment:

OP-TM-411-451 Attachment 7.1 Step 5

√ **Performance Step: 5** OPEN the actuator Equalizer Valve (located near the valve operator and marked as Equalizing Valve).

Standard: The Examinee OPENS the actuator Equalizing Valve by turning it counterclockwise to the fully OPEN position.

Evaluator Cue: **If examinee describes rotating the valve handwheel in the proper direction inform them the valve is open.**

Comment:

OP-TM-411-451 Attachment 7.1 Step 6

√ **Performance Step: 6** CLOSE MS-V-3C.

Standard: The Examinee CLOSES MS-V-3C by turning the handwheel in the clockwise direction until the valve indicates CLOSED.

Evaluator Cue: **If examinee describes rotating the valve handwheel for MS-V-3C in the proper direction inform them the valve is closed.**

Comment:

Terminating Cue: **When the Examinee reports to the CRO that MS-V-3C is in LOCAL / MANUAL control and CLOSED, the JPM may be terminated.**

STOP TIME: _____ **TIME CRITICAL STOP TIME:** _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI08 NRC SIM 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:

- You are an extra Reactor Operator
- The plant is in Hot Shutdown
- MS-V-3C has failed open

INITIATING CUE:

The CRS has directed you to:

- Establish communications with the Reactor Operator in the Control Room.
- Take local manual operation of MS-V-3C, IAW OP-TM-411-451, Attachment 7.1, Local Operation of TBVs (MS-V-3s).
- Close MS-V-3C.

Changes made to scenario 2 after exam submittal.

Establish FW Flow and Feed SG(s) – was identified as CT-30 in body in front should have been CT-10, changed.

Added underlining to actions that should be observed.

Added description of actions.

Added Examiner notes on Critical Task criteria.

Removed MU-P-1B out of service from the setup.

Changes made to scenario 2 after NRC validation:

1. Page 1, added FW-P-1A/B to Hand to Event No. 1.

2. Page 1, added C URO under Event Type to Event No. 2.

3. Page 1, removed C URO and C ARO under Event Type from Event No. 3.

4. Page 1, added "Place RBEC in Service" to Event No. 4.

5. Page 1, removed C URO & added C ARO under Event Type to Event No. 4.

6. Page 6, Added "When the reactivity manipulation is satisfied, INITIATE Event 2."

7. Page 6, added "**NOTE TO EXAMINER: The ULD is in HAND and the ULD Target Load Rate of Change is set to 1%/minute per the initial conditions.**"

8. Moved the following from page 8 to page 6:

ARO	Prior to reactor power < 75%
	• PLACE FW-P-1A in HAND IAW OP-TM-401-472(Depresses hand PB on FW-P-1A Demand station CL)
	• PLACE FW-P-1B in HAND IAW OP-TM-401-473(Depresses hand PB on FW-P-1B Demand station CL)

9. Page 7, added the following:

	URO	Place Diamond to Manual (Depresses manual PB on

		Diamond panel CC)

10. Page 8, added the following:

	ARO	Place Rx Master to Hand (Depresses hand PB on Rx Master station CC)

11. Page 8, added the following:

NOTE TO EXAMINER: The examinee may place FW-V-16A and FW-V-17A in HAND also.

12. Page 8, added the following:

NOTE TO BOOTH OPERATOR: The examinees may recognize FW-V-16B stuck open and decide to close FW-V-92B to prevent a potential overfeed condition if a Reactor Trip were to occur.

13. Page 10, changed NOTE from "**When the FW-P-1B Turbine Drain Valves are placed in the Open 3 position or when the Examiner is ready GO TO Event 3.**" To:

NOTE TO EXAMINER: When FW-P-1B is tripped, GO TO Event 3.

14. Page 18, added what PSHT and LSCM stood for in Examiner Note

15. Page 19, changed note from "**After the EOP-001 VSSVs are complete or when directed by the Lead Examiner GO TO Event 7.**" To:

NOTE TO EXAMINER: After the EF-V-30's are in HAND and when directed by the Lead Examiner GO TO Event 7.

16. Page 20, added what LSCM stood for in Examiner Note.

17. Page 20, added "per Guide 9" to Critical Task Note.

18. Page 21, added ARO for the following tasks:

CRITICAL TASK (CT-1)	URO/ARO	ENSURE all RCPs are shutdown within one minute. (Rotates all four extension control switches to stop **within 1 Minute of LSCM**)

	URO/ARO	INITIATE 4 # ESAS Actuation IAW OP-TM-642-902 4# ESAS Actuation (Press 4# Manual pushbuttons on CC/CR)

	URO/ARO	INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4. (Level will need to be raised 75% to 85% in the Operating Range)

19. Page 21, added URO for the following task:

	URO/ARO	INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4.

20. Page 9, Removed the following:

	ARO	OPEN FW-V-7B.(Rotates switch to OPEN CL)
BOOTH OPERATOR:		**FW-V-100B is not simulated. Report to the Control Room that it is open when requested.**
	ARO	OPEN FW-V-100B, request to field operator
BOOTH OPERATOR:		**FW-V-11B is controlled by REMOTE FUNCTION FWR70, which you will set to 0% to close the valve**
	ARO	Directs the Secondary AO to CLOSE FW-V-11B
	ARO	PLACE FP Turb B Drain Valves SS (PLF) in Open 3.(rotates switch) - TD-V-9B/11B - TD-V-10B/12B - TD-V-13B
	ARO	When FW-P-1B speed is < 4 rpm, then ENSURE Turning Gear Engages.(Visual verification PLF)

	ARO	PLACE FW-Y-1B EX1 (PLF) to Normal-After-Start.(Rotates extension control PLF)

21. Page 20, removed the following:

	URO	If ESAS Train A "Load Seq Block 4" lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (Train A CC).
	URO	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).

22. Page 21, removed the following:

		OP-TM-642-902 4# ESAS Actuation
	URO	CRS direction or 4 psig ESAS actuation is required by procedure.
	URO	If ESAS Train "A" "RB PRESS 4 PSIG ACTUATION" (PCR) lights are not BLUE, then PRESS Train "A" "Manual ES Actuation" "4 PSIG RB PRESS" (CC).
	URO	If ESAS Train "B" "RB PRESS 4 PSIG ACTUATION" (PCR) lights are not BLUE, then PRESS Train "B" "Manual ES Actuation" "4 PSIG RB PRESS" (CC).

23. Page 3, added Pass/Fail criteria for Critical Tasks listed.

24. Page 4, removed "REMA Form for the power reduction" from the initial setup.

Facility:	Three Mile Island	Scenario No.: 2	Op Test No.: NRC
Examiners:		Operators:	
Initial Conditions:	• (Temporary IC-42)		
	• 85% Power		
	• ICS Rate of Change at 1%/min		
Turnover:	Reduce power to secure FW-P-1B		
Critical Tasks:	• Establish FW Flow and Feed SG(s) (CT-10)(Rule 4.0)		
	• Initiate HPI (CT-2)		
	• Trip All RCPs (CT-1)(Rule 1.0)		

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS R URO N ARO	Power reduction to <560 MWe FW-P-1A/B to Hand
2	IC25 FW11B	C ARO C URO	FW-V-17B Fails to Respond in Auto FW-V-16B Fails As Is
3	RD0135 IC16	C CRS	Dropped rod in Group 7 (TS)
4	TH03A	C CRS C ARO	32 gpm RCS Leak: Hot Leg Nozzle (TS) Place RBEC in Service
5	FW15A ICR01 ICR03	M CRS M URO M ARO	Main FW Pump 1A Trip results in Reactor Trip
6	ICR01 ICR03	C ARO	HSPS setpoint for the OTSG EFW automatic control is set at 0.
7	TH04A	M CRS M URO M ARO	Large RCS Leak: Hot Leg Nozzle
8	ES01A ES01B ES04A ES04B	C URO	ESAS Auto Actuation Failure

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

Three Mile Island NRC Scenario #2

The crew takes the watch with the plant at 85% power and preparing to lower IAW 1102-4, Power Operations to secure FW-P-1B and repair a minor steam leak. The crew will continue the power reduction shortly after taking the watch.

After the reactivity manipulation is satisfied (reactivity manipulation), the Lead Examiner can cue the FW-V-17B failure to respond in auto and FW-V-16B is failed at 100% open resulting in a ΔTc developing due to B side FW flow being high. The ARO will place FW-V-16B and FW-V-17B in Hand IAW OP-TM-621-471, ICS Manual Control and OP-TM-421-452, Manual Control of Feedwater Flow to B OTSG.

The power reduction will be recommenced and power will be reduced to <560 MWe. FW-P-1B will be shut down IAW OP-TM-401-154, SHIFTING FW-P-1B FROM OPERATING MODE TO STANDBY MODE.

After FW-P-1B has been shut down, the Lead Examiner can cue the initiation of the dropped rod in Group 7 requiring the crew to reduce reactor power to <55% IAW OP-TM-MAP-H0101, ICS Runback.

Following the power reduction the CRS will implement OP-TM-AOP-062, Inoperable Rod, and direct the crew to attempt to recover the dropped rod. The CRS may review Tech Spec 4.7.1.2 for the inoperable rod and credit may be taken for a Tech Spec call (TS).

After the Tech Spec call has been made, the Lead Examiner can cue the initiation of the 32 GPM RCS leak. The CRS will review T.S. 3.1.6.2 and declare a 24 hour timeclock to be in Hot Shutdown (TS). The CRS will initiate OP-TM-AOP-050, Reactor Coolant Leakage, and commence a plant shutdown to mitigate the leak. The CRS will direct the ARO to initiate RB Emergency Cooling IAW OP-TM-534-901, RB Emergency Cooling Operations.

After RB Emergency Cooling has been initiated and FW-P-1B is secured, FW-P-1A will trip resulting in a reactor/turbine trip. The CRS will implement OP-TM-EOP-001, Reactor trip.

When both FW pumps have tripped, Emergency Feedwater will be actuated by the HSPS system. The ARO will have to take manual control of the EF-V-30 valves and feed the OTSGs IAW OP-TM-EOP-010, Rule 4, Feedwater Control, due to the failure of the HSPS level control setpoint to 0 (**CT-10**).

After the plant has been stabilized post trip the RCS leak will increase to 800 gpm requiring the URO to initiate HPI due to the ESAS auto actuation failure (**CT-2**). Subcooling Margin will be lost and the URO will have to Initiate Rule 1 and Trip all four RCPs within one minute (**CT-1**). The CRS will transition from OP-TM-EOP-001 to OP-TM-EOP-002, Loss of 25°F Subcooling Margin. The CRS will then transition to OP-TM-EOP-006, LOCA Cooldown.

The scenario may be terminated when the SM is notified to evaluate the EALs and the Lead Examiner is satisfied all of the major points for evaluation are complete.

Three Mile Island NRC Scenario #2 cont'd

B&W Unit EOP Critical Task Description Document 47-1229003

- CT-1 – Trip All RCPs – SBLOCA analysis predicted continued RCP operation during certain SBLOCAs could lead to RCS void fractions of 70% if RCPs continued to operate longer than one or two minutes following initiation of the SBLOCA. If RCPs are tripped following these high void fractions the core would not be adequately covered and fuel clad failure would occur.
  - CT-1 requires that the RCPs be tripped **within 1 minute of Loss of Sub Cooling Margin**, IAW 1001E reference FSAR 14.2.2.4.

- CT-2 – Initiate HPI – Full HPI flow is required to provide subcooled RC for primary to secondary heat transfer. If the SGs are available for heat removal, then adding water to the RCS will replenish the heat transfer medium for primary to secondary heat transfer.
  - For CT-2 one train of ESAS must be actuated **within 2 minutes of Loss of Subcooling Margin (LSCM)**, per FSAR 14.2.2.4. Either of the 4# or 1600# button would achieve one train and meet the FSAR requirements, therefore 1 button depressed within 2 minutes meets CT criteria.

- CT-10 - Establish FW Flow and Feed SG(s) – Necessary to prevent need for HPI Cooling, which degrades the RB conditions.
  - With an RCS leak into containment smaller than ECCS criteria, Primary to Secondary Heat Transfer (PSHT) should be maintained to prevent a Loss of Subcooling Margin (LSCM). Failure to provide PSHT that would result in LSCM would then require initiation of EFW within 20 mins, (1001E – FSAR 14.2.2.4)

Industry Experience

- FW-P-1A Coupling Failure (TMI CR-00189457)

- CM-V-1 Failure to Close (TMI CR-00840031)

- Rod Control Direction Error (TMI CR-00853201)

- Indian Point 2 Dropped Rod (1/9/03)

- Comanche Peak Unit 1 Dropped Rod (4/2/08)

- Vogtle Unit 2 RCS Leak Results in Unit Shutdown (8/21/03)

PRA

- Small LOCAs (Initiating Event)

Event	Description	Procedure Support
	Initial Set-up.	Plant at 85% power 1102-4, Power Operations steps signed off to 85% power OP-TM-401-154, Shifting FW-P-1B From Operating Mode to standby Mode
1	Power Reduction	1102-4, Power Operations steps signed off to 85% power
		OP-TM-401-154, SHIFTING FW-P-1B FROM OPERATING MODE TO STANDBY MODE
2	FW-V-17B Fails to Respond in Auto FW-V-16B Fails As Is	OP-TM-421-452, Manual Control of Feedwater Flow to B OTSG
		OP-TM-621-471, ICS Manual Control
3	Dropped Rod in Group 7 and runback failure	OP-TM-MAP-H0101, ICS Runback
		OP-TM-AOP-062, Inoperable Rod
		T. S. 4.7.1.2, Inoperable Rod
4	RCS Leak 32 gpm	T.S. 3.1.6.2 RCS Leakage
		OP-TM-AOP-050, Reactor Coolant Leakage
		OP-TM-534-901, RB Emergency Cooling Operations
5	Main FW Pump 1A Trip	OP-TM-EOP-001, Reactor trip
		OP-TM-424-901, Emergency Feedwater
6	HSPS setpoint for the OTSG EFW automatic control is set at 0.	OP-TM-EOP-010, Rule 4, Feedwater Control
7	Large RCS Leak: Hot Leg Nozzle	OP-TM-EOP-006, LOCA Cooldown
		OP-TM-EOP-002, of 25°F Subcooling Margin
8	ESAS Auto Actuation Failure	OP-TM-211-901, Emergency Injection (HPI/LPI)

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
IC-16	Reduce power to 85%, ICS FULL AUTO ICS Rate of Change set at 1%/min	Scenario Support
Malfunction ES01A	Value: Insert When: Immediately	ESAS Fail to Actuate at HPI Set Point (1600#)
Malfunction ES01B	Value: Insert When: Immediately	ESAS Fail to Actuate at HPI Set Point (1600#)
Malfunction ES04A	Value: Insert When: Immediately	ESAS Fail to Actuate at High RB Press Set Point (4#)
Malfunction ES04B	Value: Insert When: Immediately	ESAS Fail to Actuate at High RB Press Set Point (4#)
Main Console	Robust Barriers applied IAW Risk Document	Scenario Support
Malfunction IC16	Value: Insert When: Immediately	ICS Runback failure
Malfunction FW11B	Value: Insert Sev. 100% When: Immediately	FW-V-16B Fails As Is
Remote Function ICR01	Value: Insert Sev. 0 When: Immediately	OTSG 30" Start-up Level Set PT EFW Cntrl A
Remote Function ICR03	Value: Insert Sev. 0 When: Immediately	OTSG 30" Start-up Level Set PT EFW Cntrl A
Malfunction IC25	Value: Insert When: Event 2	FW-V-17B Fails to Respond in Auto
Malfunction RD0135	Value: Insert When: Event 3	Dropped rod in Group 7
Malfunction TH03A	Value: Insert Sev. 30% When: Event 4 Ramp 120 sec.	32 gpm RCS Leak: Hot Leg Nozzle
Malfunction FW15A	Value: Insert When: Event 5	Main FW Pump 1A Trip
Malfunction TH04A	Value: Insert Sev. 0.5% When: Event 7 Ramp 300 sec.	800 gpm RCS LOCA: Hot Leg Nozzle

Op Test No.: 1	Scenario # 2	Event # 1, 2	Page 6 of 23
Event Description:	Power Reduction, FW-V-17B Fails to Respond in Auto		

Time	Position	Applicant's Actions or Behavior
Examiner Cue: Allow the shift to reduce power approximately 5% for a reactivity manipulation. When the reactivity manipulation is satisfied, INITIATE Event 2.		
BOOTH OPERATOR: When directed by the lead examiner, INITIATE EVENT 2.		
Indications Available: ΔTc develops due to B side FW flow being high.		
	CRS	Directs the URO to continue the power reduction at 1%/minute IAW 1102-4 Power Operations.
		1102-4, Power Operations
NOTE TO EXAMINER: The ULD is in HAND and the ULD Target Load Rate of Change is set to 1%/minute per the initial conditions.		
	URO	If SG/REACTOR DEMAND is in AUTO, then REDUCE reactor power as follows:
		• ENSURE ULD is in HAND.
		• SET ULD LOAD RATE OF CHANGE to ≤ 1 %/minute for PLANNED reductions or at a rate determined by CRS for Forced power reductions.
		• SET ULD Target Load Demand to desired setpoint.
	ARO	Prior to reactor power < 75%
		• PLACE FW-P-1A in HAND IAW OP-TM-401-472(Depresses hand PB on FW-P-1A Demand station CL)
		• PLACE FW-P-1B in HAND IAW OP-TM-401-473(Depresses hand PB on FW-P-1B Demand station CL)
	ARO	Diagnoses the failure of FW-V-17B to respond in Auto based on ΔTc indication and the difference between FW-V-17A and FW-V-17B positions.
	CRS	Directs the ARO to take Hand control of Feedwater IAW OP-TM-621-471, ICS Manual control.

Op Test No.: 1 Scenario # 2 Event # 1, 2 Page 7 of 23

Event Description: Power Reduction, FW-V-17B Fails to Respond in Auto

Time	Position	Applicant's Actions or Behavior
		OP-TM-621-471, ICS Manual control Steps 4.1, 4.2
	URO	ENSURE ULD in HAND.
	URO	PLACE SG/REACTOR DEMAND station in HAND. (Depresses hand PB on SG/RX station CC)
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows:
		• 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%.
		OP-TM-621-471, ICS Manual control Steps 4.3, 4.4
	ARO	PLACE SG A/B LOAD RATIO (ΔTC) station in HAND. (Depresses hand PB on SG A/B station CC)
	ARO	PLACE SG A FW DEMAND station in HAND. (Depresses hand PB on SG A FW Demand station CC)
	ARO	PLACE SG B FW DEMAND station in HAND. (Depresses hand PB on SG B FW Demand station CC)
	ARO	ADJUST SG A and/or B FW DEMAND to maintain Tavg , ΔTC, and OTSG level within limits. (Uses toggle to raise or lower as requried ΔTC Demand station CC)
	URO	Place Diamond to Manual (Depresses manual PB on Diamond panel CC)

Op Test No.: 1	Scenario # 2	Event # 1, 2	Page 8 of 23
Event Description:	Power Reduction, FW-V-17B Fails to Respond in Auto		

Time	Position	Applicant's Actions or Behavior
	ARO	Place Rx Master to Hand (Depresses hand PB on Rx Master station CC)
		OP-TM-421-452, Manual Control of Feed Flow to B OTSG Section 3.0
	ARO	VERIFY SG B FW DEMAND station in HAND.
NOTE TO EXAMINER: The examinee may place FW-V-16A and FW-V-17A in HAND also.		
NOTE TO BOOTH OPERATOR: The examinees may recognize FW-V-16B stuck open and decide to close FW-V-92B to prevent a potential overfeed condition if a Reactor Trip were to occur.		
		OP-TM-421-452 Section 4.0
	ARO	If ICS HAND POWER is available, then PLACE FW Valves in HAND as follows:
		If FW-V-17B is the controlling valve, then
		• PLACE SU FW VLV FW-V-16B in HAND. (Depresses hand PB on FW-V-16B Demand station CC)
		• PLACE MFW VLV FW-V-17B in HAND. (Depresses hand PB on FW-V-17B Demand station CC)
		• ADJUST the controlling FW Valve position to maintain limits. (Operates toggles in raise/lower direction as required)
	CRS	Directs the CREW to continue the power reduction.
	CRS	When ULD target load is < 560 MWe And prior to FW-P-1A or B SPEED DEMAND less than 3%, PLACE one Feedwater Pump in STANDBY IAW OP-TM-401-153 (A) or OP-TM-401-154 (B)
	CRS	Directs the ARO to secure FW-P-1B IAW OP-TM-401-154, SHIFTING FW-P-1B FROM OPERATING MODE TO STANDBY MODE.

Op Test No.: 1 Scenario # 2 Event # 1, 2 Page 9 of 23

Event Description: Power Reduction, FW-V-17B Fails to Respond in Auto

Time	Position	Applicant's Actions or Behavior
		OP-TM-401-154 Section 3.0
	ARO	Verify FW-P-1A is reset or HSPS EFW actuation of both FWPs is in defeat.
	ARO	Verify Turbine Load < 560 MWe.(Using MW-0001 or DTCS)
		OP-TM-401-154 Section 4.0
	ARO	If FW-P-1A is in the Operating Mode then PERFORM the following:
	ARO	ENSURE LO-P-8B is operating. (Rotates LO-P-8B extension control to start on CL)
	ARO	PLACE ICS FP B Turbine Speed Control Hand/Auto in Hand (CL).(Depresses HAND PB)
	ARO	Slowly REDUCE ICS36B-MCS FW-P-1B speed and Verify FW-P-1A maintains feedwater valve ΔP. (Using Toggle switch CL)
	ARO	REDUCE speed of FW-P-1B until ICS FP B Turbine Speed Control station demand is at 0% (CL).
	ARO	PLACE 1B FPT Governor in Slow Lower position and reduce speed to The Low Speed Stop.(Extension control CL)
	ARO	WHEN FW-P-1B discharge pressure is more than 100 psi below FW-P-1A discharge pressure then PRESS FW-P-1B Trip pushbutton.(PB at FWP controls CL)
	ARO	VERIFY the following: - M-1-7, FWP 1B TRIP is In. - High Pressure Stop Valves (HPSV) and Low Pressure Stop Valves (LPSV) lights indicate Closed.

Op Test No.: 1 Scenario # 2 Event # 1, 2 Page 10 of 23

Event Description: Power Reduction, FW-V-17B Fails to Respond in Auto

Time	Position	Applicant's Actions or Behavior
	ARO	ENSURE FW-V-1B Closed (CL).(Visual verification CL)
NOTE TO EXAMINER:		**When FW-P-1B is tripped, GO TO Event 3.**

Op Test No.: 1	Scenario # 2	Event # 3	Page 11 of 23
Event Description:	Dropped Rod in Group 7		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE Event 3**
Indications Available:		**CRD Pattern Asymmetric Alarm, reduction in power, RCS pressure and RCS temperature, Group and individual rod in limit lights**
	URO	Diagnoses a dropped rod in Group 7.
	CRS	Directs entry into OP-TM-AOP-062, Inoperable Rod.
Procedure Note:		
A control rod is inoperable if any of the following conditions exist:		
Control rod does not meet flight time requirement		
Control rod cannot be exercised		
Control rod is misaligned with the group by more than 9 inches		
Control rod cannot be located with relative or absolute position indication or in or out limits		
NOTE TO EXAMINER:		**The dropped control rod should be declared to be inoperable per TS 4.7.1.2. AOP-062 covers the necessary TS actions for the inoperable rod. If the CRS does not review the Tech Spec after entering AOP-062 a follow-up question should be asked to satisfy the TS call.**
		Tech Spec 4.7.1.2
	CRS	If a control rod is misaligned with its group average by more than an indicated nine inches, the rod shall be declared inoperable and The limits of Specification 3.5.2.2 shall apply. The rod with the greatest misalignment shall be evaluated first. The position of a rod declared inoperable due to misalignment shall not be included in computing the average position of the group for determining the operability of rods with lesser misalignments.

Op Test No.: 1 Scenario # 2 Event # 3 Page 12 of 23

Event Description: Dropped Rod in Group 7

Time	Position	Applicant's Actions or Behavior
	CRS	Determines entry conditions are met due to:
		1.1 Either of the following conditions exist: - One or more inoperable control rods - One or more dropped rod groups and the reactor is not shutdown > 1% ΔK/K.
		OP-TM-AOP-062 Followup Actions
	CRS	RECORD time of discovery of inoperable rod:
	CRS	REQUEST duty reactor engineer to report to the control room.
	CRS	VERIFY reactor power > 5 %.
	CRS	VERIFY safety group Out Limit (Diamond panel) is LIT.
	CRS	VERIFY the inoperable rod is fully inserted.
	CRS	If all of the following conditions exist: - The rod is latched - The rod is misaligned with the group average by more than 9 inches - The rod has been misaligned for less than one hour
	CRS	Determines the rod is not latched
NOTE TO EXAMINER:		**When directed by the Lead Examiner GO TO Event 4**

Op Test No.: 1	Scenario # 2	Event # 4	Page 13 of 23
Event Description: RCS Leak			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**Lowering Pressurizer level, Lowering makeup tank level, increased makeup flow, MAP C-1-1 alarm for RM-A-2 RB Radiation Monitor.**
	URO	Diagnoses an increase in makeup flow and lowering of Makeup Tank level.
	CRS	Directs the URO to do a leak rate calculation.
	URO	Estimates the leak to be greater than 1 gpm.
	CRS	Determines the leakage exceeds Tech Spec 3.1.6.2 allowable leakage.
		TS 3.1.6.2
		If unidentified reactor coolant leakage (excluding normal evaporative losses) exceeds one gpm or if any reactor coolant leakage is evaluated as unsafe, the reactor shall be placed in hot shutdown within 24 hours of detection.
	CRS	Directs entry into OP-TM-AOP-050, Reactor Coolant Leakage.
		OP-TM-AOP-050, Reactor Coolant Leakage
	CRS	All of the following conditions exist: - RCS leakage (excluding OTSG tube leakage) exceeds Technical Specifications - HPI not required for inventory control - MU system is in the ES standby mode
	URO	INITIATE OP-TM-EOP-010, Guide 9, "RCS Inventory Control

Op Test No.: 1 Scenario # 2 Event # 4 Page 14 of 23

Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
	CRS	IAAT HPI is required to maintain Pressurizer level, then GO TO OP-TM-EOP-001, "Reactor Trip".
	URO	ENSURE MU-V-8 is aligned to "THRU TO FILTERS" position.
	CRS	NOTIFY the SM to review EALs.
	CRS	VERIFY the reactor is shutdown.
		RNO: INITIATE Plant Shutdown at a rate determined by T.S. 3.1.6.5 using 1102-4 "Power Operation" and 1102-10 "Plant Shutdown".
	CRS	VERIFY leak is in the Auxiliary Building. –RM-A-2, 4, 6, 8 –Auxiliary Building sump level –Containment sump level
		RNO: GO TO Section 7.0, "Leak In Containment".
		AOP-050 section 7.0
	URO/ARO	ANNOUNCE, "RCS leakage to the Reactor Building exists." All non-essential personnel exit Reactor Building."(May contact HP to determine no one is in RB N/A step)
	ARO	VERIFY Containment temperature stable and less than 130 °F.(at PLF Containment temp recorder TR-AH-655)
	ARO	INITIATE OP-TM-534-901.
	ARO	ANNOUNCE, "RCS leakage to the Reactor Building exists and Reactor Building temperatures are high. All personnel exit

Op Test No.: 1 Scenario # 2 Event # 4 Page 15 of 23

Event Description: RCS Leak

Time	Position	Applicant's Actions or Behavior
		Reactor Building."
	CRS	GO TO Step 7.5
		OP-TM-534-901, RB Emergency Cooling Operations
	ARO	VERIFY 1600 psig ES actuation, RB pressure is approaching 2 psig or Emergency Director or Shift Manager has authorized use of RBEC.
	ARO	VERIFY 1D or 1E 4160V Bus is energized.
	ARO	DISPATCH an operator to CLOSE NS-V-85 (IB 295: S of RR Valve Room).
PROCEDURE 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.**
	ARO	START or VERIFY running:(Rotates extension controls to start) RR-P-1A (CC) RR-P-1B (CR)
	ARO	ENSURE OPEN: (Observation) RR-V-3A RR-V-3B RR-V-3C
	ARO	ENSURE OPEN: (Depresses Open PB for each) RR-V-4A (CR) RR-V-4B (CR) RR-V-4C (CR)

Op Test No.: 1	Scenario # 2	Event # 4	Page 16 of 23
Event Description: RCS Leak			

Time	Position	Applicant's Actions or Behavior
		RR-V-4D (CR) RR-V-1A (CC) RR-V-1B (CR)
	ARO	GO TO Section 4.3.
	ARO	ENSURE NS-V-85 is Closed (IB 295: S of RR Valve Room).
	ARO	IAAT RB pressure > 2 psig, then ENSURE AH-E-1s are operating in SLOW SPEED.
NOTE TO EXAMINER:		**After the RB Emergency Cooling is in operation GO TO Event 5.**

Op Test No.: 1	Scenario # 2	Event # 5, 6	Page 17 of 23
Event Description:	FW-P-1A Trip, Reactor Trip, HSPS Setpoint for OTSG level control at 0		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When Directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available: Control rods insert, Reactor power decreasing, Annunciator for trip of FW-P-1A, EFW actuates.		
	URO	Diagnoses the reactor trip.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip
		OP-TM-EOP-001, Reactor Trip IMAs
Examiner Note: The reactor is shut down is accomplished IAW OS24 as follows; Power Range NI indication < 5% or All Control Rods inserted or Source Range count rate continuously lowering		
	URO	• PRESS both Reactor Trip and DSS pushbuttons. (CC)
		• VERIFY REACTOR SHUTDOWN
		• PRESS Turbine Trip pushbutton. (CL)
		• VERIFY the turbine stop valves are Closed. (CL DTC screen)
	ARO	Performs a Symptom Check
	ARO	Initiates OP-TM-424-901
	ARO	DISPATCH an Auxiliary Operator (AO) to EF-V-30 area.
	ARO	IAAT steps 4.1.4, 4.1.5, or 4.1.6 are not satisfied, then INITIATE Section 4.2 "Contingency Actions".
	ARO	VERIFY the following Emergency Feedwater pumps discharge pressure > OTSG pressure: (Visual verification) – EF-P-1

Op Test No.: 1	Scenario # 2	Event # 5, 6	Page 18 of 23
Event Description:	FW-P-1A Trip, Reactor Trip, HSPS Setpoint for OTSG level control at 0		

Time	Position	Applicant's Actions or Behavior
		– EF-P-2A – EF-P-2B
	ARO	VERIFY A OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established.
	ARO	VERIFY B OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established.
	ARO	Initiates OP-TM-EOP-010, Rule 4 Feedwater Control
	ARO	If EFW is actuated, then VERIFY <u>two</u> or more EFW pumps are running.
	ARO	VERIFY SCM > 25°F or OTSG level between 75 to 85% Operating Range Level.
	ARO	VERIFY the OTSG is <u>not</u> DRY
		VERIFY one of the following: An RCP is ON OTSG level > 50% Operating Rang
	ARO	MAINTAIN OTSG level > 25" Startup Range Level using Main or EFW
Examiner Note:		With an RCS leak into containment smaller than ECCS criteria, Primary to Secondary Heat Transfer (PSHT) should be maintained to prevent a Loss of Subcooling Margin (LSCM). Failure to provide PSHT that would result in LSCM would then require initiation of EFW within 20 mins, (1001E – FSAR 14.2.2.4) NOTE: SCM will be lost later in event, manual action will be required to raise level 75-85%

Op Test No.: 1	Scenario # 2	Event # 5, 6	Page 19 of 23
Event Description:	FW-P-1A Trip, Reactor Trip, HSPS Setpoint for OTSG level control at 0		

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK (CT-10)	ARO	Takes manual control of the EF-V-30 valves to feed the OTSGs due to the setpoint failure. (Depresses manual PB and moves slider to the right to open valves)
	CRS	Continues Directing OP-TM-EOP-001
	ARO	• ANNOUNCE Reactor Trip.
	ARO	• VERIFY OTSG levels > setpoint.
		RNO: INITIATE Rule 4, "Feedwater Control"
	URO	INITIATE Guide 9, "RCS Inventory Control".
	ARO	INITIATE Guide 6, "OTSG Pressure Control".
	URO	INITIATE Guide 8, "RCS Pressure Control".
	URO	INITIATE OP-TM-642-904 "Reactor Trip Isolation ESAS Actuation".
	CRS	IAAT Containment pressure exceeds 2 psig, then perform the following.
	CRS	**INITIATE** OP-TM-534-901, RB Emergency Cooling.
	CRS	IAAT PRESSURIZER LEVEL can not be MAINTAINED WITHOUT HPI, then GO TO EOP-006.
NOTE TO EXAMINER:		**After the EF-V-30's are in HAND and when directed by the Lead Examiner GO TO Event 7.**

Op Test No.: 1 Scenario # 2 Event # 7, 8 Page 20 of 23

Event Description: Large RCS leak, ESAS Auto Actuation Failure

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 7.**
Indications Available:		**Makeup Tank level decreases at a faster rate, Pressurizer level decreasing rapidly, RCS pressure decreasing rapidly, Makeup flow rising**
	URO	Diagnoses the increase in RCS leak rate and implements OP-TM-EOP-010, Guide 9 RCS Inventory Control actions.
NOTE TO EXAMINER:		**RCS pressure will degrade rapidly during this event. The URO will not have time to go through Guide 9 before getting to the ESAS setpoint. The URO should diagnose the failure of the 1600 or 4 psig ESAS auto actuations and initiate ESAS manually.**
Examiner Note:		For CT-2 one train of ESAS must be actuated **within 2 minutes of Loss of Subcooling Margin (LSCM)**, per FSAR 14.2.2.4. Either of the 4# or 1600# button would achieve one train and meet the FSAR requirements, therefore 1 button depressed within 2 minutes meets CT criteria.
CRITICAL TASK (CT-2)	URO	Initiates OP-TM-211-901, "Emergency Injection HPI/LPI" per Guide 9. (Depresses "A" and "B" 1600# Manual Actuation PBs on CC and CR)
	URO	VERIFY a valid automatic actuation has occurred or a manual actuation of HPI is required.
	URO	If any of the components on Attachment 7.1 are not in the required condition, then INITIATE Section 4.2
	URO	Diagnoses the loss of Subcooling Margin.
	CRS	Directs entry into OP-TM-EOP-002, Loss of 25°F Subcooling Margin, and performance of OP-TM-EOP-010, Rule 1.

Op Test No.: 1 Scenario # 2 Event # 7, 8 Page 21 of 23

Event Description: Large RCS leak, ESAS Auto Actuation Failure

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-010, Rule 1
	URO	VERIFY it has been more than two minutes since RCP start.
Examiner Note:		CT-1 requires that the RCPs be tripped within 1 minute of LSCM, IAW 1001E reference FSAR 14.2.2.4.
CRITICAL TASK (CT-1)	URO/ARO	ENSURE all RCPs are shutdown within one minute. (Rotates all four extension control switches to stop **within 1 Minute of LSCM**)
	URO/ARO	INITIATE 4 # ESAS Actuation IAW OP-TM-642-902 4# ESAS Actuation (Press 4# Manual pushbuttons on CC/CR)
	URO/ARO	INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4. (Level will need to be raised 75% to 85% in the Operating Range)
		OP-TM-EOP-002, Loss of 25°F Subcooling Margin
	CRS	ENSURE announcement of reactor trip.
	URO	VERIFY both LPI pumps are operating.
	URO	VERIFY PORV is closed. (Tailpipe ΔP indicator, Alarm G-1-7, A0517).
	CRS	INITIATE Attachment 1 "Isolation of possible sources of leakage".
	CRS	REQUEST SM evaluate Emergency Action Levels (EALs).
	CRS	ENSURE performance of an alarm review.

Op Test No.: 1 Scenario # 2 Event # 7, 8 Page 22 of 23

Event Description: Large RCS leak, ESAS Auto Actuation Failure

Time	Position	Applicant's Actions or Behavior
	CRS	VERIFY all RC pumps are shutdown
	URO	VERIFY one of the following exists: SCM > 25 °F, ADEQUATE HPI
	CRS	VERIFY cooldown rate > 40 °F/hr, or primary to secondary heat transfer (PSHT) exists.
	CRS	VERIFY PRESSURIZER LEVEL IS BEING MAINTAINED WITHOUT HPI.
		RNO: GO TO EOP-006
	CRS	Transitions to OP-TM-EOP-006, LOCA Cooldown
		OP-TM-EOP-006, LOCA Cooldown
	URO	ENSURE 4 psig ESAS IAW OP-TM-642-902, "4 psig ESAS Actuation".
	URO	ENSURE each of the following procedures are initiated: (Actions are to verify on PCR all ESAS components in proper position "Blue Board" NOTE BS-V-2's will remain Yellow) OP-TM-211-901, "Emergency Injection HPI/LPI", OP-TM-244-901, "Containment Isolation", OP-TM-534-901, "RB Emergency Cooling",
	URO	ENSURE HPI and LPI are operated IAW Rule 2
	URO	If Core Flood tank levels > 2 ft, then ENSURE both CF-V-1A and CF-V-1B are Open. (PCR)
	ARO	INITIATE 1105-18, Containment Hydrogen Monitor, to perform

Op Test No.: 1 Scenario # 2 Event # 7, 8 Page 23 of 23

Event Description: Large RCS leak, ESAS Auto Actuation Failure

Time	Position	Applicant's Actions or Behavior
		an Emergency Condition Startup of the Hydrogen Monitors
	ARO	INITIATE OP-TM-826-901, "Control Building Ventilation System Radiological Event Operations". (Obtains procedure, if scenario runs long enough will swap fans at H&V panel)
	ARO	ENSURE performance of an alarm review.
	CRS	REQUEST SM evaluate Emergency Action Levels (EALs).
NOTE TO EXAMINER:		**After the SM is directed to evaluate the EALs the scenario can be terminated.**
		Terminate the Scenario

Follow-up question highest event entered during scenario?

Answer: FA1, Loss of 25°F Subcooling Margin

Post submittal changes to scenario 3

Added information on critical task performance detail and failure criteria.
Underlined major actions that should be observed.
Added additional detail on what to observe.

Changes made after validation:

1. Page 1, changed "AH-E-1C is OOS for motor replacement" to "AH-E-1C is OOS for maintenance on its' breaker"
2. Page 1, changed C CRS to I CRS for event 1.
3. Page 3, added pass/fail criteria for critical tasks.
4. Page 9, added:

BOOTH OPERATOR:	**If crew calls for load dispatcher, the 4 bus return to service time is unknown.**

5. Page 10, added information about Tech Spec 3.3.2 and 3.3.3 and the following note;

Examiner NOTE:	CRS may reference these Technical Specifications. They were applicable during the time that the 1D 4kV bus was de-energized.

6. Page 11, changed font for one line item to match the rest.
7. Page 11, changed URO on one line and ARO on another to URO/ARO on both lines.
8. Page 12, added:

NOTE TO EXAMINER:	**The crew may try to re-open MU-V-18. Prior to attempting to reopen, good operating practice would be to first close MU-V-17 to avoid a transient.**

9. Page 12, added:

NOTE TO EXAMINER:	**Crew may decide not to open MU-V-17.**

10. Page 13, added:

NOTE TO EXAMINER:	**Crew may decide not to open MU-V-217.**

11. Page 15, added:

NOTE TO EXAMINER:	**While MS-V-2A/B are closed, T.S.3.4.1.1b and 3.4.1.1.a(1) apply.**

12. Page 18, changed URO to URO/ARO on one line.
13. Page 18, changed Note to Examiner to read:

Examiner Note:	Two rods will be stuck full out on Reactor Trip, but the reactor is shut down is accomplished IAW OS-24 as follows; Power Range NI indication < 5% or All Control Rods inserted or

Source Range count rate continuously lowering Emergency Boration will be required per Rule 5.

14. Page 18, changed Note to Examiner to read:

NOTE TO EXAMINER: and	Per OS-24, Conduct of Operations During Abnormal Emergency Events: 4.7.2 Determination of Core Subcooling Margin (SCM) (or Superheat) **CAUTION** 1. Wide range T HOT inputs to TI-977 and TI-978 have a relatively slow response time. When hot leg temperature is lowering rapidly (i.e. greater than 900 F/HR), indicated temperature will indicate higher than actual temperature, and SCM indication will read lower than actual SCM.

15. Pages 19-20, added several contingency steps in the event the crew takes action for a LSCM, identified with an asterisk.
16. Page 22, added the following:

NOTE TO EXAMINER:	**MS-V-2A will NOT close due to high D/P. If, after the OTSG depressurizes, the open and then closed pushbuttons are pressed, then the valve will close.**

17. Page 23, added CT-30 label to one line.
18. Page 25, added CT-30 label to one line.

Facility:	Three Mile Island		Scenario No.:	3	Op Test No.: NRC
Examiners:			Operators:		
Initial Conditions:	• 100% power, MOC (Temp IC-43)				
	• NS-P-1A OOS for Maintenance				
	• NS-P-1B running on the 1P 480V bus				
	• AH-E-1C is OOS for maintenance on its' breaker				
Turnover:	Maintain 100% power Operations				
Critical Tasks:	• Control RCS Inventory (CT-30)				
	• Isolate Overcooling SGs (CT-17)				

Event No.	Malf. No.	Event Type*	Event Description
1	RM0323	I CRS	RM-G23 Fails high (TS)
2	ED03D	C CRS C URO C ARO	Aux Transformer B Fault Pressure (TS) NS-P-1B restart
3	01A4S20 - ZDISRP1 C(3)	C ARO	SR-P-1C Fails to auto start
4	MU06	C CRS C URO	MU-V-18 Fails Closed
5	MS03A	N CRS R URO N ARO	Main Steam Leak in the Intermediate Building
6	MS03A	M CRS M URO M ARO	Major steam leak in the Intermediate Building
7	ICR13 FW11A MS04A	C URO C ARO	Main Steam Safety Valve fails to reseat. (MS-V-17A) SG A Lo Press Isolation Setpoint is at zero psig (Isolation failure) Startup Feedwater Valve FW-V-16A Fails at 100% Open (CT-17 and CT-30) (Overcooling)
8	RD02010 RD02056	C CRS C URO	Two Control rods fail to fully insert

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

Three Mile Island NRC Scenario #3

The crew will take the watch with reactor power at 100% and ICS in Full Automatic. SR-P-1A and SR-P-1C are running. NS-P-1A is OOS for maintenance and will be out for two days. NS-P-1B is running on the 1P 480 Volt ES Bus and is selected for ES.

After the crew has accepted the watch and on cue from the Lead Examiner, the failure of RB Hi Range monitor RM-G-23 can be inserted. Panel Alarms PRF1 1-8 RM-G-22, RM-G-23 Alert and PRF1 2-8 RM-G-22, RM-G-23 Hi alarms actuate and the crew will diagnose the failure of the instrument. The CRS will review TS 3.5.5.2 and declare a 7 day timeclock based on the failure. **(TS)**

After the Tech Spec call has been made, the Lead Examiner can cue the Auxiliary Transformer B trip. The 1C 4160V bus will fast transfer to the A Auxiliary Transformer and the A Diesel Generator will start and load the 1D 4160V ES bus. The crew will respond in accordance with the electrical MAP alarm responses (B-1-1, B-1-5, AA-1-8), and OP-TM-AOP-013, Loss of 1D 4160V Bus, to restart NS-P-1B on the A Diesel and prevent heatup of components supplied by the Nuclear Services Closed Cooling water system, including the Reactor Coolant Pumps. The CRS should review TS 3.7.2.b and declare a 30 day timeclock due to only one Auxiliary Transformer being operable and the diesel generator is already loaded on the bus **(TS).**

The ARO should diagnose that Secondary Services River Water Pump SR-P-1C did not auto start when SR-P-1A tripped and start it manually to prevent heatup of steam plant components supplied by the Secondary Closed System.

After the Tech Spec call is made, the Lead Examiner can cue the failure of MU-V-18 closed. The URO will diagnose the failure due to Pressurizer level going down and Makeup Tank level rising. The URO will diagnose the failure of MU-V-18 closed and will initiate OP-TM-EOP-010, Guide 9, RCS Inventory Control IAW OP-TM-MAP-G0205, PZR LEVEL HI/LO. The URO will have to use MU-V-16B to provide makeup to the RCS.

After the plant has been stabilized with manual Pressurizer level control, the Lead Examiner can cue the initiation of the Main Steam Leak in the Intermediate Building. The crew should diagnose the steam leak and send an Auxiliary Operator to investigate. The CRS will initiate OP-TM-AOP-051, Secondary Side High Energy Leak. The crew will attempt to isolate the leak and begin a plant shutdown IAW 1102-4, Power Operations (reactivity manipulation).

After the reactivity manipulation is complete the leak size will be increased and the crew may elect to manually trip the reactor prior to an automatic trip. The CRS will initiate OP-TM-EOP-001, Reactor Trip. When the reactor trips a Main Steam Safety Valve will stick open on the A OTSG. The crew will subsequently diagnose the leak as being from the A OTSG and isolate the OTSG in accordance with OP-TM-EOP-010, Rule 3, Excessive Heat Transfer. In addition, the crew will diagnose the failure of the A OTSG Isolation to occur at 600 psig and FW-V-16A failed 100% open causing an overfeed. The CRS will transition to OP-TM-EOP-003, Excessive Primary to Secondary Heat Transfer. The ARO will have to close FW-V-92A to isolate Feedwater flow to the A OTSG due to FW-V-16A being failed open (**CT-17**). 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.

Three Mile Island NRC Scenario #3 Continued

When the OTSG is isolated and empty the URO will have to terminate HPI using Rule 2, HPI/LPI THROTTLING CRITERIA and OP-TM-211-901, Attachment 7.3, THROTTLING HPI **(CT-30).** This is a critical task in that failure to throttle/terminate HPI flow will result in a rapid rise in Pressurizer level and pressure eventually challenging the PORV setpoint.

The crew should diagnose the failure of two control rods to fully insert and will have to initiate Emergency Boration in accordance with OP-TM-EOP-010, Rule 5, Emergency Boration.

The Lead Examiner can terminate the scenario when the URO gets to the step in Rule 5 requiring letdown to be established. Letdown does not have to be re-established to end the scenario.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

- CT -17 - Isolate Overcooling SGs - This is a critical task in that continued feeding of an OTSG with a steam break will continue to overcool the RCS, which could result in emptying the Pressurizer and causing a loss of subcooling margin. This would significantly change the mitigation strategy of the event.
  - Critical task (CT-17) is to isolate the affected OTSG prior to emptying the pressurizer, alternately if HPI held pressurizer volume, RCS cooldown below 329°F with HPI on would violate T.S. either condition should be considered grounds for failing critical task.

- CT-30 – Control RCS Inventory – When no symptom is present Pressurizer level is adjusted with MU; HPI is not needed and can complicate achieving stability and cause unnecessary HPI nozzle thermal cycles.
  - HPI Must be throttled to prevent exceeding design limits. PTS curve is generally 250°F SCM, as stated in CT-17 a Technical Specification Violation would occur if HPI were left on below LTOP setpoint 329°F. Exceeding 250°F SCM or going below 329°F should be considered Critical task failure.

Industry Experience:

- AH-E-1C Tripped During ES Testing (TMI CR-00778856)
- SER 1-05 Hope Creek Steam Leak and scram (10/10/04)
- TMI Reactor Trip (11/2/06) Main Steam Safety Valves remained open longer than expected. (IR 552591)

PRA

- Secondary Line Breaks (Initiating Event)

Event	Description	Procedure Support
	Initial Set-up.	100% Power MOC, NS-P-1A OOS, SR-P-1A and SR-P-1B Running, NS-P-1B Running on the 1P 480V Bus and selected for ES
1	**RM-G23 RB Hi Range Monitor fails high**	T. S. 3.5.5.2
		Alarm Response PRF1 1-8 and 2-8
2	**Auxiliary Transformer B Fault Pressure Trip**	MAP Alarm B-1-5, 480 Volt ES Motor Trip
		OP-TM-AOP-013, Loss of 1D 4160V Bus
		T. S. 3.7.2.b, Offsite Sources
3	**Secondary Services River Water Pump SR-P-1C failure to auto start**	OP-TM-AOP-013, Loss of 1D 4160V Bus
		MAP AA-1-6, 480V BOP Motor Trip
4	**MU-V-18 Fails Closed**	OP-TM-EOP-010, Guide 9 RCS Inventory Control
		OP-TM-MAP- G0205, PZR LEVEL HI/LO
5	**Main Steam Leak in the Intermediate Building**	OP-TM-AOP-051, Secondary Side High Energy Leak
6	**Major Steam Leak in the Intermediate Building**	OP-TM-EOP-001, Reactor Trip
7	**Main Steam Safety Valve fails to reseat. (MS-V-17A)** **SG A Lo Press Isolation Setpoint is at zero psig** **Startup Feedwater Valve FW-V-16A Fails at 100% Open (CT-17 and CT-30)**	OP-TM-EOP-010, Rule 3, Excessive Heat Transfer
8	**Two Control rods fail to fully insert**	OP-TM-EOP-010, Rule 5, Emergency Boration

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-16	100% HFP, ICS Full AUTO ENSURE SR-P-1A and SR-P-1B Running	
Console Center NS-P-1B NAS	NS-P-1B Running NS-P-1B-1P Bkr CLOSED	Scenario Support
Remote Function CCR19	Value: 1P When: Immediately	Scenario Support
Console Right NS-P-1B PTL	NS-P-1B-1S PTL NS-P-1B-1S Bkr OPEN	Scenario Support
Remote Function CCR21	Value: NS-P1B When: Immediately	Scenario Support
Console Center NS-P-1A PTL	NS-P-1A Tagged OOS NS-P-1A Bkr OPEN	Scenario Support
Remote Function CCR18	Value: OUT When: Immediately	Scenario Support
Console Right AH-E-1C PTL	AH-E-1C PTL AH-E-1C Bkr OPEN	Scenario Support
Remote Function CHR07	Value: OUT When: Immediately	Scenario Support
I/O Override 01A4S20-ZDISRP1C(3)	Value: NAP OFF When: Immediately	SR-P-1C Fails to auto Start
Malfunction RD0223	Value: Insert When: Immediately	Stuck Rod
Malfunction RD0239	Value: Insert When: Immediately	Stuck Rod
Malfunction FW11A	Value: Insert When: Immediately	Startup Feedwater Valve Fails as is (FW-V-16A)
Malfunction MU06	Value: Insert When: Immediately	MU-V-18 Fails as is
DISPLAY ON MONITOR muvmuv18	Value: Insert Sev 0 When: Event 4 MANUALLY	MU-V-18 Fails closed
Remote Function ICR13	Value: Insert Sev. 0% When: Immediately	SG A Lo Press Isolation setpoint
Main Console	Robust Barriers applied IAW Risk Document	Main Console
Malfunction RM0323	Value: Insert When: Event 1	RM-G23 RB High Range Monitor fails high
Malfunction ED03D	Value: Insert When: Event 2	Auxiliary Transformer B Fault Pressure Trip
Malfunction MS03A	Value: Insert Sev. 0.038% When: Event 5	Main Steam Leak Outside RB

Malfunction MS03A	Value: When:	COMMAND mmf ms03a 100 Event 6	Main Steam Leak Outside RB
Malfunction MS04A	Value: When:	Insert Sev. 100% Event 7 ratpw<5%	Main Steam Safety Valve Leaks/Fails to Reseat (MS-V-17A)

Op Test No.: 1	Scenario # 3	Event # 1	Page 7 of 27
Event Description:	RM-G-23 RB High Range Monitor Fails High		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 1.**
Indications Available:		**Alarm Panel PRF1 1-8 RM-G-22, RM-G-23 Alert and PRF1 2-8 RM-G-22, RM-G-23 Hi alarms actuate, RM-G-23 indication fails high, RM-G-23 Alert and High alarms are actuated.**
	CRS	DIRECTS entry into PRF1 1-8 and 2-8, RM-G-22, RM-G-23 Hi
	CRS	Diagnose RM-G-23 failed high due to no other indications of increased radiation levels on other radiation monitors: • RM-G-22, RM High Range Monitor • RM-L-1, Letdown Monitor high and low range indications • RM-A-2, RB Atmospheric monitor (PIG) channels on PRF
	CRS	Review TS 3.5.5.2 for Accident Monitoring Instrumentation
	CRS	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.
	CRS	Table 3.5-3, Post Accident Monitoring Instrumentation
	CRS	Instrument: Containment High Range Radiation (RMG-22/RMG-23) — Required Number of Channels: 2 — Minimum Number of Channels: 2 — ACTION: A

Op Test No.: 1 Scenario # 3 Event # 1 Page 8 of 27

Event Description: RM-G-23 RB High Range Monitor Fails High

Time	Position	Applicant's Actions or Behavior
	CRS	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 the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.
NOTE TO EXAMINER:		**After the Tech Spec call has been made, GO TO Event 2.**

Op Test No.: 1	Scenario # 3	Event # 2, 3	Page 9 of 27
Event Description:	Aux Transformer 1B Trip, SR-P-1C Fails to Auto Start		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 2.**
Indications Available:		**MAP Annunciators B-1-1, B-1-5, AA-1-8, EG-Y-1A Starts and loads the 1D 4160V bus.**
	CRS	Diagnose trip of the B Auxiliary Transformer.
	CRS	Directs entry into OP-TM-AOP-013, Loss of 1D 4160V Bus due to: All of the following conditions exist: - 1D 4160V bus is de-energized or recovered by EG-Y-1A - At least one auxiliary transformer is energized - The OTSGs are being used for RCS heat removal
BOOTH OPERATOR:		**If crew calls for load dispatcher, the 4 bus return to service time is unknown.**
		OP-TM-AOP-013
	ARO	ANNOUNCE entry into OP-TM-AOP-013, "Loss of 1D 4160V Bus" over the "RED" plant page and radio.
	ARO	INITIATE OP-TM-861-901, "Diesel Generator EG-Y-1A Emergency Operations". (obtains procedure and verifies normal operation of diesel)
	URO	VERIFY seal injection flow > 22 gpm.
NOTE TO EXAMINER:		**The CRS should GO TO Section 4.0 "Return to Normal" once it is verified that the 1D 4160V Bus is re-powered from EG-Y-1A.**
	CRS	IAAT 1D 4160 V bus is energized, then GO TO Section 4.0 "Return to Normal".

Op Test No.: 1	Scenario # 3	Event # 2, 3	Page 10 of 27
Event Description:	Aux Transformer 1B Trip, SR-P-1C Fails to Auto Start		

Time	Position	Applicant's Actions or Behavior
		Section 4.0 Return to Normal
		If EG-Y-1A is powering the 1D 4160V bus, then PERFORM the following:
	CRS	• LOG entry into TS 3.7.2.b. action statement. Reactor operation in this condition is limited to 30 days.
		T. S. 3.7.2.b
	CRS	Both 230/4.16 kV unit auxiliary transformers shall be in operation except that within a period not to exceed eight hours in duration from and after the time one Unit 1 auxiliary transformer is made or found inoperable, two diesel generators shall be operable, and one of the operable diesel generator will be started and run continuously until both unit auxiliary transformers are in operation. This mode of operation may continue for a period not exceeding 30 days.
Examiner NOTE:		CRS may reference these Technical Specifications. They were applicable during the time that the 1D 4kV bus was de-energized.
	CRS	• LOG entry into TS 3.3.2/3.3.3 action statement. Reactor operation in this condition is limited to 7 days.
		TS 3.3.2
		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.*
		TS 3.3.3
		3.3.3 Exceptions to 3.3.2 shall be as follows: a. Both CFTs shall be OPERABLE at all times. b. Both the motor operated valves associated with the CFTs shall be fully open at all times. c. One reactor building cooling fan and associated cooling unit shall be permitted to be out-of service for seven days.

Op Test No.: 1	Scenario # 3	Event # 2, 3	Page 11 of 27
Event Description:	Aux Transformer 1B Trip, SR-P-1C Fails to Auto Start		

Time	Position	Applicant's Actions or Behavior
	ARO	ENSURE LO-P-6 is not in P-T-L. (Visual Verification on PLF)
	ARO	ENSURE all bus relay targets and control room alarms are reset.
	ARO	ENERGIZE 1N 480V bus as follows: (Rotates both control switches on CL) - CLOSE N1-02 "1D 4160V Bus Unit 12". - CLOSE 1N-02 "1N 480 Bus Unit 1B".
	ARO	RESTORE Control Bldg 1st floor ventilation IAW 1104-19 (Obtains 1104-19, restores control building fans at H&V panel)
	CRS	ENSURE the following systems are operating IAW the associated procedure:
		• SR-P-1A, B, and C, 1104-31
		• AH-E-9A, or B, 1104-16
		• AH-E-24A, or B, 1104-24H
		• WT-P-33A, or B, 1104-33
		• AH-E-1A and AH-E-1C, OP-TM-823 series
	ARO/URO	The ARO should diagnose that SR-P-1C did not auto start when SR-P-1A tripped and should start it manually IAW MAP Annunciator AA-1-6, 480V BOP Motor Trip. (Rotates extention control to START CL)
	URO/ARO	Diagnoses that NS-P-1B tripped when the 1P 480V bus tripped and must be manually restarted IAW MAP Annunciator B-1-5, 480V ES Motor Trip. (Rotates extension control to START CC)
NOTE TO EXAMINER:		**After the Tech Spec call has been made, and SR-P-1C and NS-P-1B have been started GO TO Event 4.**

Op Test No.: 1 Scenario # 3 Event # 4 Page 12 of 27

Event Description: MU-V-18 Fails Closed

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4 BY SETTING muvmuv18 to ZERO IN MONITOR.**
Indications Available:		**Makeup flow indication goes to zero, Pressurizer level lowering, Makeup Tank level rising**
	URO	Diagnoses failure of MU-V-18 based on Makeup flow going to zero, Pressurizer level going down and Makeup Tank level rising and MU-V-18 console center indication.
NOTE TO EXAMINER:		**The CRS may review OP-TM-211-472, Manual Pressurizer Level Control to try and mitigate the event; however OP-TM-MAP- G0206, PZR LEVEL HI/LO provides the guidance to use Guide 9 since MU-V-17 and MU-V-217 are not available.**
NOTE TO EXAMINER:		**The crew may try to re-open MU-V-18. Prior to attempting to reopen, good operating practice would be to first close MU-V-17 to avoid a transient.**
	CRS	Directs URO to OP-TM-EOP-010, Guide 9 RCS Inventory Control IAW OP-TM-MAP-G0206.
		OP-TM-EOP-010, Guide 9 RCS Inventory Control
	URO	VERIFY MU pump is operating.
	URO	VERIFY MU-V-5 is Closed.
NOTE TO EXAMINER:		**MU-V-18 will not open so MU-V-17 and MU-V-217 will not be available for use due to being isolated. MU-V-16B will have to be used to restore Pressurizer level.**
	URO	ENSURE MU-V-17 is Open.
NOTE TO EXAMINER:		**Crew may decide not to open MU-V-17.**

Op Test No.: 1	Scenario # 3	Event # 4	Page 13 of 27
Event Description:	MU-V-18 Fails Closed		

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY PZR level is being restored.
		RNO: THROTTLE MU-V-217
NOTE TO EXAMINER:		**Crew may decide not to open MU-V-217.**
	URO	VERIFY MU24-FI > 20 gpm
		RNO: THROTTLE MU-V-16B or MU-V-16D (Depresses OPEN and STOP PBs to obtain desired flow CC)
	URO	VERIFY PZR level is being restored.
NOTE TO EXAMINER:		**When MU-V-16B is opened to restore Pressurizer level, GO TO Event 5.**

Op Test No.: 1	Scenario # 3	Event # 5	Page 14 of 27
Event Description:	Main Steam Leak in the Intermediate Building		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available:		**Fire Protection Panel alarms 1-9 and 1-10, Intermediate Building Fire and Trouble alarms,**
	CRS	An AO will be dispatched to the Auxiliary Building to determine the cause of the fire alarms.
BOOTH OPERATOR:		**Report back as the AO at the Intermediate Building that you opened the door and the Intermediate Building is full of steam. It is not advisable for anyone to go into the building. The fire alarm is Zone 5 on the local panel FS-PNL-1B-1.**
BOOTH OPERATOR:		**If contacted as Security report that there are no personnel key carded into the Intermediate Building**
	CRS	The CRS directs entry into OP-TM-AOP- 051, Secondary Side High Energy Leak
	CRS	Determines Entry Conditions are met based on:
		• All of the following: – Indication of secondary side steam leak. – Leak does not cause XHT or LOHT. – The OTSGs are being used for RCS heat removal.
		• Leak source can not be determined due to leak preventing access to the area.
	ARO	ANNOUNCE entry into OP-TM-AOP-051, "Secondary Side High Energy Leak" and to evacuate affected area over the plant page and radio.
	URO	MAINTAIN reactor power < 100%. (Reduces power on ULD as required to maintain reactor power less than 100%)
	CRS	IAAT XHT or LOHT exists, then GO TO EOP-001.

Op Test No.: 1 Scenario # 3 Event # 5 Page 15 of 27

Event Description: Main Steam Leak in the Intermediate Building

Time	Position	Applicant's Actions or Behavior
	CRS	REQUEST SM to evaluate EALs.
	CRS	If leak is in Intermediate Building, then GO TO Section 5.0.
		OP-TM-AOP-051 Section 5
	CRS	IAAT Hi-2 temperature alarm is received on safety related equipment, then TRIP the reactor. (Should announce IAAT step to crew)
	ARO	ENSURE AH-E-73 is in Normal-After-Start. (Verification at H&V panel)
	ARO	ENSURE both of the following are running: (Starts NON-running AH-E-24 at H&V panel by rotating extension control) - AH-E-24A - AH-E-24B
	URO	VERIFY TBVs are not controlling OTSG pressure.
NOTE TO EXAMINER:		**The steam leak will not be isolated by the closing of the MS-V-2s. The Control Room will contact the AO at the Intermediate Building to determine if the leak has been isolated.**
BOOTH OPERATOR:		**When called to check if the leak still exists after the MS-V-2s are closed inform the control room that you can still hear the leak and there is no change in volume.**
NOTE TO EXAMINER:		**While MS-V-2A/B are closed, T.S.3.4.1.1b and 3.4.1.1.a(1) apply.**

Op Test No.: 1 Scenario # 3 Event # 5 Page 16 of 27

Event Description: Main Steam Leak in the Intermediate Building

Time	Position	Applicant's Actions or Behavior
	ARO	Determine if leak is downstream of MS-V-2A by performing the following: (Depresses CLOSE PB, obtains report after full close indication then depresses OPEN PB at CC) - CLOSE MS-V-2A. - OPEN MS-V-2A.
	ARO	Determine if leak is downstream of MS-V-2B by performing the following: (Depresses CLOSE PB, obtains report after full close indication then depresses OPEN PB at CC) - CLOSE MS-V-2B. - OPEN MS-V-2B.
	CRS	VERIFY reactor is shutdown.
		RNO: SHUTDOWN the plant IAW 1102-4, "Plant Operation" and 1102-10, "Plant Shutdown.
	CRS	Directs the plant shutdown IAW 1102-4, Power Operation
		1102-4
	CRS	CRS INITITATES Enclosure 2A due to the emergency forced power reduction. (Enclosure 2A would be completed for NON-emergency power reductions)
	CRS	Reduce reactor power to the desired power as follows:
	ARO	MAINTAIN Generator Reactive Load IAW OP-TM-301-472. (Adjusts Main Gen. Voltage Reg. as required CL potentiometer)
	URO	REDUCE reactor power as follows: 1. ENSURE ULD is in HAND. 2. SET ULD LOAD RATE OF CHANGE to ≤ 1%/minute for PLANNED reductions or at a rate determined by CRS for Forced power reductions.

Op Test No.: 1	Scenario # 3	Event # 5	Page 17 of 27
Event Description:	Main Steam Leak in the Intermediate Building		

Time	Position	Applicant's Actions or Behavior
		3. SET ULD Target Load Demand to desired setpoint. (Lowers on ULD toggle to desired setpoint)
	CRS	PERFORM the actions per Enclosure 2B.
		1102-4, Enclosure 2B
	ARO	Prior to FW-U-1B speed < 4000 RPM START LO-P-8B. (Rotates Extension control to START CL)
	ARO	Prior to FW-U-1A speed < 4000 RPM START LO-P-8A. (Rotates Extension control to START CL)
NOTE TO EXAMINER:		**After the reactivity manipulation is complete GO TO Event 6**

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 18 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 6.**
Indications Available:		**RCS Pressure reducing rapidly, Reactor Power rising, Pressurizer level lowering, Makeup Tank level lowering, Reactor Trip, ESAS actuation**
	URO/ARO	Diagnose large steam leak resulting in a reactor trip.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip
Examiner Note:		Two rods will be stuck full out on Reactor Trip, but the reactor is shut down is accomplished IAW OS-24 as follows; Power Range NI indication < 5% or All Control Rods inserted or Source Range count rate continuously lowering Emergency Boration will be required per Rule 5.
		OP-TM-EOP-001, Reactor Trip IMAs
	URO	• PRESS both Reactor Trip and DSS pushbuttons. (CC)
		• VERIFY REACTOR SHUTDOWN
		• PRESS Turbine Trip pushbutton. (CL)
		• VERIFY the turbine stop valves are Closed. (CL DTC screen)
NOTE TO EXAMINER:		Per OS-24, Conduct of Operations During Abnormal and Emergency Events: 4.7.2 Determination of Core Subcooling Margin (SCM) (or Superheat) **CAUTION** 1. Wide range T HOT inputs to TI-977 and TI-978 have a relatively slow response time. When hot leg temperature is lowering rapidly (i.e. greater than 900 F/HR), indicated temperature will indicate higher than actual temperature, and SCM indication will read lower than actual SCM.

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 19 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior
		VSSV Symptom Check
	ARO	IAAT a symptom exists, then GO TO the symptom response procedure using the following priority: EOP-003, "Excessive Primary to Secondary Heat Transfer", Diagnosed by ALL the Following o RCS average temperature < 540°F o Uncontrolled lowering of RCS temperature o Tsat for OTSG pressure is less than Tcold on affected OTSG(s)
NOTE TO EXAMINER: If the Crew decides to enter OP-TM-EOP-002, Loss of Sub-Cooling Margin, then the appropriate steps will be taken (recognized by a "*")		
	CRS*	Directs entry into OP-TM-EOP-002, LOSS OF 25 °F SUBCOOLING MARGIN
		OP-TM-EOP-002, LOSS OF 25 °F SUBCOOLING MARGIN
	URO*	PERFORM Rule 1, LSCM.
		Rule 1, LSCM
	URO*	IAAT SCM < 25 °F, and the REACTOR is SHUTDOWN, then perform the following:
		VERIFY it has been more than two minutes since RCP start.
		ENSURE all RCPs are shutdown within one minute.
		INITIATE 4 # ESAS Actuation IAW OPTM-642-902 4# ESAS Actuation
		INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4.
		OP-TM-EOP-002, LOSS OF 25 °F SUBCOOLING MARGIN
	CRS*	ENSURE announcement of reactor trip.

Op Test No.: 1 Scenario # 3 Event # 6,7,8 Page 20 of 27

Event Description: Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open

Time	Position	Applicant's Actions or Behavior
	CRS/URO *	VERIFY PORV is closed. (Tailpipe .P indicator, Alarm G-1-7, A0517).
	URO*	INITIATE Attachment 1 "Isolation of possible sources of leakage".
	CRS*	REQUEST SM evaluate Emergency Action Levels (EALs).
	CRS*	ENSURE performance of an alarm review.
	CRS*	VERIFY all RC pumps are shutdown.
	CRS*	VERIFY one of the following exists: ___ SCM > 25F, ___ ADEQUATE HPI.
	CRS*	If primary to secondary heat transfer is excessive (XHT), then GO TO EOP-003.
	CRS	Directs entry into OP-TM-EOP-003, Excessive Primary to Secondary Heat transfer.
		OP-TM-EOP-003, Excessive Primary to Secondary Heat transfer.
	ARO	PERFORM Rule 3, XHT.
NOTE TO EXAMINER:		**The ARO may recognize the overfeed situation in the A OTSG and close FW-V-92 to isolate FW-V-16A.**
	ARO	VERIFY OTSG level < 97.5%

Op Test No.: 1 Scenario # 3 Event # 6,7,8 Page 21 of 27

Event Description: Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open

Time	Position	Applicant's Actions or Behavior
	ARO	VERIFY primary to secondary heat transfer is excessive.
Examiner Note:		Critical task (CT-17) is to isolate the affected OTSG prior to emptying the pressurizer, alternately if HPI held pressurizer volume, RCS cooldown below 329°F with HPI on would violate T.S. either condition should be considered grounds for failing critical task.
CRITICAL TASK (CT-17)	ARO	PERFORM Phase 1 Isolation of the affected OTSG(s). Phase 1 Isolation: OTSG A MS-V-1A (Depresses CLOSE PB CC) MS-V-1B (Depresses CLOSE PB CC) FW-V-16A (Depresses CLOSE PB CC) FW –V-17A (Depresses CLOSE PB CC) FW-V-5A (Depresses CLOSE PB CC) or verifies closed. FW-V-92A (Depresses CLOSE PB CC) MS-V-3D (Presses HAND PB on controller and toggles to 0) MS-V-3E (Covered by action for MS-V-3D same controller) MS-V-3F (Covered by action for MS-V-3D same controller) MS-V-4A (Covered by action for MS-V-3D same controller) FW-V-85A (Turb Bldg 322') (Notifies field operator to close)
	ARO	VERIFY steam leak is not in RB or Intermediate Building. (leak is in Intermediate Building continues with RNO)
	ARO	RNO: PERFORM Phase 2 Isolation of the affected OTSG(s). Phase 2 Isolation: OTSG A EF-V-30A (Presses Manual PB and closes using slider CC) EF-V-30D (Presses Manual PB and closes using slider CC)

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 22 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior
		MS-V-2A (Depresses CLOSE PB on CC)
NOTE TO EXAMINER:		**MS-V-2A will NOT close due to high D/P. If, after the OTSG depressurizes, the open and then closed pushbuttons are pressed, then the valve will close.**
	ARO	THROTTLE EFW IAW Rule 4, "Feedwater Control".
	ARO	VERIFY OTSG level and pressure stabilizes.
	ARO	INITIATE Guide 12, "RCS Stabilization".
		OP-TM-EOP-010, Guide 12, "RCS Stabilization".
	ARO	If OTSG pressure < 750 psig, and can be controlled, then DEFEAT HSPS LO-LO Pressure MFW Isolation.
	ARO	ADJUST OTSG pressure so that secondary T_{sat} is lower than RCS cold leg temperature. (Places MS-V-3A,B,C controller in hand and raises demand to lower "B" OTSG pressure below Tsat of RCS Tc CC)
	URO	THROTTLE HPI IAW Rule 2
	ARO	ADJUST OTSG pressure to stabilize RCS temperature.
	ARO	If the OTSG will completely depressurize then INITIATE Guide 2, "OTSG Isolation From Condenser".
NOTE TO EXAMINER:		**ESAS will already be actuated when Guide 9 is initiated. When Pressurizer level begins to recover the URO will have to terminate HPI.**
	URO	INITIATE Guide 9, "RCS Inventory Control".

Op Test No.: 1 Scenario # 3 Event # 6,7,8 Page 23 of 27

Event Description: Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open

Time	Position	Applicant's Actions or Behavior
CRITICAL TASK (CT-30)	CRS	Directs the termination of HPI to limit the RCS pressure increase when the A OTSG is dry.
	URO	THROTTLE HPI IAW Rule 2
		OP-TM-EOP-010, Rule 2, HPI Throttling
	URO	VERIFY MU PUMP FLOW ≤ 515 gpm/pump.
	URO	VERIFY SCM < 250 °F
	URO	VERIFY an RCP is ON
	URO	When any of the following conditions exist: - SCM > 25 °F and HPI COOLING is not required, then HPI may be THROTTLED IAW OP-TM-211-901, "Emergency Injection (HPI/LPI)".
		OP-TM-211-901, "Emergency Injection (HPI/LPI)".
	URO	If all components are in the required condition, then GO TO Section 4.3
		Section 4.3
	URO	MONITOR HPI and LPI IAW RULE 2 and THROTTLE HPI IAW Attachment 7.3
NOTE TO EXAMINER:		**ESAS may have already been defeated or re-enabled depending on the timing of the event. Defeating or**

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 24 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior
		Enabling ESAS is a memory item performed by the operators. Depending on RCS Pressure the channels will be either defeated or enabled.
		OP-TM-642-901, 1600 PSIG ESAS Actuation
		Attachment 7.1
	URO	If any channel "BYPASS PERMIT" lights are ON, then PRESS associated 1600 PSIG RC PRESS "BYPASS" pushbutton (CC): RC1A, RC2A, RC3A
	URO	For channels not bypassed in step 1, PRESS the associated "1600 PSIG RC PRESS" "ENABLE AND CHANNEL RESET" pushbutton (CC) to remove the actuation signal and enable the channel:
	URO	For channels enabled in step 2, VERIFY both "ENABLE AND CHANNEL RESET" and "FULLY ENABLED" lights are on for the associated channel.
	URO	VERIFY all Train "A" "RC PRESS 1600 PSIG ACTUATION" (PCR) BLUE lights are OFF.
		Attachment 7.2
	URO	If any channel "BYPASS PERMIT" lights are ON, then PRESS associated 1600 PSIG RC PRESS "BYPASS" pushbutton (CC): RC1B, RC2B, RC3B
	URO	For channels not bypassed in step 1, PRESS the associated "1600 PSIG RC PRESS" "ENABLE AND CHANNEL RESET" pushbutton (CC) to remove the actuation signal and enable the channel:
	URO	For channels enabled in step 2, VERIFY both "ENABLE AND CHANNEL RESET" and "FULLY ENABLED" lights are on for the associated channel.

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 25 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY all Train "B" "RC PRESS 1600 PSIG ACTUATION" (PCR) BLUE lights are OFF.
Examiner Note:		HPI Must be throttled to prevent exceeding design limits. PTS curve is generally 250°F SCM, as stated in CT-17 a Technical Specification Violation would occur if HPI were left on below LTOP setpoint 329°F. Exceeding 250°F SCM or going below 329°F should be considered Critical task failure.
		OP-TM-211-901, Attachment 7.3
CRITICAL TASK (CT-30)	URO	VERIFY ESAS in defeat IAW OP-TM-642-901, "1600 psig ESAS Actuation" (May verify blue lights off or ESAS alarm clear)
	URO	IAAT three MU pumps are running and CRS concurrence is obtained, then SHUTDOWN the ES selected pump lined up to MU & SI and PLACE CS in Normal-After-Stop. (e.g. normally MU-P-1A) (Rotates MU-P-1A extension control to STOP CC)
	URO	VERIFY throttling is permitted IAW RULE 2 and OBTAIN CRS concurrence
	URO	WAAT HPI throttling is permitted IAW RULE 2 and prior to reducing any MU pump flow to less than 115 GPM, then perform the following: 1. If DH-V-7A and DH-V-7B are Closed, then OPEN MU-V-36 and MU-V-37 (Depresses OPEN PBs for each CC)
	URO	WAAT Emergency Boration is not required (Rule 5), then INITIATE Guide 9 to close MU-V-14A and MU-V-14B
NOTE TO EXAMINER:		**Emergency Boration is required due to the two stuck rods so at least one MU-V-14 must remain open.**

Op Test No.: 1 Scenario # 3 Event # 6,7,8 Page 26 of 27

Event Description: Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open

Time	Position	Applicant's Actions or Behavior
	URO	IAAT CRS directs "termination" of HPI, then A. SHUTDOWN the MU pumps which started on ES and PLACE CS in Normal-after-stop. (MU-P-1C on CL) B. CLOSE both MU-V-16 valves lined up to MU/SI pump. (MU-V-16A & B on CC) C. CLOSE both MU-V-16 valves opposite MU/SI pump. (MU-V-16C & D on CL) D. GO TO Step 10.
	URO	When OP-TM-244-901 criteria are satisfied, then OPEN MU-V-18.
NOTE TO EXAMINER:		**The URO will have to use MU-V-16B to maintain RCS inventory due to the previous failure of MU-V-18.**
	CRS	Directs the URO to Emergency Borate IAW OP-TM-EOP-010, Rule 5
		OP-TM-EOP-010, Rule 5
	URO	VERIFY a MU pump is operating.
	URO	VERIFY Total Injection (MU, SI and HPI) > 50 gpm.
		RNO: INITIATE OP-TM-211-950, "Restoration of Letdown Flow".
NOTE TO EXAMINER:		**The scenario can be terminated at this point. Letdown does not have to be re-established to end the scenario.**
		TERMINATE the scenario.

Op Test No.: 1	Scenario # 3	Event # 6,7,8	Page 27 of 27
Event Description:	Major Steam Leak in Intermediate Building, Main Steam Safety Valve fails to reseat, Startup Feedwater Valve FW-V-16A fails at 100% Open		

Time	Position	Applicant's Actions or Behavior

Follow-up question highest event entered during scenario?

This scenario did not meet the conditions for an EAL call during validation but may reach an alarm point for equipment on the computer that 2 would warrant a HA6, Fire or Explosion, declaration due to the steam leak in the Intermediate Building.

Scenario 4 changes
Removed Critical task 11 it is embedded in CT-10 (This will affect "beans".)
Added underline to actions that should be observed.
Added Examiner notes on Critical Task actions and failure criteria.

Post validation changes made:

1. Page 1, removed CT-11 from Critical task list
2. Page 1, removed C ARO from Event #2
3. Page 1, replace C CRS, C URO, and C ARO with I CRS, I URO, and I ARO
4. Page 3, added Pass/Fail Criteria for Critical Tasks
5. Page 8 modified statement to move on to next event to ensure we wait until "ARTS" are bypassed, otherwise the ATWAS won't be an ATWAS.

NOTE TO EXAMINER:	**When the reactivity manipulation has been satisfied AND the RPS FW Anticipatory Trip functions are in effect as evidenced by fwp bypass lights on all four cabinets being DIM GO TO Event 2.**

6. Page 9, added Booth Operator note for actions to take

BOOTH OPERATOR:	**- When told to verify MU-V-20 handwheel is locked in the full closed position, wait the appropriate time frame and report that it is verified.** **- When told to open MU-V-70A, use MUR01 to accomplish this.** **- When told to bypass MU-V-2A/B high temp bypass switch, use MUR89.** **- When told to bypass MU-V-3 high temp bypass switch, use MUR90.**

7. Page 9, added Note to Examiner

NOTE TO EXAMINER:	**If additional cooling water is not throttled in to ICCW coolers, letdown flow will isolate on high temperature. The crew will then have to restore letdown IAW OP-TM-211-950. If this happens, refer to ARO* actions for the appropriate steps.**
Added appropriate steps for OP-TM-211-950 starting on page 11	

8. Page 16, Edited Map B-1-6 to read Map B-1-5 in two locations
9. Page 18, Edited Note to Examiner to read:

NOTE TO EXAMINER:	**Due to the SASS failure, Alarm H-3-2 will not be received, therefore the crew will have to use a knowledge based decision to implement OP-TM-621-451.**

10. Page 20-21, Added the following steps:
    a. Alarm response for MAP G-1-2
    b. OP-TM-641-455, RPS CHANNEL MANUAL BYPASS
    c. TECH SPEC 3.5.1
11. Page 24, Edited Note to Examiner to read:

NOTE TO EXAMINER:	**The ARO will have to control OTSG levels manually with only one EF-P-2 pump running to control level and pressure and to prevent runout of the pump.**

12. Page 25, Edited Note to Examiner to read:

NOTE TO EXAMINER:	**The ARO may have already attempted to start EF-P-2B due to its failure to auto start on HSPS actuation. The pump will not start manually from the control switch. Additionally, the URO may not try to start EF-P-2B since it was already tripped.**

13. Page 26, Added Note to Examiner for clarification:

NOTE TO EXAMINER:	**Limiting the flow from EF-P-2A/B (if only one pump is operating) is to prevent pump runout.**

14. Page 29, Replaced TSDT with Tube to Shell Differential Temperature (TSDT)
15. Page 30, Edited Examiner Note to read:

CT-10

EXAMINER NOTE: Opening FW-V-6 and depressurizing the OTSG to less than 600 psig to establish primary to secondary cooling is a critical task, failure to accomplish either this or HPI/PORV cooling and allowing the plant to heatup into a Loss of Subcooling would jeopardize fuel clad and should be considered failure to met the critical task. Primary to secondary cooling is preferred over HPI/PORV cooling due to:

- More stable
- Does not challenge RCS integrity
- Does not fill the Reactor Building with RCS water

Facility:	Three Mile Island	Scenario No.: 4	Op Test No.: NRC
Examiners:		Operators:	
Initial Conditions:	• Reactor Power 5%, Plant Startup in progress (Temp IC-49)		
	•		
Turnover:	Continue power escalation and place turbine on line		
Critical Tasks:	• Establish FW Flow and Feed SGs (Rule 1) (CT-10)		
	• Shutdown Reactor – ATWS (CT-24)		

Event No.	Malf. No.	Event Type*	Event Description
1		N CRS R URO N ARO	Power Escalation
2	MU01B	C CRS C URO	Makeup Pump 1B Trip (TS)
3	RW04A	C CRS	Decay Heat River Water Pump Trip (TS)
4	NI27A	I CRS I URO I ARO	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High
5	FW15A	M CRS M URO M ARO	FW-P-1A Trip
6	RD27A RD27B RD28	C URO	ATWS
7	FW17 I/O Override	C CRS C ARO	EF-P-1 Trips on start EF-P-2B Fails to start
8	FW-18A	C CRS C URO C ARO	EF-P-2A Trips

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

Three Mile Island NRC Scenario #4

The plant is at 5% power following a shutdown for five days to perform repairs on the turbine. Chest warming of the turbine is complete. Following the turnover the crew will continue the power ascension IAW 1102-2, Plant Startup (reactivity manipulation) to 12% so the turbine can be rolled and synchronized.

After the reactivity manipulation has been satisfied (approximately 10% power), the Lead Examiner can cue the trip of Makeup Pump MU-P-1B resulting in a loss of seal injection and normal makeup. CRS should declare Technical Specification 3.5.7 REMOTE SHUTDOWN SYSTEM Table 3.5-4 minimum functions not met and the function must be restored in 30 days or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within an additional 12 hours. The Crew will have to respond IAW OP-TM-AOP-041, Loss of Seal Injection. Decay Heat River Water Pump DR-P-1A, Decay Heat Closed Cooling Water Pump DC-P-1A and MU-P-1A will be started. Normal makeup and seal injection will be restored.

After makeup and seal injection have been restored, the Lead Examiner can cue the trip of DR-P-1A, which is supplying cooling for MU-P-1A. The crew will respond by swapping MU-P-1A cooling from Decay Heat Closed Cooling Water System to Nuclear Services Closed Cooling Water IAW MAP B-1-6, 480V ES Motor Trip, and OP-TM-543-439, Swapping MU-P-1A Cooling to NS. The CRS will review T. S. 3.3.1.1.c and T. S. 3.3.2 and declare a 72 hour timeclock based on having only one Decay Heat River Water Pump operable.

After the Tech Spec call has been made, the Lead Examiner can cue the failure of the RC Narrow Range Pressure instrument high. The PORV, RC-RC-2, will lift and have to be isolated IAW OP-TM-MAP-G0107, PORV OPEN (Acoustic). The Spray Valve, RC-V-1, will open and have to be closed in manual OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO. The Pressurizer heaters will energize and have to be placed in Hand to gain control. The CRS will initiate OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS, to select the alternate instrument.

After the alternate instrument is selected and spray and heaters are back in Auto the Lead Examiner can cue the trip of FW-P-1A causing a loss of all Feedwater. The reactor will fail to trip automatically or manually and the URO will have to open the 1G-02 and 1L-02 breakers to trip the reactor IAW OP-TM-EOP-001, Reactor Trip **(CT-24)**.

Emergency Feedwater Pump EF-P-1 will trip on overspeed during startup and EF-P-2B will not start automatically or manually. The ARO will initiate OP-TM-424-901, Emergency Feedwater, and OP-TM-EOP-010, Rule 4, Feedwater Control, to establish proper flow to the OTSGs.

After the plant is stabilized post trip, the Lead Examiner can cue the trip of EF-P-2A. The crew will diagnose the lack of primary to secondary heat transfer and transition to OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer. The crew will perform Attachment 1, OTSG Feed using a Condensate Booster Pump to feed the OTSGs **(CT-10)**.

Three Mile Island NRC Scenario #4 cont'd

The Lead Examiner can terminate the scenario when the OTSGs are being fed from the Condensate Booster Pump and OTSG pressure is being controlled between 500-600 psig.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

-
- CT-10 - Establish FW Flow and Feed SG(s) (Rule 4) – Necessary to prevent need for HPI Cooling, which degrades the RB conditions. This will involve reducing OTSG pressure to 500-600psig to allow feeding OTSGs.
    - Criteria: Opening FW-V-6 and depressurizing the OTSG to less than 600 psig to establish primary to secondary cooling is a critical task, failure to accomplish either this or HPI/PORV cooling and allowing the plant to heatup into a Loss of Subcooling would jeopardize fuel clad and should be considered failure to met the critical task. Primary to secondary cooling is preferred over HPI/PORV cooling due to:
        - More stable
        - Does not challenge RCS integrity
        - Does not fill the Reactor Building with RCS water
- CT-24 – Shutdown Reactor – ATWS - This is a critical task in that the reactor may be generating more heat than the emergency Feedwater system can remove.
    - Criteria: Crew must recognize the failure of the reactor to trip on loss of Feed Water Pumps while greater than 7% power. Action must be taken to shutdown the reactor. If actions are taken to restore feedwater or manually reduce plant power to within the capacity of EFW then this should be considered Critical Task Failure based on failure to recognize the inability of RPS to protect the core.

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)
- Loss of Decay River Pump (Risk Increase Factor)
- PORV RC-RV-2 (Risk Increase Factor)

Event	Description	Procedure Support
	Initial Set-up.	5% Power, Plant Startup in progress
1	**Power Escalation**	1102-2, Plant Startup
		OP-TM-301-102, Main Turbine Generator Standby Mode to Operating Mode
2	**MU-P-1B Trip**	OP-TM-AOP-041, Loss of Seal Injection
		T. S. 3.5.7 Remote Shutdown
3	**DR-P-1A Trip**	MAP B-1-6, 480V ES Motor Trip
		OP-TM-543-439, Swapping MU-P-1A Cooling to NS
		T. S. 3.3.1.4.4 and T. S. 3.3.2
4	**RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High**	OP-TM-MAP-G0107, PORV OPEN (Acoustic)
		OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
		OP-TM-MAP-H0302, SASS Mismatch
		OP-TM-220-503, Manual Control of Pressurizer Pressure
5	**Main Feedwater Pump 1A Trip**	OP-TM-424-901, Emergency Feedwater
		OP-TM-EOP-010, Rule 4, Feedwater Control
		OP-TM-EOP-001, Reactor Trip
6	**ATWS**	OP-TM-EOP-001, Reactor Trip
7	**EF-P-1 Trips** **EF-P-2B Fails to start**	OP-TM-424-901, Emergency Feedwater
8	**EF-P-2A Trips**	OP-TM-EOP-004, Lack of Primary to Secondary heat Transfer

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-5	5% Power 1102-2, Plant startup signed off to step 3.2.11 and Enclosure 2 through page 3 of 11. OP-TM-301-102, Main Turbine Generator Standby Mode to Operating Mode signed off to step 4.7.5, Chest Warming complete	
I/O Override 02A4S37-ZDIEFP2B(2)	Value: STR OFF When: Immediately	EF-P-2B Manual Start Failure
I/O Override 02A4S37-ZDIEFP2B(1)	Value: STP ON When: Immediately	EF-P-2B Auto Start Failure
I/O Override 01A5S22-ZDIPBFPTB	Value: OFF When: Immediately	FW-P-1B RESET PB
Malfunction IC48	Value: Insert When: Immediately	SASS Channel Failure RC Pressure
Malfunction RD27A	Value: Insert When: Immediately	RPS Manual Trip Block
Malfunction RD27B	Value: Insert When: Immediately	DSS Manual Trip Block
Malfunction RD28	Value: Insert When: Immediately	Reactor Auto Trip Block
Malfunction MU01B	Value: Insert When: Event 2	MU-P-1B Trip
Malfunction RW04A	Value: Insert When: Event 3	DR-P-1B Trip
Malfunction NI27A	Value: Insert Sev. 100% When: Event 4	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High
Malfunction FW15A	Value: Insert When: Event 5	FW-P-1A Trip
Malfunction FW17	Value: Insert When: Event 7 fwnefp1>0.9	EF-P-1 Overspeed Trip
Malfunction FW18A	Value: Insert When: Event 8	EF-P-2A Trip

Op Test No.: 1	Scenario # 4	Event # 1	Page 6 of 31
Event Description:	Power Escalation		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Examiners Cue: Direct the crew to continue the power escalation.		
	CRS	Directs continuation of the power escalation IAW 1102-2, Plant Startup.
		1102-2, Plant Startup
	URO	RAISE reactor power at a rate within limits per Enclosure 4 to 100% by withdrawal of control rods in sequence. (30% power/hr)
	URO	When NI power is between 5% and 10%, then 1. VERIFY AUTO INHIBIT is Off 2. ENSURE rod control is in SEQ 3. VERIFY neutron error is "zero" 4. PLACE Diamond station in AUTO
	URO	ADJUST REACTOR DEMAND to control reactor power.
Booth Operator Instructions: Set REMOTE FUNCTIONS FWR14 and FWR15 to 0% to close FW-V-85A and FW-V-85B. Report to the Control Room that it took 7 seconds to close FW-V-85A and 6 seconds to close FW-V-85B.		
	ARO	When reactor power > 5%, CLOSE Main Feedwater minimum flow valves and RECORD time to close valve from 4.5 turns open. • FW-V-85A CLOSED • FW-V-85A CLOSURE TIME _____ seconds • FW-V-85B CLOSED

Op Test No.: 1	Scenario # 4	Event # 1	Page 7 of 31
Event Description:	Power Escalation		

Time	Position	Applicant's Actions or Behavior
		• FW-V-85B CLOSURE TIME seconds
	CRS	When NI power > 7%, VERIFY Main Feedwater ARTS is not bypassed by observing RPS Cabinet lights. (Dim Light)
	ARO	When FW-V-16A > 50% and less than 80% OPEN • VERIFY FW-V-17A is closed • OPEN FW-V-5A
	ARO	When FW-V-16B > 50% and less than 80% OPEN • VERIFY FW-V-17B is closed • OPEN FW-V-5B
NOTE TO EXAMINER:		**Feedwater Demand Stations do not have to be in auto to continue the scenario.**
	ARO	Prior to reactor power > 20% • OBTAIN CRS concurrence • VERIFY "SG A FW DEMAND" "HAND MINUS AUTO" indication is at or above the red diamond. • PLACE "SG A FW DEMAND" indicator in the "FW A DEMAND" position. • PLACE SG A FW DEMAND" Station to AUTO • VERIFY "SG A FW DEMAND" remains at 0 percent • VERIFY "SG B FW DEMAND" "HAND MINUS AUTO" indication is at or above the red diamond. • PLACE "SG B FW DEMAND" indicator in the "FW A DEMAND" position.

Op Test No.: 1	Scenario # 4	Event # 1	Page 8 of 31
Event Description:	Power Escalation		

Time	Position	Applicant's Actions or Behavior
		• PLACE SG B FW DEMAND" Station to AUTO • VERIFY "SG B FW DEMAND" remains at 0 percent
NOTE TO EXAMINER:		**When the reactivity manipulation has been satisfied AND the RPS FW Anticipatory Trip functions are in effect as evidenced by fwp bypass lights on all four cabinets being DIM GO TO Event 2.**

Op Test No.: 1	Scenario # 4	Event # 2	Page 9 of 31
Event Description:	Makeup Pump MU-P-1B Trip		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 2.**
Indications Available:		**MAP Annunciators F-1-7 and F-1-8 for low Seal Injection Flow and Lab Seal ΔP, Low Seal Injection flow indication, Makeup Flow at zero, MAP Annunciators B-1-2 4KV ES Motor Trip and B-2-2 4KV ES Motor Overload.**
BOOTH OPERATOR:		**- When told to verify MU-V-20 handwheel is locked in the full closed position, wait the appropriate time frame and report that it is verified.** **- When told to open MU-V-70A, use MUR01 to accomplish this.** **- When told to bypass MU-V-2A/B high temp bypass switch, use MUR89.** **- When told to bypass MU-V-3 high temp bypass switch, use MUR90.**
	URO	Diagnoses the loss of MU-P-1B.
	CRS	Directs entry into OP-TM-AOP-041, Loss of Seal Injection.
NOTE TO EXAMINER:		**If additional cooling water is not throttled in to ICCW coolers, by jogging open on NR-V-15B CR, letdown flow will isolate on high temperature. The crew will then have to restore letdown IAW OP-TM-211-950. If this happens, refer to ARO* actions for the appropriate steps.**
		OP-TM-AOP-041, Loss of Seal Injection
	CRS	Determines the entry conditions are met: All of the following conditions exist: • RCS temperature > 190°F • Seal injection flow is < 22 GPM (MAP F-1-5) • Immediate attempts to restore flow with MU-V-32 from the CR have failed.

Op Test No.: 1 Scenario # 4 Event # 2 Page 10 of 31

Event Description: Makeup Pump MU-P-1B Trip

Time	Position	Applicant's Actions or Behavior
	CRS	IAAT ICCW flow is < 550 GPM (IC-5-FI) and SI Flow < 22 GPM, then perform the following: A. ENSURE the reactor is tripped. B. ENSURE all RCPs are tripped.
	URO	ENSURE MU-V-32 is in HAND and Closed.
	CRS	When 1D or 1E 4160V bus is energized, then CONTINUE.
	CRS	VERIFY a makeup pump is operating (MU header pressure MU2-PI is above RCS pressure) and aligned to seal injection.
		RNO:
	URO	ENSURE MU-V-17 is Closed.
	URO	VERIFY [MU-T-1 pressure and level are in the unrestricted operating region] or [MU-V-14A or B is Open].
	URO	If MU tank level was < 18" at any time, then PERFORM OP-TM-211-271 to vent the MU pumps.
	CRS	If MU-V-77 A & B are Open, then GO TO section 4.0.
		Section 4.0, No MU pumps are operating. Start MU-P-1A
	CRS	ENSURE MU-P-1A is ES Selected. (CB 338: 1D 4160V Bus Unit 7)
	URO	VERIFY one of the following: • MU-V-36 and 37 are Open • MU-V-16A or 16B is Open

Op Test No.: 1 Scenario # 4 Event # 2 Page 11 of 31

Event Description: Makeup Pump MU-P-1B Trip

Time	Position	Applicant's Actions or Behavior
	URO	ENSURE DR-P-1A and DC-P-1A are operating. (Rotates Control Switches on CC)
	URO	START MU-P-1A. (Rotates Control Switch on CC)
	CRS	When MU-V-77A & B are Open, then GO TO Step 3.5.
	URO	VERIFY MU-V-20 is Open
	URO	Slowly ADJUST MU-V-32 to 38 gpm seal injection flow at a rate that will limit RCP radial bearing cooldown rate < 1°F/min.
	URO	If MU-V-17 is in HAND, then RESTORE Pzr level at a rate consistent with RCS pressure control.
The following steps are contingent on Letdown being lost.		
		OP-TM-211-950, "Restoration of Letdown Flow."
		Prerequisites
	ARO*	VERIFY ICCW flow > 550 GPM.
	ARO*	VERIFY the following valves are Open: – IC-V-2 – IC-V-3 – IC-V-4
	ARO*	VERIFY any of the following: – ESAS defeated. – ESAS did not actuate. – AOP-046 was entered. (This was entered Condition Met)

Op Test No.: 1 Scenario # 4 Event # 2 Page 12 of 31

Event Description: Makeup Pump MU-P-1B Trip

Time	Position	Applicant's Actions or Behavior
	ARO*	VERIFY ICCW cooler outlet temperature < 100°F.
		Main body
	ARO*	ENSURE the following valves are Closed: (Depresses CLOSE PB) – MU-V-3 – MU-V-4 – MU-V-5
	ARO*	ENSURE the following are Open: – MU-V-1A – MU-V-1B
	ARO*	ENSURE the following are Open: (Turns switches on PCR) – MU-V-2A – MU-V-2B
	ARO*	If MU-V-5 is remotely operable, then PLACE MU-V-5 at 10% Open. (By rotating demand knob)
	ARO*	ENSURE MU-V-3 is Open. (Depresses OPEN PB)
	ARO*	CONTROL ICCW temperature IAW OP-TM-541-461.
	ARO*	MAINTAIN letdown temperature < 125°F.
	ARO*	Raise letdown flow at < 2.5 gpm/min to desired flow as follows: (May use computer point or perform "A. & B." below rotates demand knob to raise flow)

Op Test No.: 1 Scenario # 4 Event # 2 Page 13 of 31

Event Description: Makeup Pump MU-P-1B Trip

Time	Position	Applicant's Actions or Behavior
	CRS	ENSURE compliance with Tech Spec 3.3.1.1.b. (Compliance met)
		TS 3.3.1.1.b
		Two Makeup and Purification (MU)/High Pressure Injection (HPI) pumps are OPERABLE in the engineered safeguards mode powered from independent / essential buses. specification 3.0.1 applies
		T. S. 3.5.7
	CRS	Reviews Tech Spec 3.5.7 REMOTE SHUTDOWN SYSTEM Table 3.5-4 minimum functions not met and the function must be restored in 30 days or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within an additional 12 hours.
	CRS	CRS declares a 30 day Tech Spec timeclock due to the loss of MU-P-1B.
NOTE TO EXAMINER:		**The CRS may review Admin Procedure 1038 and declare a 30 day timeclock based on Step 9.3.6 and Exhibit 2.**
	CRS	GO TO Section 9.0 (Return to Normal).
	CRS	PLACE MU-V-32 in AUTO using OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations.
		OP-TM-211-476.
	URO	When AUTO control of MU-V-32 (CC) is required, then PERFORM the following:
	URO	MONITOR current Seal Injection Flow (MU42-FI1)(CC).

Op Test No.: 1 Scenario # 4 Event # 2 Page 14 of 31

Event Description: Makeup Pump MU-P-1B Trip

Time	Position	Applicant's Actions or Behavior
	URO	PLACE MU-V-32 (CC) in the FLOW ERROR position.
	URO	ADJUST Seal Injection Flow (MU42-FI1)(CC) to obtain zero flow error (approximately 50% on indicator) using toggle switch on MU-V-32 (CC).
	URO	PLACE MU-V-32 (CC) in the POSITION DEMAND position.
	URO	RETURN MU-V-32 (CC) to AUTO by pressing the Red AUTO PB and VERIFY Red AUTO light is Lit on (CC).
	CRS	ENSURE MU-V-17 is in AUTO (OP-TM-211-472).
		OP-TM-211-472, Manual Pressurizer Level Control
	URO	When AUTO control of MU-V-17 is required, then PERFORM the following:
	URO	VERIFY MU hand and MU Auto power are available
	URO	MONITOR the following: - Pressurizer level (RC-LI-777A / RC1-LR) (CC). - RCS Pressure (RC3-PR (CC) / RC-PI-949A (PCL). - Makeup Flow (MU24AFI)(CC).
	URO	ENSURE auto setpoint is correct for plant conditions.
	URO	PLACE MU-V-17 in the PRZR LEVEL ERROR position.

Op Test No.: 1	Scenario # 4	Event # 2	Page 15 of 31
Event Description:	Makeup Pump MU-P-1B Trip		

Time	Position	Applicant's Actions or Behavior
	URO	ADJUST MU-V-17 as needed to reduce Pressurizer level error to zero (obtain approx. 50% on indicator).
	URO	PLACE MU-V-17 in the POSITION DEMAND position.
	URO	PRESS MU-V-17 H/A station Red AUTO PB and VERIFY Red AUTO light is Lit on (CC).
NOTE TO EXAMINER:		**After MU-V-17 has been returned to Auto and the Tech Spec call is made GO TO Event 3**

Op Test No.: 1	Scenario # 4	Event # 3	Page 16 of 31
Event Description:	Decay Heat River Water Pump 1A Trip		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 3.**
Indications Available:		**MAP Annunciators B-1-5 480V ES Motor Trip and B-2-5 480V ES Motor Overload, DR-P-1A breaker disagreement amber light.**
	CRS	Directs entry into MAP Annunciator procedure B-1-5
		MAP Annunciator procedure B-1-5
	CRS	Review Technical Specification requirements in Sections 3.3 and 3.4 for having the affected component out of service.
		TS 3.3.1.4.d
		Two decay heat river water pumps must be OPERABLE.
		TS 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.
	CRS	Declares a 72 hour time clock to repair DR-P-1A.
	ARO	If a Decay Heat Closed Cooling Water pump or Decay Heat River Water pump is out of service, then PERFORM OP-TM-543-439(440), Swapping MU-P-1A(C) Cooling to NS, for the affected train.

Op Test No.: 1	Scenario # 4	Event # 3	Page 17 of 31
Event Description:	Decay Heat River Water Pump 1A Trip		

Time	Position	Applicant's Actions or Behavior
		OP-TM-543-439, Swapping MU-P-1A Cooling to NS
	ARO	VERIFY all prerequisites have been met.
	URO	If required to shift MU-P-1A cooling to NS, then PERFORM the following:
BOOTH OPERATOR:		**When directed to swap Makeup Pump 1A cooling to NS, set REMOTE FUNCTION CCR12 to NS. Two minutes after being ordered to open NS-V-80 and 81 report the valves open.**
	ARO	NOTIFY Control Room to monitor the following: • NS-T-1 level (NS-LI-800 / NS-LI-801)(CC). • DC-T-1A level (DC-LI-109) (CR).
	ARO	Contacts the Primary AO to CLOSE the following valves: • DC-V-41A • DC-V-45A
	ARO	Contacts the Primary AO to OPEN the following valves: • NS-V-80 • NS-V-81
NOTE TO EXAMINER:		**After MU-P-1A cooling has been swapped to Nuclear Services Closed Cooling GO TO Event 4**

Op Test No.: 1	Scenario # 4	Event # 4	Page 18 of 31
Event Description:	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**MAP Annunciators G-1-6,PZR SAFETY OR PORV OPEN (DP), G-1-7 PORV OPEN (Acoustic), G-1-2 RPS CHANNEL TRIP, G-3-8 RC PRESS NARROW RANGE HI/LO, PORV open indication on CC, RC-V-1 Spray Valve open indication on CC, Hi RC Pressure indication on CC recorder Ch. 1, Pressurizer heater demand at zero.**
	URO	Diagnoses RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High.
	CRS	Directs verification that the instrument is failed and orders the PORV Block Valve RC-V-2 closed IAW OP-TM-MAP-G0107, PORV Open (Acoustic).
	URO	Closes RC-V-2, PORV Block Valve. (Presses CLOSE PB on CC)
	CRS	Directs RC-V-1 Spray Valve closed in manual IAW OP-TM-MAP-G0308, RC Press Narrow Rng Hi/Lo.
	URO	Closes RC-V-1, Spray Valve. (Rotates Auto Manual switch and presses and hold CLOSE PB on CC)
	CRS	Directs the Pressurizer Heaters controlled in Hand IAW OP-TM-220-503, Manual Control of Pressurizer Pressure.
	URO	Controls the Pressurizer Heaters in Hand. (Places Banks 4 and 5 in manual on CR)
NOTE TO EXAMINER:		**Due to the SASS failure, Alarm H-3-2 will not be received, therefore the crew will have to use a knowledge based decision to implement OP-TM-621-451.**

Op Test No.: 1	Scenario # 4	Event # 4	Page 19 of 31
Event Description:	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High		

Time	Position	Applicant's Actions or Behavior
	CRS	Directs entry into OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
	CRS	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000 Integrated Control System or table in OP-TM-MAP-H0302 as necessary).
	CRS	VERIFY one of the following: 1. Difference between affected and alternate channel(s) is(are) less than "SASS Setpoint Δs" listed in OP-TM-H0302. Or 2. Selecting the alternate instrument will not affect ICS control or plant stability.
	CRS	Determines instrument RC3B-PT1 is indicating correct RCS pressure from the Table in OP-TM-MAP-H0302, SASS Mismatch.
	URO	<u>SELECT alternate instrument with the console pushbutton (on CC)</u> • VERIFY plant stable.
	CRS	If selected input is not the 'preferred' (top pushbutton) instrument, then ISSUE an EST or EDT (Equipment Status/Deficiency Tag) for affected instrument/channel.
	CRS	Directs URO to return Pressurizer pressure control to Auto IAW OP-TM-220-503, Manual Control of Pressurizer Pressure.
		OP-TM-220-503, Manual Control of Pressurizer Pressure

Op Test No.: 1 Scenario # 4 Event # 4 Page 20 of 31

Event Description: RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High

Time	Position	Applicant's Actions or Behavior
		OP-TM-220-503, Manual Control of Pressurizer Pressure, Return to Normal.
	URO	ENSURE RCS pressure is stable at approximately 2155 PSIG.
	URO	ENSURE RC-V-1 is CLOSED.
	URO	ENSURE RC-V-1-EX2, RC-V-1 Select Switch, is in AUTO. (Rotates Auto/Manual switch on CC back to Auto)
	URO	ENSURE the following are in AUTO A. RC-HTR-BANK-1-EX1 B. RC-HTR-BANK-2-EX1 C. RC-HTR-BANK-3-EX1
	URO	ENSURE Pressurizer Heater Pressure controller measured variable close to the red diamond.
	URO	ENSURE Pressurizer Heater Banks 4 and 5 are de-energized and in AUTO. (Rotates switches back to Auto on CR)
	URO	PLACE Pressurizer Pressure Station in AUTO. (Auto PB depressed on CC)
	CRS	Directs the URO to open RC-V-2, PORV Block Valve
	URO	Depresses RC-V-2 OPEN PB on CC.
	CRS	Directs entry into OP-TM-MAP-G0102
		OP-TM-MAP-G0102, RPS CHANNEL TRIP

Op Test No.: 1	Scenario # 4	Event # 4	Page 21 of 31
Event Description:	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High		

Time	Position	Applicant's Actions or Behavior
	ARO	If channel trip is otherwise unexpected, then PERFORM the following:
		CHECK RPS bistables to determine cause of trip.
		If trip condition can not be cleared or the reason for the trip is not known, then PLACE RPS channel in Manual Bypass IAW OP-TM-641-455.
	CRS	ENSURE compliance with Tech Spec 3.5.1 (Compliance will be met with current conditions)
		Tech Spec 3.5.1.2 The key operated channel bypass switch associated with each reactor protection channel will be used to lock the reactor trip module in the untripped state as indicated by a light. Only one channel shall be locked in this untripped state at any one time. Unit operation at rated power shall be permitted to continue with Table 3.5-1, Column "A". Only one channel bypass key shall be kept in the control room.
		OP-TM-641-455, RPS CHANNEL MANUAL BYPASS
	ARO	If no channel in Manual Bypass (MAP G-3-1 clear), then perform the following:
		Verify no Vital Bus work in progress that could affect operable RPS Channels.
	ARO	Place selected RPS Channel Manual Bypass Switch to BYPASS position using Key #6.
	ARO	Verify Manual by-pass lamp Bright on Reactor Trip Module.
	ARO	Verify Manual by-pass lamp Bright on outside of RPS cabinet
	ARO	Verify alarm MAP G-3-1 In.
	ARO	Document Manual Bypass position change in CR logbook.

Op Test No.: 1	Scenario # 4	Event # 4	Page 22 of 31
Event Description:	RC3A-PT1 RC Narrow Range Pressure Transmitter Fails High		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**After the ARTS trips are armed on the RPS Cabinets for the Feedwater Pumps and the alternate instrument is selected and Pressurizer pressure control is back in automatic GO TO Event 5. If desired by the Lead Evaluator the scenario can continue without placing the Pressurizer Pressure control to auto.**

Op Test No.: 1	Scenario # 4	Event # 5,6,7	Page 23 of 31
Event Description:	FW-P-1A Trip, ATWS, EF-P-1 Trips, EF-P-2B Fails to Start		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available:		**MAP Annunciator M-1-1 FWP 1A TRIP, G-1-2 RPS Channel Trip, J-1-2 EFW TURB OS TRIP, J-1-3 OTSG A EFW ACTUATED, J-1-4 OTSG B EFW ACTUATED, J-2-2 EFP TURB STM PRESS HI, Panel Center Control Rod indication show rods have not dropped**
	URO	Diagnoses a reactor trip should have occurred due to the FW-P-1A trip and pushes the RPS and DSS trip pushbuttons.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip.
	URO	PRESS both Reactor Trip and DSS pushbuttons.
CT-24 "ATWS"		
EXAMINER NOTE:		Crew must recognize the failure of the reactor to trip on loss of Feed Water Pumps while greater than 7% power. Action must be taken to shutdown the reactor. If actions are taken to restore feedwater or manually reduce plant power to within the capacity of EFW then this should be considered Critical Task Failure based on failure to recognize the inability of RPS to protect the core.
	URO	VERIFY REACTOR SHUTDOWN
Critical Task (CT-24)	URO	RNO: • TRIP both 1L-02 and 1G-02 • If the REACTOR is SHUTDOWN, then GO TO step 2.3
	URO	PRESS Turbine Trip pushbutton.
	URO	VERIFY the turbine stop valves are Closed.
NOTE TO EXAMINER:		**No Symptoms will exist at this time.**

Op Test No.: 1 Scenario # 4 Event # 5,6,7 Page 24 of 31

Event Description: FW-P-1A Trip, ATWS, EF-P-1 Trips, EF-P-2B Fails to Start

Time	Position	Applicant's Actions or Behavior
	ARO	Performs a symptom check.
	ARO	Initiates OP-TM-424-901 Emergency Feedwater.
		OP-TM-424-901 Emergency Feedwater.
	ARO	DISPATCH an Auxiliary Operator (AO) to EF-V-30 area.
	ARO	IAAT steps 4.1.4, 4.1.5, or 4.1.6 are not satisfied, then INITIATE Section 4.2 "Contingency Actions".
	ARO	VERIFY the following Emergency Feedwater pumps discharge pressure > OTSG pressure: – EF-P-1 – EF-P-2A – EF-P-2B
	ARO	Initiates Section 4.2
NOTE TO EXAMINER:		**The ARO will have to control OTSG levels manually with only one EF-P-2 pump running to control level and pressure and to prevent runout of the pump.**
	ARO	VERIFY A OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established.
	ARO	VERIFY B OTSG level is above setpoint IAW Rule 4, or Emergency Feedwater flow is established.
		Section 4.2, Contingency Actions
	ARO	If EF-P-1 discharge pressure < available OTSG pressure,

Op Test No.: 1 Scenario # 4 Event # 5,6,7 Page 25 of 31

Event Description: FW-P-1A Trip, ATWS, EF-P-1 Trips, EF-P-2B Fails to Start

Time	Position	Applicant's Actions or Behavior
		then perform the following:
	ARO	If OTSG A is available, then ENSURE the following valves are open: – MS-V-2A – MS-V-13A
	ARO	If OTSG B is available, then ENSURE the following valves are open: – MS-V-2B – MS-V-13B
	ARO	If MS-PI-204 < 140 psig, then ENSURE MS-V-6 is Open.
	ARO	If EF-U-1 is tripped (Annunciator J-1-2), then perform the following: A. ENSURE EFW actuation is in DEFEAT (8 switches) (All eight switches rotated to defeat on CC and CR). B. CLOSE MS-V-13A. (Depresses CLOSE PB on CC) C. CLOSE MS-V-13B. (Depresses CLOSE PB on CC)
BOOTH OPERATOR:		**When directed to reset EF-P-1, report that the trip mechanism for EF-P-1 is broken.**
	URO	Directs the AO at EFW to reset EF-P-1 locally.
NOTE TO EXAMINER:		**The ARO may have already attempted to start EF-P-2B due to its failure to auto start on HSPS actuation. The pump will not start manually from the control switch. Additionally, the URO may not try to start EF-P-2B since it was already tripped.**
	URO	If all the following conditions exist:

Op Test No.: 1 Scenario # 4 Event # 5,6,7 Page 26 of 31

Event Description: FW-P-1A Trip, ATWS, EF-P-1 Trips, EF-P-2B Fails to Start

Time	Position	Applicant's Actions or Behavior
		– EF-P-2B discharge pressure < available OTSG pressure, – Voltage on 1D 4160V bus > 4100V – Control power is available as indicated by the green indicator light at the EF-P-2B control switch. (CR) then perform the following: 1. IAAT EF-P-2B discharge pressure > available OTSG pressure, then GO TO step 4.2.5 2. START EF-P-2B
		OP-TM-424-901, Section 4.3
	URO	THROTTLE EFW IAW Rule 4, "Feedwater Control".
	CRS	OP-TM-EOP-010, Reactor Trip VSSVs
	ARO	ANNOUNCE Reactor Trip.
	URO	VERIFY control rod groups 1 through 7 are fully inserted.
	ARO	VERIFY both OTSG Operate Range levels < 97.5%.
	ARO	VERIFY Main FW Flow to each OTSG < 0.5 Mlb/hr.
	ARO	VERIFY OTSG levels > setpoint.
		RNO: INITIATE Rule 4, "Feedwater Control".
		Rule 4 Feedwater Control
NOTE TO EXAMINER:		**Limiting the flow from EF-P-2A/B (if only one pump is operating) is to prevent pump runout.**
	ARO	If EFW is actuated, then VERIFY two or more EFW pumps are

Op Test No.: 1 Scenario # 4 Event # 5,6,7 Page 27 of 31

Event Description: FW-P-1A Trip, ATWS, EF-P-1 Trips, EF-P-2B Fails to Start

Time	Position	Applicant's Actions or Behavior
		running.
		RNO: If only EF-P-2A or EF-P-2B are operating, then MAINTAIN flow to OTSGs < 515 gpm.
		OP-TM-EOP-001, Reactor Trip
	URO	VERIFY 1D and 1E 4160V buses are energized from auxiliary transformers.
	URO	INITIATE Guide 9, "RCS Inventory Control".
	ARO	INITIATE Guide 6, "OTSG Pressure Control".
	URO	INITIATE Guide 8, "RCS Pressure Control".
NOTE TO EXAMINER:		**When the plant has been stabilized post-trip and EFW has been initiated to the OTSGs GO TO Event 8.**

Op Test No.: 1	Scenario # 4	Event # 8	Page 28 of 31
Event Description:	EF-P-2A Trips, Lack of Primary to Secondary Heat transfer		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 8.**
Indications Available:		**OTSG Levels decreasing, RCS Pressure rising, J-2-3, OTSG A LEVEL LOW, J-2-4 OTSG B LEVEL LOW, RCS temperature rising.**
	ARO	Diagnoses the trip of EF-P-2A and that no feedwater is available.
	CRS	Directs performance of a Symptom Check.
NOTE TO EXAMINER:		**The ARO will diagnose lack of primary to secondary heat transfer based on incore temperature rising and NO FEEDWATER available.**
	ARO	IAAT a symptom exists, then GO TO the symptom response procedure using the following priority: EOP-004, "Lack of Primary to Secondary Heat Transfer",
	CRS	Directs entry into OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer.
NOTE TO EXAMINER:		**If the crew attempts to start FW-P-1B it will not reset from the control room.**
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
	URO	ENSURE no more than one RCP operating per loop. Two RCPs are secured. (Rotates extension control on CC to stop) (Normally RC-P-1B and RC-P-1C would be shut down) (RC-P-1A & 1B are in "A" loop, RC-P-1C & 1D are in "B" loop)
	ARO	INITIATE OP-TM-424-901, "Emergency Feedwater".
	URO	ENSURE announcement of reactor trip.

Op Test No.: 1 Scenario # 4 Event # 8 Page 29 of 31

Event Description: EF-P-2A Trips, Lack of Primary to Secondary Heat transfer

Time	Position	Applicant's Actions or Behavior
	URO	VERIFY both 1D and 1E 4160V buses are energized from auxiliary transformers.
	CRS	IAAT RCS pressure approaches 2450 psig (or 552 psig if < 329°F), and FEEDWATER is not available, then GO TO EOP 009 "HPI COOLING".
	CRS	If all of the following conditions are met: - A Condensate Booster Pump is On (CO-P-2 CL) - At least one RCP is On (RC-P-1 CC) - An OTSG is intact then PERFORM Attachment 1, "OTSG Feed Using a Condensate Booster Pump".
		Attachment 1, "OTSG Feed Using a Condensate Booster Pump".
	ARO	ENSURE CLOSED the following: • FW-V-16A (Depresses CLOSE PB on CC) • FW-V-16B (Depresses CLOSE PB on CC)
	ARO	MAINTAIN Tube to Shell Differential Temperature (TSDT) IAW Guide 14

Op Test No.: 1	Scenario # 4	Event # 8	Page 30 of 31
Event Description:	EF-P-2A Trips, Lack of Primary to Secondary Heat transfer		

Time	Position	Applicant's Actions or Behavior
CT-10 EXAMINER NOTE:		Opening FW-V-6 and depressurizing the OTSG to less than 600 psig to establish primary to secondary cooling is a critical task, failure to accomplish either this or HPI/PORV cooling and allowing the plant to heatup into a Loss of Subcooling would jeopardize fuel clad and should be considered failure to met the critical task. Primary to secondary cooling is preferred over HPI/PORV cooling due to: - More stable - Does not challenge RCS integrity - Does not fill the Reactor Building with RCS water
Critical Task (CT-10)	ARO	OPEN FW-V-6 (Depresses OPEN PB on CL)
	ARO	WAAT OTSG Pressure < 750 psig, then DEFEAT OTSG Lo-Lo Pressure MFW Isolation (Depresses both trains LO/LO pressure defeat)
	ARO	WAAT OTSG Press < 600 psig, then FEED IAW Rule 4, (Throttles FW-V-16A and FW-V-16B using toggle switches on CC)
		OP-TM-EOP-010 Rule 4
	ARO	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
Critical Task	ARO	THROTTLE MS-V-3's to MAINTAIN OTSG Press 500-600 psig (Controls MS-V-3s in hand using toggle switch)

Op Test No.: 1	Scenario # 4	Event # 8	Page 31 of 31
Event Description:	EF-P-2A Trips, Lack of Primary to Secondary Heat transfer		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**The scenario can be terminated when the OTSGs are being fed from the Condensate Booster Pump and OTSG pressure is being controlled between 500-600 psig.**
		TERMINATE the scenario.

Follow-up question highest event entered during scenario?

Answer: MS3, Automatic Reactor Trip and Manual Reactor Trip from Console Center were not successful as indicated by Reactor Power ≥5%.

Post submittal changes to scenario 5

Added information on critical task performance detail and failure criteria.
Underlined major actions that should be observed.
Added additional detail on what to observe.

Changes made post-validation:

1. Page 1, Changed "Full ICS Auto" to "ICS in Auto except ULD in Hand"
2. Page 1, changed I CRS and I ARO to C CRS and C ARO for event 1.
3. Page 1, Added "Tripping 'A' RPS" under event 2 description.
4. Page 1, changed I CRS and I CRO to C CRS and C CRO for event 3.
5. Page 1, changed C ARO to I ARO for event 5.
6. Page 2, edited Scenario details to include ULD in Hand (1st sentence).
7. Page 2 edited Scenario details to remove C RPS channel from the tech spec action and added a statement as to why C RPS does not make sense.
8. Page 3, added pass/fail criteria for critical tasks.
9. Page 5, added :

Malfunction HVB-6-11	Value: When:	ON Event 1	Cry Wolf Alarm

10. Page 6, changed severity of malfunction TH16A.
11. Page 6, added two additional commands:

Event Trigger #10	Event Action: ZDIADVBU==1 Command: DMF MS07A	Removes MS-V-4A Failure when ADV on B/U Loader
Event Trigger #11	Event Action: ZDICSAHE18A(2)==1 Command DMF HVB-6-11	Removes Fan Trip Alarm when AH-E-18A taken to OFF

12. Page 7, added:

	CRS/ARO	Diagnoses trip of AH-E-18A

13. Page 11, added:

NOTE TO EXAMINER:	**Tripping of the "C" RPS cabinet would also work, but would not be prudent in this scenario.**

14. Page 11, edited the following line to minimize confusion:

	CRS	Declares a one hour timeclock to trip "A" RPS to restore degree of redundancy to 1 with one out of two remaining, ("B" and "D" remain operable and if either cabinet trips, it will cause RPS actuation.)

15. Page 18, changed load rate of change setting from 1%/min to 3-5%/min per management expectations.

16. Page 18, added the following:

NOTE TO EXAMINER:	**The examinee may not perform actions on LO-P-8A/B as they are not "EP" required steps per Enclosure 2B.**

17. Page 20, added the following:

NOTE TO EXAMINER:	**Operator Aid #107 can be used to determine the approximate Feedwater Flow required. Additionally, the thumbrule of "FW should be ratioed approximately 70/30% with the higher flow in the loop with 2 RCP's" could be used.**

18. Page 20, edited the following line to include 5 stations:

	ARO	Places both Feedwater Loop masters in Hand. (Depresses HAND PB on CC/CR for each of 5 stations) 1) SG/Rx Master 2) Delta T 3) SG Feed Masters A&B 4) Diamond 5) Rx Master

19. Page 20, edited the following line for ΔTC:

	ARO	Raises flow to the A OTSG and lowers flow to the B OTSG to achieve a delta Tc of +/-5F. (Uses Toggles in raise/lower directions on FW LOOP MASTERS)

20. Page 22, added Guide 9 steps, with note that they are verification only.
21. Page 25, added the following:

	ARO	Transfers MS-V-4A/B to the Back-Up Loaders by depressing the Back-Up Loader Pushbutton.

22. Page 26, added Guide 9 title prior to steps.
23. Page 26 added:

	URO	VERIFY MU Tank Level < 96 inches.

Added step to RNO throttle MU-V-217 (Presses open PB on CC)

24. Page 27 added action taken on MU-V-3, underlined this action and the actions for Manual ES

Facility:	Three Mile Island	Scenario No.: 5	Op Test No.: NRC
Examiners:		Operators:	
Initial Conditions:	• (Temporary IC-58)		
	• 100% Power ICS in Auto except ULD in Hand		
	• MU-P-1B OOS for oil replacement (T.S. 3.5.7 - 30 day)		
	• RPS Channel C is in Manual Bypass due to NI-7 OOS		
	• 1303-5.5 Control Room Emergency Filtering System "A" Operational Test is 2 hours into the 10 hour run.		
Turnover:	Maintain 100% Power Operations		
Critical Tasks:	• Minimize SCM (CT-7)		
	• Initiate HPI (CT-2)		

Event No.	Malf. No.	Event Type*	Event Description
1	13A8S06-ZDISAHE 18A(4)	C CRS C ARO	AH-E-18A trips (TS)
2	NI21A	I CRS I ARO	NI-5 Total Power Summer Amp fails low causing a feedwater transient (TS) Tripping "A" RPS channel
3	MU07	C CRS C URO	RCP Seal Injection Control Valve Fails (MU-V-32)
4	MU19C	N CRS R URO N ARO	RC-P-1C #1 seal failure
5	ICK314B	I ARO	Feedwater fails to re-ratio
6	TC01	M CRS M URO M ARO	Turbine Trip/Reactor Trip
7	TH15A	C CRS C URO	OTSG Tube Rupture High
8	MS07A	C ARO	Atmospheric Dump Valve Fails Open
9	TH16A	M CRS M URO M ARO	OTSG Tube Rupture Middle
10	MU24C MU24D MU24E	C URO	MU-V-16A, MU-V-16B and MU-V-16C ES Alignment Failure

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

Three Mile Island NRC Scenario #5

The plant is at 100% power with the ICS in full automatic except for the ULD in Hand. MU-P-1B is out of service for an oil replacement. RPS Channel C is in Manual Bypass due to a failure of the NI-7 Power Range detector Power Supply. AH-E-18A is running for surveillance.

After the crew has accepted the watch the Lead Examiner can cue the failure of AH-E-18A. CRS will address Tech Spec 3.15.1, declaring a 7 day time clock. The ARO will be directed to restore normal control room ventilation IAW 1104-19, Normal Control Building Ventilation.

After the tech spec call is made and the ARO has restored ventilation the examiner can initiate the failure of NI-5. The NI-5 total power summer amp fails low causing a feedwater transient requiring the crew to reset Powdex Bypass Valve CO-V-51 IAW OP-TM-423-409, CO-V-51 Manual Operation. The CRS will declare NI-5 to be inoperable and address Tech Specs for two inoperable power range NIs (5 & 7) per Table 3.5-1. The CRS should determine that within one hour, A RPS channel must be placed in a tripped state to achieve the required degree of redundancy of ONE. The CRS should direct entry into OP-TM-641-421, Tripping and Resetting RPS Channels to trip the A RPS Channel (While tripping C RPS channel would also work, it would not make sense to in this scenario).

After the Tech Spec call has been made and CO-V-51 has been returned to auto, the Lead Examiner can cue the MU-V-32 Seal Injection Flow control failure. The URO will diagnose the reduction in seal injection flow using the annunciator alarms and console indications, and take Hand control of MU-V-32 and establish 32-40 gpm of flow IAW OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations. MU-V-32 will not be returned to auto during the scenario.

After Seal Injection flow has been re-established, the Lead Examiner can cue the Reactor Coolant Pump RC-P-1C #1 seal failure. The crew will diagnose the seal failure and reduce power to < 75% (reactivity manipulation) to secure RC-P-1C IAW OP-TM-AOP-040, RCP-#1 Seal Failure. When RC-P-1C is secured feedwater will not automatically re-ratio and the ARO will have to take manual control of the Feedwater Loop Masters IAW OP-TM-621-471, ICS Manual Operations. The ARO may have to pump down the RC Drain Tank due to the increase in flow from RC-P-1C.

When satisfied with the reactivity maneuver the Lead Examiner can cue the turbine trip. The reactor will trip as a result of the turbine trip and the CRS will initiate OP-TM-EOP-001, Reactor Trip. A 30 gpm tube leak will develop in the A OTSG post-trip and will be identified during the Symptom Check. The CRS will transition to OP-TM-EOP-005, OTSG Tube Leakage to mitigate the event.

After Atmospheric Dump Valve MS-V-4A opens post-trip it will stick open 5% and have to be closed locally IAW OP-TM-411-451, Manual Control of TBVs/ADVs, to stop the release from the A OTSG. If the valve is not discovered post-trip it will be identified when the OTSG is isolated IAW EOP-005.

Three Mile Island NRC Scenario #5 cont'd

After the plant has been stabilized and the CRS has implemented EOP-005, the Lead Examiner can cue the increase in the leak size. The crew will diagnose the larger leak and will have to initiate HPI to maintain Pressurizer level IAW OP-TM-EOP-010, Guide 9, RCS Inventory Control. MU-V-16A, MU-V-16B and MU-V-16C will have to be opened manually IAW OP-TM-211-901, Emergency Injection (HPI/LPI) Contingency Actions, to restore Pressurizer level since they fail to respond to the ESAS signal **(CT-2)**.

The Crew will also have to minimize SCM IAW OP-TM-EOP-010, Guide 8, RCS Pressure Control **(CT-7)**.

The scenario can be terminated when SCM is minimized and MS-V-4A is closed.

B&W Unit EOP Critical Task Description Document 47-1229003

CT-2 – Initiate HPI – Full HPI flow is required to provide subcooled RC for primary to secondary heat transfer. If the SGs are available for heat removal, then adding water to the RCS will replenish the heat transfer medium for primary to secondary heat transfer.

(CT-2) The URO will open MU-V-16A, MU-V-16B and MU-V-16C to restore Pressurizer level. The URO may have already opened these valves IAW OS-24, Conduct of Operations During Abnormal and Emergency Events, which allows taking manual action if an automatic operation fails to occur. Actions must be taken to establish HPI within 2 minutes of a Loss of Subcooled Margin for Tube leakage events per 1001E time critical tasks list, FSAR 14.2.2.4.

CT-7 – Minimize SCM – Except when RCP NPSH limits are applicable and are more restrictive, RCS pressure should be maintained close to, but above, the minimum SCM to minimize RCS-SG ΔP. The reason for minimizing RCS-SG ΔP is to reduce the leak flow rate from primary to secondary to as low as possible. Therefore, this procedure (minimizing SCM) is desirable whenever possible during SGTR mitigation.

(CT-7) HPI must be throttled to minimize SCM while maintaining margin > 30°F this minimizes primary to secondary leakage and reduces dose on the secondary side of the plant as well as minimizing release to the public. If HPI is allowed to raise OTSG pressure above 1000 psig after OTSG is full, a liquid RCS release to atmosphere would occur. Task failure would be to not throttle and challenge this.

Industry Experience

- Indian Point 2 (2/15/00) – Steam Generator Tube Failure (380 litres per minute)
- Palo Verde 2 (3/14/93) – Steam Generator Tube Leak ranged between 11 and 39 litres per day, suddenly turned to 900 litres per minute tube rupture.

PRA

- Steam Generator Tube Rupture (Initiating Event)

Event	Description	Procedure Support
	Initial Set-up.	Plant at 100% power MU-P-1B Tagged OOS RPS Channel C in Manual Bypass Protected Equipment signs on RPS Channels A, B, and D 1303-5.5 in progress signed off through 10 run start.
1	**AH-E-18A trip (TS)**	Tech Spec 3.15.1
		1303-5.5, to terminate surveillance
		1104-19, Normal Control Building Ventilation
2	**NI 5 total power summer amp fails low causing a feedwater transient (TS)**	Tech Spec Table 3.5-1
		OP-TM-641-421, Tripping and Resetting RPS Channels
		OP-TM-423-409, CO-V-51 Manual Operation
		OP-TM-MAP-H0302, SASS Mismatch
3	**RCP Seal Injection Control Valve Fails (MU-V-32)**	OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations
4	**RC-P-1C #1 seal failure**	OP-TM-AOP-040, RCP-#1 Seal Failure
		OP-TM-226-153, Shutdown RC-P-1C
5	**Feedwater fails to re-ratio**	OP-TM-621-471, ICS Manual Operations
6	**Turbine Trip/Reactor Trip**	OP-TM-EOP-001, Reactor Trip
7	**OTSG Tube Rupture High**	OP-TM-EOP-005, OTSG Tube Leakage
8	**Atmospheric Dump Valve Fails Open**	OP-TM-411-451, Manual Control of TBVs/ADVs
9	**OTSG Tube Rupture Middle**	OP-TM-EOP-005, OTSG Tube Leakage
		OP-TM-EOP-010, Guide 9, RCS Inventory Control
		OP-TM-EOP-010, Guide 8, RCS Pressure Control
10	**MU-V-16A, MU-V-16B and MU-V-16C ES Alignment Failure**	OP-TM-211-901, Emergency Injection (HPI/LPI)

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-16	100% Power MOC RPS Channel C in Manual Bypass Protected Equipment signs on RPS Channels A, B, and D 1303-5.5A signed off through 10 hour run	
Perform 1303-5.5A	Through step 8.1.17	
Start MU-P-1A	Place Control Switch in NAS	Scenario Support
Remote Function CCR12	Value: Insert NS When: Immediately	Scenario Support
Stop MU-P-1B	Value: Insert PTL When: Immediately	Scenario Support
MU-P-1B	Place EDT on MU-P-1B-1D Control Switch Place EDT on MU-P-1B-1E Control Switch	Scenario Support
Remote Function MUR21	Value: OUT When: Immediately	Scenario Support
Start IC-P-1B	Place Control Switch in NAS	Scenario Support
Stop IC-P-1A	Place Control Switch in NAT	Scenario Support
RPS Channel C	Place RPS Channel C in Manual Bypass	Scenario Support
NI-7 Detector Power Supply	Place NI-7 Detector Power Supply in RPS Cabinet C in OFF and apply and EDT tag	Scenario Support
Main Console	Robust Barriers applied IAW Risk Document	Scenario Support
Malfunction MU24C	Value: Insert When: Immediately	MU-V-16A ES Alignment Failure
Malfunction MU24D	Value: Insert When: Immediately	MU-V-16B ES Alignment Failure
Malfunction MU24E	Value: Insert When: Immediately	MU-V-16C ES Alignment Failure
Constant ICK314B in Monitor	Value: Insert Mon. 10.0 When: Immediately	FW flow fails to re-ratio **Reset to normal value of 0.01 after scenario is terminated.**
I/O Override 13A8S06-ZDISAHE18A(4)	Value: OFF When: Event 1	Control Bldg Fan AH-E-18A Trips
Malfunction HVB-6-11	Value: ON When: Event 1	Cry Wolf Alarm

Malfunction NI21A	Value: When:	Insert Event 2		NI 5 total power summer amp fails low
Malfunction MU07	Value: When:	Insert Event 3	Sev. 20% Ramp 120 sec	RCP Seal Injection Control Valve Fails (MU-V-32)
Malfunction MU19C	Value: When:	Insert Event 4	Sev. 9% Ramp 120 sec	RC-P-1C Seal Failure
Malfunction TC01	Value: When:	Insert Event 6		Turbine Trip
Malfunction TH15A	Value: When:	Insert Event 7	Sev. 0.15% ratpwr < 5%	OTSG Tube Rupture High
Malfunction MS07A	Value: When:	Insert Event 8 msvmsv4a > 0.5%	Sev. 5%	Atmospheric Dump Valve Fails Open
Malfunction TH16A	Value: When:	Insert Event 9	Sev. 4.9% Ramp 120 sec.	OTSG Tube Rupture Middle
Event Trigger #10	Event Action: ZDIADVBU==1 Command: DMF MS07A			Removes MS-V-4A Failure when ADV on B/U Loader
Event Trigger #11	Event Action: ZDICSAHE18A(2)==1 Command DMF HVB-6-11			Removes Fan Trip Alarm when AH-E-18A taken to OFF

Op Test No.: 1	Scenario # 5	Event # 1	Page 7 of 32
Event Description:	AH-E-18A Trips		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 1.**
Indications Available:		**Alarm HVB-6-11 will actuate, AH-E-18A RED running light will be OUT and the GREEN OFF light will be illuminated, AH-E-19A RED running light will be OUT and the GREEN OFF light will be illuminated.**
	CRS/ARO	Diagnoses trip of AH-E-18A
	CRS	Directs entry into HVB-6-11, H&V System Motor Trip
		HVB-6-11, H&V System Motor Trip
	ARO	SHUTDOWN in service train and START standby train IAW 1104-19, Control Building Ventilation System.
		1104-19, Control Building Ventilation System Section 3.7.2
	ARO	Make a Plant Page Announcement ATTENTION Plant Personnel, Starting Control Building Ventilation, use caution when opening or closing Control Building doors due to the potential for high differential pressures to exist.
	ARO	VERIFY that fire alarms are clear for Control Tower and AIT on Panels H&V A/B and PL A/B.
	ARO	START AH-E-19A(B).(At H&V Panel rotates Extension Control to START and holds for RED light.)
	ARO	START AH-E-17A(B). (At H&V Panel rotates Extension Control to START and holds for RED light.)
	ARO	VERIFY AH-E-95A(B) automatically start (Lights center section of H&V Panel)

Op Test No.: 1 Scenario # 5 Event # 1 Page 8 of 32

Event Description: AH-E-18A Trips

Time	Position	Applicant's Actions or Behavior
	ARO	DEPRESS AND HOLD "AH-D-28/617 RESET PB" on H&V PANEL AND START AH-E-20A OR AH-E-20B.
	ARO	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	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	START AH-E-21 from the Control Tower 4th floor Library.
ICO report fan started (not modeled)		
	ARO	SECURE AH-E-90 and 91 fans from FH Bldg. 305 if running. N/A this step if not required. (Calls for NLO to Stop)
	ARO	START AH-E-26 from FH Bldg. 305. (Calls for NLO to Start)
ICO report fan started (not modeled)		
	CRS	Reviews T.S. 3.15.1, Emergency Control Room Air Treatment System
		3.1 5.1.1 Except as specified in Specification 3.1 5.1.3 below, both emergency treatment systems, AH-E-18A fan and associated filter AH-F3A and AH-E-18B fan and associated filter AH-F3B shall be operable at all times, per the requirements of Specification 3.15.1.2 below when containment integrity is required and when irradiated fuel handling operations are in progress.

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Event Description: AH-E-18A Trips

Time	Position	Applicant's Actions or Behavior
		3.15.1.3 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, reactor operation or irradiated fuel handling operations are permissible only during the succeeding 7 days provided the redundant system is verified to be OPERABLE.
	CRS	Declares a 7 day timeclock.
NOTE TO EXAMINER:		**After the TS call has been made GO TO Event 2.**

Op Test No.: 1	Scenario # 5	Event # 2	Page 10 of 32
Event Description:	NI-5 Total Power Summer amp fails low causing a Feedwater Transient		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 2.**
Indications Available:		**Alarm PLB-5-8 Powdex Trouble actuates, CO-V-51 ΔP indication is zero on CL, MAP Annunciators H-3-2 SASS MISMATCH, H-2-1 ICS IN TRACK, H-1-4 NEUTRON X-LIMIT TO FW, H-2-5 FW X-LIMIT TO RX, N-1-7 POWDEX DP HIGH actuate, SASS actuation indication for NI-5 and NI-6 on CC.**
	CRS	Directs entry into OP-TM-MAP-H0302, SASS Mismatch
		OP-TM-MAP-H0302, SASS Mismatch
	URO	Verifies plant stability.
	URO	DETERMINE which input is bad (NI-5)
	URO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
	CRS	The CRS will declare NI-5 to be inoperable and will review Tech Spec 3.5.1
		TS 3.5.1.1
		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.
		TS 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.

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Event Description: NI-5 Total Power Summer amp fails low causing a Feedwater Transient

Time	Position	Applicant's Actions or Behavior
	CRS	Determines that the minimum degree of redundancy for Power Range Channels is not met for Column B.
		TS Table 3.5-1 Requirements
		Power range instrument channel:
		Column (A) Minimum Operable Channels 2 Column (B) Minimum Degree of Redundancy 1 Column (C) Operator Action if Conditions of Column A and B Cannot be Met – (a)
		TS Table 3.5-1 Action Required (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.
NOTE TO EXAMINER:		**Tripping of the "C" RPS cabinet would also work, but would not be prudent in this scenario.**
	CRS	Declares a one hour timeclock to trip "A" RPS to restore degree of redundancy to 1 with one out of two remaining, ("B" and "D" remain operable and if either cabinet trips, it will cause RPS actuation.)
	CRS	Directs entry into OP-TM-641-421, Tripping and Resetting RPS Channels.
		OP-TM-641-421, Tripping and Resetting RPS Channels.
	CRS	VERIFY RPS will be in compliance with Tech. Spec. 3.5.1 following actions of this procedure.

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Event Description: NI-5 Total Power Summer amp fails low causing a Feedwater Transient

Time	Position	Applicant's Actions or Behavior
	CRS	VERIFY Shift Management concurrence to trip RPS channel.
	ARO	VERIFY RPS channels B, C, D are Reset (not tripped).
	ARO	ENSURE channel A is not in Manual Bypass
	ARO	PLACE Contact Monitor Test module switch to TEST OPERATE in RPS Cabinet A. (Rotates switch to test operate)
	ARO	VERIFY Alarm MAP G-1-2 RPS Channel Trip In.
	ARO	VERIFY Reactor Trip module (RTM) TEST TRIP lamp Bright in RPS Cabinet A.
	ARO	VERIFY respective RTM Protective Subsystem lamp Bright in RPS Cabinet A.
	ARO	PLACE Contact Monitor Test module switch to OPERATE in RPS Cabinet A.
	ARO	LOG tripped RPS channel(s) in Control Room logbook.
	CRS	Exits the one hour Tech Spec timeclock due to adequate degree of redundancy.
BOOTH OPERATOR:		**As AO at Powdex report back to the control room that the Powdex System High Pressure Drop and High Pressure Drop Open Bypass alarms were actuated along with the High conductivity alarms. All alarms did reset.**
	ARO	Diagnoses CO-V-51 is open based on DP and local Powdex alarms.

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Event Description: NI-5 Total Power Summer amp fails low causing a Feedwater Transient

Time	Position	Applicant's Actions or Behavior
	CRS	Directs the ARO to return CO-V-51 to auto IAW OP-TM-423-409, CO-V-51 Manual Operation.
		OP-TM-423-409.
	ARO	If CO-V-51 has tripped open on high ΔP, then GO TO Step 5.5.
	ARO	ALIGN CO-V-51-EX1 as follows: (At CO-V-51 controller CR) 1. SELECT MAN. 2. SELECT POS DEM. 3. ADJUST Δ knob until demand is 100%.
BOOTH OPERATOR:		**Set REMOTE FUNCTION FWR40 to RESET when directed by the ARO to PRESS CO-V-51-EX7, CO-V-51 Release PB, at Powdex Panel.**
	ARO	Directs the AO at Powdex to PRESS CO-V-51-EX7, CO-V-51 Release PB, at Powdex Panel.
	ARO	Slowly CLOSE CO-V-51 using Δ knob while monitoring system ΔP until one of the following occurs: - CO-V-51 is fully closed - System ΔP reaches 30 psid
	ARO	SELECT SET PT on CO-V-51-EX1.
	ARO	ENSURE CO-V-51 setpoint is set at 50% (35 psid).
	ARO	SELECT AUTO on CO-V-51-EX1.
	ARO	SELECT ΔP on CO-V-51-EX1 to monitor system ΔP.

Op Test No.: 1	Scenario # 5	Event # 2	Page 14 of 32
Event Description:	NI-5 Total Power Summer amp fails low causing a Feedwater Transient		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**After the TS call has been made and CO-V-51 has been returned to auto GO TO Event 3.**

Op Test No.: 1	Scenario # 5	Event # 3	Page 15 of 32
Event Description:	RCP Seal Injection Control Valve Fails partially closed		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 3.**
Indications Available:		**MAP Annunciators F-1-5 RCP SEAL TO INJECT FLOW HI/LO, F-1-6, RCP PUMP LAB SEAL DP LOW actuate, MU-V-32 controller indicates 20% demand, Total Seal Injection flow indicates low on CC.**
	URO	Diagnoses the reduction in RCP Seal Injection flow based on console indications and MAP Annunciators.
	CRS	Directs entry into OP-TM-MAP-F0105, RCP SEAL TOT INJECT FLOW HI/LO.
NOTE TO EXAMINER:		**The CRS may direct the URO to place MU-V-32 in Hand IAW Annunciator OP-TM-MAP-F0106, RCP Lab Seal DP Low, which does not require initiating OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations.**
		OP-TM-MAP-F0105, RCP SEAL TOT INJECT FLOW HI/LO
	CRS	Directs the URO to PLACE MU-V-32 Controller in manual IAW OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations and ESTABLISH correct flow.
		OP-TM-211-476, Seal Injection Control – MU-V-32 Console Operations
	URO	VERIFY all prerequisites have been met.
	URO	MONITOR current Seal Injection Flow (MU42-FI1)(CC).
	URO	PLACE MU-V-32 (CC) in HAND by pressing White HAND PB and PERFORM the following: • VERIFY White HAND light is Lit on (CC). • MAINTAIN Seal Injection Flow (MU42-FI1)(CC) 36 to 40 gpm using toggle switch (CC).

Op Test No.: 1	Scenario # 5	Event # 3	Page 16 of 32
Event Description:	RCP Seal Injection Control Valve Fails partially closed		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**After Seal Injection flow has been returned to the normal band GO TO Event 4.**

Op Test No.: 1 Scenario # 5 Event # 4, 5 Page 17 of 32

Event Description: RC-P-1C Seal Failure, FW Flow fails to re-ratio

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**MAP Annunciator F-1-3 RCP SEAL #1 LEAK OFF FLOW HI/LO actuates, RC-P-1C Seal Leak Off flow indicates 6.2 gpm on the recorder on PC and on the computer.**
	URO	Diagnoses the failure of RC-P-1C #1 seal based on seal leak off flow indication.
	CRS	Directs entry into OP-TM-AOP-040, RCP #1 Seal Failure
		OP-TM-AOP-040, RCP #1 Seal Failure
	CRS	Determines the entry conditions for AOP-040 are met: RC Pump #1 seal leakoff flow > 6 gpm on any RCP and thermal barrier cooling or seal injection is in service.
	URO	MAXIMIZE seal injection flow not to exceed 60 gpm.
	CRS	INITIATE a power reduction using 1102-4 to within the appropriate limits (Reactor and MWe) based on shutdown of the RCP:

✓	# RCPs Left Running	Rx Power Limit (%)	MWe
	3	< 75	< 665
	1/loop	< 49	< 445
	0 in any loop	0	0

	CRS	Initiates 1102-4, Power Operation for the power reduction.
		1102-4, Power Operation
	CRS	Initiates Enclosure 2A

Op Test No.: 1	Scenario # 5	Event # 4, 5	Page 18 of 32
Event Description:	RC-P-1C Seal Failure, FW Flow fails to re-ratio		

Time	Position	Applicant's Actions or Behavior
	URO	If SG/REACTOR DEMAND is in AUTO, then REDUCE reactor power as follows: • ENSURE ULD is in HAND. • SET ULD LOAD RATE OF CHANGE to rate determined by CRS for Forced power reductions. (3-5% per Operations Management expectations) • SET ULD Target Load Demand to desired setpoint.
	CRS	PERFORM the actions per Enclosure 2B.
NOTE TO EXAMINER:		**The examinee may not perform actions on LO-P-8A/B as they are not "EP" required steps per Enclosure 2B.**
	ARO	Prior to FW-U-1B speed < 4000 RPM start LO-P-8B (rotates extension control on CL)
	ARO	Prior to FW-U-1A speed < 4000 RPM start LO-P-8A (rotates extension control on CL)
	ARO	Prior to reactor power < 75% • PLACE FW-P-1A in HAND IAW OP-TM-401-472 • PLACE FW-P-1B in HAND IAW OP-TM-401-473 (Placed in HAND by depressing HAND PB for each on CL)
		OP-TM-AOP-040
	CRS	When power (Reactor and Turbine) is within limits to support RCP shutdown, then PERFORM the following to shutdown affected RCP: OP-TM-226-153 (C RCP)
		OP-TM-226-153, Shutdown RC-P-1C

Op Test No.: 1 Scenario # 5 Event # 4, 5 Page 19 of 32

Event Description: RC-P-1C Seal Failure, FW Flow fails to re-ratio

Time	Position	Applicant's Actions or Behavior
	CRS	VERIFY Reactor Power < the following for the final RCP Combination: • 2 / 1 RCP Combination - < 75% NI Power
	CRS	VERIFY Turbine Load < the following for the final RCP Combination: • 2 / 1 RCP Combination - < 665 MWE
PROCEDURE NOTE:		**A 2 / 1 RCP combination with OTSG levels LLLs will require a re-ratio (approx. 70% / 30%) of Feedwater flow to A / B OTSG.**
	CRS	If Reactor power is > 20%, then EVALUATE expected FW Flow requirements for new RCP combination, to minimize effects on Delta Tc.
	URO	PLACE at least one each of the following in Normal-After-Start: • RC-P-2C-1, Oil Lift Pump AC HP (CC), • or RC-P-2C-2, Oil Lift Pump DC HP (CC) • RC-P-3C-1, Backstop Oil Pump #1 (CC), • or RC-P-3C-2, Backstop Oil Pump #2 (CC)
	URO	PLACE RC-P-1C in Pull-To-Lock. (on CC)
	URO	VERIFY the following: RC-P-1C not rotating backwards (PPC L2877, RC-P-1C Reverse Rotation not in alarm).
	URO	PLACE the following in Pull-To-Lock: • RC-P-3C-2, Backstop Oil Pump #2 • RC-P-3C-1, Backstop Oil Pump #1

Op Test No.: 1 Scenario # 5 Event # 4, 5 Page 20 of 32

Event Description: RC-P-1C Seal Failure, FW Flow fails to re-ratio

Time	Position	Applicant's Actions or Behavior
	URO	PLACE the following in Pull-To-Lock: • RC-P-2C-2, Oil Lift Pump DC HP • RC-P-2C-1, Oil Lift Pump AC HP
		OP-TM-AOP-040, Step 3.5
	URO	When affected RCP stops rotating, then promptly CLOSE the following for affected RCP: MU-V-33C (Depresses CLOSE PB on CC)
NOTE TO EXAMINER:		**Operator Aid #107 can be used to determine the approximate Feedwater Flow required. Additionally, the thumbrule of "FW should be ratioed approximately 70/30% with the higher flow in the loop with 2 RCP's" could be used.**
	ARO	Diagnoses that Feedwater flow does not re-ratio based on delta Tc and loop feedwater flows.
	CRS	Directs the ARO to place Feedwater in Hand IAW OP-TM-621-471 and adjust feedwater flow.
	ARO	Places both Feedwater Loop masters in Hand. (Depresses HAND PB on CC/CR for each of 5 stations) 1) SG/Rx Master 2) Delta T 3) SG Feed Masters A&B 4) Diamond 5) Rx Master
	ARO	Raises flow to the A OTSG and lowers flow to the B OTSG to achieve a delta Tc of +/-5F. (Uses Toggles in raise/lower directions on FW LOOP MASTERS)

Op Test No.: 1	Scenario # 5	Event # 4, 5	Page 21 of 32
Event Description:	RC-P-1C Seal Failure, FW Flow fails to re-ratio		

Time	Position	Applicant's Actions or Behavior
NOTE TO EXAMINER:		**When the plant is stable with Feedwater Flow re-ratioed GO TO Event 6.**

Op Test No.: 1	Scenario # 5	Event # 6, 7, 8	Page 22 of 32
Event Description:	Turbine/Reactor Trip OTSG Tube Leak, Atmospheric Dump Valve fails open		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 6 and ENSURE Event 8 actuates.**
Indications Available:		**Control rods insert, Reactor Power <5%, Turbine Trip indication, RM-A-5 and RM-A-15 Condenser Offgas monitors rising, RM-G-26 MS LINE SG A rising, MAP Annunciators G-1-1 REACTOR TRIP, K-1-1 TURBINE TRIP, C-1-1 Radiation level High, Console indication for MS-V-4A indicating the valve open.**
	URO	Diagnoses the reactor has tripped based on rod position indications and reactor power lowering, and the Reactor Trip Annunciator actuated.
	CRS	Directs entry into OP-TM-EOP-001, Reactor Trip.
		OP-TM-EOP-001, Reactor Trip, IMAs
	URO	PRESS both Reactor Trip and DSS pushbuttons. (CC)
	URO	PRESS Turbine Trip pushbutton. (CL)
	URO	VERIFY the turbine stop valves are Closed. (CL DTCS screen)
	ARO	Performs a Symptom Check and diagnoses an OTSG tube leak exists. (As indicated on RMS PRF)
	ARO	IAAT a symptom exists, then GO TO the symptom response procedure using the following priority: • EOP-005, "OTSG Tube Leakage".
	CRS	Directs entry into OP-TM-EOP-005, OTSG Tube Leakage.
		OP-TM-EOP-005, OTSG Tube Leakage.

Op Test No.: 1 Scenario # 5 Event # 6, 7, 8 Page 23 of 32

Event Description: Turbine/Reactor Trip OTSG Tube Leak, Atmospheric Dump Valve fails open

Time	Position	Applicant's Actions or Behavior
	CRS	NOTIFY "Shift Dose Assessor" to begin offsite dose assessment.
	ARO	ANNOUNCE OTSG TUBE LEAK.
	URO	INITIATE Guide 9, "RCS Inventory Control".
Note MU-V-17 should operate in automatic, guide 9 steps are all verification of conditions		
		Guide 9, RCS Inventory Control
	URO	VERIFY MU Tank Level > 55 inches and ESAS HPI is not actuated
	URO	VERIFY MU Tank Level < 96 inches.
	URO	VERIFY MU pump is operating.
	URO	VERIFY MU-V-5 is Closed.
	URO	VERIFY MU24-FI > 20 gpm
	URO	ENSURE MU-V-17 is Open
	URO	VERIFY PZR level is being restored.
	URO	VERIFY MU24-FI > 20 gpm
	URO	VERIFY PZR level is being restored.
	URO	VERIFY PZR level is being restored.

Op Test No.: 1 Scenario # 5 Event # 6, 7, 8 Page 24 of 32

Event Description: Turbine/Reactor Trip OTSG Tube Leak, Atmospheric Dump Valve fails open

Time	Position	Applicant's Actions or Behavior
	ARO	Contacts an AO to INITIATE the following procedures to start <u>both</u> Auxiliary Boilers: • OP-TM-414-401, "Starting AS-B-1A". • OP-TM-414-402, "Starting AS-B-1B".
	CRS	VERIFY the reactor is critical.
		RNO: GO TO step 3.10
	CRS	REQUEST SM to Evaluate Emergency Action Levels • NOTIFY Power Team • NOTIFY TSO • NOTIFY NDO.
	CRS	<u>IDENTIFY the affected OTSG:</u> • OTSG A
	ARO	Dispatches an operator to Place the Handwheel, of MS-V-13A, in the CLOSED position.
	CRS	Directs the ARO to INITIATE Attachment 2, "Radiological Controls".
	CRS	VERIFY the reactor is critical.
		RNO: GO TO step 3.26
	ARO	ENSURE announcement of reactor trip.
NOTE TO EXAMINER:		**If MS-V-4A has not been discovered to be open by this**

Op Test No.: 1	Scenario # 5	Event # 6, 7, 8	Page 25 of 32
Event Description:	Turbine/Reactor Trip OTSG Tube Leak, Atmospheric Dump Valve fails open		

Time	Position	Applicant's Actions or Behavior
		point the AO sent to check the MSSVs will report steam coming from one of the MS-V-4 tailpipes.
BOOTH OPERATOR:		**Check the position of MS-V-4A on MONITOR or the RNI screen. One minute after being dispatched to check the MSSVs report that they are closed; however there is steam coming from one of the MS-V-4 tailpipes if MS-V-4A has not been previously closed.**
NOTE TO EXAMINER:		**The crew may direct the AO to close MS-V-15A to isolate the leaking/stuck open MS-V-4A.**
	ARO	Transfers MS-V-4A/B to the Back-Up Loaders by depressing the Back-Up Loader Pushbutton.
	ARO	DISPATCH an Operator to check MSSV status.
NOTE TO EXAMINER:		**After the MSSV status has been reported GO TO Event 9**

Op Test No.: 1	Scenario # 5	Event # 9,10	Page 26 of 32
Event Description:	OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 9.**
Indications Available:		**RCS pressure reducing, Pressurizer level going down. OTSG A level rising.**
	URO	Diagnoses the increase in RCS leak rate and implements OP-TM-EOP-010, Guide 9 RCS Inventory Control actions.
		Guide 9, RCS Inventory Control
	URO	VERIFY MU Tank Level > 55 inches and ESAS HPI is <u>not</u> actuated.
		RNO: <u>OPEN MU-V-14A or MU-V-14B (Depresses OPEN PB on CC)</u>
	URO	VERIFY MU Tank Level < 96 inches.
	URO	VERIFY MU pump is operating.
	URO	VERIFY MU-V-5 is Closed.
	URO	VERIFY MU24-FI > 20 gpm
	URO	ENSURE MU-V-17 is Open.
	URO	VERIFY PZR level is being restored.
		RNO: THROTTLE MU-V-217 (Presses OPEN P.B. on CC)
	URO	VERIFY MU24-FI > 20 gpm
	URO	VERIFY PZR level is being restored.
		RNO:

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Event Description: OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation

Time	Position	Applicant's Actions or Behavior
		CLOSE MU-V-3 (Presses P.B. on CC)
	URO	VERIFY PZR level is being restored.
		RNO: INITIATE HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI".
		OP-TM-211-901, "Emergency Injection HPI/LPI".
	URO	VERIFY a valid automatic actuation has occurred or a manual actuation of HPI is required.
	URO	If ESAS Train A "Load Seq Block 4" lights (PCR) are not BLUE, then PRESS "Manual ES Actuation" "1600 PSIG RC PRESS" (Train A CC).
NOTE TO EXAMINER:		**The URO will initiate the B Train of HPI before going to the Contingency Actions for MU-V-16A and MU-V-16C.**
	URO	If any of the components on Attachment 7.1 are not in the required condition, then INITIATE Section 4.2
	URO	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).
	URO	If any of the components on Attachment 7.2 are not in the required condition, then INITIATE Section 4.2
		Section 4.2 Contingency Actions, Step 4.2.4
	URO	If any of the following did not Open • MU-V-16A • MU-V-16B • MU-V-16C

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Event Description: OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation

Time	Position	Applicant's Actions or Behavior
		• MU-V-16D then perform the following to ensure flow through all four HPI nozzles:
NOTE TO EXAMINER:		**(CT-2) The URO will open MU-V-16A, MU-V-16B and MU-V-16C to restore Pressurizer level. The URO may have already opened these valves IAW OS-24, Conduct of Operations During Abnormal and Emergency Events, which allows taking manual action if an automatic operation fails to occur. Actions must be taken to establish HPI within 2 minutes of a Loss of Subcooled Margin for Tube leakage events per 1001E time critical tasks list, FSAR 14.2.2.4.**
CRITICAL TASK (CT-2)	URO	If two ES selected MU pumps are operating, then ENSURE one of the following pairs of valves are Open: (Depresses OPEN PB for MU-V-16A, B, C as required to obtain at least one of the combinations below) (N/A steps not performed) A. MU-V-16A and MU-V-16B B. MU-V-16A and MU-V-16D C. MU-V-16B and MU-V-16C D. MU-V-16C and MU-V-16D
		OP-TM-EOP-005
	CRS	IAAT OTSG A (B) pressure approaches, or is greater than 1000 psig, then perform the following:
	ARO	ENSURE MS-V-2A (MS-V-2B) is Open. (Visual verification CC)
	ARO	OPEN MS-V-3D, E, F (MS-V-3A, B, C) to maintain OTSG pressure < 1000 psig. (Depresses HAND PB on controlled and toggles open valves)
	ARO	IAAT OTSG level is rising due to tube leakage in an

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Event Description: OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation

Time	Position	Applicant's Actions or Behavior
		AVAILABLE OTSG, then preferentially STEAM to maintain OTSG level < 85%.
NOTE TO EXAMINER:		**OTSG isolation criteria should not be challenged prior to RCS pressure being reduced to <1000 psig.**
	CRS	IAAT OTSG isolation criteria may be challenged prior to reducing RCS pressure < 1000 psig, then perform the following: • INITIATE RCS cooldown to 500°F at a rate within RCS inventory control capability and < 240 °F/hr. • ENSURE RC-V-2 is Open. • CYCLE the PORV to reduce SCM to approximately 30 °F.
	URO	MINIMIZE SCM IAW Guide 8, "RCS Pressure Control".
Examiner Note:		(CT-7) HPI must be throttled to minimize SCM while maintaining margin > 30°F this minimizes primary to secondary leakage and reduces dose on the secondary side of the plant as well as minimizing release to the public. If HPI is allowed to raise OTSG pressure above 1000 psig after OTSG is full, a liquid RCS release to atmosphere would occur. Task failure would be to not throttle and challenge this.
CRITICAL TASK (CT-7)		OP-TM-EOP-010, Guide 8, "RCS Pressure Control"
	URO	ENSURE HPI/LPI is throttled per Rule 2.
	URO	Bypasses ESAS signals on CC and CR
	URO	Throttles HPI IAW OP-TM-211-901 Attachment 7.3
	URO	Verifies ESAS bypassed

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Event Description: OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation

Time	Position	Applicant's Actions or Behavior
	URO	IAAT three MU pumps are running **and** CRS concurrence is obtained, **then SHUTDOWN** the ES selected pump lined up to MU &SI **and PLACE** Control Switch in Normal-After-Stop. (Rotates extension control MU-P-1A to STOP CC)
	URO	**Verify** throttling is permitted IAW RULE 2 **and OBTAIN** CRS concurrence.
	URO	**WAAT** HPI throttling is permitted IAW RULE 2 **and** prior to reducing any MU pump flow to less than 115 GPM, **then** perform the following: 1. **If** DH-V-7A **or** DH-V-7B are Closed, **then OPEN** MU-V-36 **and** MU-V-37. (Depresses OPEN PB prior to reducing any pump flow <115 gpm CC)
	URO	**WAAT** Emergency Boration is **not** required (Rule 5), **then INITIATE** Guide 9 to close MU-V-14A and MU-V-14B.
	URO	**IAAT** CRS directs "termination" of HPI, **then** A. **SHUTDOWN the** MU pumps which started on ES **and PLACE** Control Switch in Normal-After-Stop. B. **CLOSE** both MU-V-16 valves lined up to MU/SI pump. C. **CLOSE** both MU-V-16 valves opposite MU/SI pump. D. **GO TO** Step 10
	URO	**CLOSE** MU-V-16 valves to establish flow through one valve on each train and retain HPI flow through four RCS nozzles (e.g. MU-V-16A and MU-V-16D)
	URO	**THROTTLE** the open MU-V-16 opposite of MU and SI.
	URO	**If** two MU pumps are operating, **then when** flow is reduced to one MU-V-16,

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Event Description: OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation

Time	Position	Applicant's Actions or Behavior
		1. **If** both pumps are ES selected **then SHUTDOWN** pump opposite MU & SI **and PLACE** Control Switch in Normal-After-Stop. (e.g. , normally NA) 2. **If** two MU pumps are operating, **then SHUTDOWN** the ES selected pump **and PLACE** Control Switch in Normal-After-Stop. (e.g., normally MU-P-1C)
	URO	**When** OP-TM-244-901 criteria is satisfied, **then OPEN** MU-V-18
	URO	**If** MU-V-36 or mu-V-37 is Closed, **then ENSURE** MU or SI flow >40 GPM.
	URO	**THROTTLE** MU-V-16 parallel to MU and SI (i.e., normally MU-V-16B)
	URO	If RCS Temp is rising, then NOTIFY CRS.
	URO	ENSURE Przr Heaters are OFF.
	URO	VERIFY an RCP is ON (visual confirmation of RED light CC)
	URO	ENSURE RC-V-3 is Open (Visual confirmation OPEN light CC)
	URO	THROTTLE OPEN RC-V-1 (Depresses OPEN PB on CC)
	URO	When desired press is achieved, then CLOSE RC-V-1 (Depresses and holds CLOSE PB on CC)
NOTE TO EXAMINER:		**When SCM has been minimized the scenario can be terminated.**
		TERMINATE the scenario.

Op Test No.: 1	Scenario # 5	Event # 9,10	Page 32 of 32
Event Description:	OTSG Tube Rupture, MU-V-16A and MU-V-16C do not open on ESAS actuation		
Time	Position	Applicant's Actions or Behavior	

Follow-up question highest event entered during scenario?

Answer: FS1 2.d.1, Steam Generator Tube Rupture that requires/results in an ESAS actuation and;

FS1 3.d.1, Primary-to-Secondary leakrate >10 gpm with UNISOLABLE steam release from affected S/G to the environment.