Facility:	TMI Unit 1	Task No.:	OF1000005
Task Title:	Verify watch standing requirements – Work-hour Rules	JPM No.:	TMI 2015 NRC JPM RO A1-1
K/A Reference:	2.1.5 (2.9)	Modified Bank JPM	

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 a shift Reactor Operator.
- It is currently 1700 on Week 5, Day 7 of the current shift cycle.
- You were on vacation for Weeks 3 and 4 of the current shift cycle.
- Plant is at power.
- PQS is not available.
- To help fill empty spots for the next shift cycle, you have been asked to stand overtime watches.
- All shifts are 12 hours.

Task Standard:

- All critical steps evaluated as SAT.

Required Materials:

- LS-AA-119, Fatigue Management and Work Hour Limits, Rev. 11
- Calculator

General References:

- LS-AA-119, Fatigue Management and Work Hour Limits, Rev. 11

Handouts:

- A shift cycle with requested overtime days (Attachment 1)
- LS-AA-119, Fatigue Management and Work Hour Limits, Rev. 11

Initiating Cue: Review the shift schedule and determine whether you are able to stand the requested additional watches and give the reason(s) if there are any that you cannot stand.

Time Critical Task: N/A

Validation Time: 10 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

EVALUATOR CUE: **Provide Attachment 1.**

LS-AA-119, Step 5.1.1

Performance Step: 1 Determine whether the examinee can stand watch as requested on Week 1, Day 1.

√ **Standard:** Examinee determines that he/she **cannot** stand the requested watch on **Week 1, Day 1** as that would be 7 days in a row at 12 hours/day, for a total of 84 hours.

- No more than 72 work hours in any 7-day (168-hour) period.

Comment:

EVALUATOR NOTE: **IAW LS-AA-119, the averaging period is the duration over which the 54-hour average is calculated and may be consistent with standard shift schedules but may not be greater than 6 weeks.**

LS-AA-119, Step 5.1.2

Performance Step: 2 Determine whether the examinee can stand watch as requested on Week 2, Day 6.

√ **Standard:** Examinee determines that he/she **can** stand the requested watch on **Week 2, Day 6** as it does not violate any of the following limits:

- No more than 16 work hours in any 24-hour period.
- No more than 26 work hours in any 48-hour period.
- No more than 72 work hours in any 7-day (168-hour) period.
- A covered individual's required Maximum Average Work Hours is a weekly maximum average of 54 hours worked, calculated based on a rolling averaging period of up to 6 weeks.

Comment:

LS-AA-119, Step 5.1.1

Performance Step: 3 Determine whether the examinee can stand watch as requested on Week 5, Day 1

√ **Standard:** Examinee determines that he/she **cannot** stand the requested watch on **Week 5, Day 1** as that would be >16 hours in a row.

- No more than 16 work hours in any 24-hour period.

Comment:

Terminating Cue: **When examinee has determined whether they can or cannot stand any of the 3 requested watches, JPM may be terminated.**

ANSWER KEY

DO NOT HAND TO STUDENTS

DAY	CAN STAND WATCH (YES OR NO)	REASON WHY (IF NO IN PREVIOUS COLUMN)
MONDAY, WEEK 1, NEXT CYCLE	NO	It would be more than 72 work hours in a 7-day (168-hour) period.
SATURDAY, WEEK 2, NEXT CYCLE	YES	No Work-Hour limits will be violated.
MONDAY 1, WEEK 5, NEXT CYCLE	NO	It would be more than 16 work hours in a 24-hour period.

ANSWER KEY

DO NOT HAND TO STUDENTS

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM RO A1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are a shift Reactor Operator.
- It is currently 1700 on Week 5, Day 7 of the current shift cycle.
- You were on vacation for Weeks 3 and 4 of the current shift cycle.
- Plant is at power.
- PQS is not available.
- To help fill empty spots for the next shift cycle, you have been asked to stand overtime watches.
- All shifts are 12 hours.

INITIATING CUE: Review the shift schedule and determine whether you are able to stand the requested additional watches and give the reason(s) if there any that you cannot stand.

TIME CRITICAL: No

DAY	CAN STAND WATCH (YES OR NO)	REASON WHY (IF NO IN PREVIOUS COLUMN)
MONDAY, WEEK 1, NEXT CYCLE		
SATURDAY, WEEK 2, NEXT CYCLE		
MONDAY 1, WEEK 5, NEXT CYCLE		

Attachment 1
Shift Cycle with Requested Overtime Days

	WEEK 5, CURRENT CYCLE							WEEK 1, NEXT CYCLE						
	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
Your Shift		**D(1)**	**D(1)**	D	D	D	D	**D(2)**	T	T	T	T		

	WEEK 2, NEXT CYCLE							WEEK 3, NEXT CYCLE						
	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
Your Shift	N	N	N			**D(2)**		D	D	D	D	D	D	

	WEEK 4, NEXT CYCLE							WEEK 5, NEXT CYCLE						
	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN
Your Shift				V	V	N	N	**D(2)**			D	D	D	D

Key:

D= Day shift
N= Night shift
T = Training
V = Vacation
(1)= Requested additional watches already stood
(2)= Requested additional watches

Facility:	Three Mile Island	Task No.:	62201020-02
Task Title:	Given a dropped rod at power, calculate SDM.	JPM No.:	2015 TMI NRC JPM RO A1-2
K/A Reference:	2.1.25 3.9 / 4.2		Modified Bank JPM

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:

- Reactor Power is 75%, steady state for 2 weeks.
- Dropped Rod in Group 6, fully inserted.
- Boron Depletion Correction Factor .99.
- Cycle Burnup 375 EFPD.
- Boron Concentration 1020 ppmB.
- No Reactor Engineers are available.
- PPC is unavailable.
- Tave is 532F.

Task Standard: All critical steps evaluated as SAT.

Required Materials: OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Rev 4
OP-TM-300-000, Reactivity and Power Distribution Calculations, Rev 5

General References: OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Rev 4
OP-TM-300-000, Reactivity and Power Distribution Calculations, Rev 5
OP-TM-300-401, Inoperable Rod Worth, Rev 1

Initiating Cue: CRS directs the calculation of shutdown margin using OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions.

Time Critical Task: N/A

Validation Time: 25 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

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

Performance Step: 1

Prerequisites:

- VERIFY all data sources (OP-TM-300-000 attachments, Reactivity Datasheet, AREVA Physics Data Manual) are for the current fuel cycle.
- VERIFY RCS TAVE is ≥ 530°F.

Standard: Verifies the prerequisites.

Comment:

PROCEDURE NOTE: **OP-TM-300-000, Flowchart 2 may be consulted for additional insight into Shutdown Margin determination and suggested actions.**

A Shutdown Margin of > 1% Δk/k must be maintained at all times (T.S. 3.5.2.1). Verification that Shutdown Margin is > 1% Δk/k does not imply that the reactor is subcritical by > 1% Δk/k.

The qualitative assessment verifies that the Shutdown Margin is >1% Δk/k, but does not provide a numerical value for Shutdown Margin.

The quantitative assessment determines a numerical value for Shutdown Margin.

OP-TM-300-205, Step 4.1

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

4.1.1 If a qualitative assessment of Shutdown Margin is desired, then DETERMINE Shutdown Margin IAW Section 4.2.

4.1.2 If a quantitative assessment of Shutdown Margin is desired, then DETERMINE Shutdown Margin IAW Section 4.3.

Standard: Examinee determines that a quantitative assessment is desired and goes to Section 4.3

Comment:

OP-TM-300-205, Step 4.3.1

Performance Step: 3 PERFORM calculation IAW Attachment 7.3 and instructions in Attachment 7.4 or DTSQA-approved software.

Standard: Examinee goes to Attachment 7.3

Comment:

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

OP-TM-300-205, Attachment 7.3, Step 1.0

Performance Step: 4 CALCULATION FOR A SDM AT:

DATE _____ TIME _____

Standard: Current date and time are recorded.

Comment:

EVALUATOR NOTE: **Step 1.1, Tave, is already filled in.**

OP-TM-300-205, Attachment 7.3, Step 1.2

Performance Step: 5 Record Cycle Burnup.

Standard: Examinee obtains data from initial conditions and records 375 EFPD on Line 1.2 of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.a

Performance Step: 6 Record Measured Boron Concentration.

Standard: Examinee obtains data from initial conditions and records 1020 ppmB on Line 1.3.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.b

Performance Step: 7 Record Boron Depletion Correction Factor.

Standard: Examinee obtains data from initial conditions and records 0.99 on Line 1.3.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.c

Performance Step: 8 Calculate Corrected Boron Concentration.

√ **Standard:** Examinee multiplies 1020 times 0.99 and records between 1009.5 ppmB and 1010 ppmB on Line 1.3.c of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.4

Performance Step: 9 Determine Fuel Excess Reactivity from Figure 1.

√ **Standard:** Examinee interprets Figure 1 and records between +5.4% Δk/k and +5.6% Δk/k on Line 1.4 of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.5.a

Performance Step: 10 Determine HZP Inverse Boron Worth from Figure 8.

√ **Standard:** Examinee interprets Figure 8 and records between 138.5 ppmB/%Δk/k and 139.5 ppmB/%Δk/k on Line 1.5.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.5.b

Performance Step: 11 Calculate Boron Worth.

√ **Standard:** Examinee divides 1.3.c by 1.5, multiplies by (-1) and records between -7.2% Δk/k and -7.3 % Δk/k on Line 1.5.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.6

Performance Step: 12 Record Xenon Reactivity Worth.

√ **Standard:** Examinee interprets Figure 12 and records between -2.15% Δk/k and -2.25% Δk/k on Line 1.6 of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.7.a

Performance Step: 13 Record time since last shutdown.

Standard: Examinee determines that the reactor is not shutdown from initial conditions and records 0 (or N/A) on Line 1.7.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.7.b

Performance Step: 14 Record Samarium and Plutonium Buildup Reactivity Worth from Figure 15.

√ **Standard:** Examinee determines that the reactor is not shutdown from initial conditions, interprets Step 7 of Attachment 7.4, and records 0% Δk/k on Line 1.7.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.8.a

Performance Step: 15 Record number of known Inoperable Control Rods.

Standard: Examinee determines that there are no inoperable rods that are not fully inserted from initial conditions and records 0 on Line 1.8.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.8.b

Performance Step: 16 Record Total Inoperable Rod Worth.

Standard: Examinee determines that there are no inoperable rods that are not fully inserted from initial conditions, interprets Step 8 of Attachment 7.4, and records 0% Δk/k on Line 1.8.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.9

Performance Step: 17 Calculate Shutdown Margin.

√ **Standard:** Examinee adds lines 1.4, 1.5.b, 1.6, 1.7.b, and 1.8.b and records between -3.75% Δk/k and -4.15% Δk/k on Line 1.9 of Attachment 7.3.

Comment:

PROCEDURE NOTE: **Verification of shutdown margin more negative than –1% Δk/k does not imply 1% Δk/k subcriticality.**

OP-TM-300-205, Attachment 7.3, Step 2.1

Performance Step: 18 Shutdown margin is verified to be more negative than –1% Δk/k. (Circle one) Yes / No

Standard: Examinee determines that Line 1.9 is more negative than –1% Δk/k and circles Yes on Line 2.1 of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 2.2

Performance Step: 19 If Shutdown Margin is not more negative than –1% Δk/k, then TAKE action to satisfy T.S. 3.5.2.1 and 3.5.2.5

Standard: Examinee determines that Line 1.9 is more negative than –1% Δk/k and therefore the step is N/A.

Comment:

Performance Step: 20 CALCULATED BY_____ DATE/TIME_____

Standard: Signs Attachment 7.3 and adds the current date and time.

Comment:

Terminating Cue: **After Attachment 7.3 is signed, dated and time recorded: Evaluation on this JPM is complete.**

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

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ATTACHMENT 7.3
Shutdown Margin at Hot Shutdown Calculation Data Sheet
Page 1 of 1

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

1.0 CALCULATION FOR A SDM AT: DATE Filled in TIME Filled in

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) 532 °F
2. CYCLE BURNUP 375 EFPD
3. a. MEASURED BORON CONCENTRATION 1020 ppmB
   b. BORON DEPLETION CORRECTION FACTOR 0.99
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
   c. CORRECTED BORON CONCENTRATION (3a x 3b) 1009.5 - 1010 ppmB
4. EXCESS REACTIVITY (FIG. 1) 5.4 - 5.6 % Δk/k
5. BORON REACTIVITY WORTH
   5a. HZP Inverse Boron Worth (FIG. 8) 138.5-139.5 ppmB/%Δk/k
   5b. Boron Worth (3c ÷5a) x (-1) -7.2 - -7.3 % Δk/k
6. XENON REACTIVITY WORTH (PPC, Reactor Engr, FIG. 12) -2.15 - -2.25 % Δk/k
7. SAMARIUM AND PLUTONIUM BUILDUP REACTIVITY WORTH (FIG. 15)
   7a. If shutdown: Time since last shutdown 0 HRS
   7b. Reactivity due to samarium and plutonium buildup 0 % Δk/k
8. INOPERABLE CONTROL RODS THAT ARE NOT FULLY INSERTED
   8a. No. of known inoperable rods (>0%WD) 0
   8b. Total inoperable rod worth (CP-TM-300-401) 0 % Δk/k
   (In addition to the stuck rod as required by T.S. included in Line 5)
9. SHUTDOWN MARGIN (4 + 5b +6 + 7b + 8b) -3.75 - -4.15 % Δk/k

CAUTION

Verification of shutdown margin more negative than –1% Δk/k does **not** imply 1% Δk/k subcriticality.

2.0 ACCEPTANCE CRITERIA

1. Shutdown margin is verified to be more negative than –1% Δk/k. (Circle one) Yes / No
2. If Shutdown Margin is **not** more negative than –1% Δk/k, **then** TAKE action to satisfy T.S. 3.5.2.1 and 3.5.2.5

CALCULATED BY *Filled in* DATE/TIME Filled in

APPROVED BY (SRO) _____ DATE/TIME _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2015 TMI NRC JPM RO A1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Reactor Power is 75%, steady state for 2 weeks.
- Dropped Rod in Group 6, fully inserted.
- Boron Depletion Correction Factor .99.
- Cycle Burnup 375 EFPD.
- Boron Concentration 1020 ppmB.
- No Reactor Engineers are available.
- PPC is unavailable.
- Tave is 532F.

INITIATING CUE: CRS directs the calculation of shutdown margin using OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions.

Time Critical: No

Facility:	TMI – Unit 1	Task No.:	22601001
Task Title:	ICCW Station Print Read	JPM No.:	2015 TMI NRC JPM RO A2
K/A Reference:	2.2.41 (3.5)	New JPM	

Examinee: NRC Examiner:

Facility Examiner: 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:

- **Time = 0 minutes:**
  - The plant is operating at 100% power.
  - A moderate earthquake occurs and the following damage results:
    - An Instrument Air leak has occurred downstream of IA-V-826. The leak has been isolated from upstream components by closing IA-V-826.
    - The 69 Selector Switch for IC-V-4 has failed to the "Emergency" position
    - Many fuses have blown throughout the plant, including both IC2/3A fuses and FU-IC4/3A.
- **Time = 4 minutes:**
  - Another moderate earthquake occurs and the following damage results:
    - An Intermediate Closed Cooling Water (ICCW) System leak occurs. MAP C-3-2 is in alarm and ICCW Surge Tank level is 7 inches and lowering.
- **Time = 5 minutes:**
  - A major earthquake occurs and the following damage results:
    - An RCS LOCA occurs; RCS Pressure is 1550# and lowering slowly.
    - IC-V-2 has become mechanically bound after 60% of its travel.
- **Time = 10 minutes (current time):**
  - Conditions are as follows:
    - RCS Pressure is 1475 psig and steady
    - RCS Temperature is 450F and lowering very slowly.
    - IC-V-6 did NOT receive an ES signal.

Task Standard:

- Determine status of Intermediate Closed Cooling Water Containment Isolation Valves given various faults.

Required Materials:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3

General References:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3

Handouts:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3

Initiating Cue: Using the prints provided, determine the positions of the valves listed in the table below and the reason for that position.

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with an asterisk)

Start Time _____

EXAMINER CUE:

Hand Examinee the following:

- **Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks**
- **Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks**
- **Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA**
- **Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB**
- **Print 208-499, Intermediate Cooling Isolation Valve IC-V-2**
- **Print 209-077, Intermediate Cooling Isolation Valve IC-V-3**
- **Print 209-078, Intermediate Cooling Isolation Valve IC-V-4**
- **Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74**
- **Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users**
- **Print 302-620, Intermediate Cooling Flow Diagram**
- **Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3**

Performance Step: 1 Determine Line Break Isolation logic.

Standard:

- Using Print 209-532, examinee determines from the initial conditions that a 1600# ES has occurred. Therefore, any combination of 2/3 ES channels will allow a complete path for current to flow, energizing 74X3/RCA□4D.
- Using Print 209-542, examinee determines that since ICCW Surge Tank level is low, the associated contact closes, allowing for a complete path for current to flow, energizing 63X2/-. The associated 63X2/- contact closes and the associated 74X3/RCA□4D closes, allowing for a complete path for current to flow, energizing 63Z2/-□4A.
- Using prints 209-632 and 209-642, a similar logic is made up for the "B" Train, ending ultimately in the energizing of 63Z2/-□5B.

Comment:

Performance Step: 2 Determine status of IC-V-2 and reason why.

Standard:

- Using Print 208-499:
  - Examinee determines from the initial conditions that IC-V-2 became mechanically bound at 40% open.
  - Therefore, the status of IC-V-2 is OPEN (or THROTTLED OPEN).

Comment:

Performance Step: 3 Determine status of IC-V-3 and reason why.

√ **Standard:**

- Using Print 209-077:
  - Examinee determines from the initial conditions that fuses FU-IC2/3A have blown. As a result, a complete path for current to flow does NOT exist to energize the closing coil.
  - Therefore, the status of IC-V-3 is OPEN.

Comment:

Performance Step: 4 Determine status of IC-V-4 and reason why.

√ **Standard:**

- Using Print 209-078:
  - Examinee determines from the initial conditions that the 69 Selector Switch is in Emergency, therefore all of the 69 contacts have swapped from their normal positions. As a result, a complete path for current to flow does NOT exist to energize the closing coil
  - Therefore, the status of IC-V-4 is OPEN.

Comment:

Performance Step: 5 Determine status of IC-V-6 and reason why.

√ **Standard:**

- Using Print 302-279:
  - Examinee determines from the initial conditions that an Instrument Air leak has occurred downstream of IA-V-826. Although the leak has been isolated from upstream components by closing IA-V-826, the air supply for IC-V-6 has bled off. IC-V-6 fails closed on a loss of Instrument Air.
  - Therefore, the status of IC-V-6 is CLOSED.

Comment:

Performance Step: 6 Determine status of IC-V-74 and reason why.

Standard:

- Using Print 208-499:
  - Examinee determines from the initial conditions that since IC-V-2 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 209-077:
  - Examinee determines from the initial conditions that since IC-V-3 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 209-078:
  - Examinee determines from the initial conditions that since IC-V-4 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 302-279:
  - Examinee determines from the initial conditions that since IC-V-6 has gone 95% closed, it will close the contact associated with IC-V-74. However, the contacts for IC-V-4 and IC-V-6 are in series to energize the opening coil for IC-V-74.
- Therefore, the status of IC-V-74 is CLOSED.

√

Comment:

Terminating Cue: **When the examinee has addressed the status of all five valves, JPM may be terminated.**

STOP TIME: _____

ANSWER KEY

DO NOT HAND TO STUDENTS

Valve ID	Position	Reason
IC-V-2	OPEN (or THROTTLED OPEN)	MECHANICAL BINDING
IC-V-3	OPEN	BLOWN FUSES
IC-V-4	OPEN	69 SELECTOR SWITCH IS IN EMERGENCY
IC-V-6	CLOSED	LOSS OF INSTRUMENT AIR
IC-V-74	CLOSED	NO OPEN SIGNAL RECEIVED

ANSWER KEY

DO NOT HAND TO STUDENTS

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2015 TMI NRC JPM RO A2

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:

- **Time = 0 minutes:**
  - The plant is operating at 100% power.
  - A moderate earthquake occurs and the following damage results:
    - An Instrument Air leak has occurred downstream of IA-V-826. The leak has been isolated from upstream components by closing IA-V-826.
    - The 69 Selector Switch for IC-V-4 has failed to the "Emergency" position
    - Many fuses have blown throughout the plant, including both IC2/3A fuses and FU-IC4/3A.
- **Time = 4 minutes:**
  - Another moderate earthquake occurs and the following damage results:
    - An Intermediate Closed Cooling Water (ICCW) System leak occurs. MAP C-3-2 is in alarm and ICCW Surge Tank level is 7 inches and lowering.
- **Time = 5 minutes:**
  - A major earthquake occurs and the following damage results:
    - An RCS LOCA occurs; RCS Pressure is 1550# and lowering slowly.
    - IC-V-2 has become mechanically bound after 60% of its travel.
- **Time = 10 minutes (current time):**
  - Conditions are as follows:
    - RCS Pressure is 1475 psig and steady
    - RCS Temperature is 450F and lowering very slowly.
    - IC-V-6 did NOT receive an ES signal.

INITIATING CUE: Using the prints provided, determine the positions of the valves listed in the table below and the reason for that position.

TIME CRITICAL: No

Valve Identification	Position	Reason
IC-V-2		
IC-V-3		
IC-V-4		
IC-V-6		
IC-V-74		

Facility:	TMI Unit 1	Task No.:	EPAA101007
Task Title:	Perform State and Local Event Notification	JPM No.:	TMI 2015 NRC JPM RO A4
K/A Reference:	G2.4.43 (3.2/3.8)	Modified Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- You are the third Reactor Operator on shift.
- I will act as the Shift Manager/Shift Emergency Director.
- An Alert, HA4, was declared at Three Mile Island Unit 1 at 1300 hours on after an explosion occurred which resulted in reported visible damage to the BWST.
- The BWST is not leaking.
- Neither the TSC nor the EOF are staffed.
- It is currently 1303 hours.

Task Standard: All critical steps evaluated as SAT.

Required Materials:

- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 21
- EP-MA-114-100-F-01, State/Local Event Notification Form, Rev O

General References:

- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 21
- EP-MA-114-100-F-01, State/Local Event Notification Form, Rev O

Handouts:

- EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 21, filled out through Step 4.1.16.
- EP-MA-114-100-F-01, State/Local Event Notification Form, Rev O filled out IAW EP-MA-114-100 with the following exceptions:
  - 1. Do not fill out the "Utility Message No" line
  - 2. Do not sign on the "Emergency Director Approval" line

Initiating Cue: As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the alert, HA4, IAW EP-MA-114-100, Mid-Atlantic State/Local Notifications.

Time Critical Task: Yes

Validation Time: 10 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____ TIME CRITICAL START TIME: Same as Start Time

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

EVALUTAOR CUE: **Provide EP-MA-114-100, Mid-Atlantic State/Local Notifications, Rev 21, filled out through Step 4.1.16 and EP-MA-114-100-F-01, filled out with the errors stated in the Handout section.**

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

EP-MA-114-100, Step 4.2.1.1

Performance Step: 1 When provided with the completed notification form, the designated communicator shall:

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

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

Comment:

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

EP-MA-114-100, Step 4.2.1.2

Performance Step: 2 Verify "Emergency Director Approval" signature has been entered on the top of the form.

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

Comment:

EP-MA-114-100, Step 4.2.1.3

Performance Step: 3 Review form for completeness and identify any missing information (incomplete blocks) to:

Control Room → Shift Manager (Shift Emergency Director)

TSC → TSC Director

EOF → EOF Director

Standard: Examinee reviews the form and verifies completeness.

Comment:

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

EP-MA-114-100, Step 4.2.2

Performance Step: 4 Select the outgoing line for the appropriate station and confirm dial tone on NARS line.

√ **Standard:** Examinee selects the NARS labeled telephone.

Comment:

EVALUATOR CUE: **If the examinee dials the correct number ("44"), state the following: "You hear people answer the phone".**

EP-MA-114-100, Step 4.2.3

Performance Step: 5 Dial the appropriate code (CAN No.) listed for the affected station at the top of Roll Call Box on the State/Local Event Notification Form (for EP-MA-114-100-F-01).

√ **Standard:** Examinee dials "44"

Comment:

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

EVALUATOR NOTE: **Step 4.2.3.1 is N/A.**

EP-MA-114-100, Step 4.2.4

Performance Step: 6 Repeat the following message while allowing agencies to come on line:

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

After approximately 10 to 15 seconds, read the following message:

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

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

Examinee, after approximately 10 to 15 seconds, states "This is the Exelon Nuclear TMI-1. Please standby to receive a notification message and respond as the roll is called."

Comment:

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

EP-MA-114-100, Step 4.2.5.1

Performance Step: 7 Conduct an Initial Roll Call for the agencies listed on Page 3 of the State/Local Event Notification Form.

- Record the time (in 24-hour clock) as each required party responds to the roll call.

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

√ Examinee correctly records the time contacted in 24 hour clock time on page 3 of the S&L Notification form in the appropriate block for each agency.

Comment:

EVALUATOR NOTE: **Steps 4.2.5.2 and 4.2.5.3 are N/A.**

EP-MA-114-100, Step 4.2.5.4

Performance Step: 8 Enter the time (in 24-hour clock) that initial roll call was completed at the bottom of the roll call box.

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

Comment:

EP-MA-114-100, Step 4.2.6

Performance Step: 9 Read blocks one at a time from the approved notification form.

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

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

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

Comment:

EVALUATOR CUE: **When the examinee asks if there are any questions, state "there are no questions".**

EP-MA-114-100, Step 4.2.7.1

Performance Step: 10 Conduct the final roll call for each agency listed on the back of the Event Notification Form, and check them off as they respond to the final roll call.

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

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

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

Comment:

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

TIME CRITICAL STOP TIME: _____

EVALUATOR NOTE: **Step 4.2.7.2 is N/A.**

EP-MA-114-100, Step 4.2.8

Performance Step: 11 To end the call, read the following:
- "This concludes the notification message."

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

Comment:

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

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

_____ - _____ = _____ **Minutes**

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM RO A4

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the third Reactor Operator on shift.
- I will act as the Shift Manager/Shift Emergency Director.
- An Alert, HA4, was declared at Three Mile Island Unit 1 at 1300 hours on after an explosion occurred which resulted in reported visible damage to the BWST.
- The BWST is not leaking.
- Neither the TSC nor the EOF are staffed.
- It is currently 1303 hours.

INITIATING CUE: As the Emergency Director I am assigning you the task to perform the State and Local Notifications of the declaration of the alert, HA4, IAW EP-MA-114-100, Mid-Atlantic State/Local Notifications.

TIME CRITICAL: Yes

Facility:	Three Mile Island	Task No.:	OF1000005
Task Title:	Maintain Minimum Shift Staffing, Control Overtime	JPM No.:	TMI 2015 NRC JPM SRO A1-1
K/A Reference:	2.1.5 (3.9)	Modified Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- You are the Control Room Supervisor.
- I will act as all other personnel.
- Plant is at 100% power.
- The time is 2300 on the Exam Date.
- The shift Scheduler is unavailable.
- The shift is staffed as follows:
    - SRO 1 – Shift Manager
    - You – CRS (not STA qualified)
    - SRO 3 – STA
    - RO 1 – URO
    - RO 2 – ARO
    - RO 3 – C&T RO
- The Shift Technical Advisor (STA), SRO 3, reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located, so he is going to get a pair of old prescription glasses from his locker.
- No other SRO's are currently at the station.

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

Required Materials:
- OP-TM-112-101-1002, Shift Staffing Requirements, Rev. 8
- Tech Spec 6.2.2 and Table 6.2-1, Amendment 219
- LS-AA-119, Overtime Controls, Rev. 11
- LMS Qual Matrix Report (Attachment #1)
- Prepared Overtime List (Attachment #2)
- A disconnected phone for simulation

General References:
- Technical Specifications

Handout:
- OP-TM-112-101-1002, Shift Staffing Requirements, Rev. 8
- LS-AA-119, Overtime Controls, Rev. 11
- LMS Qual Matrix Report (Attachment #1)
- Prepared Overtime List (Attachment #2)

Initiating Cue: You are to perform the steps necessary to ensure your shift is properly staffed. A phone is provided for any calls, if required.

Time Critical Task: N/A

Validation Time: 7 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **Provide Examinee with OP-TM-112-101-1002, LS-AA-119, Shift Staffing Report, LMS Qual Matrix Report, and Overtime list.**

Performance Step: 1 Examinee references Technical Specifications and/or OP-TM-112-101-1002 to determine minimum shift staffing requirements for current conditions.

Standard: Examinee determines from OP-TM-112-101-1002, Section 4.1, that three SROs are required.

Examinee determines that due to the prescription being old, the STA cannot be considered one of the shift SRO's.

√ Examinee determines that a call out must be made to get shift staffing back to allowable numbers.

Comment:

EVALUATOR NOTE: **Tech Specs allow for, except for Shift Manager, that shift crew composition may be one 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.**

Performance Step: 2 Examinee initiates action to comply with Technical Specification requirements for three licensed SROs.

Standard: Action initiated by referring to Overtime list

Comment:

Performance Step: 3 Examinee seeks a replacement for the third licensed SRO position left vacant by the inability of the STA to meet requirements for the job.

Standard: Examinee references the Overtime Callout list to identify a replacement SRO to be called.

Comment:

EVALUATOR CUE: **Once it is decided that someone must be called in, direct the examinee to use Attachment #2 in the order of personnel listed.**

EVALUATOR CUE: **If examinee calls Miscavage to report to work, answer that you are on your way.**

EVALUATOR NOTE: **If examinee tells Miscavage to report to work, the JPM is completed UNSAT due to Miscavage not being qualified.**

Performance Step: 4 Examinee references the provided materials to evaluate the STA watchstanding ability of Miscavage.

√ **Standard:** Examinee skips Miscavage as he is inactive per the LMS Qual Matrix Report.

Comment:

Evaluator's Cue: **If examinee calls Johnson to report to work, answer "I just had three beers at a friend's house. If you need me though, I'll come in as soon as I can"**

EVALUATOR NOTE: **If examinee tells Johnson to report to work, the JPM is completed UNSAT due to Johnson not being Fit for Duty.**

Performance Step: 5 Examinee references the provided materials to evaluate the STA watchstanding ability of Johnson.

√ **Standard:** Examinee initially informs Johnson to report to work immediately, then acknowledges alcohol consumption and informs Johnson NOT to report at this time due to Fit For Duty concerns.

Comment:

Evaluator's Cue: **If examinee calls Adams to report to work, answer "This is my one day off in the past seven days since I validated NRC exams in the simulator yesterday. If you need me though, I'll come in as soon as I can"**

EVALUATOR NOTE: **If examinee tells Adams to report to work, the JPM is completed UNSAT due to Adams violating Work Hour Rule limitations.**

Performance Step: 6 Examinee references the provided materials to evaluate the STA watchstanding ability of Adams.

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

Comment:

Evaluator's Cue: **If examinee calls Shuff to report to work, answer "I am making a self-declaration of fatigue and do not wish to report to work".**

EVALUATOR NOTE: **If examinee tells Shuff to report to work, the JPM is completed UNSAT due to Shuff being not Fit for Duty.**

Performance Step: 7 Examinee references the provided materials to evaluate the STA watchstanding ability of Shuff.

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

Comment:

EVALUATOR CUE: **If examinee calls Lewis to report to work, answer that you are on your way.**

EVALUATOR NOTE: **If examinee calls Lewis to report to work, the JPM is completed UNSAT due to Lewis not being qualified,**

Performance Step: 8 Examinee references the provided materials to evaluate the STA watchstanding ability of Lewis.

√ **Standard:** Examinee skips Lewis as he is inactive per the LMS Qual Matrix Report.

Comment:

Evaluator's Cue: **If examinee calls Harris to report to work, answer "I am on vacation due to my wife having surgery tomorrow afternoon. If you need me though, I'll come in as soon as I can"**

√ **Performance Step: 9** Examinee references the provided materials to evaluate the STA watchstanding ability of Harris.

Standard: Examinee informs Harris to report to work immediately.

Comment:

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

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM SRO A1-1

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are the Control Room Supervisor.
- I will act as all other personnel.
- Plant is at 100% power.
- The time is 2300 on the Exam Date.
- The shift Scheduler is unavailable.
- The shift is staffed as follows:
    - SRO 1 – Shift Manager
    - You – CRS (not STA qualified)
    - SRO 3 – STA
    - RO 1 – URO
    - RO 2 – ARO
    - RO 3 – C&T RO
- The Shift Technical Advisor (STA), SRO 3, reports that his contact lenses have popped out and are lost. He reminds you that he has a license restriction that requires him to wear corrective lenses. His backup eyeglasses are missing and cannot be located, so he is going to get a pair of old prescription glasses from his locker.
- No other SRO's are currently at the station.

INITIATING CUE:

You are to perform the steps necessary to ensure your shift is properly staffed. A phone is provided for any calls, if required.

Attachment #1

LMS Qual Matrix Report
Date: Exam Date 1:15:00 AM

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

Qualification ID	Qualification Title	Qualification Parent	Johnson, E	Brady, R	Brown, F	Williams, D	Bracke, A	DeSantis, N	Goodlavage, T	Miscavage, B	Kulasinsky, J	Lewis, D	Harty, M	Shuff, J	Harris, R	Price, W	Adams, M	Smith, C	Favorito, N	Valent, J	Smith, B	Yockey, G
N-TM-OP-STA QUAL	TMI STA: SHIFT QUALIFIED	Root Qual	Y	N	N	N	Y	Y	N	N	O	N	Y	Y	O	O	O	O	O	N	Y	N

Attachment #2

OVERTIME CALLOUT FOR Ops Shift Schedule
STARTING AT (Exam Date) 17:30:00 AND ENDING AT (Exam Date +1) 06:00:00
SRO # 2 STA QUALIFICATION Shift Technical Advisor
REPORT CREATION DATE exam date 23:00:00
NOTES:

Crew	Currently Working Shift	Name Phone	OT Hours	Accept	Refuse	Comments
Day	None	Miscavage, B	0			
Day	None	Johnson, E	0			
Day	None	Adams, M	0			
Day	None	Shuff, J	0			
Day	None	Lewis, D	0			
Day	None	Harris, R	0			

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

Facility:	Three Mile Island	Task No.:	62201020-02
Task Title:	Given a Dropped Rod at Power, Review Submitted SDM for Approval.	JPM No.:	2015 TMI NRC JPM SRO A1-2
K/A Reference:	2.1.25 3.9 / 4.2		Modified Bank JPM

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:

- Reactor Power is 20%, steady state for 2 weeks.
- Dropped Rod in Group 6, fully inserted.
- Boron Depletion Correction Factor .89.
- Cycle Burnup 200 EFPD.
- Boron Concentration 870 ppmB.
- No Reactor Engineers are available.
- PPC is unavailable.
- Tave is 532F.

Task Standard: All critical steps evaluated as SAT.

Required Materials: OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Rev 4
OP-TM-300-000, Reactivity and Power Distribution Calculations, Rev 5

General References: OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Rev 4
OP-TM-300-000, Reactivity and Power Distribution Calculations, Rev 5
OP-TM-300-401, Inoperable Rod Worth, Rev 1

Initiating Cue:	As the CRS, review for approval the OP-TM-300-205 calculation of shutdown margin. If there are errors or actions, document any found. If additional actions / restrictions are needed, summarize at the bottom of this cue sheet.
Time Critical Task:	N/A
Validation Time:	25 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

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

Performance Step: 1

Prerequisites:

- VERIFY all data sources (OP-TM-300-000 attachments, Reactivity Datasheet, AREVA Physics Data Manual) are for the current fuel cycle.
- VERIFY RCS TAVE is ≥ 530°F.

Standard: Verifies the prerequisites.

Comment:

PROCEDURE NOTE: **OP-TM-300-000, Flowchart 2 may be consulted for additional insight into Shutdown Margin determination and suggested actions.**

A Shutdown Margin of > 1% Δk/k must be maintained at all times (T.S. 3.5.2.1). Verification that Shutdown Margin is > 1% Δk/k does not imply that the reactor is subcritical by > 1% Δk/k.

The qualitative assessment verifies that the Shutdown Margin is >1% Δk/k, but does not provide a numerical value for Shutdown Margin.

The quantitative assessment determines a numerical value for Shutdown Margin.

OP-TM-300-205, Step 4.1

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

4.1.1 If a qualitative assessment of Shutdown Margin is desired, then DETERMINE Shutdown Margin IAW Section 4.2.

4.1.2 If a quantitative assessment of Shutdown Margin is desired, then DETERMINE Shutdown Margin IAW Section 4.3.

Standard: Examinee determines that a quantitative assessment is desired and goes to Section 4.3

Comment:

OP-TM-300-205, Step 4.3.1

Performance Step: 3 PERFORM calculation IAW Attachment 7.3 and instructions in Attachment 7.4 or DTSQA-approved software.

Standard: Examinee goes to Attachment 7.3

Comment:

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

OP-TM-300-205, Attachment 7.3, Step 1.0

Performance Step: 4 CALCULATION FOR A SDM AT:

DATE _____ TIME _____

Standard: Current date and time are recorded.

Comment:

EVALUATOR NOTE: **Step 1.1, Tave, is already filled in.**

OP-TM-300-205, Attachment 7.3, Step 1.2

Performance Step: 5 Record Cycle Burnup.

Standard: Examinee obtains data from initial conditions and verifies 200 EFPD on Line 1.2 of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.a

Performance Step: 6 Record Measured Boron Concentration.

Standard: Examinee obtains data from initial conditions and verifies 870 ppmB on Line 1.3.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.b

Performance Step: 7 Record Boron Depletion Correction Factor.

Standard: Examinee obtains data from initial conditions and verifies 0.89 on Line 1.3.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.3.c

Performance Step: 8 Calculate Corrected Boron Concentration.

√ **Standard:** Examinee multiplies 870 times 0.89 and verifies between 774 ppmB and 775 ppmB on Line 1.3.c of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.4

Performance Step: 9 Determine Fuel Excess Reactivity from Figure 1.

√ **Standard:** Examinee interprets Figure 1 and records between +7.6% Δk/k and +7.8% Δk/k on Line 1.4 of Attachment 7.3.

√ Examinee recognizes error with the RO calculation.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.5.a

Performance Step: 10 Determine HZP Inverse Boron Worth from Figure 8.

√ **Standard:** Examinee interprets Figure 8 and verifies between 147.1 ppmB/%Δk/k and 147.5 ppmB/%Δk/k on Line 1.5.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.5.b

Performance Step: 11 Calculate Boron Worth.

√ **Standard:** Examinee divides 1.3.c by 1.5, multiplies by (-1) and verifies between -5.2% Δk/k and -5.3 % Δk/k on Line 1.5.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.6

Performance Step: 12 Record Xenon Reactivity Worth.

√ **Standard:** Examinee interprets Figure 12 and records between -1.01% Δk/k and -1.08% Δk/k on Line 1.6 of Attachment 7.3.

√ Examinee recognizes error with the RO calculation.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.7.a

Performance Step: 13 Record time since last shutdown.

Standard: Examinee determines that the reactor is not shutdown from initial conditions and verifies 0 (or N/A) on Line 1.7.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.7.b

Performance Step: 14 Record Samarium and Plutonium Buildup Reactivity Worth from Figure 15.

Standard: Examinee determines that the reactor is not shutdown from initial conditions, interprets Step 7 of Attachment 7.4, and verifies 0% $\Delta k/k$ on Line 1.7.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.8.a

Performance Step: 15 Record number of known Inoperable Control Rods.

Standard: Examinee determines that there are no inoperable rods that are not fully inserted from initial conditions and verifies 0 on Line 1.8.a of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.8.b

Performance Step: 16 Record Total Inoperable Rod Worth.

Standard: Examinee determines that there are no inoperable rods that are not fully inserted from initial conditions, interprets Step 8 of Attachment 7.4, and verifies 0% Δk/k on Line 1.8.b of Attachment 7.3.

Comment:

OP-TM-300-205, Attachment 7.3, Step 1.9

Performance Step: 17 Calculate Shutdown Margin.

√ **Standard:** Examinee adds lines 1.4, 1.5.b, 1.6, 1.7.b, and 1.8.b and records between +1.22% Δk/k and +1.6% Δk/k on Line 1.9 of Attachment 7.3.

Error with the RO calculation (Error Carried Forward)

Comment:

PROCEDURE NOTE: **Verification of shutdown margin more negative than –1% Δk/k does not imply 1% Δk/k subcriticality.**

OP-TM-300-205, Attachment 7.3, Step 2.1

Performance Step: 18 Shutdown margin is verified to be more negative than –1% Δk/k. (Circle one) Yes / No

√ **Standard:** Examinee determines that Line 1.9 is NOT more negative than –1% Δk/k and circles No on Line 2.1 of Attachment 7.3.

√ Examinee recognizes error with the RO calculation.

Comment:

EVALUATOR NOTE:

Tech Spec 3.5.2.1: The available shutdown margin shall not be less than one percent delta K/K with the highest worth control rod fully withdrawn.

Tech Spec 3.5.2.5: Control Rod Positions

a. Operating rod group overlap shall not exceed 25 percent ±5 percent, between two sequential groups except for physics tests.

b. Position limits are specified for regulating control rods. Except for physics tests or exercising control rods, the regulating control rod insertion/withdrawal limits are specified in the CORE OPERATING LIMITS REPORT.

1. If regulating rods are inserted in the restricted operating region, corrective measures shall be taken immediately to achieve an acceptable control rod position. Acceptable control rod positions shall be attained within 24 hours, and FQ(Z) and N/F ΔH shall be verified within limits once every 2 hours, or power shall be reduced to ≤ power allowed by insertion limits.

2. If regulating rods are inserted in the unacceptable operating region, initiate boration within 15 minutes to restore SDM to ≥1% delta K/K, and restore regulating rods to within restricted region within 2 hours or reduce power to ≤ power allowed by rod insertion limits.

OP-TM-300-205, Attachment 7.3, Step 2.2

Performance Step: 19 If Shutdown Margin is not more negative than –1% Δk/k, then TAKE action to satisfy T.S. 3.5.2.1 and 3.5.2.5

√ **Standard:** Examinee States the need to satisfy T.S. 3.5.2.1 and 3.5.2.5

Comment:

PERFORMANCE INFORMATION

Performance Step: 20 CALCULATED BY_____ DATE/TIME_____

Standard: Examinee does NOT sign Attachment 7.3

Comment:

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

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

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ANSWER KEY – DO NOT HAND OUT TO STUDENT

ATTACHMENT 7.3
Shutdown Margin at Hot Shutdown Calculation Data Sheet
Page 1 of 1

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

1.0 CALCULATION FOR A SDM AT: DATE Exam Day TIME 1 Hour Ago

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) 532 °F
2. CYCLE BURNUP 200 EFPD
3. a. MEASURED BORON CONCENTRATION 870 ppmB
   b. BORON DEPLETION CORRECTION FACTOR 0.89
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
   c. CORRECTED BORON CONCENTRATION (3a x 3b) = 774-775 ppmB
4. EXCESS REACTIVITY (FIG. 1) 7.6 - 7.8 % Δk/k
5. BORON REACTIVITY WORTH
   5a. HZP Inverse Boron Worth (FIG. 8) 147.1-147.5 ppmB/%Δk/k
   5b. Boron Worth (3c ÷5a) x (-1) -5.2 - -5.3 % Δk/k
6. XENON REACTIVITY WORTH (PPC, Reactor Engr, FIG. 12) -1.01 - -1.08 % Δk/k
7. SAMARIUM AND PLUTONIUM BUILDUP REACTIVITY WORTH (FIG. 15)
   7a. If shutdown: Time since last shutdown 0 HRS
   7b. Reactivity due to samarium and plutonium buildup 0 % Δk/k
8. INOPERABLE CONTROL RODS THAT ARE NOT FULLY INSERTED
   8a. No. of known inoperable rods (>0%WD) 0
   8b. Total inoperable rod worth (OP-TM-300-401) 0 % Δk/k
   (In addition to the stuck rod as required by T.S. included in Line 5)
9. SHUTDOWN MARGIN (4 + 5b +6 + 7b + 8b) +1.22 - +1.59 % Δk/k

CAUTION

Verification of shutdown margin more negative than –1% Δk/k does not imply 1% Δk/k subcriticality.

2.0 ACCEPTANCE CRITERIA

1. Shutdown margin is verified to be more negative than –1% Δk/k. (Circle one) Yes / No
2. If Shutdown Margin is not more negative than –1% Δk/k, then TAKE action to satisfy T.S. 3.5.2.1 and 3.5.2.5

CALCULATED BY *Filled in* DATE/TIME Filled in

APPROVED BY (SRO) *Not signed* DATE/TIME

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2015 TMI NRC JPM SRO A1-2

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- Reactor Power is 20%, steady state for 2 weeks.
- Dropped Rod in Group 6, fully inserted.
- Boron Depletion Correction Factor .89.
- Cycle Burnup 200 EFPD.
- Boron Concentration 870 ppmB.
- No Reactor Engineers are available.
- PPC is unavailable.
- Tave is 532F.

INITIATING CUE: As the CRS, review for approval the OP-TM-300-205 calculation of shutdown margin. If there are errors or actions, document any found. If additional actions / restrictions are needed, summarize at the bottom of this cue sheet.

Time Critical: No

ATTACHMENT 7.3
Shutdown Margin at Hot Shutdown Calculation Data Sheet
Page 1 of 1

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

1.0 CALCULATION FOR A SDM AT: DATE Exam Day TIME 1 Hour Ago

1. T_{AVE} (Assume T_{AVE} = 532 ± 2°F) 532 °F
2. CYCLE BURNUP 200 EFPD
3. 3a. MEASURED BORON CONCENTRATION 870 ppmB
   3b. BORON DEPLETION CORRECTION FACTOR 0.89
   (PPC, Control Room Log, Reactor Engineering, Reactivity Datasheet)
   3c. CORRECTED BORON CONCENTRATION (3a x 3b) = 774 ppmB
4. EXCESS REACTIVITY (FIG. 1) 8.3 % Δk/k
5. BORON REACTIVITY WORTH
   5a. HZP Inverse Boron Worth (FIG. 8) 147.3 ppmB/%Δk/k
   5b. Boron Worth (3c ÷ 5a) x (-1) -5.25 % Δk/k
6. XENON REACTIVITY WORTH (PPC, Reactor Engr, FIG. 12) -2.45 % Δk/k
7. SAMARIUM AND PLUTONIUM BUILDUP REACTIVITY WORTH (FIG. 15)
   7a. If shutdown: Time since last shutdown 0 HRS
   7b. Reactivity due to samarium and plutonium buildup 0 % Δk/k
8. INOPERABLE CONTROL RODS THAT ARE NOT FULLY INSERTED
   8a. No. of known inoperable rods (>0%WD) 0
   8b. Total inoperable rod worth (OP-TM-300-401) 0 % Δk/k
   (In addition to the stuck rod as required by T.S. included in Line 5)
9. SHUTDOWN MARGIN (4 + 5b + 6 + 7b + 8b) -15.99 % Δk/k

CAUTION

Verification of shutdown margin more negative than −1% Δk/k does **not** imply 1% Δk/k subcriticality.

2.0 ACCEPTANCE CRITERIA

1. Shutdown margin is verified to be more negative than −1% Δk/k. (Circle one) Yes / No
2. If Shutdown Margin is **not** more negative than −1% Δk/k, then TAKE action to satisfy T.S. 3.5.2.1 and 3.5.2.5

CALCULATED BY *Rich Megill* DATE/TIME Exam Day/1 Hour Ago

APPROVED BY (SRO) _____ DATE/TIME _____

Facility:	TMI – Unit 1	Task No.:	22601001
Task Title:	ICCW Station Print Read with Tech Spec	JPM No.:	2015 TMI NRC JPM SRO A2
K/A Reference:	2.2.41 (3.9)	New JPM	

Examinee: NRC Examiner:

Facility Examiner: 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:

- **Time = 0 minutes:**
  - The plant is operating at 100% power.
  - A moderate earthquake occurs and the following damage results:
    - An Instrument Air leak has occurred downstream of IA-V-826. The leak has been isolated from upstream components by closing IA-V-826.
    - The 69 Selector Switch for IC-V-4 has failed to the "Emergency" position
    - Many fuses have blown throughout the plant, including both IC2/3A fuses and FU-IC4/3A.
- **Time = 4 minutes:**
  - Another moderate earthquake occurs and the following damage results:
    - An Intermediate Closed Cooling Water (ICCW) System leak occurs. MAP C-3-2 is in alarm and ICCW Surge Tank level is 7 inches and lowering.
- **Time = 5 minutes:**
  - A major earthquake occurs and the following damage results:
    - An RCS LOCA occurs; RCS Pressure is 1550# and lowering slowly.
    - IC-V-2 has become mechanically bound after 60% of its travel.
- **Time = 10 minutes (current time):**
  - Conditions are as follows:
    - RCS Pressure is 1475 psig and steady
    - RCS Temperature is 450F and lowering very slowly.
    - IC-V-6 did NOT receive an ES signal.

Task Standard:

- Determine status of Intermediate Closed Cooling Water Containment Isolation Valves given various faults.

Required Materials:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3
- TMI Technical Specifications 3.6.6, Amendment 278

General References:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3
- TMI Technical Specifications

Handouts:

- Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks, Rev 6
- Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks, Rev 5
- Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA, Rev 5
- Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB, Rev 5
- Print 208-499, Intermediate Cooling Isolation Valve IC-V-2, Rev 11
- Print 209-077, Intermediate Cooling Isolation Valve IC-V-3, Rev 10
- Print 209-078, Intermediate Cooling Isolation Valve IC-V-4, Rev 8
- Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74, Rev 10
- Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users, Rev 13
- Print 302-620, Intermediate Cooling Flow Diagram, Rev 51
- Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3
- TMI Technical Specifications 3.6.6, Amendment 278

Initiating Cue: Using the prints provided, determine the positions of the valves listed in the table below and the reason for that position, including identification of any Tech Specs **applicable to the valves listed in the table.**

Time Critical Task: No

Validation Time: 34 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with an asterisk)

Start Time _____

EXAMINER CUE: **Hand Examinee the following:**

- **Print 209-532, Engineered Safeguard Actuation A Alarm and Interlocks**
- **Print SS-209-632, Engineered Safeguard Actuation B Alarm and Interlocks**
- **Print SS-209-542, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDA**
- **Print SS-209-642, Engineered Safeguard E.S. Actuation RBI on NSCCC & ICCC Line Break Channel LDB**
- **Print 208-499, Intermediate Cooling Isolation Valve IC-V-2**
- **Print 209-077, Intermediate Cooling Isolation Valve IC-V-3**
- **Print 209-078, Intermediate Cooling Isolation Valve IC-V-4**
- **Print 209-079, Intermediate Cooling Isolation Valve ICV6 & ICV74**
- **Print 302-279, Sheet 8, Instrument Air Flow Diagram – Aux. Building End Users**
- **Print 302-620, Intermediate Cooling Flow Diagram**
- **Print 208-752, Electrical Elementary Diagram Remote Shutdown, Rev. 3**

Performance Step: 1 Determine Line Break Isolation logic.

Standard:

- Examinee determines from the initial conditions that a 1600# ES has occurred. Therefore, using Print 209-532, any combination of 2/3 ES channels will allow a complete path for current to flow, energizing 74X3/RCA□4D.
- Using Print 209-542, examinee determines that since ICCW Surge Tank level is low, the associated contact closes, allowing for a complete path for current to flow, energizing 63X2/-. The associated 63X2/- contact closes and the associated 74X3/RCA□4D closes, allowing for a complete path for current to flow, energizing 63Z2/-□4A.
- Using prints 209-632 and 209-642, a similar logic is made up for the "B" Train, ending ultimately in the energizing of 63Z2/-□5B.

Comment:

Performance Step: 2 Determine status of IC-V-2 and reason why.

Standard:

- Using Print 208-499:
  - Examinee determines from the initial conditions that IC-V-2 became mechanically bound at 40% open.
  - Therefore, the status of IC-V-2 is OPEN (or THROTTLED OPEN).

Comment:

Performance Step: 3 Determine status of IC-V-3 and reason why.

√ **Standard:**

- Using Print 209-077:
  - Examinee determines from the initial conditions that fuses FU-IC2/3A have blown. As a result, a complete path for current to flow does NOT exist to energize the closing coil.
  - Therefore, the status of IC-V-3 is OPEN.

Comment:

Performance Step: 4 Determine status of IC-V-4 and reason why.

√ **Standard:**

- Using Print 209-078:
  - Examinee determines from the initial conditions that the 69 Selector Switch is in Emergency, therefore all of the 69 contacts have swapped from their normal positions. As a result, a complete path for current to flow does NOT exist to energize the closing coil.
  - Therefore, IC-V-4 is OPEN.

Comment:

Performance Step: 5 Determine status of IC-V-6 and reason why.

√ **Standard:**

- Using Print 302-279:
  - Examinee determines from the initial conditions that an Instrument Air leak has occurred downstream of IA-V-826. Although the leak has been isolated from upstream components by closing IA-V-826, the air supply for IC-V-6 has bled off. IC-V-6 fails closed on a loss of Instrument Air.
  - Therefore, the status of IC-V-6 is CLOSED.

Comment:

Performance Step: 6 Determine status of IC-V-74 and reason why.

√ **Standard:**

- Using Print 208-499:
  - Examinee determines from the initial conditions that since IC-V-2 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 209-077:
  - Examinee determines from the initial conditions that since IC-V-3 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 209-078:
  - Examinee determines from the initial conditions that since IC-V-4 has not gone 95% closed, it will not close the contact associated with IC-V-74.
- Using Print 302-279:
  - Examinee determines from the initial conditions that since IC-V-6 has gone 95% closed, it will close the contact associated with IC-V-74. However, the contacts for IC-V-4 and IC-V-6 are in series to energize the opening coil for IC-V-74.
- Therefore, the status of IC-V-74 is CLOSED.

Comment:

Examiner Note: **Bolded item below identifies the critical portion of the step.**

Examiner Note: **Although the reactor plant is already at hot shutdown conditions, the plant is not yet at cold shutdown conditions (TS Section 1.2.1 COLD SHUTDOWN: The reactor is in the cold shutdown condition when it is subcritical by at least one percent delta k/k and Tave is no more than 200°F) and therefore, the LCO is still applicable.**

Performance Step: 7 Determine applicable Tech Spec LCO's.

Standard:

- Examinee determines from Tech Spec 3.6 that Containment Integrity is required for the given conditions:
- Tech Spec 3.6.1: Except as provided in Specifications 3.6.6, 3.6.8, and 3.6.12, CONTAINMENT INTEGRITY (Section 1.7) shall be maintained whenever all three of the following conditions exist:
  - a. Reactor coolant pressure is 300 psig or greater.
  - b. Reactor coolant temperature is 200 degrees F or greater.
  - c. Nuclear fuel is in the core.
- Examinee determines using Tech Spec 3.6.6.a, a 48 Tech Spec Time Clock is in effect due to IC-V-2 and IC-V-3 being inoperable.
- Tech Spec 3.6.6.a: When CONTAINMENT INTEGRITY is required, if a CIV (other than a purge valve) is determined to be inoperable:
  - a. For lines isolable by two or more CIVs, the CIV(s)* required to isolate the penetration shall be verified to be OPERABLE. If the inoperable valve is not restored within **48 hours**, at least one CIV* in the line will be closed or the reactor shall be brought to HOT SHUTDOWN within the next 6
- Examinee determines using Tech Spec 3.6.6.b, a 72 Tech Spec Time Clock is in effect due to IC-V-4 being inoperable.
- Tech Spec 3.6.6.a: When CONTAINMENT INTEGRITY is required, if a CIV (other than a purge valve) is determined to be inoperable:
  - b. For lines isolable by one CIV, where the other barrier is a closed system, the line shall be isolated by at least one closed and de-activated automatic valve, closed manual valve, or blind flange within 72 hours or the reactor shall be brought to HOT SHUTDOWN within the next 6 hours and to the COLD SHUTDOWN condition within an additional 30 hours.

√

Comment:

Terminating Cue: **When the examinee has addressed the status of all five valves and Tech Specs, JPM may be terminated.**

STOP TIME: _____

ANSWER KEY

DO NOT HAND TO STUDENTS

Valve Identification	Position	Reason
IC-V-2	**OPEN** (or THROTTLED OPEN)	**MECHANICAL BINDING**
IC-V-3	**OPEN**	**BLOWN FUSES**
IC-V-4	**OPEN**	**69 SELECTOR SWITCH IS IN EMERGENCY**
IC-V-6	**CLOSED**	**LOSS OF INSTRUMENT AIR**
IC-V-74	**CLOSED**	**NO OPEN SIGNAL RECEIVED**
TECH SPEC LCO	**48 hours** 72 hours	**IC-V-2 and IC-V-3 inoperable (TS 3.6.6.a)** IC-V-4 inoperable (TS 3.6.6.b)

ANSWER KEY

DO NOT HAND TO STUDENTS

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2015 TMI NRC JPM SRO A2

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:

- **Time = 0 minutes:**
  - The plant is operating at 100% power.
  - A moderate earthquake occurs and the following damage results:
    - An Instrument Air leak has occurred downstream of IA-V-826. The leak has been isolated from upstream components by closing IA-V-826.
    - The 69 Selector Switch for IC-V-4 has failed to the "Emergency" position
    - Many fuses have blown throughout the plant, including both IC2/3A fuses and FU-IC4/3A.
- **Time = 4 minutes:**
  - Another moderate earthquake occurs and the following damage results:
    - An Intermediate Closed Cooling Water (ICCW) System leak occurs. MAP C-3-2 is in alarm and ICCW Surge Tank level is 7 inches and lowering.
- **Time = 5 minutes:**
  - A major earthquake occurs and the following damage results:
    - An RCS LOCA occurs; RCS Pressure is 1550# and lowering slowly.
    - IC-V-2 has become mechanically bound after 60% of its travel.
- **Time = 10 minutes (current time):**
  - Conditions are as follows:
    - RCS Pressure is 1475 psig and steady
    - RCS Temperature is 450F and lowering very slowly.
    - IC-V-6 did NOT receive an ES signal.

INITIATING CUE: Using the prints provided, determine the positions of the valves listed in the table below and the reason for that position, including identification of any Tech Specs **applicable to the valves listed in the table.**

TIME CRITICAL: No

Valve	Position	Reason
IC-V-2		
IC-V-3		
IC-V-4		
IC-V-6		
IC-V-74		
TECH SPEC LCO		

Facility:	TMI Unit 1	Task No.:	ADM08016
Task Title:	REVIEW RB ENTRY SURVEY LOG	JPM No.:	TMI 2015 NRC JPM SRO A3
K/A Reference:	G 2.3.13 (3.8)	Modified Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom X Simulator _____ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- The plant has been steady at full power for 22 months.
- The Kidney Filter System is Out of Service.
- The RB Purge System has **not** been operated.
- An entry into the Reactor Building is planned to perform corrective maintenance within the Fuel Transfer Canal.

Task Standard: Faults identified, survey not approved.

Required Materials:

- RP-TM-460-1007, Access to TMI-1 Reactor Building, Rev. 8
- A current copy of a Radiation Work Permit for the Reactor Building that includes no respiratory protection requirements

General References:

- RP-TM-460-1007, Access to TMI-1 Reactor Building, Rev. 8

Handouts:

- Attachment 1 of RP-TM-460-1007 filled out with faults described in JPM.
- Attachment 4 of RP-TM-460-1007 filled to match Attachment 1.
- RP-TM-460-1007, Access to TMI-1 Reactor Building, Rev. 8
- A current copy of a Radiation Work Permit for the Reactor Building that includes no respiratory protection requirements

Initiating Cue: You are the Shift Manager on duty. Review for approval the RB Entry Survey Log IAW RP-TM-460-1007, Access to TMI-1 Reactor Building.

If approved, fill out Table 1 below only.

If not approved, fill out Tables 1 and 2 below.

Time Critical Task: N/A

Validation Time: 10 minutes.

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

Evaluator Cue: **Provide completed Attachments 1 and 4 of RP-TM-460-1007 filled out with faults described in JPM, a current copy of a Radiation Work Permit for the Reactor Building that includes no respiratory protection requirements, and a blank copy of RP-TM-460-1007.**

RP-TM-460-1007, Section 3.2

Performance Step: 1 Ensure that particulate airborne activity is below 30% DAC as determined by analysis of air samples or RM-A-2 reading (See attachment 4 for using RM-A-2 readings).

Standard: Examinee verifies Particulate is below 30% DAC as determined by reviewing RM-A-2 Sample Lab results IAW Attachment 1 and Attachment 4.

Comment:

RP-TM-460-1007, Section 3.2

Performance Step: 2 Ensure that Iodine airborne activity is below 30% DAC as determined by analysis of air samples or RM-A-2 reading (See Attachment 4 for using RM-A-2 readings).

√ **Standard:** Examinee determines Iodine is **NOT** below 30% DAC by reviewing RM-A-2 reading Sample Lab results IAW Attachment 1 and Attachment 4.

√ Examinee identifies that respiratory protection is required for RB entry per section 3.2; therefore the current RWP is not applicable.

Examinee identifies that the following actions are applicable IAW Attachment 7:
- Post as Airborne Radioactivity Area
- Hoods required for entry. Ensure all hair is under protective clothing is possible.
- Consider using facial PC's.

Comment:

RP-TM-460-1007, Section 3.2

Performance Step: 3 If noble gas is in excess of 1 DAC and has increased by x3 over previous sample, contact Rad. Engineering.

Standard: Examinee verifies Gas is below 1 DAC by RM-A-2 by reviewing Sample Lab results IAW Attachment 1 and Attachment 4.

Comment:

RP-TM-460-1007, Section 3.2

Performance Step: 4 Contact Occupational Safety and the Control Room if the sample results are either of the following:

- More than 0.4 percent hydrogen (RM-A-2 samples) or combustible gas meter alarms.

√ **Standard:** Examinee determines Explosive Gas is more than 0.4% by reviewing RM-A-2 reading Sample Lab results IAW Attachment 1.

√ Examinee states the need to notify Occupational Safety and the Control Room of the result.

Comment:

RP-TM-460-1007, Section 3.2

Performance Step: 5 Contact Occupational Safety and the Control Room if the sample results are either of the following:

- Oxygen levels are less than 19.5%

Standard: Examinee verifies Oxygen is above 19.5% as determined by reviewing RM-A-2 reading Sample Lab results IAW Attachment 1.

Comment:

RP-TM-460-1007, Section 3.3

Performance Step: 6 The approval of the Shift Manager, Plant Manager, Radiation protection Manager, or designees, are required for entries within secondary shielding, inside the gates on top of the "D" rings, or within the Fuel Transfer Canal when reactor power level is 1 percent or greater. The Polar Crane is considered as being included on the top of the D-Ring area. Approvals will be recorded on Attachment 6.

√ **Standard:** Examinee identifies that Attachment 6 needs to be completed due to the work taking place in the Fuel Transfer Canal while greater than 1% reactor power.

Comment:

Performance Step: 7 Approve the RB Entry Survey Log

√ **Standard:** Examinee does **NOT** approve entry.

Comment:

Terminating Cue: **When examinee has completed the paperwork, the JPM is terminated.**

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

ANSWER KEY – DO NOT HAND OUT TO STUDENTS

TABLE 1

Circle One	
Approved	**Not Approved**

TABLE 2

Issue (If any)	Actions
Iodine is NOT below 30% DAC	**Respiratory protection is required for RB entry.**
Explosive Gas is more than 0.4%	**Notify Occupational Safety and the Control Room.**
Location of work to be done	**Attachment 6 needs to be completed due to the work taking place in the Fuel Transfer Canal while greater than 1% reactor power.**

ANSWER KEY – DO NOT HAND OUT TO STUDENTS

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM SRO A3

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- The plant has been steady at full power for 22 months.
- Neither the Kidney Filter System is Out of Service.
- The RB Purge System has **not** been operated.
- An entry into the Reactor Building is planned to perform corrective maintenance within the Fuel Transfer Canal.

INITIATING CUE:

You are the Shift Manager on duty. Review for approval the RB Entry Survey Log IAW RP-TM-460-1007, Access to TMI-1 Reactor Building.

If approved, fill out Table 1 below only.

If not approved, fill out Tables 1 and 2 below.

TABLE 1

Circle One	
Approved	**Not Approved**

TABLE 2

Issue (If any)	Actions

Facility:	TMI Unit 1	Task No.:	OF010009
Task Title:	Given a set of conditions, determine the Emergency Action Level (EAL) and make a Protective Action Recommendation (PAR) IAW the facility Emergency Plan.	JPM No.:	TMI 2015 NRC JPM SRO A4
K/A Reference:	2.4.44 (4.4)	Modified Bank JPM	

To be conducted one on one.

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom __X__ Simulator _____ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- T= -30 minutes:
  - Plant is at 100% Power.
  - Weather: Breezy. Temp: 60°F. Wind: from 130° at 8 mph.
  - EG-Y-4, Station Blackout Diesel Generator, has been Out of Service for maintenance for 20 hours. It is expected to return to service in 12 additional hours.

- T= -10 minutes:
  - A Loss of Offsite Power occurs.
  - EG-Y-1A, "A" Emergency Diesel Generator, is secured by an Auxiliary Operator due to a fire in the EG-Y-1A Fuel Rack.
  - The fire is reported out but there is visible damage to the fuel rack.
  - The Maintenance Supervisor has informed you that, due to the extent of damage to the fuel rack, he is estimating at least 7 hours to make repairs to EG-Y-1A. It appears that the fire started due to a faulty component and no acceptable replacement part is in stock. Engineers are researching to determine if the faulty component is identical on EG-Y-1B, "B" Emergency Diesel Generator.

- T= Now (**current time**):
  - EG-Y-1B, "B" Emergency Diesel Generator, is secured by an Auxiliary Operator due to a fire in the EG-Y-1B Fuel Rack.
  - The fire is reported out but there is visible damage to the fuel rack.
  - The Maintenance Supervisor has informed you that, due to the dark conditions and the extent of damage to the fuel rack, he is estimating at least 10 hours to make repairs to EG-Y-1B.
  - The Transmission System Operator calls in and says that it is estimated to take 6 additional hours to get power restored.

Task Standard: Correctly identifies EAL and PAR.

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 19
- EP-AA-111-F-09, TMI PLANT BASED PAR FLOWCHART, Revision F
- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST, Revision U
- EP-AA-112-F-09, EMERGENCY PUBLIC ADDRESS ANNOUNCEMENTS, Revision E

- EP-MA-114-100-F-01, STATE/LOCAL EVENT NOTIFICATION FORM, Revision O
- EP-AA-1009 Addendum 3 EXELON NUCLEAR EMERGENCY ACTION LEVELS FOR THREE MILE ISLAND (TMI) STATION, Revision 0
- EP-AA-112-100-F-06 ERO NOTIFICATION OR AUGMENTATION Revision Q.
- EP-AA-114-F-01 PWR RELEASE IN PROGRESS DETERMINATION GUIDANCE, Revision E
- EP-MA-114-100, MID-ATLANTIC STATE/LOCAL NOTIFICATIONS, Revision 21

Handouts:

- EP-AA-112-100-F-01, SHIFT EMERGENCY DIRECTOR CHECKLIST.
- Emergency Director Binder

Initiating Cue:

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

Time Critical Task: Yes

Validation Time: 23 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check)

EVALUATOR CUE: **The Time Critical Start Time is when the Cue is acknowledged.**

#1 Time Critical Start Time: _____

Performance Step: 1 Compares conditions to the EAL Table.

Standard: Examinee:

- Determines that a loss of all off-site AC power to Emergency 4KV Buses has occurred, AND
- Determines that a failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV Buses has occurred, AND
- Determines that restoration of at least one Emergency 4KV Bus in less than 4 hours is not likely.
- √ Determines conditions are met for GENERAL EMERGENCY EAL MG1.

Comment:

EP-AA-112-100-F-01

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

Standard:

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

Comment:

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

#1 Time Critical Stop Time: _____

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

Performance Step: 3 Announce the event classification, possible escalation paths, and declaration time to the Control Room staff.

√ **Standard:** Examinee announces MG1 based on a loss of all off-site AC power to Emergency 4KV Buses has occurred, AND a failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV Buses has occurred, AND restoration of at least one Emergency 4KV Bus in less than 4 hours is not likely.
Examinee announces the event classification time.

Comment:

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

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

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

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

Standard: Examinee records EAL MG1 on EP-AA-112-100-F01.
Examinee records thresholds 1, 2, and 3a.
Examinee records the time of declaration on EP-AA-112-100-F01.

Comment:

EVALUATOR NOTE: **Step 1.4C is N/A.**

EVALUATOR CUE: **Repeat any direction given to you with regards to EP-AA-112-F-09.**

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

Performance Step: 5 SELECT the Emergency Public Address Announcements from the form and DIRECT performance of the public address announcement within 15 minutes of event classification.

√ **Standard:** Examinee fills out EP-AA-112-F-09 (found at tab 1), section 4.2.A, and hands to communicator (NRC examiner) to make the announcement.

Comment:

EVALUATOR CUE: **Repeat any direction given to you with regards to EP-AA-112-100-F-06.**

EVALUATOR CUE: **If requested to provide DAPAR information, then respond "Offsite dose projections are < 1 REM TEDE and < 5REM CDE thyroid".**

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

Performance Step: 6 If the ERO has not been activated, then DIRECT activation of the ERO Notification using Scenario 1, "Actual Event Respond to Facility," or Scenario 3, "Actual Event Alternate Reporting Location," as appropriate, per EP-AA-112-100-F-06.

Standard: Examinee hands out EP-AA-112-100-F-06 and directs activation of the ERO notification using Scenario 1.

Comment:

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

Performance Step: 7

Determine the PAR per the Emergency Classification and Protective Action Recommendations procedure.

- Emergency Classification and PAR Procedure: Tab 6
- Plant Based PAR Flowchart: Tab 7

Standard:

Examinee follows the flowchart of EP-AA-111-F-09, Page 1, as follows:

- Initial PAR after GE declared – **Yes**
- Any Loss of Containment? – **No**
- Is there a Hostile Action event in Progress?– **No**
- Is this PAR from the Control Room?– **Yes**
- State has informed you of impediments to evacuation?– **No**

Examinee determines the following actions are required:

√ - Evacuate 2-mile radius, AND

√ - Evacuate 2-5 miles in the following downwind sectors:
  - WSW / W / WNW / NW / NNW / N / NNE

Comment:

EVALUATOR NOTE: **The #2 Time Critical Stop Time is when the completed form, EP-MA-114-100-F-01, is handed to the Communicator.**

#2 Time Critical Stop Time: _____

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

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

Performance Step: 8 Direct performance of State/Local notifications within 15 minutes of the event classification as required per the Notifications procedure.
Notification Procedure (EP-MA-114-100): Tab 3
Notification Form (EP-MA-114-100-F-01): Tab 4
Release in Progress Determination Guidance (EP-AA-114-F-01): Tab 21

√ **Standard:**

- Examinee fills out EP-MA-114-100-F-01 (while using EP-MA-114-100 and EP-AA-114-F-01 for guidance) as follows:
  - Block 1: This is a DRILL
  - Block 2: C- TMI
  - Block 3: A- ONE
  - Block 4: D- GENERAL EMERGENCY
  - Block 5: Time and Date of declaration
  - Block 6: A- INITIAL DECLARATION
  - Block 7: MG1
  - Block 8: C- System Malfunction
  - Block 9: A- NO radiological release in-progress
  - Block 10: 130 (degrees) / 8 (miles per hour)
  - Block 11: B-
    (E)360 DEGREES FROM 0 MILES (SITE BOUNDRY) TO 2 MILES
    AND
    THE FOLLOWING SECTORS FROM 2 MILES TO 5 MILES:
    (E)WSW / W / WNW / NW / NNW / N / NNE
    AND
    THIS PAR(IS NOT) THE RESULT OF A RAPIDLY PROGRESSING SEVERE ACCIDENT.
- Examinee hands the filled out form to the communicator.

Comment:

EVALUATOR NOTE: **Time Critical #2 must be equal to or less than 15 minutes.**

Time Critical #2= **(Time of declaration _____**
(#2 Critical Stop Time) - _____
= _____ mins

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 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:

- T= -30 minutes:
  - Plant is at 100% Power.
  - Weather: Breezy. Temp: 60°F. Wind: from 130° at 8 mph.
  - EG-Y-4, Station Blackout Diesel Generator, has been Out of Service for maintenance for 20 hours. It is expected to return to service in 12 additional hours.

- T= -10 minutes:
  - A Loss of Offsite Power occurs.
  - EG-Y-1A, "A" Emergency Diesel Generator, is secured by an Auxiliary Operator due to a fire in the EG-Y-1A Fuel Rack.
  - The fire is reported out but there is visible damage to the fuel rack.
  - The Maintenance Supervisor has informed you that, due to the extent of damage to the fuel rack, he is estimating at least 7 hours to make repairs to EG-Y-1A. It appears that the fire started due to a faulty component and no acceptable replacement part is in stock. Engineers are researching to determine if the faulty component is identical on EG-Y-1B, "B" Emergency Diesel Generator.

- T= Now (**current time**):
  - EG-Y-1B, "B" Emergency Diesel Generator, is secured by an Auxiliary Operator due to a fire in the EG-Y-1B Fuel Rack.
  - The fire is reported out but there is visible damage to the fuel rack.
  - The Maintenance Supervisor has informed you that, due to the dark conditions and the extent of damage to the fuel rack, he is estimating at least 10 hours to make repairs to EG-Y-1B.
  - The Transmission System Operator calls in and says that it is estimated to take 6 additional hours to get power restored.

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

Time Critical: Yes

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	62201020
Task Title:	Respond to an Inoperable/Stuck Control Rod	JPM No.:	TMI 2015 NRC JPM A
K/A Reference:	005 AA1.01 (3.6 / 3.4)	Modified JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom _____ Simulator __X__ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- A reactor power reduction was in progress IAW 1102-4.
- MAP G-2-1, CRD Pattern Asymmetric, is in alarm.
- The affected Control Rod is approximately 7.5" from the rest of the rods in the affected Group.
- Position indication is not suspect.
- The crew has stabilized the plant at the current power level.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References:

- OP-TM-MAP-G0201, CRD Pattern Asymmetric, Rev 3.
- OP-TM-621-471, ICS Manual Control, Rev 7.
- OP-TM-622-414, Exercising One or More Control Rods, Rev 5.

Handout:	None
Initiating Cue:	Take corrective actions IAW OP-TM-MAP-G0201 to clear the alarm and to return the misaligned Control Rod to within 1" of the rest of the group.
Time Critical Task:	NO
Validation Time:	20 minutes

SIMULATOR SETUP

1. Reset the simulator to IC 16 (Temporarily snapped into IC-197)

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

2. Run the setup:

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

3. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **Steps 4.1 and 4.2 are N/A.**

OP-TM-MAP-G0201, Step 4.3.1

Performance Step: 1 If actual rod misalignment exists (i.e., not a PI problem), then PERFORM the following:

- PLACE Diamond Panel in MANUAL per OP-TM-621-471, ICS Manual Control.

Standard: Examinee goes to OP-TM-621-471.

Comment:

OP-TM-621-471, Step 3.0

Performance Step: 2 Precautions, Limitations, and Prerequisites

Standard: Examinee verifies Precautions, Limitations, and Prerequisites.

Comment:

EVALUATOR NOTE: **The Condition in Step 4.1 is already met. Step 4.1.1 is N/A.**

OP-TM-621-471, Step 4.2

Performance Step: 3 Establish manual SG/REACTOR Control as follows:

- PLACE SG/REACTOR DEMAND station in HAND.
- ENSURE control rod position does not change.
- VERIFY alarm H-2-1 "ICS in Track" In.

√ **Standard:** Examinee places the SG/Reactor Demand station in HAND by pressing the white HAND pushbutton, verifying the white HAND light lit, red AUTO light not lit.
Examinee verifies that control rod position does not change
Examinee verifies that MAP alarm H-2-1 is lit.

Comment:

EVALUATOR NOTE: **Step 4.2.4 should remain N/A throughout the JPM. Step 4.3 is N/A.**

OP-TM-621-471, Step 4.4.1

Performance Step: 4 Establish manual Feedwater Control as follows:

- PLACE SG A/B LOAD RATIO (□TC) station in HAND.

√ **Standard:** Examinee places the SG A/B LOAD RATIO (ΔT_c) station in HAND by pressing the white HAND pushbutton, verifying the white HAND light lit, red AUTO light not lit.

Comment:

PROCEDURE NOTE: **Either SG A or B FW DEMAND station may be placed in HAND first.**

OP-TM-621-471, Step 4.4.2

Performance Step: 5 Establish manual Feedwater Control as follows:

- PLACE SG A FW DEMAND station in HAND.

√ **Standard:** Examinee places the SG A FW DEMAND station in HAND by pressing the white HAND pushbutton, verifying the white HAND light lit, red AUTO light not lit.

Comment:

OP-TM-621-471, Step 4.4.3

Performance Step: 6 Establish manual Feedwater Control as follows:
- PLACE SG B FW DEMAND station in HAND.

√ **Standard:** Examinee places the SG B FW DEMAND station in HAND by pressing the white HAND pushbutton, verifying the white HAND light lit, red AUTO light not lit.

Comment:

EVALUATOR NOTE: **Step 4.4.4 should remain N/A throughout the JPM. Step 4.5 is N/A.**

PROCEDURE NOTE: **CAUTION: With FW Pumps in AUTO, SG A/B FW DEMAND adjustments will affect FW pump speed and it may be necessary to place FW pumps in HAND IAW OP-TM-401-472 and 473.**

PROCEDURE NOTE: **Raising SG A FW DEMAND or lowering SG B FW DEMAND will make ΔTC more negative (ΔTC = TC A – TC B).**

OP-TM-621-471, Step 4.6.1

Performance Step: 7 Establish manual Reactor Control as follows:
- SELECT MANUAL on the DIAMOND PANEL.

√ **Standard:** Examinee places the Diamond Panel in Manual by pressing the Auto-Manual pushbutton, verifying the MAN light lit, AUTO light not lit.

Comment:

OP-TM-621-471, Step 4.6.2

Performance Step: 8 Establish manual Reactor Control as follows:
- PLACE REACTOR DEMAND station in HAND.

√ **Standard:** Examinee places the REACTOR DEMAND station in HAND by pressing the white HAND pushbutton, verifying the white HAND light lit, red AUTO light not lit.

Comment:

EVALUATOR NOTE: **Step 4.6.3 should remain N/A throughout the JPM.**

OP-TM-MAP-G0201, Step 4.3.2

Performance Step: 9 PERFORM OP-TM-622-414, Exercising One or More Control Rods to realign affected rod(s) with its Group Average Position.

Standard: Examinee goes to OP-TM-622-414.

Comment:

EVALUATOR CUE: **Provide OP-TM-622-414.**

OP-TM-622-414, Step 3.0

Performance Step: 10 Precautions, Limitations, and Prerequisites

Standard: Examinee verifies Precautions, Limitations, and Prequisites.

Comment:

EVALUATOR CUE: **When prompted, Shift Manager permission is granted.**

OP-TM-622-414, Step 4.1

Performance Step: 11 Obtain Shift Management permission to perform rod move(s).

Standard: Examinee obtains Shift Manager permission to perform rod move.

Comment:

EVALUATOR NOTE: **The term "RP power" in the next step refers to Reactor Power.**

EVALUATOR CUE: **Obtaining Heat Balance data is a function of the STA. Role play, if required, to state that heat balance shows the plant is stable at less than 99% power.**

OP-TM-622-414, Step 4.2

Performance Step: 12 Ensure plant is stable at ≤ 99% RP power (use heat balance, if available).

Standard: Examinee verifies the plant is stable at ≤ 99% power.

Comment:

OP-TM-622-414, Step 4.3

Performance Step: 13 Ensure a Diamond Panel lamp test is performed and any burned out bulbs replaced.

Standard: Examinee performs a Diamond Panel lamp test (CC).

Comment:

OP-TM-622-414, Step 4.4

Performance Step: 14 Ensure a PI Panel (PIP) lamp test is performed and any burned out indicators repaired.

Standard: Examinee performs a PI Panel lamp test (PC).

Comment:

OP-TM-622-414, Step 4.5

Performance Step: 15 Determine which group/rod(s) is to be moved by evaluating one or more of the following:
- PI Panel indications
- PPC rod position indications
- FIDMIS indications
- Zone Reference indications

Standard: Examinee determines that Control Rod 7-1 is the rod to be moved.

Comment:

EVALUATOR NOTE: **Step 4.6 is met.**

OP-TM-622-414, Step 4.7

Performance Step: 16 Ensure SEQ OR is selected on the DIAMOND PANEL.

√ **Standard:** Examinee presses the SEQ OR pushbutton and verifies that SEQ OR is lit and SEQ is not lit (CC).

Comment:

EVALUATOR NOTE: **Step 4.8 is N/A. Step 4.9 is an If At Any Time statement that should not be required for the duration of the JPM. Step 4.10 is N/A.**

OP-TM-622-414, Step 4.11.1

Performance Step: 17 If it is desired to move a single rod, then perform the following:
- SELECT the desired group on the GROUP SELECT SWITCH and the desired rod on the SINGLE SELECT SWITCH.

√ **Standard:** Examinee selects "7" on the Group Select Switch by rotating the switch until the arrow is aligned with "7" (CC).

√ Examinee selects "1" on the Single Select Switch by rotating the switch until the arrow is aligned with "1" (CC).

Comment:

EVALUATOR NOTE: **Step 4.11.2 is N/A.**

OP-TM-622-414, Step 4.11.3

Performance Step: 18 INSERT or WITHDRAW the selected rod as required.

√ **Standard:** Examinee inserts Control Rod 7-1 until aligned within one inch of the rest of Group 7.

Comment:

OP-TM-622-414, Step 4.11.4

Performance Step: 19 PRESS the RPI RESET pushbutton on the DIAMOND PANEL.

Standard: Examinee presses the RPI reset pushbutton on the Diamond Panel (CC).

Comment:

Terminating Cue: **The JPM may be terminated when the RPI Reset pushbutton has been pressed.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM A

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

Initial Conditions:

- For this event you are assigned the duties of the Unit RO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- A reactor power reduction was in progress IAW 1102-4.
- MAP G-2-1, CRD Pattern Asymmetric, is in alarm.
- The affected Control Rod is approximately 7.5" from the rest of the rods in the affected Group.
- Position indication is not suspect.
- The crew has stabilized the plant at the current power level.

INITIATING CUE: Take corrective actions IAW OP-TM-MAP-G0201 to clear the alarm and to return the misaligned Control Rod to within 1" of the rest of the group.

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	22301010
Task Title:	Respond to a Loss of Pressurizer Level Control with Failures – Alt Path	JPM No.:	TMI 2015 NRC JPM B
K/A Reference:	011 A2.03 (3.8 / 3.9)	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- For this event you are assigned the duties of the Unit Reactor Operator (URO).
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- Increased Letdown flowrates are in effect IAW OP-TM-211-441, Increased Letdown Flowrates.

Task Standard: All critical steps evaluated as SAT.

Required Materials: OP-TM-211-441, Rev. 4A, marked up through Step 4.1.5.

General References:

- OP-TM-MAP-G0205, PZR Level HI/LO, Rev. 3
- OP-TM-MAP-G0105, PZR Level HI-HI, Rev 2
- OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS, Rev. 3
- OP-TM-EOP-010, Emergency Procedure Rules, Guides, and Graphs, Rev. 17, pgs 20-21
- OP-TM-211-441, Increased Letdown Flowrates, Rev. 4A
- OP-TM-211-472, Manual Pressurizer Level Control, Rev. 4

Handout: None

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

Time Critical Task: NO

Validation Time: 23 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-235)

1. Insert the following Malfunctions:

   RC04A, RC1-LT1 RC PZR LVL Trans failure @ 0.001%, on **Event #1.**

   Ensure MAP G-2-5 is in but MAP G-1-5 is **not** in.

2. Insert the following Overrides:

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

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

3. Create the following Trigger:

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

4. Insert the following value on the Monitor page:

   MUMMT = 25300

5. Perform OP-TM-211-441 to increase letdown rate to 70 gpm.

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

7. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH CUE: **When directed by the Evaluator, insert EVENT 1**

EVALUATOR NOTE: **MAP G-1-5 is also expected to be in alarm, but the actions listed are within G-1-5 arecovered in MAP G-2-5. Therefore, MAP G-1-5 actions are not specifically listed here.**

EVALUATOR CUE: **As CRS, acknowledge condition and entry into OP-TM-MAP-G0205**

EVALUATOR NOTE: **The examinee may refer to OP-TM-621-472, Manual Pressurizer Level, to place MU-V-17 in HAND.**

OP-TM-MAP-G0205, Step 4.1-1

Performance Step: 1 PLACE MU-V-17 in Hand and control PZR level.

Standard: Examinee:

- Announces Pressurizer level lowering and failed level instrument.
- Presses MU-V-17 Hand Control pushbutton, verifies red auto light out, white hand light lit.
- Raises on MU-V-17 controller to restore Pressurizer level.

Comment:

EVALUATOR NOTE: **The examinee may refer to OP-TM-621-451, Selecting Alternate Instrument to ICS, to select the valid level signal. If so, provide a copy.**

OP-TM-MAP-G0205, Step 4.1-2

Performance Step: 2 SELECT a valid level signal.

√ **Standard:** Examinee selects RC-1 LT-3 instrument by pressing pushbutton on Console Center.

Comment:

EVALUATOR NOTE: **The examinee may try to restore Pressurizer level prior to placing MU-V-17 in Auto.**

BOOTH CUE: **When MU-V-17 placed in Auto, ensure MU-V-18 has gone closed.**

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

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

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

Comment:

OP-TM-MAP-G0205, Step 4.2

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

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

Comment:

Alternate Path starts here when candidate enters Guide 9.

GUIDE 9, Step C.1

Performance Step: 5 VERIFY MU pump is operating.

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

Comment:

GUIDE 9, Step C.2

Performance Step: 6 ENSURE MU-V-5 is Closed.

√ **Standard:** Examinee closes MU-V-5 by dialing the MU-V-5 setpoint clockwise until MU-V-5 indicates closed on the controller potentiometer (CC).

Comment:

GUIDE 9, Step C.3

Performance Step: 7 VERIFY MU24-FI > 20 gpm

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

Comment:

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

GUIDE 9, Step C.3 RNO

Performance Step: 8 ENSURE MU-V-18 is Open.

Standard: Examinee:

- Observes MU-V-18 is closed by Green light lit, and attempts to open MU-V-18 by pressing OPEN Pushbutton. May call to have NLO OPEN MU-V-18 locally.
- Recognizes that MU-V-18 will not open and continues on.

Comment:

GUIDE 9, Step C.4

Performance Step: 9 ENSURE MU-V-17 is Open.

Standard: Examinee ensures MU-V-17 is Open.

Comment:

GUIDE 9, Step C.5

Performance Step: 10 VERIFY PZR level is being restored.

Standard: Examinee recognizes MU24-FI is NOT > 20 gpm

Comment:

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

GUIDE 9, Step C.5 RNO

Performance Step: 11 THROTTLE MU-V-217.

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

Comment:

GUIDE 9, Step C.6

Performance Step: 12 VERIFY MU24-FI > 20 gpm

Standard: Examinee recognizes MU24-FI is NOT > 20 gpm

Comment:

GUIDE 9, Step C.6 RNO

Performance Step: 13 THROTTLE MU-V-16B or MU-V-16D.

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

Comment:

GUIDE 9, Steps C.7 and C.8

Performance Step: 14 VERIFY PZR level is being restored.

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

Comment:

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

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM B

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the Unit Reactor Operator (URO).
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- Increased Letdown flowrates are in effect IAW OP-TM-211-441, Increased Letdown Flowrates.

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

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	AOP211005
Task Title:	Restore Seal Injection with a Loss of ICCW – Alt Path	JPM No.:	TMI 2015 NRC JPM C
K/A Reference:	003 K6.02 2.7/3.1		Bank JPM, 2014 ILT NRC Exam

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: __X__

Classroom _____ Simulator __X__ Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- The Reactor is at 100% power.
- MU-P-1B has tripped and is not selected for ES from either power supply.
- You are the URO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.

Task Standard: Attempt to restore Seal Injection and trip the Reactor and Reactor Coolant Pumps when required.

Required Materials:

- OP-TM-AOP-041, Loss Of Seal Injection, Rev 6.

General References:

- OP-TM-AOP-041, Loss Of Seal Injection, Rev 6.
- OP-TM-EOP-001, Reactor Trip, Rev 12.

Initiating Cue: The Control Room Supervisor directs you to restore Seal Injection IAW OP-TM-AOP-041, Loss of Seal Injection.

Time Critical Task: N/A

Validation Time: 15 minutes

SIMULATOR SETUP

Exam Setup: IC 16, (Temp IC 239)

1. Insert the following:

   A. Remote **MUR12** on **Event #1** to open MU-V-76A&B

   B. **Trigger #2** **MU-P-1C>1.0**

   IMF CC04A 10

   C. Override **03A4S22-ZDIICP1B(4)** to **ON Immediately**

   D. Override **03A4S22-ZDIICP1B(1)** to **OFF Immediately**

   E. Override **03A4S22-ZDIICP1B(2)** to **OFF Immediately**

   F. Override **03A4S22-ZDIICP1B(3)** to **OFF Immediately**

   G. Override **03A4S22-ZDIICP1B(5)** to **OFF Immediately**

   H. Override **02A5S71-ZDICSMUP1A(1)** to **ON Immediately**

   I. Override **02A5S71-ZDICSMUP1A(2)** to **OFF Immediately**

   J. Override **02A5S71-ZDICSMUP1A(3)** to **OFF Immediately**

   K. Override **02A5S71-ZDICSMUP1A(4)** to **OFF Immediately**

   L. Override **02A5S71-ZDICSMUP1A(5)** to **OFF Immediately**

   M. Malfunction **RC36 Immediately**

   N. Malfunction **MU33A Immediately**

   O. Malfunction **MU31C Immediately**

2. Freeze the Simulator.

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

4. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

Evaluator's Cue: **Provide a copy of OP-TM-AOP-041, Loss Of Seal Injection.**

Evaluator's Note: **Steps 3.1 and 3.2 are "If At Any Time" steps and are not applicable at this time.**

OP-TM-AOP-041 Step 3.3

Performance Step: 1 ENSURE MU-V-32 is in HAND and Closed.

√ **Standard:** Examinee recognizes that MU-V-32 is in AUTO and open, and:

1. Presses the white HAND button on the MU-V-32 Bailey controller station, observing that the white HAND light is lit and the red AUTO light is not lit (CC).
2. √ Holds the toggle switch on the MU-V-32 Bailey controller station in the downward direction until MU-V-32 indicates closed by the indicator being at 0 (CC).

Comment:

OP-TM-AOP-041 Step 3.4

Performance Step: 2 When 1D or 1E 4160V bus is energized, then CONTINUE.

Standard: Examinee verifies 1D and/or 1E 4160V bus is energized and continues.

Comment:

OP-TM-AOP-041 Step 3.5

Performance Step: 3 VERIFY a makeup pump is operating (MU header pressure MU2-PI is above RCS pressure) and aligned to seal injection.

Standard: Examinee determines that a makeup pump is not operating by none of the three makeup pumps showing red running lights or amps (CC/CR) and goes to the RNO column.

Comment:

OP-TM-AOP-041 Step 3.5, RNO 1

Performance Step: 4 ENSURE MU-V-3 is Closed.

Standard: Examinee closes MU-V-3 by pressing the green closed pushbutton and verifying that the red Open light is not lit and the green closed light is lit (CC).

Comment:

OP-TM-AOP-041 Step 3.5, RNO 2

Performance Step: 5 ENSURE MU-V-17 is Closed.

Standard: Examinee closes MU-V-17 by:

1. Presses the white HAND button on the MU-V-17 Bailey controller station, observing that the white HAND light is lit and the red AUTO light is not lit (CC).
2. Holds the toggle switch on the MU-V-17 Bailey controller station in the downward direction until MU-V-17 indicates closed by the indicator being at 0 (CC).

Comment:

OP-TM-AOP-041 Step 3.5, RNO 3

Performance Step: 6 VERIFY [MU tank level >40"] or [MU-V-14A or B is Open].

Standard: Examinee verifies that MU tank level is greater than 40" by observing the MU-T level indicator (CC)

Comment:

Examiner Note: **Step 3.5, RNO 4 is N/A.**

OP-TM-AOP-041 Step 3.5, RNO 5

Performance Step: 7 If MU-V-77 A & B are Open, then GO TO section 4.0.

Standard: Examinee recognizes that MU-V-77A&B are open by the plate indicator (CC) or by recognizing the initial conditions did not state anything to contradict normal lineups, and Goes To Section 4.0

Comment:

Examiner Note: **Step 4.0 is N/A.**

Booth Operator Note: **If contacted as an NLO, reply that MU-P-1A has been verified as ES selected.**

OP-TM-AOP-041 Step 4.1

Performance Step: 8 Ensure MU-P-1A is ES Selected on MU-P-1A-43. (CB 338: 1D 4160V Bus Unit 7)

Standard: Examinee recognizes MU-P-1A is ES Selected from the initial conditions.

Comment:

OP-TM-AOP-041 Step 4.2

Performance Step: 9 VERIFY one of the following:
- MU-V-36 and 37 are Open
- MU-V-16A or 16B is Open

Standard: Examinee verifies that MU-V-36 and MU-V-37 are open by the red open lights lit, green closed lights not lit (CC)

Comment:

OP-TM-AOP-041 Step 4.3

Performance Step: 10 ENSURE DR-P-1A and DC-P-1A are operating.

Standard: Examinee:

1. Starts DR-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CC).
2. Starts DC-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CC).

Comment:

OP-TM-AOP-041 Step 4.4

Performance Step: 11 START MU-P-1A.

Standard: Examinee attempts to start MU-P-1A by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, recognizes that MU-P-1A fails to start by red running light not lit, green stop and yellow mismatch lights lit, and no amps (CC).
Examinee Goes to RNO column.

Comment:

Examiner Note: **Step 4.4, RNO 1 is N/A.**

OP-TM-AOP-041 Step 4.4, RNO 2

Performance Step: 12 If MU-P-1C is available, then GO TO Section 6.0.

Standard: Examinee determines that MU-P-1C is available and Goes To Section 6.0.

Comment:

Booth Operator Cue: **If contacted as an NLO to open MU-V-76A&B, acknowledge the direction and insert EVENT #1 to open MU-V-76A&B.**

OP-TM-AOP-041 Step 6.0

Performance Step: 13 If MU-V-76A & B are closed and HPI train A and Normal MU header piping is intact, then DISPATCH an operator to open MU-V-76 A & B. (AB 281: MU valve alley)

Standard: Examinee determines that MU-V-76A&B are closed by the plate indicator (CC) or by recognizing the initial conditions did not state anything to contradict normal lineups, and dispatches an NLO to open MU-V-76A and MU-V76B.

Comment:

OP-TM-AOP-041 Step 6.1

Performance Step: 14 Ensure MU-P-1C is ES Selected on MU-P-1C-43. (CB 338: 1E 4160V Bus Unit 9)

Standard: Examinee recognizes MU-P-1C is ES Selected from the initial conditions.

Comment:

OP-TM-AOP-041 Step 6.2

Performance Step: 15 VERIFY one of the following:
- MU-V-36 and 37 are Open
- MU-V-16A or 16B is Open

Standard: Examinee verifies that MU-V-36 and MU-V-37 are open by the red open lights lit, green closed lights not lit (CC)

Comment:

OP-TM-AOP-041 Step 6.3

Performance Step: 16 ENSURE DR-P-1B and DC-P-1B are operating.

Standard: Examinee:

√ 1. Starts DR-P-1B by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).

√ 2. Starts DC-P-1B by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).

Comment:

OP-TM-AOP-041 Step 6.4

Performance Step: 17 START MU-P-1C.

√ **Standard:** Starts MU-P-1C by rotating the Control switch clockwise to the Start position, releasing to the Normal-After-Start position, and verifying red running light lit, green stop light not lit, and amps (CR).

Comment:

Alternate Path Begins

Booth Operator Cue: **Ensure Event #2 is triggered when MU-P-1C is started. If not, then Insert Event #2.**

OP-TM-AOP-041 Step 3.1.A

Performance Step: 18 IAAT ICCW flow is < 550 GPM (IC-5 FI) and SI Flow < 22 GPM, then perform the following:

A. ENSURE the reactor is tripped.

Standard: Examinee recognizes that ICCW flow is < 550 GPM (CR) and SI Flow < 22 GPM (CC) and performs the Immediate Manual Actions of OP-TM-EOP-001.

Comment:

OP-TM-EOP-001, Step 2.1

Performance Step: 19 PRESS both Reactor Trip and DSS pushbuttons.

√ **Standard:** Examinee presses the Reactor Trip pushbutton (CC) and the DSS pushbutton (CC).

Comment:

OP-TM-EOP-001, Step 2.2

Performance Step: 20 VERIFY REACTOR SHUTDOWN.

Standard: Examinee verifies the reactor is shutdown as defined in OS-24, Conduct of Operations During Abnormal and Emergency Events:

The reactor is shutdown when the heat generation by fission has been stopped. This condition can be confirmed immediately following a reactor trip as follows:
1) Power Range NI's indicate less than 5%,
2) all control rods are inserted, or
3) source range count rate is continuously lowering.

Comment:

OP-TM-EOP-001, Step 2.3

Performance Step: 21 PRESS Turbine Trip pushbutton.

Standard: Examinee presses the Turbine Trip pushbutton (CL)

Comment:

OP-TM-EOP-001, Step 2.4

Performance Step: 22 VERIFY the turbine stop valves are Closed.

Standard: Examinee verifies the Turbine Stop Valves are closed by observing the digital indications on CL.

Comment:

Examiner Note: **The examinee may perform a symptom check at this time, but it is not required.**

	Performance Step: 23	***OP-TM-AOP-041 Step 3.1.B*** IAAT ICCW flow is < 550 GPM (IC-5 FI) and SI Flow < 22 GPM, then perform the following: B. ENSURE all RCPs are tripped.
√	**Standard:**	Examinee secures RC-P-1A by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).
√		Examinee secures RC-P-1B by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).
√		Examinee secures RC-P-1C by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).
√		Examinee secures RC-P-1D by rotating the Control Switch (CC) counter-clockwise to the "Stop" position and releasing it to the "Normal-After-Stop" position, verifying the green light is lit, red light is not lit, and amps indicate zero (CC).
	Comment:	

Terminating Cue: **After RCP's are secured, evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM C

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- The Reactor is at 100% power.
- MU-P-1B has tripped and is not selected for ES from either power supply.
- You are the URO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.

INITIATING CUE: The Control Room Supervisor directs you to restore Seal Injection IAW OP-TM-AOP-041, Loss of Seal Injection.

TIME CRITICAL: No

Facility:	TMI Unit 1	Task No.:	FWC001
Task Title:	Respond to an OTSG Overfeed – Alt Path	JPM No.:	TMI 2015 NRC JPM D
K/A Reference:	SYS 035 A2.04 (3.6/3.8)	New JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- For this event you are assigned the duties of the ARO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The unit is operating at 100% power.
- OP-TM-621-471, ICS Manual Control and OP-TM-301-471, Manual Control of the Main Turbine have been initiated due to fluctuations in ICS performance.
- The URO has just stepped off of the carpet to get his lunch and has turned over reactivity to you.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: MAP J-1-6, OTSG B Level Hi, Revision 12

OP-TM-EOP-001, Reactor Trip, Rev 12

OP-TM-621-471, ICS Manual Control, Rev 7, filled out through step 4.6.3

OP-TM-421-451, Manual Control of Feed Flow to "A" OTSG, Rev 3

OP-TM-421-452, Manual Control of Feed Flow to "B" OTSG, Rev 3

Handout:	None
Initiating Cue:	Perform OP-TM-421-451, Manual Control of Feed Flow to "A" OTSG and OP-TM-421-452, Manual Control of Feed Flow to "B" OTSG to place Feedwater Valves in ICS HAND Control.
Time Critical Task:	No
Validation Time:	7 minutes

SIMULATOR SETUP

- IC-16 (Temporarily snapped in IC-198)
- Insert The following Overrides:
  - ZDIICS32BMCS(1) AUT OFF EVENT 1
  - ZDIICS32BMCS(2) MAN ON EVENT 1
  - ZDIICS32BMCS(3) RSE ON EVENT 1
  - ZDIICS32BMCS(4) LOW OFF EVENT 1

  - ZDIICS35BMCS(1) OFF EVENT 1
  - ZDIICS35BMCS(2) MAN ON EVENT 1
  - ZDIICS35BMCS(3) ON EVENT 1
  - ZDIICS35BMCS(4) OFF EVENT 1

  - ZLOFWV5B(2) RED ON IMMEDIATELY
- Insert the following Malfunctions:
  - RD28 INSERT IMMEDIATELY
  - RD32 INSERT IMMEDIATELY
  - IC32A INSERT IMMEDIATELY
  - IC32B INSERT IMMEDIATELY
  - FW13B INSERT IMMEDIATELY
- Insert the following Triggers:
  - TRIGGER 1 ZDIICS35BMCS(2)==1
INSERT
  - TRIGGER 2 ZDIFWV5B(2)==1
DMF FW13B
  - TRIGGER 3 ZDIFWV5B(2)==1
DOR ZLOFWV5B(2)

  - TRIGGER 4 RC002==97.5
IMF XXX

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR NOTE: **Once the procedures are located and if requested, hand the Examinee a copy of OP-TM-421-451 and OP-TM-421-452.**

OP-TM-421-451, Step 3.3:

Performance Step: 1

Prerequisites:

3.3.1 Verify Condensate and Feedwater (421) Systems not in System Shutdown Mode IAW OP-TM-421-000, Condensate and Feedwater Systems.

3.3.2 Verify SG A FW DEMAND station in HAND.

Standard:

- Examinee verifies that the Condensate and Feedwater Systems not in System Shutdown Mode from the initial conditions of 100% Reactor Power.
- Examinee verifies that the SG A FW DEMAND station in HAND by the white HAND light lit and the red AUTO light not lit (CC).

Comment:

OP-TM-421-451, Step 4.1.1:

Performance Step: 2

If FW-V-17A is the controlling valve, then

1. Place SU FW VLV FW-V-16A in HAND.
2. Place MFW VLV FW-V-17A in HAND.

Standard:

- Examinee determines that MU-V-17A is the controlling valve since, at 100% power, FW-V-16A is 100% open and FW-V-17A is throttled.
- √ Examinee places FW-V-16A in HAND by pressing the white HAND pushbutton for FW-V-16A on the FW-V-16A Bailey Control Stations and verifying that the white HAND light is lit and the red AUTO light is not lit (CC).
- √ Examinee places FW-V-17A in HAND by pressing the white HAND pushbutton for FW-V-17A on the FW-V-17A Bailey Control Stations and verifying that the white HAND light is lit and the red AUTO light is not lit (CC).

Comment:

EVALUATOR NOTE: **OP-TM-421-451, Step 4.1.3 should not need to be performed. Step 4.1.4 is N/A.**

OP-TM-421-452, Step 3.3:

Performance Step: 3

Prerequisites:

3.3.1 Verify Condensate and Feedwater (421) Systems not in System Shutdown Mode IAW OP-TM-421-000, Condensate and Feedwater Systems.

3.3.2 Verify SG B FW DEMAND station in HAND.

Standard:

- Examinee verifies that the Condensate and Feedwater Systems not in System Shutdown Mode from the initial conditions of 100% Reactor Power.
- Examinee verifies that the SG B FW DEMAND station in HAND by the white HAND light lit and the red AUTO light not lit (CC).

Comment:

OP-TM-421-452, Step 4.1.1:

Performance Step: 4

If FW-V-17B is the controlling valve, then

1. Place SU FW VLV FW-V-16B in HAND.
2. Place MFW VLV FW-V-17B in HAND.

Standard:

- Examinee determines that MU-V-17B is the controlling valve since, at 100% power, FW-V-16B is 100% open and FW-V-17B is throttled.
- Examinee places FW-V-16B in HAND by pressing the white HAND pushbutton for FW-V-16B on the FW-V-16B Bailey Control Stations and verifying that the white HAND light is lit and the red AUTO light is not lit (CC).
- Examinee places FW-V-17B in HAND by pressing the white HAND pushbutton for FW-V-17B on the FW-V-17B Bailey Control Stations and verifying that the white HAND light is lit and the red AUTO light is not lit (CC).

Comment:

EVALUATOR NOTE: **OP-TM-421-452, Step 4.1.3 should not need to be performed. Step 4.1.4 is N/A.**

BOOTH CUE: **Ensure EVENT #1 has been inserted on the FW-V-17B trigger.**

Alternate Path starts here when candidate enters OP-TM-MAP-J0106.

PROCEDURE NOTE: **CAUTION: If taking manual action with FW-V-16B/17B, do so carefully coordinating with RCS parameters so as not to cause a Reactor trip.**

BOOTH CUE: **If directed to manually close FW-V-17B or any other valve, acknowledge the order ONLY. No action will be taken.**

BOOTH CUE: **If directed to manually trip FW-P-1A and FW-P-1B, acknowledge the order ONLY. No action will be taken.**

MAP J-1-6, Manual Action Step 1:

Performance Step: 5 If as a result of an unplanned event, the "B" OTSG Operating Rg. Lvl is > alarm setpoint and is verified by diverse and redundant indications:

a. Take manual control of OTSG B Feedwater control as necessary to maintain level < alarm setpoint.
b. If EFW is operating throttle EF-V-30B and C as necessary.

Standard:

- Examinee attempts to lower Feedwater flow to the "B" OTSG by lowering on the toggle switch for FW-V-17B on the FW-V-17B Bailey Control Stations but recognizes that FW-V-17B is not responding in HAND control, as evidenced by no change in valve position or feedwater flowrate (CC).
- Examinee may attempt to lower Feedwater flow to the "B" OTSG by placing FW-V-17B in AUTO by pressing the red AUTO pushbuttons on the Bailey Control Station. This will not work, as evidenced by no change in valve position or feedwater flowrate (CC).
- Examinee may attempt to secure Feedwater flow to the "B" OTSG by tripping the "A" and "B" Main Feedwater Pumps by pressing the respective trip pushbuttons. This also does not resolve the problem, as evidenced by no change in valve position or feedwater flowrate (CC).

Comment:

Performance Step: 6

MAP J-1-6, Manual Action Step 2a:
If HSPS MFW Isolation occurs at power:
a. Verify isolation (FW-V-5B, 92B, 16B and 17B shut)

√ **Standard:**

- Examinee determines that HSPS isolation has not occurred and presses the green close pushbutton for FW-V-5B and FW-V-92B, verifying the green Closed light lit and the red Open light not lit for each (CC).

Comment:

Performance Step: 7

MAP J-1-6, Manual Action Step 2b:
If HSPS MFW Isolation occurs at power:
b. Trip the reactor

√ **Standard:**

Examinee trips the reactor by pressing the Reactor Trip and DSS pushbuttons (CC).

Comment:

Performance Step: 8

MAP J-1-6, Manual Action Step 2c:
If HSPS MFW Isolation occurs at power:
c. Go to OP-TM-EOP-001

Standard:

Examinee goes to OP-TM-EOP-001

Comment:

EVALUATOR NOTE: **OP-TM-EOP-001, Step 2.1 has already been performed.**

OP-TM-EOP-001, Step 2.2

Performance Step: 9 VERIFY REACTOR SHUTDOWN.

Standard: Examinee verifies the reactor is shutdown as defined in OS-24, Conduct of Operations During Abnormal and Emergency Events:

The reactor is shutdown when the heat generation by fission has been stopped. This condition can be confirmed immediately following a reactor trip as follows:
1) Power Range NI's indicate less than 5%,
2) All control rods are inserted or
3) Source range count rate is continuously lowering.

Comment:

OP-TM-EOP-001, Step 2.3

Performance Step: 10 PRESS Turbine Trip pushbutton.

Standard: Examinee presses the Turbine Trip pushbutton (CL)

Comment:

OP-TM-EOP-001, Step 2.4

Performance Step: 11 VERIFY the turbine stop valves are Closed.

Standard: Examinee verifies the Turbine Stop Valves are closed by observing no illuminated red bars on the digital indications (CL).

Comment:

OP-TM-EOP-001, Step 2.4 RNO Step 3

Performance Step: 12 Initiate Guide 12, "RCS Stabilization"

Standard: Guide 12 is initiated

Comment:

Terminating Cue: **When guide 12 has been initiated, the JPM may be terminated.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM D

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- For this event you are assigned the duties of the ARO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The unit is operating at 100% power.
- OP-TM-621-471, ICS Manual Control and OP-TM-301-471, Manual Control of the Main Turbine have been initiated due to fluctuations in ICS performance.
- The URO has just stepped off of the carpet to get his lunch and has turned over reactivity to you.

INITIATING CUE: Perform OP-TM-421-451, Manual Control of Feed Flow to "A" OTSG and OP-TM-421-452, Manual Control of Feed Flow to "B" OTSG to place Feedwater Valves in ICS HAND Control.

TIME CRITICAL: No

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	21401004
Task Title:	Initiate RB Spray – Alt Path	JPM No.:	TMI 2015 NRC JPM E
K/A Reference:	026 A2.03 4.1/4.4	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:
- You are the URO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor tripped due to a large RCS leak.
- ESAS Actuation has occurred.

Task Standard: All critical steps SAT

Required Materials: None

General References:
- OP-TM-214-901, RB Spray Operation, Rev. 4
- OP-TM-642-903, 30 PSIG ESAS Actuation, Rev. 1
- OP-TM-244-901, Containment Isolation, Rev. 3

Handout:
- OP-TM-214-901, RB Spray Operation, Rev. 4
- OP-TM-642-903, 30 PSIG ESAS Actuation, Rev. 1

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

Time Critical Task: No

Validation Time: 10 minutes

SIMULATOR SETUP

1. Initialize the Trainer to Temp IC 188.

    a. Insert MALFUNCTION BS05B, BS-P-1B ES Start Failure
    b. Insert MALFUNCTION ES04B, ES Fail to Actuate at Hi RB Press (4#)
    c. Insert MALFUNCTION ES03B, ES Fail to Actuate at HiHi RB Press (30#)
    d. SET I/O OVERRIDE 03A4S02-ZDIPB1RBB to OFF ('B' Train 4# Manual PB)
    e. Insert MALFUNCTION TH05 at 50%
    f. Perform IMAs of OP-TM-EOP-001
    g. 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 CUE: **Go to RUN on the Simulator.**

OP-TM-642-903 Step 3.1

Performance Step: 1 Precautions.

Standard: Examinee reviews the Precautions.

Comment:

EVALUATOR NOTE: **Wide Range RB Pressure is >30#**

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: Examinee verifies CRS direction to initiate 30 psig ESAS actuation.

Comment:

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.**

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 determines the Train "A" "RB PRESS 30 PSIG ACTUATION" lights are blue on PCR.

Comment:

EVALUATOR NOTE: **The examinee may recognize that "B" Train 30# ES Containment Isolation Valves did not isolate and may press the "B" Train 30 PSIG Manual Actuation pushbutton (CR).**

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 "B" "MANUAL ES ACTUATION" "30 PSIG RB PRESS" (CC) pushbutton.

Standard: Examinee determines the Train "B" "RB PRESS 30 PSIG ACTUATION" lights are blue on PCR.
Examinee may note "B" side 30 PSIG isolation failed to occur and Presses 30 PSIG Manual Actuation PB on (CR).

Comment:

OP-TM-642-903 Step 4.3.1

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

- Initiate OP-TM-214-901 "RB Spray Operation".

Standard: 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 3.1-3.2

Performance Step: 6 Precautions and Limitations of OP-TM-214-901

Standard: Examinee reviews the Precautions and Limitations.

Comment:

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

OP-TM-214-901 Step 3.3

Performance Step: 7

Prerequisites:

- Verify RB spray system was in ES standby IAW OP-TM-214-000.
- Verify RB Spray has been automatically actuated or Reactor building pressure is approaching 30 psig or Emergency Director has authorized use of RB Spray.
- Verify 1D or 1E 4160V Bus is energized

Standard: Examinee determines the Prerequisites are met.

Comment:

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.**

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

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:

- Examinee verifies that DH-V-5A, BS-V-3A and BS-V-1A are open as indicated by the RED open lights being on and the GREEN closed lights off.
- 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: Examinee verifies 1E 4160V bus is energized as indicated by the bus voltmeter reading approximately 4160V.

Comment:

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:

- 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.
- 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.
- Examinee goes to Section 4.2.

Comment:

Alternate Path begins

EVALUATOR NOTE: **Step 4.2.1 is N/A.**

OP-TM-214-901 Step 4.2.2.1

Performance Step: 12 If initiating BS Train B, then perform the following:

- Verify 1E 4160V bus is energized.

Standard: 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 initiating BS Train B, then perform the following:
- If DH-V-5B or DH-V-6B is not open…

Standard: 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 initiating BS Train B, then perform the following:
- 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:
- Examinee determines BS-P-1B is shutdown as indicated by the RED on light is not lit and the GREEN off light is lit on CR.
- √ Examinee presses the open pushbutton for BS-V-3B and verifies BS-V-3B is open as indicated by the RED open light is on and the GREEN closed light is off on CR or PCR.

Comment:

OP-TM-214-901 Step 4.2.2.4

Performance Step: 15 If initiating BS Train B, then perform the following:
- 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:
- Examinee determines BS-P-1B is shutdown as indicated by the RED on light is not lit and the GREEN off light is lit on CR.
- √ Examinee presses the open pushbutton for BS-V-1B and verifies BS-V-1B is open as indicated by the RED open light is on and the GREEN closed light is off on CR or PCR.

Comment:

Performance Step: 16

OP-TM-214-901 Step 4.2.2.5

If initiating BS Train B, then perform the following:

- 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:

- 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.

√

- Examinee starts BS-P-1B by rotating the Control Switch in the clockwise direction, and verifies that BS-P-1B is operating as indicated by the RED breaker closed indication on and the GREEN breaker open indicator off on CR.

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.: TMI 2015 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 URO.
- The instructor/examiner will act as the ARO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- 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.

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	21301001
Task Title:	Lower CFT Level and Pressure from the Control Room	JPM No.:	TMI 2015 NRC JPM F
K/A Reference:	006 A4.02 (4.0 / 3.8)	New JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- For this event you are assigned the duties of the Third RO.
- The instructor/examiner will act as the URO, ARO and CRS.
- The ICO will act as the Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- MAP D-2-7, CF TNK 1A LEVEL/PRESS HI/LO, has just alarmed.
- The Core Flood System is in the ES Standby Mode.
- Core Flood Sample valve lineup is current IAW N1807, Primary Chemistry Sampling.
- High Pressure Nitrogen is available IAW 1104-26, Nitrogen Supply System.
- The Vent Header is lined up to MWST IAW 1104-27, Waste Disposal – Gaseous.
- OP-TM-220-251, RCS Leak Rate Determination, is not in progress.

Task Standard:	All critical steps SAT
Required Materials:	None
General References:	OP-TM-MAP-D0207, CF TNK 1A LEVEL/PRESS HI/LO, Rev 2 OP-TM-213-465, Lowering CF-T-1A Level, Rev 2 OP-TM-213-477, Lowering CF-T-1A Nitrogen Pressure During ES Standby Mode, Rev 4 OP-TM-213-473, Raising CF-T-1A, Rev 3, filled out through 4.3.3 OP-TM-213-000, Core Flood System, Rev 10
Handout:	None
Initiating Cue:	The Control Room Supervisor has directed you to return CF-T-1A to normal bands IAW OP-TM-MAP-D0207.
Time Critical Task:	YES
Validation Time:	23 minutes

SIMULATOR SETUP

- 100% IC16 (Temporarily snapped into IC-236)

1. Insert the following:

   - **03A3M21-ZAOWDLLI805** to a value of **15.0 immediately**.
   - **03A3M21-ZAOWDLLI804** to a value of **15.0 immediately**.
   - **03A3M09-ZAODHLI811** to a value of **4.0 immediately**.
   - **06A2A6-ZAORBPI 1186** to a value of **0.7 immediately**
   - **06A2A7-ZAOBSPI982B** to a value of **25.2 immediately**.
   - **06A2A8-ZAOBSPI982A** to a value of **0.04 immediately**.
   - **06A2A9-ZAOBSPI981A** to a value of **0.03 immediately**.
   - **14A1AR1-ZAOLI115(2)** to:
     - an **INITIAL VALUE of 46.0**
     - a **FINAL VALUE of 48.0**
     - **ramp of 5 minutes** on **EVENT #1**

   - **Mudmgastank(8)** to a value of **1835.0 immediately** or as necessary to ensure CF-T-1A is between 655-660#.
   - **Mudmasstank(8)** to a value of **50750.0 immediately** or as necessary to ensure CF-T-1A is >12.01 ft.

   - **DH07A** to a value of **100.0** on **EVENT #1**
   - **DH15A** to a value of **0.4** on **EVENT #1**
   - **DHR07** to a value of **close** on **EVENT #4**

- **TRIGGER #1:**
  - **ZDIPBOCFV2A==1**
  - **EVENT #1**

- **TRIGGER #2:**
  - **ZDIPBCCFV2A==1**
  - **DMF DH07A**

- **TRIGGER #3:**
  - **ZDIPBCCFV2A==1**
  - **DMF DH15A**

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

3. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____ TIME CRITICAL START TIME: Same as Start Time

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

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

EVALUATOR CUE: **If the examinee identifies the need to refer to Tech Specs, state that the CRS will refer to the appropriate Tech Specs.**

OP-TM-MAP-D0207, Step 4.0

Performance Step: 1

- MONITOR PPC Area 5 Group 26 for CF-Tank's parameters.
- ADJUST level and/or pressure as required IAW OP-TM-213 series procedures.
- If either CFT pressure indication is outside of 585 to 615 psig or level indication is outside of 11.29 to 11.87 ft and Reactor is critical, then REFER Tech. Spec. 3.3.1.2.a Action Statement.

Standard:

- Examinee determines that CF-T-1A level AND pressure are high out of band and refers to OP-TM-213-000, Core Flood System.

- Examinee determines that OP-TM-213-465, Lowering CF-T-1A Level, will be used to lower CF-T-1A level.

- Examinee determines that OP-TM-213-477, Lowering CF-T-1A Nitrogen Pressure during ES Standby Mode, will be used to lower CF-T-1A pressure.

Comment:

EVALUATOR NOTE: **The following steps are to lower CF-T-1A Level IAW OP-TM-213-465. The steps to lower CF-T-1A pressure are found on page 10 of this JPM.**

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

OP-TM-213-465, Steps 3.0 through 4.1

Performance Step: 2 Precautions, Limitations, and Prerequisites

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

Comment:

OP-TM-213-465, Step 4.2

Performance Step: 3 USE the following points on the PPC to monitor changes (Area 5 Group 26)

A0476, CF TANK 1A PRESS 1

A0477, CF TANK 1A PRESS 2

A0480, CF TANK 1A LEVEL 1

A0481, CF TANK 1A LEVEL 2

Standard: Examinee selects the above points on the PPC.

Comment:

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

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

OP-TM-213-465, Step 4.4

Performance Step: 4 Drain CF Tank using 4.5 or 4.6 (NA the other steps).

Standard: Examinee determines that, since CFT pressure is greater than 50 psig and that the reactor is NOT shutdown, Section 4.5 is the applicable section to use.

Comment:

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

OP-TM-213-465, Step 4.5.1

Performance Step: 5 OPEN CF-V-18B.

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

Comment:

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

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

OP-TM-213-465, Step 4.5.2

Performance Step: 6 OPEN CF-V-20A (PL).

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

Comment:

BOOTH CUE: **Ensure Trigger 1 occurs when CF-V-2A is opened. If not, insert Event #1.**

OP-TM-213-465, Step 4.5.3

Performance Step: 7 OPEN CF-V-2A (CC).

√ **Standard:** Examinee opens CF-V-2A by pressing the open pushbutton, verifying red open light lit, green close light not lit.

Comment:

EVALUATOR CUE: **If asked, give a target level band of 11.60-11.70 ft.**

PROCEDURE NOTE: **CF-T-1A must be maintained > 11.35 ft when the Reactor is critical.**

BOOTH CUE: **Ensure Triggers 2 and 3 occur when CF-V-20A is closed. If not, then delete DH07A and DH15A.**

OP-TM-213-465, Step 4.5.4

Performance Step: 8 When CF-T-1A reaches the desired level, then CLOSE CF-V-20A (PL).

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

Comment:

OP-TM-213-465, Step 4.5.5

Performance Step: 9 CLOSE CF-V-2A (CC).

√ **Standard:** Examinee closes CF-V-2A by pressing the close pushbutton, verifying red open light not lit, green close light lit.

Comment:

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

OP-TM-213-465, Step 4.5.1

Performance Step: 10 CLOSE CF-V-18B.

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

Comment:

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

OP-TM-213-477, Steps 3.0 through 4.1

Performance Step: 11 Precautions, Limitations, and Prerequisites

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

Comment:

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

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

OP-TM-213-477, Step 4.2

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

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

Comment:

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

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

OP-TM-213-477, Step 4.3

Performance Step: 13 CLOSE CF-V-3A-BK (Unit 6C on 1A RW MCC).

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

Comment:

OP-TM-213-477, Step 4.4

Performance Step: 14 TREND the following points on the PPC: (Area 5 Group 26)

- A0476, CF TANK 1A PRESS 1
- A0477, CF TANK 1A PRESS 2
- A0480, CF TANK 1A LEVEL 1
- A0481, CF TANK 1A LEVEL 2

Standard: Examinee selects the above points on the PPC.

Comment:

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

EVALUATOR CUE: **If addressed, state that an extra Reactor Operator is monitoring RCDT level.**

OP-TM-213-477, Step 4.6

Performance Step: 15 VENT CF-T-1A as needed using CF-V-3A (CC).

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

Comment:

EVALUATOR NOTE: **Time Critical Stop Time is when both Level and Pressures are returned to within the Tech Spec bands.**

Level : 11.13 – 12.01 ft

Pressure: 575 – 625 psig

TIME CRITICAL STOP TIME: _____

OP-TM-213-477, Step 4.7

Performance Step: 16 VERIFY a pressure decrease in CF-T-1A.

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

Comment:

OP-TM-213-477, Step 4.8

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

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

Comment:

OP-TM-213-477, Step 4.9

Performance Step: 18 VERIFY a stable trend on the following PPC points (Area 5 Group 26):

- A0476, CF TANK 1A PRESS 1
- A0477, CF TANK 1A PRESS 2

Standard: Examinee verifies the above points are stable.

Comment:

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

OP-TM-213-477, Step 5.1

Performance Step: 19 VERIFY CF-T-1A parameters as follows:

- CF-T-1A Pressure is > 585 psig and < 615 psig.
- CF-T-1A Level is > 11.35 ft and < 11.81 ft.

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

Comment:

Terminating Cue: **When examinee has returned CF-T-1A level and pressure to the required bands, JPM may be terminated.**

STOP TIME: _____

TIME CRITICAL START TIME – CRITICAL STOP TIME: (Must be less than 60 minutes)

_____ - _____ = _____ **Minutes**

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 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:

- For this event you are assigned the duties of the Third RO.
- The instructor/examiner will act as the URO, ARO and CRS.
- The ICO will act as the Auxiliary Operators in the plant as needed.
- The Reactor is operating at 100% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- MAP D-2-7, CF TNK 1A LEVEL/PRESS HI/LO, has just alarmed.
- The Core Flood System is in the ES Standby Mode.
- Core Flood Sample valve lineup is current IAW N1807, Primary Chemistry Sampling.
- High Pressure Nitrogen is available IAW 1104-26, Nitrogen Supply System.
- The Vent Header is lined up to MWST IAW 1104-27, Waste Disposal – Gaseous.
- OP-TM-220-251, RCS Leak Rate Determination, is not in progress.

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

TIME CRITICAL: YES

Facility:	THREE MILE ISLAND UNIT 1	Task No.:	64101001
Task Title:	Startup Reactor Protection System Channel	JPM No.:	TMI 2015 NRC JPM G
K/A Reference:	012 A4.02 3.3/3.4	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- The Reactor is at 100% power.
- You are the ARO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- "D" RPS was de-energized.
- Breaker 19 on VBD has been closed.
- OP-TM-641-404, section 4.0 has been completed.
- It is desired to close breakers from the Control Room, if applicable.

Task Standard: "D" RPS channel is re-energized, reset, out of manual bypass, the CRD breakers are closed and the electronic trips reset

Required Materials:

- OP-TM-641-404 Rev 1, De-energizing RPS Channel D
- OP 1105-11, Auxiliary Instrumentation and Control Systems, Rev. 39
- OP-TM-641-421, Tripping and Resetting RPS Channels, Rev. 2
- OP-TM-622-401, Closing CRD Breaker Locally, Rev. 4

General References:

- OP-TM-641-404 Rev 1, De-energizing RPS Channel D
- OP 1105-11, Auxiliary Instrumentation and Control Systems, Rev. 39
- OP-TM-641-421, Tripping and Resetting RPS Channels, Rev. 2
- OP-TM-622-401, Closing CRD Breaker Locally, Rev. 4

Initiating Cue: The Control Room Supervisor directs you to reset the "D" RPS channel and restore the channel to normal condition for power operation, per Section 5.0 of OP-TM-641-404, De-energizing RPS Channel D.

Time Critical Task: N/A

Validation Time: 33 minutes

SIMULATOR SETUP

Exam Setup: IC 16, (Temp IC 235)

- Select IC-16 - 100% hot full power (MOC)
- Use OP-TM-641-404 and perform the actions in section 4.0.

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE: **Provide a copy of OP-TM-641-404 signed off through step 4.3.3.**

Performance Step: 1 Operator reviews procedure.

Standard: Examinee determines section 5.0 is to be completed.

Comment:

BOOTH CUE: **CRO at VBD reports breaker 19 for RPS Channel D is ON.**

OP-TM-641-404 Step 5.1.1

Performance Step: 2 Ensure breaker 19 (RPS Channel D) ON at VBD.

Standard: Examinee contacts the operator at VBD to ensure the breaker is ON.

Comment:

OP-TM-641-404 Step 5.1.2

Performance Step: 3 Verify Power Available lamp lit at NI/RPS D Subassembly Cabinet 1 (CM-1)

Standard: Examinee verifies the Power Available lamp is lit.

Comment:

OP-TM-641-404 Step 5.1.3.1

Performance Step: 4 Ensure the System AC Power (Dual Breaker) switch is ON at NI/RPS Subassembly Cabinet 1.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.3.2

Performance Step: 5 Ensure the System Fans (Left Breaker) switch is ON at NI/RPS Subassembly Cabinet 1.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.3.3

Performance Step: 6 Ensure the System Fans (Right Breaker) switch is ON at NI/RPS Subassembly Cabinet 1.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.4

Performance Step: 7 Place the AC Power to Rectifier (-15 Volt RPS DC Power Supply) switch On at NI/RPS Subassembly Cabinet 2.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.5.1

Performance Step: 8 Place the AC Power to Rectifier (+15 Volt RPS DC Power Supply) switch On at NI/RPS Subassembly Cabinet 1.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.5.2

Performance Step: 9 Place the System DC Power (AC-Supply-Bakelite Tag) switch On at NI/RPS Subassembly Cabinet 1.

√ **Standard:** Examinee turns the switch to the ON position.

Comment:

OP-TM-641-404 Step 5.1.5.3

Performance Step: 10 Place the Contact Monitor P. S. switch On at NI/RPS Subassembly Cabinet 1.

- Press Reset Toggle
- Verify volts on scale

√ **Standard:** Examinee turns the switch to the ON position.

√ Examinee presses the reset toggle switch.

Examinee verifies volts are on scale.

Comment:

OP-TM-641-404 Step 5.1.5.4

Performance Step: 11 Place the Detector P. S. NI-8 (Detector Power Supply) switch On at NI/RPS Subassembly Cabinet 1.

- Press Reset Toggle
- Verify volts on scale

√ **Standard:** Examinee turns the switch to the ON position

√ Examinee presses the reset toggle switch

Examinee verifies volts are on scale.

Comment:

EXAMINER CUE: **When requested provide the operator with OP 1105-11.**

OP-TM-641-404 Step 5.1.6

Performance Step: 12 RESET NI-4 related modules IAW Enclosure 5 of 1105-11, Auxiliary Instrumentation and Control Systems.

Standard: Examinee goes to 1105-11.

Comment:

OP 1105-11 Enclosure 5 Step 1

Performance Step: 13 At P.S. NI-4 (Auxiliary Power Supply):

- ENSURE Power Switch On.
- PRESS Reset toggle.
- VERIFY volts on scale.

√ **Standard:** Examinee turns the switch to the ON position

√ Examinee presses the reset toggle switch

Examinee verifies volts are on scale.

Comment:

OP 1105-11 Enclosure 5 Step 2

Performance Step: 14 At Detector P.S. NI-4:

- ENSURE Power Switch On.
- PRESS Reset toggle.
- VERIFY volts on scale.

√ **Standard:** Examinee turns the switch to the ON position

√ Examinee presses the reset toggle switch

Examinee verifies volts are on scale.

Comment:

OP 1105-11 Enclosure 5 Step 3

Performance Step: 15 At SUR ROD/WD INHIBIT Bistable:

- PRESS OUTPUT STATE Reset and VERIFY OUTPUT STATE lamp Dim.
- PRESS OUTPUT MEMORY Reset and VERIFY OUTPUT MEMORY lamp Dim.

√ **Standard:** Examinee presses the output state reset toggle switch

√ Examinee presses the output memory reset toggle switch

Examinee verifies both the OUTPUT STATE and OUTPUT MEMORY lamps are dim.

Comment:

EVALUATOR NOTE: **1105-11, Enclosure 5, Step 4 is N/A.**

EVALUATOR NOTE: **When requested provide the operator with OP-TM-641-421.**

OP-TM-641-404 Step 5.1.7

Performance Step: 16 RESET "D" RPS Channel IAW OP-TM-641-421, Tripping and Resetting RPS Channels.

Standard: Examinee goes to OP-TM-641-421.

Comment:

EVALUATOR CUE: **If requested as CRS to verify Tech Spec compliance state, "Tech Spec 3.5.1 is being complied with"**

OP-TM-641-421, Sections 1.0 , 2.0 , 3.0

Performance Step: 17 Reviews Sections 1, 2, 3.

Standard: Sections reviewed steps 3.3.1 and 3.3.2 signed off.

Comment:

EVALUATOR CUE: **Concurrence is given to reset the D RPS logic.**

OP-TM-641-421, Step 5.1

Performance Step: 18 VERIFY Shift Management concurrence to reset RPS logic.

Standard: Examinee receives concurrence to reset RPS logic.

Comment:

EVALUATOR NOTE: **Step 5.2 is N/A**

PROCEDURE NOTE: **Steps 5.3.1, 5.3.2, 5.3.3, and 5.3.4 may be commenced in any order.**

OP-TM-641-421, Step 5.3.4.1

Performance Step: 19 Perform Attachment 7.4

Standard: Examinee Goes to OP-TM-641-421, Attachment 7.4

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 20 Press ∅/PN Trip Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the ∅/PN Trip Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 21 Press POWER IMBALANCE FLOW Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the POWER IMBALANCE FLOW Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 22 Press HIGH BLDG. PRESS Contact Buffer TEST RESET (Bottom switch),
Verify INPUT STATE lamps off (both)

√ **Standard:** Examinee presses the HIGH BLDG. PRESS Contact Buffer TEST RESET – switch

Examinee verifies both input state lamps off.

Comment:

EVALUATOR NOTE: **Resetting of Turb Bypass and FWP Bypass are N/A.**

OP-TM-641-421, Att. 7.4

Performance Step: 23 Verify TURB TRIP Contact Buffer Input State lamp off

Standard: Examinee verifies input state lamp is off.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 24 Verify FWP TRIP Contact Buffer Input State lamp is off

Standard: Examinee verifies input state lamp is off.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 25 Press HIGH FLUX Trip Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the HIGH FLUX Trip Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

EXAMINER NOTE: **Resetting of FLUX > 10% FP Bistable and SHUTDOWN BYPASS bistable is N/A.**

OP-TM-641-421, Att. 7.4

Performance Step: 26 Press HI PRESS TRIP Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the HI PRESS TRIP Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 27 Press LO PRESS TRIP Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the LO PRESS TRIP Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 28 Press PRESS/TEMP TRIP Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the PRESS/TEMP TRIP Bistable Reset Toggle Switches

Examinee verifies output state and output memory lamps dim.

Comment:

OP-TM-641-421, Att. 7.4

Performance Step: 29 Press HIGH TEMP> TRIP Bistable Reset Toggle Switches
Verify OUTPUT STATE – dim
Verify OUTPUT MEMORY - dim

√ **Standard:** Examinee presses the HIGH TEMP> TRIP Bistable Reset Toggle Switches

Examinee verifies the output state and output memory lamps verified dim.

Comment:

OP-TM-641-421, Step 5.3.4.2

Performance Step: 30 PRESS Reactor Trip Module (RTM) SUBSYSTEM Reset switch.

√ **Standard:** Examinee presses the Reactor Trip Module subsystem reset switch.

Comment:

OP-TM-641-421, Step 5.3.4.3.A

Performance Step: 31 Verify RTM SUBSYSTEM TRIP lamp Dim.

Standard: Examinee verifies the RTM Subsystem Trip lamp is dim.

Comment:

OP-TM-641-421, Step 5.3.4.3.B

Performance Step: 32 Verify PROTECTIVE SUB-SYSTEM lamp No. 4 on outside of each RPS cabinet Dim.

Standard: Examinee verifies the PROTECTIVE SUB-SYSTEM lamp No. 4 on the outside of each RPS cabinet is Dim.

Comment:

OP-TM-641-421, Step 5.4

Performance Step: 33 When all RPS channels are reset, then VERIFY alarm MAP G-1-2 (RPS Channel Trip) Clear.

Standard: Examinee verifies MAP G-1-2 is clear.

Comment:

EVALUATOR NOTE: **When requested provide the operator with OP-TM-622-401.**

OP-TM-641-404, Step 5.1.8

Performance Step: 34 If required by plant conditions to close CRD-CB-1D, then PERFORM OP-TM-622-401, Closing CRD Breaker Individually.

Standard: Examinee goes to OP-TM-622-401.

Comment:

EVALUATOR CUE: **As Shift Manager, a comprehensive lineup of breaker auxiliaries is not required.**

EVALUATOR CUE: **As Shift Manager, concurrence is given to close the affected CRD breaker.**

OP-TM-622-401, Step 3.3

Performance Step: 35 The operator verifies the prerequisites of OP-TM-622-401 are met.

Standard: Examinee verifies prerequisites of OP-TM-622-401 are met.

Comment:

OP-TM-622-401, Step 4.1.1

Performance Step: 36 SELECT IN LIMIT BYPASS at the DIAMOND PANEL.

√ **Standard:** Examinee presses the IN LIMIT BYPASS switch at the Diamond Panel (CC), verifying the light is lit.

Comment:

OP-TM-622-401, Step 4.1.2

Performance Step: 37 DEPRESS the TRIP RESET pushbutton at the DIAMOND PANEL.

√ **Standard:** Examinee presses the TRIP RESET switch at the Diamond Panel (CC)

Comment:

OP-TM-622-401, Step 4.1.3

Performance Step: 38 DE-SELECT IN LIMIT BYPASS at the DIAMOND PANEL.

√ **Standard:** Examinee presses the IN LIMIT BYPASS switch at the Diamond Panel (CC), verifying the light is not lit.

Comment:

OP-TM-622-401, Step 4.1.4

Performance Step: 39 VERIFY the applicable alarm below clears

- MAP G-1-3, CRD A or C Trip Bkr Open
- MAP G-1-4, CRD B or D Trip Bkr Open

Standard: Examinee verifies that MAP G-1-3 and G-1-4 are both clear.

Comment:

EVALUATOR CUE: **A Third Reactor Operator is locally standing by for any required local actions.**

OP-TM-622-401, Step 4.1.5

Performance Step: 40 RESET the applicable UV relay locally, as follows:

CRD-CB-1D\27D, CRD Breaker Ch D UV Relay/Target (CRD-CB-1D control compartment).

Standard: Examinee directs a Reactor Operator to reset CRD-CB-1D\27D.

Comment:

Terminating Cue: **After the order goes out to reset, JPM is complete.**

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

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 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:

- The Reactor is at 100% power.
- You are the ARO.
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- "D" RPS was de-energized.
- Breaker 19 on VBD has been closed.
- OP-TM-641-404, section 4.0 has been completed.
- It is desired to close breakers from the Control Room, if applicable.

INITIATING CUE: The Control Room Supervisor directs you to reset the "D" RPS channel and restore the channel to normal condition for power operation, per Section 5.0 of OP-TM-641-404, De-energizing RPS Channel D.

TIME CRITICAL: No

Facility:	Three Mile Island Unit 1	Task No.:	AOP033001
Task Title:	Respond to Loss of SCCW – Alt Path	JPM No.:	TMI 2015 NRC JPM H
K/A Reference:	026 AA1.05 3.1/3.1	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: _____ Actual Performance: X

Classroom _____ Simulator X Plant _____

READ TO THE EXAMINEE

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

Initial Conditions:

- You are the Assist Reactor Operator (ARO).
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 40% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- The CRS is navigating through OP-TM-AOP-050, Reactor Coolant Leakage, due to an RCS Leak.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References:

- OP-TM-MAP-N0102, SEC CLOSED PMP DISCH PRESS LO, Rev 0
- OP-TM-MAP-N0202, SEC CLOSED SURGE TNK LVL HI/LO, Rev. 3
- OP-TM-AOP-033, LOSS OF SECONDARY COMPONENT COOLING, Rev. 3

Handout:

- OP-TM-AOP-033, LOSS OF SECONDARY COMPONENT COOLING, Rev. 3

Initiating Cue:	Respond to the cues and indications given by the simulator as well as any input from the CRS.
Time Critical Task:	No
Validation Time:	10 Minutes

SIMULATOR SETUP

1. Reset the simulator to Temp IC 180.

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. Reduce Reactor Power to 40% and verify ARTS lights are lit.
3. Insert Override 01A4S06-ZDISCP1B(3) to OFF immediately to prevent auto start of the standby SCCW Pump.
4. Insert override 01A1M02-ZAOSCPI149, final value of 50 immediately.
5. Insert override 01A1M01-ZAOSCLI84, final value of 45 immediately
6. Insert malfunction CC01A on EVENT #1 to trip SC-P-1A.
7. Insert override 01A1M02-ZAOSCPI149, original value of 50, final value of 30, ramp of 10, delay of 20, on EVENT #2 to simulate SCCW pump discharge pressure just less than 50 psi.
8. Insert override 01A1M01-ZAOSCLI84, original value of 45, final value of 0, ramp of 20, on EVENT #2 to simulate SCCW Surge Tank Level lowering.
9. Insert Annunciator N-2-2, delay of 18, on EVENT #2.
10. 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.
11. This completes the setup for this JPM.

(Denote Critical Steps with a check mark)

START TIME: _____

BOOTH CUE: **Insert Event #1.**

OP-TM-MAP-N0102 Step 4.1

Performance Step: 1 Verify adequate SC surge tank level.

Standard: Examinee verifies adequate SCCW surge tank level by observing the surge tank level indication (CL) and observing that Main Annunciator N-2-2 is not in alarm.

Comment:

OP-TM-MAP-N0102 Step 4.2

Performance Step: 2 If a Secondary Closed Pump has tripped, then ensure the standby pump is operating.

Standard: Examinee determines that SC-P-1A has tripped and that SC-P-1B has not automatically started.
Examinee starts SC-P-1B by rotating the Control Switch in the clockwise direction and verifies red running light lit, green off light not lit (CL)

Comment:

BOOTH CUE: **Insert Event #2.**

EVALUATOR CUE: **When it is determined that OP-TM-AOP-033 is required, hand the examinee a copy of OP-TM-AOP-033 and state "the CRS is continuing in AOP-050 and you are to take the appropriate actions of OP-TM-AOP-033".**

OP-TM-MAP-N0202 Step 4.1

Performance Step: 3

If Level is Low, then PERFORM the following:

A. IAAT level < 1 ft and lowering, then GO TO OP-TM-AOP-033, "Loss of Secondary Component Cooling"

Standard: Examinee determines level is <1ft and lowering, and goes to OP-TM-AOP-033.

Comment:

Alternate Path begins.

OP-TM-AOP-033, Step 3.1

Performance Step: 4

ANNOUNCE entry into OP-TM-AOP-033, "Loss of Secondary Component Cooling" over the plant page and radio.

Standard: Examinee announces entry into OP-TM-AOP-033, "Loss of Secondary Component Cooling" over the plant page and radio.

Comment:

Evaluator Note: **Step 3.2.1 is N/A**

OP-TM-AOP-033, Step 3.2.2

Performance Step: 5

IAAT either condition exists:

- SC surge tank level < 1 ft. (SC-LI-84) and lowering.
- SC pump discharge pressure (SC-PI-149) < 50 psig,

Then perform the following:

- If reactor power is < 45%, then trip the main turbine.

√ **Standard:** Examinee determines that SC surge tank level < 1 ft. (SC-LI-84) and lowering, and trips the Main Turbine by pressing the turbine trip pushbutton, observing Overhead alarm is in, MW generated reduce, and stop valves go closed.

Comment:

OP-TM-AOP-033, Step 3.2.3

Performance Step: 6 IAAT either condition exists:
- SC surge tank level < 1 ft. (SC-LI-84) and lowering.
- SC pump discharge pressure (SC-PI-149) < 50 psig,

Then perform the following:
PLACE all Secondary Closed pumps in PTL.

√ **Standard:** Examinee places SC-P-1A/B/C in PTL by rotating the Control switches counter-clockwise while simultaneously lifting upward (CL) and verifying that no associated indicating lights are lit.

Comment:

OP-TM-AOP-033, Step 3.2.4

Performance Step: 7 IAAT either condition exists:
- SC surge tank level < 1 ft. (SC-LI-84) and lowering.
- SC pump discharge pressure (SC-PI-149) < 50 psig,

Then perform the following:
- GO TO Section 4.0 "Shutdown Of SC Cooled Components".

Standard: Examinee goes to Section 4.0

Comment:

OP-TM-AOP-033, Step 4.1

Performance Step: 8 ENSURE no more than one Main Feedwater pump is operating.

Standard: Examinee verifies only one MFW pump is operating.

Comment:

OP-TM-AOP-033, Step 4.2

Performance Step: 9 ENSURE all Heater Drain pumps are shutdown:

Standard: Examinee verifies HD-P-1A/B/C are shutdown by the Green lights are lit and the Red lights are not lit.

Comment:

OP-TM-AOP-033, Step 4.3

Performance Step: 10 ENSURE no more than one Condensate booster pump is operating.

√ **Standard:** Examinee shuts down one Condensate Booster Pump by rotating the Control switches counter-clockwise (CL) and verifying that the Green lights are lit and the Red lights are not lit.

Comment:

OP-TM-AOP-033, Step 4.4

Performance Step: 11 ENSURE no more than one Condensate pump is operating.

√ **Standard:** Examinee shuts down one Condensate Pump by rotating the Control switches counter-clockwise (CL) and verifying that the Green lights are lit and the Red lights are not lit.

Comment:

Evaluator Note: **Step 4.5 is N/A at this time.**

OP-TM-AOP-033, Step 4.6

Performance Step: 12 PLACE IA-P-4 in PTL.

√ **Standard:** Examinee places IA-P-4 in PTL by rotating the Control switches counter-clockwise while simultaneously lifting upward (PL) and verifying that no associated indicating lights are lit.

Comment:

OP-TM-AOP-033, Step 4.7

Performance Step: 13 VERIFY the reactor is shutdown.
RNO: INITIATE Reactor Trip IAW EOP-001

Standard: Examinee recognizes that the reactor is not shutdown and informs the CRS that a reactor trip needs to occur.

Comment:

Terminating Cue: **When IA-P-4 is in PTL and the need for a reactor trip is determined; the JPM may be terminated.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 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 Assist Reactor Operator (ARO).
- The instructor/examiner will act as the URO and CRS.
- The ICO will act as Auxiliary Operators in the plant as needed.
- The Reactor is operating at 40% power with ICS in full automatic.
- No Maintenance or surveillances are scheduled for this shift.
- The CRS is navigating through OP-TM-AOP-050, Reactor Coolant Leakage, due to an RCS Leak.

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

Facility:	Three Mile Island Unit 1	Task No.:	21104016
Task Title:	Initiate Emergency Boration IAW EOP-020	JPM No.:	TMI 2015 NRC JPM I
K/A Reference:	004 G2.1.30 (4.4/4.0)	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator _____ Plant X

READ TO THE EXAMINEE

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

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 steps evaluated as SAT.

Required Materials: None

General References: EOP-020, COOLDOWN FROM OUTSIDE OF CONTROL ROOM, Revision 18

Handout: EOP-020, Step 3.22 (pg. 15), and simulated Key #2

Initiating Cue: The CRS has assigned you to perform EOP-020, Step 3.22 – Initiate Emergency Boration. No other operators are available to assist with Emergency Boration. All component actions will be simulated unless told otherwise.

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 3.22 – 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.: TMI 2015 NRC JPM I

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- 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 3.22 – Initiate Emergency Boration. No other operators are available to assist with Emergency Boration. All component actions will be simulated unless told otherwise.

Facility:	Three Mile Island Unit 1	Task No.:	85201004
Task Title:	Respond to a Loss of Instrument Air	JPM No.:	TMI 2015 NRC JPM J
K/A Reference:	078 A3.01 (3.1 3.2)	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator _____ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:

- You are an Auxiliary Operator.
- The examiner will act as all other personnel.
- The plant is at 100% power.
- IA-P-4, Main Instrument Air Compressor, is Out Of Service.
- IA-P-1A and IA-P-1B, "A" and "B" Instrument Air Compressors, have just tripped
- The Control Room has entered OP-TM-AOP-028, Loss of Instrument Air.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-AOP-028, LOSS OF INSTRUMENT AIR, Rev. 6

Handout: OP-TM-AOP-028, LOSS OF INSTRUMENT AIR, Rev. 6

Initiating Cue: The CRS has directed you to perform the applicable in-plant portion of OP-TM-AOP-028, steps 3.3 and 3.4. All component actions will be simulated unless told otherwise.

Time Critical Task: No

Validation Time: 30 Minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE: **When the examinee looks at IA-PI-491, indicate 80 psig on IA-PI-491.**

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:

- Examinee proceeds to IA-PI-491 in IB Basement and determines IA-PI-491 is reading less than 85 psig.
- Examinee determines from the initial conditions that IA-P-1A and IA-P-1B are unable to be started from the Control Room.

Comment:

Evaluator Cue: **When HAND is selected state that there is no additional sound and no rotation of Flywheel.**

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

Performance Step: 2 Ensure SA-P-1A or SA-P-1B is running.

Standard:

- Examinee selects HAND to start SA-P-1A and/or 1B locally (Turbine Building 305 south end).
- Examinee determines that SA-P-1A and SA-P-1B will not start.

Comment:

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

OP-TM-AOP-028, Step 3.3 RNO part 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:**

- Examinee depresses red Reset button on 1A ES MCC unit 4A or 1B ES MCC Unit 5B (Control Tower, 2nd floor)
- Examinee determines that the thermal overload was reset.

Comment:

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

EVALUATOR CUE: **Indicate 90 psig on IA-PI-493,**
Indicate 65 psig on IA-PI-491.

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

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:

- Examinee determines that IA-V-2104 A and IA-V-2104B are closed.
- Examinee locates and reads gauges, performs subtraction and determines DP greater than 20 psid.

√

- Examinee obtains a ladder and simulates opening IA-V-2106 by rotating the handwheel in the counter-clockwise direction, looking for valve stem movement.

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.: TMI 2015 NRC JPM J

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are an Auxiliary Operator.
- The examiner will act as all other personnel.
- The plant is at 100% power.
- IA-P-4, Main Instrument Air Compressor, is Out Of Service.
- IA-P-1A and IA-P-1B, "A" and "B" Instrument Air Compressors, have just tripped
- The Control Room has entered OP-TM-AOP-028, Loss of Instrument Air.

INITIATING CUE:

The CRS has directed you to perform the applicable in-plant portion of OP-TM-AOP-028, steps 3.3 and 3.4. All component actions will be simulated unless told otherwise.

Facility:	Three Mile Island Unit 1	Task No.:	AOP009001
Task Title:	EFW from Fire Service using FS-P-15	JPM No.:	TMI 2015 NRC JPM K
K/A Reference:	061 A2.04 (3.4/3.8)	Bank JPM	

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: _____

Classroom _____ Simulator _____ Plant X

READ TO THE EXAMINEE

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

Initial Conditions:

- You are an Auxiliary Operator.
- The examiner will act as all other personnel.
- A plane has crashed into the control tower and the plant has suffered a blackout.
- The Site ED at the TSC has taken over control of the plant and OP-TM-AOP-009 has been entered.
- Due to the damages EFW must be supplied by FS-P-15. OP-TM-424-921 has been initiated and completed up through step 4.6.

Task Standard: All critical steps evaluated as SAT.

Required Materials: None

General References: OP-TM-424-901, Emergency Feedwater, Rev.2
OP-TM-424-921, EFW FROM FIRE SERVICE USING FS-P-15, Rev 6

Handout: OP-TM-424-921, EFW FROM FIRE SERVICE USING FS-P-15, Rev 6, signed off through step 4.6.

Initiating Cue: The Site ED has directed you to Align the FS-P-15 to OTSGs IAW OP-TM-424-921 step 4.7. You have been assigned the valves in the Turbine Building and another Auxiliary Operator is lining up the valves in the Intermediate Building.

Time Critical Task: No

Validation Time: 20 minutes

SIMULATOR SETUP

N/A

(Denote Critical Steps with a check mark)

START TIME: _____

EVALUATOR CUE: **Hand the examinee OP-TM-424-921 signed off up through step 4.6.**

EVALUATOR CUE: **When examinee successfully simulates opening FW-V-13, state that the FW-V-13 stem is "full out".**

OP-TM-424-921, Step 4.7.1

Performance Step: 1 OPEN FW-V-13

√ **Standard:** Examinee REPORTS to FW-V-13 (located in the TB 322' elev. 12' West of FW-P-1A on the Hi Pressure Heater Header 6' off the floor) and simulates opening the valve by turning the hand wheel counterclockwise.

Comment:

EVALUATOR CUE: **If examinee fails to properly engage the clutch, state that the handwheel turns easily with no stem motion.**

EVALUATOR CUE: **When examinee successfully simulates opening FW-V-5, state that FW-V-5 has stopped turning.**

OP-TM-424-921, Step 4.7.2

Performance Step: 2 Open FW-V-5A

√ **Standard:** Examinee REPORTS to FW-V-5A (TB, 322' Elevation, SW of FW-P-1B), simulates pushing the handcluch to engage position and simulates rotating handwheel counter clockwise.

Comment:

EVALUATOR NOTE: **The actions for FW-V-5B will be performed by another Auxiliary Operator, as stated in the initiating cue.**

EVALUATOR CUE: **When examinee successfully simulates opening aligning the holes, state that the holes are simulated aligned.**

OP-TM-424-921, Step 4.7.3

Performance Step: 3 Open FW-V-17A

√ **Standard:** Examinee REPORTS to FW-V-17A (TB, 322' Elevation, SW of FW-P-1B) and simulates turning valve handwheel to align holes in sleeve with hole in valve stem.

Comment:

EVALUATOR CUE: **When examinee successfully simulates inserting the pin, state that the pin is simulated inserted.**

OP-TM-424-921, Step 4.7.3

Performance Step: 4 Open FW-V-17A

√ **Standard:** Examinee simulates inserting the pin in the hole in the sleeve/stem

Comment:

EVALUATOR CUE: **If examinee fails to press in on the switch, state that the switch does not turn.**

EVALUATOR CUE: **When examinee successfully simulates the rotation, state that the indicator is pointing towards MANUAL.**

OP-TM-424-921, Step 4.7.3

Performance Step: 5 Open FW-V-17A

√ **Standard:** Examinee simulates pressing in and rotating the AUTO/MANUAL switch 90 degrees counter-clockwise to MANUAL position.

Comment:

EVALUATOR CUE: **When examinee successfully simulates opening the actuator equalizer valve, state that the actuator equalizer valve handwheel has stopped turning.**

OP-TM-424-921, Step 4.7.3

Performance Step: 6 Open FW-V-17A

√ **Standard:** Examinee simulates opening FW-V-17A by turning the hand wheel counterclockwise.

Comment:

EVALUATOR NOTE: **The actions for FW-V-17B will be performed by another Auxiliary Operator, as stated in the initiating cue.**

EVALUATOR CUE: **When examinee successfully simulates opening aligning the holes, state that the holes are simulated aligned.**

OP-TM-424-921, Step 4.7.5

Performance Step: 7 CLOSE FW-V-16A

√ **Standard:** Examinee REPORTS to FW-V-16A (TB, 322' Elevation, SW of FW-P-1B) and simulates turning valve handwheel to align holes use holes in the sleeve closest to actuator diaphragm with hole in valve stem.

Comment:

EVALUATOR CUE: **When examinee successfully simulates inserting the pin, state that the pin is simulated inserted.**

OP-TM-424-921, Step 4.7.5

Performance Step: 8 CLOSE FW-V-16A

√ **Standard:** Examinee simulates inserting the pin in the hole in the sleeve/stem.

Comment:

EVALUATOR CUE: **If examinee fails to press in on the switch, state that the switch does not turn.**

EVALUATOR CUE: **When examinee successfully simulates the rotation, state that the AUTO/MANUAL indicator is pointing towards MANUAL.**

OP-TM-424-921, Step 4.7.5

Performance Step: 9 CLOSE FW-V-16A

√ **Standard:** Examinee simulates pressing in and rotating the AUTO/MANUAL switch 90 degrees counter-clockwise to MANUAL position.

Comment:

EVALUATOR CUE: **When examinee successfully simulates opening the actuator equalizer valve, state that the actuator equalizer valve handwheel has stopped turning.**

OP-TM-424-921, Step 4.7.5

Performance Step: 10 CLOSE FW-V-16A

√ **Standard:** Examinee simulates opening the actuator equalizer valve, by turning the valve handwheel counterclockwise.

Comment:

EVALUATOR CUE: **When examinee successfully simulates closing FW-V-16A, state that FW-V-16A stem is "full in".**

OP-TM-424-921, Step 4.7.5

Performance Step: 11 CLOSE FW-V-16A

√ **Standard:** Examinee simulates closing FW-V-16A by turning the hand wheel counterclockwise

Comment:

Terminating Cue: **After FW-V-16A is simulated closed: Evaluation on this JPM is complete.**

STOP TIME: _____

VERIFICATION OF COMPLETION

Job Performance Measure No.: TMI 2015 NRC JPM K

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Question:

Response:

Result: SAT _____ UNSAT _____

Examiner's Signature: _____ Date: _____

INITIAL CONDITIONS:

- You are an Auxiliary Operator.
- The examiner will act as all other personnel.
- A plane has crashed into the control tower and the plant has suffered a blackout.
- The Site ED at the TSC has taken over control of the plant and OP-TM-AOP-009 has been entered.
- Due to the damages EFW must be supplied by FS-P-15. OP-TM-424-921 has been initiated and completed up through step 4.6.

INITIATING CUE: The Site ED has directed you to Align the FS-P-15 to OTSGs IAW OP-TM-424-921 step 4.7. You have been assigned the valves in the Turbine Building and another Auxiliary Operator is lining up the valves in the Intermediate Building.

Time Critical Task: No

Facility:	Three Mile Island	Scenario No.:	1	Op Test No.:	2015-301
Examiners:		Operators:			

Initial Conditions:
- (Temporary IC-175)
- 85% Power, MOL
- BS-P-1A is OOS for maintenance, expected to return to service in 6 hours.
- Crane work is occurring on the West side of the Plant to stage new piping

Turnover: Maintain 85% Power Operations

Critical Tasks:
- PORV Control for Heat Transfer (CT-13) (If conditions are met)
- Shutdown Reactor - ATWS (CT-24)
- Restore Feed to a Dry OTSG (CT-26)

Event No.	Malf. No.	Event Type*	Event Description
1	RM0323	TS CRS	Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure
2	ZAIRC1LIC	C CRS C URO	MU-V-17 Fails Closed in Auto, entry into OP-TM-211-472 (URO: Controls Pressurizer Level with MU-V-17 in Manual)
3	ED09D	TS CRS C ARO	Loss of D Inverter, Loss of VBD, entry into OP-TM-AOP-018 (ARO: Place Rad Monitors Interlock switches to Defeat, Restore Control Building Ventilation)
4	02A5S81	C CRS C URO	Low Makeup Tank Pressure, entry into OP-TM-MAP-D0303 (URO: Raise Makeup Tank pressure)
5	IC23	I CRS I URO I ARO	SG/RX Demand Station fails to 0 Volts, Entry into OP-TM-AOP-070 (URO/ARO: ICS station to Manual, Stabilize Power)
6	MU29	C CRS R URO C ARO	RCS leak through the Letdown Line, entry into OP-TM-AOP-050 (URO: Lowers power in Manual ARO: Isolate the Letdown Line)
7	FW15B RD28 RD32	M CRS M URO M ARO	"B" Main Feed Pump trips, "A" Main Feed Pump Runs to 0 rpm, ATWS, Lack of Primary to Secondary Heat Transfer.
8	FW19	C CRS C ARO	EFW Control Valves fail to operate, EF-V-52A-D Closed (ARO: Establish PSHT via Condensate Booster Pump flow)
9 (if required)	MU35B	C CRS C URO	MU-P-1A/C will not start, MU-P-1B trips. (URO: Establish PORV control for Heat Transfer)

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

Three Mile Island NRC Scenario #1

Event #1: When the crew has accepted the watch, the Lead Examiner can cue the Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure.

The operators will diagnose the Failure of RM-G-23 based on alarms and RM-G-23 indications. The CRS will review T.S. and declare 7 day clock IAW Table 3.5-3.

Although there is a redundant instrument (RM-G-22), Tech Specs require both instruments to be operational based upon the following:

> The operability of design basis accident monitoring instrumentation as identified in Table 3.5-3 ensures that sufficient information is available on selected plant parameters to monitor and assess the variables following an accident. (This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," Rev. 3, May 1983.) These instruments will be maintained for that purpose.

IAW Tech Spec 3.5.5.2:

> 3.5.5.2 The channels identified for the instruments specified in Table 3.5-3 shall be OPERABLE. With the number of instrumentation channels less than required, restore the inoperable channel(s) to OPERABLE in accordance with the action specified in Table 3.5-3.

Table 3.5-3

INSTRUMENTS	REQ'D # OF CHANNELS	MIN # OF CHANNELS	ACTION
Containment High Range Radiation (RM-G22/G-23)	2	2	A

> Action A: With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirements:
>
> 1. either restore the inoperable channel(s) to OPERABLE status within 7 days of the event, or
> 2. prepare and submit a Special Report within 30 days following the event outlining action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

When the T.S. is declared, the scenario can continue.

Event #2: the Lead Examiner will cue the failure of MU-V-17.

The crew will diagnose MU-V-17 closing by the controlling station indicating closed, lowering pressurizer level, rising Makeup Tank level, and/or Annunciator G-2-5, PZR LVL HI/LO, in alarm. An improper diagnosis will lead the crew to believe that there is an RCS leak. The URO will place the Control Station for MU-V-17 in HAND control and manually restore Pressurizer level.

Once MU-V-17 is in HAND control and Pressurizer level is being restored, the scenario can continue.

Event #3: The Lead Examiner will cue the Loss of Vital Bus "D".

The effects of a loss of VBD which are significant to plant safety or operation are numerous. For each effect the required compensatory action is described in OP-TM-AOP-018.

This procedure stabilizes the plant and performs compensatory actions for equipment failures. It is considered a loss of Vital Bus "D" if the OTSGs are being used for RCS heat removal and an unplanned deenergization of VBD has occurred, and the following Critical Safety Functions are affected:

> **CSF 1**, Reactivity and Reactor Power Control: Maintain control of the fission process, maintain the capability to shutdown the reactor and the capability to maintain the reactor in a shutdown condition. Control energy production and reactor power distribution based on design limits and current core heat removal capability. **Loss of VBD:** NI-4 and NI-8 are lost, but the remaining channels of nuclear instrumentation and incore detectors provide sufficient information to control power level and reactor power distribution.
>
> **CSF 6**, Radiation Control and Control Room Habitability: Monitor and control the release of radiation to the environment. Maintain access to critical plant equipment and use of the Control Room. **Loss of VBD**: RM-L-6, RM-A-7, RM-A-4, and RM-A-6 are deenergized. Compensatory actions will be taken IAW ODCM requirements. Access to plant equipment and Control Room is not affected.
>
> **CSF 7**, Electrical Power: Provide electrical power as required to accomplish the other Critical Safety Functions. Provide AC and DC power for emergency equipment operation and instrumentation systems. **Loss of VBD:** VBD is deenergized. Ability to accomplish other Critical Safety Functions is not compromised.
>
> **CSF 8**, Auxiliary Emergency Systems: Provide equipment cooling (closed cooling and ventilation), and other support requirements to accomplish the other Critical Safety Functions. Provide Instrument Air for operation of EFW, ADVs, RCP Support Systems and some containment isolation valves. **Loss of VBD:** Ventilation will be lost to CB 322' Battery Rooms, Inverter Rooms, ES 480V

Switchgear Rooms, and Remote Shutdown Area. Compensatory actions will be performed IAW OP-TM-AOP-034, "Loss of Control Building Cooling." Instrument air is not affected.

CSF 9, Fire Protection and Remote Shutdown Capability: Maintain means to prevent, detect and suppress fires, as well as the capability to perform a plant shutdown without access to the Control Room. **Loss of VBD:** Loss of PRF annunciators disables alarms PRF-5-1, Relay Room Fire, PRF-7-1, IWFS/TS Bldg Fire, PRF-7-6, UPS Fire, and PRF-7-7, Process Center Fire. HVB-4-10 remains available to annunciate a fire in the Relay Room, and Relay Room CO2 fire suppression remains operable. Sprinkler systems remain operable in IWFS/TS Bldg, UPS room, and Processing Center.

The crew will diagnose the loss of Vital Bus "D" by the "D" Reactor Protection System Cabinet being deenergized, NI-8 indication deenergized (CC), Multiple annunciator alarms, including one for a failed inverter, "D" powered HSPS lights lit, and a loss of the right monitor of the Position Monitor Panel. The ARO will place Radiation Monitor Interlock switches to Defeat, and restore Control Building, Auxiliary Building, and Fuel Handling Building Ventilation. The CRS will identify and declare the following Tech Spec: 3.5.5.2.

When the radiation monitor interlock switches are in defeat, ventilation lineup restoration is in progress, and the Tech Spec has been declared, the scenario can continue.

Event #4: The Lead Examiner will cue the low Makeup Tank Hydrogen pressure.

The operators will diagnose the low pressure in the Makeup Tank by Main Annunciator Panel Alarm D-3-3 and the pressure indication displayed on Plant Processing Computer point A1028.

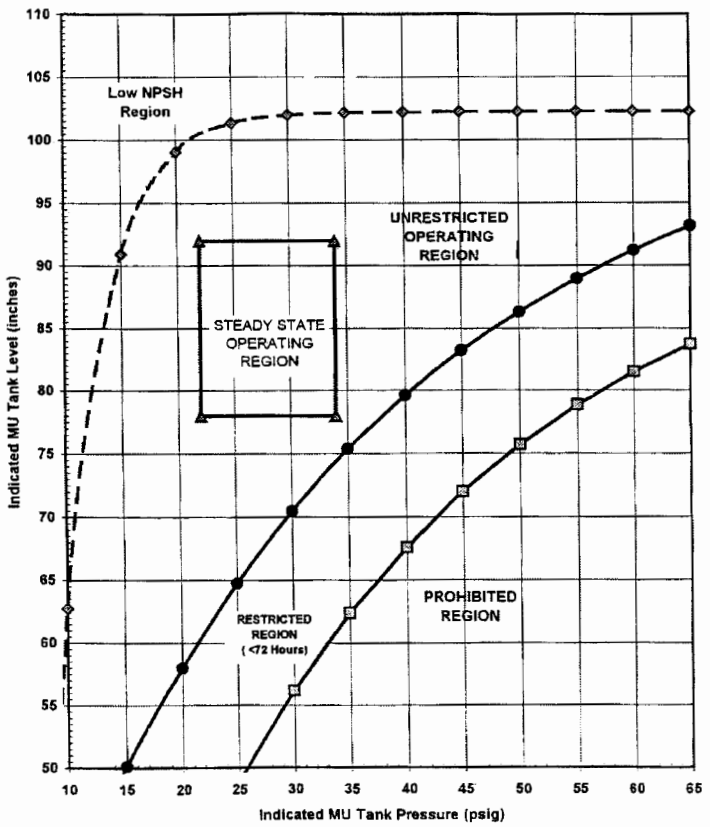
IAW OPM, Section B-05:

Hydrogen or Nitrogen is introduced into the system by a ring header in the water space of the Makeup Tank. Hydrogen is used as an overpressure in the Makeup Tank when the plant is hot and Nitrogen is used when the plant is cooled down.

Hydrogen overpressure is maintained in the Makeup Tank to assure a slight amount of excess Hydrogen in the circulating Reactor Coolant. Hydrogen is used for Oxygen control in the Reactor Coolant. Hydrogen is introduced into the Makeup Tank until a desired concentration of: *25* - 40 Std CC HZ / Kg H2O is attained in the Reactor Coolant System.

Attachment 7.3 of OP-TM-211-000 (shown below) ensures that the MU pump design NPSH requirements would be met throughout the most limiting design basis scenario. If MU Tank pressure is above curve 2 for a given steady-state MU tank level, then if the design basis transient occurs, and MU tank level and pressure rapidly decrease and no operator action is taken, the pump will have NPSH margin at all times. The design basis transient is a LOCA at the "B" HPI

RCS nozzle. The challenge to MU pump NPSH occurs due to high flow through the normal MU flow (open MU-V-217 and start a 2nd MU pump) and no other operator actions. NPSH margin decreases until MU-V-14A&B open on a 1600# ESAS signal.



The URO will add Hydrogen to the Makeup Tank IAW OP-TM-211-486, Hydrogen Addition to MU-T-1 from HN-V-6A.

Once Makeup Tank pressure has returned to the acceptable range, the scenario can continue.

Event #5: The Lead Examiner will cue the failure of the SG/RX Demand Station to Zero Volts.

This will cause an ICS transient, which if not responded to swiftly, will cause a Reactor Trip. The crew will diagnose the ICS failure by a rapid change in RCS pressure, multiple annunciator alarms, and/or changes in indications at multiple ICS stations. Entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET will be required based on RCS pressure not being controlled in ICS AUTO.

"RCS pressure is not being controlled" requires the operator to make a subjective determination, based on their skills, training, and experience.

A determination that RCS pressure is being controlled should include the following elements:

1) The reason for the transient is understood
2) RCS pressure response is consistent with the expected response for the event
3) Automatic or manual control in accordance with normal operating procedures is effectively controlling RCS pressure.

A conservative assessment (i.e. concluding that RCS pressure is not being controlled) is appropriate when the three conditions above cannot be satisfied. ICS failures are one class of events that can lead to an upset in primary to secondary heat transfer. Most ICS failures can be mitigated by use of the appropriate manual control normal operating procedures.

This entry into AOP-070 is unique from the other scenarios because Reactor Power will lower to approximately 50% while RCS pressure rises. The URO will have to place the Diamond Panel in manual to control Reactor Power or RPS will trip the reactor on high RCS pressure

Once the plant is stabilized in ICS HAND control, the scenario can continue.

Event #6: The Lead Examiner will cue the RCS leak through the Letdown Line.

The crew will diagnose the RCS leak through the Letdown Line by lowering Pressurizer level, lowering Makeup Tank level, rising counts on RM-L-1, and by verbal report from the field. The crew will enter OP-TM-AOP-050, Reactor Coolant Leakage, ultimately ending up in Section 5.0, Isolation of Letdown.

OP-TM-AOP-050 is designed to identify leak location using Radiation monitors, sump level trends and MU and RCS system instruments. The procedure avoids attempts to isolate the leak until the specific location is determined. This strategy is limited (i.e. action may be required without specific leak location identification) by the ability of personnel to access areas where the leak is located. Normally closed valves are checked closed to isolate flow paths that would result in RCS leakage.

This procedure provides the response for RCS leaks where the leak rate exceeds Technical Specifications up to but not including leaks that require more then normal makeup (i.e. HPI). The leak may be identified by local observation, leak rate surveillance or Control Room indications (MU tank level, RM-A-2, etc).

Whenever the leak location is known and the capability to isolate the leak is identified, the leak is isolated. The approach considers the effect on plant operation with the leak isolated. There are procedure sections that deal with isolation, which requires loss of letdown, loss of seal injection and loss of a MU pump recirc path.

> The procedure flow path for a leak in the Letdown Line is as follows: Section 3.0 confirms leak in Auxiliary Building, leak is not identified with transfer to Section 4.0 "Shutdown of Makeup Pump". MU-P-1C is started, and MU-P-1B is stopped. Leak is not affected; MU-P-1C shutdown results in transfer to Section 5.0 "Isolation of Letdown". Letdown is isolated, MU-P-1B is restarted, seal injection recovered. Plant cooldown performed and procedure exited.

The URO will isolate the Letdown line. The CRS will identify and declare the following Tech Spec: 3.1.6:

> 3.1.6.1 If the total reactor coolant leakage rate exceeds 10 gpm, the reactor shall be placed in hot shutdown within 24 hours of detection.

Once the Tech Spec has been declared and Letdown has been isolated, the scenario can continue.

Events #7/8/9: The Lead Examiner will cue the Loss of the "B" Main Feedwater Pump, the "A" Main Feed Pump Running to 0 rpm, and ATWS.

The crew will diagnose the Loss of FW-P-1B by an immediate drop in Feedwater flow, OTSG level decreasing rapidly, steam header pressure increasing, a neutron cross-limit alarm coming in, and the remaining feedwater pump speed increases causing feedwater flow to recover somewhat.

The crew will diagnose the loss of Main Feedwater by an immediate drop in Feedwater flow, OTSG level decreasing rapidly, and a rapid rise inn RCS pressure and temperature. The URO will identify that an ATWS has occurred and will perform the Immediate Manual Actions of OP-TM-EOP-001, REACTOR TRIP.

> Memorized operator action is appropriate because operator response time can significantly alter the consequences of an ATWS or a failure of the turbine to trip when required.
>
> The reactor protection system is designed to prevent fuel clad or RCS pressure boundary failure. If RCS conditions are outside of the RPS envelope and RPS fails to de-energize the control rod drive mechanisms, prompt operator response can minimize the potential for fuel damage or an RCS pressure boundary failure
>
> EOP-001 is the primary entry point to the EOP network. This procedure is designed to address or direct procedures to address events from a reactor trip with no adverse plant conditions or equipment failures as well as events which challenge the fission product barriers.

The first priority (with the exception of entry into OP-TM-EOP-005 at power to mitigate an OTSG tube leak) to mitigate the consequences of a significant plant upset is to ensure the reactor is shutdown. Success of all subsequent EOP action is based on reducing core heat generation to reactor decay heat generation rates.

– Once the reactor is shutdown, prompt isolation of the turbine steam flow path is significant. Until the major steam flow path through the turbine to the condenser is isolated, RCS heat removal will be much larger than heat generation, and a rapid RCS cooldown will continue.

– When the turbine steam flow path is isolated, plant conditions are evaluated to determine if any symptoms of a core cooling upset are present.

Based on a symptom of low subcooling margin, excessive heat transfer, lack of primary to secondary heat transfer or primary to secondary leakage, rule based actions and entry into other sections of the EOP network is performed.

The crew will identify a Lack of Heat Transfer based on the following definition from OS-24, Conduct of Operations During Abnormal and Emergency Events:

LOHT is the inability of either OTSG to remove sensible heat from the RCS.

LOHT can be confirmed if one of the following sets of conditions exists:

- Incore temperatures or Thot rising above 580°F and at least one RC Pump operating
- Incore temperatures rising and NO FEEDWATER available
- Incore temperatures rising and RCS circulation can not be confirmed

The CRS will direct entry into OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER.

RCP philosophy IAW the GEOG and the OP-TM-EOP-004 Basis Document:

One or two RCPs (one in each loop) should be left running to reduce heat input to the RCS yet provide for heat transfer as soon as FW is restored to either OTSG.

The step intent is to reduce heat input to the RCS while maintaining forced flow in both RC loops.

Impact to pressurizer spray flow should be considered when selecting RCPs for shutdown.

Although one RCP is allowed, our procedure directs one RCP in each loop to allow for even flow between the loops (avoiding the reverse directional flow in the opposite loop), and to prevent a loss of forced RCS flow if the only running RCP were to trip.

The ARO will recognize that EFW control valves are inoperable and report that feedwater is not available.

> If feedwater is NOT available, then efforts to establish EFW should continue. If this event occurs when the condensate booster pumps could provide a continuous feedwater supply, then the booster pumps may be used alone to feed the OTSGs.
>
> HPI COOLING will be initiated (EOP-009) when RCS pressure approaches the PORV setpoint. After initiating HPI COOLING, actions to restore feedwater (main or emergency) should continue.

Depending on the response time of the crew, one of two paths will be taken.

The first (and most likely) path will be to perform Attachment 1 of OP-TM-EOP-004 to feed the OTSG's with the Condensate Booster Pumps.

The second path (if the conditions are met) the CRS will direct entry into OP-TM-EOP-009, HPI COOLING. HPI will not be adequate, which will force the URO to manually control the PORV to maintain RCS pressure while minimizing inventory losses until Primary to Secondary Heat Transfer exists. A report from the field will inform the control room that EF-V-52A-D are closed. These valves are the downstream isolations to the EF-V-30A-D, Emergency Feedwater Flow Control Valves. The Auxiliary Operator will be directed to open the EF-V-52A-D valves and report that only the EF-V-52D will open. EF-V-52D will be opened and the ARO will feed the "A" OTSG IAW OP-TM-EOP-010 Guide 13, Feeding a Dry or Depressurized OTSG.

Termination: The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-13 – PORV Control for Heat Transfer – During action to restore primary to secondary heat transfer, RCS pressure must be continually controlled. RCS pressure is controlled by manually opening and closing the PORV. This prevents excessive PORV cycling which could occur if the PORV were allowed to operate automatically.

During mitigation of LHT, manually cycle the PORV as necessary to maintain RCS pressure between the PORV setpoint or RV P-T limit and minimum SCM (if subcooled) or 1600 PSIG (if saturated).

1. Performing PORV Control for Heat Transfer outside of the following limit should be considered **grounds for failure of the critical task:**

    i. PORV automatically lifts three (3) times after reaching OP-TM-EOP-009, Step 4.2.

Safety Significance: During mitigation of LHT the PORV should be manually cycled to control RCS pressure between the PORV setpoint or RV P-T limit and 1600 PSIG if the RC is saturated or minimum allowable SCM if the RC is subcooled. The PORV opening values prevent challenges to the pressurizer safety valves and the RV P-T limit while the PORV closing values maintain a positive primary to secondary side AT (SGs remain heat sinks).

Cues:

1. High RCS pressure alarm
2. SCM monitor and associated alarms
3. SPDS displays and associated alarms
4. P-T display and associated alarms
5. Verbal alert by plant staff that RCS pressure has reached the PORV setpoint

Performance Indicators:

1. Operation of PORV and PORV block valve controls

Feedback:

1. PORV and PORV block valve status indication
2. RCS pressure and temperature
3. Verbal indication by plant staff that PORV flow has been initiated

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-24 – Shutdown Reactor - ATWS – Actuation of the manual reactor trip pushbutton, to backup the automatic trip and/or provide the necessary reactor trip, anytime the reactor trips or should have tripped. In the event the reactor fails to trip, in response to automatic and manual demands, then perform the following: Deenergize CRDMs

1. Shutting down the reactor due to an ATWS outside of the following limit should be considered **grounds for failure of the critical task:**

    1. Not deenergizing the CRDM power supplies:
        1. 1G-02
        2. 1L-02

Safety Significance: Without taking the proper actions, there exists a potential challenge to the Reactor Coolant System pressure boundary due to high RCS pressure.

An ATWS could occur due to a failure of the RPS to initiate a reactor trip signal upon one of the reactor trip parameters reaching its trip limit or the control and safety rods failing to insert once the RPS trip signal is given automatically or manually. A Diverse Scram System (DSS) is provided, independent of the RPS, to minimize the potential for an ATWS event. However, the operator must recognize and react to any of the reactor trip parameters that exceeds its limit but does not cause a reactor trip.

In this situation, the manual reactor trip button has been actuated but reactor power is not less than the plant specific reactor power level for verification of a reactor trip. Therefore, the reactor has not been shut down and there has been a failure of all or most of the control and safety rods to insert into the reactor core. Given that RPS, DSS and the manual reactor trip have failed to trip the reactor, then immediate actions to shut down the reactor by the alternate methods should be initiated. These methods include trip of CRDM breakers and maximum rate of boron addition to the RCS. Once the control and safety rods are successfully tripped into the core, or sufficient boric acid has been added to provide an adequate shutdown margin, the reactor will be shut down.

This should be achieved prior to taking additional mitigating actions because post-trip transient mitigation, from this point forward, is based on the assumption that the reactor is shutdown (subcritical).

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-24 – Shutdown Reactor - ATWS – Continued

Cues:

1. RPS channel alarms
2. RCS Power, Pressure and Temperature indications
3. P-T display and associated alarms
4. Verbal alert by plant staff that reactor shutdown requirements have not been met

Performance Indicators:

1. Operation of control rod drive feeder breakers

Feedback:

1. Nuclear Instruments
2. Control rod status indication
3. Control rod drive breaker status indication
4. Verbal indication from plant staff of reactor shutdown status

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-26 – Restore Feed to a Dry OTSG - If a RCP is running, establish FW to the SG(s) and control FW flow to maintain RCS cooldown rate within limits. EFW flow is established at less than 450 GPM total flow and MFW flow is established at less than 200,000 LBM/HR total flow.

2. Restoring Feed to a Dry OTSG (sustained) outside of the following limits should be considered **grounds for failure of the critical task:**

    i. To minimize OTSG stress, do not exceed MFW flow greater than than 200,000 LBM/HR total flow (sustained).
    ii. To ensure the main feedwater nozzles remain full and to prevent cavitation type damage to the Main Feedwater nozzles if they are not full of subcooled fluid, do not fall below less than 160,000 LBM/HR total flow (sustained).

Safety Significance:
If it is decided to perform the cooldown by using trickle feeding, it will be necessary to control the rate of FW addition to the SGs to maintain RCS cooldown limits. The FW flow rate should be adjusted to get the desired cooldown rate. If possible EFW should be used to limit SG thermal stresses. If MFW is used with the MFW nozzles, it will only be effective with forced flow.

Once heat transfer is restored in the SG, feed rates can be adjusted as necessary to control the cooldown and SG tube-to-shell ΔT.

Cues:
1. Low SG level alarms
2. Low SG pressure alarms
3. Verbal alert by plant staff that no SG is available for heat transfer

Performance Indicators:
1. Operation of EFW/MFW pump controls
2. Operation of EFW/MFW valve controls

Feedback:
1. EFW/MFW flow
2. SG level and pressure
3. RCS pressure and temperature
4. Verbal alert by plant staff of EFW/MFW flow status

Industry Experience:

- FW-P-1A Coupling Failure (TMI CR-00189457)
- Harris Nuclear Plant Manual Scram Due to Loss of Feedwater (12/14/99)
- Oconee 1 Loss of Feedwater (5/26/00)

PRA

- Feedwater Transient (Initiating Event)

Event	Description	Procedure Support
	Initial Set-up.	85% Power, MOL BS-P-1A Tagged OOS LO-P-8A/8B Running
1	Reactor Building Hi Range Radiation Monitor, RM-G-23, Failure	OP-TM-PRF1-0108, RM-G-22 RM-G-23 ALERT
		OP-TM-PRF1-0208, RM-G-22 RM-G-23 HI
2	MU-V-17 Fails closed in AUTO	OP-TM-MAP-G0205
3	Loss of D Inverter, Loss of VBD	OP-TM-AOP-018, Loss Of VBD
		1104-19, Control Building Ventilation System
		1104-15A, Auxiliary and Fuel Handling Building Supply and Exhaust System
4	Low Makeup Tank Pressure	OP-TM-MAP-D0303, MU Tank Press Hi/Lo
		OP-TM-211-486, Hydrogen Addition to MU-T-1 From HN-V-6A
5	RCS leak through the Letdown Line	OP-TM-AOP-050, Reactor Coolant Leakage
		1102-4, Power Operations
6	SG/RX Demand Station fails to Zero Volts	OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset
7	"B" Main Feed Pump Runs to 0 rpm, ATWS, Lack of Primary to Secondary Heat Transfer	OP-TM-EOP-001, Reactor Trip
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
8	EFW Control Valves fail to operate, EF-V-52D	OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
9	MU-P-1A/C will not start, MU-P-1B trips	OP-TM-EOP-009, HPI Cooling

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-175	85% HFP ICS full AUTO	Equilibrium XENON
BS-P-1A	Place in PTL Immediately	Scenario Support
BS-P-1A	Place EDT on BS-P-1A Control Switch	Scenario Support
Remote xxx	Value: OUT When: Immediately	BS-P-1A Breaker for Scenario Support
LO-P-8A	Start Immediately	Scenario Support
LO-P-8B	Start Immediately	Scenario Support
Malfunction RD28	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD32	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD27A	Value: Insert When: Immediately	ATWS Scenario Support
Malfunction RD27B	Value: Insert When: Immediately	ATWS Scenario Support
Remote FWR54	Value: MAN When: Immediately	EF-V-30A Local Control
Remote FWR55	Value: 0 When: Immediately	EF-V-30A Control Set to 0
Remote FWR56	Value: MAN When: Immediately	EF-V-30B Local Control
Remote FWR57	Value: 0 When: Immediately	EF-V-30B Control Set to 0
Remote FWR58	Value: MAN When: Immediately	EF-V-30C Local Control
Remote FWR59	Value: 0 When: Immediately	EF-V-30C Control Set to 0
Remote FWR60	Value: MAN When: Immediately	EF-V-30D Local Control
Remote FWR61	Value: 0 When: Immediately	EF-V-30D Control Set to 0
Malfunction MU31C	Value: Insert When: Immediately	MU-P-1A will not start
Malfunction MU34C	Value: Insert When: Immediately	MU-P-1C will not start
Malfunction RM0323	Value: Insert When: EVENT 1	RM-G-23 Fails

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Override 02A5A06-ZAIRC1LIC SP	Value: 0 When: Event 2	MU-V-17 Fails Closed in AUTO
Malfunction ED09D	Value: Insert When: Event 3	Loss of VBD
Override 02A5S81-ZDIPBOMUV13 OPN	Value: ON When: Event 4	Makeup Tank Nitrogen Leak
Override 02A5S81-ZLOMUV13(2) OPN	Value: OFF When: Event 4	Makeup Tank Nitrogen Leak
Override 02A5S82-ZLOMUV13(1) CLS	Value: ON When: Event 4	Makeup Tank Nitrogen Leak
Malfunction MU29	Value: 100.0 When: Event 5	RCS leak through the Letdown Line
Remote IC23	Value: Insert When: Event 6	SG/RX Demand Station fails to Zero Volts
Malfunction FW15B	Value: On When: EVENT 7	FW-P-1B Trips
Override 01A5S07-ZDIMSCA(1) FSTLO	Value: ON When: EVENT 7	FW-P-1A Runs to 0 RPM
Override 01A5A03-ZDIICS36AMCS(1) AUT	Value: OFF When: EVENT 7	FW-P-1A Runs to 0 RPM
Override 01A5A03-ZDIICS36AMCS(2) MAN	Value: ON When: EVENT 7	FW-P-1A Runs to 0 RPM
Override 01A5A03-ZDIICS36AMCS(3) RSE	Value: OFF When: EVENT 7	FW-P-1A Runs to 0 RPM
Override 01A5A03-ZDIICS36AMCS(4) LO	Value: OFF When: EVENT 7	FW-P-1A Runs to 0 RPM
Malfunction MU35B	Value: INSERT When: EVENT 8 Delay: 10 SECONDS	MU-P-1B trips
Override 02A5S82-ZDIPBCMUV13 CLS	Value: ON When: Event 10	Makeup Tank Nitrogen Leak
Remote HSR13	Value: LT1050 When: Event 11	Selecting LT 1050

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Remote HSR14	Value: LT1042 When: Event 11	Selecting LT 1042
Remote HSR15	Value: LT1048 When: Event 11	Selecting LT 1048
Remote HSR16	Value: LT1040 When: Event 11	Selecting LT 1040
Trigger 10	Value: DOR ZDIPBOMUV13 When: When directed	Makeup Tank Nitrogen Leak

Op Test No.:	NRC	Scenario #	1	Event #	1	Page	19	of 56

Event Description: RM-G-23 Failure

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 1**
Indications Available: PRF1 alarms, RM-G-23 indication.		
	Crew	Identifies failed instrument
	CRS	Initiates entry into the following 30 Day TS timeclock: Table 3.5-3
EXAMINER NOTE:		**Table 3.5-3** **Containment High Range Radiation (RM-G-22/23)** **Required number of channels: 2** **Minimum number of channels: 2** **Action A: With the number of OPERABLE channels less than required by the minimum channels OPERABLE requirements:** **1. either restore the inoperable channel(s) to OPERABLE status within 7 days of the event, or** **2. prepare and submit a Special Report within 30 days following the event outlining action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.**
EXAMINER NOTE:		**After the Tech Spec call is made, then GO TO Event 2.**

Footnote: 1 – PRF: Panel Right Front
2 – RM-G-22: High Range Containment Area Monitor
3 – RM-G-23: High Range Containment Area Monitor

Op Test No.:	NRC	Scenario #	1	Event #	2	Page	20	of	56

Event Description: MU-V-17 Fails Closed in Auto

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 2**
Indications Available:		**MU-V-17 Controlling Station indicates 0 (CC), Flow indicator MU-24A/B FI read 0 (CC), Pressurizer level indicates lowering on LI-777A and RC1-LR (CC), Makeup Tank level indicates rising (CC), PPC Point A1028, MU Tank Pressure High, in alarm.**
	Crew	Diagnose a closure of MU-V-17 in AUTO control.
	CRS	Directs entry into OP-TM-211-472, MANUAL PRESSURIZER LEVEL CONTROL
		OP-TM-211-472, MANUAL PRESSURIZER LEVEL CONTROL
	URO	Step 4.2.1: Places MU-V-17 in HAND by pressing White HAND PB on the MU-V-17 Control Station (CC).
	URO	Step 4.2.2: Verifies the White HAND light is Lit and the Red AUTO light is not lit on the MU-V-17 Control Station (CC).
	URO	Step 4.2.3: Adjusts Pressurizer level as required, initially by moving the toggle switch in the upward direction, on the MU-V-17 Control Station (CC), to open MU-V-17 and raise pressurizer level.
EXAMINER NOTE:		**Once the Pressurizer level is being restored with MU-V-17 in HAND control, then GO TO Event 3.**

Footnote: 1 – MU-V-17: Makeup to the Pressurizer Control valve.
2 – MU-24A/B FI: Normal Makeup Flow Indicator.
3 – LI-777A: Pressurizer Level Indication.
4 – RC1-LR: Pressurizer Level Recorder.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	21	of	56

Event Description: Loss of D Inverter, Loss of VBD (TS)

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 3**
Indications Available:		**Multiple Main Annunciator Panel Alarms illuminated, "D" RPS Cabinet deenergized, 1 of 2 Control Rod Positon Indication Panels deenergized, 1 Row of HSPS lights lit**
	Crew	Diagnosis a loss of Vital Bus "D".
	CRS	Direct entry into OP-TM-AOP-018, Loss of VBD.
		OP-TM-AOP-018, Loss of VBD
	ARO	Step 3.1: Announces entry into OP-TM-AOP-018, "Loss of VBD," over the plant page and radio.
EXAMINER NOTE:		**OP-TM-AOP-018, Steps 3.2-3.5 have no action required. If asked, as Shift Manager, state "there are no fuel movements in progress".**
	ARO	Step 3.6: Places RM-A-1G interlock switches in the DEFEAT position by turning the interlock defeat switch to the defeat position and verifying that Main Annunciator C-2-1 is in alarm.
	ARO	Step 3.7: Restores Control Tower ventilation IAW 1104-19, "Control Building Ventilation System."
EXAMINER NOTE:		**1104-19 has no direct section to recover from an RMS interlock. Section 3.7.2 is scripted below.** **Previous validators also used Section 3.4, which had the same steps in order as scripted below.**
		1104-19, Control Building Ventilation System

Footnote: 1 – RM-A-1G: Control Room Radiation Monitor, Gas Channel.

Op Test No.: NRC	Scenario # 1	Event # 3	Page 22 of 56
Event Description:	Loss of D Inverter, Loss of VBD (TS)		

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.7.2.2.1: Makes 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	Step 3.7.2.2.2: Verifies that fire alarms are clear for Control Tower and Air Intake Tunnel (AIT) on Heating and Ventilation Panels H&V A/B and PL A/B.
	ARO	Step 3.7.2.2.3: Verifies AH-E-19A is running by observing the red light lit and green light not lit.
EXAMINER NOTE:		**The ventilation fan controls are set up such that they must be held in the Start position longer than other Control switches. This is normal and expected.**
	ARO	Step 3.7.2.2.4: Starts AH-E-17A by turning the Control Switch in the clockwise direction, and observing the red light lit and green light not lit.
	ARO	Step 3.7.2.2.5: Verifies AH-E-95A has automatically started by observing the red light lit and green light not lit.
	ARO	Step 3.7.2.2.6/7: Presses "AH-D-28/617 RESET PB" on H&V PANEL and holds it in while Starting AH-E-20A by turning the Control Switch in the clockwise direction and observing the red light lit and green light not lit. Releases "AH-D-28/617 RESET PB" on H&V PANEL when AH-D-28/617 are OPEN as indicated by ESAS indication on PCR or white open light on H&V Panel.

Footnotes:
1 – AH-E-19A: Control Building Ventilation System return Fan, "A" Train.
2 – AH-E-17A: Control Building Normal Supply Fan, "A" Train.
3 – AH-E-95A: Control Building Booster Fan, "A" Train.
4 – H&V A: Heating and Ventilation Panel A.
5 – H&V B: Heating and Ventilation Panel B.
6 – AH-D-28/617: Control Building Ventilation System discharge dampers.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	23 of 56

Event Description: Loss of D Inverter, Loss of VBD (TS)

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.7.2.2.8: Selects AH-E-93A/94A for operation at H&V PANEL.
BOOTH CUE:		**If directed as an Auxiliary Operator to:** - **START AH-E-21, then, after a pause, report back that "AH-E-21 is running".** - **SECURE AH-E-90 and 91 fans from FH Bldg. 305 OR to report the status of AH-E-90 and AH-E-91, then after a pause, report back that "AH-E-90 and 91 are secured".** - **START AH-E-26, then, after a pause, report back that "AH-E-26 is running".**
EXAMINER NOTE:		**OP-TM-AOP-018, Step 3.8 requires no action once Control Building Ventilation is restored.**
		OP-TM-AOP-018, Loss of VBD
	CRS	Step 3.8: Initiates OP-TM-AOP-034, "Loss of Control Building Cooling."
	ARO	Step 3.9: Selects the desired groups (5 through 7) on CRD-FPM-A by selecting the 5-7 position with the toggle switch on the left side PI panel (PC)

Footnotes:
1 – AH-E-93A: Control Building Hallway Ventilation System Fans, "A" Train.
2 –AH-E-94A: Control Building Hallway Ventilation System Fans, "A" Train.
3 – AH-E-21: Kitchen/Toilet Fan.
4 – AH-E-90: Control Tower First Floor Recirculation Fan.
5 – AH-E-91: Control Tower First Floor Recirculation Fan.
6 – AH-E-26: Machine Shop Supply Fan.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	24	of	56

Event Description: Loss of D Inverter, Loss of VBD (TS)

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.10: Places the following radiation monitor interlock switches in the DEFEAT position (PCR): • RM-A-4G • RM-A-6G • RM-G-9
	ARO	Step 3.11: Restores Auxiliary Building and Fuel Handling Building ventilation IAW 1104-15A, "Auxiliary and Fuel Handling Building Supply and Exhaust System."
		1104-15A, Auxiliary and Fuel Handling Building Supply and Exhaust System
	ARO	Step 3.3.2.1/2: Verifies AH-E-14B/D are running by observing the red lights lit and green lights not lit (H&V Panel).
	ARO	Step 3.4.2.1.A.1: Ensures open FH BLDG Isolation Dampers, AH-D-120,121,122 (H&V Panel), by turning the Control Switch clockwise and verifying the red light is lit, green light not lit.
	ARO	Step 3.4.2.1.A.2: Starts AH-E-10 by turning the Control Switch in the clockwise direction and observing the red light lit and green light not lit.

Footnotes:
1 – AH-E-14B: Fuel Handling E.S.F. Exhaust Fan, "B" Train.
2 –AH-E-14D: Fuel Handling E.S.F. Exhaust Fan, "B" Train.
3 – AH-D-120: Fuel Handling E.S.F. System damper.
4 – AH-D-121: Fuel Handling E.S.F. System damper.
5 – AH-D-122: Fuel Handling E.S.F. System damper.
6 – AH-E-10: Fuel Handling E.S.F. Supply Fan.
7 – AH-FR-149: Fuel Handling E.S.F. System Air Flow Recorder.
8 – AH-FR-150: Fuel Handling E.S.F. System Air Flow Recorder.
9 – AH-FR-151: Fuel Handling E.S.F. System Air Flow Recorder.
10 – RM-A-4G: Fuel Handling Building Exhaust Radiation Monitor, Gas Channel.
11 – RM-A-6G: Auxiliary Building Exhaust Radiation Monitor, Gas Channel.
12 – RM-G-9: Fuel handling Building Fuel Handling Area Radiation Monitor.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	25	of	56

Event Description: Loss of D Inverter, Loss of VBD (TS)

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.4.2.1.B: Starts AH-E-11 by turning the Control Switch in the clockwise direction and observing the red light lit and green light not lit. Observes flows trending upward on AH-FR-149, 150, and 151 (H&V Panel)
BOOTH CUE:		**If directed to select instruments in HSPS Cabinet IAW AOP-018 Step 3.13, then INSERT EVENT #11, then report the instruments as selected.**
		OP-TM-AOP-018, Loss of VBD
	CRS	Step 3.13: Directs an Auxiliary Operator to select the following instruments in HSPS Cabinet Section A2 Rack 4 for EF-V-30B and EF-V-30D control: - LT-1042 - LT-1040 - LT-1050 - LT-1048
EXAMINER NOTE:		**A Tech Spec does exist for PORV Position Monitors, also a 7 day clock, but can be exited by closing the PORV Block Valve.**
	CRS	Declares a 3.5.5.2 (7 Day) Tech Spec clock, based on RM-G-26 or RM-G-22.
EXAMINER NOTE:		**A 72 hour Tech Spec (3.5.1.9) does exist if the alternate instruments are not selected for HSPS.**

Footnotes:
1 – EF-V-30B: Emergency Feedwater Control to "B" OTSG valve.
2 – EF-V-30D: Emergency Feedwater Control to "A" OTSG valve.
3 – RM-G-22: RB inside "A" D-Ring Radiation Monitor.
4 – RM-G-26: Main Steam Line From OTSG "A" Radiation Monitor.
5 – AH-E-11: Fuel Handling E.S.F. Supply Fan.
6 – AH-FR-149: Fuel Handling E.S.F. System Air Flow Recorder.
7 – AH-FR-150: Fuel Handling E.S.F. System Air Flow Recorder.
8 – AH-FR-151: Fuel Handling E.S.F. System Air Flow Recorder.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	26	of 56

Event Description: Loss of D Inverter, Loss of VBD (TS)

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**T.S. 3.5.5.2: The channels identified for the instruments specified in Table 3.5-3 shall be OPERABLE. With the number of instrumentation channels less than required, restore the inoperable channel(s) to OPERABLE in accordance with the action specified in Table 3.5-3.** **Table 3.5-3, Action A: With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirements:** **1. either restore the inoperable channel(s) to OPERABLE status within 7 days of the event, or** **2. prepare and submit a Special Report within 30 days following the event outlining action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.**
EXAMINER NOTE:		**Once ventilation has been restored and the Tech Spec call made, then GO TO Event 4.**

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	27	of	56

Event Description: Low Makeup Tank Pressure

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 4.**
Indications Available:		**Main Annunciator D-3-3 in alarm, and PPC point A1028 in alarm with low pressure indication.**
BOOTH CUE:		**Once D-3-3 comes into an alarm condition, insert Event #10 to remove the fault.**
BOOTH CUE:		**Call in as an Auxiliary Operator and state that you heard MU-V-13 leaking by and that you torqued down on the valve. The sound has subsided.**
	Crew	Diagnoses the low Makeup Tank pressure.
	CRS	DIRECTS entry into OP-TM-MAP-D0303, MU TANK PRESS HI/LO
		OP-TM-MAP-D0303, MU TANK PRESS HI/LO
	URO	Step 4.3.1: If pressure is Low, then PERFORM the following: 4.3.1 PERFORM one of the following: • PRESSURIZE MU-T-1 IAW OP-TM-211-481 or OP-TM-211-486 (H2) or OP-TM-211-482 (N2).
		OP-TM-211-486, HYDROGEN ADDITION TO MU-T-1 FROM HN-V-6A
	URO	Step 3.2: Verifies the Prerequisites.
	URO	Step 4.1: Determines target pressure using Attachment 7.3 of OP-TM-211-000

Footnotes: 1 – MU-V-13: Makeup Tank Vent Valve
2 – MU-T-1: Makeup Tank

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	28	of	56

Event Description: Low Makeup Tank Pressure

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.10 and 3.11: Maintains RCS pressure between 2105 and 2205 psig, controls RCS Tavg 578 to 580 °F, and controls RCS ΔTc < 5° F by adjusting SG A and SG B FW Demand Station toggle switches as applicable.
EXAMINER NOTE:		**Step 4.2 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**
BOOTH NOTE:		**When directed as an Auxiliary Operator to perform steps 4.3 through 4.5, call back that the steps are complete. They are not modeled in the simulator.**
	URO	Steps 4.3-4.5: Direct an Auxiliary Operator to perform the following actions in the field: o Slowly OPEN the cylinder isolation valve of the in service H2 cylinder. (N/A other H2 cylinders) o HN-T-1A o HN-T-2A o HN-T-1B o HN-T-2B o Slowly OPEN HN-V-6A o Slowly OPEN HN-V-5A
	URO	Step 4.6: Opens MU-V-28 to pressurize MU-T-1 to required value (MU17-PI) by pressing the red open pushbutton and verifying the red open light is lit and the green closed light is not lit (CC).

Footnotes:
1 – HN-T-1A/1B/2A/2B: MU-T-1 Hydrogen Supply Bottles
2 – HN-V-5A: Hydrogen Supply Isolation Valve "A" Side
3 – HN-V-6A: Hydrogen Supply Bottle Isolation Valve
4 – MU-V-28: Hydrogen to Makeup Tank Control Valve
5 – MU-T-1: Makeup Tank
6 – MU17-PI: Makeup Tank Pressure Indicator

Op Test No.: NRC	Scenario # 1	Event # 4	Page 29 of 56
Event Description:	Low Makeup Tank Pressure		

Time	Position	Applicant's Actions or Behavior
	URO	Step 5.1.1: When H2 addition to MU-T-1 is complete, then PERFORM the following: o CLOSE MU-V-28 to pressurize MU-T-1 to required value (MU17-PI) by pressing the green closed pushbutton and verifying the red open light is not lit and the green closed light is lit (CC).
BOOTH NOTE:		**When directed as an Auxiliary Operator to perform steps 5.1.2 through 5.2, call back that the steps are complete. They are not modeled in the simulator.**
	URO	Steps 5.1.2 through 5.2: Direct an Auxiliary Operator to perform the following actions in the field: o ENSURE CLOSED HN-V-5A o ENSURE CLOSED HN-V-6A o ENSURE CLOSED the cylinder valve of the in service H2 cylinder. (N/A other H2 cylinders) o HN-T-1A o HN-T-2A o HN-T-1B o HN-T-2B
EXAMINER NOTE:		**Once Makeup Tank pressure has returned to the acceptable band, then GO TO Event 5.**

Footnotes:
1 – HN-T-1A/1B/2A/2B: MU-T-1 Hydrogen Supply Bottles
2 – HN-V-5A: Hydrogen Supply Isolation Valve "A" Side
3 – HN-V-6A: Hydrogen Supply Bottle Isolation Valve
4 – MU-V-28: Hydrogen to Makeup Tank Control Valve
5 – MU-T-1: Makeup Tank
6 – MU17-PI: Makeup Tank Pressure Indicator

Op Test No.: NRC	Scenario # 1	Event # 5	Page 30 of 56
Event Description:	SG/RX Demand Station Fails to Zero Volts		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed by the Lead Examiner INITIATE Event 5.**
Indications Available:		**Power reduces quickly, Main Annunciators H-2-1, H-1-4, and H-3-2 in alarm, RCS Pressure reduces.**
	Crew	Diagnoses Total RCS Flow IN Failure to Zero Volts.
EXAMINER NOTE:		**The crew may decide to perform OP-TM-621-471. Those steps can be found on page 53 of this Scenario.**
	CRS	DIRECTS entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	URO	Step 2.1 (**IMA**): Places the Diamond Station in Manual by pressing the Manual/Auto pushbutton on the Diamond Panel and observing the Manual light is lit and the Auto light is not lit (CC)
	URO/ARO	Step 2.2 (**IMA**): Places SG A FW Demand and SG B FW Demand ICS Stations in HAND by pressing the HAND pushbuttons on each ICS Station and verifying the white HAND lights are lit and the red AUTO lights are not lit on the selected ICS stations (CC).
	URO	Step 2.3 (**IMA**): Verifies Turbine Header Pressure is between 835 and 935 psig as read on the Turbine Header Pressure digital indication (CL)

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	31	of	56

Event Description: SG/RX Demand Station Fails to Zero Volts

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.4 (**IMA**): Verifies RCS Pressure is lowering and/or less than 2205 PSIG by observing RCS pressure meters (CC and PC). As required, if RCS Pressure is >2205 psig, URO places RC-V-1 control in Manual (CC), opens RC-V-1 fully by pressing the open pushbutton and observing the red open light lit and the green closed light not lit (CC), and then places RC-V-1 control back to AUTO.
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.1 and 3.2 are IAAT's that should not be applicable during this Event.**
	CRS	Step 3.3: Verifies the Main Turbine is reset by observing it on-line (CL).
	CRS	Step 3.4: Assigns manual control responsibilities and control bands as follows:
	URO	Inserts or withdraws control rods to maintain Reactor power within 1% of current power level by operating the manual Control Rod control handle on the Diamond Panel as applicable (CC).
	ARO	Adjust FW Flow to maintain Tavg within 2 °F of current temperature by adjusting SG A and SG B FW Demand Station toggle switches as applicable (CC). Maintain Turbine Hdr Pressure within 10 psig of current pressure by adjusting Turbine Load Set Station demand as applicable (CL).
	ARO	Step 3.5: Makes scripted announcement.
EXAMINER NOTE:		**OP-TM-AOP-070, Step 3.6 is N/A.**

Footnote: 1 – RC-V-1: Pressurizer Spray valve.

Op Test No.:	NRC	Scenario #	1	Event #	5	Page	32	of	56

Event Description: SG/RX Demand Station Fails to Zero Volts

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.7: Ensures SG/Reactor Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Ensures Reactor Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Ensures SG A/B Load Ratio Demand Station is in HAND by pressing the HAND pushbutton and observing white HAND light is lit and red AUTO light is not lit.
	URO	Step 3.7: Observes that the ULD ICS Station is already in HAND by the white HAND light being lit.
	CRS	Step 3.8: Verifies that MFW Pumps are controlling FW Valve dP greater than 30 psid (CL) and that Reactor Power is greater than 75% (CC).
EXAMINER NOTE:		**OP-TM-AOP-070, step 3.9 is N/A and 3.10 has already been verified.**
	ARO	Step 3.11: Maintains RCS pressure between 2105 and 2205 psig by adjusting SG "A" FW Demand and SG "B" FW Demand ICS Station toggle switches as applicable as applicable (CL and CC).
	ARO	Step 3.12: Maintains RCS Tavg 578 to 580 °F, and controls RCS ΔTc < 5° F by adjusting SG "A" FW Demand and SG "B" FW Demand ICS Station toggle switches as applicable as applicable (CL and CC).
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.13 and 3.14 are N/A.**
EXAMINER NOTE:		**Once OP-TM-AOP-070 actions have been completed and the plant is stabilized: then GO TO Event 6.**

Op Test No.:	NRC	Scenario #	1	Event #	6	Page	33	of 56
Event Description:	RCS Leak Through the Letdown Line							

Time	Position	Applicant's Actions or Behavior
BOOTH CUE: When directed by the Lead Examiner, INITIATE Event 6.		
Indications Available: Verbal report from the field, lowering level in the Pressurizer		
BOOTH CUE:		**Call in and state "This is Rad Pro. There is a leak from the Letdown Line about a half inch downstream from the wall. I have left the area and my best guess leakrate is about fifteen gallons per minute."**
	Crew	Diagnoses RCS leak through the Letdown Line.
	CRS	DIRECTS entry into OP-TM-AOP-050, REACTOR COOLANT LEAKAGE
		OP-TM-AOP-050, REACTOR COOLANTLEAKAGE
	ARO	Step 3.1: Announce entry into OP-TM-AOP-050, "Reactor Coolant Leakage" and the location of the leak (if known) over the plant page and radio.
EXAMINER NOTE:		**The steps associated with Guide 9 are found on page 36.**
	URO	Step 3.2: INITIATE OP-TM-EOP-010, Guide 9, "RCS Inventory Control".
	URO	Step 3.6: ENSURE MU-V-8 is aligned to "THRU TO FILTERS" position.
	CRS	Step 3.7: NOTIFY the SM to review EALs.

Footnote: 1 – MU-V-8: Letdown Split Valve to Makeup Tank or Reactor Coolant Bleed Tank

Op Test No.:	NRC	Scenario #	1	Event #	6	Page	34	of 56

Event Description: RCS Leak Through the Letdown Line

Time	Position	Applicant's Actions or Behavior
	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".
		OP-TM-621-471, ICS Manual Operations
	URO	Step 4.2.4: If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows: • 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%. • If rapid power reduction is required, then LOWER as necessary to achieve desired reactor power level and ENSURE FW flow controlled within limits by lowering and/or raising on the SG/REACTOR DEMAND toggle switch (CC) as necessary.
	CRS	Step 3.10: IAAT RCS leak location is known sufficiently to determine the following: 2. If isolation of Letdown is required to stop the leak, then GO TO Section 5.0, "Isolation Of Letdown".
	Crew	Step 3.11: Verify leak is in the Auxiliary Building: - RM-A-2, 4, 6, 8 will be steady (PRF) - Auxiliary Building sump level will be rising on FT-118 (LWDS) - Containment sump level will be steady on FT-804 (CC/CR)

Footnotes:
1 – RM-A-2: Reactor Building Atmosphere Area Radiation Monitor
2 – RM-A-4: Fuel Handling Building Exhaust Air Area Radiation Monitor
3 – RM-A-6: Auxiliary Building Exhaust Air Area Radiation Monitor
4 – RM-A-8: Fuel Handling Building and Auxiliary Building Exhaust Air Area Radiation Monitor

Op Test No.: NRC	Scenario # 1	Event # 6	Page 35 of 56
Event Description:	RCS Leak Through the Letdown Line		

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.12: Announces "RCS leakage to the Auxiliary Building exists. All non-essential personnel exit Auxiliary Building."
BOOTH CUE:		**If directed by the Control Room as Radiation Protection to perform appropriate radiological surveys and control access to the affected area, acknowledge the direction. No further action should be required.**
	CRS/ARO	Step 3.13 Notifies Radiation Protection to perform appropriate radiological surveys and control access to the affected area.
BOOTH CUE:		**If directed by the Control Room to look for the leak in the Auxiliary Building (or when directed by the Lead Examiner), then call back and state that "There is a leak from the Letdown Line about a half inch downstream from the wall".**
	ARO	Step 3.14: Dispatches personnel to look for the leak in the Auxiliary Building.
	URO	Step 5.1: Isolates letdown by closing: - MU-V-1A by pressing the close pushbutton and verifying the green closed light it lit and the red open light is not lit (CC). - MU-V-1B by pressing the close pushbutton and verifying the green closed light it lit and the red open light is not lit (CC).
	CRS	Step 5.2: Verifies seal injection in service by observing flow on MU-42-FI1.

Footnotes: 1 – MU-V-1A: "A" Letdown Cooler Inlet Isolation Valve
2 – MU-V-1B: "B" Letdown Cooler Inlet Isolation Valve

Op Test No.: NRC	Scenario # 1	Event # 6	Page 36 of 56
Event Description:	RCS Leak Through the Letdown Line		

Time	Position	Applicant's Actions or Behavior
	URO	Step 5.3: Lowers seal injection to 26 gpm using MU-V-32 by pressing the toggle switch on the MU-V-32 Bailey Control Station in the downward direction, as necessary, until seal injection indicates approximately 26 gpm on MU-42-FI1 (CC)
BOOTH CUE:		**If directed by the Control Room as Chemistry to maximize RCS sampling to the sample sink (CE-104 and CE-105), acknowledge the direction. No further action should be required.**
	CRS/ARO	Step 5.4: Requests Chemistry maximize RCS sampling to the sample sink. (CE-104 and CE-105)
EXAMINER NOTE:		**The depth of progress in Guide 9 is dependent on hoe the crew navigates through OP-TM-AOP-050. The steps listed below are the maximum number of steps that the crew could take.**
		OP-TM-EOP-010, Guide 9, RCS Inventory Control
	URO	Verify MU Tank Level >55 inches & ESAS HPI is not actuated.
	URO	Verify MU Tank Level <96 inches.
	URO	Verify MU Pump is operating.

Footnotes: 1 – MU-V-14A/B: Makeup Pump Suction Valves from BWST
2 – MU24-FI: Normal Makeup Narrow Range Flow Indicator
3 – CE-104: RCS Loop "B" Letdown Cooler Sample Point
4 – CE-105: Pressurizer Sample Point
5 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.:	NRC	Scenario #	1	Event #	6	Page	37	of 56

Event Description: RCS Leak Through the Letdown Line

Time	Position	Applicant's Actions or Behavior
	URO	Verify MU-V-5 is closed.
	URO	Verify MU24-FI >20 gpm
	URO	Ensure MU-V-17 is open.
	URO	Verify Pressurizer level is being restored. RNO: Throttle MU-V-217 by pressing the open and closed pushbuttons, as necessary, to make up for the loss in the Letdown Line.
	CRS	Briefs a Reactor Shutdown IAW 1102-4, Power Operations
EXAINER NOTE:		**Tech Spec: 3.1.6:** **3.1.6.1 If the total reactor coolant leakage rate exceeds 10 gpm, the reactor shall be placed in hot shutdown within 24 hours of detection.**
EXAMINER NOTE:		**Once the TS call is made, then GO TO Event 7.**

Footnotes: 1 – MU-V-17: Normal Makeup to Reactor Coolant System Control Valve
2 – MU-V-217: High Capacity Normal Makeup Valve
3 – MU-V-5: Letdown Flow Control Bypass Valve

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	38	of 56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner: Initiate Event 7.**
Indications Available:		**Initial: Main Annunciator Panel alarms M-1-7 and H-1-1 actuate, LO-P-8B starts, FW-P-1B indicate zero RPMs.** **Latter: FW-P-1A RPMs go to zero, Feedwater flow lowers to zero, RCS pressure and temperature rise, OTSG level lowers.**
	Crew	Diagnoses a loss of Feedwater and ATWS.
EXAMINER NOTE:		**The ARO may trip FW-P-1A which will automatically actuate Emergency Feedwater.** **The URO will trip the reactor, as allowed by OS-24:** **4.2 Actions Not Described in Procedures** **A. Licensed operators may take action without procedural guidance, and without taking a variance under the following conditions:** **• Initiating a manual reactor TRIP when a licensed operator believes the reactor is not in a safe condition.** **• Action taken to directly compensate for the failure of an automatic system.** **• Action to manually actuate a safety system when the automatic actuation setpoint is being approached.**
		OP-TM-EOP-001, REACTOR TRIP
CT-24	URO	Step 2.1 (IMA): Presses Both Reactor Trip and DSS pushbuttons (CC).

Footnotes: 1 – FW-P-1A: "A" Main Feed Pump.
2 – FW-P-1B: "B" Main Feed Pump.
3 – LO-P-8B: FW-P-1B Turbine AC Oil Pump

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	39	of	56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.2 (IMA): Verifies that the reactor is shutdown by <u>one</u> of the following: **1.** Power Range Nuclear Instrumentation indicates less than 5% (CC) **2.** All control rods are inserted (PC) **3.** Source Range count rate is continuously lowering (CC)
	URO	Step 2.3 (IMA): Presses the Turbine Trip pushbutton (CL)
	URO	Step 2.4 (IMA): Verifies the Turbine Stop valves are closed by observing the indication on CL.
	ARO	Performs a Symptom Check, recognizes a Lack of Primary-to-Secondary Heat Transfer based on NO Main Feedwater and NO Emergency Feedwater due to the EF-V-30 valves failing, and informs the CRS.
EXAMINER NOTE:		**A Lack of Primary-to Secondary Heat Transfer will be identified based on the following definition found in OS-24:** **One of the following sets of conditions:** • **Incore temperatures or THOT rising above 580°F and at least one RC Pump operating.** • **Incore temperatures rising and NO FEEDWATER available.** • **Incore temperatures rising and RCS circulation can not be confirmed.** **Following a loss of all RC Pumps, incore temperatures will rise while building natural circulation. Time should be taken to allow for the building of natural circulation.**

Footnotes: 1 – EF-V-30: Emergency Feedwater Valves to "A" and "B" OTSG's

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	40	of	56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**EF-V-30A/B/C/D will have no flow because EF-V-52A/B/C/D (the downstream isolation valves for EF-V-30's) are closed and are required to be opened to allow EFW flow to the OTSGs.**
	CRS	Announces entry into OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER.
		OP-TM-EOP-004, LACK OF PRIMARY TO SECONDARY HEAT TRANSFER
	URO	Step 3.1: Ensure no more than one RCP operating per loop by shutting down RC-P-1C or RC-P-1D by rotating the control switch for either pump clockwise, verifying the red light is lit, and the green light is not lit (CC).
EXAMINER NOTE:		**Upon initiating OP-TM-424-901, the ARO will discover and announce that EF-V-30A/B/C/D will not open, and will announce it to the CRS. Any further actions contained in OP-TM-424-901 will be useless.**
	CRS	Step 3.2: Initiate OP-TM-424-901, "Emergency Feedwater".
	ARO	Step 3.3: Announces the reactor trip.

Footnotes:
1 – EF-V-30A: Emergency Feedwater Valve to "A" OTSG
2 – EF-V-30B: Emergency Feedwater Valve to "B" OTSG
3 – EF-V-30C: Emergency Feedwater Valve to "B" OTSG
4 – EF-V-30D: Emergency Feedwater Valve to "A" OTSG
6 – EF-V-52A: EF-V-30A Block Valve ("A" OTSG)
5 – EF-V-52B: EF-V-30B Block Valve ("B" OTSG)
6 – EF-V-52C: EF-V-30C Block Valve ("B" OTSG)
7 – EF-V-52D: EF-V-30D Block Valve ("A" OTSG)
8 – RC-P-1C: "C" Reactor Coolant Pump
9 – RC-P-1D: "D" Reactor Coolant Pump

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	41	of 56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Steps 3.4-3.7 are N/A.**
EXAMINER NOTE:		**If conditions are met for OP-TM-EOP-004 Step 3.8 the CRS will transition to OP-TM-EOP-009, HPI Cooling. These steps continue below.** **If conditions are met for OP-TM-EOP-004, Step 3.9 the crew will attempt to feed the OTSGs with a Condensate Booster Pump IAW Attachment 1 of OP-TM-EOP-004. The steps of Attachment 1 are located on Page 49.**
		OP-TM-EOP-009, HPI COOLING
	URO	Step 3.1: IAAT SCM < 25°F, then perform the following: 1. PERFORM Rule 1 2. CONTINUE with EOP-009
	URO	Step 3.2: Ensure RC-V-2 is OPEN by the red light lit, green light not lit (CC).
	URO	Step 3.3: Initiates 4 psig ESAS IAW OP-TM-642-902, "4 psig ESAS Actuation" by pressing the "A" and "B" train 4# ESAS manual pushbuttons (CC/CR)
BOOTH NOTE:		**Ensure the following:** - **MU-P-1A and MU-P-1C do not start on any ESAS signal.** - **MU-P-1B trips as soon as the ES signal is actuated.**

Footnotes: 1 – MU-P-1A: "A" Makeup Pump
2 – MU-P-1B: "B" Makeup Pump
3 – MU-P-1C: "C" Makeup Pump
4 – RC-V-2: PORV Isolation Valve

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	42	of	56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Due to no Makeup Pumps operating, the crew will recognize that HPI is not adequate.**
	URO	Step 3.4: Verify Adequate HPI. RNO: Go to Section 4.0.
		OP-TM-EOP-009, Section 4.0: Inadequate HPI
CT-13	URO	Step 4.2.1: IAAT RCS pressure approaches TS 3.1-1 limit or 2450 psig, then perform the following: • ENSURE the PORV block is open by the red light lit, green light not lit (CC).
CT-13	URO	Step 4.2.2: IAAT RCS pressure approaches TS 3.1-1 limit or 2450 psig, then perform the following: • OPEN the PORV (RC-RV-2) by turning the Control Switch to the open position, verifying MAP alarms G0106 and G0107 are in alarm and flow is indicated on the CC meter.
CT-13	URO	Step 4.2.3: IAAT RCS pressure approaches TS 3.1-1 limit or 2450 psig, then perform the following: • When RCS pressure is reduced to ~1750 psig, or approaches 25 °F SCM, then CLOSE the PORV, verifying MAP alarms G0106 and G0107 are not in alarm and no flow is indicated on the CC meter.
EXAMINER NOTE:		**The URO will perform the above three steps, as necessary, each time the IAAT conditions are met.**

Footnotes: 1 – RC-RV-2: PORV - Pressurizer Vent to Reactor Coolant Drain Tank Isolation Valve
2 – RC-V-2: PORV Isolation Valve

Op Test No.: NRC	Scenario # 1	Event # 7/8/9	Page 43 of 56
Event Description:	Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.		

Time	Position	Applicant's Actions or Behavior
	URO	Step 4.3: Ensure either the PORV or PORV block valve is Closed.
	ARO	Step 4.4: Ensure the following RCS Vent Valves are CLOSED by observing the valve positions (PCR): • RC-V-28 or RC-V-44 • RC-V-40A or RC-V-41A • RC-V-40B or RC-V-41B • RC-V-42 or RC-V-43
	URO	Step 4.5: If SCM ≥ 25 °F then Shutdown all RC Pumps by rotating the control switch for either pump clockwise, verifying the red light is lit, and the green light is not lit for the remaining two RCP's (CC).
EXAMINER NOTE:		**The URO may deenergize the Pressurizer heaters by taking the Control switch for each bank to "OFF".**
	URO	Step 4.6: Ensure all pressurizer heaters are de-energized by placing the Pressurizer heater bank control switches to OFF (CC)
	CRS	Step 4.8: IAAT FEEDWATER is available to at least one OTSG, then GO TO EOP-004

Footnotes:
1 – RC-V-28: Pressurizer Vent to Reactor Coolant Drain Tank Isolation Valve
2 – RC-V-40A: "A" Hot Leg Vent to Reactor Coolant Drain Tank and Atmosphere
3 – RC-V-40B: "B" Hot Leg Vent to Reactor Coolant Drain Tank and Atmosphere
4 – RC-V-41A: "A" Hot Leg Vent to Reactor Coolant Drain Tank and Atmosphere
5 – RC-V-41B: "B" Hot Leg Vent to Reactor Coolant Drain Tank and Atmosphere
6 – RC-V-42: Reactor Vessel Head Vent to Reactor Building Atmosphere
7 – RC-V-43: Reactor Vessel Head Vent to Reactor Building Atmosphere
8 – RC-V-44: Pressurizer Vent Isolation Valve

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	44	of	56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The ARO should report to the CRS the status of Feedwater and direct an Auxiliary Operator to open EF-V-52A/B/C/D and restore feedwater to at least one dry OTSG.**
EXAMINER NOTE:		**The crew will continue in OP-TM-EOP-009 until they reach Step 4.8 at which time they verify feedwater is available and re-enter OP-TM-EOP-004.**
EXAMINER NOTE:		**With feedwater restored to an OTSG there is a possibility of losing Sub Cooling Margin. If this occurs the crew will take one of the following three paths based on procedural guidance:** • **If the crew is in OP-TM-EOP-004 when approaching loss of SCM, the procedure directs them to OP-TM-EOP-009.** • **If the crew is in OP-TM-EOP-009 at the time SCM is lost, the procedure directs them to perform OP-TM-EOP-010 Rule 1 and then remain in EOP-009.** • **If SCM is lost when the crew is in any other procedure or plant condition, they will enter OP-TM-EOP-002.**
		OP-TM-EOP-002, Loss of 25°F Subcooling Margin
	CRS	Step 2.1: Perform Rule 1, LSCM
		OP-TM-EOP-010, Rule 1, LSCM
	URO	Step 1: Verify more than two minutes since RCP start.

Footnotes:
1 – EF-V-52A: EF-V-30A Block Valve ("A" OTSG)
2 – EF-V-52B: EF-V-30B Block Valve ("B" OTSG)
3 – EF-V-52C: EF-V-30C Block Valve ("B" OTSG)
4 – EF-V-52D: EF-V-30D Block Valve ("A" OTSG)
5 – EF-V-30: Emergency Feedwater Valve

Op Test No.: NRC	Scenario # 1	Event # 7/8/9	Page 45 of 56
Event Description:	Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.		

Time	Position	Applicant's Actions or Behavior
	URO	Step 2: ENSURE all RCPs are shutdown within one minute by performing the following: • IAAT a RCP cannot be secured from the Console, then de-energize 1A 6900v and 1B 6900v busses. • ENSURE RC-P-1A is OFF. • ENSURE RC-P-1B is OFF. • ENSURE RC-P-1C is OFF. • ENSURE RC-P-1D is OFF.
	URO	Step 3: INITIATE 4 # ESAS Actuation IAW OP-TM-642-902 4# ESAS Actuation.
	URO	Step 4: INITIATE OP-TM-424-901, "Emergency Feedwater" and FEED IAW Rule 4.
EXAMINER NOTE:		**OP-TM-EOP-002 Steps 3.1 through 3.5 will be N/A**
		OP-TM-EOP-002, Loss of 25°F Subcooling Margin
	CRS	Step 3.6: REQUEST SM evaluate Emergency Action Levels (EALs).
	ARO	Step 3.7: ENSURE performance of an alarm review.
	URO	Step 3.8: Verify all Reactor Coolant Pumps are shutdown.
	CRS	Step 3.9: VERIFY one of the following exists: • SCM > 25 °F, • ADEQUATE HPI. RNO: GO TO Section 4.0, Rapid RCS Cooldown

Footnotes: 1 – RC-P-1A: "A" Reactor Coolant Pump
2 – RC-P-1B: "B" Reactor Coolant Pump
3 – RC-P-1C: "C" Reactor Coolant Pump
4 – RC-P-1D: "D" Reactor Coolant Pump

Op Test No.:	NRC	Scenario #	1	Event #	7/8/9	Page	46	of	56

Event Description: Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Steps 4.1 and 4.2 will not be performed during this scenario.**
	ARO	Step 4.3: IAAT OTSG pressure < 750 psig, then DEFEAT HSPS Lo Lo Pressure MFW Isolation.
	ARO	Step 4.4: RAISE OTSG Operate Range level to 75 to 85% using EFW.
BOOTH CUE:		**Report to the Control Room as Secondary Auxiliary Operator, "I'm down at the EV-F-30 area and EF-V-52A, B, C, and D are CLOSED. Do you want me to do anything with these valves?"**
BOOTH CUE:		**When directed to open EF-V-52A through D, then perform the following:** **1. Place FWR 54 to AUTO** **2. Place FWR 56 to AUTO** **3. Place FWR 58 to AUTO** **4. Place FWR60 to AUTO** **5. Report back that EF-V-52A, B, C and D are open.**
EXAMINER NOTE:		**The ARO should report to the CRS the status of Feedwater and direct the Auxiliary Operator to open one or both EF-V-52 valves and restore feedwater to at least one dry OTSG. Flow is restored to the "A" OTSG IAW Guide 13**

Footnotes: 1 – EF-V-52A: EF-V-30A Block Valve ("A" OTSG)
2 – EF-V-52B: EF-V-30B Block Valve ("B" OTSG)
3 – EF-V-52C: EF-V-30C Block Valve ("B" OTSG)
4 – EF-V-52D: EF-V-30D Block Valve ("A" OTSG)

Op Test No.: NRC	Scenario # 1	Event # 7/8/9	Page 47 of 56
Event Description:	Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.		

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-010, GUIDE 13, Feeding a Dry or Depressurized OTSG
	ARO	Step 1: VERIFY the OTSG pressure boundary is intact inside the Intermediate and Reactor Buildings.
	ARO	Step 3: If TSDT is negative, and one of the following: - an RCP is ON or - the OTSG is intact then FEED the OTSG at a maximum flow of 0.2 Mlbm/hr using MFW.
	OR	
	ARO	Step 4: If TSDT is positive, then perform the following: A. If an RCP is ON, then FEED using EFW up to the maximum flow of 435 gpm. RNO: FEED the OTSG at a maximum of 0.2 Mlb/hr using MFW. B. If all the RCP's are OFF and the OTSG is intact, then FEED the OTSG at a maximum of 0.2 Mlb/hr using MFW.
EXAMINER NOTE:		**The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.**

Op Test No.: NRC	Scenario # 1	Event # 7/8/9	Page 48 of 56
Event Description:	Loss of both Main Feedwater Pumps, ATWS, EFW Failure, HPI Fails.		

Time	Position	Applicant's Actions or Behavior

Follow-up question: What was the highest event entered during scenario?

Answer:

MA2 due to:

1. **Automatic Reactor Trip was unsuccessful and Manual Reactor Trip was successful.**

OR

FA1 due to:

1. **Loss of SCM or HPI / PORV Cooling Used.**

Op Test No.: NRC	Scenario # 1	Event # 7 (Alt)	Page 49 of 56
Event Description:	Condensate Booster Pump Cooling		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**If conditions are met for OP-TM-EOP-004, Step 3.9 the crew will attempt to feed the OTSGs with a Condensate Booster Pump IAW Attachment 1 of OP-TM-EOP-004, Attachment 1.**
		OP-TM-EOP-004
	ARO	Step 3.8: IAAT RCS pressure approaches 2450 psig (or 527 psig if < 329°F), and feedwater is not available, then GO TO EOP 009 "HPI COOLING".
	CRS	Step 3.9: If all of the following conditions are met: • A Condensate Booster Pump is On • At least one RCP is On • An OTSG is intact; then PERFORM Attachment 1, "OTSG Feed Using a Condensate Booster Pump", to the ARO.
		OP-TM-EOP-004, ATTACHMENT 1, OTSG feed using a Condensate Booster Pump
	N/A	Step 1: IAAT EFW is recovered, then perform: N/A
	ARO	Step 2: Ensures CLOSED the following: 1. FW-V-16A by placing the FW-V-16A Bailey Station Controller to HAND by pressing the white HAND button, observing the white HAND light lit, red AUTO light not lit, and then lowering (if required) the toggle switch on the FW-V-16A Bailey Station until the valve position indicates zero (CC). 2. FW-V-16B by placing the FW-V-16B Bailey Station Controller to HAND by pressing the white HAND button, observing the white HAND light lit, red AUTO light not lit, and then lowering (if required) the toggle switch on the FW-V-16B Bailey Station until the valve position indicates zero (CC).

Footnotes: 1 – FW-V-16A: "A" Feedwater Startup Control Valve
2 – FW-V-16B: "B" Feedwater Startup Control Valve

Op Test No.:	NRC	Scenario #	1	Event #	7 (Alt)	Page	50	of	56

Event Description: Condensate Booster Pump Cooling

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3: Maintains TSDT IAW Guide 14
CT-26	ARO	Step 4: Opens FW-V-6 by pressing the red open pushbutton and observing the red open pushbutton lit, green closed pushbutton closed (CL).
CT-26	ARO	Step 5: When OTSG Pressure < 750 psig, then defeats OTSG Lo-Lo Pressure MFW Isolation by pressing the Lo-Lo Pressure MFW Isolation bypass pushbuttons and observing the amber lights for each are lit (CC and CL).
CT-26	ARO	Step 6: When OTSG Press <600 psig, then Feeds IAW Rule 4.
	ARO	Step 7: Throttle MS-V-3's to maintain OTSG Press 500-600 psig by adjusting the toggle switch on each Turbine Bypass Valve Bailey Station in either the upward or downward direction, as necessary, to maintain proper OTSG pressure.
		OP-TM-EOP-010, RULE 4, Feedwater Control
	ARO	Step 3: VERIFY the OTSG is not DRY. RNO: If Primary to Secondary Heat Transfer is not available to either OTSG, then initiate FW as follows: If EFW is not available, then MAINTAIN MFW flow < 0.2 Mlb/HR / OTSG.
		OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
	N/A	Step 3.11: IAAT OTSG pressure < 750 psig, then DEFEAT HSPS Lo-Lo Pressure MFW Isolation.

Footnotes: 1 – FW-V-6: Main Feedwater Pump Bypass
2 – MS-V-3's: Turbine Bypass Valves
3 – MS-V-4's: Atmospheric Dump Valves

Op Test No.:	NRC	Scenario #	1	Event #	7 (Alt)	Page	51	of 56

Event Description: Condensate Booster Pump Cooling

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.12: IAAT all RCPs are Off, then INITIATE Guide 7, "RCP Restart".
	ARO	Step 3.13: REDUCE OTSG Pressure so that secondary Tsat is 40 to 60°F lower than incore thermocouple temperature.
EXAMINER NOTE:		**Step 3.14 is N/A**
	ARO	Step 3.15: REDUCE OTSG Pressure so that secondary Tsat is 90 to 100°F lower than incore thermocouple temperature.
CT-26	ARO	Step 3.16: RAISE OTSG level to 75 to 85% Operate Range with EFW.
		OP-TM-EOP-010, RULE 4, Feedwater Control
	N/A	Step 1: If EFW is actuated, then VERIFY two or more EFW pumps are running.

Footnotes: 1 – EF-P-2A: "A" Motor Driven emergency Feedwater Pump
2 – EF-P-2B: "B" Motor Driven emergency Feedwater Pump

Op Test No.:	NRC	Scenario #	1	Event #	7 (Alt)	Page	52	of	56

Event Description: Condensate Booster Pump Cooling

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**SCM can only be determined by the PPC when the RCP's are secured and Natural Circulation has not been verified per OS-24, Conduct of Operations During Abnormal and Emergency Events:** **If any of the following conditions exist:** **o All RCPs are shutdown and natural circulation has not been verified in both loops** **o TI-977 and TI-978 are not valid** **o TI-977 or TI-978 (SCM indication) is less than 25F and hot leg temperature is changing rapidly (i.e. immediately after a reactor trip or temperature lowering at greater than 900 F/HR),** **then USE incore subcooling margin C4008 (or C4132). Otherwise, USE the most conservative subcooling margin indicator on PCL (TI-977 or TI-978).**
	ARO	Step 2: Verify SCM > 25°F or OTSG level between 75 to 85% Operating Range Level by observing that SCM is greater than 25°F on the PPC.
CT-26	ARO	Step 3: Verify the OTSG is not dry. RNO: If Primary to Secondary Heat Transfer is not available to either OTSG, then initiate FW as follows: - If EFW is not available, then MAINTAIN MFW flow < 0.2 Mlb/HR / OTSG. END
EXAMINER NOTE:		**The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.**

Footnotes: 1 – TI-977: Loop "A" Saturation Margin Temperature Indicator
2 – TI-978: Loop "B" Saturation Margin Temperature Indicator

Op Test No.: NRC	Scenario # 1	Event # 5 (alt)	Page 53 of 56
Event Description:	SG/RX Demand Station Fails to Zero Volts (alternate actions)		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The crew may decide to perform OP-TM-621-471 for Event 5.**
		OP-TM-621-471, ICS Manual Control
	URO	ENSURE ULD in HAND.
	URO	PLACE SG/REACTOR DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	DETERMINE which input is bad.
		OP-TM-MAP-H0302
	INFO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	ENSURE ULD in HAND IAW OP-TM-621-473, "ULD Manual Control".
EXAMINER NOTE:		**SASS Setpoint Delta is 3.9% Reactor Power**

Op Test No.: NRC	Scenario # 1	Event # 5 (alt)	Page 54 of 56
Event Description:	SG/RX Demand Station Fails to Zero Volts (alternate actions)		

Time	Position	Applicant's Actions or Behavior
	URO	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and VERIFY both of the following: – Difference between affected and alternate channels are less than "SASS Setpoint Δs" as listed in OP-TM-MAP-H0302 Table. – Selecting alternate instrument will not affect ICS control or plant stability.
	URO	SELECT alternate instrument(s) with console PB by pressing the pushbutton for NI-6 input to ICS (CC), verifying that NI-6 selected instrument light is lit and the NI-5 selected instrument light is not lit.
	URO	VERIFY plant stable.
EXAMINER NOTE:		**The scenario can be terminated when an OTSG is being fed by feedwater to > 6" on Startup Range instruments and incore temperatures are no longer rising.**

Op Test No.:	NRC	Scenario #	1	Event #	3 (supp)	Page	55	of	56

Event Description: EFFECTS OF LOSS OF VBD

Time	Position	Applicant's Actions or Behavior

EFFECTS OF LOSS OF VBD

One channel of CRD Trip Confirm will de-energize to its actuate state but the other channel remains operable. Turbine will not trip and FW-V-5A/B will not close.

"D" RPS channel de-energizes. CRD-CB-1D open. "D" RPS channel trip signal is sent to all other RPS cabinets. (TS Table 3.5-1)

RCPPM-1D&2D de-energize. RC-P-1D tripped signal is sent to RPS Channels A, B, and C, and HSPS EFW Initiation Train A & Train B.

ES Relay Cabinet 3B de-energizes: 1 channel tripped in all ES actuations, B train only.

HSPS Channel IV de-energizes. HSPS Channel IV tripped signal sent to HSPS Trains A & B.

Multiple SASS transfers occur due to loss of HSPS Channel IV instruments.

Annunciator SER B de-energizes. MAP annunciator power remains on VBC. Annunciator Panel PL transfers to backup power from TRA. All Annunciators on PRF and PRF1 fail.

Loss of power to RM-L-6 will close WDL-V-257.

Loss of power to RM-A-6G will trip AH-E-11.

Loss of power to RM-A-4G will trip AH-E-10 and close dampers AH-D-120, AH-D-121, and AH-D-122.

Loss of power to RM-A-7G will close WDG-V-47.

Loss of power to RM-A-1G trips AH-E-17A/B, AH-E-20A/B, AH-E-21, AH-E-26, AH-E-93A/B, AH-E-94A/B & AH-E-95A/B, closes AH-D-28,37&39, and opens AH-D-36.

Loss of power to RM-G-9 Trips AH-E-10 and closes AH-D-120, AH-D-121, and AH-D-122.

AH-D-30A-G and AH-D-31A-G fail closed, resulting in loss of ventilation to:
A&B Battery Rooms
A&B Inverter Rooms
1P & 1S 480V ES Switchgear Rooms
Remote Shutdown Area.

Control room radio on Computer Console, P.E.M.A radio, and Scanner will be inoperable.
Control room radio on CRS desk will remain operable.

Invalid alarms:
C-1-1
J-1-5
J-1-6

Inoperable alarms:
All PRF annunciators
All PRF1 annunciators
C-1-5
G-1-6
G-1-7

Op Test No.:	NRC	Scenario #	1	Event #	3 (supp)	Page	56	of	56

Event Description: EFFECTS OF LOSS OF VBD

Time	Position	Applicant's Actions or Behavior

EFFECTS OF LOSS OF VBD (cont)

Inoperable Instrumentation:

- BS-PT-1189, RB Pressure
- DH-LT-811, RB ECCS Sump Level (CR) (T.S. Table 3.5-3)
- Exciter Voltage and Current indication
- FW-LT-1041, "A" OTSG Operating Range
- FW-LT-1043, "A" OTSG Startup Range
- FW-LT-1049, "B" OTSG Operating Range
- FW-LT-1051, "B" OTSG Startup Range
- MS-PT-1181, "A" OTSG Pressure
- MS-PT-1183, "B" OTSG Pressure
- NI-4, Intermediate Range
- NI-8, Power Range
- PORV Acoustic Position Monitor (TS Table 3.5-2)
- RC-DPT-921, PORV Tailpipe ΔP (TS Table 3.5-2)
- RC-DPT-922, Code Safety A Discharge Pipe ΔP (TS Table 3.5-2)
- RC-DPT-923, Code Safety B Discharge Pipe ΔP (TS Table 3.5-2)
- RC-LT-1037, RCS Drain Down Level
- RM-A-1 (PIG), Control Room
- RM-A-4 (PIG), FHB (ODCM Part 1 Table 2.1-2)
- RM-A-6 (PIG), AB (ODCM Part 1 Table 2.1-2)
- RM-A-7G, Waste Gas Effluent (ODCM Part 1 Table 2.1-2)
- RM-G-3, Sampling Room
- RM-G-4, Hot Machine Shop
- RM-G-7, RB Main Fuel Handling Bridge (TS 3.8.1)
- RM-G-9, Spent Fuel Bridge (TS 3.8.1)
- RM-G-15, Heat Exchanger Vault
- RM-G-22, RB High Range (TS Table 3.5-3)
- RM-G-26, A OTSG Steam Line (TS Table 3.5-3)
- RM-L-6, Liquid Radioactive Waste Discharge (ODCM Part 1 Table 2.1-1)
- SSA-3 / SSP-1, Seismic Monitoring Panel
- WDL-LT-805, RB Normal Sump Level
- WDL-LT-807, RB Flood Level (TS Table 3.5-3)

Facility:	Three Mile Island	Scenario No.:	2	Op Test No.:	2015-301
Examiners:		Operators:			

Initial Conditions:
- (Temporary IC-176)
- 100% Power, MOL
- BS-P-1A is OOS for maintenance, expected to return to service in 6 hours.
- Crane work is occurring on the West side of the Plant to stage new piping

Turnover: Maintain 100% Power Operations

Critical Tasks:
- Electrical Power Alignment (CT-8)
- Turbine Trip (CT-18)
- Protect against RCP Seal LOCA (CT-*)

Event No.	Malf. No.	Event Type*	Event Description
1	NI27A	I CRS I URO I ARO	Pressurizer Pressure Instrument Fails High, entry into OP-TM-MAP-G0106, OP-TM-MAP-G0107 (URO: Blocks PORV, closes Spray Valve, Pressurizer Heater Control in Manual, ARO: "A" RPS to Manual Bypass)
2	IC12	C CRS C URO C ARO	Total RCS Flow IN Fails to Zero Volts, entry into OP-TM-AOP-070 and 1102-4. (URO/ARO: ICS station to Manual, Stabilize Power)
3	03A3S09 - ZDI1SAE 2(1)	TS CRS C URO C ARO	Loss of 1E 4KV Bus, Entry into OP-TM-AOP-014 (URO: Manual control of Makeup valves. ARO: Restore Seal Injection)
4	TU01D	N CRS R URO N ARO	High Vibrations on Main Turbine, entry into OP-TM-MAP-K0201 and 1102-4 (URO/ARO: Power reduction with ICS in Manual)
5	EG04A EG04B	I CRS I URO	Loss of Stator Coolant Pumps, Main Turbine fails to automatically runback and trip (URO: Trip Reactor)
6	HVB-1-1 HVB-2-1 A-1-4	TS CRS C ARO	Fire in EG-Y-1B Room, entry into OP-TM-AOP-001 (ARO: Secure EG-Y-1B)
7	ED01	M CRS M URO M ARO	Loss of Offsite Power, entry into OP-TM-AOP-020.
8	EG01A	C CRS C URO	"A" EDG fails to start, SBO start required. (URO)

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

Three Mile Island NRC Scenario #2

Event #1: When the crew has accepted the watch, the Lead Examiner will cue the Pressurizer Pressure Instrument Failing High. This will cause the Spray Valve and the PORV to open on the false signal, thereby reducing RCS pressure. The URO will enter OP-TM-MAP-G0106, PZR Safety or PORV Open (DP), OP-TM-MAP-G0107, PORV Open (Acoustic), and/or OP-TM-MAP-G0308, RC PRESS Narrow RNG HILO, to close the Spray Valve and PORV.

The ARO will enter OP-TM-MAP-G0102, RPS Channel Trip, to place the "A" RPS Cabinet in Manual Bypass IAW OP-TM-641-455, creating a "2 out of 3" logic from a "1 out of 3" logic.

The purpose of Manual Bypass is normally to allow channel testing without sacrificing plant reliability or dependability. A secondary purpose is to allow for a false trip input, due to a fault, to be removed from the logic. Initiation of Manual Bypass puts a separate power source directly on the main trip relay which holds it energized no matter the status of the associated bistables or the Test/Interlock relay.
Initiation of Manual Bypass changes the logic from "2 out of 4" to "2 out of 3" and leaves the plant with a redundancy of 1.

> The degree of redundancy is the difference between the number of operable channels and the number of channels that must be actuated to cause a trip. For example:
>
> Normally:
> 4 channels operable– 2 channels needed to trip = a degree of redundancy of 2.
>
> If one channel is in Manual Bypass:
> 3 channels operable – 2 channels needed to trip = a degree of redundancy of 1.

Once RCS pressure has been recovered and the "A" RPS Cabinet has been placed in Manual Bypass, the scenario can continue.

Event #2: The Lead Examiner will cue the Total RCS Flow IN Failing to Zero Volts. This will cause an ICS transient, which if not responded to swiftly, will cause a Reactor Trip. The crew will diagnose the ICS failure by a rapid change in RCS pressure, Reactor Power rising, multiple annunciator alarms, and/or changes in indications at multiple ICS stations. Entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET will be required based on RCS pressure not being controlled in ICS AUTO.

"RCS pressure is not being controlled" requires the operator to make a subjective determination, based on their skills, training, and experience.

A determination that RCS pressure is being controlled should include the following elements:

1) The reason for the transient is understood
2) RCS pressure response is consistent with the expected response for the event
3) Automatic or manual control in accordance with normal operating procedures is effectively controlling RCS pressure.

A conservative assessment (i.e. concluding that RCS pressure is not being controlled) is appropriate when the three conditions above cannot be satisfied. ICS failures are one class of events that can lead to an upset in primary to secondary heat transfer. Most ICS failures can be mitigated by use of the appropriate manual control normal operating procedures.

Once the plant is stabilized in ICS HAND control and sufficient reactivity manipulation has occurred, the scenario can continue.

Event #3: The Lead Examiner will cue the Loss of 1E 4KV Bus. This event mitigation procedure is designed to:

1) Ensure redundant systems are operable or operating, as applicable
2) Use EG-Y-1B or EG-Y-4 to re-energize bus if bus was not lost due to a bus fault,
3) Monitor DC system voltage, shutdown the reactor, and cross tie 1P to 1S to prevent adverse effects to vital buses (VBB or VBD).

A loss of the 1E bus affects the following Critical Safety Functions:

CSF 1, Reactivity & Reactor Power Control: Maintain control of the fission process, maintain the capability to shutdown the reactor and the capability to maintain the reactor in a shutdown condition. Control energy production and reactor power distribution based on design limits and current core heat removal capability. Loss of 1E 4160V bus: Reactor shutdown capability is unaffected. CA-P-1B & MU-V-14B are unavailable. Emergency boration can be performed using the "A" train.

CSF 2, Reactor Vessel Inventory Control: Provide the means to maintain the core covered with sub cooled water. Loss of 1E 4160V bus: Train B Emergency Core Cooling systems (HPI & LPI) are inoperable. Train A is unaffected.

CSF 3, RCS Integrity: Maintain the capability to control heatup and cooldown rates and control RCS pressure prevent reactor vessel brittle fracture or LTOP events. Maintain RCP seal cooling to prevent excessive loss of RCS inventory through RCP seals. Loss of 1E 4160V bus: Emergency Pzr Htr GRP 9 is unavailable. RCS pressure can be controlled using Emergency Pzr Htr GRP 8. IC-P-1B is unavailable but IC-P-1A should be unaffected. MU-P-1B-E trips. Seal injection will be restored using MU-P-1A. The loss of NR pumps, power to NR-V-15A & B and loss of seal injection make it likely that letdown will isolate on high temperature. Letdown can be restored after local ICCW temperature control is established. Loss of 1C ESV MCC: All Pzr heaters de-energized due to LO LO level interlock control de-energized. Once shutdown, RCS pressure can be controlled using Emergency Pzr Htr GRP 8. MU-P-4A is inoperable. MU-P-1A remains operable as long as shaft driven pump (MU-P-5A) is operable. If MU-P-1A unavailable, Seal injection will be restored using MU-P-1B-D.

CSF 4, Core Heat Removal: Provide the capability to remove core heat production at all times. Loss of 1E 4160V bus: EF-P-2B and DHR Train B are inoperable. EF-P-2A, EF-P-1 and DHR Train A are unaffected.

CSF 5, Containment Integrity: Provide means to prevent or minimize fission product release to the environment. (1) Maintain containment pressure below design and (2) Provide capability to isolate the containment when required. Loss of 1E 4160V bus: RBEC Train B & RBS Train B are unavailable. Normal RB cooling, RBEC Train A and BS Train A are unaffected, Loss of 1C ESV MCC: Both containment isolation valves on the normal RB cooling line inoperable. RB-V-2A is powered from 1C ESV MCC and RB-V-7 is powered from 1B ES MCC. AH-E-1C inoperable along with AH-E-1B which is energized from 1B ES MCC

CSF 6, Radiation Control & Control Room Habitability: Monitor and control the release of radiation to the environment. Maintain access to critical plant equipment and use of the Control Room. Loss of 1E 4160V bus: B Train of CB Ventilation is unavailable. A train is unaffected. Loss of 1C ESV MCC: Interlocks for radiation monitors inoperable. Follow appropriate ODCM Sections for RM-L-6, RM-A-4, 6, 7, 8, 9, and 14.

CSF 7, Electrical Power: Provide electrical power as required to accomplish the other Critical Safety Functions. Provide AC and DC power for emergency equipment operation and instrumentation systems. Loss of 1E 4160V bus: If a 4160V bus fault prevents use emergency diesels, then prolonged loss of AC increases risk of loss of DC and vital buses. Cross of 1P to 1S 480V buses after the reactor is shutdown is performed to prevent loss of vital buses VBB and VBD. 1C ES Valves MCC would de-energize if it did not auto transfer to the 1P 480V bus.

CSF 8, Auxiliary Emergency Systems: Provide equipment cooling (closed cooling & ventilation), and other support requirements to accomplish the other Critical Safety Functions. Provide Instrument Air for operation of EFW, ADVs, RCP Support Systems and some containment isolation valves. Loss of 1E 4160V bus: Train B of all emergency cooling support systems (CB cooling, NS cooling, ICCW, river water, equipment ventilation) is lost. Train A is unaffected. Loss of 1C ESV MCC: All AB Exhaust Fans inoperable. AH-E-14A/C trip on a loss of 1C ESV MCC and AH-E-14B/D trip on a loss of interlock power from CT-E (1B ES MCC)

CSF 9, Fire Protection & Remote Shutdown Capability: Maintain means to prevent, detect and suppress fires, as well as the capability to perform a plant shutdown without access to the Control Room. Loss of 1E 4160V bus: Loss of control room FS indication, loss of remote capability to actuation charcoal filter deluge systems, FS-P-3 starts, FS-P-2 swaps to 1R bus. These problems do not significantly degrade fire protection capability or adversely affect RSD capability. Loss of 1C ESV MCC: AIT protective features inoperable. AH-D-38 combustible vapor and high temperature interlocks inoperable. Follow appropriate AP 1038 sections.

The crew will diagnose the Loss of 1E 4KV Bus by half of the Control Room lighting being out until the "B" Emergency Diesel Generator powers the bus (in 10 seconds) and multiple annunciators in alarm. The ARO will restore seal injection with MU-P-1A. The URO will control MU-V-17 and MU-V-32 in Manual.

Due to RM-A-2 remaining deenergized, the CRS will identify and declare the following 72 hour LCO Tech Spec:

> 3.1.6.8: When the reactor is critical and above 2 percent power, two reactor coolant leak detection systems of different operating principles shall be in operation for the Reactor Building with one of the two systems sensitive to radioactivity. The systems sensitive to radioactivity may be out-of-service for no more than 72 hours provided a sample is taken of the Reactor Building atmosphere every eight hours and analyzed for radioactivity and two other means are available to detect leakage.

Once Seal Injection is restored with MU-P-1A and the Tech Spec has been declared, the scenario can continue.

Event #4: The Lead Examiner will cue the High Vibrations on Main Turbine.

The crew will diagnose the High Vibrations on Main Turbine by Main Annunciator K-2-1 in alarm, and multiple PPC points in alarm. The crew will commence a power reduction to < 45% with ICS in manual to trip the Main Turbine. This is the reactivity manipulation for the scenario.

Once sufficient reactivity manipulation has occurred, the scenario can continue.

Event #5: The lead examiner will cue the Loss of Stator Coolant Pumps, causing a lack of Main Generator Stator Cooling.

The crew will diagnose a Loss of Stator Cooling Pumps by Main Annunciators L-2-7, GEN STATOR STBY CLG PUMP RUN, and Main Annunciator L-1-7, GEN STATOR CLG LOSS RUNBACK, in alarm, and no operating Stator Coolant Pump indications on PCL.

The crew will enter OP-TM-MAP-L0107 and OP-TM-MAP-L0207. The ARO will attempt to start the standby pump from PCL and will identify that it will not start. The crew will identify that the Turbine Control Valves are not closing as expected and, if the condition continues for more than 3.5 minutes, that the Main Turbine did not automatically trip.

- IAW OP-TM-MAP-L0107:
  - Automatic Actions:
    - Turbine Control Valves close at 23.4% vmo/min.
    - Turbine trips after 2 minute time delay should turbine not runback to approximately 95% power.
    - Turbine trips after 3.5 minute time delay should turbine not runback to approximately 29.6% power.

The CRS will enter OP-TM-EOP-001, Reactor Trip. The URO will trip the reactor (CT-18). The Main Turbine will fail to automatically trip and the URO will trip it manually. The ARO will adjust Main Feedwater flow to avoid an overcooling event.

Once the Reactor and Main Turbine have been tripped and a symptom check has been performed, then the scenario can continue.

Event #6: The Lead Examiner will cue the Fire in EG-Y-1B Room. AOP-001 provides the direction for operations response to a fire. The specific directions for fighting the fire and minimizing the damage caused by the fire are implemented by the Fire Brigade leader using the Fire "Pre Plan" Documents. The actions to respond to the effects of the fire on plant operation and nuclear safety are described in emergency operating procedures, abnormal event operating procedures and alarm response procedures. Based on the effects described in the fire hazards analysis, if successful mitigation of the impact of the fire requires proactive or specific complex actions, then a mitigation procedure for the specific fire zone has been established. If the impact of the fire could be successfully mitigated by symptom based response, then other EOP, AOP and alarm response procedures (not designed exclusively for fire) are used.

> **Appendix R**: The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

FHAR: Systems required to support the shutdown systems are the:

- Intermediate closed cycle cooling system (one train available except for a fire where both pumps are located),
- ISPH air handling,
- Nuclear service closed cycle cooling system (one NS pump, one NS heat exchanger available for all fires),
- Nuclear service river water system (one NR pump available for all fires)
- Decay heat closed cycle cooling system (one DC pump available for all fires),
- Decay heat river water system (one DR pump available for all fires),
- Electrical distribution system.

Instrument Air is required for safe shutdown. Because of the two hour backup instrument air bottles and local air bottles provided at the critical shutdown components, normal instrument air is not protected.
Solenoid operated valves will be manually operated or controlled before the backup instrument air system is depleted.
A detailed evaluation, based on a system approach, was made to identify all components which can be used for safe shutdown.

Support systems credited in the FHAR:

- Instrument Air
  - Instrument Air Compressors:
    - IA-P-1A
    - IA-P-1B
  - Copper air lines & fittings
  - 2 hour backup bottles

- Electrical Power
  - Diesel Generators
    - EG-Y-1A
    - EG-Y-1B
  - 4160V Switchgear
    - 1D 4160V ES Bus
    - 1E 4160V ES Bus

The crew will diagnose a fire in EG-Y-1B Room by H&V B-2-1 in alarm and a report by an auxiliary Operator. The CRS will enter OP-TM-AOP-001, FIRE, ATTACHMENT 19. The ARO will secure EG-Y-1B. The CRS will identify and declare a 6 hour 3.0.1 LCO Tech Spec by following the following Tech Spec path:

T.S. 3.7.2: The reactor shall not remain critical unless all of the following requirements are satisfied:

c. Both diesel generators shall be operable except that from the date that one of the diesel generators is made or found to be inoperable for any reason, reactor operation is permissible for the succeeding seven days provided that the redundant diesel generator is:

1. Verified to be operable immediately;
2. Within 24 hours, either:
   a. determine the redundant diesel generator is not inoperable due to a common mode failure; or,
   b. test redundant diesel generator in accordance with surveillance requirement 4.6.1.a.

With one diesel generator inoperable, in addition to the above, verify that: All required systems, subsystems, trains, components and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE or follow specifications 3.0.1.

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

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

Once EG-Y-1B has been secured and the Tech Spec call has been made, then the scenario can continue.

Event #7/8: The lead examiner will cue the Loss of Offsite Power.

The crew will diagnose a Loss of Offsite Power by the Control Room lighting going dark for 10 seconds, followed by half of the lights returning once the A Emergency Diesel Generator powers the 1D 4Kv bus, as well as several alarms indicating a loss of the 4 bus and 8 bus. The CRS will direct entry into OP-TM-AOP-020, Loss of Station Power.

OP-TM-AOP-020 addresses two types of Loss of Station Power events:

(1) Loss of Offsite Power with one or both diesels supplying the ES 4160V busses, and
(2) a loss of offsite power with no diesels supplying the ES 4160V busses.

If one or both diesels are supplying the ES busses, the procedure walks the operators through ensuring RCS cooling and RCP seal cooling is established. As long as one diesel is available, the reactor can be stabilized and the operators can methodically walk through powering additional busses and starting additional equipment.

"A" EDG will fail to start and the URO will manually start the SBO Diesel Generator IAW OS-24 and OP-TM-864-901. Failure criteria would be considered if a class 1E bus is not energized within 10 minutes.
IAW FSAR 8.5.2:

> 8.5.2 ALTERNATE AC (AAC) POWER SOURCE
>
> The AAC power source has been designed so that it will be available within ten minutes of the onset of the station blackout event, and it has sufficient capability and capacity to operate systems necessary for coping with a station blackout for the required station blackout duration of four hours to bring the plant to and maintain it in safe shutdown.
>
> The AAC will be manually started from the TMI-1 Control Room. Circuit breakers necessary to bring power to a safe shutdown bus are capable of being actuated in the Control Room within that period.
>
> Class 1E Battery capacity, compressed air, and containment isolation were not specifically evaluated because those services can be powered from the AAC power source.
>
> SBO components and subsystems are physically protected against the effects of likely weather-related events that may initiate the loss of off-site power event. The AAC has an independent air start system and fuel oil system. There is also a separate DC power source that supplies the AAC and its associated breaker control. Two breakers, one that is non-Class 1E and one that is Class 1E, separate the AAC supply from the 4160 V Engineered Safeguards buses (see Drawing E-206-011).
>
> The AAC source will not normally be connected to the preferred or on site emergency power system. No single active failure or weather-related event will disable both the emergency on-site AC power sources and simultaneously fail the AAC power source.
>
> The AAC system will not automatically load shutdown equipment on the ES bus; manual loading will be employed.
>
> Once the AAC Supply is providing power to 4 kV ES Bus 1E or 1D, the operator actions are essentially identical to that under a loss of offsite power with only one Emergency Diesel Generator operating, except for restoration of offsite power.

The scenario can be terminated when a 4kV ES Bus has been energized from the SBO Diesel Generator and natural circulation has been established.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-8 - Electrical Power Alignment - If station auxiliary power is not available, then perform the following:

- In the event that no emergency AC supply (or alternate AC source) is available, then perform [SBO procedure] and continue attempts to restore AC power.

Performing electrical alignment control outside of the following limits should be considered **grounds for failure of the critical task**:

- In a condition where no emergency AC supply is available, place the Station Blackout Diesel (SBO) on a 4160 volt ES bus within 10 minutes.

Time Duration Source: FSAR Section 8.5: An alternate AC (AAC) power source is utilized at TMI-1, provided by the SBO diesel generator. The AAC power source has been designed so that it will be available within ten minutes of the onset of the station blackout event, and it has sufficient capability and capacity to operate systems necessary for coping with a station blackout for the required station blackout duration of four hours to bring the plant to and maintain it in safe shutdown.

Safety Significance: Plant electrical power is necessary for the operation of normal and emergency plant equipment. Therefore, it is important that the plant operator provide normal AC power, usually supplied through the station auxiliary transformer(s). If normal AC power cannot be supplied, then actions are necessary to initiate operation of the emergency AC source(s) including alternate AC supplies, if applicable. If both normal and emergency AC power are lost, then a station blackout has occurred. For such events, station blackout procedures provide plant specific actions which are to be taken while efforts are being made to restore AC power. Providing normal AC power greatly enhances the transient mitigation capability of the plant, e.g. normal RCS make up systems remain operational.

Cues:

- Auxiliary and emergency bus voltage low alarms
- Verbal indication by plant staff that auxiliary and emergency AC bus voltage is low
- Overhead lights turn off

Performance Indicators:

- Operation of auxiliary/emergency AC power source controls (SBO)

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-8 - Electrical Power Alignment –Continued

Feedback:

- Auxiliary/emergency bus voltage normal
- Verbal indication by plant staff of auxiliary/emergency AC power equipment status

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-18 – Turbine Trip - Whenever conditions exist such that a reactor trip is required, then the normally redundant actions of tripping the reactor and main turbine should be accomplished immediately. Tripping the main turbine provides assurance of a redundant trip signal to the main turbine electro-hydraulic control unit.

Due to Excessive Heat Transfer concerns, tripping the Main Turbine outside of the following limit should be considered **grounds for failure of the critical task**:

- Trip the Main Turbine to ensure that it does not cause a continuous excessive cooldown rate or Tcold to be less than 329°F.
- Once the reactor is shutdown, prompt isolation of the turbine steam flow path is significant. Until the major steam flow path through the turbine to the condenser is isolated, RCS heat removal will be much larger than heat generation, and a rapid RCS cooldown will continue. (Source: OP-TM-EOP-0011)

Safety Significance: When the reactor is tripped (shutdown), steam flow to the main turbine must be stopped in order to maintain the appropriate primary to secondary heat balance. When the appropriate primary to secondary heat balance is established, the normal heat removal systems are available for plant control thus enhancing the transient mitigation capability of the plant. If the turbine steam flow path is not isolated after a rapid reduction in reactor heat generation (reactor trip), extremely rapid RCS cooldown is possible. Prompt operator action can minimize the extent of this overcooling and potential consequences to RCS pressure boundary. A prolonged rapid cooldown will complicate plant control and could challenge OTSG tube integrity or Reactor Vessel integrity.

Cues:

- Visual indications (closed generator output and exciter breakers, main turbine stop and control valves are not closed)
- P-T display and associated alarms
- Verbal alert by plant staff that all main turbine stop and control valves are not closed immediately following actuation of a reactor trip signal
- Verbal alert by plant staff that main alternator output/exciter breakers are not open immediately following actuation of a reactor trip signal

Performance Indicators:

- Operation of control room manual main turbine trip pushbutton
- Main turbine trip alarm
- Main turbine-generator exciter alarms
- Main turbine-generator breaker status alarms

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-18 – Turbine Trip - Continued

Feedback:

- RC temperature and pressure
- SG level and pressure
- Mega-Watt electric indication
- Main turbine-generator breaker status indications
- Verbal notification by plant staff of main turbine trip status

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-* - Protect against RCP Seal LOCA – **If** any Reactor Coolant Pump #1 seal inlet temperature > 235°F, then perform the following:

- Isolate seal injection and prevent ICCW cooling to the seals to prevent warping the RCP seals and to prevent creating 4 LOCAs into containment.

- Protecting against RCP Seal LOCA outside of the following limits should be considered **grounds for failure of the critical task**:

  - Do not initiate Seal Injection while any Reactor Coolant Pump #1 seal inlet temperature > 235°F.
  - Do not restore Intermediate Closed Cooling Water while any Reactor Coolant Pump #1 seal inlet temperature > 235°F.

Safety Significance: RCP seal temperatures above 235°F will result in increased seal leakage of approximately 21 gpm / pump. To avoid seal damage and excessive seal leakage (i.e., > 21 gpm/pump, do **not** restore RCP seal injection. To avoid water hammer, thermal barrier cooler damage, and RCS leakage to the ICCW system, do **not** restore RCP thermal barrier cooling. Either Seal Injection restoration or Intermediate Closed Cooling Water restoration would lead to a reduction of RCS inventory.

Cues:
- Computer indication for RCP #1 Seal Inlet Temperature

Performance Indicators:
- Operation of MU-V-20, RCP Seal Injection Reactor Building Isolation Valve.
- Ensuring Intermediate Closed Cooling Water Pumps are not running.

Feedback:
- MU-V-20 closed indication.
- Intermediate Closed Cooling Water Pumps indication.

Industry Experience:

- OE28735 – Main Turbine High Vibration Trips (Palo Verde Unit 1 and 3) (5/5/09)
- Low System Grid Voltage at TMI on 7/6/99 (Control Room Log)
- Fort St. Vrain Loss of all AC Power (Blackout) (10/27/83)
- SOER 99-1 Loss of Grid (12/99)

PRA

- Loss of Offsite Power (Initiating Event)
- Diesel Generator 1A loss (Risk Increase Factor)

Scenario Set-up
NRC Scenario 2

Event	Description	Procedure Support
	Initial Set-up.	85% Power, MOL BS-P-1A Tagged OOS LO-P-8A/8B Running
1	Pressurizer Pressure Instrument Fails High	OP-TM-MAP-G0106
		OP-TM-MAP-G0107
		OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO.
		OP-TM-MAP-G0102, RPS CHANNEL TRIP
		OP-TM-641-455, RPS Channel Manual Bypass
2	Total RCS Flow IN Fails to Zero Volts	OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset
3	Loss of 1E 4KV Bus	OP-TM-AOP-014, LOSS OF 1E 4160V BUS
		OP-TM-AOP-041, Loss of Seal Injection
4	High Vibrations on Main Turbine	OP-TM-MAP-K0201, MN TURB VIBR/ECC HI
		1102-4, Power Operations
		OP-TM-621-471, ICS Manual Control
5	Generator Stator Cooling Runback / Reactor Trip	OP-TM-MAP-L0107, Gen Stator Clg Loss Runback
		OP-TM-EOP-001, Reactor Trip
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
6	Fire in EG-Y-1B Room	HVB-0201, DIESEL GEN FAN 1B DISCH AIR TEMP HI
		OP-TM-AOP-001, Fire
7	Loss of Off-Site Power	OP-TM-AOP-020, Loss of Station Power
		OP-TM-861-902, Diesel Generator EG-Y-1A Emergency Operations
		OP-TM-AOP-041, Loss of Seal Injection
8	"A" EDG fails to start, manual start required.	OP-TM-864-901, SBO Diesel Generator (EG-Y-4) Operations

Scenario Set-up
NRC Scenario 2

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-176	100% HFP ICS full AUTO	Equilibrium XENON
BS-P-1A	Place in PTL Immediately	Scenario Support
BS-P-1A	Place EDT on BS-P-1A Control Switch	Scenario Support
Remote xxx	Value: OUT When: Immediately	BS-P-1A Breaker for Scenario Support
Malfunction IC48	Value: Insert When: Immediately	SASS Channel Failure
Malfunction TC02	Value: Insert When: Immediately	Automatic Turbine Trip Disabled
Malfunction EG01A	Value: Insert When: Immediately	EG-Y-1A Fails to Auto Start
Malfunction NI27A	Value: 100 When: Event 1	Pressurizer Pressure Fails High
Malfunction IC12	Value: Insert When: Event 2	Total RCS Flow IN Fails to Zero Volts
Override 03A3S09-ZDI1SAE2(1) TRP	Value: ON When: Event 3	Loss of 1E 4kV Bus
Malfunction TU01D	Value: 50 When: Event 4	High Vibrations on Main Turbine
Malfunction EG04A	Value: Insert When: EVENT 5	"A" Stator Cooling Pump Trip
Malfunction EG04B	Value: Insert When: EVENT 5	"B" Stator Cooling Pump Trip
Malfunction HVB-1-1	Value: ON 30 Second Delay When: Event 6	Fire in EG-Y-1B Room
Malfunction HVB-2-1	Value: ON 32 Second Delay When: Event 6	Fire in EG-Y-1B Room
Malfunction A-1-2	Value: ON When: Event 6	Fire in EG-Y-1B Room
Override xxxAxxxSxxx-ZDICSAHE29B(1) PTL	Value: OFF 31 Second Delay When: Event 6	Fire in EG-Y-1B Room
Override xxxAxxxSxxx ZDICSAHE29B(2) STP	Value: OFF 31 Second Delay When: Event 6	Fire in EG-Y-1B Room
Override xxxAxxxSxxx ZDICSAHE29B(3) NAP	Value: ON 31 Second Delay When: Event 6	Fire in EG-Y-1B Room
Override xxxAxxxSxxx ZDICSAHE29B(4) NAS	Value: OFF 31 Second Delay When: Event 6	Fire in EG-Y-1B Room
Override xxxAxxxSxxx ZDICSAHE29B(5) STR	Value: OFF 31 Second Delay When: Event 6	Fire in EG-Y-1B Room

Scenario Set-up
NRC Scenario 2

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Malfunction ED01	Value: Insert When: EVENT 7	Loss of Off-Site Power
Override xxxxxxxxxxxxxxxxx	Value: ON When: Event 10	Opens MU-V-20 locally

Op Test No.:	NRC	Scenario #	2	Event #	1	Page	19	of 49
Event Description:	Pressurizer Pressure Instrument Failure (High)							

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 1**
Indications Available:		**Main Annunciators G-1-2, G-1-6, G-1-7, G-3-8 in alarm, Annunciators LWDS-1-4 and LWDS-1-5 in alarm, RCS pressure lowering, Flow indicated through the PORV (CC).**
EXAMINER NOTE:		**OP-TM-MAP-G0106 and OP-TM-MAP-G0107 have identical steps listed, and address the PORV but not the Spray Valve. OP-TM-G0308 should be used.**
EXAMINER NOTE:		**The transient has taken Reactor Power greater than 100% during validation. Good Control Board Awareness by the crew will be needed to recognize and correct the situation.**
	Crew	Recognizes that the selected Pressurizer Pressure Instrument has failed high.
	CRS	Directs entry into OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO.
		OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO
	URO	Step 4.2.1: Determines that the PORV is open and that RCS pressure is <2400 psig, and then closes RC-V-2 by pressing the close pushbutton and verifying the green closed light is lit and the red open light is not lit (CC).
	URO	Step 4.2.2: Closes RC-V-1 by pressing the close pushbutton and verifying the green closed light is lit and the red open light is not lit (CC).

Footnotes:
1 – RC-V-1: Pressurizer Spray Control Valve
2 – RC-V-2: PORV Isolation Valve
3 – PORV: Pressurizer Pilot Operated Relief Valve

Op Test No.: NRC	Scenario # 2	Event # 1	Page 20 of 49
Event Description:	Pressurizer Pressure Instrument Failure (High)		

Time	Position	Applicant's Actions or Behavior
	URO	Step 4.2.5: Determines that Pressurizer level is >80 inches as seen by all Pressurizer level indications (CC) and ensures that all Pressurizer heaters are energized by observing the energized lights lit for all Pressurizer heaters banks (1 through 5) (CR).
	CRS	Directs entry into OP-TM-MAP-G0102, RPS CHANNEL TRIP.
		OP-TM-MAP-G0102, RPS CHANNEL TRIP
	CRS	Step 4.0: Determines the following: - The channel trip was not due a loss of a Vital Bus. - The plant is in compliance with Tech Spec 3.5.1. - The trip condition cannot be cleared. And directs that the "A" RPS Channel be placed in Manual Bypass IAW OP-TM-641-455, RPS Channel Manual Bypass.
		OP-TM-641-455, RPS Channel Manual Bypass
EXAMINER CUE:		**If requested for Shift manager permission to manually bypass one RPS channel, grant permission.**
EXAMINER NOTE:		**Step 4.1 is N/A.**
EXAMINER CUE:		**If asked, state that "There is no Vital Bus work in progress".**
	ARO	Step 4.2.1: Verifies that no Vital Bus work is in progress.
	ARO	Step 4.2.2: Performs the following: - Obtains Key 27 from the key locker (facing the LWDS panel on the side of the desk).

Op Test No.:	NRC	Scenario #	2	Event #	1	Page	21	of 49
Event Description:	Pressurizer Pressure Instrument Failure (High)							

Time	Position	Applicant's Actions or Behavior
EXAMINER CUE:		**All keys other than key #6 are identical in the simulator. Therefore, if key #27 is not in the locker, role play that any key other than #6 is key #27.**
	ARO	Step 4.2.2: Performs the following: - Places Key 27 in the Manual Bypass Switch keyhole in RPS Channel A, Right side cabinet (Red cabinet) and turns the Manual Bypass key switch to Bypass.
	ARO	Step 4.2.2: Performs the following: - Verifies that the manual Bypass lamp is bright on the Reactor Trip module in RPS Channel A, Right side cabinet (Red cabinet)
	ARO	Step 4.2.2: Performs the following: - Verifies that the manual Bypass lamp is bright on the outside of RPS Channel A, Right side cabinet (Red cabinet)
	ARO	Step 4.2.2: Performs the following: - Verifies that MAP G-3-1 is in alarm.
EXAMINER CUE:		**If asked, state as the Shift Manager that you will document the Manual Bypass position change in the Control Room logbook.**
EXAMINER NOTE:		**The crew should select the alternate Pressure Instrument. The steps to do so are listed below for the Examiner to follow along but are not required to be completed prior to continuing on in the scenario.**

Op Test No.:	NRC	Scenario #	2	Event #	1	Page	22	of 49

Event Description: Pressurizer Pressure Instrument Failure (High)

Time	Position	Applicant's Actions or Behavior
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	Step 4.1: Ensures ULD is in HAND by the white HAND light lit and the red AUTO light not lit on the ULD Bailey Control Station (CC).
EXAMINER NOTE: Step 4.2 is N/A.		
	URO	Step 4.3: Compares alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and verifies that selecting the alternate instrument (RC3B-PT1) will not affect ICS control or plant stability.
	URO	Step 4.4: Selects the alternate instrument (RC3B-PT1) by pressing the RC3B-PT1 pushbutton and verifying that the RC3B-PT1 light is lit and the RC3A-PT1 light is not lit (CC)
	URO	Step 4.5: Verifies the plant is stable.
EXAMINER NOTE: Steps 4.6 through 4.9 are N/A.		
EXAMINER NOTE: Once RPS Channel "A" has been placed in Manual Bypass, then GO TO Event 2.		

Footnote: 1 – ULD: Unit Load Demand

Op Test No.:	NRC	Scenario #	2	Event #	2	Page	23	of	49

Event Description: Total RCS Flow IN Fails to Zero Volts

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 2**
Indications Available:		**Main Annunciators H-1-1, H-2-1, and H-3-4 in alarm, Reactor Power lowering.**
	Crew	Diagnoses Total RCS Flow IN Failure to Zero Volts.
EXAMINER NOTE:		**The crew may decide to perform OP-TM-621-471. Those steps can be found on page 47 of this Scenario.**
	CRS	DIRECTS entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	URO	Step 2.1 (**IMA**): Places the Diamond Station in Manual by pressing the Manual/Auto pushbutton on the Diamond Panel and observing the Manual light is lit and the Auto light is not lit (CC)
	URO/ARO	Step 2.2 (**IMA**): Places SG A FW Demand and SG B FW Demand ICS Stations in HAND by pressing the HAND pushbuttons on each ICS Station and verifying the white HAND lights are lit and the red AUTO lights are not lit on the selected ICS stations (CC).
	URO	Step 2.3 (**IMA**): Verifies Turbine Header Pressure is between 835 and 935 psig as read on the Turbine Header Pressure digital indication (CL)
EXAMINER NOTE:		**If the alternate pressure instrument was not selected, then the URO will control RC-V-3 instead of RC-V-1 in the next step.**

Op Test No.:	NRC	Scenario #	2	Event #	2	Page	24	of	49

Event Description: Total RCS Flow IN Fails to Zero Volts

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.4 (**IMA**): Verifies RCS Pressure is lowering and/or less than 2205 PSIG by observing RCS pressure meters (CC and PC). As required, if RCS Pressure is >2205 psig: URO places RC-V-1 control in Manual (CC), opens RC-V-1 fully by pressing the open pushbutton and observing the red open light lit and the green closed light not lit (CC), and then places RC-V-1 control back to AUTO.
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.1 and 3.2 are IAAT's that should not be applicable during this Event.**
	CRS	Step 3.3: Verifies the Main Turbine is reset by observing it on-line (CL).
	CRS	Step 3.4: Assigns manual control responsibilities and control bands as follows:
	URO	Inserts or withdraws control rods to maintain Reactor power within 1% of current power level by operating the manual Control Rod control handle on the Diamond Panel as applicable (CC).
	ARO	Adjust FW Flow to maintain Tavg within 2 °F of current temperature by adjusting SG A and SG B FW Demand Station toggle switches as applicable (CC). Maintain Turbine Hdr Pressure within 10 psig of current pressure by adjusting Turbine Load Set Station demand as applicable (CL).
	ARO	Step 3.5: Makes scripted announcement.
EXAMINER NOTE:		**OP-TM-AOP-070, step 3.6 is N/A.**

Footnote: 1 – RC-V-1: Pressurizer Spray Control Valve

Op Test No.: NRC	Scenario # 2	Event # 2	Page 25 of 49
Event Description:	Total RCS Flow IN Fails to Zero Volts		

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.7: Ensures SG/Reactor Demand, Reactor Demand, and SG A/B Load Ratio Demand Stations are in HAND by pressing each HAND pushbutton and observing white HAND lights are lit and red AUTO lights are not lit for each station. Observes that the ULD ICS Station is already in HAND by the white HAND light being lit.
	CRS	Step 3.8: Verifies that MFW Pumps are controlling FW Valve dP greater than 30 psid (CL) and that Reactor Power is greater than 75% (CC).
EXAMINER NOTE:		**OP-TM-AOP-070, step 3.9 is N/A and 3.10 has already been verified.**
	ARO	Step 3.11 and 3.12: Maintains RCS pressure between 2105 and 2205 psig, controls RCS Tavg 578 to 580 °F, and controls RCS ΔTc < 5° F by adjusting SG A and SG B FW Demand Station toggle switches as applicable.
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.13 and 3.14 are N/A.**
EXAMINER NOTE:		**Once OP-TM-AOP-070 actions have been completed and the plant is stabilized, then GO TO Event 3.**

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	26	of 49
Event Description:	Loss of 1E 4KV Bus (TS)							

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner, INITIATE Event 3.**
Indications Available:		**Multiple Main Annunciators in alarm, half of the normal Control Room lighting lost for ten seconds.**
	Crew	Diagnoses the loss of 1E 4KV Bus and EG-Y-1B failure to auto start.
	CRS	Directs entry into OP-TM-AOP-014, LOSS OF 1E 4160V BUS.
		OP-TM-AOP-014, LOSS OF 1E 4160V BUS
	ARO	Step 3.1: Announces entry into OP-TM-AOP-014, "Loss of 1E 4160V Bus" over the plant page and radio.
	CRS	Step 3.2: Directs OP-TM-861-902, "Diesel Generator EG-Y-1B Emergency Operations".
EXAMINER NOTE:		**Steps for OP-TM-AOP-041 are listed on Page 28 to avoid confusion.**
	URO	Step 3.3: Verifies seal injection flow is not > 22 gpm and directs entry into OP-TM-AOP-041, Loss of Seal Injection.
BOOTH CUE:		**If directed as an Auxiliary Operator to throttle SR-V-6 thirty degrees open, acknowledge the order. No action is required.**
	ARO	Step 3.5: Directs an Auxiliary Operator to throttle SR-V-6 approximately 30 degrees open.

Footnotes:
1 – EG-Y-1B: "B" Emergency Diesel Generator
2 – SR-V-6: Secondary River Water System Outlet Header Isolation Valve

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	27	of	49

Event Description: Loss of 1E 4KV Bus (TS)

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**If directed as an Auxiliary Operator to open NR-V-15A or NR-V-15B to maintain ICCW temperature less than 100°F, acknowledge the order. No action required.**
	ARO	Step 3.6: Determines that MU-V-3 is open and directs an Auxiliary Operator to open NR-V-15A or NR-V-15B to maintain ICCW temperature less than 100°F.
	URO	Step 3.10: Determines that IC-P-1A is running.
	URO	Step 3.11: Determines that NR-P-1A is running.
BOOTH CUE:		**If directed as an Auxiliary Operator to initiate OP-TM-541-443 to swap NR-P-1B to the 1R 480V bus, acknowledge the order. No action required.**
	ARO	Step 3.12: Directs an Auxiliary Operator to initiate OP-TM-541-443 to swap NR-P-1B to 1R 480V bus.
	CRS	Step 3.14: Determines that NS-P-1A and NS-P-1B are running.
	ARO	Step 3.16: Initiates an alarm review.

Footnotes:
1 – NR-V-15A: IC-C-1A River Outlet Valve
2 – NR-V-15B: IC-C-1B River Outlet Valve
3 – MU-V-3: RCS Letdown Reactor Building Isolation Valve
4 – IC-P-1A: "A" Intermediate Closed Cooling Water Pump
5 – NR-P-1A: "A" Nuclear River Water Pump
6 – NR-P-1B: "B" Nuclear River Water Pump
7 – NS-P-1A: "A" Nuclear Services Closed Cooling Pump
8 – NS-P-1B: "B" Nuclear Services Closed Cooling Pump
9 – IC-C-1A: "A" Intermediate Closed Cooling Water Cooler
10 – IC-C-1B: "B" Intermediate Closed Cooling Water Cooler

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	28	of	49

Event Description: Loss of 1E 4KV Bus (TS)

Time	Position	Applicant's Actions or Behavior
EXAMINER CUE:		**When directed to evaluate EAL's, acknowledge the order.**
	CRS	Step 3.17: Requests that the SM evaluate Emergency Action Levels (EALs).
EXAMINER NOTE:		**There are more steps in OP-TM-AOP-014, but are not listed in the scenario because when the 1E 4kv Bus is energized, the CRS will transition to the Return to Normal section.**
	CRS	Identifies and declares T.S. 3.1.6.8 (72 Hour) based on RM-A-2 being out-of-service.
EXAMINER NOTE:		**T.S. 3.1.6.8:** **When the reactor is critical and above 2 percent power, two reactor coolant leak detection systems of different operating principles shall be in operation for the Reactor Building with one of the two systems sensitive to radioactivity.** **The systems sensitive to radioactivity may be out-of-service for no more than 72 hours provided a sample is taken of the Reactor Building atmosphere every eight hours and analyzed for radioactivity and two other means are available to detect leakage.**
		OP-TM-AOP-041, Loss of Seal Injection
	URO	Step 3.3: Places MU-V-32 in HAND by pressing the White HAND pushbutton and verifying the White HAND light lit red AUTO light not lit.

Footnotes: 1 – RM-A-2: Reactor Building Atmosphere Area Radiation Monitor
2 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.:	NRC	Scenario #	2	Event #	3	Page	29	of	49

Event Description: Loss of 1E 4KV Bus (TS)

Time	Position	Applicant's Actions or Behavior
	ARO	Step 3.4: Determines that a Makeup Pump is not running and IAW the RNO, performs the following: – Places MU-V-17 in HAND by pressing the White HAND pushbutton and verifying the White HAND light lit red AUTO light not lit (CC). – Dials MU-V-17 to full closed (CC).
	CRS	Step 3.5, RNO 4: Goes to Section 4.0.
	ARO	Step 4.1-4.2: Verifies MU-P-1A is ES selected and that MU-V-36 and MU-V-37 are open.
	ARO	Step 4.3: – Starts DR-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC). – Starts DC-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC).
	ARO	Step 4.4: Starts MU-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC).

Footnotes:
1 – MU-V-17: Normal Makeup to Reactor Coolant System Valve
2 – MU-P-1A: "A" Makeup Pump
3 – MU-V-36: Makeup Pump Recirculation Valve
4 – MU-V-37: Makeup Pump Recirculation Valve
5 – DR-P-1A: "A" Decay River Water Pump
6 – DC-P-1A: "A" Decay Closed Cooling Water Pump

Op Test No.: NRC	Scenario # 2	Event # 3	Page 30 of 49
Event Description:	Loss of 1E 4KV Bus (TS)		

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.8: Slowly adjusts MU-V-32 for 38 gpm seal injection flow rate, while limiting RCP radial bearing cooldown rate to less than 1°F/minute.
	URO	Step 3.9: Restores Pressurizer Level by toggling MU-V-17 control station in HAND.
EXAMINER'S NOTE:		**Once the 1E 4kv bus is energized, Seal injection has been restored, and the Tech Spec call has been made, then GO TO Event 4.**

Footnotes: 1 – MU-V-17: Normal Makeup to Reactor Coolant System Valve
2 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.:	NRC	Scenario #	2	Event #	4	Page	31	of	49

Event Description: High Vibrations on the Main Turbine, Power Reduction

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 4.**
Indications Available:		**Main Annunciator K-2-1 in alarm, Multiple PPC alarms.**
	Crew	Diagnosis High Vibrations on Main Turbine.
	CRS	Directs entry into OP-TM-MAP-K0201, MN TURB VIBR/ECC HI
BOOTH CUE:		**If contacted as Electrical Maintenance and/or the Maintenance Director, acknowledge the following directions:** – **Electrical Maintenance to confirm vibration level is real.** – **Maintenance Director for possible notification to insurance carrier (NML) IAW attached guidelines.**
		OP-TM-MAP-K0201, MN TURB VIBR/ECC HI
	ARO	Step 4.2: Determines that the unit is at power and vibrations are > 6 Mils, and notifies Electrical Maintenance and the Maintenance Director.
	CRS	Step 4.3: Determines that the unit is at power, and directs the URO to reduce load to ≤ 45 percent.
EXAMINER NOTE:		**OP-TM-MAP-K0201, Steps 4.3-4.9 are N/A.**
		1102-4, Power Operations
	CRS	Step 3.3.2.A.2.c): Recognizes that SG/REACTOR DEMAND is in HAND, and has the URO REDUCE reactor power IAW OP-TM-621-471 "ICS Manual Control"
EXAMINER NOTE:		**The next step is the reactivity manipulation for the scenario. The ARO will control feedwater manually during the power reduction.**

Op Test No.: NRC	Scenario # 2	Event # 4	Page 32 of 49
Event Description:	High Vibrations on the Main Turbine, Power Reduction		

Time	Position	Applicant's Actions or Behavior
		OP-TM-621-471, ICS Manual Control
	URO	Step 4.2.4: If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows: • 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%. • If rapid power reduction is required, then LOWER as necessary to achieve desired reactor power level and ENSURE FW flow controlled within limits by lowering and/or raising on the SG/REACTOR DEMAND toggle switch (CC) as necessary.
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	ARO	Step 3.10 and 3.11: Maintains RCS pressure between 2105 and 2205 psig, controls RCS Tavg 578 to 580 °F, and controls RCS ΔTc < 5° F by adjusting SG A and SG B FW Demand Station toggle switches as applicable.
EXAMINER NOTE:		**Once sufficient reactivity manipulation is observed, then GO TO Event 5.**

Op Test No.:	NRC	Scenario #	2	Event #	5	Page	33 of 49

Event Description: Loss of Stator Coolant Pumps, Main Turbine fails to Manually Trip

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available:		**Stator Cooling Pump Trip, PPC alarms for Stator Temperatures, MAP alarms L-1-7 and L-2-7 actuated.**
	CREW	Announce "Generator Stator Coolant Runback"
	ARO	Identifies the trip of GN-P-5A.
		OP-TM-MAP-L-2-7, GEN STATOR STBY CLG PUMP RUN
	ARO	Step 4.0: Ensure standby pump started (pump indication lights on PLF)
	ARO	Reports that GN-P-5B failed to start.
EXAMINER NOTE:		**The following Automatic Actions would normally occur:** • **Turbine control valves Close at 23.4% vwo/min.** • **Turbine control trips to HAND on ICS station and ICS goes into track.** • **Turbine trips after 2 minute time delay should turbine not runback to average generator current < 25, 474 amps (approx plant load of 95% power).** • **Turbine trips after 3.5 minute time delay should turbine not runback to average generator current < 9322 amps (approx plant load of 29.6% power).** **However, the Turbine Control Valves DO NOT Close in this scenario and the Main Turbine fails to automatically trip.**

Footnotes: 1 – GN-P-5A: "A" Stator Cooling Water Pump
2 – GN-P-5B: "B" Stator Cooling Water Pump

Op Test No.: NRC	Scenario # 2	Event # 5	Page 34 of 49
Event Description:	Loss of Stator Coolant Pumps, Main Turbine fails to Manually Trip		

Time	Position	Applicant's Actions or Behavior
		MAP L-1-7, GEN STATOR CLG LOSS RUNBACK
	CRS	Step 4.1: IAAT Reactor power is > 45% and the Turbine trips, then GO TO OP-TM-EOP-001, "Reactor Trip".
	ARO	Step 4.2: IAAT Reactor power is < 45% and the Turbine trips, then GO TO OP-TM-MAP-K0101.
	CRS	INITIATE 1102-4, Power Operations
EXAMINER NOTE:		**The ARO may report that Main Turbine Control Valves are not closing or based on ICS in Hand Control during a turbine runback and an upset of the Primary to Secondary parameters, the CRS may direct the Reactor and Main Turbine tripped.**
	ARO	Reports Main Turbine Control valves are not closing.
	CRS	Directs the URO to manually trip the Reactor and perform IMA's of OP-TM-EOP-001, Reactor Trip.
		OP-TM-EOP-001, Reactor Trip
	URO	Step 2.1 **(IMA)**: PRESS both Reactor Trip and DSS pushbuttons.
	URO	Step 2.2 **(IMA)**: Verify Reactor Shutdown
CT-18	URO	Step 2.3 **(IMA)**: PRESS Turbine Trip pushbutton.
	URO	Step 2.4 **(IMA)**: VERIFY the turbine stop valves are Closed
	URO	Step 3.1: Performs a Symptom Check and reports "Symptom Check is Negative".

Op Test No.:	NRC	Scenario #	2	Event #	5	Page	35	of	49

Event Description: Loss of Stator Coolant Pumps, Main Turbine fails to Manually Trip

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**After Symptom Check is performed, then GO TO Event 6.**

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	36	of 49
Event Description:	Fire in the EG-Y-1B Room							

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 6.**
Indications Available:		**Annunciator HVB-2-1 in alarm.**
BOOTH CUE:		**If contacted as an Auxiliary Operator to investigate the "B" EDG Room, state that "there is smoke in the "B" Emergency Diesel Room, and there are flames coming from the Control Panel on the side of the Diesel. I am exiting the room".** **If not contacted to investigate, and IF directed by the Lead Examiner, then state that "as I was entering to take my logs, I observed smoke in the "B" Emergency Diesel Room. I am exiting the Room."**
	CRS	Announces entry into HVB-0201, DIESEL GEN FAN 1B DISCH AIR TEMP HI
		HVB-0201, DIESEL GEN FAN 1B DISCH AIR TEMP HI
	ARO	Step 1: Ensures AH-E-29B is secured by verifying green flag indicated, green off light lit, and red running light not lit.
	CRS	Announces entry into OP-TM-AOP-001, Fire.
		OP-TM-AOP-001, Fire
	ARO	Steps 3.2-3.6: – Turns on the Whelen Siren. – Announces "Fire, "B" Emergency Diesel Room, Fire brigade report to "B" Emergency Diesel Room" over the page and radio. – Actuates the Fire Alarm. – Repeats the above announcement. – Turns off the Whelen Siren.

Footnote: 1 – AH-E-29B: Diesel Generator Room "B" Fan

Op Test No.:	NRC	Scenario #	2	Event #	6	Page	37	of	49

Event Description: Fire in the EG-Y-1B Room

Time	Position	Applicant's Actions or Behavior
	CRS	Step 3.11: References Attachment 1 and determines to Go To Attachment 19.
		OP-TM-AOP-001, Fire, Attachment 19
	ARO	Closes CO-V-13 by pressing the close pushbutton and verifying green closed light lit, red open light not lit (CC)
	ARO	Places G11-02 in PTL.
EXAMINER NOTE:		**The CRS should also direct securing EG-Y-1B.**
BOOTH CUE:		**If EG-Y-1B is secured, then report in as the Fire Brigade Leader that the fire is out.**
	CRS	Identifies and declares 6 hour Tech Spec 3.0.1.

Footnotes:
1 – CO-V-13: Hotwell Emergency Makeup From CO-T-1B Header
2 – G11-02: 1E 4160V Supply Circuit Breaker From EG-Y-1B
3 – EG-Y-1B: "B" Emergency Diesel Generator
4 – CO-T-1B: "B" Condensate Storage Tank

Op Test No.: NRC	Scenario # 2	Event # 6	Page 38 of 49
Event Description:	Fire in the EG-Y-1B Room		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**T.S. 3.7.2.c.** **Both diesel generators shall be operable except that from the date that one of the diesel generators is made or found to be inoperable for any reason, reactor operation is permissible for the succeeding seven days provided that the redundant diesel generator is:** **1. verified to be operable immediately;** **2. within 24 hours, either:** **a. determine the redundant diesel generator is not inoperable due to a common mode failure; or,** **b. test redundant diesel generator in accordance with surveillance requirement 4.6.1.a.** **With one diesel generator inoperable, in addition to the above, verify that:** **All required systems, subsystems, trains, components and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE or follow specifications 3.0.1.** **T.S. 3.0.1:** **When a Limiting Condition for Operation is not met, except as provided in action called for in the specification, within one hour action shall be initiated to place the unit in a condition in which the specification does not apply by placing it, as applicable, in:** **1. At least HOT STANDBY within the next 6 hours.** **2. At least HOT SHUTDOWN within the following 6 hours, and** **3. At least COLD SHUTDOWN within the subsequent 24 hours.**
EXAMINER NOTE:		**Once EG-Y-1B is secured and the Tech Spec call has been made, then GO TO Event 7.**

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	39	of 49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE EVENT 7.**
Indications Available:		**Control Room lights go out, MU-P-1A trips, loss of Makeup, and Seal Injection flows.**
	CRS	Diagnoses the loss of offsite power and lack of EG-Y-1A to start.
EXAMINER CUE:		**ENTER TIME CRITICAL START TIME: _____**
EXAMINER NOTE:		**OS-24 allows for the operators to start the "A" emergency Diesel Generator as compensation for the automatic start not functioning. This manual action, however, will not be successful either.** **IAW OS-24, Section 4.2 Actions Not Described in Procedures:** **A. Licensed operators may take action without procedural guidance, and without taking a variance under the following conditions.** • **Action taken to directly compensate for the failure of an automatic system.**
		OS-24, Conduct of Operations During Abnormal and Emergency Events
	URO	Recognize EG-Y-1A did not start and attempts to start EG-Y-1A by pressing the start pushbutton, observes running light is not lit, improper volts and hertz, and observing the Control Room lights are not lit after a 10 second delay.
	CRS	Directs entry into OP-TM-AOP-020, Loss of Station Power.

Footnotes: 1 – EG-Y-1A: "A" Emergency Diesel Generator
2 – MU-P-1A: "A" Makeup (HPI) Pump

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	40	of 49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
		OP-TM-AOP-020, Loss of Station Power
	CRS	Step 3.3: Determines that neither ES 4160V bus is energized, RNO: Goes to Section 4.0 STATION BLACKOUT.
	CRS	Step 4.2: Initiates OP-TM-864-901 to energize 1D or 1E 4160V bus from the SBO Diesel.
EXAMINER NOTE:		**The actions to place the Station Blackout Diesel Generator and place it on an ES Bus are listed on the next page.**
EXAMINER CUE:		**CT-* will be accomplished by performing the steps listed below.** **If the steps are carried out and maintained until the end of the scenario, then the Critical Task has been accomplished.** **If the steps below are not carried out, then run the scenario until it a Makeup Pump is started to verify that the crew would cause seal damage.**
CT-*	ARO	Step 4.3: Places IC-P-1A and IC-P-1B in PTL by turning the Control Switches counter-clockwise and pulling upward so that the each control switch locks in the upward position (CL).
CT-*	ARO	Step 4.4: Closes MU-V-20 by pressing the Closed pushbutton and verifying the Green Closed light lit and the Red Open light not lit (CC).
		Step 4.4: Closes MU-V-3 by pressing the Closed pushbutton and verifying the Green Closed light lit and the Red Open light not lit (CC).

Footnotes:
1 – IC-P-1A: "A" Intermediate Closed Cooling Water Pump
2 – IC-P-1B: "B" Intermediate Closed Cooling Water Pump
3 – EG-Y-4: Station Blackout Diesel Generator
4 – MU-V-20: RCP Seal Injection RB isolation Valve
5 – MU-V-3: RCS Letdown RB Isolation Valve

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	41	of	49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
		Step 4.4: Closes MU-V-26 by pressing the Closed pushbutton and verifying the Green Closed light lit and the Red Open light not lit (CC).
		OP-TM-864-901 , SBO DIESEL GENERATOR (EG-Y-4) OPERATIONS
EXAMINER NOTE:		**The CRS may decide to energize either the 1D 4kV ES bus or the 1E 4kV ES bus.** **Scripted below are the actions to restore the 1D 4kV ES bus and it's associated "A" Train ES components.** **Identical actions are taken for the 1E 4kV ES bus and its "B" Train ES components, but are not scripted.**
	URO	Step 4.1.1: Verifies that 1D 4160V bus is de-energized by no voltage indication for the 1D 4kV bus (CR)
	URO	Step 4.1.2: Determines that the PPC is available, and verifies S2072, 4 KV BUS 1D OVERCURRENT, is NORM.
	URO	Step 4.1.3: Ensures that 1SA-D2 and 1SB-D2 are OPEN by observing 1SA-D2 green open indication flag (CR) and by rotating the Control Switch for 1SB-D2 counter-clockwise and observing the green open indication flag (CR).
	URO	Step 4.1.4.B: Ensures that FS-P-2 is operable except that power is not available based on it previously running.
CT-8	URO	Step 4.1.45A: Places BS-P-1A in PTL by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CL).

Footnotes: 1 – FS-P-2: Fire Service Pump.
2 – BS-P-1A: "A" Building Spray Pump.
3 – MU-V-26: RCP Seal Return RB Isolation Valve
4 – EG-Y-4: Station Blackout Diesel Generator

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	42	of	49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
CT-8	URO	Step 4.1.5.B: Places MU-P-1A in PTL by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CC).
CT-8	URO	Step 4.1.5.C: Places DH-P-1A in PTL by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CC).
CT-8	URO	Step 4.1.5.D: Places RR-P-1A in PTL by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CC).
CT-8	URO	Step 4.1.5.E: Places EF-P-2A in PTL by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CL).
CT-8	URO	Step 4.1.6: Presses and Holds the SBO DIESEL GENERATOR START PB (CR) for approx. 8 seconds .
	URO	Step 4.1.9. Ensures G1-02 is in Pull-To-Lock by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (CL).
CT-8	URO	Step 4.1.10. Ensures T1-C2 is in Pull-To-Lock by turning the Control Switch counter-clockwise and pulling upward so that the switch locks in the upward position (PL).
CT-8	URO	Step 4.1.11. Closes G2-12 by turning the Control Switch clockwise direction, verifying the red indicating flag is visible, that the red closed light is lit, and the green open light is not lit (PL).

Footnotes: 1 – EF-P-2A: "A" Motor Driven Emergency Feedwater Pump.
2 – MU-P-1A: "A" Train ESAS selected Makeup Pump.
3 – DH-P-1A: "A" Decay Heat Removal Pump.
4 – RR-P-1A: "A" Reactor River Pump.

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	43	of 49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
CT-8	URO	Step 4.1.12. Closes T1-D2 to energize 1D 4kV by rotating the Control Switch in the clockwise direction, verifying the red indicating flag is visible, that the red closed light is lit, the green open light is not lit, and half of the overhead lighting is illuminated in the Control Room.
EXAMINER CUE:		**ENTER TIME CRITICAL STOP TIME: _____ (Allowable time to complete Critical Task is 10 Minutes)**
EXAMINER CUE:		**CRIT. STOP TIME – CRIT. START TIME = _____ (Allowable time to complete Critical Task is 10 Minutes)**
		OP-TM-AOP-041, Loss of Seal Injection
	URO	Step 3.3: Places MU-V-32 in HAND by pressing the White HAND pushbutton and verifying the White HAND light lit red AUTO light not lit.
	URO	Step 3.4: Determines that a Makeup Pump is not running and IAW the RNO, performs the following: – Places MU-V-17 in HAND by pressing the White HAND pushbutton and verifying the White HAND light lit red AUTO light not lit (CC). – Dials MU-V-17 to full closed (CC).
	CRS	Step 3.5, RNO 4: Goes to Section 4.0.
	URO	Step 4.1-4.2: Verifies MU-P-1A is ES selected and that MU-V-36 and MU-V-37 are open.

Footnotes:
1 – MU-V-17: Normal Makeup to Reactor Coolant System Valve
2 – MU-P-1A: "A" Makeup Pump
3 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.:	NRC	Scenario #	2	Event #	7/8	Page	44	of 49

Event Description: Loss of Offsite Power, "A" Emergency Diesel Generator does not start.

Time	Position	Applicant's Actions or Behavior
	URO	Step 4.3-4.4: • Starts DR-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC). • Starts DC-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC).
	URO	Step 4.4: Starts MU-P-1A by rotating the Control Switch clockwise, verifying red flag indicated, red running light lit, green secured light not lit (CC).
	URO	Step 3.6: Verifies that #1 seal temperatures are less than 235F via the PPC.
BOOTH CUE:		**When directed to unlock and locally open MU-V-20, then insert Event # 11 and then report back that MU-V-20 has been unlocked and opened locally.**
	URO	Step 3.7: Determines that MU-V-20 is NOT open by the red green closed light lit and red open light not lit (CC). RNO: Directs an Auxiliary Operator to unlock and locally open MU-V-20.
EXAMINER'S NOTE:		**If RCP seal temperatures are greater than 235F, then the next step will cause a RCP seal leak.**

Footnotes:
1 – MU-V-20: RCP Seal Injection RB isolation Valve
2 – MU-P-1A: "A" Makeup Pump
3 – DR-P-1A: "A" Decay River Water Pump
4 – DC-P-1A: "A" Decay Closed Cooling Water Pump

Op Test No.: NRC	Scenario # 2	Event # 7/8	Page 45 of 49
Event Description:	Loss of Offsite Power, "A" Emergency Diesel Generator does not start.		

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.8: Slowly adjusts MU-V-32 for 38 gpm seal injection flow rate, while limiting RCP radial bearing cooldown rate to less than 1°F/minute.
	URO	Step 3.9: Restores Pressurizer Level by toggling MU-V-17 control station in HAND.
Examiner's Note:		**The scenario can be terminated when a 4kV ES Bus has been energized from the SBO Diesel Generator and either seal injection has been restored or MU-V-20 is closed and IC-P-1A/B are in Pull-To-Lock.**

Footnotes: 1 – MU-V-17: Normal Makeup to Reactor Coolant System Valve
2 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.: NRC	Scenario # 2	Event # 7/8	Page 46 of 49
Event Description:	Loss of Offsite Power, "A" Emergency Diesel Generator does not start.		

Time	Position	Applicant's Actions or Behavior

Follow-up question highest event entered during scenario?

HA3

FIRE or EXPLOSION resulting in any of the following:

- VISIBLE DAMAGE to a Table H2 permanent structure.

OR

- VISIBLE DAMAGE to safety system equipment contained within a Table H2 area.

OR

- Control Room indication of degraded safety system equipment performance contained within a Table H2 area.

OR

MA1,

1. AC power capability to Emergency 4KV Buses reduced to only one of the following power sources for > 15 minutes:

- Auxiliary Transformer 1A
- Auxiliary Transformer 1B
- Emergency Diesel EG-Y-1A
- Emergency Diesel EG-Y-1B
- SBO Diesel generator EG-Y-4

AND

2. Any additional single failure will result in station blackout.

Op Test No.:	NRC	Scenario #	2	Event #	Various	Page	47	of	49
Event Description:	Supplemental Information								

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The crew may decide to perform OP-TM-621-471 for Event 5.**
		OP-TM-621-471, ICS Manual Control
	URO	ENSURE ULD in HAND.
	URO	PLACE SG/REACTOR DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	DETERMINE which input is bad.
		OP-TM-MAP-H0302
	INFO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	ENSURE ULD in HAND IAW OP-TM-621-473, "ULD Manual Control".
EXAMINER NOTE:		**SASS Setpoint Delta is 3.9% Reactor Power**
	URO	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and VERIFY both of the following: – Difference between affected and alternate channels are less than "SASS Setpoint Δs" as listed in OP-TM-MAP-H0302 Table. – Selecting alternate instrument will not affect ICS control or plant stability.

Op Test No.: NRC	Scenario # 2	Event # Various	Page 48L of 49L
Event Description:	Supplemental Information		

Time	Position	Applicant's Actions or Behavior
	URO	SELECT alternate instrument(s) with console PB by pressing the pushbutton for NI-6 input to ICS (CC), verifying that NI-6 selected instrument light is lit and the NI-5 selected instrument light is not lit.
	URO	VERIFY plant stable.

Op Test No.:	NRC	Scenario #	2	Event #	Various	Page	49	of	49

Event Description: Supplemental Information

Time	Position	Applicant's Actions or Behavior

EFFECTS OF LOSS OF 1E 4160V bus
• Loss of EF-P-2B
• Loss of many BOP indicators FW valve dp indication is available for FW pump control.
• Loss of MU batch controller
• Loss of MU-P-1B-E and MU-P-1C.
• Loss of MU-P-3B (main oil pump for MU-P-1B)
• Loss of BS Train B
• 1M Loss of SR-P-1B and SR-P-1C
• Loss of: RR Train B, RR-V-3B, RR-V-4B
• Loss of DH, DC and DR Train B
• Loss of NR-P-1C and NR-P-1B-T
• Loss of NS-P-1C and NS-P-1B-S
• Loss of IC-P-1B
• Loss of SF-P-1B and AH-E-8B
• Loss of RC-V-3 (Pzr Spray Block Valve)
• Loss of AH-E-1B
• Loss of AH-E-9B
• Loss of AH-E-14B and AH-E-14D
• Loss of "B" ESF ventilation system
• Loss of sample pumps on: RM-A-2, RM-A-8
• Loss of FW-V-5B and FW-V-92B

Facility:	Three Mile Island	Scenario No.:	3	Op Test No.:	2015-301
Examiners:		Operators:			

Initial Conditions:	• (Temporary IC-177)
	• 85% Power, MOL
	• BS-P-1A is OOS for maintenance, expected to return to service in 6 hours.
	• Crane work is occurring on the West side of the Plant to stage new piping
Turnover:	Maintain 85% Reactor Power
Critical Tasks:	• Control HPI (CT-5)
	• Establish FW Flow and Feed SG(s) (CT-10)
	• Natural Circulation RCS Flow (CT-12)

Event No.	Malf. No.	Event Type*	Event Description
1	DHR32	TS CRS	BWST level lowers, entry into OP-TM-MAP-E0304
2	03A4S01 - ZDIPB1R CB ON	TS CRS I URO I ARO	Inadvertent ES Actuation, "B" Train (TS), entry into OP-TM-AOP-046 (URO: Defeats signal, ARO: Opens MU-V-2A/B)
3	RC08B IC51	I CRS I URO I ARO	Tc Instrument Fails High, SASS Fails to Actuate, entry into OP-TM-AOP-070 (URO: Manual control of Control Rods, ARO: Manual control of Feedwater)
4	MU19A	N CRS R URO N ARO	RC-P-1A #1 Seal Leak, leak at 6.5 gpm, Entry into OP-TM-AOP-040 (URO/ARO: Power reduction in manual)
5	MU19A	C CRS C URO	RC-P-1A #1 Seal Failure, leak at 10 gpm, Entry into OP-TM-AOP-040 (URO: Secure RC-P-1A)
6	MS19A	C CRS C ARO	Isolable Steam Leak in Turbine Bldg, entry into OP-TM-AOP-051. (ARO: Isolate Steam Leak)
7	TH06	M CRS M URO M ARO	RCS LOCA, entry into OP-TM-AOP-050, OP-TM-EOP-001.
8	CC06A	C CRS C URO	NSCCW Rupture in RC-P-1A Motor Air Cooler, Loss of NSCCW, entry into OP-TM-AOP-031 (URO: Trip RCP's)
9	ICR02 ICR04	C CRS C ARO	HSPS fails to feed OTSG's to 50% (ARO: Feed OTSG's to >50% in manual)

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

Three Mile Island NRC Scenario #3

Event #1: When the crew has accepted the watch, the Lead Examiner will cue the lowering level of the BWST due to a crane piercing the tank at the 53.5 ft level.

The crew will diagnose the low level in the BWST by lowering level on the BWST level indicators (CC and CR) and annunciator E-3-4 in alarm. Although it initially drops rapidly, the crew will identify it as steady at approximately 54.5 ft.

The operability of the borated water storage tank (BWST) as part of the ECCS, ensures that a sufficient supply of borated water is available for injection by the ECCS in the event of a LOCA. The contained water volume limit of 350,000 gallons includes an allowance for water not usable because of tank discharge location and sump recirculation switchover setpoint.

The limits on BWST minimum volume and boron concentration ensure that:

1) sufficient water is available within containment to permit recirculation cooling flow to the core, and

2) the reactor will remain at least one percent subcritical following a Loss-of-Coolant Accident (LOCA).

The CRS will review and declare the following 1 hour Tech Spec:

3.3.1.1.a: The borated water storage tank (BWST) shall contain a minimum of 350,000 gallons of water having a minimum concentration of 2,500 ppm boron at a temperature not less than 40°F.

If the BWST volume is not within limits, restore the BWST to OPERABLE within one hour. Specification 3.0.1 applies.

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

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

Once the Tech Spec has been declared, the scenario can continue.

Event #2: The Lead Examiner will cue the "B" Train Inadvertent ESAS Actuation (1600# Manual HPI). The crew must quickly recognize the condition and perform the required Immediate Manual Actions to minimize the RCS pressure transient and pressurizer in-surge due to HPI injection.

Additionally, while at power, immediately reducing HPI minimizes the possibility of a reactor trip on high RCS pressure.

The following Critical Safety Functions are affected by an inadvertent ESAS signal:

CSF 1, Reactivity & Reactor Power Control: Maintain control of the fission process, maintain the capability to shutdown the reactor and the capability to maintain the reactor in a shutdown condition. Control energy production and reactor power distribution based on design limits and current core heat removal capability. **HPI Actuation** will insert negative reactivity as borated water from the BWST will be injected into the RCS. ICS will pull control rods to maintain ULD demand and RCS Tave. This could potentially cause an All Rods Out condition. As primary side power decreases, ICS cross limits will lower feedwater flow in an attempt to match primary to secondary heat removal.

CSF 2, Reactor Vessel Inventory Control: Provide the means to maintain the core covered with sub cooled water. **HPI Actuation** will isolate RCS letdown and normal makeup. HPI will cause pressurizer level to rise. MU tank level will lower (MUT level/pressure requirements). BWST level will lower (BWST TS level), which is already low due to the previous event.

CSF 3, RCS Integrity: Maintain the capability to control heatup and cooldown rates and control RCS pressure to prevent reactor vessel brittle fracture or LTOP events. Maintain RCP seal cooling to prevent excessive loss of RCS inventory through RCP seals. **HPI Actuation** will cause RCS pressure to rise. Seal Injection is not affected by an ES actuation. OP-TM-AOP-046 has the operator secure the remaining MU pump if the MU-V-16s cannot be closed from the control room. This action immediately terminates HPI and seal injection. The thermal barrier heat exchangers provide adequate seal cooling when the Seal Injection is secured. OP-TM-AOP-046 ensures adequate thermal barrier cooling prior to terminating seal injection. Once MU-V-36 and MU-V-37 are opened locally and the appropriate MU-V-16s are closed, a makeup pump is restarted and Seal Injection is re-established.

CSF 4, Core Heat Removal: Provide the capability to remove core heat production at all times. **HPI Actuation** will inject cold BWST into the RCS. The RCS will also cool due to the negative reactivity insertion from the injected BWST water lowering core power.

CSF 5, Containment Integrity: Provide means to prevent or minimize fission product release to the environment. (1) Maintain containment pressure below design and (2) Provide capability to isolate the containment when required. An inadvertent **HPI Actuation** will start the Reactor River system, and the RB cooling fans will be running in slow speed. Normal cooling to the RB cooling fans will be isolated. RB Temperature and pressure will lower due to the actuation of the RR system. The degree of temperature reduction would depend of river temperature. Building Spray System valves will open to align the BWST to the RB, but the BS pumps would not start unless a 30# signal is present. Closure of the containment isolation valves under the HPI signal would not adversely affect their associated systems.

CSF 7, Electrical Power: Provide electrical power as required to accomplish the other Critical Safety Functions. Provide AC and DC power for emergency equipment operation and instrumentation systems. An inadvertent **HPI Actuation** will start the emergency diesel generators unloaded.
CSF 8, Auxiliary Emergency Systems: Provide equipment cooling (closed cooling & ventilation), and other support requirements to accomplish the other Critical Safety Functions. Provide Instrument Air for operation of EFW, ADVs, RCP Support Systems and some containment isolation valves. An inadvertent **HPI Actuation** will start support systems to support ECCS and RB cooling systems. The DC and DR pumps will start to support MUP and DHP cooling which would be running during an inadvertent actuation. ES selected NS and NR pumps will start. Two NR and NS pumps are normally running. There is a potential for three NS pumps running which would start an overcooling of the NS system.

CSF 9, Fire Protection & Remote Shutdown Capability: Maintain means to prevent, detect, and suppress fires, as well as the capability to perform a plant shutdown without access to the Control Room. An inadvertent **HPI Actuation** would trip FS-P-2.

The crew will diagnose the Inadvertent ESAS Signal by multiple annunciators in alarm, "B" Train components in their ES actuated state, and/or "B" EDG running, while all primary indications appear steady or rising (RCS pressure not at 1600#). The URO will perform the Immediate Manual Actions of OP-TM-AOP-046, INADVERTANT ESAS. The ARO will restore letdown IAW OP-TM-211-950 (performing the appropriate portion of the procedure when restoring from isolation following an ESAS signal). .

The CRS will review T.S. and declare a 1 hour LCO timeclock IAW 3.5.1.1, 3.5.1.3, and Table 3.5-1.

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.

3.5.1.3: In the event the number of protection channels operable falls below the limit given under Table 3.5-1, Column "A", operation shall be limited as specified in Column "C". Specification 3.0.1 applies.

Table 3.5-1 (Instruments Operating Conditions):

C. Engineered Safety Features

Functional Unit	/ Min Operable Channels	/ Min Degree of Redundancy
Manual Pushbutton /	2	/ N/A

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

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

Once the plant is stabilized, Letdown is restored, and the Tech Spec call IS made the scenario can continue.

Event #3: The Lead Examiner will cue the Tc Instrument Failure (High) with SASS failing to actuate. This will cause an ICS transient, which if not responded to swiftly, will cause a Reactor Trip. The crew will diagnose the ICS failure by a rapid change in RCS pressure, Reactor Power rising above 100%, multiple annunciator alarms, and/or changes in indications at multiple ICS stations. Entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET will be required based on RCS pressure not being controlled in ICS AUTO.

"RCS pressure is not being controlled" requires the operator to make a subjective determination, based on their skills, training, and experience.

A determination that RCS pressure is being controlled should include the following elements:

1) The reason for the transient is understood
2) RCS pressure response is consistent with the expected response for the event
3) Automatic or manual control in accordance with normal operating procedures is effectively controlling RCS pressure.

A conservative assessment (i.e. concluding that RCS pressure is not being controlled) is appropriate when the three conditions above cannot be satisfied. ICS failures are one class of events that can lead to an upset in primary to secondary heat transfer. Most ICS failures can be mitigated by use of the appropriate manual control normal operating procedures.

When ICS is in manual control and the plant is stable, the scenario can continue.

Event #4: The Lead Examiner will cue the leak on the RC-P-1A #1 seal, The crew will enter OP-TM-AOP-040 and maximize seal injection. The URO will have to reduce reactor power with ICS in manual to secure the RCP. This is the reactivity manipulation event.

IAW OP-TM-AOP-0401, RCP#1 Seal Failure Basis Document:

> Westinghouse Technical Bulletin ESBU-TB-93-01-R1 "Revised procedures for RCP shutdown with No. 1 seal leakage outside operating limits" is the primary technical reference. This bulletin requires an "orderly" RCP shutdown with seal leakoff > 6.0 GPM and seal temperatures stable within limits.

When the reactivity manipulation has been satisfied the scenario can continue.

Event #5: The Lead Examiner will cue the failure of the RC-P-1A #1 seal, The crew will identify the OP-TM-AOP-040 IAAT statement and secure RC-P-1A.

IAW OP-TM-AOP-0401, RCP#1 Seal Failure Basis Document:

> Westinghouse Technical Bulletin ESBU-TB-93-01-R1 "Revised procedures for RCP shutdown with No. 1 seal leakage outside operating limits" is the primary technical reference. The bulletin requires an "immediate" RCP shutdown if
>
> (1) seal leakoff > 8.0 GPM or
> (2) seal leakoff > 6.0 GPM and seal temperatures continuing to rise.

Once RC-P-1A has been secured, the scenario can continue.

Event #6: The Lead Examiner will cue the Isolable Steam Leak in the Turbine Building.

The operators will diagnose a Secondary Side Steam Leak based on a lowered efficiency of the Secondary Plant (Megawatts, Header Pressure, OTSG pressures, etc.) and a call-in report from the field.

Upon a Steam Leak in the Turbine Building, the following Critical Safety Functions are affected:

CSF 1, Reactivity and Reactor Power Control: Maintain control of the fission process, maintain the capability to shutdown the reactor and the capability to maintain the reactor in a shutdown condition. Control energy production and reactor power distribution based on design limits and current core heat removal capability. A secondary side steam leak will bypass steam away from the Turbine. If the steam leak is large enough, electrical generation will lower. ICS will raise reactor power to raise MWe back up to ICS demanded MW. If the steam leak causes Tave to lower, ICS will also try to raise reactor power to recover Tave.

CSF 7, Electrical Power: Provide electrical power as required to accomplish the other Critical Safety Functions. Provide AC and DC power for emergency equipment operation and instrumentation systems. A Steam Leak may affect power to non-safety related equipment in the Turbine Building.

CSF 9, Fire Protection and Remote Shutdown Capability: Maintain means to prevent detect and suppress fires, as well as the capability to perform a plant shutdown without access to the Control Room. A Steam Leak may cause fire alarms to actuate. This could be the first indication of a Steam Leak to the Control Room. May cause sprinkler systems to actuate or fire dampers to close.

The crew will diagnose the Steam Leak and the CRS will enter OP-TM-AOP-051, Secondary Side High Energy Leak. OP-TM-AOP-051 is entered for Steam Leaks that affect large portions of the plant and therefore it is not obvious to the operator what needs to be done initially to isolate the leak.

The affected Building is determined and from there, OP-TM-AOP-051 systematically attempts to isolate the leak remotely from the Control Room while taking steps to minimize the adverse effects of a steam environment on safety related equipment. The OP-TM-AOP-051 mitigation strategy for a Steam Leak in the Turbine Building is as follows:

- Attempt to isolate the leak from the Control Room.
- Shutdown and Cooldown the plant in a controlled manner to minimize pressure surges that could make the leak worse. Shutdown may have to be done quickly or the plant may have to be tripped depending on the circumstances.

The ARO will isolate Steam Leak by closing the appropriate valve, MS-V-5B. This can be performed because the steam supplies to the Main Feedwater Pumps are as follows:

- Below 25% power, Main Steam, only, supplies the Main Feedwater Pumps.
- Between 25% and 40% power, Main Steam supplements Extraction Steam as supplies to the Main Feedwater Pumps.
- Above 40% power, Extraction Steam, only, supplies the Main Feedwater Pumps.

Once the Steam Leak has been isolated, the scenario can continue.

Event #7: The lead examiner will cue the RCS LOCA.

IAW FSAR, Chapter 14:

Specific time periods during and following a LOCA can be identified as:
(1) blowdown,
(2) refill,
(3) reflood, and
(4) long term cooling.

The blowdown, refill, and reflood periods are short term (seconds and minutes) transient characteristics directed toward availability and rapid response to maintain the cladding temperature and building pressures at or below prescribed design limits.

The blowdown phase can be characterized as the decrease in the potential energy of the RCS to a level equal to that of its immediate surroundings. Core flow is variable and dependent on the nature, size, and location of the break. Departure from nucleate boiling (DNB) is generally calculated to occur very quickly; core cooling is by film boiling. Since film boiling amounts to only a small part of the steady state cooling, the cladding temperature increases by 600 to 1200°F by the end of the blowdown phase. During the very last seconds of blowdown, cooling is by convection of steam, and the cladding temperature is increasing.

Following blowdown, a short time is required for the ECCS to refill the bottom of the reactor vessel before final cooling can be established. During this period, core cooling is negligible, and the cladding experiences a near-adiabatic heatup. This phase is termed refill.

When the ECCS water reaches the bottom of the core, the period of reflood commences. Core cooling by quenching is by steam generated below the rising water level and by water droplets entrained in the steam. The cladding temperature excursion is generally terminated before the core is covered by water because the steam water mixture is sufficient to remove the relatively low decay heat power being generated at this time. The core is eventually covered by a mixture of steam and water, and the path to long term cooling is established through the use of pumped injection.

The period following reflood is of longer duration (minutes, hours, days); the cooling objectives are to remove decay heat and to provide gradual temperature reduction for the RCS and Reactor Building

The CRS will enter OP-TM-AOP-050, Reactor Coolant Leakage, and OP-TM-EOP-001, Reactor Trip. The URO will trip the reactor. The ARO will perform a symptom check and identify no symptoms that would lead to other EOP entry.

Once the symptom check has been completed, the scenario can continue.

Event #8/9: The Lead Examiner will cue the NSSCW Rupture in RC-P-1A Motor Air Cooler. It is considered a loss of NSCCW if NSCCW surge tank level reach 1.6 feet and lowering, and the following Critical Safety Functions are affected:

> **CSF 4**, Core Heat Removal: Provide the capability to remove core heat production at all times: **Loss of Nuclear Services cooling function:** RC pumps must be shutdown. Natural Circulation will be used RCS heat removal.
>
> **CSF 8**, Auxiliary Emergency Systems: Provide equipment cooling (closed cooling and ventilation), and other support requirements to accomplish the other Critical Safety Functions. Provide Instrument Air for operation of EFW, ADVs, RCP Support Systems, and some containment isolation valves: **Loss of Nuclear Services cooling function**: Other CSFs are affected as follows: (1) the reliability of safety related power sources and instrumentation system is degraded by the loss of the control building chillers and (2) the reliability of the decay closed pump motors and emergency feed pump motors is degraded by the loss of cooling to the area ventilation coolers.
>
> **CSF 10**, Chemistry Control: Provide the means to monitor and control primary and secondary water chemistry in order to ensure the long term reliability of plant systems and limit the potential release of radioactive materials: **Loss of Nuclear Services cooling function** would result in the loss of the capability to obtain an RCS or OTSG sample.

The crew will diagnose a NSSCW Leak in RC-P-1A Motor Air Cooler by lowering NSCCW Surge Tank level (LI-800/801 on CC), Annunciators AA-1-2 and F-2-1 in alarm, and/or PPC alarm L2790.

The CRS will enter OP-TM-AOP-031, LOSS OF NUCLEAR SERVICE CLOSED COOLING. The URO will trip the RCP's, trip the NSCCW Pumps, start MU-P-1A, place MU-P-1B in PTL, and provide cooling to MU-P-1A.

The ARO will identify that the EFW Setpoint will fail to zero% in automatic control and will place the EF-V-30 Controllers to Manual and feed to 75-85% in the Operating Range to promote Natural Circulation. Without this step being performed, the OTSG's will have no inventory and Natural Circulation will not occur.

IAW FSAR, Chapter 14:

> The energy generated by the core is transferred by convection to the steam generators during the natural circulation flow phase.

The scenario can be terminated when Reactor Coolant Pumps have been secured and natural circulation has been established.

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-5 – Control HPI – MU/HPI flow MUST be THROTTLED to prevent overpressurizing the RCS when SCM exists by keeping the RC pressure below the RV P-T limit. HPI flow must be maintained within acceptable operational bounds. This requires maintaining HPI flow greater than the minimum allowable pump flow rate and less than the pump runout flow rate.

- Controlling HPI outside of the following limits should be considered grounds for failure of the critical task:
  - Do not allow the Pressurizer to go empty.
  - Maintain RCS Pressure below the PORV setpoint.

Safety Significance: The only requirement to allow throttling of HPI is the existence of SCM. Throttling means to reduce the HPI flow rate below full flow rate. In general, HPI flow may be throttled anytime SCM exists as indicated by the incore T/Cs. HPI flow must not be throttled when SCM is lost.
If the PORV is not maintained open (i.e., allowed to cycle) during HPI cooling, the RC will continue to heat up as the PORV is opened and closed either automatically or manually to control pressure. This heatup will continue until SCM is lost or HPI mass flow starts removing more energy than is being added to the RC. Full HPI flow must always be maintained when SCM does not exist. In addition, while the PORV is being cycled, full HPI flow must be maintained until the core outlet temperature is decreasing. This criteria ensures that full HPI flow will be maintained if the PORV is permitted to cycle; therefore, throttling the HPI flow cannot be permitted until the HPI flow is sufficient to remove decay heat.
MU/HPI flow MUST be THROTTLED to prevent overpressurizing the RCS when SCM exists by keeping the RC pressure below the RV P-T limit. HPI flow must be maintained within acceptable operational bounds. This requires maintaining HPI flow greater than the minimum allowable pump flow rate and less than the pump runout flow rate

Cues:

1. SPDS displays and associated alarms
2. SCM monitor and associated alarms
3. P-T display and associated alarms
4. RCS pressure and temperature (incore T/Cs)

Performance Indicators:

1. Operation of HPI pump controls
2. Operation of HPI valve controls

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-5 – Control HPI – Continued

Feedback:

1. HPI pump status indications
2. HPI valve status indications
3. HPI Flow
4. RCS pressure and temperature (incore T/Cs)

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-10 - Establish FW Flow and Feed SG(s) (Rule 4) – In accordance with minimum flow rates and SG levels of Rule 4.0, feed available SG(s) to appropriate levels.

The normal method of core cooling is by transferring core heat to the RC, then transferring the heat from the RC to the secondary side steam system via the SGs. This mode of heat transfer requires that adequate inventory of feedwater be supplied to the SGs, either as a liquid level, liquid flowrate or both. In the event all feedwater is lost HPI cooling can provide backup cooling of the core; however, this mode causes degradation of the RB. It is the intention of the GEOG bases to maintain appropriate FW flow, including trickle feed, to the SGs if at all possible. This includes use of approved plant specific alternate FW sources (e.g., service water, fire water systems, etc.). Failure to accomplish either this or HPI/PORV cooling and allowing the plant to heatup into a Loss of Subcooling would jeopardize fuel clad

Primary to secondary cooling is preferred over HPI/PORV cooling due to:

- More stable
- Does not challenge RCS integrity

  - Attempting to establish FW Flow and Feed OTSG's outside of the following limit should be considered **grounds for failure of the critical task**:
    - Allowing the plant to heatup into a Loss of Subcooling Margin due to insufficient Feedwater.

Safety Significance: Heat removal from the reactor coolant by the SGs is required for a range of LOCAs to satisfy the acceptance criteria of 10 CFR 50.46. For this range of LOCAs, the RCS inventory will decrease, resulting in a period of little primary to secondary heat transfer. This can cause the RCS to heat up and repressurize causing a decrease in MU/HPI flow rate such that MU/HPI flow by itself may not be sufficient for keeping the core covered and adequately cooled.

Cues:

1. Low FW flow alarms
2. SG low level alarms
3. Low SG pressure alarms
4. SPDS displays and associated alarms
5. Verbal alert by plant staff that all FW flow has been lost and/or SG(s) level is inappropriate for current plant conditions

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-10 - Establish FW Flow and Feed SG(s) (Rule 4) – Continued

Performance Indicators:

1. Operation of associated EFW valve controls.

Feedback:

1. EFW flow
2. SG level and pressure
3. RCS pressure and temperature
4. Verbal alert by plant staff of FW flow and/or SG(s) level status

B&W Unit EOP Critical Task Description Document, 47-1229003-04:

CT-12 – Establish Natural Circulation RC Flow – Whenever forced RC flow is not available, NC flow should be established. Maintaining primary to secondary heat transfer via NC eliminates the need to add RC to the RB as would occur with the back up feed and bleed HPI core cooling mode.

- If primary to secondary heat transfer has been lost, then establish and maintain appropriate SG levels in accordance with Rule 4.0.
- Reduce SG pressure using the TBVs/ADVs to establish a positive primary to secondary side □T of - 50°F.
- RCS pressure should be maintained constant or slightly increasing using MU or HPI. RCS pressure should not be increased if PTS guidance is invoked.

- Trying to establish Natural Circulation RC flow outside of the following limits should be considered **grounds for failure of the critical task**:

  - Establish Natural Circulation prior to transitioning into OP-TM-EOP-009, HPI Cooling.

Safety Significance: Enhances the transient mitigation capability of the plant by maintaining SGs operable and eliminates the need to add RC to the RB as with HPI Cooling.

Cues:
- Low RC flow alarm
- Verbal alert by plant staff that all RCPs have tripped
- SCM monitor and associated alarms
- P-T display and associated alarms

Performance Indicators:
- Operation of EFW/FW pump and valve controls
- Operation of TBV/ADV controls
- Operation of MU/HPI pump and valve controls

Feedback:
- Verbal verification that natural circulation has been established
- SG pressure
- RC temperature

Industry Experience:

- OE22275 - Reactor Coolant System (RCS) Leak Near ¾" Bypass Line On 2HV-8701B (Vogtle Unit 2) (3/20/06)
- OE29538 – Potential Inadequate Controls of Reactor Coolant System (RCS) Leak Path (Oconee Nuclear Station –ONS) (8/3/09)
- IRS 6380 – Primary Coolant Leak Caused by Rupture of a Makeup Pipe (Kola Unit 2) (3/3/94)

PRA

- Small LOCAs (Initiating Event)

Event	Description	Procedure Support
	Initial Set-up.	85% Power, MOL BS-P-1A Tagged OOS LO-P-8A/8B Running
1	BWST level lowers	OP-TM-MAP-E0304, BWST Temp/Lvl Hi/Lo
		Technical Specifications
2	Inadvertent ES Actuation	OP-TM-AOP-046, Inadvertent ES Actuation
		OP-TM-211-950, Restoration of Letdown Flow
		Technical Specifications
3	Tc Instrument Fails High, SASS fails to actuate	OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset
		OP-TM-MAP-H0302, SASS Mismatch
		OP-TM-621-471, ICS Manual Control
4	RC-P-1C #1 Seal Leak	OP-TM-AOP-040, RCP Seal Failure
		OP-TM-226-151, Shutdown RC-P-1A
5	RC-P-1C #1 Seal Failure	OP-TM-AOP-040, RCP Seal Failure
6	Isolable Steam Leak in Turbine Building	OP-TM-AOP-051, Secondary Side High Energy Leak
7	RCS LOCA	OP-TM-AOP-050, Reactor Coolant Leakage
		OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
		OP-TM-EOP-001, Reactor Trip
8	NSCCW Rupture in RC-P-1A Motor Air Cooler, Loss of NSCCW, Reactor trip	OP-TM-AOP-031, Loss Of Nuclear Services Component Cooling
		OP-TM-MAP-F0108, NS Surge Tank Level Hi/Lo
9	EFW Setpoint at 0 in Auto	OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
		OP-TM-211-901, Emergency Injection (HPI/LPI)

Scenario Set-up

NRC Scenario 3

ACTION	COMMENTS / INSTRUCTIONS	DESCRIPTION
Initialization IC-177	85% HFP ICS full AUTO	Equilibrium XENON
BS-P-1A	Place in PTL Immediately	Scenario Support
BS-P-1A	Place EDT on BS-P-1A Control Switch Immediately	Scenario Support
Remote xxx	Value: OUT When: Immediately	BS-P-1A Breaker for Scenario Support
Malfunction ICR02	Value: 0 When: Immediately	HSPS Operating Range level input to "A" OTSG fails to 0
Malfunction ICR04	Value: 0 When: Immediately	HSPS Operating Range level input to "B" OTSG fails to 0
Remote DHR32	Value: Final 86 Ramp of 20 When: Event 1	BWST Level Lowers to 54"
I/O Override 03A4S01-ZDIPB1RCB ON	Value: On When: EVENT #2	Inadvertent ESAS Actuation
Malfunction RC08B	Value: 100 Ramp 30 secs When: EVENT 3	Tc Instrument Failure/ SASS Failure
Malfunction IC51	Value: Insert When: EVENT 3	Tc Instrument Failure/ SASS Failure
Malfunction MU19A	Value: 20 When: Event 4	RC-P-1A Seal Failure, approx. 6.5 gpm
Trigger 5	Value: mmf MU19A 40 When: N/A	RC-P-1A Seal Failure greater than 8gpm
Malfunction MS19A	Value: 1 When: EVENT 6	Steam Line Break in the Turbine Building
Malfunction TH06	Value: 0.19 When: Event 7	LOCA
Malfunction CC06	Value: 100 When: Event 8	NSCCW Rupture, Loss of NSCCW
Trigger 10	Value: dmf es08a When: zdipb2rc4a==1	Allows 500# ES Signal to be defeated

Op Test No.:	NRC	Scenario #	3	Event #	1	Page	19 of 51

Event Description: BWST level lowers (TS)

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 1**
Indications Available:		**Main Annunciator E-3-4 in alarm, BWST digital indicators (LI-808-A/B) lower until approximately 54', PPC Points A0486 and A0487 lower until approximately 54'.**
	Crew	Diagnoses a lowering of BWST level, and stabilizing at approximately 54'.
	CRS	Directs entry into OP-TM-MAP-E0304, BWST TEMP/LVL HI/LO.
BOOTH CUE:		**If directed, as an Auxiliary Operator and/or Maintenance, to investigate the BWST level lowering, then make the following report:** **"The crane working near the BWST has swung its' load into the BWST and pierced it. There is no visual indication of further water coming out of the hole in the BWST".**
		OP-TM-MAP-E0304, BWST TEMP/LVL HI/LO
	ARO	Step 4.1.1: Determines that console and computer level indications are accurate.
EXAMINER NOTE:		**Steps 4.1.2 through 4.1.5 are N/A.**
	CRS	Step 4.1.5: Determines that BWST level indication is less than 56.0 ft and Reactor is not shutdown, and declares entry into TS 3.3.1.1.a. (1 hour).
EXAMINER NOTE:		**Steps 4.1.6 through 4.4 are N/A.**

Footnote: 1 – BWST: Borated Water Storage Tank

Op Test No.:	NRC	Scenario #	3	Event #	1	Page	20	of	51

Event Description: BWST level lowers (TS)

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**T.S. 3.3.1.1.a:** **The Borated Water Storage Tank (BWST) shall contain a minimum of 350,000 gallons of water having a minimum concentration of 2,500 ppm boron at a temperature not less than 40°F.** **If the BWST volume is not within limits, restore the BWST to OPERABLE within one hour. Specification 3.0.1 applies.** **T.S. 3.0.1:** **When a Limiting Condition for Operation is not met, except as provided in action called for in the specification, within one hour action shall be initiated to place the unit in a condition in which the specification does not apply by placing it, as applicable, in:** **1. At least HOT STANDBY within the next 6 hours.**
EXAMINER NOTE:		**The crew may decide to commence with the power reduction IAW 1102-4. The steps are listed in later in the scenario guide. It is not desired to observe the power reduction prior to continuing on to the next event.**
EXAMINER NOTE:		**Once the Tech Spec is called, then GO TO Event 2.**

Footnote: 1 – BWST: Borated Water Storage Tank

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	21	of	51

Event Description: Inadvertant ESAS Actuation

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE EVENT 2.**
Indications Available:		**'B' Train ESAS Actuation indications on PCR and CR, MU-P-1C running, HPI flow to the RCS indicated, RB Emergency Cooling in operation, MAP alarms.**
	Crew	Diagnoses the Inadvertent ES using RCS pressure and RB pressure indications.
	CRS	Directs entry into OP-TM-AOP-046, Inadvertent ESAS
		OP-TM-AOP-046, Inadvertent ESAS
	URO	Step 2.1 (IMA): DEFEAT invalid ESAS signals by pressing the "B" 1600# manual Defeat pushbuttons, verifying the defeat lights are lit, the actuated lights are not lit, overhead ES alarms are clear, and the blue status lights are clear (CR).
	URO	Step 2.2 (IMA): STOP Makeup Pumps not required for seal injection (MU-P-1C) by turning the control switch counter-clockwise, verifying the green light is lit and the red light is not lit (CR).
	URO	Step 2.3 (IMA): Throttles MU-V-16s with HPI flow (MU-V-16C and MU-V-16D) to minimize and maintain MU Pump flow > 115 gpm (CR).
	ARO	Step 3.1: Announces entry into OP-TM-AOP-046, Inadvertent ESAS Actuation over the plant page and radio

Footnote:
1 – MU-P-1C: "C" Makeup Pump
2 – MU-V-16C: "B" Train High Pressure Injection Control Valve
3 – MU-V-16D: "B" Train High Pressure Injection Control Valve

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	22	of	51

Event Description: Inadvertant ESAS Actuation

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Step 3.2 is N/A.**
	URO	Step 3.3: Ensures MU-V-36 is Open by the red open light lit and the green closed light not lit (CC).
	URO	Step 3.3: Ensures MU-V-37 is Open by pressing the open pushbutton, verifying that the valve open light is lit and the valve closed light is not lit (CC).
EXAMINER NOTE:		**Step 3.4 is N/A.** **Steps 3.5 through 3.7 are IAAT statements that are expected to remain N/A for the duration of the scenario.**
	URO	Step 3.8: Verifies that MU-V-36 and MU-V-37 are Open by the red open light lit and the green closed light not lit for each valve (CC).
	URO	Step 3.9: Determines that MU-V-77A&B are Open, then performs the following: • ENSURE MU-V-16A is Closed by the red open light not lit and the green closed light lit (CC).
	URO	Step 3.9: Determines that MU-V-77A&B are Open, then performs the following: • ENSURE MU-V-16B is Closed by the red open light not lit and the green closed light lit (CC).

Footnotes:
1 – MU-V-36: Makeup Pump Recirculation Valve
2 – MU-V-37: Makeup Pump Recirculation Valve
3 – MU-V-16A: "A" Train High Pressure Injection Control Valve
4 – MU-V-16B: "A" Train High Pressure Injection Control Valve
5 – MU-V-77A: MU-P-1A/B Discharge Header Cross Connect Valve
6 – MU-V-77B: MU-P-1A/B Discharge Header Cross Connect Valve

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	23	of	51

Event Description: Inadvertant ESAS Actuation

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Steps 3.10 and 3.11 are N/A.**
	URO	Step 3.12: Determines that the unit is at power, then perform the following: • Ensures that MU-V-14A is closed by verifying that the green closed light is lit and the red open light is not lit (CC).
	URO	Step 3.12: Determines that the unit is at power, then perform the following: • Ensures MU-V-14B is closed by pressing the closed pushbutton and verifying that the green closed light is lit and the red open light is not lit (CC).
EXAMINER NOTE:		**Step 3.13 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**
	ARO	Step 3.14: Determines that the unit is at power, then ensures two Secondary River pumps running as evidenced by the red running lights lit and the green secured lights not lit (CL).
	ARO	Step 3.15: Initiates an alarm review.
EXAMINER NOTE:		**The actions for OP-TM-211-950, Restoration of Letdown Flow, are listed beginning on page 25.**
	CRS	Step 3.16: Initiates OP-TM-211-950, "Restoration of Letdown Flow."

Footnotes: 1 – MU-V-14A: "A" Train Makeup Pump Suction From BWST
2 – MU-V-14B: "B" Train Makeup Pump Suction From BWST

Op Test No.: NRC	Scenario # 3	Event # 2	Page 24 of 51
Event Description:	Inadvertant ESAS Actuation		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Step 3.17 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**
	CRS	Step 3.18: Reviews Tech Specs for ES operability impact.
	CRS	Declares a 72 hour Tech Spec IAW either 3.5.1.1 or 3.5.1.3, and Table 3.5-1 For ESAS Operability requirements.

EXAMINER NOTE:

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.

3.5.1.3 In the event the number of protection channels operable falls below the limit given under Table 3.5-1, Column "A", operation shall be limited as specified in Column "C". Specification 3.0.1 applies.

Table 3.5-1 (Instruments Operating Conditions)

C. Engineered Safety Features

Functional Unit	Min Operable Channels	Min Degree of Redundancy
Manual Pushbutton	**2**	**N/A**

(g) The Operability requirement is for the manual actuation switch for the specified feature on each train to be OPERABLE.

1. If the manual actuation switch on one train is inoperable, restore the switch to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 6 hours.

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	25 of 51
Event Description:	Inadvertant ESAS Actuation						

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Step 3.19 is a WHEN statement that is expected to remain N/A for the duration of the scenario.**
		OP-TM-211-950, Restoration of Letdown Flow
	ARO	Step 3.2.1: Limitation: To prevent letdown cooler leakage caused by thermal stress, the rate of change of letdown flow should be limited to 2.5 GPM/Min. If letdown flow indication is not available, then maximum open position of MU-V-5 is 50% or MU-V-98 ½ turn. Open valve from closed to the maximum open position gradually over at least a 20 minute period.
	ARO	Step 3.3.1: VERIFY ICCW flow > 550 GPM.
	ARO	Step 3.3.2: VERIFY the following valves are Open: – IC-V-2 – IC-V-3 – IC-V-4
	URO	Step 3.3.3: VERIFY any of the following: – ESAS defeated. – ESAS did not actuate. – AOP-046 was entered.
	URO	Step 3.3.4: VERIFY ICCW cooler outlet temperature < 100°F.

Footnote:
1 – MU-V-5: Letdown Flow Control Bypass Valve
2 – IC-V-2: Intermediate Closed Cooling Water from Reactor Building Isolation Valve
3 – IC-V-3: Intermediate Closed Cooling Water from Reactor Building Isolation Valve
4 – IC-V-4: Intermediate Closed Cooling Water to WDL-C-1, Reactor Coolant Pumps, MU-C-1A/B

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	26	of	51

Event Description: Inadvertant ESAS Actuation

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.3.5: VERIFY all CRD stator temperatures < 160°F or reactor is shutdown.
	URO	Step 3.3.6: If RM-L-1 alarmed or ESAS actuated, then VERIFY the following: - Integrity of letdown line to MU-T-1 has been assessed. - RM-G-22 & 23 do not indicate excessive RCS activity. - RM-A-6, RM-A-8, or portable radiation monitors are in service to detect any release that may result from opening containment isolation valves. - ED/SM has given permission to re-open containment isolation valves.
EXAINER NOTE:		**Steps 4.1 through 4.4 are N/A.**
	ARO	Step 4.5: ENSURE the following valves are Closed: - MU-V-3 by the red open light lit and the green closed light not lit (CC). - MU-V-4 by the red open light lit and the green closed light not lit (CC). - MU-V-5 by, at the MU-V-5 Bailey Control Station, rotating the control knob fully clockwise and verifying that the position indicator indicates zero (CC).
EXAMINER NOTE:		**Step 4.6 is N/A.**

Footnotes:
1 – MU-V-3: RCS Letdown Reactor Building Isolation Valve
2 – MU-V-4: Letdown Orifice Isolation Valve
3 – MU-V-5: Letdown Flow Control Bypass Valve

Op Test No.:	NRC	Scenario #	3	Event #	2	Page	27	of	51

Event Description: Inadvertant ESAS Actuation

Time	Position	Applicant's Actions or Behavior
	ARO	Step 4.7: ENSURE the following are Open: - MU-V-1A by the red open light lit and the green closed light not lit (CC). - MU-V-1B by the red open light lit and the green closed light not lit (CC).
EXAMINER NOTE:		**Step 4.8.1 is N/A.**
	ARO	Step 4.8.2: ENSURE the following are Open: - MU-V-2A by taking the control switch to open (PCR), verifying red light is lit, green light is not lit (PCR and CC) - MU-V-2B by taking the control switch to open (PCR), verifying red light is lit, green light is not lit (PCR and CC)
EXAMINER NOTE:		**Steps 4.8.3 through 4.9.1 are N/A.**
	ARO	Step 4.9.2: Determines that MU-V-5 is remotely operable, and places MU-V-5 to 10% Open by turning the control knob counter-clockwise and verifying that the position indicator indicates 10% (CC).
	ARO	Step 4.10: Ensures MU-V-8 is aligned to the THRU position (CC).

Footnotes:
1 – MU-V-5: Letdown Flow Control Bypass Valve
2 – MU-V-8: Letdown Split Valve to Makeup Tank or Reactor Coolant Bleed Tank
3 – MU-V-2A: "A" Letdown Cooler Outlet Isolation Valve
4 – MU-V-2B: "B" Letdown Cooler Outlet Isolation Valve
6 – MU-V-1A: "A" Letdown Cooler Inlet Isolation Valve
6 – MU-V-1B: "B" Letdown Cooler Inlet Isolation Valve

Op Test No.: NRC	Scenario # 3	Event # 2	Page 28 of 51
Event Description:	Inadvertant ESAS Actuation		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Steps 4.11.1 through 4.11.3 are N/A.**
	ARO	Step 4.11.4: Ensures MU-V-3 is Open by pressing the open pushbutton and verifying that the valve open light is lit and the valve closed light is not lit (CC).
EXAMINER NOTE:		**Step 4.11.5 is N/A.** **Steps 4.12 and 4.13 are not expected to be actionable steps.** **Steps 4.14.1 and 4.14.2 are N/A.**
	ARO	Step 4.14.3: Raise letdown flow at < 2.5 gpm/min to desired flow as follows: Throttle MU-V-5 by dialing up the control knob in the open demand direction (CC)
EXAMINER NOTE:		**After the Tech Spec call is made and MU-V-5 is ≥20% DEMAND, then GO TO Event 3.**

Footnotes: 1 – MU-V-3: RCS Letdown Reactor Building Isolation Valve
2 – MU-V-5: Letdown Flow Control Bypass Valve

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	29	of	51

Event Description: Tc Instrument Failure (High)

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE EVENT 3.**
Indications Available:		**Tc indication offscale high, Digital Tave indicator rising, multiple MAP alarms, Control Rod movement inward.**
EXAMINER NOTE:		**The crew may decide to perform OP-TM-MAP-H0302. Those steps can be found on page 50 of this Scenario.**
	Crew	Diagnoses the Tc Instrument failure.
	CRS	Directs entry into OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	URO	Step 2.1 (**IMA**): Places the Diamond Station in MAN by pressing the "Auto/Manual" pushbutton (CC) on the diamond panel and observing the Manual light lit and the auto light not lit, and INSERT control rods as necessary to reduce power below Reactor power limit and for gross balance with total FW flow.
	URO/ARO	Step 2.2 (**IMA**): Places SG A FW Demand and SG B FW Demand ICS Stations in HAND by pressing the HAND pushbuttons on each ICS Station and verifying the white HAND lights are lit and the red AUTO lights are not lit on the selected ICS stations (CC).
	URO	Step 2.3 (**IMA**): Verifies Turbine Header Pressure is between 835 and 935 psig as read on the Turbine Header Pressure digital indication (CL)

Op Test No.: NRC	Scenario # 3	Event # 3	Page 30 of 51
Event Description:	Tc Instrument Failure (High)		

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.4 (**IMA**): Verifies RCS Pressure is lowering and/or less than 2205 PSIG by observing RCS pressure meters (CC and PC). As required, if RCS Pressure is >2205 psig: Places RC-V-1 control in Manual (CC), opens RC-V-1 fully by pressing the open pushbutton and observing the red open light lit and the green closed light not lit (CC), and then places RC-V-1 control back to AUTO.
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.1 and 3.2 are IAAT's that should not be applicable during this Event.**
	CRS	Step 3.3: Verifies the Main Turbine is reset by observing it on-line (CL).
	CRS	Step 3.4: Assigns manual control responsibilities and control bands as follows:
	URO	Inserts or withdraws control rods to maintain Reactor power within 1% of current power level by operating the manual Control Rod control handle on the Diamond Panel as applicable (CC).
	ARO	Adjust FW Flow to maintain Tavg within 2 °F of current temperature by adjusting SG A and SG B FW Demand Station toggle switches as applicable (CC). Maintain Turbine Hdr Pressure within 10 psig of current pressure by adjusting Turbine Load Set Station demand as applicable (CL).
	ARO	Step 3.5: Makes scripted announcement.
	URO	Step 3.6: If Reactor power has been reduced > 3%, then INITIATE 1102-4, "Power Operations," actions for power reduction.

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	31	of	51

Event Description: Tc Instrument Failure (High)

Time	Position	Applicant's Actions or Behavior
	URO	Step 3.7: ENSURE the following ICS stations are in HAND. - SG/Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. - Reactor Demand by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. - SG A/B Load Ratio by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out and ADJUST FW Flow to stabilize Tavg at the current RCS temperature. - ULD
	ARO	Step 3.8: VERIFY both of the following: - Operating MFW Pumps are controlling FW Valve dP greater than 30 psid. - Reactor power is greater than 75%.
EXAMINER NOTE:		**Step 3.9 is N/A.** **Step 3.10 has already been verified.**
	ARO	Step 3.11: MAINTAIN RCS pressure between 2105 and 2205 psig and slowly ADJUST feedwater flow to control RCS Tavg 578 to 580 °F.
	ARO	Step 3.12: MAINTAIN RCS Tavg 578 to 580°F and slowly ADJUST loop feedwater flows to control RCS $\Delta Tc < 5°$ F.
EXAMINER NOTE:		**OP-TM-AOP-070, steps 3.13 and 3.14 are N/A.**

Op Test No.:	NRC	Scenario #	3	Event #	3	Page	32	of	51

Event Description: Tc Instrument Failure (High)

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Once OP-TM-AOP-070 actions have been completed and the plant is stabilized, then GO TO Event 4.**

Op Test No.:	NRC	Scenario #	3	Event #	4	Page	33	of	51
Event Description:	RCP #1 Seal Leak								

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 4.**
Indications Available:		**RC Pump #1 seal leakoff flow > 6 gpm PPC, RCDT level rising.**
	ARO	Diagnoses RC-P-1C Seal Leakoff excessive.
	CRS	Directs entry into OP-TM-AOP-040, RCP #1 Seal Failure.
		OP-TM-AOP-040, RCP #1 Seal Failure
EXAMINER NOTE:		**Step 3.1 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**
	URO	Step 3.2: Maximizes seal injection flow not to exceed 60 gpm by pressing the white Hand pushbutton on the MU-V-32 Bailey Control Station, verifying the white Hand light lit and the red Auto light not lit, then adjusting the toggle switch in the upward direction to maximize seal injection (CC).
	CRS	Step 3.3: Initiates 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
		1102-4, Power Operations
	CRS	Step 3.3.2.A.2.c): Recognizes that SG/REACTOR DEMAND is in HAND, and has the URO REDUCE reactor power IAW OP-TM-621-471 "ICS Manual Control"

Footnote: 1 – MU-V-32: Reactor Coolant Pump Seal Injection Control Valve

Op Test No.:	NRC	Scenario #	3	Event #	4	Page	34	of	51
Event Description:	RCP #1 Seal Leak								

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The next step is the reactivity manipulation for the scenario.**
		OP-TM-621-471, ICS Manual Control
	URO	Step 4.2.4: If necessary to maintain reactor power or control rods within limits or if a power change is being conducted IAW 1102-4, then ADJUST SG/REACTOR DEMAND as follows: • 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%. • If rapid power reduction is required, then LOWER as necessary to achieve desired reactor power level and ENSURE FW flow controlled within limits by lowering and/or raising on the SG/REACTOR DEMAND toggle switch (CC) as necessary.
EXAMINER NOTE:		**The ARO will control feedwater manually during the power reduction.**
		OP-TM-AOP-070, PRIMARY TO SECONDARY HEAT TRANSFER UPSET
	ARO	Step 3.10 and 3.11: Maintains RCS pressure between 2105 and 2205 psig, controls RCS Tavg 578 to 580 °F, and controls RCS ΔTc < 5° F by adjusting SG A and SG B FW Demand Station toggle switches as applicable.
EXAMINER NOTE:		**Once sufficient reactivity manipulation is observed, then GO TO Event 5.**

Op Test No.:	NRC	Scenario #	3	Event #	5	Page	35	of 51
Event Description:	RCP #1 Seal Failure							

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by the Lead Examiner INITIATE EVENT 5.**
Indications Available:		**RC Pump #1 seal leakoff flow > 8 gpm PPC, RCDT level rising.**
	Crew	Diagnoses the rise in RC-P-1A Seal Leakoff.
		OP-TM-AOP-040, RCP #1 Seal Failure
	CRS	Step 3.1: Determines that RC Pump #1 seal leakoff flow > 8 gpm and verifies that Reactor power will not challenge RPS limit when RCP is shutdown.
	URO	Step 3.1: Determines that RC Pump #1 seal leakoff flow > 8 gpm and trips RC-P-1A.
	URO	Step 3.5: Verifies that the affected RCP stops rotating by observing no further vibrations on the Vibration Monitor Panel (PCL), then closes MU-V-33A by pressing the close pushbutton and verifying the green closed light lit and the green open light not lit (CC).
EXAMINER NOTE:		**Once RC-P-1A is secured, then GO TO Event 6.**

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	36	of	51

Event Description: Isolable Steam Leak in the RB

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When Reactor Power is greater than 40% and when directed by the Lead Examiner INITIATE EVENT 6.**
Indications Available:		**Lowering Generated MWe, Lowering Tave, Reactor Power rising**
EXAMINER NOTE:		**If Reactor Power is not greater than 40%, then have the Shift Manager direct a power ascension to 70%.**
BOOTH CUE:		**Report, as Auxiliary Operator, "There is a large steam leak on the North Side of the Turbine Building. Specific location is unknown.**
	Crew	Diagnoses the steam leak
	CRS	Announces entry into OP-TM-AOP-051, Secondary Side High Energy Leak.
		OP-TM-AOP-051, Secondary Side High Energy Leak
	ARO	Step 3.1: ANNOUNCE entry into OP-TM-AOP-051, "Secondary Side High Energy Leak" and to evacuate affected area over the plant page and radio.
	URO	Step 3.2: MAINTAIN reactor power < 100%.
EXAMINER NOTE:		**Steps 3.3 through 3.5 are IAAT statements that are expected to remain N/A for the duration of the scenario.**
BOOTH CUE:		**As Shift Manager, acknowledge the request to evaluate EAL's.**
	CRS	Step 3.6: REQUEST SM to evaluate EALs.

Op Test No.:	NRC	Scenario #	3	Event #	6	Page	37	of	51

Event Description: Isolable Steam Leak in the RB

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Steps 3.7 and 3.8 are N/A**
	CRS	Step 3.9: If leak is in Turbine Building, then GO TO Section 6.0
		SECTION 6.0, TURBINE BUILDING
	CRS	Step 6.1: CONSIDER evacuating the following: - Operations Office Building using the back stairwell. - Telephone Equipment Room in the Service Building.
EXAMINER NOTE:		**There is a procedure note that states that the crew can perform isolation of A and B side of the Turbine Bldg in any order. If the crew performs the "B" side first (Step 6.3), the actions are similar to Step 6.2 but are not scripted here.**
BOOTH CUE:		**When requested by the Control Room to report the status of the steam leak following closure of MS-V-5A, report "The steam leak IS isolated.** **When requested by the Control Room to report the status of the steam leak following closure of MS-V-5B, report "The steam leak IS NOT isolated".**
	ARO	Step 6.2.1: If power >40% or FW-P-1B is tripped, then determine if leak is downstream of MS-V-5A by performing the following: • CLOSE MS-V-5A

Footnote: 1 – MS-V-5A: Main Steam Supply to "A" MFP Turbine.
2 – MS-V-5B: Main Steam Supply to "B" MFP Turbine.
3 – FW-P-1B: "B" Main Feedwater Pump

Op Test No.: NRC	Scenario # 3	Event # 6	Page 38 of 51
Event Description:	Isolable Steam Leak in the RB		

Time	Position	Applicant's Actions or Behavior
	ARO	Step 6.2.2: If power >40% or FW-P-1B is tripped, then determine if leak is downstream of MS-V-5A by performing the following: • If steam leak is isolated, then GO TO Section 7.0
EXAMINER NOTE:		**Once the leak is isolated and plant is stable, then GO TO Event 7.**

Footnote: 1 – MS-V-5A: Main Steam Supply to "A" MFP Turbine.

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	39	of	51

Event Description: RCS LOCA

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 7.**
Indications Available:		**Multiple Main Annunciators in alarm, RSC Pressure lowering, Pressurizer level lowering, Makeup Tank level lowering, ESAS actuation, Reactor Building Pressure rising, RB sump level rising.**
	Crew	Diagnoses the LOCA
	CRS	Announces entry into OP-TM-AOP-050, Reactor Coolant Leakage
		OP-TM-AOP-050, Reactor Coolant Leakage
	ARO	Step 3.1: Announces entry into OP-TM-AOP-050, "Reactor Coolant Leakage" and the location of the leak (if known) over the plant page and radio.
	URO	Step 3.2: Initiates OP-TM-EOP-010, Guide 9, "RCS Inventory Control".
		OP-TM-EOP-010, GUIDE 9, RCS Inventory Control
	URO	Step C.1: Verify MU Pump is operating by the red running light lit and the green secured light not lit on MU-P-1B (CR).
	URO	Step C.2: Ensure MU-V-5 is closed by, at the MU-V-5 Bailey Control Station, rotating the control knob fully clockwise and verifying that the position indicator indicates zero (CC).
	URO	Step C.3: Verifies MU24-FI >20 gpm (CC).

Footnotes: 1 – MU-P-1B: "B" Makeup Pump.
2 – MU-V-5: Letdown Flow Control Bypass Valve
3 – MU24-FI: Normal Makeup Narrow Range Flow Indicator

Op Test No.:	NRC	Scenario #	3	Event #	7	Page	40	of	51

Event Description: RCS LOCA

Time	Position	Applicant's Actions or Behavior
	URO	Step C.4: Ensures MU-V-17 is open by the indicator showing open on the MU-V-17 Bailey Control Station (CC).
	URO	Step C.5: Verify Pressurizer Level is being restored. **RNO:** Throttles MU-V-217 by pressing the open pushbutton (CC), verifying valve open light is lit and valve closed light not lit.
	URO	Step C.6: Verifies MU24-FI >20 gpm (CC).
	URO	Step C.7: Verify Pressurizer Level is being restored. **RNO:** Closes MU-V-3 by pressing the close pushbutton (CC), verifying valve closed light is lit and valve open light not lit.
	URO	Step C.8: Verify Pressurizer Level is being restored. **RNO:** Initiates HPI IAW OP-TM-211-901, "Emergency Injection HPI/LPI" by pressing manual ES pushbuttons (CC and CR)
	CRS	Step 3.3: Determines that HPI is required to maintain Pressurizer level, and goes to OP-TM-EOP-001, "Reactor Trip".
		OP-TM-EOP-001, Reactor Trip
	URO	Step 2.1 (**IMA**): Presses Both Reactor Trip and DSS pushbuttons (CC).

Footnotes:
1 – MU24-FI: Normal Makeup Narrow Range Flow Indicator
2 – MU-V-17: Normal Makeup to RCS Control Valve.
3 – MU-V-217: High Capacity Normal Makeup Valve.
4 – MU-V-3: RCS Letdown Reactor Building Isolation Valve.

Op Test No.: NRC	Scenario # 3	Event # 7	Page 41 of 51
Event Description:	RCS LOCA		

Time	Position	Applicant's Actions or Behavior
	URO	Step 2.2 (**IMA**): Verifies that the reactor is shutdown by one of the following: - Power Range nuclear instrumentation indicates less than 5% (CC) - All control rods are inserted (PC) - Source Range count rate is continuously lowering (CC)
	URO	Step 2.3 (**IMA**): Presses the Turbine Trip pushbutton (CL).
	URO	Step 2.4 (**IMA**): Verifies the Turbine Stop valves are closed by observing the indication on CL.
	ARO	Step 3.1: Performs a Symptom Check and recognizes that no symptoms exist at this time.
EXAMINER NOTE:		**Once the symptom check has been performed, then GO TO Event 8.**

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	42	of 51

Event Description: NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure

Time	Position	Applicant's Actions or Behavior
BOOTH CUE:		**When directed by the Lead Examiner INITIATE Event 8.**
Indications Available:		**Lowering level on NSCCW Surge tank indicators (LI-800/801 on CC), Annunciators AA-1-2 and F-2-1 in alarm (if cleared), and/or PPC alarm L2790.**
	Crew	Diagnoses the loss of Nuclear Services Closed Cooling Water (NSCCW).
EXAMINER NOTE:		**Alarm response F-1-8 alarms at 1.6 feet in the NSCCW Surge Tank.**
	CRS	Directs entry into OP-TM-MAP-F0108, NS SURGE TANK LEVEL HI/LO
		OP-TM-MAP-F0108, NS SURGE TANK LEVEL HI/LO
	CRS	Step 4.1: Determines that NS-T-1 level is less than 1.6 ft. and lowering (LI-800/801 on CC), and initiates OP-TM-AOP-031, "Loss of NS Component Cooling".
		OP-TM-AOP-031, Loss of Nuclear Services Component Cooling
	ARO	Step 3.1: Announces the following over the plant page and radio: "Entering AOP-031, Loss of Nuclear Services Component Cooling. Tripping the reactor and initiating Emergency Feedwater."

Footnotes: 1 – RC-P-1A: "A" Reactor Coolant Pump
2 – NS-T-1: Nuclear Services Closed Cooling Water Surge Tank
3 – LI-800: Nuclear Service Closed Cooling Surge Tank Level Indicator
4 – LI-801: Nuclear Service Closed Cooling Surge Tank Level Indicator

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	43	of 51

Event Description: NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Step 3.2 has already been accomplished.**
	URO	Step 3.3: Shuts down all Reactor Coolant Pumps (RC-P-1A-D) by rotating the Control Switch for each pump in the counter-clockwise direction and verifying green flag indicated, green light lit, red light not lit for each pump (CC) and loop low flow Main Annunciators in alarm for each loop, as well as verifying that an Oil Lift pump and Backstop Oil pump running by red light on, green light off for each pump (CC).
	URO	Step 3.4.1: Places NS-P-1A and NS-P-1C in Pull-to-Lock by rotating the Control Switch for each pump in the counter-clockwise direction full and by simultaneously pulling upward on the switch until locked in an elevated position, verifying by black flag indicator, and the red, green, and amber lights not lit for each pump (CC and CR).
BOOTH CUE:		**If directed, as an Auxiliary Operator to close IA-V-49 and open NS-V-100, acknowledge the order. No action is required for the scenario.**
	ARO	Step 3.4.2 and 3.4.3: Directs an Auxiliary Operator to close IA-V-49, located in FHB 348: west wall by NS-T-1, and to open NS-V-100, located in FHB 348: On top of NS-T-1.
EXAMINER NOTE:		**Step 3.5 is an IAAT statement that is expected to remain N/A for the duration of the scenario.**

Footnote:
1 – RC-P-1A-D: "A" through "D" Reactor Coolant Pumps
2 – NS-P-1A: "A" Nuclear Service Closed Cooling Pump
3 – NS-P-1B: "B" Nuclear Service Closed Cooling Pump
4 – IA-V-49: Nuclear Services Closed Cooling Water Surge Tank Instrument Air Isolation Valve.
5 – NS-V-100: Nuclear Service Closed Cooling Water Surge Tank Vent Valve.
6 – NS-T-1: Nuclear Service Closed Cooling Water Surge Tank.

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	44	of	51

Event Description: NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The following steps will start MU-P-1A and secure MU-P-1B. MU-P-1B is cooled by NSCCW only, which has been lost. MU-P-1A has a backup cooling supply (Decay Heat Removal System).**
	URO/ARO	Step 3.6.1: Determines that MU-P-1A is available and that both MU-V-77A and MU-V-77B are open, and then starts DC-P-1A by rotating the Control Switch in the clockwise direction and verifying red flag indicator, red light lit, green light not lit (CC).
	URO/ARO	Step 3.6.2: Starts MU-P-1A by rotating the Control Switch in the clockwise direction and verifying red flag indicator, red light lit, green light not lit (CC).
	URO/ARO	Step 3.6.3: Places MU-P-1B in Pull-to-Lock by rotating the Control Switch in the counter-clockwise direction full and by simultaneously pulling upward on the switch until locked in an elevated position, verifying by black flag indicator, and the red, green, and amber lights not lit (CR).
	URO/ARO	Step 3.6.4: Starts DR-P-1A by rotating the Control Switch in the clockwise direction and verifying red flag indicator, red light lit, green light not lit (CC).

Footnotes:
1 – MU-P-1A: "A" Train ESAS selected Makeup Pump.
2 – MU-V-77A and MU-V-77B: "A" and "B" Makeup Pump Discharge Header Cross-Connect Valve.
3 – DC-P-1A: "A" Decay Closed Cooling Pump.
4 – MU-P-1B: "B" Makeup Pump.
5 – DR-P-1A: "A" Decay River Water Pump.

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	45	of	51

Event Description: NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**HSPS not feeding the OTSG's with EFW to 50% is addressed in one of two ways. The scripted path is via OS-24, Conduct of Operations for Abnormal and Emergency Events. Alternately, the ARO may perform OP-TM-424-901, Emergency Feedwater, Step 4.2.8.1. This second method accomplishes the same goal but uses only 2 EF-V-30 valves instead of all 4. The ARO needs to perform only one of the two actions.**
EXAMINER NOTE:		**IAW OS-24, Conduct of Operations During Abnormal and Emergency Events, Section 4.2 Actions Not Described in Procedures:** **A. Licensed operators may take action without procedural guidance, and without taking a variance under the following conditions.** - **Action taken to directly compensate for the failure of an automatic system.**
CT-10	ARO	Recognizes that "A" and "B" OTSG levels are lower than setpoint (50%-85%) and/or that EF-V-30A-D are closed, and performs the following IAW OS-24: - Places the EF-V-30A-D controllers in Manual control by pressing the manual pushbutton for each controller and verifying that the manual lights are lit and the auto lights are not lit for each controller (CL and CL). - Throttles EF-V-30A-D by placing each valve's manual control stick to the right and verifying flow through the EFW indicators (CL and CC). Alternately, the ARO may perform the following: - Places the control setpoints switches in manual on the EF-V-30A-D controllers (CL and CC). - Dials the setpoint handwheels as necessary on the EF-V-30A-D controllers (CL and CC).

Footnotes: 1 – EF-V-30A/D:EFW Control Valves to "A" OTSG
2 – EF-V-30B/C:EFW Control Valves to "B" OTSG

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	46 of 51
Event Description:	NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure						

Time	Position	Applicant's Actions or Behavior
		OP-TM-EOP-010 Guide 10, "Natural Circulation"
CT-12	ARO	IAAT all RCPs are off, then A If all of the following conditions exist, then adequate natural circulation is present: - RCS Thot minus Tcold stabilizes at less than 50 °F. - THOT < 600 °F. - Incore temperature stabilizes and tracks Thot. - Cold leg temperatures approach saturation temperature for secondary side pressure. - OTSG heat removal is indicated by feeding or steaming with stable OTSG pressure. - SCM > 25°F.
		OP-TM-EOP-010, RULE 2, HPI THROTTLING
EXAMINER NOTE:		**Steps A.1 and A.32 conditions are met.**
		Step A.3: VERIFY a RCP is ON. RNO: If incore temperature is lowering, then THROTTLE HPI IAW OP-TM-211-901, "Emergency Injection (HPI / LPI)" to MINIMIZE SCM.
		OP-TM-211-901, EMERGENCY INJECTION (HPI/LPI)
CT-5	URO	Att. 7.3, Step 1: Defeats ESAS signals by pressing the defeat pushbuttons (manual and/or automatic signals as required).
CT-5	URO	Att 7.3, Step 2: Determines that three MU pumps are running and obtains CRS concurrence, then SHUTDOWN the ES selected pump lined up to MU & SI and PLACE Control Switch in Normal-After-Stop. (e.g., normally MU-P-1A).

Footnote: 1 – MU-P-1A: "A" Train ESAS selected Makeup Pump.

Op Test No.: NRC	Scenario # 3	Event # 8/9	Page 47 of 51
Event Description:	NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure		

Time	Position	Applicant's Actions or Behavior
CT-5	URO	Att. 7.3, Step 3/4: 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: • Obtains CRS concurrence to throttle HPI. • Determines that DH-V-7A and DH-V-7B are closed, and opens MU-V-36 and MU-V-37 by pressing the open pushbutton and observing the open light lit and the closed light not lit for each(CC).
EXAMINER NOTE:		**Step 5 may be performed, but is not the priority. Guide 9 is initiated already, so the step is met, but it is important to move on and throttle HPI.** **Step 6 is N/A.**
CT-5	URO	Att. 7.3, Step 7: Closes two 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) by pressing the closed pushbutton for two MU-V-16 valves and verifying that the closed light is lit and the open light is not lit for each of the two valves.
CT-5	URO	Att. 7.3, Step 8: Throttle open the MU-V-16 opposite of MU and SI (MU-V-16C or MU-V-16D) by pressing the close, open, and stop pushbuttons as necessary to provide adequate HPI makeup flow.

Footnotes:
1 – DH-V-7A: "A" Decay Heat Cooler Outlet to MU Pump Suction Valve.
2 – DH-V-7B: "B" Decay Heat Cooler Outlet to MU Pump Suction Valve.
3 – MU-V-36: MU-P-1A/B/C Recirc Isolation Valve.
4 – MU-V-37: MU-P-1A/B/C Recirc Isolation Valve.
5 – PORV: Pressurizer Pilot Operated Relief Valve.
6 – MU-V-16A: "A" HPI Control Valve.
7 – MU-V-16C: "C" HPI Control Valve.
8 – MU-V-16D: "D" HPI Control Valve.

Op Test No.:	NRC	Scenario #	3	Event #	8/9	Page	48 of 51
Event Description:	NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure						

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The following CT-5 steps to throttle HPI will only be performed if HPI flow is still excessive. IF HPI is no longer excessive, the following steps are not required prior to scenario termination.**
CT-5	URO	Att. 7.3, Step 9: If two MU pumps are operating, then when flow is reduced to one MU-V-16: 2. If two MU pumps are operating, then SHUTDOWN the ES selected pump and PLACE Control Switch in Normal-After-Stop (MU-P-1C) by rotating the Control Switch counter-clockwise, observing that the green indicator flag is visible, the green off light is lit, the red running light is not lit, and amps are zero (CR)
EXAMINER NOTE:		**Step 10 is N/A.**
CT-5	URO	Att. 7.3, Step 11: THROTTLE MU-V-16 parallel to MU and SI (MU-V-16A or MU-V-16B) by pressing the close, open, and stop pushbuttons as necessary to provide adequate HPI makeup flow.
BOOTH CUE:		**Role play as Shift Manager, as requested, and give permission to open MU-V-18.**
	URO	Att. 7.3, Step 12: Upon obtaining Shift Manager concurrence, determines that OP-TM-244-901 requirements are met and opens MU-V-18 by pressing the open pushbutton and observing the open light lit and the closed light not lit (CC).

Footnotes: 1 – MU-P-1C: "C" Makeup Pump.
2 – MU-V-16A: "A" HPI Control Valve.
3 – MU-V-16B: "B" HPI Control Valve.
4 – MU-V-18: Normal Makeup Reactor Building Isolation Valve.

Op Test No.: NRC	Scenario # 3	Event # 8/9	Page 49 of 51
Event Description:	NSCCW Rupture, Loss of NSCCW, HSPS Setpoint Failure		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**Scenario can be terminated when HPI has been throttled, Natural Circulation has been verified, and the OTSG's are being maintained >50% in the Operating Range.**

Follow-up question highest event entered during scenario?

Answer: FA1, RCS2.a.1

FA1 - Reactor Coolant System - Loss

EAL Threshold Values:

Op Test No.:	NRC	Scenario #	3	Event #	3 (Alt)	Page	50	of	51

Event Description: Tc Instrument Failure (High) Alt Actions

Time	Position	Applicant's Actions or Behavior
Examiner Note: The crew may decide to perform OP-TM-MAP-H0302 for Event 3.		
		OP-TM-MAP-H0302
	INFO	If plant control is not stable or Validity of selected instrument is unknown or suspect, then PLACE affected stations in Hand IAW associated manual operations procedures to balance plant parameters.
		OP-TM-621-471, ICS Manual Control
	URO	ENSURE ULD in HAND.
	URO	If SG/REACTOR Station is being placed in HAND to support a planned activity, then VERIFY reactor power is less than 2558 MWth (99.6%).
	URO	PLACE SG/REACTOR DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	ENSURE control rod position does not change.
	URO	VERIFY alarm H-2-1 "ICS in Track" In.
	URO	PLACE SG A/B LOAD RATIO (ΔTC) station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	PLACE SG A FW DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.
	URO	PLACE SG B FW DEMAND station in HAND by pressing the white "Hand" pushbutton (CC), verifying that the white "Hand" light is lit and the red "Auto" light goes out.

Op Test No.:	NRC	Scenario #	3	Event #	3 (Alt)	Page	51	of	51

Event Description: Tc Instrument Failure (High) Alt Actions

Time	Position	Applicant's Actions or Behavior
		OP-TM-MAP-H0302
	URO	DETERMINE which input is bad.
	INFO	ENSURE valid instrument selected IAW OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS.
		OP-TM-621-451, Selecting Alternate Instrument Inputs to ICS
	URO	ENSURE ULD in HAND IAW OP-TM-621-473, "ULD Manual Control".
	URO	COMPARE alternate inputs (using Attachment 7.3 of OP-TM-621-000, Integrated Control System or table in OP-TM-MAP-H0302 as necessary) and VERIFY both of the following: – Difference between affected and alternate channels are less than "SASS Setpoint Δs" as listed in OP-TM-MAP-H0302 Table. – Selecting alternate instrument will not affect ICS control or plant stability.
	URO	SELECT alternate instrument(s) with console PB by pressing the pushbutton for the valid Tc instrument input to ICS (CC), verifying that valid Tc selected instrument light is lit and the invalid Tc selected instrument light is not lit.
	URO	VERIFY plant stable.